

CITY AIRPORT DEVELOPMENT PROGRAMME (CADP)

# CADP: ENVIRONMENTAL STATEMENT VOLUME 1

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# CADP - Environmental Statement Volume 1

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# Glossary and Abbreviations

Acronym	Meaning
AOD	Above Ordnance Datum
AONB	Area of Outstanding Natural Beauty
APF	Aviation Policy Framework
APF	Aviation Policy Framework
AQAP	Air quality Action Plan
AQMA	Air Quality Management Area
ARSP	Airport Stand Replacement Project
ATC	Air Traffic Control
ATMs	Air Transport Movements
BAP	Biodiversity Action Plan
BOD	Biological Oxygen Demand
CA	Character Area
CAA	Civil Aviation Authority
CADP	City Airport Development Programme
CAH	City Aviation House
CCHP	Combined Cooling, Heating and Power
CE&D	Construction, Excavation and Demolition
CEMP	Construction Environmental Management Plan
CHP	Combined Heat and Power
CL:AIRE	Contaminated Land: Applications in Real Environments
CO <sub>2</sub>	Carbon Dioxide
DAS	Design and Access Statement
dB	Decibel
DBA	Desk Based Assessment
DEFRA	Department for Environment, Food and Rural Affairs
DfT	Department for Transport
DLR	Docklands Light Railways
DMP	Dust Management Plan
DSHE	Dock Source Heat Exchange

EMT	Emissions Factor Toolkit
EA	Environment Agency
EH	English Heritage
EIA	Environmental Impact Assessment
ELWA	East London Waste Authority
EPA	Environmental Protection Act
ES	Environmental Statement
ETE	Eastern Terminal Extension
EU	European Union
ExCeL	Exhibition and Conference Centre
FEGP	Fixed Electrical Ground Power
FRA	Flood Risk Assessment
FTE	Full-Time Equivalent
GDP	Gross Domestic Product
GHG	Greenhouse Gases
GiGL	Greenspace information for Greater London
GLA	Greater London Authority
GLHER	Greater London Historic Environment Record
GLVIA	Guidelines for Landscape and Visual Impact Assessment
GPA	Ground Power Unit
GVA	Gross Value Added
HDV	Heavy Duty Vehicles
HER	Historic Environment Records
HGV	Heavy Good Vehicles
HIA	Health Impact Assessment
HSE	Health and Safety Executive
IAQM	Institute of Air Quality Management
ICAO	International Civil Aviation Organisation
IEEM	Institute of Ecology and Environmental Management
HEMA	Institute of Environment Management
KGV Dock	King George V Dock
LAQM	Local Air Quality management

LBG	London Borough of Greenwich
LBN	London Borough of Newham
LBTH	London Borough of Tower Hamlets
LCACC	London City Airport Consultative Committee
LCY	London City Airport ("the Airport")
LDF	Local Development Framework
LEZ	Low Emission Zone
LIGS	Locally Important Geological Sites
LPA	Local Planning Authority
LPAs	Local Planning Authorities
LTO	landing and takeoff cycle
LVIA	Landscape and Visual Impact Assessment
M	Metres
mppa	Million Passengers Per Annum
NATS	National Air Traffic Services
NEC	Noise Exposure category
NNR	National Nature Reserves
NO <sub>2</sub>	Nitrogen Dioxide
NOMMS	Sound Insulation Scheme
NO <sub>x</sub>	Nitrogen Oxides
NPPF	National Planning Policy Framework
NTS	Non-Technical Summary
OBB	Out Bound Baggage
OIP	Operational Improvement Programme
OIP	Operational Improvement Programme
OS	Ordnance Survey
PIA	Personal Injury Accident
PM <sub>10</sub> and PM <sub>2.5</sub>	Fine Particles
PPG	Planning Policy Guidance
PPE	Personal Protective Equipment
PSZ	Public Safety Zone
RGB	Royal Borough of Greenwich

RIGS	Regionally Important Geological Sites
RoDMA	Royal Docks Management Authority
RVP	Rendezvous Point
SAC	Special Area of Conservation
SAM	Scheduled Ancient Monument
SBINC	Site of Borough Importance for Nature Conservation
SFRA	Strategic Flood Risk Assessment
SINC	Sites of Importance to Nature Conservation
SPA	Special Protection Area
SPZ	Source Protection Zone
SSSI	Site of Special Scientific Interest
SuDS	Sustainable Urban Drainage Systems
SWDS	Surface Water Drainage Strategy
TA	Transport Assessment
TVIA	Townscape and Visual Assessment
UDP	Unitary Development Plan
UEL	University of East London
UST	underground storage tank
VER	Valued Ecological Receptors
WHO	World Health Organisation
WTE	Western Terminal Extension
ZTV	Zone of Theoretical Visibility



Term	Meaning
Administrative Boundary	A limit or border of a geographic area under the jurisdiction of some governmental or managerial entity.
Air Noise	Refers to the noise pollution produced by any aircraft or its components, during various phases of a flight.
Air Transport Movements	Landings or take-offs of aircraft engaged on the transport of passengers, freight or mail on commercial terms. All scheduled movements, including those operated empty, loaded charter and air taxi movements are included.
Aircraft Movements	Any aircraft take-off or landing at an airport. These could be either commercial or non-commercial flights. For airport traffic purposes one arrival and one departure are counted as two movements.
Aircraft Stands	Parking position for an aircraft.
Airfield	An area of land set aside for the takeoff, landing, and maintenance of aircraft.
Airside	The side of an airport terminal from which aircraft can be observed; the area beyond security checks and passport and customs control.
Airside Road	Generally refer to the road situated between the aircraft stands and the terminal or pier building, used for airside traffic of service, operations, and airline vehicles.
Airside-Landside Boundary	The boundary between airside and landside subject to aviation security requirements that seeks to prevent movement of unauthorised bodies and/or goods between an unregulated area and the regulated area of the Airport development lying accessible only via the appropriate level of security screening.
Apron	That part of an airport, other than the manoeuvring areas intended to accommodate the loading and unloading of passengers and cargo, the refuelling, servicing, maintenance and parking of aircraft, and any movement of aircraft, vehicles and pedestrians necessary for such purposes. Also referred to as the 'Ramp'.
Arrivals Concourse	Landside area receiving arriving passengers who have emerged from the baggage reclaim or customs facilities, usually containing a 'meeters and greeters area' as well as retail and other support functions.
Arrivals Concourse Building	(Specific to the Airport) The southern-most building of the proposed Eastern Terminal Extension, containing landside arrivals passenger facilities.
Auxiliary Power Units	An auxiliary power unit (APU) is a device on a vehicle that provides energy for functions other than propulsion.
Baggage Reclaim	The baggage claim area is an airport terminology that describes the area of an airport terminal where one claims checked-in baggage.
Baseline	2012 constitutes the most reliable and robust 'baseline year' and ensures a full calendar year of data can be assessed.
Bombardier CS100	The Bombardier C Series is a family of narrow body, twin-engined, medium range jet airliners
BREEAM	BRE Environmental Assessment Method (BREEAM) is a voluntary measurement rating for green buildings.
Code C aircraft	A standard of aircraft size specified by the International Civil Aviation Organization.
Deadweight	Deadweight refers to the jobs and GVA that would arise anyway even in the absence of the proposed CADP.

Design year	This year represents the completion of the CADP1 and CADP2 works.
Displacement	defined by the Homes & Communities Agency (formerly English Partnerships) Additionally Guide as follows: "Displacement arises when the development takes market share (called product market displacement) or labour, land or capital (factor market displacement) from other existing local firms or organisations
Dockside Development	(Specific to the Airport) Works along the landside stretch of Airport property, extending from the east side of the proposed Forecourt development to Woolwich Manor Way. Part of the Completed CADP.
Dock Source Heat Exchange System	Is proposed to serve part of the heating and cooling demand for the Airport.
Eastern Ancillary Buildings	including: Taxi /Car Rental Services Building, Taxi Marshall's Kiosk, Vehicle Control Point facility, and Eastern Energy Centre;
Eastern Energy Centre	(Specific to the Airport) Proposed Energy Centre situated in the eastern Dockside area and housing various elements of plant that service the proposed Eastern Terminal Extension and proposed Forecourt. Part of the Completed CADP.
Eastern Terminal Extension	(Specific to the Airport) Proposed Eastern Extension of the main Terminal, including the Arrivals Concourse Building, the Main Processor Building, the Outbound Baggage Extension, the Eastern Pier and Noise Barrier. Part of the Completed CADP.
Facilitating Works	(Specific to the Airport) Part of the Interim CADP, including the temporary Coaching Building and associated link bridge, airside road alterations, extension of the concrete deck for an expanded outbound baggage facility (OBB), a new light-weight enclosure for expanded OBB, and Noise Barrier. Part of the Interim CADP.
Fish Refugia	(Specific to the Airport) Wire screens to replace otherwise destroyed habitat, which in turn provide a shelter for fish fry.
Forecourt	(Specific to the Airport) Proposed new multi-modal transport area including pick-up and drop-off accommodation for buses, taxis, and private cars, as well as landscaped areas adjacent to the Eastern Terminal Extension. Part of the Completed CADP.
Ground Noise	Noise referred to by aircraft on the ground
Hazardous Waste	A hazardous waste is waste that poses substantial or potential threats to public health or the environment.
Hotel	(Specific to the Airport) Dockside facility with up to 260 bedrooms, submitted as a separate outline application: 'Planning Application CADP2'.
Immigration Facility	A passport checking facility, within an airport terminal, for inbound passengers who are arriving on an international flight.
Instrument Landing System	A ground-based instrument approach system that provides precision guidance to an aircraft approaching and landing on a runway.
Interim CADP	(Specific to the Airport) The complement of projects that includes: Phase 1 Western Terminal Extension, Western Energy Centre, temporary OBB extension, temporary Coaching Facility, temporary Noise Barrier, additional 3 stands, and a portion of taxi lane. These elements are submitted as a separate detailed application: 'Planning Application CADP1'.
Jet Centre	Corporate Aviation Centre located at the western side of the Airport.
KGV Dock	King George V Dock, the last of the Royal Docks to be constructed, situated to the south of the Airport runway and the Royal Albert Dock.

L <sub>A90</sub>	Statistically the LA90 value is often used to describe background noise levels and is defined as the level exceeded for 90% of the measured time.
L <sub>Aeq</sub>	The Equivalent Continuous sound Level (L <sub>Aeq</sub> ) is the level of a notional steady sound, which at a given position and over a defined period of time would have the same A-weighted acoustic energy as the fluctuating noise.
Load Factors	The average assumed passenger occupancy of a flight, expressed as a percentage.
Made Ground	Artificial ground e.g. tarmac
Mobile Ground Power Units	Where fixed ground power is not available, mobile power units can be deployed.
Noise Barrier	A physical barrier to provide noise insulation
Noise Contours	A continuous line on a map that represents equal levels of noise exposure.
Noise Factored Movements	A numerical factor applied to a noise source, dependent on the time, type or level of noise produced which have an effect of limiting the number a aircraft using the Airport
Outbound Baggage	Baggage that has been checked-in by passengers who are departing on a flight, and that is to be screened, sorted and prepared for conveyance to the aircraft.
Outbound Baggage Expansion	(Specific to the Airport) Concrete deck extension and fabric enclosure housing the extended carousel and make-up positions for the interim outbound baggage requirements.
Parameter Plans	Plans and elevations setting out the proposed restrictions on the location and scale of a particular development being submitted under an outline planning application.
Permitted Aircraft Movement Limits	Limitation on aircraft movement, generally relates to time of day.
Pier	A building housing departing gate areas, departures corridors, as well as arrivals corridors that permit the circulation of passengers to and from the aircraft stands in a controlled fashion.
Phase 1 Western Terminal Extension (Phase 1 WTE)	(Specific to the Airport) Proposed interim extension containing passenger processing, office, and kitchen facilities, and situated within the existing 'triangle' Service Yard. Part of the Interim CADP.
Phase 2 Western Terminal Extension (Phase 2 WTE)	(Specific to the Airport) Proposed completed extension containing an expanded and reconfigured goods and waste facility, as well as storage and other minor support facilities, and situated within the existing 'triangle' Service Yard. Part of the Completed CADP.
Piling	Post like foundation driven into the ground to support a structure.
Principle Year	2023 has been chosen as the 'Principal Assessment Year' for the purpose of the EIA because it represents the optimisation of the CADP infrastructure and associated improvements at the Airport. The 2 year period after the completion of the proposed CADP physical works allows for a gradual increase in passenger numbers to approximately 5.87 million, due to an increased 'load factor' and the displacement of corporate aviation flights by scheduled commercial movements.
Public Safety Zone	Areas of land at the end of runways established at the busiest airports in the UK, within which certain planning restrictions apply.
Quiet Areas	Formally identified under Environmental Noise (England) Regulations 2006 (as amended) and consider protection of spaces of relative tranquillity or high soundscape quality, particularly through borough open space strategies.
Remote Stand	Aircraft parking position located away from passenger waiting lounges or gate rooms, requiring bussing or extended walking distances for loading or unloading those passengers.

Runway threshold	The beginning of that portion of the runway useable for landing.
Secondary A Aquifer.	Permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. These are generally aquifers formerly classified as minor aquifers.
Service Yard	(Specific to the Airport) The triangle-shaped external space between the west extent of the existing Terminal building and Hartmann Road utilised for temporary accommodation and service deliveries. Otherwise known as the 'Triangle'.
Southern Lands	(Specific to the Airport) Area of land partly owned by LCY, adjacent to the existing terminal building and lying between Hartmann Road to the north, Newland Street to the south, and Leonard Street to the west.
Spatial Scope	The geographical extent of the EIA is referred to as the spatial scope. The spatial scope of the assessment varies depending on the particular receptor.
Stockpiling	Stored construction related material so that security and the inventory can be maintained
Study Area	Designated area defined for an assessment.
Taxilane	Zone for circulation of aircraft moving between the runway and the stands.
Terminal	(Specific to the Airport) A temporary two-storey structure comprising three coaching gate room for departing passengers, and linked to the main terminal departures lounge at the upper level. Part of the Interim CADP.
Thames Barrier	London's flood defence due to the tidal element of the River Thames
The 2009 Permission	Planning permission granted (under Section 73 of the Town and Country Planning Act 1990) for variation of conditions 13 and 15 of the outline planning permission No. N/82/104 dated 23 May 1985, as previously varied by the Secretary of State on the 26 September 1991 and by the London Borough of Newham on 21 July 1998 and 11 July 2007, to allow up to 120,000 total aircraft movements per annum (number of total movements in 2006 was 79,616) with related modifications to other limits.
Transitional Year	During 2019, the majority of the proposed CADP works will be under construction. This year therefore represents an interim scenario ongoing construction and partial operation of the CADP. The forecasts that have been calculated are based on the infrastructure that will be in place at this time.
Transition Surface	An assessment surface that sets out the zone, relative to a civil aviation runway, within which no physical obstacles should occur.
Triangle	(Specific to the Airport) See 'Service Yard'.
Urbanisation	The physical growth of urban areas.
Western Energy Centre	(Specific to the Airport) Proposed Energy Centre situated in the western Service Yard and housing various elements of plant that services the Western Terminal Extension and the Facilitating Works Coaching Facility.



# 1 Introduction

1.1 This Environmental Statement (ES) has been prepared by RPS Planning and Development (RPS) on behalf of London City Airport Limited (LCY) ('the Airport') to accompany two planning applications to the London Borough of Newham (LBN). The proposed development project, known as the City Airport Development Programme (CADP), comprises a full planning application to construct new passenger facilities, 7 new aircraft stands and associated infrastructure (CADP1) together with a separate outline planning application for a Hotel (CADP2).

1.2 The CADP1 application is required to enable the Airport to respond to forecast growth in passenger numbers (particularly at peak periods) and to accommodate new generation aircraft which are physically larger than the current fleet. The planning application is described as:

*"Planning Application CADP 1: Works to demolish existing buildings and structures and provide additional infrastructure and passenger facilities at London City Airport without changes to the number of permitted flights or opening hours previously permitted pursuant to planning permission 07/01501/VAR. Detailed planning permission is being sought for:*

- a) *Demolition of existing buildings and structures;*
- b) *Works to provide 4 no. upgraded aircraft stands and 7 new aircraft parking stands;*
- c) *The extension and modification of the existing airfield to include the creation of a taxiway running parallel to the eastern part of the runway and connecting with the existing holding point;*
- d) *The creation of a vehicle access point over King George V dock for emergency vehicle access;*
- e) *Laying out of replacement landside Forecourt area to include vehicle circulation, pick up and drop off areas and hard and soft landscaping;*
- f) *The Eastern Extension to the existing Terminal building (including alteration works to the existing Terminal Building) to provide reconfigured and additional passenger facilities and circulation areas, landside and airside offices, immigration areas, security areas, landside and airside retail and catering areas, baggage handling facilities, storage and ancillary accommodation;*
- g) *The construction of a 3 storey Passenger Pier to the east of the existing Terminal building to serve the proposed passenger parking stands;*
- h) *Erection of a noise barrier at the eastern end of the proposed Pier;*
- i) *Erection of a temporary noise barrier along part the southern boundary of the Application Site to the north of Woodman Street;*

- j) *Western Extension and alterations to the existing Terminal to provide reconfigured additional passenger facilities and circulation areas, security areas, landside and airside offices, landside retail and catering areas and ancillary storage and accommodation;*
  - k) *Western Energy Centre, storage, ancillary accommodation and landscaping to the west of the existing Terminal;*
  - l) *Temporary Facilitation works including erection of a noise reduction wall to the south of 3 aircraft stand, a Coaching Facility and the extension to the outbound baggage area;*
  - m) *Works to upgrade Hartmann Road;*
  - n) *Landside passenger and staff parking, car hire parking and associated facilities, taxi feeder park and ancillary and related work;*
  - o) *Eastern Energy Centre;*
  - p) *Dock Source Heat Exchange System and Fish Refugia within King George V Dock; and*
  - q) *Ancillary and related works”.*
- 1.3 Outline Planning Permission is being sought for the hotel (Application CADP2) to provide a degree of flexibility for the building which is likely to be brought forward separately by a hotel operator. This application is described as:
- “Planning Application CADP2: Erection of a Hotel with up to 260 bedrooms, ancillary flexible A1-A4 floorspace at ground floor, meeting/conference facilities together with associated amenity space, landscaping, plant and ancillary works”.*
- 1.4 The proposed CADP1 and CADP2 applications are described in full within Chapter 2 of this ES.
- Background and Need for the Proposed CADP
- 1.5 The Airport currently operates within the terms of a July 2009 planning permission (ref. 07/01510/VAR) which enables it to operate up to 120,000 aircraft movements, subject to the operation of a noise factoring system and other controls, as described in Chapter 4 of this ES. The Airport is not seeking to increase the number of aircraft movements or change its hours of operation, beyond that which is already approved. Furthermore, all existing environmental and operational controls, strategies and systems approved through the conditions attached to the 2009 planning permission and the associated Section 106 planning agreement will continue to apply.
- 1.6 The ability of the Airport to enhance its infrastructure and facilities is constrained by its dockside location and the proximity of other constraints including the Docklands Light Railway (DLR) to the south. Accordingly, it is proposed to extend eastwards by constructing a suspended concrete deck over approximately 7.54 hectares (ha) of King George V (KGV) Dock.

- 1.7 The location of the Airport between the Royal Albert Dock and KGV Dock is illustrated in Figure 1.1 below (looking east).

**Figure 1.1 - Aerial View of London City Airport (looking east)**

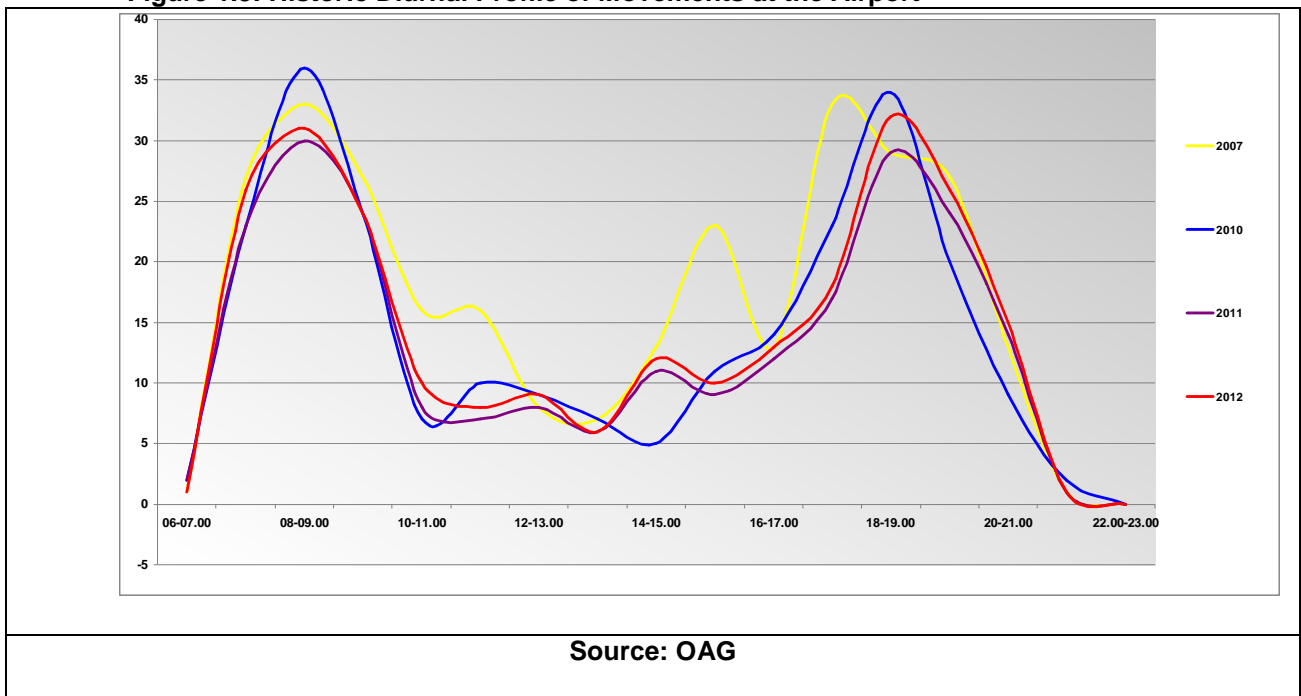


- 1.8 All of the proposed CADP works will take place within the Application Site, which is contained within the redline boundary defined in Figure 1.2 at the end of this chapter. The Application Site for CADP 1 extends to 60.1 hectares and includes the existing airport boundary and areas outside (principally to the south) required for the implementation of the CADP. It overlaps with the 0.59 hectare application site for the proposed Hotel (CADP2) to ensure integration between the two proposals. Collectively, the combined site (CADP1 and CADP2) is referred to as 'the Application Site' throughout this ES unless otherwise noted.
- 1.9 In 2012 London City Airport handled 70,502 total aircraft movements and 3.03 million passengers. The Airport has the highest proportion of business travellers of any major UK according to CAA survey data for 2012<sup>1</sup> (the Airport's own surveys place the proportion even higher). This compares to around 30% at Heathrow and 15% at Gatwick. This means that activity is and will continue to be focussed around weekday activity in the morning and evening busy period, when business travellers need to fly. As the Airport becomes busier it will be more challenging to accommodate the passengers and aircraft movements at the concentrated am and pm peaks. This concentration of aircraft movements in the peak hours is illustrated in Figure 1.3 below. As the Airport becomes busier it will be more challenging to accommodate the passengers and aircraft movements at these am and pm peaks.

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<sup>1</sup> Civil Aviation Authority (CAA) Airport Statistics 2012

**Figure 1.3: Historic Diurnal Profile of Movements at the Airport**



- 1.10 In January 2013, the Department for Transport (DfT) published its latest Aviation Forecasts<sup>2</sup>. In respect of London City Airport, the DfT anticipate the Airport reaching 104,000 aircraft movements (take off and landings) and handling approximately 4.9 million passengers by 2020, rising to 120,000 movements and 6.2 million passengers by 2030, based on the current infrastructure. The Airports own forecasts predict that if the CADP planning application were to be granted then the Airport could handle 107,000 aircraft movements<sup>3</sup> and cater for approximately 5.87 million passengers by 2023. However, if the proposed CADP were not to proceed then there would be approximately 88,000 aircraft movements and around 4.44 million passengers by 2023.

#### Matching Infrastructure to Future Aircraft Sizes

- 1.11 Financial pressures and a greater awareness of sustainability imperatives are encouraging the airlines to increase the average size of aircraft and also to choose more fuel efficient and quieter planes when replacing their existing older fleets. These larger planes are generically referred to as 'Larger Code C' aircraft, reflecting their categorisation according to the Civil Aviation Authority (CAA). As explained below, such aircraft are physically larger than the current Airport infrastructure can deal with.
- 1.12 New generation Code C aircraft, such as the Bombardier C-100 (on order by Swiss International Airlines), offer the potential for even greater fuel efficiency and emissions (CO2) savings, as

<sup>2</sup> Department for Transport, (2013); UK Aviation Forecasts. DfT.

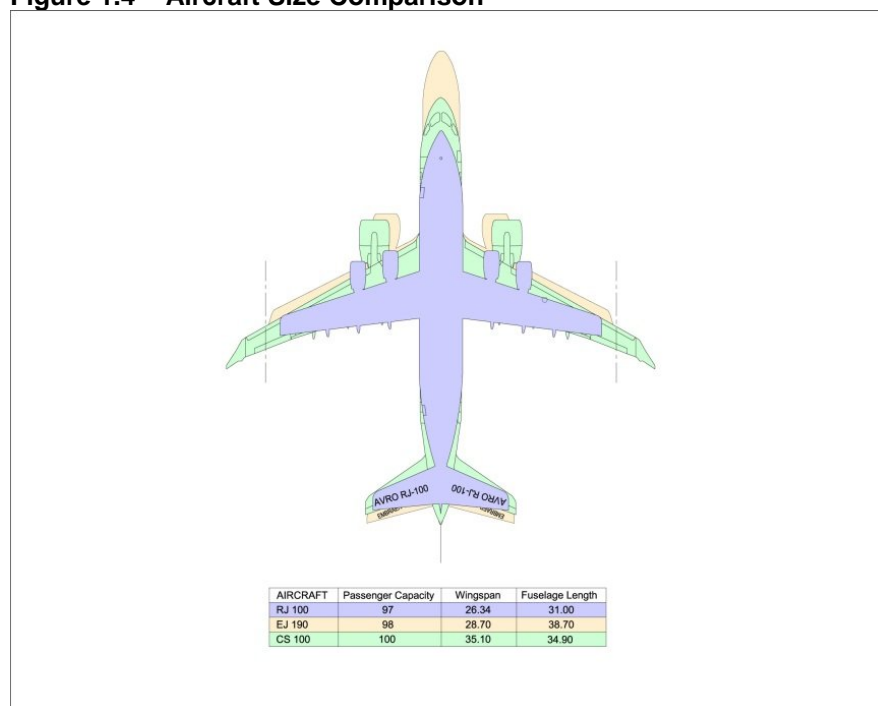
<sup>3</sup> 'Aircraft movements' are defined in the 2009 Planning Agreement with LBN.



measured on a per passenger/ km basis. This is because they incorporate more advanced airframe and engine technology and have a wider wingspan which provides better “lift” than older, smaller and proportionally heavier jets currently in operation.

- 1.13 As the Airport becomes progressively busier it will become more challenging to accommodate passengers and aircraft movements during the critical morning and early evening peak periods. Moreover, the continuing trend towards larger Code C aircraft using the Airport will exert pressure on the efficient use of the runway, the availability of adequately sized stands and manoeuvring space, and other airport infrastructure. For instance, existing aircraft such as the British Airways A318 and the proposed Swiss International Airlines Bombardier C-Series (to be introduced in 2016) are unable to use the taxilane in front of the West Pier at the Airport. In addition, there are presently only 4 stands (Stands Nos. 21-24) which can accommodate these larger Code C jets.
- 1.14 Figure 1.4 below provides a comparison between an RJ100 (an older aircraft in operation for many years), the larger Embraer EJ190 (introduced at LCY in 2010) and the Bombardier CS100 (due to be introduced at LCY in 2016). The Embraer EJ190 and Bombardier CS100 are forecast to make up an increasing proportion of the fleet over the next decade.

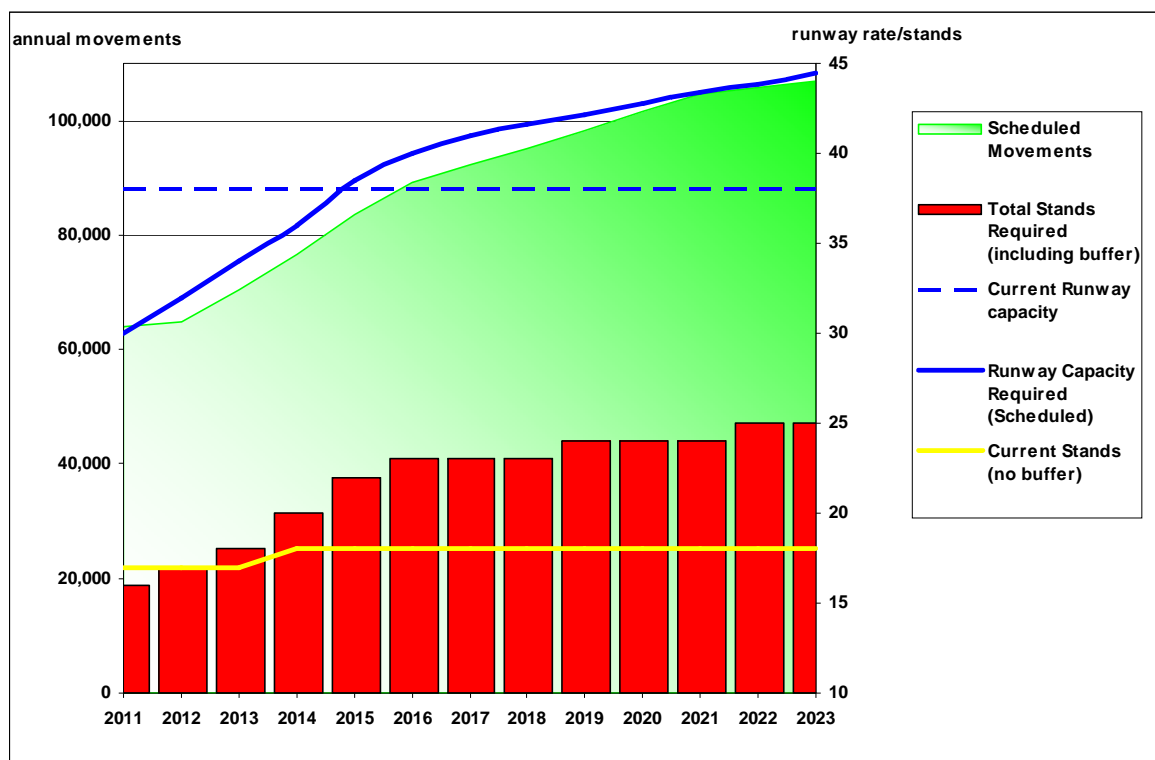
**Figure 1.4 – Aircraft Size Comparison**



- 1.15 In addition to a lack of suitably sized stands, the modern larger Code C aircraft are not able to use the taxilane at the western end of the airfield and are also required to back-track on the runway, both on arrival and on departure, as they can only use one of the taxi links. This has the effect of slowing down the rate at which aircraft can take-off or land as they have to wait for the runway to be vacated. As the number and proportion of larger aircraft increase, it will therefore erode the Airport’s ability to handle airline and passenger demand, particularly in the important peak periods. Therefore, if the Airport is to remain competitive and be able to accommodate such aircraft, its infrastructure must be upgraded as proposed by the CADP.

- 1.16 It has been determined that, under the CADP, there will be a requirement for 25 operational aircraft stands (including 2 buffer stands for delayed or long stopping aircraft) and a new parallel taxiway and runway link in order to handle a predicted runway movement rate of 45 scheduled movements per hour in the peak by 2023. This compares to the currently approved 18 stands.
- 1.17 Figure 1.5 summarises the airfield capacity required and the timing related to the scheduled movement demand forecasts. As can be seen, the Airport will be constrained by stand capacity in the very near future and by runway capacity by 2016, on the basis of the anticipated rate of introduction of larger Code C aircraft.

**Figure 1.5 - Scheduled Movement Demand and Airfield Capacity Required**



#### Matching Terminal Capacity to Passenger Numbers

- 1.18 The current Terminal infrastructure is nearing capacity and without extra space growth will be constrained. The larger size of aircraft expected to be operating from the Airport will carry more passengers than the aircraft they will replace over the medium term. Hence, there will be more passengers seeking to use the Terminal building, particularly in the peak morning and early evening periods. These increased passenger numbers cannot be handled within the existing Terminal whilst maintaining the fast transit expected by business travellers in particular - the target transit time from entering the Airport to reaching the departure lounge is 20 minutes for departing passengers; the target arrival times are 15 minutes for passengers with carry-on luggage disembarking the aircraft to leaving the Terminal. Maintaining this customer proposition (which, in reality, is frequently bettered) is an important part of the need for the proposed CADP.

- 1.19 A key part of the CADP1 proposal is the construction of two extensions to the existing Terminal – the Western Terminal Extension (WTE) and the Eastern Terminal Extension (ETE), incorporating a new 3 storey passenger Pier (the East Pier) to provide circulation, waiting and ancillary facilities for departing and arriving passengers. This extension of the Terminal will, in turn, permit the reconfiguration and upgrades to essential airport functions such as baggage processing, immigration, security and staff facilities. It will also deliver more space and better facilities for passengers in line with modern service standards and guidance from the Civil Aviation Authority (CAA).
- 1.20 The different components of the proposed WTE and ETE and other building elements proposed through the CADP1 application are described in Chapter 2 of this ES.

#### Summary of CADP Need Case

- 1.21 The key drivers for the CADP1 and how these are addressed by the proposals are summarised in Table 1.1 below.

**Table 1.1: CADP Challenges and Solutions: Peaks, Planes and People**

Challenge	Solution
<b>Business travellers want to travel in morning and evening</b> – the Airport runway is almost full in the peak period. New routes need peak runway slots and additional stands – without them growth is limited.	Parallel taxiway, increasing peak runway utilisation and new stands.
<b>New generation aircraft are getting larger</b> e.g. the Bombardier CS100 will be at the Airport in 2016 – this aircraft will not fit on current stands.	New and upgraded larger stands.
<b>Larger aircraft</b> and increased demand for business travel means <b>more passengers</b> – current terminal infrastructure is nearing capacity. Without extra space, growth will be constrained.	Extended Terminal and ancillary infrastructure.

- 1.22 In summary, the proposed CADP will allow the Airport to make the better use of its existing runway, within the constraints of the 120,000 noise factored movement limit and other controls which apply to its 2009 planning permission. This will allow the Airport to:
- respond to the growing business demand for peak hour flights;
  - provide for the more fuel efficient and quieter new generation of larger aircraft;
  - mitigate the environmental impact of aircraft back-tracking on the runway;
  - provide contingency aircraft stands to allow the Airport to manage aircraft movements efficiently and to preserve an essential level of resilience to accommodate delays; and
  - provide for the increasing number of passengers through improved space and facilities in the extended Terminal building in order to meet passenger expectations and respond to growing security and other requirements.

- 1.23 There will also be knock-on benefits in terms of local employment generation as a result of the CADP, which adds weight to the need case. Overall, taking all types of employment into account, the CADP proposals would generate an increase in local employment of approximately 1,500 compared to 2012, when the full impact of the hotel is taken into account. This is made up of 1,250 jobs as a result of the increase in operational activity at the Airport and around 200 jobs in total related to the hotel and other elements of CADP2. Further detail on the business case and operational requirements for the proposed CADP is provided within Chapter 7: Socio-economics, Recreation and Community of this ES and within a 'Need Statement' prepared by York Aviation on behalf of the Airport. This Need Statement accompanies the CADP1 application.

#### CADP Development Scenarios

- 1.24 The methodology and approach to the Environmental Impact Assessment (EIA) of the CADP proposals has been informed by the annual passenger and aircraft traffic forecasts calculated by York Aviation for the years 2017, 2019, 2021 and 2023, for both the 'With Development' and 'Without Development' scenarios. These and other assessment years and scenarios considered through the EIA process are described within Chapter 3: EIA Methodology.
- 1.25 Without the proposed CADP, both scheduled aircraft movement numbers and passenger numbers would be curtailed by the existing infrastructure and terminal capacity constraints, some elements of which are expected to reach a saturation point over the next few years. This would make the future performance of the Airport less certain and would be contrary to the Government's priority for the aviation industry to make much better use of existing runway capacity at UK airports over the short to medium term. Current forecasts anticipate that these constraints would be removed by the proposed CADP. However, the proposed infrastructure and extended Terminal capacity has been sized explicitly to accommodate the projected growth in aircraft numbers and passengers to 2023. Any significant further growth over the longer term (to, say, 2030) would not be possible within the constraints of the 120,000 'noise factored' movement cap established through the 2009 planning permission, nor would there be surplus capacity in the proposed CADP infrastructure (aircraft stands or Terminal facilities) to cater for this growth.
- 1.26 As described in Chapter 6: Development Programme and Construction, the proposed CADP will be developed out in a sequential manner in response to the forecast demand in aircraft fleet mix and passenger numbers. The first 3 replacement stands are currently expected to be built out and operational by the end of 2016 (the 'Interim CADP') and the entire CADP completed by 2021 (the 'Completed CADP'). It is commercially important for the Airport to retain some flexibility in the implementation of the development.
- 1.27 Table 1.2 summarises the forecast aircraft movements, passenger numbers and load factors (i.e. the % average available seats expected to be full per flight) in the 'With' and 'Without' development cases, as compared to the current (2012) baseline.

**Table 1.2: Summary of Forecast Passenger and Aircraft Movement Forecasts**

	<b>2012 Baseline</b>	<b>2017 With Dev.</b>	<b>2019 With Dev.</b>	<b>2019 W/O Dev</b>	<b>2021 With Dev.</b>	<b>2021 W/O Dev</b>	<b>2023 With Dev.</b>	<b>2023 W/O Dev.</b>
Scheduled Movements	64,775	92,149	98,802	84,941	104,901	88,822	107,119	87,713
Passengers	3,029,013	4,304,000	4,871,000	4,154,000	5,512,000	4,391,000	5,874,000	4,435,000
Average Load Factor	60.8%	57.40%	58.8%	58.5%	60.2%	60.2%	60.8%	61.7%
Business Aviation Movements	5,727	7,700	8,100	8,100	6,400	8,500	3,920	9,000

Source: York Aviation, June 2013. Note: Test and Training Movements are excluded.

- 1.28 Table 1.3 summarises the principal elements of the proposed CADP and the likely sequencing. A full description of these elements of the CADP is provided in Chapter 2: Site Context and Scheme Description, with further details provided in Chapter 6: Development Programme and Construction.

**Table 1.3: Indicative Sequence of the CADP Project**

CADP Description (indicative chronological order)	Indicative Development Phasing
<ul style="list-style-type: none"> <li>• 3 new stands and reconfiguration of existing stands 21-24</li> <li>• Partial extension of the taxilane running adjacent to the runway.</li> <li>• Temporary Facilitating Works including Coaching Facility, extension to existing Out Bound Baggage (OBB) facility, and temporary noise barrier.</li> <li>• Temporary Construction Noise Barrier at Woodman Street.</li> <li>• Western Terminal Extension Phase 1 (WTE1)</li> <li>• Western Energy Centre</li> </ul>	<p><b>Interim CADP</b> (2016 to 2017) including 3 stands and the first section of the parallel taxilane; Phase 1 of the Western Terminal Extension (WTE1); construction of the Western Energy Centre; and Temporary Facilitating Works</p>
<hr/> <ul style="list-style-type: none"> <li>• 4 additional new stands (providing a total of 11 larger code C stands)</li> <li>• Completion of taxilane.</li> <li>• New entry/exit link to the runway</li> <li>• Eastern Terminal Extension (ETE)</li> <li>• East Pier</li> <li>• Noise barrier extending from the new East Pier to the end of the concrete deck</li> <li>• New Terminal forecourt</li> <li>• Construction of Hotel (subject to commercial demand)</li> <li>• Landside passenger and staff parking, car hire parking and associated facilities, taxi feeder park and ancillary and related work – progressively built out to match demand</li> <li>• Eastern Energy Centre;</li> </ul>	<p><b>Transitional Phase</b> (2019) including construction of the 4 additional stands and final phase of the parallel taxilane. Depending on the progression of the Eastern Terminal Extension and East Pier, the Coaching Facility would become redundant and would be demolished to allow for stands 21-24 to be enlarged to assume their ultimate configuration. At this stage all of the eastern stands would be capable of accommodating the larger new generation of aircraft.</p>
<hr/> <ul style="list-style-type: none"> <li>• Completion of Western Terminal Extension Phase 2 (WTE2)</li> <li>• Provision of landside RVP access pontoon.</li> <li>• Works to upgrade Hartmann Road.</li> </ul>	<p><b>Completed CADP/ Design Year (2021):</b> likely completion date for all physical works associated with the CADP.</p>
<p><b>Without CADP Development</b></p>	
<ul style="list-style-type: none"> <li>• Ongoing minor operational works only – no planning permission required.</li> </ul>	<p>Stand 11 reinstatement (planning reference 13/00267/FUL, approved on 8<sup>th</sup> April 2013) to west of airfield expected to be built out by end of 2013</p>

#### Environmental Impact Assessment (EIA) Process

- 1.29 This ES has been prepared in accordance with the Town and Country Planning (Environmental Impact Assessment) (England and Wales) 2011 ('the EIA Regulations').
- 1.30 The proposed CADP constitutes an "infrastructure project" in accordance with Schedule 2 of the EIA Regulations and falls within category 10 (e) – "construction of airfields" on account of the fact that the relevant threshold is met, namely: "the area of works exceeds 1 hectare".

- 1.31 EIA is not mandatory for Schedule 2 developments and it is normally for the local planning authority (LPA) to determine whether it is necessary, taking into account the nature, scale, location and environmental sensitivity of the project and its potential effects on the environment. However, in this instance, it is accepted that the CADP is “EIA Development” and therefore the Airport voluntarily commissioned the EIA and associated technical studies without recourse to a Screening Opinion from the London Borough of Newham (LBN) as the competent LPA.
- 1.32 This ES reports on the outcome of the EIA process, which was conducted over a period of approximately 10 months and formed an iterative part of the CADP design evolution. The ES presents an assessment of the likely significant environmental effects of the proposed CADP in a systematic way, thereby ensuring that the main adverse (negative) and beneficial (positive) effects are properly identified, and that options for avoiding, reducing, off-setting or enhancing such effects are considered. The information contained in this ES will help inform the planning determination process and will therefore be of relevance to LBN. However, it is also likely to be of interest to the Greater London Authority (GLA), the Environment Agency (EA), English Heritage (EH) and the other statutory authorities, as well as the local community around the Airport and other stakeholders in the project.
- 1.33 The scope of the ES was set out in the Scoping Report submitted to LBN on 8<sup>th</sup> October 2012 and discussed through a series of subsequent meetings with the Council, the adjoining boroughs, the Royal Docks Management Authority (RoDMA) and the statutory authorities. LBN provided its Scoping Opinion in a letter dated 4<sup>th</sup> December 2012. Subsequent changes to the project and the coverage of the EIA were then confirmed through meetings and written correspondence with the Council, including two Scoping Update letters to LBN dated 21<sup>st</sup> February and 14<sup>th</sup> June 2013. A more detailed account of the scoping process is presented in Chapter 3: EIA Methodology.
- 1.34 There are no set requirements for the compilation and structure of an ES. However, the EIA Regulations defines an ES as a statement that includes:
- (a) such information referred to in Part 1 of Schedule 4 as is “reasonably required to assess the environmental effects of the development and which the applicant can, having regard to current knowledge and methods of assessment, reasonably be required to compile”, and*
- (b) that includes “at least the information referred to in Part II of Schedule 4”.*
- 1.35 The location of the information required by Regulation 2(1), Schedule 4 (Parts 1 and II) of the EIA Regulations is summarised in Table 1.4.

**Table 1.4: Location of Specified Information within the ES**

Specified Information	Location Within ES
Part I and Part II	
1. Description of the development, including in particular:	
(a) A description of the physical characteristics of the whole development and the land use requirements during the construction and operational phases; (Part II – 1)	Chapter 1: Introduction Chapter 2: Site Context and Scheme Description Chapter 5: Development Programme and Construction

Specified Information	Location Within ES
(b) A description of the main characteristics of the production processes, for instance, nature and quantity of materials used; (Part II – 3)	Chapter 2: Site Context and Scheme Description Chapter 5: Development Programme and Construction
(c) An estimate, by type and quantity, of expected residues and emissions (water, air and soil pollution, noise, vibration, light, heat, radiation, etc) resulting from the operation of the proposed development. (Part II – 3)	Chapter 8: Noise and Vibration Chapter 9: Air Quality Chapter 10: Townscape and Visual Impact Chapter 12: Water Resources and Flood Risk Chapter 15: Waste Chapter 17: Climate Change
2. An outline of the main alternatives studied by the applicant or appellant and an indication of the main reasons for his choice, taking into account the environmental effects. (Part II – 4)	Chapter 4: Consideration of Alternatives
3. A description of the aspects of the environment likely to be significantly affected by the development, including in particular, population, flora, fauna, soil, water, air, climatic factors, material assets, including the architectural and archaeological heritage, landscapes and inter-relationship between the above factors.	All technical chapters (7-17) plus Chapter 20: Summary of Mitigation and Residual Impacts
4. A description of the likely significant effects of the development on the environment, which should cover the direct and any indirect, secondary, cumulative, short, medium and long term, permanent and temporary, positive and negative effects of the development, resulting from:	All technical chapters (7-17) plus Chapter 20: Summary of Mitigation and Residual Impacts
(a) The existence of the development;	
(b) The use of natural resources;	
(c) The emission of pollutants, the creation of nuisances and the elimination of waste; and the description by the applicant of the forecasting methods used to assess the effects on the environment.	
5. A description of the measures envisaged to prevent, reduce and where possible offset any significant adverse effects on the environment. (Part II – 2)	
6. A non-technical summary of the information provided under paragraphs 1-5 of this Part.	The ES Non-Technical Summary (separate document)
7. An indication of any difficulties (technical deficiencies or lack of know-how) encountered by the Applicant in compiling the required information.	Chapter 3: EIA Methodology and within technical chapters (7-17) where relevant.

## ES Structure and Content

### *Environmental Statement (Volume I)*

- 1.36 The main ES (Volume I) is divided into a series of Chapters, which follow this chapter - Chapter 1: Introduction. The remaining chapters of the ES are:
- a) **Chapter 2: Site Context and Scheme Description** - provides an overview of the existing Airport layout, the Application Site and its setting and provides a fuller description of the proposed CADP (CADP1 and CADP2 applications).



- b) **Chapter 3: EIA Methodology** - outlines the EIA process including the methodologies used during the pre-planning, consultation, scoping and subsequent EIA. The criteria for assessing the significance of effects (both adverse and beneficial) and the process to identify additional measures to avoid, reduce, offset or enhance identified effects are described. The specific scope and methodology of the technical assessments is provided in detail in the relevant chapters.
- c) **Chapter 4: Consideration of Alternatives** - describes the main alternatives that have been considered by the Airport and its Project Team and explains, where relevant, the reasons why certain decisions were made to discount these alternatives on environmental, commercial, operational or other grounds. The chapter examines high-level alternatives and provides some detail on later stage design iterations that have resulted in the final CADP proposals.
- d) **Chapter 5: Planning Policy Context and Existing Controls** – summarises the national, regional and local planning context for the proposed CADP, focusing on aviation policy and other statutory controls. It also describes relevant operational, safety and environmental controls currently in place at the Airport and which will be carried forward under the CADP. Each of the technical chapters also describes the topic-specific national, regional and local planning policies, legislation and guidance which are applicable to that particular assessment.
- e) **Chapter 6: Development Programme and Construction** - provides a more detailed account of the engineering works associated with the proposed CADP and presents the likely sequence of the construction works for the purpose of the EIA. This chapter also provides a summary of the overarching environmental mitigation measures that will be applied during all phases of the construction works, with reference to the Construction Environmental Management Plan (CEMP), which will be implemented by the appointed contractors.
- f) **Chapter 7: Socio-Economics, Recreation and Community** - considers the potential implications of the proposed CADP on the local and wider economy and population. The chapter assesses the potential effects of the proposed increase in aircraft movements and associated growth in passenger numbers on income and employment in LBN and elsewhere, together with its effect on the local community and recreational uses.
- g) **Chapter 8: Noise and Vibration** - considers the potential impacts of the proposed CADP on the local and wider noise environment. It considers different sources of noise to which separate standards and assessment methodologies apply, including: air noise (from aircraft in flight), ground noise (from aircraft on the runway, taxiway and stands; and from fixed building plant and other sources), road traffic noise, and construction noise and vibration.
- h) **Chapter 9: Air Quality** - considers the potential of impacts of the proposed CADP upon local air quality, including nitrogen dioxide, particulates and odours. The assessment focuses on two pollutants with respect to potential human health effects, namely nitrogen dioxide (NO<sub>2</sub>) and fine particles (PM<sub>10</sub> and PM<sub>2.5</sub>), as these pollutants are of greatest concern within LBN. Consideration is also given to the potential for odour nuisance. Each principal source of these pollutants is considered, focussing on emissions associated with aircraft, road traffic on the local network and other sources of emissions introduced by the CADP.

- i) **Chapter 10: Townscape and Visual** - assesses the likely significant effects of the development of the proposed CADP on townscape character and views experienced by the public and other receptors. The likely impacts are assessed during both the construction and operation of the proposed CADP. It identifies and describes the type and potential sensitivity of visual receptors likely to be most affected; evaluates the sensitivity of the prevailing townscape and local character areas; and, identifies both visual and townscape effects brought about by the CADP.
- j) **Chapter 11: Traffic and Transport** - considers the potential effects of the proposed CADP on surface access in terms of local road network and public transport services. A separate Transport Assessment (TA) and Travel Plan have also been prepared and are appended to the ES.
- k) **Chapter 12: Water Resources and Flood Risk** - considers the potential impact of the CADP on the hydrological regimes of the Application Site and its surroundings, in particular the likely significant effects on flood risk and the water quality of KGV Dock. It provides an account of monitoring that has been undertaken within KGV Dock, including within the open and covered water. The assessment is informed by a Surface Water Drainage Strategy (SWDS) and separate Flood Risk Assessment (FRA) that form appendices to this chapter.
- l) **Chapter 13: Ecology and Biodiversity** - This chapter reports on the potential impact of the proposed CADP on ecology and implications to the biodiversity value of the surrounding area, including habitats, protected species or otherwise notable species of wildlife. The assessment has been informed by aquatic/ limnology surveys of KGV Dock, a terrestrial habitat survey of the Application Site and various third party data sources.
- m) **Chapter 14: Cultural Heritage** - provides an assessment of the potential effects of the CADP on heritage assets within the Application Site and within a one kilometre Search Area. This includes the potential impact on both buried archaeology and built heritage assets. A full Desk Based Assessment (DBA) has been conducted in order to provide the historical and archaeological context of the Application Site, to define the heritage receptors that might be affected by the CADP and to provide the relevant planning policy and legislative background.
- n) **Chapter 15: Waste** - reports on the assessment of the likely significant environmental effects of waste generation associated with the proposed CADP. This includes the effects of waste produced as a result of demolition and construction activities and the potential additional waste to be generated during operation of the new development due to the predicted increase in passenger numbers.
- o) **Chapter 16: Ground Conditions and Contamination** - reports on the assessment of the effects of the proposed CADP relating to ground conditions and contamination. A baseline assessment has been completed which draws upon and summarises the results of a Phase 1 Environmental Risk Assessment and an intrusive ground investigation carried out at the Airport in March 2013. The assessment also draws upon numerous previous site investigations relating to the Application Site, the reports of which are reproduced in appendices to this chapter.
- p) **Chapter 17: Climate Change** - presents a carbon footprint calculation for the Airport's baseline (present-day/ 2012 operations) and future year (2023) with and without the

proposed CADP. It draws on information presented in other reports including the 2012 Airport Carbon Accreditation report and the Energy and Low Carbon Strategy that accompanies the CADP planning submission. The chapter evaluates the predicted changes in greenhouse gas (GHG) emissions that will arise due to the Airport's future operations, including from energy consumed in the Airport's buildings and emissions from aircraft in the landing and takeoff (LTO) cycle, which will be influenced by the proposed CADP.

- q) **Chapter 17: Cumulative Effects** - considers the environmental effects from other permitted and likely developments in proximity to the Airport which individually might be insignificant but, in combination with the proposed CADP, could amount to significant cumulative ('in-combination') effects.
- r) **Chapter 18: Summary of Mitigation and Residual Effects** - sets out a summary of the residual (remaining) effects after taking account of the proposed mitigation measures identified in the various ES chapters.

#### *Environmental Statement Technical Appendices (Volume II, III and IV)*

- 1.37 Volumes II, III and IV of the ES provide a set of technical appendices, including plans and drawings, separate reports, surveys and data, which have informed the EIA process. This detailed information and reports are supplied in separate volumes to prevent the main ES becoming excessively long and cumbersome.

#### *Environmental Statement Non-Technical Summary*

- 1.38 The Non-Technical Summary (NTS) presents a summary of the ES in non-technical language, as required by the EIA Regulations. The NTS provides a concise summary of the CADP proposals, the potential environmental effects identified and mitigation measures proposed to avoid, reduce or offset these effects, as well as the residual impacts of the scheme. The NTS is also presented as a standalone document so that this can be made freely available to all interested parties.

#### Other Documents Accompanying the Planning Applications

- 1.39 A number of other documents accompany both planning applications (CADP1 and CADP2). Where relevant, these are referred to in the ES and/or reproduced in the appendices to it. They include:
  - a) Planning Statement;
  - b) CADP Scheme Description;
  - c) Application Drawings;
  - d) Design and Access Statement (DAS);
  - e) Design Code (for Hotel application CADP2 only);
  - f) Transport Assessment and Travel Plan;
  - g) Need Statement;

- h) Statement of Community Involvement;
- i) Energy and Low Carbon Strategy;
- j) Sustainability Statement; and
- k) Health Impact Assessment.

#### Project Team

- 1.40 The Airport has appointed a specialist Project Team for the proposed CADP. The consultants involved in the EIA process are listed below.

**Table 1.5 – EIA and Project Team**

Organisation	Consultant Role
RPS	EIA coordination and principal authors of the ES Technical authors of the chapters on: Cultural Heritage; Ground Conditions and Contamination; Townscape and Visual Impacts; Ecology and Biodiversity; Water Resources and Flood Risk; Waste; Climate Change; Sustainability Statement; and. Health Impact Assessment (HIA)
Quod	Planning Consultants
York Aviation LLP	Socio-economics, Recreation and Community Traffic Forecasting, Simulations, Need Case Assessment
Bickerdike Allen Partners (BAP)	Noise and Vibration
Air Quality Consultants (AQC)	Air Quality
Vectos	Traffic and Transportation
Pascall + Watson	Lead CADP Architects (Terminal Buildings and Forecourt design) Author of the DAS
Allies and Morrison	Hotel Architects
TPS Consult	Airfield Engineers
Atkins	Mechanical, Electrical, Structural and Drainage Engineers. Energy and Low Carbon Strategy
LDA Design	Landscaping

#### ES Availability

- 1.41 The ES and all application documentation are available for review on LBN's public access system<sup>4</sup>. Additional copies of the ES and Technical Appendices can be provided at a cost of £300 for each volume (excluding postage and packing). Alternatively, a CD Rom version in Acrobat pdf file format is available for an administration charge of £15 (including postage and packing).

<sup>4</sup> <http://pa.newham.gov.uk/online-applications/search.do?action=simple&searchType=Application>

- 1.42 The Non-Technical Summary can be provided free of charge (as an electronic or hard copy) upon request. All ES documents are available from:

RPS Planning and Development  
14 Cornhill  
London  
EC3V 3ND  
Tel: 020 7280 3200

- 1.43 Comments on the planning applications should be forwarded to the London Borough of Newham in writing at the address below:

London Borough of Newham  
Strategic Regeneration and Olympic Legacy  
Newham Dockside  
1000 Dockside Road  
London E16 2QU

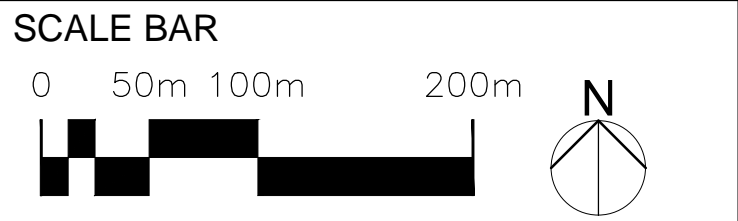
- 1.44 Alternatively emails can be sent to the Planning Case Officer: [sunil.sahadevan@newham.gov.uk](mailto:sunil.sahadevan@newham.gov.uk)





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- Base building survey information by LCY and MSA



- LEGEND
- EXISTING PRINCIPAL BUILDINGS
  - PROPOSED DEVELOPMENT BOUNDARY LINE
  - EXISTING DLR VIADUCT

-	MN	12.06.13	Issued for Planning
Rev	Dn	Date	Description

FOR APPROVAL

LondonCityAirport

London City Airport Limited City Aviation House Royal Docks London E16 2PB

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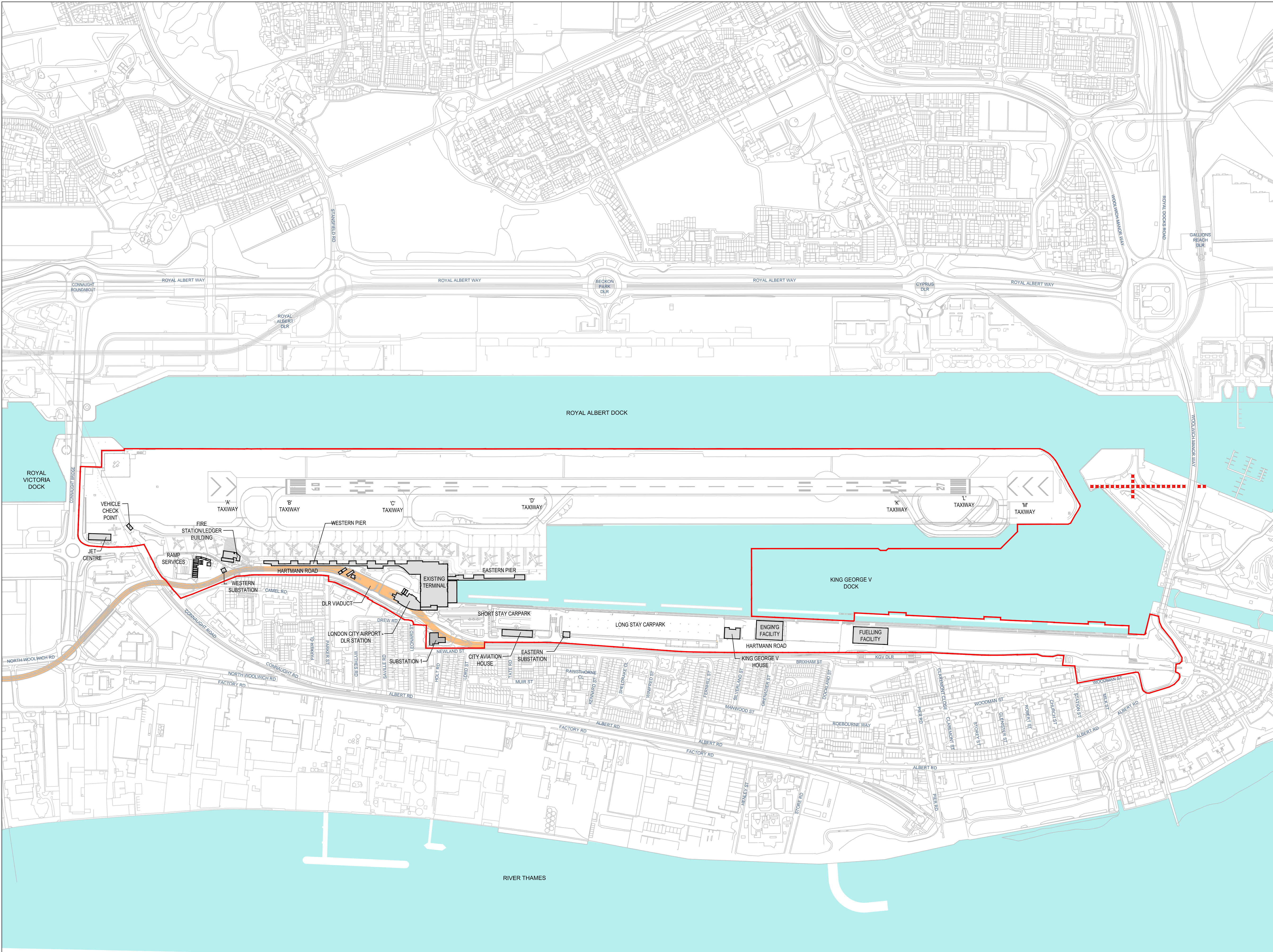
5 Carlson Court 116 Putney Bridge Road London SW15 2NQ  
+44 (0)20 8874 1311 [www.pascalls.co.uk](http://www.pascalls.co.uk)

Client  
LONDON CITY AIRPORT  
Project Name  
CITY AIRPORT DEVELOPMENT PROGRAMME

Title  
1 - SITE PLAN

Discipline Architecture		Project Phase PLANNING	
Drawing Originator Pascall+Watson architects		Originator's Job No. 4486	
Checked By SW	Checked Date 01.05.2013	Drawn By GC	Drawn Date 11.03.2013
Approved By MN	Approval Date 01.05.2013	Scale 1:3500 @ A1	

Building Grid Reference SITE	Client LCY	Originator P+W	Project Ref. 4486	Discipline B	Drawing No. SI20001	Revision -
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1 EXISTING SITE PLAN  
1:3500







## 2 Site Context and Scheme Description

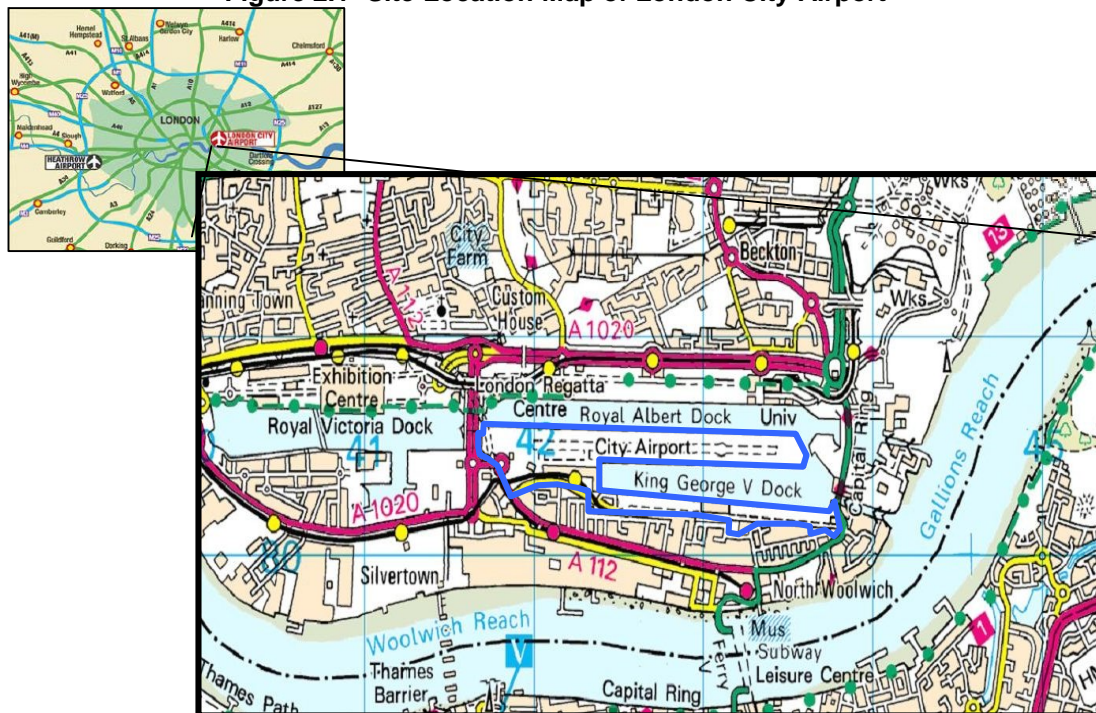
### Introduction

- 2.1 This Chapter of the ES provides a description of the existing Airport and Application Site and the then sets out the main elements of the proposed CADP, as comprised in the application for full planning permission (CADP1) and the application for outline planning permission for the Hotel (CADP2)
- 2.2 A description of the engineering works and the likely phasing of the CADP is provided separately within Chapter 6: Development Programme and Construction. Particular features of the CADP which are of relevance to individual, topic-based assessment are described in more detail in the corresponding technical chapters of the ES.

### Site Context

- 2.3 The Airport is a city centre airport that lies within the administrative area of the London Borough of Newham (LBN). It is located between the Royal Albert Dock (30 hectares) and King George V (KGV) Dock (24 hectares), adjacent to the Woolwich Reach and Gallions Reach of the River Thames. Figure 2.1 below shows the location of the Airport in the context of the Royal Docks and east London area.
- 2.4 The Airport is approximately 6 miles east of the City of London, approximately 2 miles east of Canary Wharf and 0.5 miles away from the ExCeL Exhibition and Conference Centre. The surrounding area comprises of a mix of residential, industrial and commercial uses. There is also a significant amount of planned development and regeneration in the vicinity of the Airport.

**Figure 2.1- Site Location Map of London City Airport**



- 2.5 The land around the Airport is in urban use with a mixture of clearly defined zones including residential and industrial/commercial areas located on the northern and southern banks of the River Thames at Silvertown and North Greenwich. Significant non-residential uses in the area include the large Tate and Lyle factory to the south of the Airport; the University of Eastern London (UEL) on the north-east side of the Royal Albert Dock; the Royals Business Park to the north; the London Regatta Centre on the north-west side of the Royal Albert Dock; the Excel Exhibition Centre and three adjacent high rise hotels to the west on the northern side of Royal Victoria Dock; and several areas of vacant land including land at Albert Basin to the east and a large expanse of land on the north side of Royal Albert Dock between UEL and Royals Business Park. Some of this land is currently being developed.
- 2.6 The existing layout of the Airport is summarised below and presented in Figure 1.2. This replicates the Site Plan (No1) included with the Planning Application Drawings.

#### Airfield Layout and Infrastructure

- 2.7 The Airport opened in 1987 and has grown progressively since this time. It continues to serve a primarily business travel market, with flights to domestic and European destinations
- 2.8 The existing Airport site extends to an area of 48.5 hectares. The Airport was constructed on the site of a disused shipping dock and the runway is situated on the strip of land between KGV Dock and the Royal Albert Dock.
- 2.9 The runway, which is categorised Code 2C, is used by aircraft taking off and landing in an easterly (09) direction and westerly (27) direction. The runway is capable of handling aircraft up to the capacity of an EJ190 regional jet and, in its current configuration, is able to accommodate up to 38 aircraft movements per hour but is only scheduled for 36 movements.
- 2.10 There is no parallel taxiway and aircraft arriving on Runway 09 or departing from Runway 27, typically have to 'back-track' on the runway to take-off/taxi to the apron. These aircraft must enter and leave the runway at Link D, adjacent to stand 24, giving rise to additional back-tracking on the runway. A holding point for up to 3 aircraft (known as Runway Hold 27) exists at the eastern end of the runway.
- 2.11 The airport has 18 approved stands for scheduled aircraft at the Airport. Eleven of these were original to the initial opening of the Airport, with three more provided when the western apron was reconfigured in 2002 and another four on the completion of the Eastern Apron Extension in 2008. Since mid-2011 the Airport has been operating under the sub-optimal situation of having only 17 stands in place due to the original Stand 11 needing to be removed following the remarking out of aircraft stands 1-10 to allow the Airport to accommodate larger aircraft such as the Embraer EJ190. Accordingly, the Airport applied for and was subsequently granted planning permission from LBN on 8th April 2013 to re-provide this stand to the west of the airfield (planning reference 13/00267/FUL). This replacement stand is scheduled to be built out and operational by the end of 2013.
- 2.12 Stands 21-24 to the east of the Terminal are the only ones capable of accommodating the largest aircraft currently operating at the Airport, including the Airbus A318.

- 2.13 The existing aircraft stands are located between the runway and Terminal and are serviced by the existing Western and Eastern Piers which adjoin the Terminal building. The existing Eastern Pier is 9m high and extends along the south side of aircraft stands 21-24, ending in a short length of an 8m high noise barrier which screens aircraft at the eastern end of the aircraft stands. Together with Runway Hold 27, these structures are formed on a concrete deck suspended on piles extending to the base of KGV Dock. This deck construction was undertaken as part of the Airport's Operational Improvement Programme (OIP) between 2003 and 2008.
- 2.14 The airfield is surrounded by grass on which are located the navigational and landing aids. The airside land also accommodates a fire station, various fuel storage compounds, ground and freight handling, flight catering and facilities maintenance that, collectively, are essential for the operation of the Airport.
- 2.15 In addition, there are stands at the corporate aviation facility (known as the "Jet Centre") for smaller company/ privately owned or leased aircraft. The Jet Centre is situated at the western end of the airfield and includes a public access ('landside') and restricted access to the Airport ('airside') off the Connaught Road roundabout. It consists of VIP lounges, parking for up to 25 aircraft, immigration and crew facilities. This area of the site also contains a series of fences which form part of the western perimeter boundary of the airfield.

#### Terminal and Other Buildings

- 2.16 The existing Airport Terminal is a flat roofed building of approximately 13 m in height with a conning air traffic control (ATC) tower at a maximum height of 15 m, located at the western end of KGV Dock. It contains check-in facilities, ticket desks, security processing, a departure lounge, a departure and arrival pier, departure gate areas, domestic and international baggage reclaim, immigration and customs, shops, a business centre and catering outlets.
- 2.17 The first floor departure lounge was re-configured and expanded in 1997 and, in 2001, the Terminal building was extended westwards to increase baggage reclaim capacity, enhance immigration facilities and provide accommodation for control authorities and handling agents. An upgrade of the Airports Departure Lounge was also completed in 2009. The photograph at Figure 2.2 shows existing Terminal viewed from the south (landside).

**Figure 2.2 - Terminal Building Viewed from the South**



- 2.18 To the south of the Terminal, there are drop-off and pick-up facilities, car rental facilities, as well as the Airport's staff office accommodation within the 4 storey City Aviation House (CAH). To the east of the CAH building, is KGV House which is used for offices and as a staff training facility. Further east along the dockside is the LCY Engineering Building and the LCY Fuelling Facility. The remaining land in the Application Site, to the east towards Woolwich Manor Way, is either vacant or used for goods storage and heavy vehicle parking.
- 2.19 The photograph at Figure 2.3 below illustrates the landside area of the Airport as seen from the London City Airport DLR station to the west of the Terminal. CAH can be seen to the right.

**Figure 2.3 - View of the Airport Looking Eastern from the DLR**



## **Surface Access**

### Accessibility by Car

- 2.20 The Airport is well connected to London's public transport rail system via its on site Docklands Light Railway (DLR) station, which links directly into the Airport Terminal building. As a result, it has the highest public transport mode share of any UK airport.
- 2.21 Vehicle access to the Airport is provided from Hartmann Road, which is a private road with an east-west orientation. It forms a signalised junction with the A112 Connaught Road at its western end, which currently functions as the single point of access to the Airport from the wider highway network. At its eastern end, Hartmann Road forms a signalised junction with the A117 Woolwich Manor Way, although this junction is presently closed for access to the Airport.
- 2.22 The A112 Connaught Road has an east-west orientation to the south of the Airport, parallel with Hartmann Road. It continues to the A112 Albert Road, which links with the Woolwich Ferry river crossing via Pier Road.
- 2.23 The A1020 Royal Albert Way is a two-lane dual carriageway that links the Airport, via the A1020 Connaught Bridge and A112 Connaught Road, to the A406 / A13 intersection, approximately five kilometres north-east of the Airport.
- 2.24 The main strategic road connections to the Airport are the east-west A13 and the A406 North Circular that connects with the M11 and M25 motorways. The Airport is approximately 1.5 kilometres from the A13 (Prince Regent's Lane junction), five kilometres from the A406 and 25 kilometres from the M25. In addition, the A102(M) crosses the Thames north-south via the Blackwall Tunnel approximately five kilometres from the Airport. This is the nearest road river crossing point to the Airport.

### Car Parking

- 2.25 There are two main car parking areas within the Airport, shared between passengers and staff. The short stay car park is located closest to the terminal building; and the main stay car park adjacent to east of this. These car parks are accessed via a barrier controlled exit on to Hartmann Road. Staff parking is available within both the short and main stay car parks. Further staff parking is provided at the western and triangle staff car parks.
- 2.26 The short-stay car park has 148 spaces whilst the main stay car park has 644 spaces. Fifty-two spaces are provided the western staff car park, whilst 10 spaces are provided in the triangle staff car park.
- 2.27 In addition, 120 parking spaces are allocated to car hire companies. These are located within the Forecourt and in an area adjacent to Hartmann Road.

## Accessibility by Non-Car Modes

### *Walking*

- 2.28 The Airport is accessible on foot from the surrounding residential and commercial areas. Hartmann Road has a footway on its southern side which connects directly with footways on Connaught Road to the west. There are controlled pedestrian facilities at the traffic signal controlled junction of Connaught Road and Hartmann Road. Pedestrians can also access the Airport from a dedicated pedestrian link between Hartmann Road and Newman Street.

### *Cycling*

- 2.29 Cyclists access the Airport from Hartmann Road. There are 30 covered cycle parking spaces located beneath the DLR adjacent to the motorcycle parking area. This is opposite the main entrance to the Airport Terminal. There are a further 12 cycle parking spaces located within a secure bike store in the short stay car park. Cycle stands are predominantly used by staff.

### *Black Taxi*

- 2.30 The current arrangement for black taxis is that on arrival at the Airport with passengers, the taxi will drop passengers at the front of the Terminal building within the Forecourt. Once the passenger has paid the taxi fare, the vehicle departs from the Forecourt and either turns right away from the Airport or turns left and joins the back of the taxi queue that extends eastwards on Hartmann Road towards the Airport car parks. The taxi queue length can accommodate approximately 200 taxis.

### *Private Hire Minicabs*

- 2.31 Private hire minicabs use the pick-up / drop-off areas for private vehicles within the Airport Forecourt.

### *Buses*

- 2.32 There are three bus stops adjacent to the 'ready' hire car parking area outside the Terminal building on Hartmann Road and adjacent to the Jet Centre (used by staff, crew and passengers). All buses that visit the site perform a 'U' turn around the pick-up / drop-off area so only single stops are required ensuring that passengers do not have to cross Hartmann Road to access the stops. It is also noted that LBN recently granted planning permission (ref. 13/00974/FUL) for the temporary diversion of buses along Hartmann Road from the junction of Woolwich Manor Way.
- 2.33 The Airport is served by two London Bus routes, the 473 and the 474. The 473 service travels from Stratford – Plaistow – LCY – North Woolwich, departing about every 9-13 minutes from the Terminal Forecourt in both directions. The 474 bus operates between Canning Town – LCY – North Woolwich – Beckton – Eastern Ham – Manor Park, departing about every 10-13 minutes in both directions from the Terminal Forecourt. The service operates over a 24 hour period, 7 days a week.

### *Docklands Light Railway (DLR)*

- 2.34 The DLR opened in 1987 to serve the first developments in Docklands, with eleven trains and fifteen stations. Since then, the DLR has progressively been extended to Bank, Beckton, Lewisham,



Stratford International and Woolwich Arsenal via London City Airport. The DLR London City Airport extension opened in December 2005 with the extension onwards to Woolwich Arsenal completed in 2009. The section between Canning Town and London City Airport is known as 'the Airport route.'

- 2.35 DLR is a fully accessible and integrated railway - it connects with more than 100 bus routes, five mainline railways, eight Underground lines and coach, taxi and river services. It operates between 05:30 – 00:30 on Monday to Saturdays and between 07:00 – 23:30 on Sundays.
- 2.36 Since January 2012, DLR trains on the Bank to Woolwich Arsenal service have been increased from two to three-carriage trains, to help accommodate increasing DLR passenger numbers using the service from Woolwich Arsenal.

### **The CADP Planning Proposals**

- 2.37 As described in Chapter 1, the works proposed by the CADP are proposed in two planning applications. With the exception of a landside Hotel, detailed planning permission is being sought for CADP and is described in Application 'CADP1'. The Application Site for CADP 1 extends to 60.1 hectares and includes the existing airport boundary and areas outside (principally to the south) required for the implementation of the CADP. It overlaps with the 0.59 hectare application site for the proposed Hotel (CADP2) to ensure integration between the two proposals.
- 2.38 In respect of the outline application for the Hotel (CADP 2) all matters are reserved, albeit that the definition on the layout and maximum scale of the buildings, together with the means of access, are described on parameters plans. It is anticipated that a planning condition would be imposed to ensure the development comes forward in accordance with the parameter plans, hotel design codes and the quantum of development.
- 2.39 A description of the works proposed for CADP1 is given below and the proposed site plan is presented in Figure 2.4 at the end of this chapter. This replicates the Key Plan (No4) included with the Planning Application Drawings.
- 2.40 The development is proposed to occur in two main phases, as summarised below. However, it should be noted that the exact sequence of these elements is subject to change, as outlined in Chapter 6: Development Programme and Construction.

#### **'Interim CADP':**

1. Demolition of existing buildings and structures;
2. Creation of 3 new, and 4 upgraded/relocated aircraft parking stands;
3. Partial extension of the eastern parallel taxi-lane;
4. Phase 1 of a Western Terminal Extension (WTE1);
5. Alterations to the existing Terminal Building to provide expanded and reconfigured passenger facilities and circulation areas;
6. Western Energy Centre;

7. Reconfigured western Service Yard;
8. Temporary Facilitating Works including: a Coaching Facility, extended OBB Facility and a temporary Noise Barrier; and,
9. Erection of a temporary construction noise barrier (of approximately 3m) on Woodman Street.

**‘Completed CADP’:**

1. Demolition of existing buildings and structures, including City Aviation House;
2. Creation of 4 new, and 4 amended aircraft parking stands;
3. Full extension of the eastern parallel taxi-lane;
4. A permanent Noise Barrier;
5. Phase 2 of a Western Terminal Extension (WTE2);
6. Eastern Terminal Extension (ETE) to the existing Terminal Building (including a new Eastern Passenger Pier);
7. Replacement Terminal Forecourt area;
8. Dockside elements including: Taxi Feeder Park, upgrade to Hartmann Road, landscaping, carparks (for use by airport passengers, staff and car rental - including a single-storey deck structure to the western-most carpark);
9. Eastern Ancillary Buildings, including: Taxi /Car Rental Services Building, Taxi Marshall’s Kiosk, Vehicle Control Point facility, and Eastern Energy Centre;
10. Rendezvous Point (RVP) Pontoon over KGV Dock for emergency vehicle access;
11. Dock Source Heat Exchange System and Fish Refugia within KGV Dock; and
12. Associated drainage and other supporting services infrastructure.

- 2.41 The main elements of these works are described below with reference to the relevant planning application drawings that form part of the CADP submission. The schedule of CADP application drawings is included at Appendix 2.1 of this ES. These drawings are described in further detail in the Planning Statement and Design and Access Statement (DAS) which accompany the CADP planning submission.

Description of Development

*Stands and Deck over King George V Dock [Drawing references 5.1 onwards]*

- 2.42 New aircraft stands, the extended taxi-lane and the Eastern Terminal Extension will be largely situated on a 7.4 hectare deck or platform over King George V (KGV) Dock. The deck will comprise precast reinforced concrete planks with an in-situ topping spanning onto precast concrete beams. The beams are to be supported by bored concrete piles with steel casings (typically spaced at 10m



centres) founded in the Thanet Sand beneath the dock bed. With the exception of pits for plant (including escalators, moving walkways and lifts), the deck will sit just above the water line of the dock.

- 2.43 It is proposed to enlarge existing stands 21-24 (located to the east of the existing Terminal building) and provide 7 additional stands to the east of these enlarged stands. One of the enlarged stands and all of the new stands will sit on the deck over the KGV Dock. The proposed stands are intended to allow larger new generation aircraft to manoeuvre into position unassisted and the layout allows for new and upgraded stands, each measuring 46 x 49.1metres. All new stands will be fitted with modern aircraft handling equipment including fixed electrical ground power (FEGP) and will be joined to the existing runway by new runway links to the south of the existing runway.
- 2.44 The works will create an eastern parallel taxi-lane to the south of the runway, running from existing taxi link D (in the west) to end of the runway 27 (in the east) where it will replace the existing runway hold. This will allow aircraft, in certain situations, to taxi from the aircraft parking stands to the take-off and landing position without having to use the runway; thereby improving operational efficiency. An additional aircraft link and emergency vehicle link are proposed between existing Taxiway D and K.

*Temporary Facilitating Works [Drawing references 5.21 onwards]*

- 2.45 Temporary 'Facilitating Works' are proposed in conjunction with the initial phase of the development which is likely to include 3 additional stands. Because the new East Pier will not be constructed in the Interim CADP phase, permission is sought for a temporary passenger Coaching Facility located to the east of existing stand 24. This facility will be removed, at the latest, once the East Pier is operational.
- 2.46 It is also proposed to erect a temporary Noise Barrier to the south of 3 new aircraft stands to attenuate ground noise from aircraft and construct an extension to the existing outbound baggage area.
- 2.47 The Facilitating Works thus comprise:
- a) A Temporary Coaching Facility – providing 3 coaching gate rooms close to the existing Terminal for passenger convenience and reduced passenger walking distances;
  - b) A Temporary Outbound Baggage Extension – comprising an extension to the existing concrete deck to provide additional baggage processing space. The area will be enclosed with a new lightweight fabric structure.
  - c) A Temporary Noise Barrier – this is an extension of the noise barrier to the east of stands 21-24 and has been designed to attenuate aircraft noise prior to the construction of a new passenger pier.

*Western Terminal Extension and Related Works [Drawing references 6.1or 6A.1 onwards]*

- 2.48 The Western Terminal Extension (WTE) will be built in two stages. The Interim CADP will comprise new landside and catering uses in an extension at ground floor with a new security area on the first floor (thereby enabling the first floor of the existing Terminal to be extensively reconfigured for airside passenger circulation, seating and retail and catering areas). The second floor of the proposed

extension will comprise airport related office accommodation. As part of the Interim CADP it is also proposed to build the Western Energy Centre (producing up to 35 kWt) together with a Western Service Yard.

- 2.49 The second stage of the WTE (the Completed CADP) will provide additional Airport related office accommodation which is partly required due to the need to relocate staff from the demolished City Aviation House (CAH) which sits in the location of the proposed Forecourt.

*Passenger Forecourt [Drawing references 7.1 onwards]*

- 2.50 A new passenger Forecourt area is proposed to the south and east of the enlarged Terminal. To meet security requirements there will be a 30m wide landscaped vehicle free zone in front of the enlarged Terminal building. The Forecourt will include a black taxi pick-up and drop-off facility, a private vehicle pick-up and drop-off facility and bus stops for London Buses.

*Eastern Terminal Extension, including East Pier and Eastern Energy Centre [Drawing references 8.1 onwards]*

- 2.51 The proposed Eastern Terminal Extension (ETE) will be dedicated to passenger arrivals, with the existing Terminal reconfigured for departing passengers. This new 'Arrivals' part of the Terminal will be up to 24 m AOD. The plans show a lower component of the building at its southern end fronting the passenger Forecourt (up to 17.160 m AOD).

- 2.52 Key components of the ETE are the following:

a) Ground Floor

- Airside: baggage reclaim, customs and ancillary areas
- Landside: arrivals concourse, retail, catering (food and beverage) and ancillary areas

b) First Floor

- Airside: Transfers Security, Immigration, office and public toilets

c) Second Floor

- Airside: passenger lounges and passenger circulation areas & offices
- Landside: offices, staff facilities and ancillary areas

- 2.53 The ETE will also include a reconfigured outbound baggage processing area. This part of the building will be laid out so baggage conveyors rise from the check in area (located within the existing Terminal building) to baggage machines at mezzanine level where bags will be sorted and then loaded onto baggage trailers below before these are driven to aircraft.

- 2.54 To serve the new and upgraded aircraft stands to the east of the extended Terminal Building, a 3 storey East Pier is proposed (up to 21.5 m AOD). The building will provide circulation, waiting and ancillary facilities for departing and arriving passengers. For security reasons arriving and departing passengers must be segregated with separate walkways/travelators with a domestic arrivals

walkway at ground level, international arrivals on the first floor and international and domestic departures at the upper level, adjoining passenger departure waiting areas.

- 2.55 A separate Eastern Energy Centre (Drawing References 9.33 to 9.37), to the south of the Rendezvous Point (RVP) access pontoon located in the Dockside, will house similar plant to that contained in the Western Energy Centre and will provide additional space for heat exchangers to allow connectivity to a future district heating system, as and when this becomes available in the area.
- 2.56 A Dock Source Heat Exchange (DSHE) system (Drawing Reference 9.38) is also proposed to serve part of the heating and cooling demand for the Airport. Heat exchanger pipework will be installed within King George V Dock to the south of gaterooms in the replacement East Pier (up to 7 in total). It is estimated that each system loop, would extend by up to 25x25m within the dock water. For ease of installation, maintenance and security each loop will be extended into open dock area to the south of the new deck/replacement pier, rather than under the deck. The heat exchange pipework is proposed to be located between 3m to 6m below the dock water surface. Each of the system loops will be installed on a frame with stilt, with the stilts designed to give at least 2-3m clearance from the dock bottom, to avoid disturbing any contaminants. A deflector plate is also proposed beneath the heat exchanger to minimise disturbance of the deeper water levels.
- 2.57 A permanent Noise Barrier (13.5 m AOD) is proposed at the end of the East Pier to mitigate noise impacts principally from aircraft using the end stand.

*Landside Parking and Ancillary Areas [Drawing references 9.1 onwards]*

- 2.58 The main existing vehicle access point to the Airport from the western end of Hartmann Road will be maintained and supplemented by a new permanent access from the eastern end of Hartmann Road at its junction with Woolwich Manor Way. The existing traffic controlled junction will be upgraded and Hartmann Road enhanced along its length (to have dimensions consistent with adoptable standards).
- 2.59 Between Hartmann Road and KGV Dock to the south of the proposed Hotel (see below), it is proposed to include decked and surface level car parking (to be used by airport passengers and staff and for car rental). It is also proposed to include a taxi feeder park together with various ancillary landside buildings. Table 2.1 summarises the number of parking space proposed relative to the existing.

**Table 2.1 Comparison of Existing vs Proposed Car Parking Provision**

Area	Existing	Proposed Spaces
Short Stay	148	749
Main Stay	644	
Staff Car Park	Within short and main stay	300
Western Staff Car Park	52	52
Triangle Staff Car Park	10	0
Car Hire	120	150
Total	974	1,252

- 2.60 A temporary noise barrier (3 m high) is proposed along part of the southern boundary of the site to mitigate noise impacts for residents to the south of the eastern end of Woodman Street during the construction process.

#### *Floorspace*

- 2.61 Details of existing and proposed floorspace are provided in Table 2.2 below.

**Table 2.2 – Existing and proposed floorspace**

Component	Existing (m2)	Total (m <sup>2</sup> )	Proposed
Passenger Terminal & Piers Total	17,991	51,801 (maximum)	
Decked Car Parking	-	7,432	
Vehicle Control Post Building	-	57	
Taxi/Car Rental Services Building	-	625	
Eastern Energy Centre	-	527	
Western Energy Centre	-	625	
Temporary Facilitating Works (including Coaching Building, link bridge & Area)		2910	

Notes: All figures are gross external, unless stated; Retail GEA & GIA figures are equal to each other; Floorspace figures exclude roof top plant where exposed and not fully enclosed, for which planning permission is sought in principle. Fully enclosed roof plant is included. Floorspace figures exclude roof top and basement plant, for which planning permission is sought in principle; Excludes Car parking Floorspace.

\* Includes changes to retail areas within existing Terminal within CADP1

#### **Planning Application 2 (CADP2) – Outline Application for Hotel**

- 2.62 Outline planning permission is being sought for the Hotel in order to provide the necessary flexibility for the detailed design of the scheme at a later date. Parameter Plans (Drawing References 10.1 to 10.4) and the Design Code accompanying Application CADP2 are intended to provide a framework of controls which will inform and control all reserved matters applications and, where appropriate, provide additional information on layout, means of access, scale, appearance and landscaping where is considered necessary to provide further certainty in relation to the form, operation and design quality of the proposed scheme. The Hotel will include upto 260 bedrooms (14,000 m<sup>2</sup> GEA) and has been designed to include retail and catering uses and a business centre.
- 2.63 The Town and Country (Development Management Procedure) (England) Order 2010 ('DMPO') (as amended) sets out requirements and guidance for outline planning applications. Save for what is shown on the parameter plans, this application reserves all matters which the DMPO defines as follows:
- Layout – "the way in which buildings, routes and open spaces are provided, situated and orientated in relation to each other"

- b) Means of access – “accessibility to and within the site for cycles and pedestrians in terms of the positioning and treatment of access and circulation routes and how they fit into the surrounding network”
- c) Scale - “the height, width and length of each building in relation to their surroundings”.
- d) Appearance – “the aspects of a building or place within the development which determine the visual impression the building or place makes, including the external built form of the development, its architecture, materials, decoration, lighting, colour, texture”
- e) Landscaping “the means of treatment of land for the purposes of enhancing or protecting the amenities of the proposed development (including hard and soft landscaping, planting, screening, surface materials, etc)”

*Hotel Parameter Plans [Drawing References 10.1 to 10.14]*

2.64 Parameter Plans have been submitted with CADP2 to provide the parameters for future reserved matters for the hotel application. These parameters have also informed the EIA process for this element of the CADP, for example in defining the maximum visual impact of the Hotel. These Parameter Plans are as follows:

- a) **Parameter Plan 10.1: Building Plot Parameter Plan:** The principal function of Parameter Plan 8.1 is to show the maximum proposed building outline for the Hotel (maximum extent is shown in green). It shows that the building will be up to 45 x 45 metres with the possibility of reducing in width or length by 5 metres on each of 3 of the 4 sides.
- b) **Parameter Plan 10.2 & 10.3: Proposed Maximum and Minimum Heights Parameter Plans:** Parameter Plans 10.2 & 10.3 indicate the maximum (32.1 m AOD) and minimum (27.3 m AOD) building heights that would be permitted for the Hotel. The parameters are shown in elevation and on plan to assist interpretation. For information only, the illustrative layouts are shown for context. These plans are intended to provide flexibility in the final design of scheme which will be submitted as a reserved matters application at the detailed design stage
- c) **Parameter Plan 10.4 Proposed Access and Circulation Parameter Plan:** This plan shows the anticipated location of the buildings entrance and location for servicing and taxi routes and pick up/drop off.

*Hotel Design Code*

2.65 The Design Code for the Hotel is intended to add a further level of detail to the Parameter Plans to inform future reserved matters applications. They contain committed design guidelines and principles in respect of matters such as materiality and landscaping/public.

**Conclusion**

2.66 This chapter, read in conjunction with Chapter 1: Introduction, has provided an overview of the main elements of the CADP, comprising a full application for the Terminal and infrastructure works (CADP1) and an outline application for the Hotel (CADP2). A description of the engineering works and the likely phasing of the CADP is provided separately within Chapter 6: Development Programme and Construction.

2.67 The next chapter - Chapter 3: EIA Methodology, describes the principal assessment methods and criteria used for the EIA, together with the aircraft and passenger forecasts, assessment years and ‘sensitivity tests’ applied in order to determine the likely significant environmental effects of both the CADP1 and CADP2.

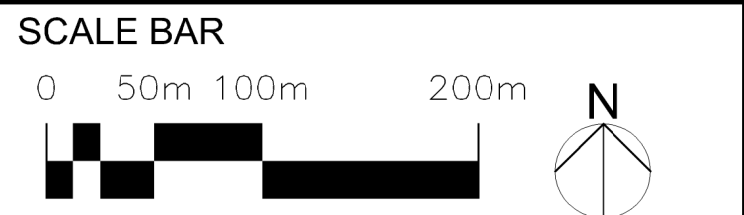




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- All information shown outside the Proposal Boundary is for illustrative purposes only.
- Internal layouts are for illustrative purposes only.

- Base building survey information by LCY and MSA



- LEGEND
- EXISTING RETAINED PRINCIPAL BUILDINGS
  - PROPOSED BUILDINGS
  - EXTENT OF PROPOSED WORKS
  - EXTENT OF PARKING ZONES FOR FULL PLANNING PERMISSION
  - PROPOSED DEVELOPMENT BOUNDARY LINE
  - PROPOSED NOISE BARRIER
  - APPLICATION DRAWING SET BOUNDARY

-	MN	01.07.13	Issued for Planning
Rev	Dm	Date	Description

## FOR INFORMATION

LondonCityAirport

London City Airport Limited City Aviation House Royal Docks London E16 2PB

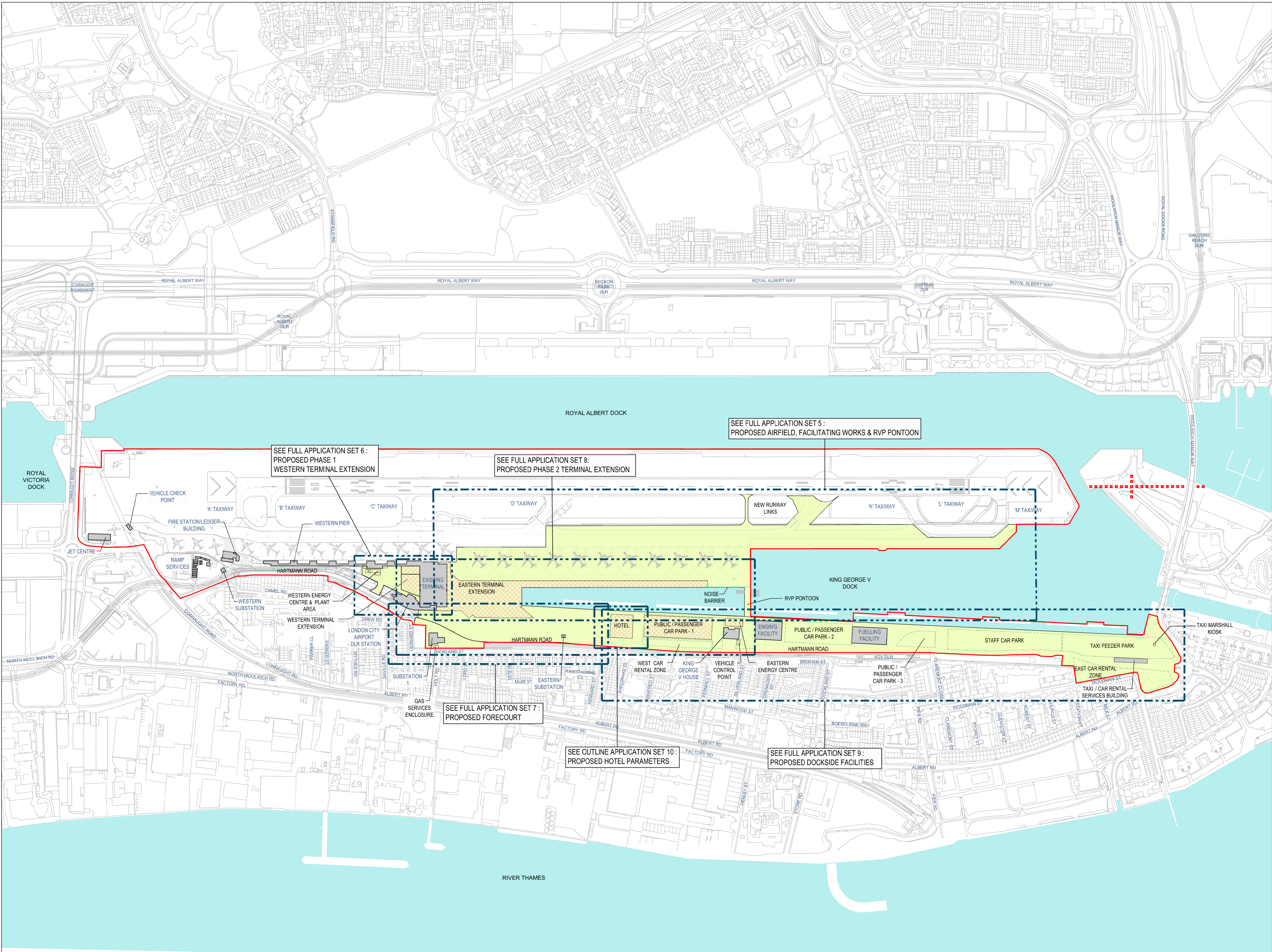
**PASCALL+WATSON**

5 Carlsson Court 116 Putney Bridge Road London SW15 2NQ  
+44 (0)20 8874 1311 [www.pascalls.co.uk](http://www.pascalls.co.uk)

Client  
**LONDON CITY AIRPORT**  
Project Name  
**CITY AIRPORT DEVELOPMENT PROGRAMME**

Title  
**3 - KEY PLAN**  
**Figure 2.4**

Discipline		Project Phase	
Architecture		PLANNING	
Drawing Originator		Originator's Job No.	
Pascall+Watson architects		4486	
Checked By	Checked Date	Drawn By	Drawn Date
SW	01.05.2013	GC	11.03.2013
Approved By	Approval Date	Scale	
MN	01.05.2013	1:3500 @ A1	
Building Grid Reference			
SITE			
Client	Originator	Project Ref.	Revision
LCY	P+W	4486	-
Drawing No.		Discipline	Revision
SI20004		B	-



1 PROPOSED SITE KEY PLAN  
1:3500







### 3 EIA Methodology

#### Introduction

- 3.1 This Chapter sets out the general scope and methodology adopted throughout the Environmental Impact Assessment (EIA) for the proposed CADP (CADP1 and CADP2), including the relevant guidance and legislation
- 3.2 The environmental, socio-economic and related effects of the proposed CADP have been predicted by comparing the conditions should permission be granted (the 'With Development' scenario) against the prevailing conditions for the 'Without Development' scenario, otherwise known as the 'Base Case'. The methods used to assess these effects and the criteria assigned to evaluate their significance are described in this chapter.
- 3.3 While general significance criteria for the EIA are presented within this chapter, any specific criteria applied to the individual environmental topics are described in the corresponding technical chapters of this ES.

#### EIA Regulations and Guidance

- 3.4 The EIA has been prepared in compliance with the EIA Regulations (2011) which implement European Council Directive No 85/337/EEC as amended by the Council Directive No. 2011/92/EU. Reference is also made to current EIA good practice guidance including:
  - a) Department of Environmental, Transport and the Regions (DETR) Circular 02/99 Environmental Impact Assessment;
  - b) Department for Communities and Local Government (DCLG), 2006; Amended Circular on Environmental Impact Assessment. A Consultation Paper June 2006;
  - c) Institute of Environmental Management and Assessment (IEMA) Update to Guidelines for Environmental Impact Assessment (2006);
  - d) Office of the Deputy Prime Minister (ODPM) Environmental Impact Assessment – A Guide to Procedures, 2001;
  - e) Department for Communities and Local Government (2012) Planning Act 2008: Guidance on the pre-application process;
  - f) IEMA (2011) The State of Environmental Impact Assessment Practice in the UK;
  - g) The Planning Inspectorate -'Using the Rochdale Envelope' (Advice Note 9, April 2012);
  - h) Recent EIA case law; and
  - i) Topic specific guidance and assessment criteria, where appropriate.
- 3.5 Chapter 5: Planning Context and Existing Environmental Controls and the Planning Statement which accompanies the CADP submission detail the planning policies and reports which are also relevant to CADP1 and CADP2, including the Aviation Policy Framework (2013).
- 3.6 Other industry standards on the specific application of EIA to aviation projects have also been taken into account, by reference to other comparable ES examples. However, there is no definitive EIA guidance which exists for the aviation sector.

### Planning Strategy and EIA

- 3.7 As described in Chapter 2: Site Context and Scheme Description, full planning permission is being sought for proposed airside infrastructure, Western and Eastern extensions to the Terminal building and associated works (Application CADP1) while outline planning permission is being sought for the proposed Hotel (Application CADP2) to provide a degree of flexibility for the building which is likely to be brought forward separately by a hotel operator.
- 3.8 This EIA has assessed the detailed and outline elements of both CADP1 and CADP2, informed by a combination of detailed drawings, parameter plans, technical studies, and strategies. The relevant planning drawings are listed in Chapter 2 and Appendix 2.1.
- 3.9 The Description of Development document (Appendix 1 to the Planning Statement) explains the status of the application drawings and confirms what is for approval and what is provided for information purposes only. The application drawings for CADP1 have been arranged into drawing sets of which relate to different areas of the Airport. Plans 1 to 4 are site wide plans (Site Plan, Demolition Plan, Key Plan, Illustrative Site Plan) with the remainder relating to the following:
5. Airfield plans, Facilitating Works and RVP Pontoon;
  6. Western Terminal Extension;
  7. Forecourt Area; and
  8. Eastern Terminal Extension.
- 3.10 The Hotel forming part of the outline CADP2 Application has been assessed by reference to a set of Parameter Plans (Drawing References 10.1 to 10.4) and a Design Code accompanying this application. The testing of such parameters is now common practice in EIA and this ensures that the likely environmental effects of such elements are properly identified and understood at the outline planning stage.
- 3.11 Where relevant, these parameters have been used to assess the 'worse case' environmental impact. The subsequent process of detailed design of the Hotel will observe these parameters, such that the environmental effects (e.g. the visibility of the building from key view points) are no more than those presented in this ES.

### EIA Stages

- 3.12 The EIA process has comprised the following stages:
- a) Establishing the existing environmental conditions of the Airport and Application Site by a review of the planning history, operations and environmental controls in force at the Airport;
  - b) Undertaking baseline surveys and site investigations at the Airport;
  - c) Collating and evaluating third party data (e.g. census statistics) and other information and data held by LBN and other statutory authorities;

- d) Identification of existing sensitive receptors from the Airport (including residents, listed buildings, ecologically sensitive areas etc.), as well as future potential receptors such as planned developments in the area;
- e) Production and submission of a Scoping Report to LBN on 8<sup>th</sup> October 2012
- f) Receipt of Scoping Opinion from LBN on 4<sup>th</sup> December 2012 and subsequent responses and updates (described below);
- g) Ongoing consultation with statutory and non-statutory consultees in relation to the EIA.
- h) Examination of the aircraft movements and passenger forecasts produced by York Aviation;
- i) Review of detailed scheme drawings, parameter plans and other design information prepared by the CADP architects (Pascall + Watson) and engineers (Atkins and TPS) ;
- j) Assessment of the likely significant environmental effects, by comparing the differences between the 'With' and 'Without' development scenarios for relevant assessment years;
- k) The completion of various 'sensitivity tests' using different forecast data and assumptions;
- l) Assessment of any cumulative effects of the development taking account of committed and allocated developments which have not yet been constructed;
- m) Identification and incorporation of direct 'mitigation by design' into the final CADP proposals;
- n) Identification of the residual (remaining) effects of the proposals assuming that the identified mitigation measures and any further enhancements are implemented; and,
- o) Preparation and submission of the ES in support of the planning application.

### **Previous Planning Application and EIA**

- 3.13 The application, in August 2007, to increase in the number of permitted aircraft movements to 120,000 (the "Interim Application") was subject to a comprehensive process of EIA and an Environmental Statement was prepared and submitted to LBN in support of this application (London City Airport Interim Application ES, August 2007). The ES presented an assessment of the potential environmental effects of the proposed increase in flights with respect to: surface transport and access; noise; air quality; socio-economics; waste and cumulative effects.
- 3.14 Two addendums to this ES were subsequently prepared in order to respond to requests by LBN for further information on the environmental and associated effects of the proposals. The first of these ES Addendums (December 2007) provided an additional assessment of the following topics: air noise, ground noise and road traffic noise; air quality; surface access and the impact of increased passenger numbers on the capacity of the DLR; and, proposed environmental monitoring and mitigation.
- 3.15 The second ES addendum (April 2008) provided further information on the socio-economic effects from the projected increase in the Public Safety Zones (PSZs) at that time, plus a more detailed consideration of cumulative effects and waste.
- 3.16 Taking into account the potential environmental effects of the proposed increase in flights, as reported in the above ES documents, LBN granted permission for this "Interim Application" in July 2009 (ref. 07/01510/VAR). This permission allows up to 120,000 annual aircraft movements at the Airport, subject to the operation of noise factored movements and daily and other limits. The Section 106 Agreement (the "2009 Planning Agreement") accompanying the

permission superseded a number of previous agreements and, together with the consolidated planning conditions attached to the 2009 Permission, control the operation of the existing Airport from a planning perspective.

- 3.17 Whilst the 2007-2008 EIA process and findings provides some context to proposed CADP, insofar as it informed the current environmental controls under which the Airport operates in accordance with the 2009 Planning Agreement (as set out in Chapter 4), this was based on different forecasts and assumptions about the rate of growth of the Airport at that time. In particular, the impact assessments adopted a central assumption of 95,000 scheduled movements and 25,000 Jet Centre ('Business Aviation') movements by 2010 and considered, through the use of sensitivity testing, that there could be up to 105,000 scheduled movements together with 15,000 Jet Centre movements by this time. It was also predicted that up to 3.9 million passengers could be accommodated at the Airport with existing infrastructure and the number of permitted aircraft movements sought.
- 3.18 Over the past seven years, the aviation industry has changed significantly, not least through the influence of the recession and technology advancements in aircraft design. In particular, the introduction of larger Code C aircraft and the need for new infrastructure to accommodate these aircraft plus the increasing concentration of aircraft movements during the morning and afternoon peak period (as described in Chapter 1) was not anticipated at the interim application stage. The Interim Application was however, described as preceding a further, more comprehensive application (or applications) to develop the Airport in phases to 2030, in accordance with the Airport's 2006 Masterplan.

### **EIA Scoping Process and Consultation**

- 3.19 The approach to the EIA was first set out within a Scoping Report which was submitted to LBN on 8<sup>th</sup> October 2012, together with a request for a Scoping Opinion in accordance with Regulation 13 of the EIA Regulations 2011 (see Appendix 3.1). The Scoping Report set out the proposed technical scope, methodology and assumptions of the EIA. It also provided a rationale for certain topics to be 'scoped out' from the EIA, as they were judged to be unaffected by the proposed CADP or were unlikely to give rise to significant environmental effects.
- 3.20 LBN provided its Scoping Opinion on 4<sup>th</sup> December 2012. This broadly endorsed the Scoping Report but requested that some additional matters should be included or clarified in the ES. The Scoping Opinion took account of written representations from a number of consultation bodies who had been sent the Scoping Report. These responses are reproduced in Appendix 3.2 and summarised later in this chapter (see Table 3.3).
- 3.21 Following receipt of the Scoping Opinion, the Airport and its Project Team met with LBN on several occasions to report on the continuing progression of the EIA process and associated studies and to discuss the matters raised by the Opinion. Meetings were also held with the Environment Agency (EA), English Heritage (EH), the Greater London Authority (GLA), Royal Docks Management Association (RoDMA), the London Borough of Tower Hamlets (LBTH) and the Royal Borough of Greenwich (RBG).

- 3.22 Taking into account the outcome of the above discussions and subsequent changes to the CADP proposals, a formal response was made to LBN on 21<sup>st</sup> February 2013 to address the specific matters raised by the Scoping Opinion and to update the Council on some proposed changes to the methodology and scope of the EIA (see Appendix 3.3). A separate detailed response by AQC Ltd (air quality consultants to the Airport) to the matters raised on the scope and methodology of the air quality assessment was also sent to LBN on 19<sup>th</sup> December 2012 (included at Appendix 3.3).
- 3.23 At the time of the scoping update letter of 21<sup>st</sup> February, the Airport was promoting a single 'hybrid' planning application whereby some elements of the CADP would be applied for in full and some in outline. The rationale for this approach was to preserve some flexibility in the future design of the Eastern Terminal Extension and the proposed Hotel, noting that these elements will not be needed until 2021 – 2023 and, as such, the final details (of layout, appearance, scale, access and landscaping) would have been subject to future reserved matters applications to LBN.
- 3.24 Under this hybrid application route, the EIA would have determined the likely significant environmental effects by assessing the maximum parameters of these outline parts. However, after ongoing discussions with the Council, the Airport agreed to revert to a full planning application for all elements of the CADP except for the proposed Hotel and to submit two separate applications (CADP1 and CADP2) as described in Chapters 1 and 2. This means that the EIA is now founded on the assessment of the detailed designs (as provided in the drawing listed at paragraph 3.9 above) except for the Hotel where the corresponding parameter plans have been assessed.
- 3.25 A further update on the planning strategy and EIA scope was provided by letter to LBN on 14<sup>th</sup> June 2012. This confirmed the dual application approach (CADP1 and CADP2) and described these proposed developments as they now appear on the application forms. This scoping update, contained in Appendix 3.3, also addressed the following matters:

#### *EIA Baseline Year*

- 3.26 Due to the delay with submitting the planning applications, it was confirmed that 2012 would be adopted as the Baseline Year for the EIA, rather than 2011 as originally envisaged. This is because a complete and validated set of data for 2012 is now available and can be used in assessments, including surface access traffic forecasts and the for the air quality and noise modelling work.

#### *Updated Movement Forecasts*

- 3.27 As explained in the Need Statement submitted with the planning applications, in January 2013 the Department of Transport (DfT) released its latest air passenger transport projections, which contained a lower growth rate assumption for UK aviation as a whole than had been predicted previously. Thereafter, in early May 2013, the Civil Aviation Authority (CAA) released its latest survey data for 2012. As a consequence of these new data, York Aviation has made an adjustment to their passenger forecast in both the 'With' and 'Without' CADP cases used for the purposes of the EIA.

- 3.28 In summary, annual passenger numbers are forecasts to be slightly lower in both 2021 (approximately 52,000 fewer passengers) and 2023 (approximately 74,000 fewer passengers). The new set of forecasts are contained in the Need Statement and summarised in Table 1.2 of Chapter 1 of this ES.

#### *Cumulative and 'Base Case' Developments*

- 3.29 The scoping update letter of 14<sup>th</sup> June (see Appendix 3.3) also confirmed that the replacement of Stand 11, which was granted planning permission on 8<sup>th</sup> April 2013 by LBN (planning reference 13/00267/FUL) would now be considered as part of the future baseline for the EIA because this replacement stand is expected to be built out and operational by the end of 2013. This will return the Airport to having 18 operational stands for scheduled aircraft, consistent with the position before mid-2011.
- 3.30 As the timing of the proposed alterations and improvements to the existing West Pier (as described in Chapter 19: Cumulative Effects) has become less certain, partly as a consequence of the current CADP proposals, this project has now been considered as a 'cumulative development' as described in Chapter 19: Cumulative Effects.

#### *Other Cumulative Schemes*

- 3.31 In addition to the list of 'cumulative schemes' set out in Section 17 of the October 2012 Scoping Report, together with those identified in the Council's subsequent Scoping Opinion, the EIA also now considers a further development identified by LBN, namely:
- a) 12/01910/FUL - Erection of three hotel buildings (364 new hotel rooms and 38 suites, 161sqm of A3 floorspace and 813 sqm of B1 floorspace).

#### **Temporal and Spatial Scope of the EIA**

- 3.32 The EIA Regulations require the assessment of a range of potential environmental, socio-economic and physical conditions or issues that may be altered by a development and dictates that the 'significance' of such effects should be determined as part of an EIA process. These include effects on human beings, flora, fauna, soil, water, air, climate, landscape, material assets and cultural heritage, and the interaction between these effects.
- 3.33 Within this ES, the significant environmental effects of the proposed CADP (CADP1 and CADP2) have been predicted for each relevant environmental topic and compared against the existing (Baseline) and future (Base Case) environmental conditions, in both the 'With Development' and 'Without Development' scenarios.

#### *Temporal Scope*

- 3.34 The environmental effects of the CADP have been assessed in the EIA using defined assessment years and criteria and by determining the difference in these effects between the 'With' and 'Without Development' projections.

- 3.35 The temporal scope for the project has been determined by taking into account the up-to-date forecasts of annual aircraft movements, passenger numbers and aircraft fleet mix (as presented in the Need Statement and summarised in Table 1.2 of this ES) and by considering the likely sequence of construction and implementation of CADP1 and CADP2, as described in Chapter 6: Development Programme and Construction.

#### *Assessment Years*

- 3.36 Table 3.1 below illustrates the main assessment years for the CADP, together with the associated aircraft and passenger forecasts.

**Table 3.1- EIA Assessment Years**

Assessment Year	Explanation	EIA Topic	Forecast With Development	Forecast Without Development
Baseline Year: 2012	2012 constitutes the most reliable and robust 'baseline year' and ensures a full calendar year of data can be assessed.	A baseline year of 2012 has been assessed in the majority of the EIA topics based on the recorded 3.03 million passengers and 75,502 aircraft movements. However, where more recent surveys and investigations have been undertaken, (e.g. site investigations) the baseline has also been informed by this data.	N/A	N/A
2019: Transitional Year	During 2019, the majority of the proposed CADP works will be under construction. This year therefore represents a 'transitional' period with ongoing construction and partial operation of the CADP. The forecasts that have been calculated are based on the infrastructure that will be in place at this time.	Where relevant, this year has been assessed in terms of environmental impacts. This includes the traffic, air quality and noise assessments which would be influenced by the changing aircraft fleet mix during this transitional period.	98,822 scheduled movements and 8,100 business aviation movements with 4.87 million passengers.	84,941 scheduled movements and 8,100 business aviation movements with 4.15 million passengers.
2021: Design Year	This year represents the completion of the CADP1 and CADP2 works	For certain topics, it is only relevant to consider the extent of the built works and not to assess the impacts beyond this point. These include: contaminated land, built heritage and archaeology, ecology, waste, and flood risk. This assessment year has also been considered for surface	104,901 scheduled movements and 6,400 business aviation movements with 5.51 million passengers.	88,822 scheduled movements and 8,500 business aviation movements with 4.39 million passengers.

Assessment Year	Explanation	EIA Topic	Forecast With Development	Forecast Without Development
		access, air quality and noise. In terms of the impacts of the forecast aircraft movements, fleet mix, load factors and passenger numbers by this time.		
2023: Principal Assessment Year	2023 has been chosen as the 'Principal Assessment Year' for the purpose of the EIA because it represents the optimisation of the CADP infrastructure and associated improvements at the Airport. The 2 year period after the completion of the proposed CADP physical works allows for a gradual increase in passenger numbers to approximately 5.87 million, due to an increased 'load factor' and the displacement of corporate aviation flights by scheduled commercial movements.	This year has been assessed within the socio-economic, air quality, noise and transport assessments.	107,119 scheduled movements and 3,920 business aviation movements with 5.87 million passengers.	87,713 scheduled movements and 9,000 business aviation movements with 4.46 million passengers.

#### *Construction Assessment Years*

- 3.37 In regard to the assessment of construction effects, the construction period is likely to extend between 2015 and 2021 (Year 1 to Year 7) as described within Chapter 6: Development Programme and Construction. The peak year for construction is considered to be 2018 (Year 4), assuming the construction starts in early 2015. Where relevant, these peaks have been assessed within the EIA. The approach to the assessment of construction effects has also been detailed within the individual chapters.

#### **Sensitivity Tests**

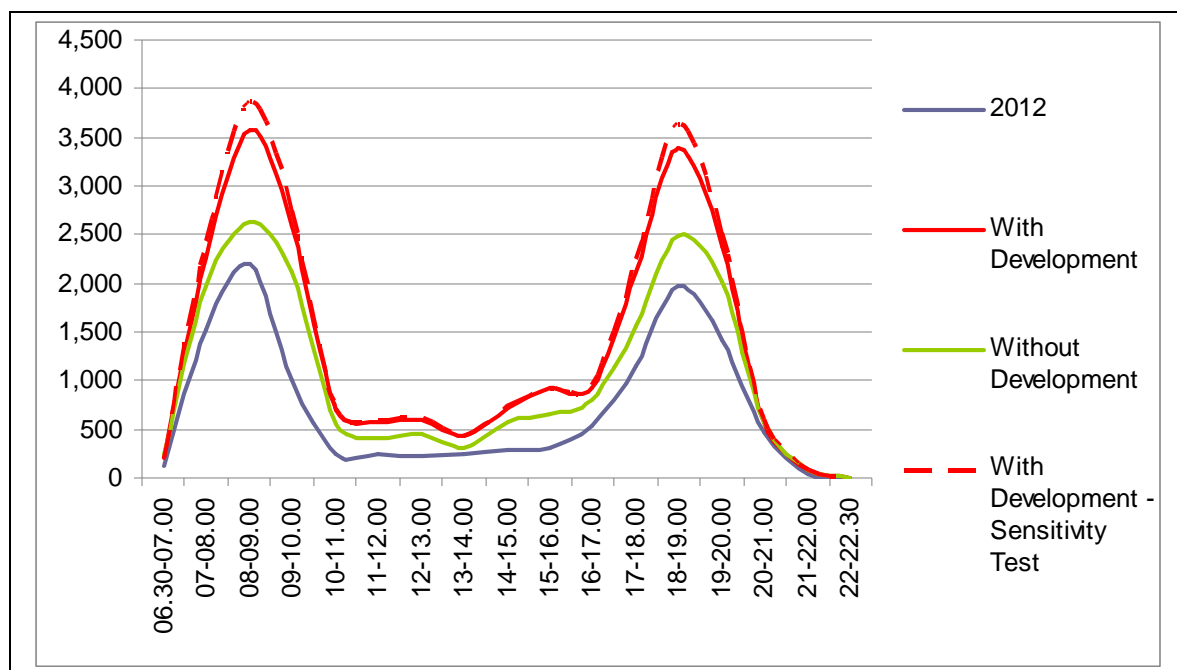
##### *2023 - Fleet Mix Sensitivity Test (Higher Passenger Case)*

- 3.38 In its Pre-Application letter of 17th January 2013, Transport for London (TfL) asked the Airport to assess the theoretical maximum utilisation of all stands and the existing runway by larger aircraft, with full passenger loads, thereby leading to higher passenger numbers using the DLR and other surface access modes during peak hours. In response to this request, York Aviation prepared a set of additional forecasts for 2023. These 'worst case' forecast data have been used to undertake a sensitivity test on the central forecasts and some of the corresponding impact assessments presented in this ES, including air noise (Chapter 8) and the calculation of additional road traffic (as described in the Transport Assessment accompanying the CADP submission).



- 3.39 It is estimated that the ceiling on the introduction of larger aircraft would be 8 larger Code C aircraft on the ground simultaneously in peak periods compared to 5 assumed in the core With Development forecast. It is assumed that these types would replace Embarer E190 operations in the projections and reflects the circumstances where the market grows more quickly on the core routes resulting in the airlines upscaling the size of the aircraft more quickly than would be expected under the core traffic growth projections. Nonetheless, this would have negligible impact on both annual and peak period passenger volumes.
- 3.40 In order to test the sensitivity of surface access requirements, peak period load factors (i.e. the proportion of seats taken up) have also been increased to 90% in the sensitivity test for the With Development scenario. This is not considered to be a realistic assumption for normal peak period operations as not all flights will operate at such a high load factor simultaneously. However, in the event that capacity constraints persist across the London airport system as a whole, load factors might eventually rise to such levels. On this basis, York Aviation forecast that the upper bound of passengers which could be accommodated with the planned CADP1 infrastructure would be no greater than approximately 6.02 mppa over the longer term, an increase over the year of 67,000 passengers, or + 1.1%. The effect of this on the daily demand profile is shown in Figure 3.1.

**Figure 3.1 - Future With Development Diurnal Profile of Passengers (passengers per hour)**



Source: York Aviation

- 3.41 In any event, the proposed infrastructure will constrain a wholesale shift to such larger aircraft due to limitations on the size of the existing stands, retained in use and due to the need for such larger aircraft to continue to back track along the western half of the runway when landing or taking off, so reducing effective runway capacity. Hence, it is considered that the central forecasts used for assessing the surface access implications robustly represent the likely peak passenger flows at 2023.

### *Sensitivity Tests - Public Safety Zones (PSZs) (Higher Risk Case)*

- 3.42 A second sensitivity test was prepared in response to request from LBN to demonstrate the worst case implications for the Public Safety Zone (PSZ) and represents a higher risk case. For this sensitivity test, a variant of the aircraft movement forecast was prepared to show the maximum number of business aviation (Jet Centre) movements in 2023 on the assumption that business aviation traffic growth would constrain the number of slots available for scheduled services within the 120,000 noise factored movements. Smaller business aviation jets have an inherently greater risk of failure (crash risk) and therefore have a disproportionate contribution to the size of the PSZs at either end of the runway.
- 3.43 The aircraft type breakdown for this sensitivity test is set out in Section 3 of the Need Statement.
- 3.44 This sensitivity test scenario is not believed to be realistic given the higher revenue to the Airport from scheduled service operations and the incentive that this gives to increase scheduled movements to the maximum possible at the expense of business aviation traffic. As these mixes do not form the likely case for the purpose of the EIA and have no other environmental implications, this sensitivity has been presented as a separate study.

### Spatial Scope

- 3.45 The geographical extent of the EIA is referred to as the spatial scope. The application site for CADP 1 extends to 60.1 hectares and includes the existing Airport boundary and areas outside (principally to the south) required for the implementation of the CADP. It overlaps with the 0.59 hectare application site for the proposed Hotel (CADP2) to ensure integration between the two proposals. These sites, in aggregate, define the minimum Study Area for the purposes of the EIA and are referred to as the 'Application Site' within this ES, unless effects are specific to one or other site.
- 3.46 The spatial scope of each assessment varies depending on the particular receptor. Certain environmental effects extend beyond the Application Site, such as air quality, noise, road traffic and socio-economic influences.
- 3.47 The spatial scope (or Study Area) of the technical assessments is set out in the corresponding ES chapters which, in each case, takes into account the following:
- a) The physical area of the proposed CADP;
  - b) The nature of the baseline environment; and,
  - c) The manner in which environmental effects are likely to be propagated.
- 3.48 As part of the EIA process, the environmental effects of a given development or scheme are typically predicted in relation to sensitive environmental receptors, including human beings (e.g. local residents, users of the Airport and associated facilities etc), built resources (e.g. roads, buildings and infrastructure) and natural resources (e.g. King George V Dock).
- 3.49 The criteria used for identifying receptors that are considered to be potentially sensitive include:
- a) Sensitivity of existing land uses (e.g. residential dwellings, schools, hospitals etc);

- b) Proximity to the site;
  - c) Extent of potential exposure to the environmental effects;
  - d) Number of individual receptors; and,
  - e) The receptor's ability to absorb change.
- 3.50 Particular sensitive receptors to certain types of effects (i.e. physical, visual, direct and indirect) are identified in each of the technical chapters of the ES.

#### EIA Consultation

- 3.51 In formulating its Scoping Opinion, LBN consulted a range of statutory and non-statutory organisations, which were provided with copies of the Scoping Report. These organisations are listed in Table 3.2 below.

**Table 3.2- List of Organisations Consulted on the Scoping Report**

Assessment Year
London Borough of Newham (LBN)
London Borough of Tower Hamlets (LB TH)
Royal Borough of Greenwich (LBG)
Environment Agency (EA)
Natural England (NE)
Greater London Authority (GLA)
Transport for London (TfL)
English Heritage
English Heritage (Greater London Archaeology Advisory Service, GLAAS)
Royal Docks Management Authority (RoDMA)
London Wildlife Trust

- 3.52 The Applicant's project team have met with relevant officers at LBN, LBTH, RBG, RoDMA, TfL, GLA and the EA which took place following receipt of the Scoping Opinion. The meetings were in order to discuss the proposed CADP, the approach to the EIA and to confirm any queries regarding the methodology outlined within the Scoping Report.
- 3.53 In order to clarify the approach and address comments on the Scoping Opinion, a response was issued to LBN on 21<sup>st</sup> February 2013, as described above. A further EIA update was provided to LBN on 14<sup>th</sup> June (enclosed at Appendix 3.3).
- 3.54 The response to the matters raised in the LBN Scoping Opinion is summarised in Table 3.3 below.

**Table 3.3- Response to Scoping Opinion**

Topic	Comment and Consultee	Response
Socio-Economic	<b>London Borough of Newham:</b> <i>'It is considered that this section should include reference to any future Public Safety Zone changes resulting from the predicted change in aircraft mix at LCA. By implication this could affect the current PSZ, and will therefore have a positive or negative impact upon future surrounding development sites in terms of socio-economics. whilst it is accepted the precise nature</i>	NATS Ltd. has been commissioned by LCY to calculate the Third Party Risk Contours and Public Safety Zones (PSZ) in 2023, using the detailed aircraft fleet mixes in the 'with' and 'without' development scenarios provided by York Aviation. These calculations apply a standard methodology used by NATS for the DfT and CAA to determine the sizes and shapes of PSZs at UK airports.  The economic consequences of any change to the PSZ contours are reported in the Socio-economic chapter of this ES. The assessment examines the change in land area infringed by the PSZ,

Topic	Comment and Consultee	Response
	<i>of the future PSZ may be difficult to predict, consideration of possibilities will still need to be given regard'.</i>	focussing on LBN allocated development sites around the Airport, and considers the associated effects on the future development potential of these sites, including any displaced/ foregone employment and Gross Value Added (GVA) effects.  As discussed above, at the behest of the GLA, a sensitivity tests has been undertaken to model the PSZ with different aircraft fleet mixes.
Noise and Vibration	<b>London Borough of Newham:</b> <i>'8.8 Given the change in fleet we will need some evidence to support the statement that ground noise with the newer aircraft have not changed'.</i>	Where possible, ground noise data for the future generation aircraft (e.g. the Bombardier C100) has been compared to existing aircraft in operation at the Airport. However, it should be noted that some of the available data from the aircraft manufacturers is indicative as certain aircraft and aircraft engines are not yet commercially operational. A further explanation of this is provided within Chapter 8: Noise and Vibration..
	<b>London Borough of Newham:</b> <i>In addition, there should be an assessment of the impact of any frequency/tonal change from new aircraft types.</i>	The Airport's noise consultants have made an informed judgment about the noise characteristics of aircraft types.
	<b>London Borough of Newham:</b> <i>'8.9 the build out of the ESD in phases is likely to significantly increase the disturbance. In carrying out the assessment for noise and vibration impacts it would be valuable to include some comparison of the phased build out versus all at once'.</i>	The noise and vibration assessment considers the impacts of the likely phasing of construction. The phasing of the CADP is dictated by certain logistical, operational and economic precedents for the Airport, including ensuring that the annual capital investment matches demand by the airlines, projected passenger throughput and income generation. Constructing the Eastern and Western Terminal Extensions and the entire infrastructure associated with the CADP in a single phase is not considered practicable or economically viable at this time. Therefore, this does not constitute a 'likely scenario' for the purpose of the EIA. However, peaks of construction activity and associated noise and vibration impacts (e.g. during piling of the dock bed and construction of concrete apron and taxi-lane) are presented in the ES in order to identify the 'worst case' impacts.
Townscape and Visual	<b>London Borough of Newham:</b> <i>'The assessment should also include views from the DLR as well as from across the northern banks of the Docks. In addition, one of the larger impacts will be the enlargement of the pier over King George V Dock, reducing the expanse of open water. This needs to be included in the assessment'.</i>	The effects on views from the DLR have been taken account of in Chapter 10: Townscape and Visual Effects, by way of qualitative commentary on the visibility of the CADP structures and the docks to passengers on passing trains. However, as these views are transient, it would not be usual to consider these as a 'representative/ sensitive viewpoints' for the purpose of the townscape and visual impact assessment which should be concerned with likely significant effects only. Also, due to problems of obtaining photographs from an enclosed, moving carriage it would be difficult to establish or replicate any particular fixed view from the DLR.
Traffic and Transport	<b>London Borough of Newham:</b> <i>'This section should also make reference to impacts to the bus network. Whilst they enjoy a smaller modal split currently, the impacts arising from the various phases of development should include an appropriate assessment.</i>	Impacts on the bus network have been considered as part of the Transport Assessment (TA). The approach to the TA was set out in further detail in the Transport Scoping Report (December 2012). This is appended to the TA which is submitted with the CADP1 planning application.

Topic	Comment and Consultee	Response
Water Resources and Ecology	<b>Environment Agency:</b> <i>'This chapter should be updated to ensure that the Water Framework Directive/ Thames River Basin Management Plan is considered throughout.'</i>	This is dealt with in Chapter 12: Water Resources and Flood Risk.
Ground Contamination	<b>Environment Agency:</b> <i>'A preliminary desk study and a piling risk assessment which consider the risks to controlled waters should be submitted within this chapter of the ES.'</i>	A contamination desk study and piling risk assessment has been undertaken. In addition, in order to further inform the assessment of contamination and the potential options for infiltration drainage/ SUDS, the Airport commissioned a site investigation covering the southern/ landside areas of the Airport. The results of this investigation are reported within Chapter 16: Ground Contamination of this ES..

### Scoped-Out Topics

- 3.55 In consideration of the EIA Regulations which require that the EIA should identify only the "likely significant environmental effects" of a development, certain topic areas were considered to be "non-significant" issues and therefore are not assessed through the EIA process. Table 3.4 summarises these topics with reference to the October 2012 Scoping Report and LBN's Scoping Opinion (see Appendix 3.1 and 3.2). The justification for scoping out these topics was presented in the Scoping Response (Appendix 3.1).

**Table 3.4- Scoped-Out Issues**

Topic to be 'Scoped-Out'	Consultee	Response
Safeguarding- in relation to protecting or 'safeguarding' the airspace around the runway.	<b>London Borough of Newham</b>	This was agreed
Daylight, Sunlight and Micro-climatic Effects	<b>London Borough of Newham</b>	This was agreed
Radio and Telecommunications Interference	<b>London Borough of Newham</b>	This was agreed
Electromagnetic Radiation/Electric Fields	<b>London Borough of Newham</b>	This was agreed
Public Safety Zone	<b>London Borough of Newham:</b> <i>'Public Safety Zone (PSZ) - this is not agreed. The proposals will allow a mix of different types of planes at LCA. By implication this could affect the current PSZ, and will therefore have a positive or negative impact on how this will impact upon future surrounding development sites in terms of socio-economics. Whilst it is accepted the precise nature of the future PSZ may be difficult to predict, consideration of possibilities will still need to be given regard. This assessment should sit within the Socio-Economics, Recreation and Community of the ES.'</i>	This matter is now considered as part of the Socio-Economics, Recreation and Community chapter of the ES.
Sustainability and Energy	<b>London Borough of Newham:</b> <i>'Sustainability and Energy- This is not agreed, and should be included in the ES. Changes to energy use at the airport are expected to occur due to the facilitation of new aircraft types and traffic movements, from the use of fixed electrical</i>	The ES contains a dedicated chapter (Chapter 17: Climate Change) which considers these inter-related factors. In

Topic to be 'Scoped-Out'	Consultee	Response
	ground power. Proposals set out in the separate Sustainability Statement may directly or indirectly influence the ES topics (including water resources and flood risk and ecology and biodiversity) and may contribute to significant local effects and as such should be scoped into the ES. Furthermore, EIA requires that cumulative impacts of development be addressed: energy and other sustainability aspects included in the Sustainability Statement may contribute to cumulative impacts.'	addition, a standalone Sustainability Statement and separate Energy and Low Carbon Strategy have been submitted to accompany the CADP planning submission in accordance with GLA policy.
Lighting (not addressed within the Scoping Report)	<b>London Borough of Newham:</b> <i>'There is no assessment of lighting impacts (if no barrier is to be constructed). The aircraft lighting and stand lighting could be a significant annoyance.'</i>	An outline lighting specification for landside and airside components of the CADP1 is presented in the DAS submitted with the planning application. In addition, a qualitative assessment of potential lighting impacts on residents in proximity to the Airport has been undertaken and is presented in Appendix 10.3.

### Assessment Criteria

- 3.56 The likely environmental effects of the proposed CADP (CADP1 and CADP2) have been predicted for each relevant environmental topic and compared to the Baseline and Base Case environmental conditions (i.e. those existing at present and Without the CADP).
- 3.57 The environmental effects of the proposed CADP are predicted in relation to the effect upon (the change to) environmental receptors, including people (e.g. local residents), built resources (e.g. the historic dock structures) and natural resources (e.g. features of ecological interest).
- 3.58 The determination and classification of the significance of environmental effects is intended to aid the relevant 'determining authorities' (in this case LB Newham) in identifying:
- a) The likely environmental effects of a development; and
  - b) The relative weight that each identified environmental effect should be given in the decision making process.
- 3.59 Within this ES, the application of generic criteria provides a common EIA approach of classifying whether the likely effects are significant or not, as well as whether these effects are adverse or beneficial. Specific criteria give due regard to the following:
- a) Extent and magnitude of impacts;
  - b) Duration of the impacts (short, medium or long term);
  - c) Permanence of the impacts (temporary or permanent);
  - d) Nature of impacts (whether direct or indirect, reversible or irreversible);
  - e) Whether the impact occurs in isolation, is cumulative or interactive;

- f) Performance against any relevant environmental quality standards;
- g) Value, importance and sensitivity of the receptor; and
- h) Compatibility with environmental policies.

3.60 In order to provide a consistent approach in reporting the outcomes of the various studies undertaken as part of the EIA, the terminology presented in Table 3.5 has generally been used within this ES to describe the relative significance of identified effects.

**Table 3.5: Levels of Significance - Terminology and Explanation**

Level of Significance	Description
Substantial/ Major	Very large or large change in environmental or socio-economic conditions. Effects, both adverse and beneficial, which are likely to be important considerations at a regional or district level because they contribute to achieving regional or local objectives or, could result in exceedance of statutory objectives and/or breaches of legislation.
Moderate	Intermediate change in environmental or socio-economic conditions. Effects which are likely to be important considerations at a local level.
Minor	Small change in environmental or socio-economic conditions. These effects may be raised as local issues but are unlikely to be of overriding importance in the decision making process.
Negligible	No discernible change in environmental or socio-economic conditions. An effect that is likely to have a negligible or neutral influence, irrespective of other effects, often not discernable above the natural levels of variation.

- 3.61 Those effects which are considered significant, and therefore material to planning decisions, are those identified as being of Minor, Moderate, or Substantial/ Major significance.
- 3.62 The determination of 'significance' is a function of the magnitude or scale of the impact(s) and the value or importance of the affected receptor. For example, the complete destruction (large magnitude) of a Grade I listed building (high value) would constitute a substantial adverse significant effect.
- 3.63 Table 3.6 provides a basic matrix-based approach to the categorisation of environment effects, with 'significant' effects shown in the highlighted cells.

**Table 3.6: Generic EIA Terminology Applied within this ES**

		High / Large	Medium	Low / Small	Very Small / Negligible
Value of Receptor	High	Substantial (unacceptable)	Substantial	Moderate	Minor
	Medium	Substantial	Moderate	Minor	Negligible
	Low	Moderate	Minor	Negligible	Negligible
	None / little	Minor	Negligible	Negligible	Negligible

- 3.64 Following their identification, significant effects have been classified within the ES on the basis of their nature and duration as follows:
- a) Beneficial effects that have a positive influence on receptors and resources;
  - b) Adverse effects that have a negative influence on receptors and resources;
  - c) Temporary effects that persist for a limited period only (due for example to particular activities, e.g. construction noise);

- d) Permanent effects that result from an irreversible change to the baseline environment (e.g. land take) or which persist for the foreseeable future (e.g. noise from ongoing Airport related activities);
  - e) Direct effects that arise from activities that form an integral part of the scheme (e.g. direct employment and Gross Value Added (GVA);
  - f) Indirect effects that arise from the impact of activities that do not explicitly form part of the scheme (e.g. induced employment elsewhere);
  - g) Secondary effects that arise as a consequence of an initial effect of the scheme (e.g. changes to groundwater conditions affecting ecology); and,
  - h) Cumulative effects. Such effects can arise from a combination of different effects at a specific location or the interaction of different effects over different periods of time.
- 3.65 Where it has not been possible to quantify the effects of the CADP proposals, qualitative assessments have been undertaken based on professional judgment in the knowledge of the information available and in the context of the proposals.
- 3.66 The specific methodologies and criteria applied to the assessment of each environmental topic are described in further detail within the individual technical chapters of the ES. For example, Chapter 13: Ecology and Biodiversity, the impact assessment method follows the established guidelines of the Institute of Ecology and Environmental Management (IEEM).

#### Structure and Approach to Technical Chapters

- 3.67 All of the impact assessment chapters (7 to 17) follow a consistent structure, as set out below and described in Chapter 1: Introduction.
- 3.68 In the majority of cases, the ES chapters are also supported by separate technical appendices which include supporting baseline data, figures, reports and plans. Where relevant, the interrelationship between topics (e.g. water quality and ecology) is explained within the chapters and cross-references are made between chapters or sub-sections.

#### *Introduction*

- 3.69 The introduction section to each chapter provides a brief summary of what is considered in the chapter and states the author and/or relevant technical contributor.

#### *Legislation and Planning Policy Context*

- 3.70 This section includes a short summary of key legislation and national, regional and local planning policies that are relevant to the particular environmental issue being considered and the assessment undertaken. Where relevant, appropriate technical guidance is also be summarised.

#### *Assessment Methodology and Significance Criteria*

- 3.71 The methods used to carry out the technical assessment and an outline of the approach used to define the significance of environmental effects is presented in this section, with reference to published professional standards and guidelines.



### *Baseline Conditions*

- 3.72 The baseline conditions of the existing site and surrounding areas (in the absence of the development) are described for the environmental issue being considered. The baseline conditions provide the context against which the likely significant environmental effects of the proposed CADP are assessed.
- 3.73 Data sources used in the determination of the baseline are described noted with specific reference to surveys, modelling or monitoring that have been undertaken to support the assessment.

### *Assessment of Effects*

- 3.74 This section identifies the likely significant effects arising from the proposed CADP and considers the effects during construction, the transitional year (2019), the Design Year (2021), and the Principal Assessment Year (2023). The assessment is presented with reference to the established environmental baseline conditions and, where relevant, the 'without development' base case.

### *Mitigation*

- 3.75 This section sets out any necessary further measures to mitigate the environmental effects of the proposals, such as enhanced environmental and operational procedures and controls.

### *Summary and Conclusions*

- 3.76 This section provides a brief summary of the assessment findings, proposed mitigation measures and residual (remaining) impacts.

### **Assumptions & Limitations**

- 3.77 The specific limitations, constraints or assumptions common to all assessment topics are listed below:
- a) The Airport will continue to operate under the obligations of the 2009 Section 106 Planning Agreement and its extant planning permission (ref. 07/01510/VAR);
  - b) The proposed CADP does not seek to increase the permitted number of flight movements, which will remain at 120,000 'noise factored' movements;
  - c) Forecasts of aircraft fleet mix, annual movements and passenger numbers are based upon the methodology included in the Need Statement accompanying the CADP submission;
  - d) The assessments contained within each of the technical chapters are based upon the scheme description and plans provided with the CADP1 and CADP2 planning applications;
  - e) The construction period is likely to be progressed in a logical and sequential manner as described in Chapter 6. However, the timing and phasing of these works is not fixed and therefore, where relevant, the EIA considers the consequence of the works progressing in a different way;
  - f) The design and construction of the CADP will satisfy environmental standards in accordance with current legislation, industry practice and knowledge, and will endeavour to achieve best practice at the time of the works;

- g) A Construction Environmental Management Plan (CEMP) containing the environmental management controls identified in this ES will be discussed and agreed with LBN following the determination of the planning application for the purpose of controlling construction activities. This plan shall be enforced and monitored during construction works.
- 3.78 In relation to constraints and uncertainties, where there are deficiencies in the data these are identified in the relevant chapter of the ES. Despite limitations, constraints and assumptions, the results of the assessment are considered robust and compliant with the EIA Regulations.

## 4 Alternatives and Design Evolution

### Introduction

- 4.1 This Chapter is provided in accordance with the requirements of Schedule 4, Part 1 (S.2) of the Town and Country planning (Environmental Impact Assessment) Regulations 2011, which specifies that an ES should contain:

*“An outline of the main alternatives studied by the applicant or appellant and an indication of the main reasons for the choice made, taking into account the environmental effects”*

- 4.2 It describes the main alternatives considered throughout the development of the proposed CADP, along with the reasons for the final proposed scheme layout and arrangements, including both detailed and outline components.
- 4.3 The design of the proposed CADP has been developed and informed with careful regard to environmental and sustainability considerations. This was achieved by undertaking the EIA in parallel with the design process, through a series of specialist consultant workshops, consultation with the public and other key stakeholders and through the close working relationship between the design team and the EIA specialists.
- 4.4 It is not considered relevant to consider alternative sites for the proposed CADP, as the proposals are solely focussed on improving the existing infrastructure at the Airport in order to get best use out of the existing runway.
- 4.5 Where specific environmental mitigation measures have been incorporated into the design of the proposed CADP, these are described and discussed in the relevant technical chapters of this ES. This chapter provides a summary of the iterative design process and refinement that has occurred throughout the design of the proposed CADP. The Design and Access Statement (DAS) forming part of the CADP submission provides full detail of the design of the scheme.
- 4.6 The 'Without Development' scenario is considered first below, followed by review of an earlier alternative proposal, a summary of the design constraints which exist at the Airport, and finally a full consideration of the evolution of the designs for the proposed CADP.

### **“Without Development” Scenario**

- 4.7 Both in the 'With' and 'Without' development scenarios, the Airport would continue to operate within the permitted 120,000 permitted noise factored movements.
- 4.8 However, the trend towards larger, more efficient aircraft will still occur to a degree in the 'Without Development' scenario but the Airport's inability to accept more than a very small number of these new generation larger aircraft will serve to constrain aircraft size growth and hold back the environmental advantages that they can bring.
- 4.9 The York Aviation Need Statement (accompanying the CADP planning submission) assesses the Airport's infrastructure requirements and concludes the following:

- a) The capacity of the apron (shortage of aircraft stands) will be a constraint on growth of services at the Airport from 2014;
- b) Runway capacity is assessed as adequate until 2015, subject to Swiss not seeking to introduce C-Series aircraft earlier than 2016 and other airlines not seeking to upgrade to larger aircraft types prior to that date;
- c) Terminal capacity is considered adequate in the short term, but by 2014 capacity for departing passengers will be below an acceptable standard of service, particularly in terms of departure lounge space. The arrivals concourse, which is currently shared with the departing passenger landside concourse, will be operating at a less than adequate level of service from 2018 onwards. Baggage reclaim facilities will be less than adequate from 2018.

4.10 It is clear, therefore, that in the 'Without development' scenario, both scheduled aircraft movement numbers and passenger numbers would be curtailed by infrastructure and terminal capacity constraints. This would make the future performance of the Airport less certain as it would not be able to accommodate either its permitted movements or the passengers associated with such movements. Such a constraint would not support the Government's priority for the aviation industry to make better use of existing runway capacity at all UK airports (Aviation Policy Framework, March 2013).

4.11 Current forecasts undertaken by York Aviation anticipate that the constraints associated with the apron, runway and terminal would be addressed by the proposed CADP and take into account the expected fleet mix and the noise factored limits. Table 4.1 below, taken from the York Aviation Need Statement, sets out the predicted passenger numbers and aircraft movements in the 'With' and 'Without' development cases. The constraints on passenger numbers and scheduled movements in the 'Without development' scenario can be seen in the below figures

**Table 4.1: London City Airport Apron Planning Application Forecasts**

	2012	2019		2021		2023	
	Existing Baseline	With Development	Without Development	With Development	Without Development	With Development	Without Development
Scheduled Movements	64,775	98,802	84,941	104,901	88,822	107,119	87,713
Passengers	3,029,013	4,871,000	4,154,000	5,512,000	4,391,000	5,874,000	4,435,000
Average Load Factor	60.8%	58.8%	58.5%	60.2%	60.2%	60.8%	61.7%
Source: York Aviation							

### Design Evolution

4.12 The Airport offers a very constrained context. As demonstrated above, in meeting the projected passenger capacity for the permitted air traffic, it is necessary to provide facilities beyond the current footprint of the existing Terminal. A key factor underlying the CADP design context and evolution is that any new or reconfigured existing facilities will only cater for the passenger capacity associated with the permitted movements.

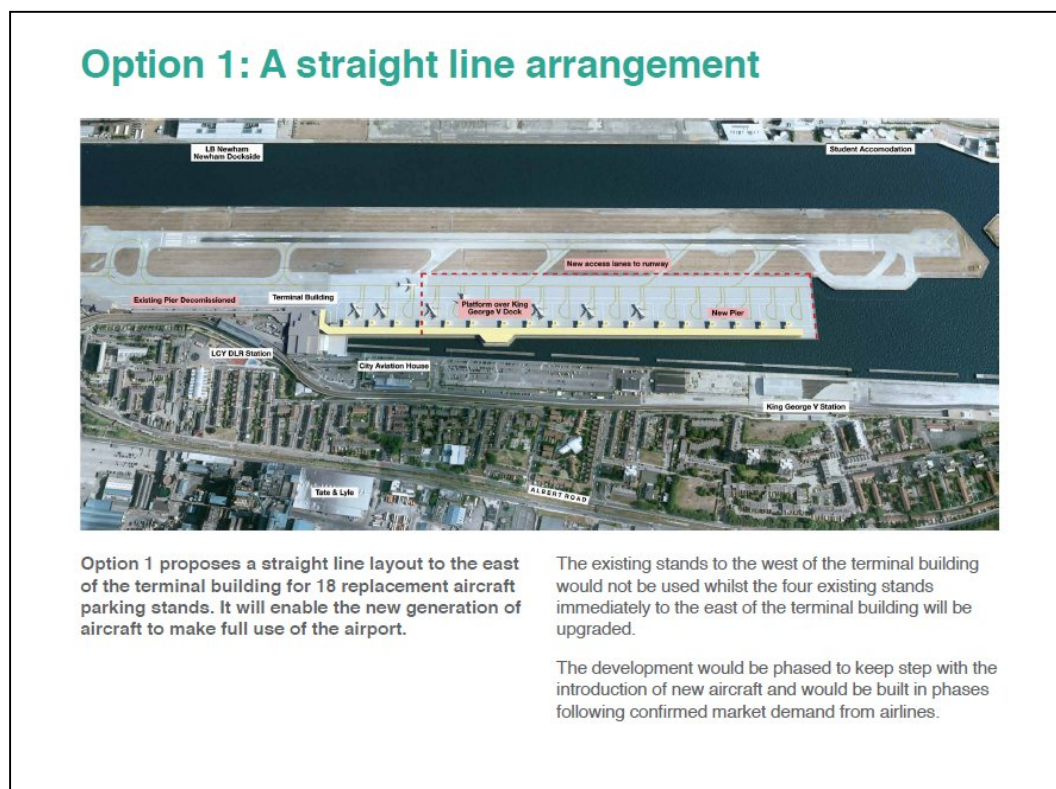
- 4.13 As further described below, the proposed CADP evolves from the Airport Stand Replacement Project (ASRP), which was put forward and consulted upon in 2011. Those proposals also looked to enhance and build upon the Airport's existing facilities, although they were not ultimately pursued through a planning application.

#### **The ASRP**

- 4.14 In 2011 the Airport announced and consulted on the Airport Stand Replacement Project (ASRP) proposals, which comprised the following:
- a) Construction of up to 14 new stands (plus the reconfiguration of Stands 21-24);
  - b) A new passenger pier and service roads on a platform/ deck over the KGV Dock; and
  - c) Realignment of the taxiway and construction of new runway links to the south of the runway.
- 4.15 The phased decommissioning of existing aircraft stands and the Western Pier, physically retained for their acoustic screening function, was also proposed.
- 4.16 The rationale for the ASRP was to enable the Airport stands and runway to accommodate physically larger aircraft. The project did not, however, take into account the increased concentration of movements into peak periods which accompanies the introduction of larger more efficient aircraft types and the consequent trend towards airlines carrying more passengers per flight (from 35 per flight on average, up to 55-60 per flight expected over the period to 2023).
- 4.17 The detrimental effect of the increased passenger numbers on terminal capacity would therefore not have been resolved by the ASRP proposals, nor would the need for additional aircraft parking positions to accommodate peak period demand. This was the main reason for the ASRP not being carried forward as a planning application, as well as the recognition that not all stands were required to accommodate the larger aircraft types simultaneously and that the full replacement of the Western Apron was not required. Additionally, LBN voiced concerns regarding the potentially piecemeal nature of the proposals, which did not cater for growth or the need for a more comprehensive approach to the future planning of the Airport.
- 4.18 The CADP proposals have, therefore, evolved from the ASRP as a more comprehensive investment in the Airport's existing facilities.
- 4.19 Prior to the public consultation on the ASRP held in November and December 2011, a review of 5 key options was undertaken in terms of the configuration of the proposals and the location of the stands. The options were as follows:
- a) Option 1A and 1B: Replace the Western stands with an Eastern apron;
  - b) Option 2A and 2B: Offset the runway to the north to free up the Western Apron;
  - c) Option 3: Restrict the taxiway in front of the Western Apron;
  - d) Option 4: Introduce a north loop; and
  - e) Option 5: Relocate the DLR.

- 4.21 These options were appraised in terms of the operational, financial and environmental implications.
- 4.22 Options 2A, 2B, 3 and 4 and were not investigated further due to major disadvantages such as to the impact on the Royal Docks and cost of the extensive construction works that would be involved. Option 5 was also disregarded due to the potential noise impacts to the residents to the south of the Airport and the extensive construction costs and negotiations required. It could also have potentially involved the need to demolish homes, which the Airport strongly wished to avoid.
- 4.23 It was therefore determined that further investigations would be undertaken into Options 1A and 1B. These were subsequently reported as Option 1 and 2 within the public consultation materials as presented in Figure 4.1 below.

**Figure 4.1: ASRP Options – Public Consultation Material**



## Option 2: A cul de sac arrangement



Option 2 proposes a 'cul de sac' layout to the east of the terminal building for the 18 replacement aircraft parking stands required to accommodate the new generation aircraft to make full use of the airport.

The existing stands to the west of the terminal building would be taken out of service in phases whilst the four existing stands immediately to the east of the terminal building will be enlarged.

The development would be phased to keep step with the introduction of newer aircraft and would only be built following confirmed market demand from airlines.

- 4.24 Feedback from the public consultation showed a preference for Option 1, with a linear arrangement of the stands. Option 2 raised concerns in terms of the potential noise implications, as the aircraft stands would be closer to the residents to the south.
- 4.25 Due regard has therefore been given to the feedback from the ASRP public consultation in developing the current plans for the proposed CADP, proposing less stands but sharing the linear arrangement of the stands to the south of the existing airfield.

### The CADP

- 4.26 As has been shown above, due to the trend towards introducing larger aircraft and a greater concentration of movements in peak periods, there is an established need for additional airfield infrastructure and passenger terminal facilities, to enable the projected increase in movements up to the consented limit to be realised at the Airport.
- 4.27 In analysing potential future configurations for new infrastructure and facilities at the Airport, the need to avoid disruption to existing infrastructure and operations were primary considerations. The other key drivers and constraints that had to be taken into account and which ultimately informed the CADP scheme are outlined in the following paragraphs.

### Design Considerations

#### *Physical Constraints*

- 4.28 London City Airport offers a very constrained context within which to shape any development. In meeting the projected passenger capacity for the permitted increase in air traffic, it is

necessary to provide facilities beyond the current footprint of the existing terminal. Significant expansion can only occur partly to the west, but mostly to the east, over King George V Dock. This requires additional piled decking over the dock to support a building of significant scale.

- 4.29 Airfield planning constrains the north line of the eastern terminal extension, allowing for the wingspan safety clearance of the relevant aircraft to be accommodated. The depth of the Eastern Pier is also largely determined by the circulation width required for mostly single direction movement through the segregated levels, as well as the depth required for the appropriate gate room capacity (which is determined in the east-west direction by the aircraft stand module minus the vertical circulation core length), and the depth required at apron level for the ground services equipment (GSE) storage zones.

#### *Permitted Aircraft Movement Limits*

- 4.30 As already noted, it is key to the concept and delivery of the project that the new and reconfigured existing facilities only cater to the passenger capacity associated with the permitted movements. The sizing of facilities must relate to a level of passenger demand that is not the absolute maximum (or peak), but secures the Level of Service set by the Airport as its required standard.

#### *Phasing and Ongoing Operations*

- 4.31 Throughout the construction of the CADP the Airport needs to stay open with the minimum amount of disruption.

#### *Airport Functionality*

- 4.32 The extension to the terminal building must enhance or replace key functions at the Airport, either to meet new requirements or to provide enhanced replacement facilities for those which already exist. The functional arrangement of these elements, working between old and new, has to form a seamless operation entity.

#### *Counter-Terrorism*

- 4.33 The arrivals concourse is constrained by the ASIAD (counter-terrorism) 30m stand-off zone requirement, spaced from the taxi-drop-off zone that has been placed as close to the existing terminal as possible.

### **CADP Design Iterations**

- 4.34 The key features of the proposed CADP have been driven by the need to accommodate the forecast passenger numbers and larger aircraft movements. This includes the provision of seven new stands served by a new passenger pier and taxilane situated over the KGV Dock. Other key features include the reconfiguration of the forecourt, car parking and provision of a Hotel as detailed in the DAS and Chapter 2 of this ES.
- 4.35 Consultation has occurred throughout the CADP design evolution, including presentations to LBN's Design Review Panel. Considering the feedback from the consultation process, as well



as the constraints outlined above, the design of the CADP has evolved through a number of iterations.

#### Early Scheme

- 4.36 The basic premise for the new Terminal has been the relocation of the arrivals facilities to an eastern extension of the existing building, thus allowing the existing terminal to focus on departure requirements. The existing baggage system is then expanded between these two major functions.
- 4.37 Early designs for the CADP reflected a desire to sympathise with the architecture of the existing terminal, which was likely to be dominated by the scale of the new proposal to the east. It sought to step the massing of the new extension down towards the existing terminal to align heights and to extend some of the existing cladding of the current terminal to form a link between the two main masses of existing and proposed terminal buildings.
- 4.38 The early Eastern Pier designs were focused on a notion of relieving the scale of the southern facade and the associated visual impact on the landside dockside area. The designs used cast glass panels in translucent patterns to create a well-lit internal experience and a lantern-effect at night, illuminating and animating the water.
- 4.39 However, the LBN's Design Review Panel, which was convened on 4<sup>th</sup> December 2012, discouraged designing the new terminal to sympathise with the existing. It was advised that the new proposal should be distinct, in design terms, from the existing Airport buildings in both external treatment and in massing. The Review Panel challenged the Airport to design the Eastern Terminal Extension and the Eastern Pier to a world class architectural standard.

#### A 'World Class' Facility

- 4.40 In response to the Design Review Panel's comments, the CADP design approach was revised to create a more contemporary treatment of the entire proposal, which was more relevant to the dockside context and to the need for a 'world class' facility with higher architectural aspirations. Please refer to the DAS accompanying the CADP submission for full details of the design of the scheme.
- 4.41 In refashioning the composition of the whole proposed new development in this context, there was opportunity to re-examine various design issues in favour of the following alternatives:

#### *Passenger Pier and Apron*

- 4.42 The re-design of the proposed three storey passenger Eastern Pier was influenced by feedback from LBN, consistent with the Design Review Panel's views, as stated in the pre-application advice (letter dated 10th January 2013):

*"We think that there is an opportunity for the remaining strip of water created by developing into the Dock to be considered as an integral part of the architectural concept and as a positive design feature. The adjoining buildings could be orientated to address the water and*

*provide a better interface in terms of passenger views, outlook and experience. The water could also be animated better through the possible use of appropriate lighting.”*

- 4.43 In response, the final design of the passenger pier has evolved to include a building facade that provides a light and bright space for arriving passengers, creating and maintaining the passengers’ connection with the water, as well as providing a significant uplift in shading, and permitting ease of cleaning and maintenance to the glazed elements projecting over the dock waters.

#### *Arrivals Concourse*

- 4.44 In refashioning the composition of the whole proposed new development, there was also the opportunity to re-examine the wayfinding issues surrounding the central glazing of the new arrivals concourse building. The design has been through a number of iterations following the consultation feedback in order to provide the most convenient and efficient path between the drop-off facilities and check-in, and also the arrivals exit doors to the pick-up facilities.
- 4.45 The retail layout within the concourse building evolved through careful design consideration, focussing on provision of double-height glazing and a generous entry experience/vista for arriving passengers emerging into the concourse. This resulted in a large glazed external facade fairly close to the centre of the arrivals concourse’s external form. Design development was subsequently seen necessary to alleviate any concern that this glazed area might be read as a main entry or exit point.
- 4.46 The final form of the arrivals concourse building, as well as the landscaping around it, all seek to permit the central glazing expanse for the benefit of the internal planning, whilst effectively and clearly designating the two appropriate entry points to the building. The forecourt split between taxi drop-off and the rest of the forecourt modes resulted in the provision of two clearly separate entry areas to serve each function.
- 4.47 Externally, the angular metallic form of the terminal frontage has been designed to make a more dramatic architectural statement, departing decisively from the style of the existing terminal.

#### *Eastern Terminal Extension Layout*

- 4.48 The retail layout of the arrivals area has also evolved. Originally, a large glazed external area was envisaged close to the centre of the façade of the arrivals concourse. However, this raised a concern that visitors or arriving passengers may wrongly read this as the main entry or exit. The final form of the building, as well as the landscaping, therefore seeks to maintain the central glazing expanse for the benefit of the internal planning, whilst more effectively designating the easterly and westerly entry points to the Terminal, greatly enhancing its overall legibility.

#### *Western Terminal Extension*

- 4.49 The Western Terminal Extension was also redesigned to follow the aesthetic changes led by the Eastern Terminal Extension. A visual connection was always sought between the DLR

passengers exiting or waiting for the train, and those passengers moving up and into the proposed security area. This route evolved as the design emphasis changed to pursuing the most convenient passenger route and best possible passenger experience from the check-in area. Full-height glazing was designed to follow the passenger on their route up until the point where security protocols prohibit public vision into the security area itself.

### **Sustainability and Energy**

- 4.50 From the outset, the principles of sustainable development formed a central tenet to the evolution of the CADP. The design team kept and constantly updated a 'CADP Energy and Environment Log' from the early stages of design through to scheme fix, which recorded the evolving selection of a wide variety of sustainability measures and potential alternatives considered feasible for inclusion in the CADP.
- 4.51 In addition, the team has undertaken a preliminary review of the proposals against the nationally recognised standards of BREEAM – the Building Research Establishment Environmental Assessment Method – in order to set out a framework for achieving a BREEAM 'Very Good' rating for the CADP.
- 4.52 This two tier process has ensured that, as well as meeting relevant sustainability planning standards set by both LBN and the Mayor of London, the design team have independently investigated a number of innovative sustainability measures that reflect the Airport's unique role and location.
- 4.53 The options in terms of the energy strategy and sustainability features of the project have been subject to consultation with key stakeholders and statutory consultees, such as the Royal Docks Management Authority (RoDMA), the Environment Agency, the GLA and LBN.
- 4.54 Full details of the sustainability and energy options for the proposed development are set out within the Sustainability Statement and Energy and Low Carbon Strategy reports which accompany the CADP planning applications.



## 5 Planning Context and Existing Controls

### Introduction

- 5.1 This Chapter sets out the overall planning policy context for the ES in terms of the previous planning history of the Airport and the existing controls that result from current planning obligations and other regulatory systems, which govern the operation of the Airport and aviation in general.
- 5.2 An assessment of the proposed CADP against relevant national, regional and local planning policy is provided in full within the Planning Statement that accompanies the CADP applications and is therefore not replicated here. A brief overview of environmental planning policy that is of direct relevance to the Airport is provided below. Relevant planning policy has also been considered under each of the technical chapters of this ES in order to consider the environmental effects of the project.

### Planning Policy Context

#### National Aviation Policy

- 5.3 The Aviation Policy Framework (APF) was published in March 2013 and sets out the current government's objectives for aviation. It is a high-level strategy that sets out the Government's strategic aviation policies, replacing the Future of Air Transport White Paper.
- 5.4 Paragraph 1.1 states that the 'primary objective is to achieve long-term economic growth. The aviation sector is a major contributor to the economy and we support its growth within a framework which maintains a balance between the benefits of aviation and its cost, particularly climate change and noise'
- 5.5 Section 2 of the APF relates to Climate Change. Paragraph 2.4 states that the Government's objective it so ensure that the aviation sector makes a significant and cost effective contribution towards reducing global emissions. It explains policy measures at a global, European and national level. No specific measures suggested for individual airports. Paragraph 2.29 states that the main focus of the strategy is to tackle international aviation emissions with national level actions seeking to support the effective working of the EU Emissions Trading scheme as a means of meeting of helping to reduce international emissions. Paragraphs 2.45 to 2.48 explain how new aircraft technology is supported and notes pressure on Airlines to reduce fuel costs and provide more fuel efficient, and hence, more carbon efficient aircraft.
- 5.6 Section 3 is concerned with noise and other local environmental impacts and states that the Government's overall policy on aviation noise is to "limit and, where possible, reduce the number of people in the UK significantly affected by aircraft noise" (paragraph 3.12). Paragraph 3.17 states that the Government will treat the 57dB L<sub>Eq</sub> 16 hour contour as the average level of daytime aircraft noise marking the approximate onset of significant community annoyance, and goes on to state that all people within this contour will experience significant adverse effects from aircraft noise and notes how people outside the contour may also consider themselves annoyed by aircraft noise. Paragraph 3.19 recommends that Airports use average noise contours and alternative measures to reflect how aircraft noise is experienced in different locations.

- 5.7 Paragraphs 3.20 to 3.23 refer to land-use planning and management and note how the NPPF (see below) expects local planning policies and decisions to ensure that new development is appropriate for its location and the effects of pollution- including noise – on health, the natural environment or general amenity to be taken into account. It goes on to note that this does not rule out noise sensitive development in locations that experience aircraft noise and recommends that: “Local planning authorities therefore have a responsibility to ensure that the land use element of the balanced approach is implemented in the context of their local plan policies, including any on noise” (paragraph 3.22).
- 5.8 Section 5 deals with Planning. Paragraph 5.6 states that the APF should inform local planning policies and is a material consideration in planning decisions. It goes on to explain the safeguarding process and also deals with the following:
- a) Surface Access - Paragraphs 5.11-13 requires all proposals for airport development to be accompanied by clear surface access proposals with Airport developers generally required to pay for the costs of any necessary upgrades;
  - b) Public Safety Zones (PSZs) – Paragraphs 5.14 to 5.16 states that the basic objective is to not increase the number of people living, congregating in PSZs, and overtime, to see the number reduced; and
  - c) Enterprise Zones – Paragraphs 5.17 to 5.22 explains the potential to develop local strategies to maximise the catalytic effects of airports to attract business and support growth, with encouragement for Airport Operators to actively engage with Local Enterprise Partnerships.

#### National Planning Policy Framework

- 5.9 The National Planning Policy Framework (NPPF) sets out the Government’s planning policies for England (published on 27 March 2012). It replaces almost all of the previously issued Planning Policy Statements (PPSs) and Planning Policy Guidance (PPGs) with a single national planning policy document. The NPPF must be taken into account in the preparation of local and neighbourhood plans, and is a material consideration in planning decisions.
- 5.10 Whilst most existing national planning policy has been revoked and replaced, London-wide policy and the local Development Plan Documents (DPDs) identified below remain active. In the event of any conflict in policy between the NPPF and regional and local DPDs, the NPPF will take precedence.
- 5.11 The key principle of the NPPF is the presumption in favour of sustainable development. It also focuses on ensuring economic growth by requiring local planning authorities to plan positively to meet the development needs of business (paragraph 20). It encourages planning authorities to take a positive approach to determining planning applications and “*seek to approve applications for sustainable development where possible*”. It further explains that development that accords with an up-to-date Local Plan should be approved, and development that conflicts should be refused unless other material considerations indicate otherwise.
- 5.12 Paragraph 87 of the draft NPPF specifically deals with aviation related development, stating:

*“When planning for ports, airports and airfields that are not subject to a separate national policy statement, planning policies should consider their growth and role in serving business, leisure, training and emergency service needs. In doing this, planning policies should take account of this Framework as well as the principles set out in the relevant national policy statements and the Government Framework for UK Aviation.”*

- 5.13 Paragraph 109 is relevant to the consideration of potential impacts from airport development and states as follows:

*“The planning system should contribute to and enhance the natural and local environment by:*

- a) protecting and enhancing valued landscapes, geological conservation interests and soils;*
- b) recognising the wider benefits of ecosystem services;*
- c) minimising impacts on biodiversity and providing net gains in biodiversity where possible, contributing to the Government’s commitment to halt the overall decline in biodiversity, including by establishing coherent ecological networks that are more resilient to current and future pressures;*
- d) preventing both new and existing development from contributing to or being put at unacceptable risk from, or being adversely affected by unacceptable levels of soil, air, water or noise pollution or land instability; and*
- e) remediating and mitigating despoiled, degraded, derelict, contaminated and unstable land, where appropriate.”*

- 5.14 NPPF policies which are specific to the individual topic areas within this ES are discussed under the relevant technical chapters.

#### The London Plan (2011)

- 5.15 The London Plan represents the upper tier of the Development Plan and sets out the Mayor of London’s strategic approach to development in the Capital.

- 5.16 Policy 6.6 is the main policy in the document covering aviation. At a strategic level it states that adequate airport capacity serving a wide range of destinations is critical to the competitive position of London in a global economy and requires the aviation industry to meet its full environmental and external cost, taking full account of environmental impacts when making decisions on patterns of aircraft operation. The second part of the policy relating to Planning Decisions is mainly concerned with proposals that increase the number of flights, something which is not proposed by the CADP.

- 5.17 In the context of the proposed CADP, the main requirements relate to environmental impacts and sustainability:

*“Development proposals affecting airport operations or patterns of air traffic (particularly those involving increases in the number of aircraft movements) should:*

- a) *give a high priority to sustainability and take full account of environmental impacts (particularly noise and air quality)*
- b) *promote access to airports by travellers and staff by sustainable means, particularly by public transport.*
- c) *development proposals for heliports should be resisted, other than for emergency services.”*

5.18 Policy 7.30 ‘London’s Canals and other Rivers and Waterspaces’ is also of relevance to the proposals. Part B seeks to protect and promote their vitality, attractiveness and historical interest, with Part A of the policy seeking to prevent their partial or complete infilling and promoting their use for transport:

*“.....Development within or alongside London’s docks should protect and promote the vitality, attractiveness and historical interest of London’s remaining dock areas by:*

- a) *Preventing their partial or complete infilling;*
- b) *Promoting their use for mooring visiting cruise ships and other vessels;*
- c) *Encouraging the sensitive use of natural landscaping and materials in and around dock areas;*
- d) *Promoting their use for water recreation;*
- e) *Promoting their use for transport.”*

5.19 The CADP proposals will involve decking over the existing dock not infilling it and will enhance its use for transport as part of the Airport.

#### London Borough of Newham Core Strategy

5.20 The Core Strategy was adopted in January 2012. Policy INF1 confirms that support will be given for optimisation of airport capacity, including access and other freight and passenger facilities. The policy also states that *“Any proposals for future growth at the airport (above the approved 120,000 flight movements per annum) in line with the Airport Masterplan will need to be carefully considered to ensure the potential impacts on the Royal Docks and its future role and function are taken into account”*.

5.21 The Core Strategy seeks to mitigate and adapt for climate change through the following measures within Policy SC1, stating as follows:

- a) Non-residential major developments will be required to achieve BREEAM ‘Very Good’ as a minimum;
- b) Maximising the efficient use of energy through passive solar design;
- c) Reusing and recycling waste arising from demolition and construction, and utilizing materials produced and/or sourced locally;



- d) Incorporating SUDS and water efficiency measures to achieve a consumption target of 105 litres per dwelling;
- e) Incorporating living roofs, planting and the provision of natural environments.

#### London Borough of Newham Unitary Development Plan

- 5.22 The 2001 Unitary Development Plan (UDP) has now been replaced by the adopted Core Strategy. Certain policies within the UDP have been saved and are listed in Appendix 2 of the Core Strategy.
- 5.23 Saved Policy EQ1 states that the Council will promote improvements to rivers and waterways in the Borough, including the docks, by:
- a) Improving public access where appropriate;
  - b) Increasing the nature conservation value of designated and potential sites of nature conservation importance;
  - c) Encouraging leisure and recreational uses where these would not conflict with nature conservation interests and transport and industrial uses;
  - d) Enhancing waterside sites through the development of appropriate designs;
  - e) Conserving historical, archaeological and cultural features; and
  - f) Improving waterside safety.
- 5.24 Saved Policy EQ4 states that the Council will seek to secure enhancements to waterside settings by permitting developments that, inter alia:
- a) Address the waterway and its frontage;
  - b) Provides focal points for public recreation through its relationship with the waterway, open spaces and other buildings;
  - c) Provides a high standard of urban design and visual amenity.
- 5.25 Policy EQ62 requires that in consultation with the Environment Agency, the Council will require appropriate flood protection and attenuation measures on site or elsewhere before any development is permitted in areas at risk from, or likely to increase the risk of, flooding. Policy EQ64 states that any development which would adversely affect the stability and continuity of tidal defences (including the Royal Docks) will be opposed by the Council.

#### **London City Airport Planning History**

- 5.26 In November 2006, the Airport published its Airport Masterplan in accordance with a requirement of the 2003 Future of Air Transport White Paper. The Masterplan described how the Airport could expand in phases to meet growing demand for air travel to 2030 and, to this end, identified three phases of development to allow the Airport to accommodate 3.5 million passengers by 2015 (Phase 1), 6 million passengers by 2025 (Phase 2) and 8 million by 2030 (Phase 3). The diagrams contained in the Masterplan document illustrate the progressive expansion of the terminal and stands, building out over the dock in an eastwards direction from 2015 onwards. The accompanying forecasts anticipated reaching 143,000 Air Transport Movements (i.e. scheduled commercial flights) and 27,600 Corporate Aviation (Jet Centre) movements by 2030.

- 5.27 On 9 July 2009, the London Borough of Newham (LBN) approved the Airport's planning application (LBN ref: 07/01510/VAR) for an increase in the total number of permitted aircraft movements at the Airport to 120,000 per annum. This was subject planning conditions and Section 106 obligations relating to a 'noise factoring' system and to daily and other limits on aircraft movements.
- 5.28 The Planning Agreement between the Airport and LBN imposes a range of obligations to control and mitigate the operation of the airport. These include (but are not limited to):
- a) Noise monitoring and mitigation programmes;
  - b) Air quality monitoring and mitigation programme;
  - c) Sustainability and environmental strategies;
  - d) Transport and surface access planning;
  - e) Education, employment and training programmes; and
  - f) Financial contributions by the Airport to local community programmes and infrastructure projects.
- 5.29 As part of the Agreement, the Airport is required to produce an Annual Performance Report (APR) to LBN on 1 July each year to document monitoring and recording of the airport's activities and performance during the previous year in relation to its 2009 planning permission.
- 5.30 This Planning Agreement has been the starting point for the CADP and it is expected that provisions will continue to operate alongside any further agreement which deal with specific issues associate with the impacts and operation of the CADP Project.
- 5.31 The planning conditions attached to the 2009 permission also control the Airport's operations and, in summary, relate to the following matters:
- a) Use of the Airport and types of aircraft permitted;
  - b) Operating hours of the Airport (essentially 0630-2200 hours Monday to Friday, 0630-1200 hours on Saturdays and 1230-2200 hours on Sundays);
  - c) The number of aircraft movements (and noise factored movements) permitted at the Airport, including during the early morning period of 0630-0659 hours;
  - d) Operation of a system of aircraft noise categorisation and noise factoring;
  - e) Operation of a system of continuous noise monitoring; and
  - f) Ground running of aeroplane engines for testing or maintenance.
- 5.32 A more detailed consideration of the planning conditions which impose various environmental controls on the Airport is given below.

#### Noise

- 5.33 Conditions 6(a), 6(b), 6(c) attached to planning permission 07/01510/VAR restrict the times that the airport shall be used for the taking off or landing of aircraft:

*"(5) The ground running of aeroplane engines for testing or maintenance purposes shall take place only between the hours of 0630 and 2200 hours from Monday to Friday inclusive and between the hours of 0630 and 1230 hours on Saturdays, 1230 and 2200 hours on Sundays and 0900 and 2200 hours on Bank Holidays and public Holidays (but not at all on Christmas Day) and;*

*i) In such locations and with such orientations of the aircraft as may be agreed in writing with the local planning authority and*

*ii) Employing such noise protection measures as may be agreed in writing with the local planning authority*

*(6a) The Airport shall not be used for the taking off or landing of aircraft at any time other than between 0630 and 2200 hours from Monday to Friday inclusive and between 0900 and 2200 hours on Bank Holidays and Public Holidays except:*

*a) In the event of an emergency*

*b) For the taking off or landing between 2200 and 2230 hours of an aircraft which was scheduled to take off from or land at the Airport before 2200 hours but which has suffered unavoidable operational delays and where that taking off or landing would not result in there being more than 400 aircraft movements at the Airport per calendar year between 2200 and 2330 hours or more than 150 such movements in any consecutive three months.*

*6b) The Airport shall not be used for the taking off or landing of aircraft on Saturdays at any time other than between 0630 and 1230 hours except:*

*i) In the event of an emergency*

*iii) For the taking off or landing between 1230 and 1300 hours on Saturdays of an aircraft that was scheduled to take off or land before 1230 hours but has suffered unavoidable operational delays and where that taking off or landing would not result in there being more than 400 aircraft movements at the airport per calendar year between 1230 and 1300 hours or more than 150 such movements in any consecutive three months.*

*iii) The taking off or landing of aircraft between 1230 hours and 1800 hours on one Saturday per calendar year for the Airport's charity open day.*

*6c) The Airport shall not be used for the taking off or landing of aircraft on Sundays at any time other than between 1230 and 2200 hours except:*

*a) In the event of an emergency*

*b) For the taking off or landing between 2200 and 2230 hours of an aircraft which was scheduled to take off from or land at the Airport before 2200 hours but which has suffered unavoidable operational early, and where that taking off or landing would not result in there being more than 400 aircraft movements at the Airport per calendar year between 2200 and 2330 hours or more than 150 such movements in any consecutive three months."*

5.34 In addition, Conditions 9 and 10 attached to planning permission 07/01510/VAR restrict the number of aircraft movements permitted at the airport in the early morning (0630-0659 hours) period:

*“(9) Between 0630 and 0659 hours on Mondays to Saturdays (excluding Bank Holidays and Public Holidays when the airport will be closed between these times) the number of aircraft movements shall not exceed 6 on any day.*

*(10) Notwithstanding the restriction on aircraft movements between 0630 and 0959 hours, as set out by Condition 9, the total movements in the period between 0630 and 0645 on Mondays to Saturdays (excluding Bank Holidays and Public Holidays when the airport will be closed between these times), shall not exceed 2 on any day.”*

#### *Air Quality*

- 5.35 The 2009 permission required the Airport to submit an Air Quality Action Plan (AQAP) to LBN for approval within 12 months of the granting of consent. The AQAP was approved by LBN on 22 June 2012 and subsequently implemented by the airport. It includes a series of 19 Measures with timescales for implementation, which focus on reducing emissions of NO<sub>x</sub> from Airport-related sources, including:

- a) Aircraft operations;
- b) Ground Support Equipment (e.g. Mobile Ground Power Units);
- c) Airside vehicles; and
- d) Black cabs (taxis).

- 5.36 The Airport runs an Air Quality Measurement Programme (AQMP) that includes the continued operation of monitoring equipment on the roof of the airport's administration building, City Aviation House, and diffusion tubes located in and around the airport. Furthermore, LCY has also commissioned and installed a second automatic monitoring station at a location on the north side of Royal Albert Dock, adjacent to the Newham Dockside building. The Airport is required by condition to report the results from the AQMP in the APR:

*“...the Airport Companies shall make the data from the Air Quality Measurement Programme available to the Council, the Airport Consultative Committee and members of the general public through the Annual Performance Report and at each meeting of the Airport Consultative Committee by reporting on such data for the most recent quarter of the year preceding such meeting for which there is data available.” (3rd Schedule / Part 3 / 1(c) - Page 31)*

#### *Sustainability and Biodiversity*

- 5.37 An Airport Sustainability Strategy and Airport Sustainability Action Plan was approved by LBN on 22 June 2012 and subsequently implemented by the airport. It includes a review of the airport's recent sustainability performance, the auditing of operational activities, updating baseline data including carbon emissions, and the establishment of specific objectives and targets against a range of sustainability indicators. A series of 35 Targets and Actions with a timescale for implementation is included. The Airport is required by condition to report progress on these Actions in the APR:

*“During the operation of the approved Airport Sustainability Action Plan, the Airport Companies shall report to the Council annually on 1 July as part of the Annual Performance Report on the*

*performance of the Airport Companies during the previous calendar year against the targets in the Airport Sustainability Action Plan” (3rd Schedule / Part 6 / 4 - Page 34)*

- 5.38 Similarly, an Airport Biodiversity Strategy was approved by LBN on 13 April 2012 and subsequently implemented by the airport. This includes a series of 10 Objectives with a timescale for implementing each Objective and a requirement to report on progress within the APR:

*“Report to the Council every two years on 1 July (on those occasions, as part of the Annual Performance Report for that year) on the performance of the Airport Companies against the objectives and measures specified in the Airport Biodiversity Strategy in the preceding two calendar years being indicated.” (3rd Schedule / Part 6 / 8 - Page 34)*

#### *Employment, Education and Training*

- 5.39 A number of conditions are in place which aim to ensure that jobs at the airport are accessible to local people and to support them to demonstrate the skills and knowledge required to be successful in a job application:

*"Use reasonable endeavours to ensure that:*

*(i) at least 70% of the full time equivalent jobs at the Airport are filled by residents of the Local Area including at least 35% filled by residents of the London Borough of Newham;*

*(ii) at least 70% of direct employees of LCA are resident in Local Area;*

*(iii) at least 35% of direct employees of LCA are resident in the London Borough of Newham.*

*(iv) where LCA initiates recruitment simultaneously for more than 1 job vacancy to advertise through local employment agency (e.g. Reed, Docklands Office), to notify vacancies to relevant Recruitment Centre and to advertise such vacancies on the Airport Website. (6th Schedule / Part 2 / 1(a) – Page 55)*

*To use reasonable endeavours to encourage employers at the Site to fill their job vacancies with residents of the London Borough of Newham and in so doing:*

*(i) within six months of the date of this Deed establish a forum for all employers at the Airport which have at least 20 individual members of staff based at the Airport and to hold meetings of that forum at least twice in each calendar year;*

*(ii) so far as practicable ensure all employers at the Airport which have at least 20 individual members of staff recruit locally as far as possible and advertise job vacancies through the Airport Website and the relevant Recruitment Centre. (6th Schedule / Part 2 / 1(b) – Page 55)*

*To use reasonable endeavours to participate in and encourage staff of LCA, other employers at the Airport and their staff to participate in local community projects and initiatives. (6th Schedule / Part 2 / 1(g) – Page 56)*

*Within 12 months of the date of this Deed to implement a work experience programme at the Airport which shall have the objective of providing one week work experience for a minimum of 40 residents of the London borough of Newham and a minimum total of eight residents of the London Boroughs of Bexley, Barking & Dagenham, Greenwich and Tower Hamlets and further..." (6th Schedule / Part 2 / 1(h) – Page 56)*

#### *Surface Access*

- 5.40 As part of the Planning Agreement (6th Schedule / Part 1 / -Page 53) the Airport is required to develop and implement a Travel Plan to help reduce the impact of air passengers and airport staff on the local road network. The Travel Plan was approved by the LBN on 14 February 2011 and focuses on increasing the use of sustainable transport methods to access the Airport.
- 5.41 The Travel Plan is a living document which is continually implemented and considered at the Airport with the leadership of the Travel Plan Coordinator.

#### **Regulatory Context**

##### Airport Safety & Design

- 5.42 The Airport is required to operate in accordance with the International Civil Aviation Organisation's (ICAO) agreed criteria. The Civil Aviation Authority (CAA) is responsible for enforcing these criteria in the UK. The Airport requires a licence, issued by the CAA, to operate. To obtain and retain this licence, the Airport needs to satisfy and continually adhere to the CAA's rigorous safety related standards.
- 5.43 Safety related standards affecting the design and layout of an airport are set out in a CAA publication, CAP168. They cover such matters as:
- a) Layout, separation and widths of runways and taxiways;
  - b) Aircraft stands and apron layout;
  - c) Height and design of buildings and structures;
  - d) Airport fire service facilities.
- 5.44 The CAA undertakes an annual audit to ensure that the Airport's facilities meet its requirements. Any future development of the Airport will always be subject to CAA approval at the time.

##### Aerodrome Safeguarding

- 5.45 To operate an airport safely it is necessary to 'protect' the airspace around the runway and approach and departure routes. This is done through a series of what are known as 'obstacle limitation surfaces', effectively lines in the sky which define, relative to the runway, maximum acceptable heights for buildings and other structures.
- 5.46 Safeguarding of aerodromes occurs through the planning system by a process of consultation between the airport operator, the applicant of any proposed development and the local planning authority. The process is intended, inter alia to:

- a) Ensure that an airport's operation is not negatively affected by developments, buildings or structures which might infringe the aerodrome's obstacle limitation surfaces;
- b) Protect visual flight paths, for example by ensuring that runway approach lighting is not obscured by development, and that lights elsewhere cannot cause confusion;
- c) Protect the accuracy of radar and other electronic aids to air navigation;
- d) Reduce the hazard from bird strikes to aircraft, associated with land uses such as waste disposal and sewage treatment sites.

- 5.47 LBN and other local planning authorities have been issued with a safeguarding map for the Airport, which identifies those planning applications on which there must be further consultation with the Airport. As a consequence of consultation, the Airport may either object to the proposal, not object, or not object subject to appropriate conditions being met.
- 5.48 The ATWP specified that the Aerodrome Safeguarding process should be used to protect land outside existing airports, needed for future expansion, against incompatible development in the intervening period. The Airport's safeguarding map is available to any local planning authorities who wish to consult it.
- 5.49 The proposed CADP will not change the safeguarding criteria which are currently applied to developments surrounding the Airport.

#### Public Safety Zones

- 5.50 PSZs are areas of land at either end of an airport runway defined by an objective assessment of the risk to an individual on the ground within those areas from an aircraft accident over the course of a year. Although air travel is a low risk means of transport, the Civil Aviation Authority (CAA) identifies PSZs at each end of a runway in order to control the number of people on the ground in the vicinity of airports who could be at risk of death or injury in the event of an aircraft accident on take-off or landing. This is achieved by restricting new development within PSZs. The basic policy objective of the Department for Transport (set out in DfT Circular 01/2010 'Control of Development in Airport Public Safety Zones' ) is that there should be no increase in the number of people living working or congregating in PSZs and that, over time, the number should be reduced as circumstances allow. The Circular states that unimplemented planning permissions in PSZs do not need to be revoked or modified and most existing developments within PSZs can remain there, but some types of new development are not permitted.
- 5.51 The annual forecast number of aircraft movements with and without the proposed CADP is as set out elsewhere in this ES and the Need Statement. This has been used as the basis for the PSZ modelling. The published 2010 PSZ forms the baseline position for the ES assessment. The 'with development' scenario has more flights than the baseline because the CADP provides for additional capacity for scheduled movements, including additional larger stands and the extension to the eastern taxi lane. The 'without development' scenario differs from the baseline due to more recent refinement of future forecasts taking into account the expected rate of introduction of larger aircraft and physical capacity limits at the Airport.

## *Airspace*

- 5.52 The Civil Aviation Authority (CAA) has overall responsibility for the control of airspace within the UK and the provision of air traffic services under the Transport Act 2000. Section 2 of the Act requires the CAA to exercise its functions, inter alia, “...to further the interests of...managers of aerodromes...” This is to be through the “range, availability, continuity cost and quality of air traffic services.” The safe use of airspace is regulated by the Directorate of Airspace Policy (DAP), a division of the CAA. National Air Traffic Services (NATS) are charged with designing and developing UK airspace to meet demand.
- 5.53 For the future, it is assumed that airspace development will keep pace with development in demand, in line with the CAA’s objectives in the Future Air Space Strategy, namely “it is intended that airspace will not become the restricting factor for the current or future operations of airspace users.” It is understood that the London Airspace Management Programme (LAMP) is intended to ensure sufficient airspace capacity at least to meet the levels of demand set out in the Department for Transport’s 2011 forecasts, which should ensure more than sufficient air space capacity to accommodate the Airport’s growth.



## 6 Development Programme and Construction

### Introduction

- 6.1 This Chapter of the Environmental Statement (ES) describes the likely programme and sequence of construction of the proposed CADP, together with and key activities and plant that will be employed during the works.
- 6.2 It also identifies the likely significant environmental effects associated with the construction works and the principal means by which such effects will be mitigated (i.e. avoided, reduced or offset) by the adoption of a project-specific Construction Environmental Management Plan (CEMP). Further detail on the likely significant environmental effects of the works (e.g. noise, dust and vehicle movements), their assessment and specific mitigation measures are set out in the corresponding technical chapters of this ES.

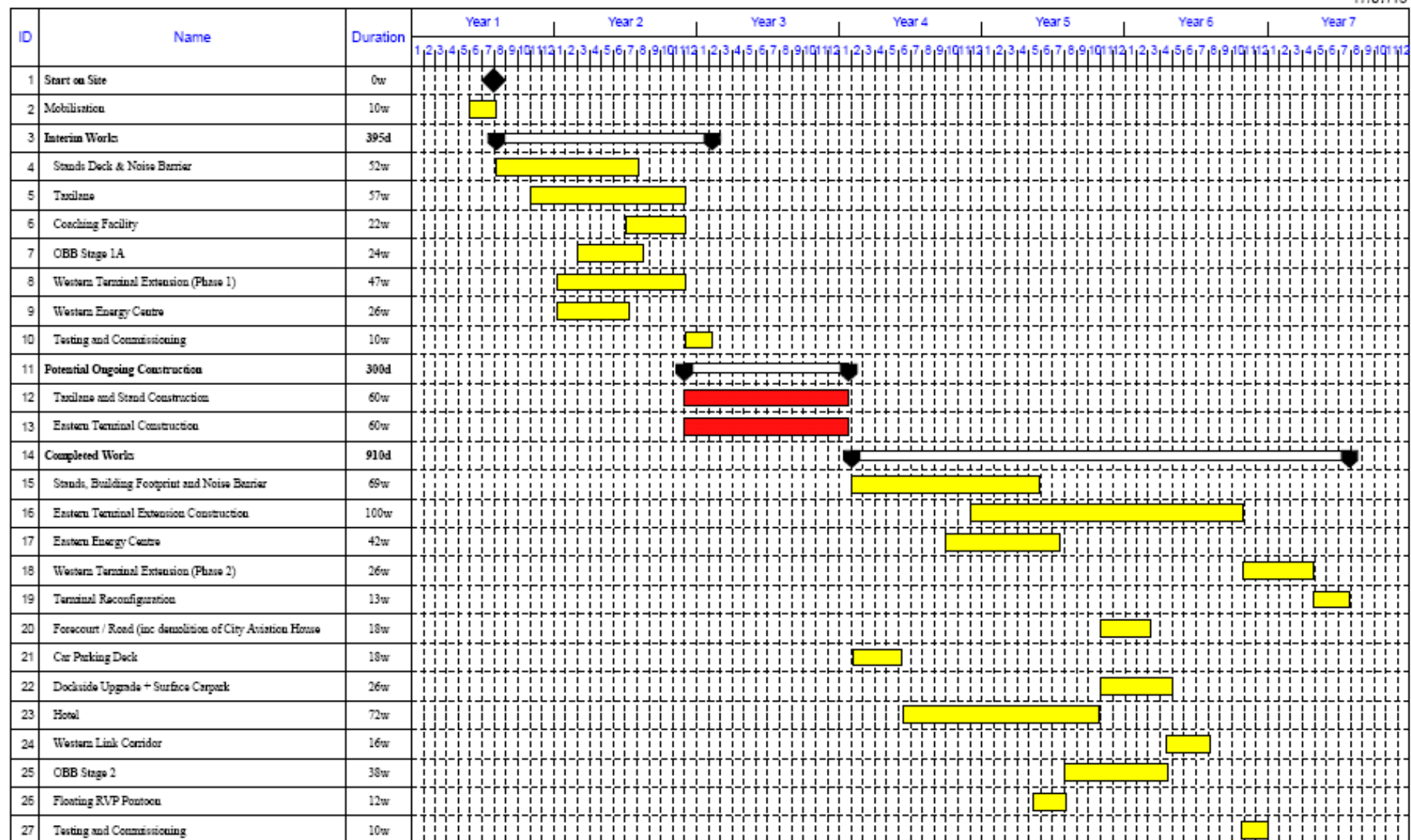
### Programme and Sequencing of Works

- 6.3 The 'likely construction sequence' of the CADP is shown in Figure 6.1 below.
- 6.4 As described in Chapters 1 and 2, the initial stage of CADP infrastructure works (the 'Interim CADP') includes the partial construction of the eastern taxilane and three new Code C compliant stands on a new deck over King George V (KGV) Dock. The temporary Facilitating Works for this infrastructure comprise: an extended outbound baggage (OBB) handling facility, a new Coaching Facility to serve the 3 stands, and a noise barrier.
- 6.5 The new stands, taxilane and Facilitating Works are shown on Figure 6.4 (CADP Years 2-3). These are expected to be complete by late 2016 in order to meet the short term/ critical requirements of the Airport and airlines, as explained in Chapter 1 and the CADP Need Statement.
- 6.6 During this time, the first phases of the Western Terminal Extension (WTE1) and the Western Energy Centre will also be developed, as denoted on Figure 6.4.
- 6.7 The remainder of the CADP will be built out progressively over the following four years (Year 3 to Year 6) to match demand. The likely sequence of the proposed CADP works is shown on the 'Indicative Construction Sequence' drawings appended to this Chapter; where Year 1 (Figure 6.3) represents the commencement of construction of the 3 new stands and the Facilitating Works and Year 7 (Figure 6.7) shows the entire CADP infrastructure developed and fully operational – constituting the 'Completed CADP'.
- 6.8 There are certain logistical, financial and operational factors that dictate the order in which the infrastructure, buildings, car parking and associated structures of the proposed CADP are delivered. This means that there is a high degree of certainty over the sequence of the main works.
- 6.9 The early delivery of the 3 new stands, taxilane, Facilitating Works and the Western Terminal Extension (WTE1) by 2016 is considered essential and 'fixed' based on known capacity constraints of the Terminal and airfield and the need to accommodate the larger Code C aircraft already ordered by SWISS.

- 6.10 In addition, the current forecasts indicate that a total of 11 Code C compliant aircraft stands (i.e. the 7 new stands plus the 4 reconfigured stands Nos. 21-24), the eastern taxilane extension and associated runway links will need to be operational by the end of 2019 to early 2020 and that the last stage of CADP works, including the Eastern Terminal Extension (ETE) and East Pier, will need to be finished in early 2021 in order to accommodate the forecast uplift in passengers by that time. These predicted milestones therefore set the timeline over which the Completed CADP is assumed to be built and therefore the period over which construction activities will occur.
- 6.11 However, the precise timing of each construction phase and activity cannot be established at this point. This is because certain elements of the proposed CADP will be only be triggered as passenger numbers and scheduled aircraft movements increase (as predicted), and other airlines operating out of the Airport (e.g. British Airways) confirm the timing of their fleet upgrades.
- 6.12 As such, it is necessary for the Airport to maintain a degree of flexibility in the timing of the works. This flexibility is reflected in the Likely Construction Sequence (Figure 6.1 below) which shows a period of “potential ongoing construction” of the taxilane, stands and Eastern Terminal Extension during Year 3, as denoted by the red bars. Specific and known demolition and construction activities at this point in time would vary in frequency depending upon the particular stage of works, however, it is considered that sufficient knowledge exists to enable the establishment of all likely and significant environmental effects related to the demolition and construction works.
- 6.13 It is highly unlikely that the construction process will be continuous during the entire 6 year period as, for example, it would not be cost-effective to build out one aircraft stand at a time or to extend the taxilane in small sections. Furthermore, the Airport would not choose to prolong individual stages of the construction for any longer than is necessary, as this could unduly affect its day-to-day operations, passengers experience and its relationship with its neighbours. As such, continuous construction activity throughout the 6 years of the CADP construction programme is not considered a realistic scenario for the purpose of the EIA. Instead, the assessment is focussed on the ‘peak year’ of construction, which has been identified as Year 4 of the CADP works (see Figure 6.5). Year 4 is likely to correspond to 2018 assuming that the construction works begin in late 2014 or early 2015 (subject to planning permission). This assessment case and year are explained in more detail below.

**Figure 6.1**

17/07/13





### **Likely 'Worst Case' Assessment Year**

- 6.14 As described in Chapter 3: EIA Methodology, Year 4 has been selected for the consideration of environmental effects from the demolition and construction works on the basis that this is likely to represent the 'worst case' period for potential impacts on sensitive receptors within and around the Airport, including local residents, passengers and members of the public.
- 6.15 As illustrated by Figure 6.5, during this year the significant infrastructure works will reach a peak, including: piling in the dock and landside areas; construction of the concrete platforms for the Eastern Terminal Extension, new East Pier and up to 4 new stands; and, potentially, the construction of the second stage of the taxiway extending to the runway hold (Hold 27) at the eastern end of the runway. These civil engineering works, described in more detail later in this chapter, have the greatest potential to generate noise, vibration, light and other pollution risks, especially as these works will need to occur during the night-time and at weekend periods when the Airport is closed.
- 6.16 South of KGV Dock, works will be ongoing during the day and night time to construct the new Eastern Energy Centre, proposed Hotel and the Forecourt. This will bring construction activities in close proximity to residents, pedestrians and passengers. In particular, residents to the south, including on Hartmann Road, are potentially most vulnerable to disturbance from these works during this period.
- 6.17 During Year 4 there is likely to be a considerable number of barge, crane and HGV movements delivering and off-loading steel, fabricated concrete elements and other construction materials. The construction compound with associated temporary barge berths and crane platforms (shaded light green on Figure 6.5) are likely to be active use during this period. This compound will be in relative close proximity to the community and educational facilities at the Storey Centre, the adjoining Fight for Peace London Academy and the Woodman Centre on Woodman Road, together with residential properties on Claremont Close and Woodman Street.
- 6.18 As shown on Figure 6.9 and explained later in this chapter, it is likely that some materials will be delivered to the construction compound by barge from the River Thames, via the lock gates at the east end of KGV Dock (Route 1), or, by road via Woolwich Manor Way, Albert Road and Hartman Road (Route 3). Further deliveries to the west will be routed via Connaught Road onto the Airport service road (Route 2) and to the south of the Terminal via Hartmann Road (Route 4). These movements have the potential to create noise, dust and other impacts within a wider catchment.
- 6.19 The visual impact of the works and potential impacts on the ecology of the docks is also potentially most pronounced during this time, as considered Chapter 10: Townscape and Visual Impact and Chapter 13: Ecology and Biodiversity respectively. During this stage, artificial 'Fish Refugia' comprising wire mesh sheets suspended from a 'dolphin' at the eastern end of KGV Dock (see Chapter 10, Figures 10.1-10.3) will be established in order to mitigate for the loss of the Dock wall habitat.

- 6.20 In summary, the potential spatial extent and magnitude of construction impacts of the CADP works is considered to be greatest during Year 4 and this year is therefore taken as the 'worst case' in the corresponding construction impact assessments presented in the technical chapters of this ES.

#### **Other Construction Assessment Years**

- 6.21 In addition to the worst case year described above, consideration is also given in the ES to the complexity of the construction works in Year 2/3 (see Figure 6.4), principally because the development of the Western Energy Centre and the first phase of the Western Terminal Extension (WT1) will occur in a congested site area, adjacent to an operating DLR railway with residential accommodation nearby. As described later in this chapter, works adjacent to the DLR will have to comply with rail engineering hours and will therefore take place during the night time, with the potential to disturb residents on Hartmann Road. Excavation of the basement of the Western Energy Centre will also generate considerable volumes of waste from the site. Furthermore, there is limited space to park delivery vehicles in this area, so there may need to be more frequent deliveries and also concrete trucks parked up on Hartmann Road when a large pour is taking place, such as for the basement of the Western Energy Centre. Accordingly, these specific activities and associated temporary environmental impacts during Year 2/3 are considered in the technical chapters of this ES, particularly Chapter 8: Noise and Vibration.
- 6.22 Much of the CADP building works occurring in the Year 5 and Year 6 would be internal (i.e. mechanical and electrical works and building fit-out) and thus the potential for generating noise and other impacts will be much less than for the main infrastructure works. Similarly, the landside works to the south and east, including the laying out of the new car parks, services, drainage and landscaping, will be of relatively low intensity and could occur during normal working hours as opposed to nights and weekends. As such, environmental impacts during these years are expected to be much less pronounced than for Year 4.
- 6.23 Notwithstanding, where appropriate, the technical authors of the EIA topics have considered whether any changes to the likely construction phasing would give rise to materially different impacts from those assessed for the 'worst case' assessment year described above. No significant additional effects (i.e. that would change a particular impact from 'minor' to 'moderate') have been identified.

#### **'In combination' Construction and Operational Effects**

- 6.24 Where relevant, the additional contribution of ongoing construction impacts is also considered relevant in the main operational assessment years, including 2017 and 2019, as described in Chapter 3. This takes account of the aggregation of impacts as a result of the 'with development' scenario (i.e. changes to the type and frequency of aircraft movements, surface access traffic and passenger throughput) during these years in combination with any temporary effects from construction (e.g. noise and HGV movements).
- 6.25 The next sections of this chapter describe the main elements of the construction programme in more detail.

## **Site Preparation**

- 6.26 In order to prepare for the commencement of the proposed CADP, the construction compound area will be established in Year 1 on land to the south east of KGV Dock. This location is shown on Figure 6.3. This area will accommodate construction offices, welfare facilities and compounds, as well as workforce parking, a materials lay-down area and on-site fabrication. The precast elements for the deck structure will be constructed at a separate off-site precast yard. The location of this precast yard will be determined closer to the construction period when a contractor has been selected.
- 6.27 The temporary construction noise barrier at Woodman Street will be erected in the first phase of the works and is likely to remain in place until Year 6, or until the completion of the works and the decommissioning of the construction compound.
- 6.28 As some materials are likely to be transported by barge (subject to financial and logistical considerations), it will be necessary to install temporary barge berths to improve berthing and craneage and ensure that the dockside area is ready for the off-loading of barges. These will be placed in the initial construction phase (Year 1) over the two easterly 'dolphins' as shown on Figure 6.3.

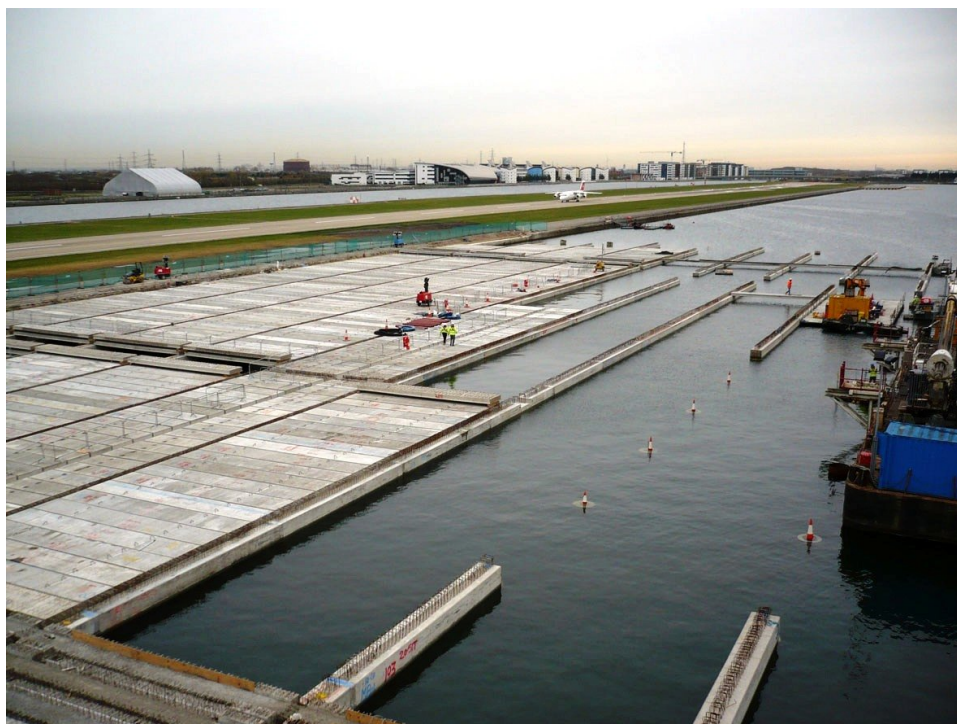
## **Piled Deck Construction Over Water**

- 6.29 The constrained environment at the Airport necessitates the construction of new piled deck platforms over the waters of KGV Dock. Two recent examples of this construction are: the existing runway Hold 27 at the eastern end of the runway; and the Eastern Apron which comprises the apron, pier and taxilane for stands 21 to 24. These platforms were constructed over the past decade using the same techniques as proposed in the CADP. This practice was also used at the ExCeL centre to provide part of the building over the water of the Royal Victoria Dock and so can be considered a 'tried and tested' technique.
- 6.30 The proposed deck, anticipated to be completed by the end of Year 5 (see Figures 6.3 to 6.6) will support the following key pieces of infrastructure:
- a) Stands 24 to 31;
  - b) Apron taxilane;
  - c) Taxilane connection to the runway hold;
  - d) Reconfiguration of the runway hold;
  - e) New East Pier building; and
  - f) Eastern Terminal Extension (arrivals building)
- 6.31 The concrete apron will be approximately 74.5 hectares (area) across KGV Dock. The deck will typically be 450mm thick sitting on 900mm deep precast beams, similar to the existing structure of the Eastern Apron (stands 21-24).



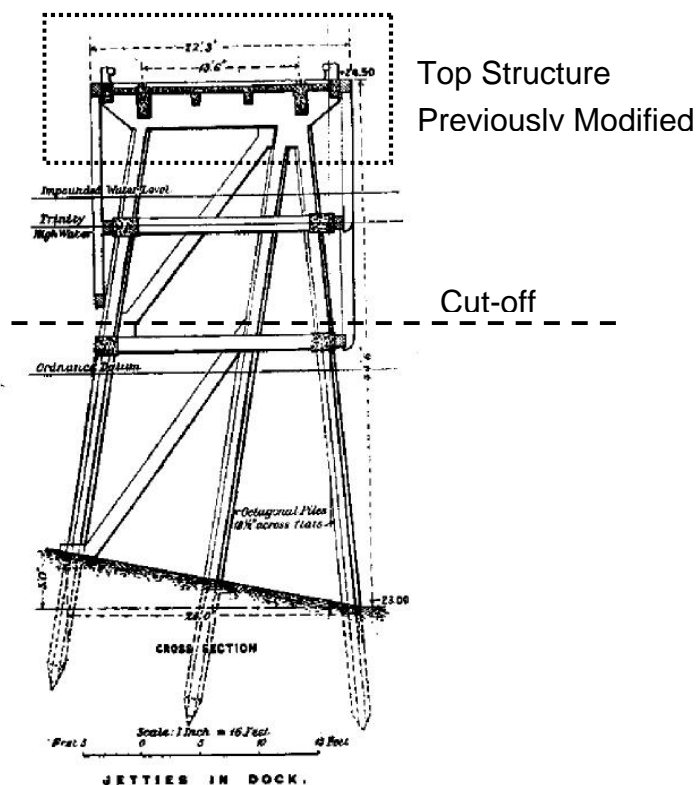
- 6.32 The construction of the new apron will follow a similar structural philosophy to the existing Eastern Apron deck, with a suspended concrete deck consisting of pre-cast reinforced concrete planks with an in-situ topping spanning onto precast beams and the original dock wall. Deck construction based on previous experience at the Airport will therefore comprise of the following key activities:
- a) Preparation of the dock wall to receive the new deck construction;
  - b) Piling through the dock waters;
  - c) Removal of the upstand around the edge of the existing deck;
  - d) Off-site precast of the concrete beam and plank elements required for construction;
  - e) Delivery of precast units to the on site materials storage facility;
  - f) Transfer of precast units to the vessels for placement;
  - g) Placement of the precast concrete beams on to the piles;
  - h) Placement of the precast concrete planks on to the beams;
  - i) Installation of the drainage and electrical infrastructure within the deck structure;
  - j) Placement of reinforcing steel for the in-situ topping;
  - k) Placement of the concrete for the in-situ topping; and,
  - l) Installation of new movement joints.
- 6.33 This process is illustrated in Figure 6.10 which shows construction during the previous Eastern Apron project.

**Figure 6.10 Photograph taken during construction of the Eastern Apron at London City Airport**



- 6.34 The new apron will connect to the existing Eastern Apron supporting stands 21-24. Movement joints will be installed around the existing apron deck so that it remains as a standalone structure with no modifications required to the existing joints.
- 6.35 To enable a tie-in to the existing airfield pavements, the levels of the new deck are constrained. These key tie-in points are: the existing eastern apron to the west; the existing runway to the north; and the existing runway hold 27 to the east. The level of the apron also dictates the extent and position of the stands as the tails of the aircraft on the stand need to be beneath the runway transitional surface. With these constraints it is necessary to cut down the existing dock wall. However, the minimum dock wall height of +5.6m AOD will be maintained to all edges of the new development in order to maintain the same flood defence characteristics. This will be achieved through an upstand around the new deck.
- 6.36 Additional cutting of the dock wall is required to enable services infrastructure to connect through the dock wall to the suspended deck. These works will be undertaken on Saturday afternoons and Sunday mornings following Airport closure, with plant and materials entering via the Airport Vehicle Control Point (VCP).
- 6.37 The construction of the deck for the Eastern Terminal Extension incorporating the permanent Out Bound Baggage (OBB) facility will involve the adjoining dolphin structure being cut off below water level, just above the lowest horizontal element (as shown on Figure 6.11 below)

**Figure 6.11 Dolphin (jetty) in the southern part of the dock**



- 6.38 The apron slab will be supported by large piles which will be designed to support the proposed infrastructure. A piling rig will be used which will be positioned on a floating platform. The piles for the proposed apron, stands and taxilane will typically be 1200mm in diameter.
- 6.39 The piling method has been selected to minimise the amount of pile driving that is necessary which will also minimise the noise generated. This also has the benefit of minimising the disturbance of dock sediment and bed material, thus reducing the possibility of adverse effects on water quality. The piling will comprise of the following key activities:
- a) Installation of a steel casing into the dock bed by vibration;
  - b) Auguring through the steel casing to create the void for the pile;
  - c) De-watering the pile casing;
  - d) Placement of reinforcing steel within the casing;
  - e) Placement of pile concrete within the casing; and
  - f) Preparation of the pile top to receive the precast concrete beam.
- 6.40 The beams will be supported by bored concrete piles with casings founded in the Thanet Sands below KGV Dock bed. For the construction of the Eastern Apron and Hold 27 decks, steel casing were provided for the bored concrete piles and this method will be adopted for the equivalent CADP works. A crawler crane will lift and place the vibrator on the casing to drive it down into the dock bed through the silts, Thames Gravels and into the Thanet Sands. The casings are likely to be left high to ensure they extend above water at all times. This will ensure that the potential for pollution of the Dock is minimised.
- 6.41 Further details are provided within the Piling Risk Assessment (ES Appendix 16.2). This assessment, which was specifically requested by the Environment Agency, considers the potential for creating contamination pathways to the groundwater through piling. It concludes that the risk of such occurrence is very low due to the piling technique to be employed.
- 6.42 The proposed piles are to be placed into the waters of KGV Dock. This is an enclosed water body and therefore does not have any significant flow, unlike rivers and tidal marine environments. Due to the still nature of the water body, it is deemed that the piling would not change the sediment accretion/erosion patterns in the dock bed silts. As such, a full assessment of estuary processes in relation to water levels and flow speeds, and the consequence of these changes to sediment accretion/erosion patterns and suspended sediment concentrations, was not deemed to be necessary.

#### **Other Airfield Developments**

- 6.43 As part of the proposed CADP, there is other airfield infrastructure required to support and complement the deck structure and associated stands and taxilane. These include:
- a) New Ground bearing pavement for runway link Juliette;

- b) Additional airfield drainage;
- c) Fixed Electrical Ground Power (FEGP);
- d) Airfield Guidance Systems;
- e) Stand Floodlighting;
- f) Noise Barrier; and
- g) Vehicle containment barriers to the new dock edge.

- 6.44 Fixed Electrical Ground Power (FEGP) will be installed at all new and final reconfigured stands proposed as part of the proposed CADP. FEGP will be provided through the provision of special downstand planks and beams, with a pit and hatch at the stand position with the aircraft connection cable stored within the pit underneath the deck.

### **Coaching Facility**

- 6.45 The new temporary Coaching Facility will be constructed as part of the Facilitating Works expected to be completed in Years 2 to 3 (refer to Figure 6.4). This will provide gates for arriving and departing passengers to the first 3 new stands in operation, prior to construction of the new East Pier. It is also proposed to erect a temporary Noise Barrier to the south of 3 new aircraft stands to attenuate ground noise from aircraft and construct an extension to the existing outbound baggage area
- 6.46 The Coaching Facility is required until the East Pier is extended because the number of aircraft loads that will require bussing increases during Phase 1 and these could not be accommodated on the existing West Pier. Furthermore, bussing to the eastern stands from the West Pier would be operationally undesirable within an intensively used airside environment.
- 6.47 As the Coaching Facility will be built within the airside environment, it is intended that it will use as many modular elements as possible in order to facilitate rapid construction and minimise disruption to the ongoing operation of the Airport.
- 6.48 The building will be situated on the existing Eastern Apron deck structure and, in order to minimise structural complications, the main building columns will be located over the existing piles beneath the deck structure. Currently, it is anticipated that one additional pile will be needed through the existing deck structure to support the loads from one of the columns that is off the main grid. This column is required to support the link bridge to the terminal over the airside road. An alternative to this additional pile is a transfer structure above the existing deck. The most appropriate solution will be chosen when the loads from the building are confirmed as the design develops.
- 6.49 The Coaching Facility will be demolished and the temporary Noise Barrier removed once further new stands are constructed and the East Pier is completed and becomes operational (expected to be by Year 6).

### **Temporary Outbound Baggage (OBB) Reconfiguration**

- 6.50 The OBB reconfiguration forms part of the Facilitating Works, which will be complete by Year 2. This will comprise the construction of a new deck (as described above) and the temporary erection of a rigid 'tent enclosure' to the east of the Terminal to replace the existing OBB facility. The layout of this temporary OBB facility has been designed to ensure that a revised route for emergency vehicle access can be accommodated.
- 6.51 The OBB enclosure will be demolished in Years 5 - 6 as the Eastern Terminal Extension progresses and the permanent OBB facility is incorporated into the new building, as described below.

### **Outbound Baggage Extension**

- 6.52 The expanded OBB facility will be located between the existing Terminal building and the proposed Eastern Terminal Extension, forming part of the arrivals complex rather than being a distinct entity. This expanded facility will use the same entry and exit route as the current OBB area and will comprise a ground level zone for baggage carousels and baggage pick-up vehicles, with a mezzanine over to accommodate the sortation system. It is expected to be completed between Years 5 and 6.

### **Western Terminal Extension and Western Energy Centre**

- 6.53 The Western Terminal Extension (WTE) is a 3 storey above ground extension of the existing Terminal building. The first phase of the WTE is proposed to be partially built-out by Year 2 with Phase 2 (WTE2) built out in Year 6, as denoted on Figures 6.4 and 6.7.
- 6.54 The WTE comprises:
- a) Western Terminal Extension: A permanent structure allowing the existing security area to be displaced from the restricted existing terminal footprint, thus freeing its previous location to serve as much needed passenger amenity space within a reconfigured terminal plan;
  - b) Western Service Yard: A permanently reconfigured 'Triangle' Service Yard area will accommodate the Western Terminal Extension building and serve the new terminal in both Interim and Completed phases of the development;
  - c) Western Energy Centre: A consolidated housing for energy supply and general plant to meet the demands of the interim development facilities.
- 6.55 The WTE will have a screened open deck plan with photovoltaics on the roof. Foundations will be piled with auger piles, concrete filled with ground beams and concrete lift pits. The structure will most likely be a composite of steel and concrete floors with a membrane coated concrete roof deck to carry plant.
- 6.56 The WTE will be built adjacent to the existing DLR station and the piled foundation will be designed to minimise any potential disruption to this adjacent structure. The roof of the extension is set below the transitional surface of the airfield, although construction will require out of hours working in this

zone. The building will be serviced from the Western Energy Centre with air handling units and foul air extracted at high level on the roof.

- 6.57 The levels of the Western Service Yard will be predominately as existing, with minor regarding to minimise the amount of cut and fill on the site.
- 6.58 There will be amendments to the services infrastructure to support the proposed design. One significant element of this will be the surface water drainage which includes an attenuation tank to reduce the runoff from the site. This is described more fully in the Surface Water Drainage Strategy (included at ES Appendix 12.2).
- 6.59 The Western Energy Centre is a single storey concrete and steel framed building above a single storey basement which will be built out in Year 2. The building will be approximately 4m high with plant screened on the roof by photovoltaics. The basement (maximum of 6.8m depth) will be concrete lined, with a drained cavity floor including pumps to gravity drainage. This facility will house plant associated with the combined cooling, heat and power (CCHP) tri-generation plant, including: combined heat and power (CHP) units; absorption chillers; pumps; heat rejection plant (located on roof); heating and cooling water buffer vessels; water tanks; stand-by generator; sub-stations; electrical panels, switchgear and equipment.

#### **Eastern Terminal Extension**

- 6.60 The and Eastern Terminal Extension (ETE) including the new East Pier are likely to be completed in the later stages of the proposed CADP construction sequence (Year 6) although the associated phased construction works are expected to commence in Year 4.
- 6.61 A Noise Barrier will be attached to the eastern end of the East Pier and will be 8m metres high. This Noise Barrier will have different extents depending on the phase of the development and is expected to be fully completed by the end of Year 5 (see Figure 6.6).
- 6.62 As described above, the new East Pier and ETE will be supported on the piled deck platform over KGV Dock. Where the buildings pass over the edge of the dock to the landside area to the south, the foundation solution will be very similar in order to maintain a continuous deck foundation with similar properties. Above the foundation level, the buildings are expected to be a clad steel frame.

#### **Eastern Energy Centre**

- 6.63 The Eastern Energy Centre, to the south of the RVP, is expected to be built out by Year 5, as shown on Figure 6.6.
- 6.64 It will house similar plant to that contained in the Western Energy Centre, as described above, and will provide additional space for the heat exchangers to allow connectivity to a future district heating system, as and when this becomes available in the area.
- 6.65 The space allowance in this facility includes circulation, maintenance and operational space, fire escape routes, combustion and ventilation air intake louvers, and exhaust flues for the CCHP plant.

Water and drainage facilities and a gas intake will also be provided and pipework will run from the Eastern Energy Centre to the Eastern Terminal Extension (ETE) via a services trench.

#### **Forecourt reconfiguration including services infrastructure**

- 6.66 It is proposed to re-grade the area of the proposed Terminal Forecourt to remove the existing retaining wall to the north of Hartmann Road. This will result in a net cut (removal of spoil) from the site.
- 6.67 The new Forecourt will include hard and soft landscaping in addition to above ground structures such as canopies, signs and lighting.
- 6.68 There will be amendments to the services infrastructure to support the proposed design. One significant element of this will be the proposed surface water drainage strategy which includes for a further attenuation tank in this location to reduce the runoff from the site (see Appendix 12.2). There will also be service connections from the Eastern Energy Centre to the new ETE..
- 6.69 The majority of the new Forecourt works will be completed by Year 4 (see Figure 6.6) although the final landscaping and security buffer area will not be finalised until the Eastern Terminal Extension is completed.

#### **Dockside Upgrade and Car Parking**

- 6.70 The dockside upgrade and new car parking areas works will be implemented in a phased manner to enable the provision of new and replacement parking as the CADP construction progresses, together with a new hire car compound and taxi feeder park to the east.
- 6.71 The single storey car parking deck that is proposed closest to the Terminal is anticipated to be a proprietary system which will enable quick construction. According to the Likely Construction Sequence (Figure 6.1, above) this structure will be constructed early in the proposed CADP (i.e. the end of Year 3).
- 6.72 All other parking areas are expected to be complete by end of Year 4 and will predominately be implemented at the existing site levels to minimise the amount of cut or fill from the site. There will be associated amendments to the services infrastructure to support the proposed design together with new landscaping areas. Again, one significant element of this will be the proposed surface water drainage system which includes for attenuation tanks to reduce the runoff from the site. This is described in more detail in the Surface Water Drainage Strategy (Appendix 12.2)

#### **New RVP Access Pontoon**

- 6.73 The new Rendezvous Point (RVP) access pontoon is likely to be a proprietary pontoon structure which is assembled on site in Year 5. This will then be overlain with an in-situ wearing course. It is expected that the pontoon units would be delivered to the site via the river and will be fixed in place with new mooring points.



### **Proposed Hotel**

- 6.74 Outline planning Permission is being sought for the Hotel in order to provide the necessary flexibility for the detailed design of the scheme at a later date.
- 6.75 The Hotel is anticipated to be built out in Year 4 to Year 5 using conventional construction techniques which are unlikely to give rise to significant environmental effects, with appropriate mitigation measures in place. However, were the Hotel is to be built out to its maximum 6 storey height, some out-of-hours working may be necessary because the associated craneage may breach the Airport's transitional surface.

### **Excavations**

- 6.76 Excavations are required for the following:
- a) Piles for the deck structures over KGV Dock;
  - b) Airside drainage attenuation tanks and other services infrastructure;
  - c) The new runway link Juliette;
  - d) Foundations for the ETE (outside of KGV Dock);
  - e) Foundations for the WTE and associated infrastructure;
  - f) Foundations and basement for the Western Energy Centre and associated infrastructure;
  - g) Foundations for the proposed Hotel and associated infrastructure;
  - h) Foundations for the Eastern Energy Centre and associated infrastructure;
  - i) Forecourt reconfiguration, particularly pavements and any necessary re-grading;
  - j) Car parking, Car Hire Parking and Taxi Feeder Park, particularly pavements and any necessary re-grading; and
  - k) Landside services infrastructure particularly attenuation tanks.
- 6.77 Excavations will also be required for the drainage works as detailed within the Surface Water Drainage Strategy. The total buildings, landscape and services excavations are predicted to derive approximately 108,000 m<sup>3</sup> of material, 17% of which is likely to be suitable for re-use as backfill on site.
- 6.78 The potential contamination issues are considered within Chapter 16: Ground Conditions and Contamination, whilst further detail on waste generation volumes and sources are provided in Chapter 15: Waste Management.

### **Plant and Equipment**

- 6.79 Consideration has been given to the types of plant that are likely to be used during the demolition and construction works. The indicative plant and equipment associated with the construction process

is set out in Table 6.1 below and has been considered within the technical chapters, including Chapter 8: Noise and Vibration and Chapter 9: Air Quality.

**Table 6.1- Indicative Plant & Equipment**

Plant and Equipment	Construction Element				
	Piling	Concrete Deck	Drainage and Services	Buildings	Landside Infrastructure
Tracked Excavators			✓		✓
Tracked Excavators with Pulverizers		✓	✓		✓
Wheeled Backhoe Loaders			✓		✓
Wheeled Backhoe Loaders with Breakers		✓	✓		✓
Hand Held Pneumatic Breaker	✓	✓	✓		✓
Dump Trucks		✓	✓		✓
Muck Away Barges	✓				
Vibratory Rollers			✓		✓
Steel Pile Casing Placements by Vibration	✓			✓	
Gas Cutters for Pile Steel Casings	✓			✓	
Piling Rigs – Rotary Bored	✓			✓	
Tracked Mobile Cranes	✓	✓			
Mobile Telescopic Cranes		✓	✓	✓	✓
Floating Craft with Cranes / Lifting Booms.		✓			
Mobile Generators	✓	✓	✓	✓	✓
Water Pumps	✓		✓		✓
Mobile Floodlights with Generators	✓	✓	✓	✓	✓
Floating pontoons, barges and tug boats	✓	✓			
Concrete Mixer Trucks	✓	✓	✓	✓	✓
Truck Mounted Concrete Pumps	✓	✓	✓	✓	✓
Poker Vibrators	✓	✓	✓	✓	✓
Vibrating Finishing Beams		✓			✓
Air Compressors	✓	✓	✓	✓	✓
Diamond Cutting Tools / Saws		✓	✓	✓	✓
Road Sweepers		✓	✓		✓

Plant and Equipment	Construction Element				
	Piling	Concrete Deck	Drainage and Services	Buildings	Landside Infrastructure
Core Drill			✓	✓	✓
Scaffold				✓	
Mobile Access Platforms				✓	✓
Delivery Trucks	✓	✓	✓	✓	✓
Skips and Skip Truck	✓	✓	✓	✓	✓

### Construction Lighting

- 6.80 Lighting will be provided to ensure safe working at night. It will be designed so as to not to interfere with aircraft navigation or create excessive light spill to surrounding areas. However, the potential impacts of temporary construction lighting have been considered within a Lighting Impact Assessment report, which forms Appendix 10.3 of this ES.
- 6.81 It is currently anticipated that lighting will be required for the following:
- Temporary flood lights installed at the contractor's compound and material storage areas;
  - Temporary flood lights placed on the deck after placement of the beams and planks to maximise the amount of daytime working during the winter months;
  - Floodlighting attached to the floating piling rigs and other vessels used for the placement of the precast beams and planks;
  - Temporary mobile floodlights used on the airfield during night time and weekend shifts;
  - Temporary floodlights associated with the building works to maximise the amount of daytime working during the winter months; and
  - Temporary floodlights in the landside areas (including the Forecourt, car parking, RVP compound and western link corridor) to maximise the amount of daytime working during the winter months.

### Cranes

- 6.82 Cranes are essential in fabricating a project of this nature, especially when utilising precast and modular elements. Due to the close proximity to the runway, tower cranes are not typically suitable due to the limitations of the transitional surface and therefore mobile cranes will be employed. The height of these cranes will vary depending on the specific task. As a general rule, the following crane heights are expected:
- New East Pier and ETE building - Typical maximum of 25m, but potentially up to 30m for exceptional plant deliveries;
  - Materials Storage Yard – Typically 30m;

- c) Piled Deck construction – Typically 30m;
- d) Deck piling rig – Typically 25m; and,
- e) Other buildings – Typical maximum of building height + 10m

## **Resources and Working Hours**

### Resources

- 6.83 It is anticipated that employment levels will fluctuate during the course of the construction programme. During the peak construction period (Year 4), a total of approximately 500 site operatives are anticipated to be required on site per calendar month.
- 6.84 Estimated construction employment during the key phases of the proposed CADP works are as follows:
- a) Between Years 1 to the beginning of Year 3 the peak personnel employed per calendar month is estimated at 400 construction workers.
  - b) Between Years 4 and the end of Year 6, the peak personnel employed per calendar month is estimated at 500 construction workers.
- 6.85 In addition, construction of the proposed Hotel has been identified separately and the peak personnel employed per calendar month for the construction of this building is estimated at 275 workers.
- 6.86 Where practical, the workforce will be sourced from the local area although where specialist skills are required these may be from outside of the local area.

### Working Hours

- 6.87 The hours of construction of the proposed CADP will be limited by the operational hours and activities of the Airport. As identified above, certain construction works will be performed at night and during the 24 hour weekend period when the Airport is closed. This is particularly relevant to activities close to the runway and those which require working at height above the transitional and other safeguarded surfaces.
- 6.88 Specific night-time (22:00 to 06:30) and weekend (12:30 Saturday to 12:30 Sunday) activities proposed are:
- a) 90% of piling (night-time and weekend);
  - b) Crane placement of large precast elements close to the runway;
  - c) Crane placement of reinforcing steel for the in-situ concrete slab;
  - d) All pavement works within the existing runway strip and dock edge (night-time and weekend);
  - e) All breaking out of KGV Dock walls (weekend only, not night-time);

- f) Drainage infrastructure constructed within the runway strip;
- g) Construction of other services within the runway strip;
- h) Construction of the new building requiring craneage affecting airfield operations; and,
- i) Essential safety and maintenance activities (night-time and weekend).

6.89 Other elements of the construction below the transitional surface and operational areas of the Airport (e.g. the surface car parking, Hotel and Eastern Energy Centre) are likely to take place during normal day-time hours (8.00 to 19:00). Any planned abnormal activities outside of these core hours will be agreed with LBN.

### Noise Control and Monitoring

6.90 As set out in Chapter 8: Noise and Vibration, it is anticipated that Section 61 consent will be agreed and established with the LBN in advance of the construction works. Under this consent, the following Construction Noise Limits are likely to apply to the proposed CADP:

**Table 6.2: Indicative Maximum Noise Limits at Residential Properties in Proximity to the Airport (Unless prior approval is obtained from LBN)**

FOR DAYTIME CONSTRUCTION NOISE LIMITS	
<b>Monday to Friday:</b> 08.00 – 18.00	75 dB LAeq, 10h
<b>Saturday</b> 08.00 – 13.00	75 dB LAeq, 5h
FOR NIGHTTIME CONSTRUCTION NOISE LIMITS	
23.00 – 08.00	55 dB LAeq, 15m
FOR OTHER TIMES CONSTRUCTION NOISE LIMITS	
<b>Saturday</b> 13.00 – 23.00 <b>Sunday</b> 08.00 – 23.00 <b>Monday – Friday</b> 18.00 -23.00	55 dB LAeq, 1h

### Access and Transportation

6.91 Construction materials and equipment are likely to be delivered both by road and river for the proposed CADP. The potential impacts of these movements have been assessed as part of Chapter 11: Traffic and Transportation of this ES and within the accompanying Transport Assessment (ES Appendix 11.1).

#### Surface Access

6.92 The preliminary proposals for construction vehicle access arrangements for the proposed CADP are shown on Figure 6.9, which shows the four principal road and dock access routes to the site (described below)

6.93 Table 6.3 below includes the indicative monthly vehicle flows for the main construction phases.

**Table 6.3 - Indicative Construction Vehicle Flows (HGVs)**

Period	Peak Vehicle Movements by Road per Calendar Month
Years 1 to the beginning of Year 3	585
Years 4 to the middle of Year 7	626

6.94 This includes the following access routes:

- a) Route 1 – Barge Access, via King George V Dock;
- b) Route 2 – Airside Site Access, via the A1020 Connaught Bridge Road and the A112 Connaught Road;
- c) Route 3 – Compound and Landside Site Access, via the A117 Woolwich Manor Way or Albert Road; and
- d) Route 4 – Secondary Compound and Landside Site Access, via the A1020 Connaught Bridge Road, the A112 Connaught Road, Camel Road and Hartmann Road. The secondary route is intended to be used only under exceptional or emergency situations.

6.95 The appointed contractors will ensure, in consultation with LBN, that site delivery access and egress is properly signposted and that any diversionary routes do not cause undue disturbance to residential properties. Site road access by large or heavy loads to the landside compound and material storage area will be restricted to agreed times.

6.96 Modern construction management methods allow 'just-in-time' deliveries, ensuring that relatively constrained sites operate efficiently with limited on-site storage of materials. This leads, where appropriate, to the use of smaller size delivery vehicles and short delivery times. It may also be appropriate for an off-site temporary storage yard to be employed, if a suitable site can be identified, allowing components to be pre-assembled prior to delivery to the construction site or bulk materials to be stored.

6.97 As described in the Transport Assessment (ES Appendix 11.1) a Construction Logistics Plan (CLP) will be produced for the proposed works which will detail the methods of transport for construction materials and employees. An assessment of the 'worst case' road traffic forecasts, assuming the exclusion of barge transport (Route 1), is also included in the TA.

6.98 The majority of construction personnel would be expected to travel to the site by public transport, or by specific buses provided for the construction workers. There would be limited vehicle parking permitted on-site for visitors. It is currently anticipated that at least 75% of construction staff would arrive by public transport with a maximum of 25% arriving by car, minibus or other means.

#### River Access

- 6.99 Subject to the outcome of further financial and logistical consideration (prior to or upon the appointment of the Principal Contractor) barge movements are likely be used to bring in the precast elements for the deck structure and to remove waste spoil from the site. Therefore, to aid the delivery of a large number of precast units to the site by barge, it is proposed to install two temporary barge berths within the Construction Compound described above. These berths will aid the off-loading of materials from the barge over the existing dolphins and enable their transfer to the crafts used for placement in the permanent works.
- 6.100 For the duration of the deck construction for the stands, apron and taxilanes, it is anticipated that 12 flat-top (SPUD) 600 Tonne barge movements will occur per calendar month. These movements exclude plant barges, tugs and associated water safety craft. Additionally, for the duration of landside and airside developments in the ground, it is anticipated that there will be 3 bulk spoil barge movements per calendar month.

### **Waste Management**

- 6.101 The proposed CADP will require construction materials to be delivered to the site and waste material, arising from excavations (spoil), pile risings and general building waste, to be removed off-site. Table 6.3 includes estimates of waste airings.

**Table 6.3- Estimates of Waste in Tonnes (Tn)**

Period	Maximum monthly waste	Total waste
Year 1 to early Year 3 (Facilitating Works)	393 Tn	2774 Tn
Year 4 to Year 7 (main works)	456 Tn	5588 Tn

- 6.102 Over 90% of construction waste material is to be targeted to be re-cycled, re-used or otherwise diverted away from landfill. This target would exclude any contaminated excavations that may need to be disposed of at a specialist licensed facility.
- 6.103 Excess spoil from pile arisings and other excavations (i.e. which are not suitable for back-fill on the site) are expected to be removed from the site by barge. Based on experience of the previous projects at the Airport, these arisings will need to be disposed of at a licensed tip (to be confirmed by the Contractor). On the previous Eastern Apron project such materials were disposed of directly from the barge to a licensed landfill in the Thames Estuary. Therefore, subject to disposal facilities available to the appointed Contractor, it is anticipated that a similar arrangement could be achieved for the CADP works.
- 6.104 Inert demolition waste and materials such as broken-out concrete and tarmac will be stockpiled for as short a period of time as possible before removal for re-use, recycling or disposal elsewhere.
- 6.105 The deck structures have been designed to maximise off-site fabrication, reduce the quantity of material and number of connections and components, in order to improve the efficiency of the construction.



- 6.106 A specific Site Waste Management Plan (SWMP) will also be implemented during the proposed CADP works, as outlined below.

#### Site Waste Management Plan (SWMP)

- 6.107 The disposal of all waste or other materials removed from the site will be in accordance with the requirements of the Environment Agency, Control of Pollution Act (COPA) 1974, Environment Act 1995, Special Waste Regulations 1996 and the Duty of Care Regulations 1991.
- 6.108 In general and in accordance with the principles of the Waste Regulations 2011, a principal aim during demolition and construction will be to reduce the amount of waste generated and exported from site. This approach complies with the waste hierarchy whereby the intention is first to minimize, then to treat at source or compact and, finally, to dispose of waste off-site as necessary.
- 6.109 All relevant contractors will be required to investigate opportunities to minimise and reduce waste generation, such as:
- a) Agreements with material suppliers to reduce the amount of packaging or to participate in a packaging take-back scheme;
  - b) Implementation of a 'just-in-time' material delivery system to avoid materials being stockpiled, which increases the risk of their damage and disposal as waste;
  - c) Attention to material quantity requirements to avoid over-ordering and generation of waste materials;
  - d) Segregation of waste at source where practical; and
  - e) Reuse and recycling of materials off-site where re-use onsite is not practical (e.g. through use of an off-site waste segregation facility and re-sale for direct reuse or reprocessing).
- 6.110 The sustainable management of waste during both the construction and operational phases of the proposed CADP is described in more detail in Chapter 15: Waste.

#### **Construction Environmental Management Plan (CEMP)**

- 6.111 The Principal Contractor will be required to develop and implement a project specific Construction Environmental Management Plan (CEMP) covering all aspects of the proposed CADP demolition, site preparation and construction works. An outline draft of this CEMP is attached at Appendix 6.1; however, it should be noted that the final form of this document will be subject to further discussion with LBN and the appointed Principal Contractor.
- 6.112 The CEMP will deal with the potential effects arising from all construction activities and identify the implementation of effective management controls, for example, the employment of dust and noise suppression methods and the proper maintenance and shielding of plant and vehicles. This CEMP would set out the management, monitoring, auditing and training procedures in place to ensure compliance with the relevant legislation and environmental 'best practice'. Thus, the proposed CADP specific CEMP would:

- a) Identify potential environmental impacts of the works, as set out in this Environmental Statement;
- b) Specify measurable limits and targets to be adhered to; and,
- c) Provide detailed mitigation measures to be undertaken and the management tools and procedures to be employed to avoid, reduce or otherwise compensate for such effects.

6.113 The CEMP will be a contractual document outlining the different procedures to be undertaken in order to complete the various works, and will contain construction environmental management controls identified in the ES. Individual trade contracts will also need to conform to the CEMP such that they incorporate requirements for environmental control, based on good working practice. These include the careful and coordinated programming of work activities, resource conservation, minimising vehicle trips, pollution control measures, adhering to health and safety regulations, quality management and communication procedures.

6.114 In this way, all parties involved with the demolition and construction works, including trade contractors and site management, will be required to work on a coordinated manner and to adopt common best practice and environmentally sound methods.

6.115 The CEMP will include the following main items:

- a) Programme and Phasing details of the works;
- b) A broad plan of the demolition and construction works, highlighting the various stages and their context within the project, including a full schedule of materials and manpower resources, as well as plant and equipment schedules;
- c) Detailed site layout arrangements (including requirements for temporary works), plans for storage, accommodation, vehicular movements, delivery and access;
- d) Prohibited or restricted operations and hours of working, including 'quite periods' of working (e.g. Sunday mornings and Bank Holidays);
- e) A schedule of environmental monitoring (for noise, dust, vibration etc.) and the setting of 'Action Values' and procedures to rectify any exceedance of these values;
- f) Details of all plant and equipment to be used;
- g) Details of operations that are likely to result in disturbance, with an indication of the expected duration of each phase and key dates.
- h) Procedures for the prior notification to LBN and relevant statutory bodies (e.g. the EA, RoDMA, PLA and the Metropolitan Police) and non-statutory stakeholders (including neighbours) of abnormal activities and deliveries so that local arrangements can be agreed;
- i) The designation of a Project Environmental Manager (PEM) including his or her responsibilities;
- j) A procedure to ensure communication is maintained with LBN and the local community to provide information on any operations likely to cause disturbance (through, for example, meetings and newsletters);

- k) Provisions for affected parties to register complaints and the procedures for responding such complaints;
- l) Provisions for regular reporting to the LBN Airport Officer or EHO, the Airport management, NATS and other on-site authorities;
- m) Details of access and egress and proposed routes for HGVs; and,
- n) Details of Emergency Procedures.

6.116 It should be noted that existing environmental management procedures at the Airport (as detailed in Chapter 5) will continue to operate, including the ongoing Air Quality and Noise monitoring regimes.

6.117 The specific construction environmental effects of the proposed CADP works are discussed in more detail the following technical chapters of this ES.

## 7 Socio-Economics, Community & Recreation

### Introduction

- 7.1 This chapter provides an assessment of the likely significant socio-economic effects arising from London City Airport's ('the Airport') proposed City Airport Development Project ('CADP'). It has been prepared by York Aviation LLP.
- 7.2 The assessment is based on employment data from the Airport's records for 2012 as well as previous research undertaken by York Aviation for the Airport in 2010 and 2011, including an economic impact study<sup>1</sup> and social survey<sup>2</sup>. These reports are attached as Appendices 7.1 and 7.2.

### Policy Context

#### National Policy

##### *The Government's Aviation Policy Framework (2013)*

- 7.3 On 22 March 2013, the Coalition Government published its Aviation Policy Framework, following consultation undertaken during 2011 and 2012. This Framework replaces the 2003 Air Transport White Paper as Government policy on aviation and sets out the Government's overall objectives for aviation and the policies needed to achieve them, alongside any future decisions the Government may make following the recommendations of the independent Airports Commission (see below).
- 7.4 In September 2012, the Secretary of State for Transport announced that the Government had asked Sir Howard Davies to chair an Independent Commission tasked with examining the scale and timing of any requirement for additional capacity to maintain the UK's global hub status, and identifying and evaluating how any need for additional capacity should be met in the short, medium, and long term. The Commission will present an interim report by the end of 2013 and a final report by the summer of 2015. The Aviation Policy Framework sets out the parameters within which the Airports Commission will work.
- 7.5 The Aviation Policy Framework puts economic growth and the environment at the heart of the Government's vision for aviation and this is made clear in the Secretary of State's Foreword:
- "The Government believes that aviation needs to grow, delivering the benefits essential to our economic wellbeing, whilst respecting the environment and protecting quality of life."*<sup>3</sup>
- 7.6 Chapter 1 of the Framework concerns the support for growth and the benefits of aviation. The introductory paragraphs reaffirm the importance of aviation to economic growth:

*"We believe that aviation infrastructure plays an important role in contributing to economic growth through the connectivity it helps deliver. For example, it provides better access to markets, enhances communications and business interactions, facilitates trade and investment*

*and improves business efficiency through time savings, reduced costs and improved reliability for business travellers and air freight operations.”<sup>4</sup>*

*“There is broad agreement that aviation benefits the UK economy, both at a national and a regional level. While views differ on the exact value of this benefit, depending on the assumptions and definitions used, responses to both the scoping document and the consultation demonstrated that the economic benefits are significant, particularly those benefits resulting from the connectivity provided by aviation. In addition we believe there to be social and cultural benefits from aviation.”<sup>5</sup>*

- 7.7 The Framework goes on to note the specific benefits the industry brings through its contribution to Gross Domestic Product (GDP) and jobs, imports and exports, manufacturing and technology, greater productivity and growth, tourism, and wider societal benefits. These are summarised in the Executive Summary:

*“Aviation benefits the UK economy through its direct contribution to gross domestic product (GDP) and employment, and by facilitating trade and investment, manufacturing supply chains, skills development and tourism. The whole UK aviation sector’s turnover in 2011 was around £53 billion and it generated around £18 billion of economic output. The sector employs around 220,000 workers directly and supports many more indirectly. The UK has the second largest aircraft manufacturing industry in the world after the USA and will benefit economically from growth in employment and exports from future aviation growth. Aviation also brings many wider benefits to society and individuals, including travel for leisure and visiting family and friends.”<sup>6</sup>*

#### Regional Policy

##### *The London Plan (2011)*

- 7.8 The Mayor of London published the replacement of the spatial development strategy for Greater London - The London Plan – in July 2011. This is the overall strategic plan for London, which sets out a fully integrated economic, environmental, transport and social framework for the development of London over the next 20 to 25 years.

- 7.9 Policy 6.6 (Aviation) states that:

*“Adequate airport capacity serving a wide range of destinations is critical to the competitive position of London in a global economy.”*

- 7.10 The Plan also notes that the Mayor...

*“...supports improvements to London’s airports that will ensure they can be used to optimum efficiency while not necessarily increasing the number of air traffic movements – improving the facilities available to passengers and providing them with the kind of experience that befits a world city, and also ensuring the availability of a range of public transport options for getting to and from airports.”<sup>7</sup>*

*The Royal Docks Vision (2010)*

- 7.11 A Vision for the Royal Docks was prepared by the Mayor of London and the Mayor of Newham and published in July 2010. The Foreword to this document makes clear that the regeneration of the Royal Docks is now an absolute priority for the Mayors.<sup>8</sup>

- 7.12 The role of the Airport in supporting the regeneration of the Royal Docks is also noted in connection with the aim to create a world-class business destination.

*"With the University of East London, City Airport, ExCeL and strong links to Canary Wharf, the O2 Centre and the City, the Royal Docks is already an attractive location for international business."*<sup>9</sup>

- 7.13 The Vision also makes clear that future development should positively benefit the local communities and that continuing economic vitality is key to quality of life and the convergence agenda (see below).

- 7.14 In March 2011, the Royal Docks was awarded Enterprise Zone status by the UK Government, which will mean businesses locating to the area will benefit from substantial business rates relief over five years as well as a simplified planning approach to development within the zone.

- 7.15 In May 2013, the Mayor of London announced details of a £1bn deal to transform part of the Royal Docks into the capital's next business district. The 35-acre site at Royal Albert Dock is to be developed by Advanced Business Park (ABP), a Chinese developer, into a gateway for Asian, Chinese and other businesses seeking to establish headquarters in Europe. The proximity of the Airport was a significant factor in attracting inward investment.

*Vision 2020 – the Greatest City on Earth*

- 7.16 In June 2013, the Mayor produced his Vision 2020 - The Greatest City on Earth. This clearly identifies the Royal Docks as an opportunity area and the role of London City Airport is serving the Royals:

*"We are returning the Royal Docks to their former glory at the forefront of international trade and exchange. This 125 hectare site - including the regeneration areas of Silvertown Quays, Royal Albert Dock and Royal Albert Basin has £22bn of development potential. Already, innovative and iconic developments are springing up to create a world class business destination - such as The Siemens Crystal and the Emirates Air Line cable car.*

*A new Enterprise Zone will support business ventures creating 6,000 new jobs. A beautiful 'floating village' will host just some of 11,000 new homes built. A £1bn joint public and private investment will create London's first Asian Business Park.*

*We will install transport links to Crossrail 1 at Woolwich and London City Airport."*<sup>10</sup>

- 7.17 The Vision also emphasises the importance of international connectivity to the London economy.<sup>11</sup>

## Local Economic Policy

- 7.18 The 'Local Area' identified in the 2009 Section 106 Agreement<sup>12</sup> for the purposes of defining a local labour catchment area, covers the London Boroughs of Barking and Dagenham, Bexley, Greenwich, Hackney, Havering, Lewisham, Newham, Redbridge, Southwark, Tower Hamlets, and Waltham Forest, as well as the District of Epping Forest. The Boroughs of Newham, Greenwich, and Tower Hamlets lie in closest proximity to the Airport and residents of these Boroughs account for a significant percentage of all staff employed at the Airport (36% in total). The local economic policies of these particular boroughs are therefore outlined below.

### *London Borough of Newham*

- 7.19 The London Borough of Newham (LBN) Economic Development Strategy was published in October 2010 and sets out an ambitious Vision for the Borough, noting its strengths and weaknesses:

*"Newham is at the heart of London's future. More jobs are likely to be created in the borough over the next two decades than anywhere else in London. Investment in Newham's Arc of Opportunity from the Olympic Park and Stratford Metropolitan Centre in the north to the Royal Docks in the south will create a new part of London, and transform the borough's economy and the life chances of its residents.*

*Today, the scale of these opportunities is only matched by the scale of the deprivation that Newham's people face. Over the next two decades, we want to ensure that Newham's economy converges with London as a whole – people living in Newham should not be earning less than those living in the rest of this global city. To achieve this convergence, we will be attracting investment on an unprecedented scale, supporting our local business to grow and ensuring that this provides employment opportunities for our residents. We will be creating a borough where people want to live, work and stay."*<sup>13</sup>

- 7.20 The Airport is cited as one of LBN's unique strengths, and its role in the regeneration of the Royal Docks is noted:

*"The Royal Docks is ideally placed as a business and leisure destination with the waterfront, London City Airport, ExCeL, the University of East London, the historic presence of Tate and Lyle and the proximity to Canary Wharf and the O2 Centre."*<sup>14</sup>

*"Visitors to ExCeL and the Siemens Centre, as well as those utilising City Airport, will provide a critical mass of custom to support a flourishing business-tourism sector including hotels, restaurants, retail, and business-related leisure."*<sup>15</sup>

- 7.21 The Development Strategy also notes the achievements of the Airport's 'Take Off into Work' initiative, to which reference is also made later in this chapter:

*"This Embedded Project Management scheme has also shown significant benefits through London City Airport's Take Off into Work Scheme. The scheme provides employability training to unemployed residents, including workshops on airport careers, CV and interview preparation and placement opportunities across a number of airport departments and other companies*



*based at the airport. To date 108 Newham residents have been employed. The programme is delivered by ELBA in partnership with London City Airport and Workplace.”<sup>16</sup>*

- 7.22 A consultation meeting with LBN on socio-economic issues was held in March 2013, during which the overriding importance of job creation was emphasised and the need to understand how the proposed CADP will generate jobs in Newham and surrounding areas and how any potential new inward investment that might arise from the Airport's development can support jobs for local people.
- 7.23 LBN highlighted how improved transport connectivity has 'unlocked' Newham, originally through the Jubilee Line, but now also with the DLR extensions and the Emirates Air Line. The Airport's role in improving connectivity to the area is acknowledged, including in the Royal Docks Infrastructure Study (Strategic Transport Study) published in March 2012 by Transport for London in partnership with LBN<sup>17</sup>. Both LBN and the Airport are supportive of a new Crossrail station to serve the Airport, or else a link between Custom House and the Airport.

#### *The Royal Borough of Greenwich*

- 7.24 A consultation meeting was held with the Royal Borough of Greenwich (RBG) on socio-economic issues in March 2013, during which it was noted that generating new jobs is key for the Borough, as is reducing unemployment to the London average, which has almost been achieved. One of the mechanisms RBG uses to address unemployment is Greenwich Local Labour and Business (GLLaB), which has placed over 10,000 people into jobs since its inception in 1996. In the past three years alone it has placed around 3,000 people into work, of whom nearly half were from black and minority ethnic communities. A critical issue is the preparation of young people and other jobseekers to apply for newly generated employment. Greenwich Employment & Skills Partnership has also been set up to co-ordinate activity among strategic partners. The activities are aimed at planning, delivery and promotion of employment, skills and training opportunities.
- 7.25 Further inward investment into the Borough is also a key objective and there is an important focus on the Digital Peninsula in North Greenwich, to which companies such as Cisco and Infusion have been attracted. RBG felt that the proximity of the Airport is likely to have been a factor in this.
- 7.26 Improved connectivity (especially the DLR extension to Woolwich Arsenal but also the Emirates Air Line) has been important in making the Borough more attractive to investors and improving accessibility to jobs. Tourism is also important to RBG and worth £774 million to the local economy. It is also a major source of local employment, helping to support more than 8,000 jobs. There are a number of proposed hotel developments around the Peninsula as well as the Cruise Liner Terminal. RBG felt that the presence of the Airport may also be a draw for new housing development and occupation.
- 7.27 RBG is keen to see continued engagement with the Airport to maximise opportunities that may arise from the proposed CADP.

## *The London Borough of Tower Hamlets*

- 7.28 The Tower Hamlets Employment Strategy of April 2011 states that:

*“The London Borough of Tower Hamlets is experiencing rapid change as it emerges from a history of deprivation to become an extension of the economic powerhouse of Central London. The Borough’s economy is worth over £6bn a year and provides 5% of all the jobs in the capital. With nearly three jobs for every two residents, and with its economy expected to grow by up to 50% in the next 20 years, Tower Hamlets is a place of opportunity. Great challenges remain, however. The Borough’s history of deprivation casts a shadow, and the Borough remains the third most deprived authority in the country and the second in London. Unemployment, at 13%, is twice the London average, and many claimants have been unemployed for two years or more. Despite the many opportunities available, less than 20% of jobs in the Borough go to residents.”<sup>18</sup>*

- 7.29 A consultation meeting was held with Tower Hamlets on socio-economic issues in March 2013, during which it was emphasised that opportunities that might arise from the proposed CADP need to be maximised in the wider local area. Tower Hamlets is the second most deprived area in London and the employment rate is 6.5% below that of the London average. The Borough would be willing to engage with the Airport in areas such as employment training, and it was noted in particular that retail and hotel employment opportunities will potentially arise from the proposed development, which could be an area for collaboration in training and filling job opportunities.

- 7.30 Canary Wharf is expected to double in size over the next 10-15 years, but fewer than 20% of all jobs in the Borough go to residents. Canary Wharf and the financial services sector is nevertheless very important to the Borough and the Airport can support the sector by providing air connectivity. The growth of the financial services sector also supports supply chain clusters in the Borough, as is noted in the Borough’s Enterprise Strategy of May 2012:

*“Tower Hamlets has a strong base on which to build, including its strategic location and a positive economic outlook. It has experienced very rapid employment growth and is functionally part of the central London economy. The profound shift to financial services creates additional jobs in associated sectors and this business cluster will continue to be vital to the development of the Borough.”<sup>19</sup>*

## The Olympic Games Legacy and Convergence

- 7.31 The Mayor of London and the Elected Mayors and Leaders of the six Host Boroughs (Barking & Dagenham, Greenwich, Hackney, Newham, Tower Hamlets, and Waltham Forest) have committed themselves to working towards socio-economic convergence with the rest of London by 2030. Convergence, in this context, means making the most of the Games Legacy to ensure that over the next 20 years the residents of the Host Boroughs will come to enjoy the same life chances as other Londoners.
- 7.32 The Convergence Framework & Action Plan 2011-2015<sup>20</sup>, published by the Mayor and the Host Boroughs, sets out practical steps to address key issues in reaching convergence. One of these is the need to create wealth and reduce poverty, which includes the objective to increase

employment by focusing (inter alia) on maximising inward investment, developing partnerships with employers and training providers to support convergence outcomes, and increasing levels of skills and qualifications among residents.

- 7.33 The proposed CADP can contribute to these objectives by allowing the Airport to reach its permitted movement levels and thereby maximise employment opportunities.

## Assessment Methodology

### Economic Impact

- 7.34 Estimates for the baseline employment and GVA impact have been derived principally from 2012 security pass data provided by the Airport, coupled with on-site research undertaken in November 2011 during which the larger individual employers at the Airport were approached on a one-to-one basis to obtain more detailed employment information.
- 7.35 A 'Study Area' was defined based on the 'Local Area' definition set out in the Airport's current Section 106 Agreement, which encompasses the London Boroughs of Barking and Dagenham, Bexley, Greenwich, Hackney, Havering, Lewisham, Newham, Redbridge, Southwark, Tower Hamlets, and Waltham Forest, as well as the District of Epping Forest. The 11 East London Boroughs in the Study Area area are shown in Figure 7.1 below. Although not specifically delineated in Figure 7.1, the District of Epping Forest, part of the County of Essex, is also part of the Study Area and lies to the north of Havering and Redbridge.

**Figure 7.1: Study Area (District of Epping Forest is also in the Study Area)**



**Table 7.1: Framework of Economic Impact Analysis**

Impact Category	Definition	Examples
Direct On-Site	Employment and income wholly or largely related to the operation of the Airport and generated within the Airport Operational Area.	Airport operator, airlines, handling agents, control authorities, concessions, freight agents, flight caterers, hotels, car parking, aircraft servicing, fuel storage.
Direct Off-Site	Employment and income wholly or largely related to the operation of the Airport and generated within an approximate 20-minute drive-time of the Airport.	Airlines, freight agents, flight caterers, hotels, car parking.
Indirect	Employment and income generated in the chain of suppliers of goods and services to the direct activities.	Utilities, retailing, advertising, cleaning, food, construction.
Induced	Employment and income generated by the spending of incomes earned in the direct and indirect activities.	Retailing, restaurants and entertainment.
Source: York Aviation		

- 7.37 This approach is widely accepted in the industry and has been adopted by ACI EUROPE, the trade association for European airports.
- 7.38 In the 2007 planning application (to increase movements to a maximum of 120,000) direct offsite effects were considered separately. However, unlike at some airports, there are no significant levels of offsite direct employment at London City Airport, given that there are no major offsite facilities such as an airport hotel or offsite car park that is wholly or largely related to the operation of the Airport. The current assessment therefore does not quantify direct offsite jobs.
- 7.39 Employment estimates have been made in terms of full-time equivalent (FTE) employees, where full-time employees are counted as one unit, and part-time employees are counted as 0.5 of a unit. Full-time is taken to mean more than 30 hours per week, and part-time is taken to mean less than 30 hours per week.
- 7.40 In considering the estimates of employment and Gross Value Added ('GVA') set out in this chapter it is important to be aware of two further issues:
- 'deadweight' - deadweight refers to the jobs and GVA that would arise anyway even in the absence of the proposed CADP. The economic impact of the proposed CADP in this case is being set against a 'without development' scenario in which the Airport's ability to accommodate growth is constrained to a greater degree than would otherwise be the case, with consequent lower growth in jobs and GVA. The issue of deadweight is therefore implicit in the economic impact of the 'without development' scenario;
  - 'displacement' – this is defined by the Homes & Communities Agency (formerly English Partnerships) Additionality Guide as follows: *"Displacement arises when the development takes market share (called product market displacement) or labour, land or capital (factor market displacement) from other existing local firms or organisations."*<sup>21</sup> The Airport does

not compete for market share in the Study Area and so there will be no product displacement. With regard to factor displacement, the Additionality Guide notes the difficulty of estimating this, but also notes that local levels of displacement tend to be low<sup>22</sup>. Factor displacement could occur if the additional jobs supported by the CADP were to be filled by people who simply move from one job in the local area to the new jobs created. However, it is clear from analysis elsewhere in this chapter that there are relatively high levels of unemployment in the Study Area and significant demand for new jobs. In December 2012 there were around 11,000 unemployment benefit claimants in Newham alone (around 95,000 in the Study Area as a whole). In the context set by these figures, the additional employment expected to be supported by the CADP is relatively small, which suggests that there is unlikely to be any significant displacement. In the light of this, it is assumed that any displacement associated with the CADP will be 'insignificant/negligible' in the context of the definitions set out in Table 7.2.

- 7.41 The employment impact of the Airport in this assessment has been estimated on the basis of:
- a) baseline employment data for 2012; this has been sourced from the Airport's security pass system, which records the company for which the employee works, the employee's position or job, and area of residence; this data was reviewed in conjunction with the Airport to ensure the highest possible degree of accuracy;
  - b) future scenarios of growth to 2019, 2021 and 2023, both with and without the proposed CADP;
  - c) a productivity assumption that the number of direct onsite jobs per million workload units per annum will fall by 2.5% per annum up to 2015, as a result of productivity gains. The growth in labour productivity at UK airports lies typically between 2% and 3% per annum, and analysis of the Airport's employment productivity since 2004 suggests that 2.8% has been achieved on average; however, as this figure is at the higher end of what might be expected, it may not be sustainable over the longer term and a lower productivity rate of 2% from 2016 onwards has therefore been assumed.
- 7.42 To calculate the indirect and induced effects, multipliers have been applied. Multipliers are derived from an accounting framework in which an initial injection of spending power is apportioned into direct income (wages, salaries and profits), indirect expenditure (expenditure on other goods and services), and leakages (expenditure outside the economy). Indirect expenditure leads to further income creation (indirect income), expenditure and leakages, and the process continues with each increment to income becoming smaller. The direct and indirect income flows both give rise to further expenditure, which in turn generates further income creation (induced income), such as the wages and salaries of people employed in restaurants and shops where the employees of airport-related companies and their suppliers spend their incomes. The ratio of total income (direct plus indirect plus induced) to the initial injection of spending power is termed the 'multiplier'.
- 7.43 The multiplier is dependent on levels of supply chain expenditure, wages and profits. A multiplier applicable to a 'local area effect' has been used, as some indirect and induced effects, especially in the aviation industry, can often spill out of the local area and should therefore not be counted in assessing local effects. Consideration of previous studies undertaken by York Aviation at the Airport and at other UK airports, where it has been possible

to collect robust survey data, suggests that a combined indirect and induced multiplier of 0.3 is appropriate for the size of the Study Area in this case. This is a slightly more conservative than the sub-regional indirect and induced multiplier of 0.5 identified in York Aviation's work for ACI EUROPE which drew on data from a wide range of European airports<sup>23</sup>.

- 7.44 GVA has been estimated using data from the Office of National Statistics (ONS), but as this data is not available for the exact Study Area as defined above, data for 'Outer London East & North East' has been taken as the nearest proxy value: this provides an estimate of GVA per employee of £44,435 for 2012, which is a slightly more conservative value than that for Newham alone, quoted in Newham's Local Economic Assessment (£47,035)<sup>24</sup> which was based on data from Experian and GVA Grimley.

#### Hotel Employment

- 7.45 The methodology for assessing the employment effect of the proposed Hotel (planning Application CADP2) is based on employment densities guidance as issued by the Homes & Communities Agency (2010)<sup>25</sup>.
- 7.46 The GVA estimate for the proposed Hotel has been estimated using the same GVA per employee average figure referred to above.

#### Construction Employment

- 7.47 The methodology for assessing construction employment and GVA effects is based on HM Treasury Guidance and the English Partnerships Additionality Guide referred to earlier. It draws on the following data:
- a) the estimated construction costs of the proposed CADP over the life of the project;
  - b) Annual Business Survey data on construction industry output and GVA per employee; and
  - c) full-time equivalents calculated in line with HM Treasury convention that 10 construction job years equals one FTE job.
- 7.48 The mean regional indirect and induced multiplier for capital projects is 0.42, according to recent research by the Department for Business Innovation and Skills<sup>26</sup>. However, as a more localised impact is being considered here, a more conservative multiplier of 0.3, consistent with that used for the employment calculation referred to above, has been used.
- 7.49 The employment calculation is based on the estimated capital cost of the construction of the proposed development over the construction period, divided by the output per employee in the industry as defined in the Annual Business Survey. The GVA calculation is based on GVA per construction job multiplied by the number of employees expected to be working on the proposed CADP each year. GVA per construction job has been calculated by dividing the GVA for the construction sector in the UK by the total employment in the sector.
- 7.50 Dividing the capital cost by the GVA per construction worker provides the number of 'construction job years'. Based on the HM Treasury's standard approach, ten construction job years is assumed to equate to one FTE job. The construction job years were thus divided by

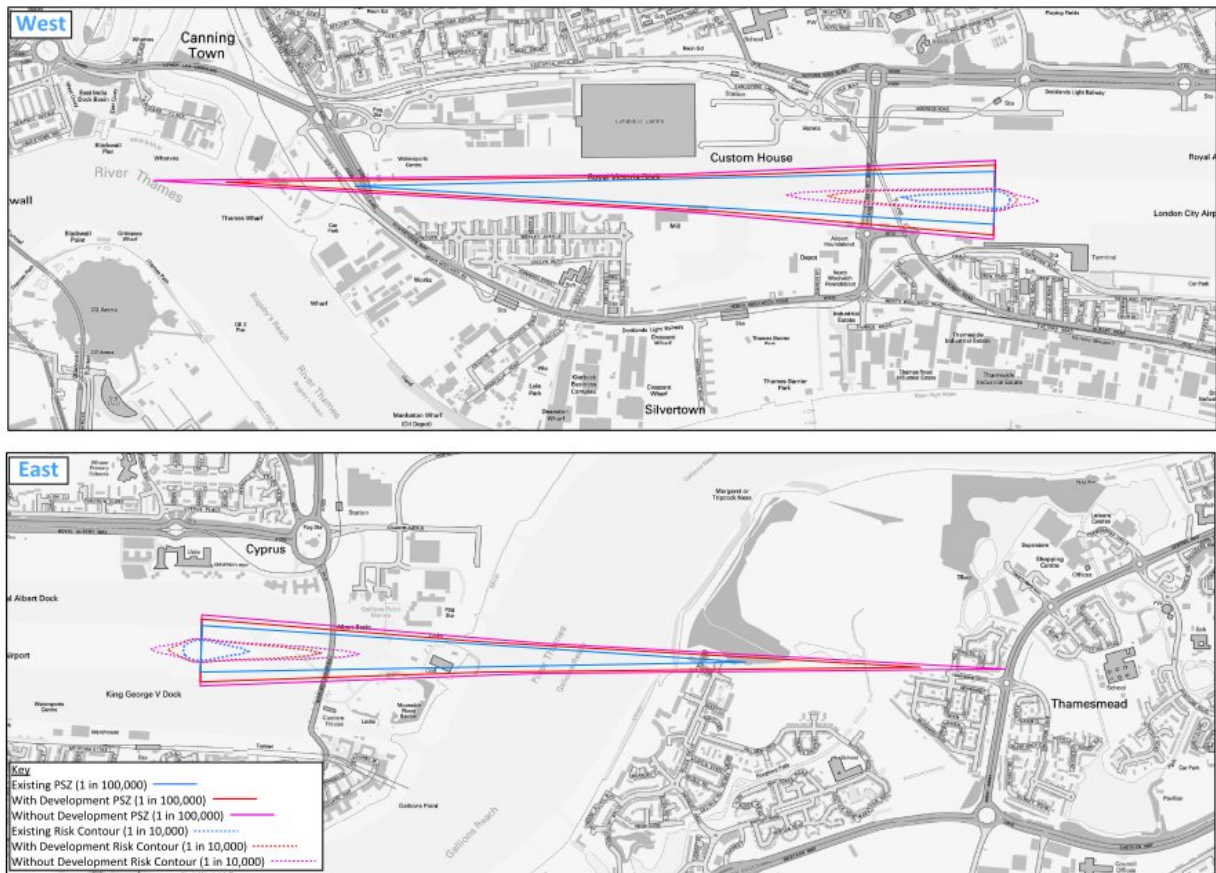
10 to arrive at the gross direct FTE jobs that would arise during construction of the proposed CADP.

#### The Impact of the Public Safety Zones (PSZ)

- 7.51 In its Scoping Opinion of 4 December 2012, LBN requested that an assessment be included in this chapter of the potential expansion of the Public Safety Zones (PSZs) that might arise from the proposed CADP, and the effect this might have on neighbouring development sites, in terms of whether these would not be able to realise their full economic redevelopment potential.
- 7.52 PSZs are areas of land at either end of an airport runway defined by an objective assessment of the risk to an individual on the ground within those areas from an aircraft accident over the course of a year. Although air travel is a low risk means of transport, the Civil Aviation Authority (CAA) identifies PSZs at each end of a runway in order to control the number of people on the ground in the vicinity of airports who could be at risk of death or injury in the event of an aircraft accident on take-off or landing. This is achieved by restricting new development within PSZs. The basic policy objective of the Department for Transport (set out in DfT Circular 01/2010 'Control of Development in Airport Public Safety Zones' ) is that there should be no increase in the number of people living working or congregating in PSZs and that, over time, the number should be reduced as circumstances allow. The Circular states that unimplemented planning permissions in PSZs do not need to be revoked or modified and most existing developments within PSZs can remain there, but some types of new development are not permitted.
- 7.53 The annual forecast number of aircraft movements with and without the proposed CADP is as set out elsewhere in this ES and in the CADP Need Statement also accompanying the CADP planning application. This has been used as the basis for the PSZ modelling. The published 2010 PSZ forms the baseline position for the ES assessment. The 'with development' scenario has more flights than the baseline because the CADP provides for additional capacity for scheduled movements, including additional larger stands and the extension to the eastern taxi lane. The 'without development' scenario differs from the baseline due to more recent refinement of future forecasts taking into account the expected rate of introduction of larger aircraft and physical capacity limits at the Airport..
- 7.54 The projected PSZ contours arising from the proposed CADP have been generated by National Air Traffic Services (NATS) on behalf of the Airport. The full document 'Third Party Risk Contours and Public Safety Zones for London City Master Plan with Forecast Movements for 2023', published by NATS on 14 December 2012, is attached as Appendix 7.3. The PSZ areas themselves are shown in Figure 7.2 below.



**Figure 7.2: Existing and revised PSZs with and without development**



- 7.55 The 'with' and 'without development' PSZs are larger than the published baseline 2010 PSZs, which NATS explains is caused by the interaction between the various input parameters to the risk model, including the crash frequency, average destroyed area and the numbers and direction of the landing/take-off operations. The differences in the overall number of movements and type of aircraft, particularly the split between scheduled and business aviation movements, is particularly important. The 'with development' 1:100,000 PSZ contour is actually 16-18% smaller than the 'without development' scenario with similar proportionate reductions to the 1:10,000 contour. NATS explains that this is primarily due to the change in traffic mix, with a higher proportion of more modern scheduled aircraft and a lower amount of executive jet movements in the 'with development' scenario.
- 7.56 A detailed assessment of potential development sites that are partially infringed by the projected 'with development' PSZ at the Airport has been prepared by Quod, informed by an analysis of existing land uses within and surrounding the PSZ, an assessment of development plan site allocations and consultations within and surrounding the PSZ, and an examination of extant and pending planning applications/permissions within and surrounding the PSZ.
- 7.57 In total, 11 potential sites were identified as falling within the western PSZ, and 10 potential sites were identified as falling within the eastern PSZ. Based on the site boundaries for allocated development sites indicated on the LB Newham and Greenwich Proposals Maps, no sites fall wholly within the existing or projected PSZ. The Department for Transport Circular referred to above categorises the types of sites that may or may not be affected. Some sites



are not considered to be materially affected because they are occupied by either roads or open water or land - i.e. where there is no effect on development potential. Similarly, several of the identified sites comprise existing residential, commercial or industrial uses that are already in operation and can therefore continue, providing that there is no expansion or intensification that would result in more people living, working or congregating within the PSZ. The recently opened Emirates Air Line falls within these categories. Furthermore, where sites have an extant planning permission that has yet to be completed or implemented, these developments can continue under the transitional arrangements outlined in paragraph 15 of the DfT circular.

7.58 Taking this background into account, sites were assessed against the policy contained within the DfT Circular and grouped into three possible categories:

- a) sites where there is likely to be an impact as a result of a the PSZs which could have planning implications;
- b) sites where there is a potential impact due to some overlap with the PSZs albeit that it is likely that future development could be laid out to avoid/mitigate impacts; and
- c) sites where there is no expected impact.

7.59 As set out above, the policy basis of the DfT (set out in DfT Circular 01/2010 'Control of Development in Airport Public Safety Zones') states that unimplemented planning permissions in PSZs do not need to be revoked or modified and most existing developments within PSZs can remain there. On this basis, Quod considered that there are two sites where there is likely to be an impact as a result of the proposed PSZs that could have planning implications: West 07 (The Corniche Floating Village) and West 09 (Strategic Site S08 'Thames Wharf'). This is on the basis that they do not benefit from any extant unimplemented consent at present, and it is likely each site will be subject to a future planning application for its development. It is recognised that the Corniche Floating Village site does benefit from an extant planning consent. However, discussions with officers have indicated that this is unlikely to be brought forward and the Mayor of London is understood to be exploring ideas for a floating village in this area. As the site is not a designated Strategic Site within the Council's Local Plan, and considering no further information is available with regards to the planned uses, Quod adopted the proposed layout of the extant consent as a basis upon which to base the analysis.

7.60 Based on the relatively limited information available about the potential future use of these developments, an assumption has been made of the employment floorspace that might be lost under the 'with' and 'without development' scenarios. Employment densities according to intended use have been applied, sourced from the Homes & Communities Agency Guide<sup>27</sup>, to project the possible level of employment impact. GVA has been calculated using the same average GVA per employee as applied elsewhere in this chapter (£44,435). In the case of the Thames Wharf development, where no firm proposals exist, an assumption has been made that 50% of the site area could be affected in employment terms and an average employment density has been used.

7.61 The resulting employment and GVA effects are set out later in this chapter under 'Assessment of Potential Effects'. However, it should be noted that:

- a) the affected sites do not yet have firm redevelopment plans and so the jobs that might be associated with them are no more than theoretical at this stage;
- b) the extent to which development on these sites could be arranged to maximize employment outside of the area covered by the PSZ is unclear; estimates have had to be made on the basis of very limited planning information at this stage and it is therefore possible that some of these jobs might not need to be foregone or displaced at all - in many cases, some minimal re-design of the site could be all that is needed to retain the full job generation potential;
- c) the extent to which the jobs foregone could be simply displaced within Newham, or within the wider Study Area, rather than lost altogether, is impossible to estimate with any accuracy.

#### Wider Economic Impact

7.62 As well as the direct, indirect and induced employment supported, the economic benefits generated by an airport can also be assessed in terms of the global connectivity it provides, and the way in which this connectivity acts as a magnet for a wide range of economic and social activities. This effect is noted as being of particular importance in the Government's recent Aviation Policy Framework, referred to earlier.

7.63 The mechanisms through which this wider impact can operate include the following:

- a) as an important element in company location decisions, the presence of an international airport can be an important factor in:
  - i. attracting new investment from outside the area, and especially companies from overseas;
  - ii. retaining existing companies in the area, whether they had previously been inward investors or indigenous operations;
  - iii. securing the expansion of existing companies in the face of competition with other areas;
- b) promoting the export success of companies located in the area by the provision of passenger and freight links to key markets (although it is acknowledged that the market for the carriage of airfreight at the Airport is small);
- c) enhancing the competitiveness of the economy, and the companies in it, through its fast and efficient passenger and freight services;
- d) encouraging the growing number of mobile workers to locate their homes and businesses within an area by providing connectivity to key destinations; and
- e) attracting inbound tourism, including both business and leisure visitors, to the area.

7.64 Whilst it is possible to make robust quantitative estimates of the direct, indirect and induced impacts of airports, the same is not the case in relation to these wider benefits. The reason for this is that wider economic benefits include areas where outcomes are dependent on a range of factors and it impossible to isolate those that might be specifically attributable to the proximity of an airport, rather than to other factors. Nevertheless, these wider economic benefits are an

increasingly significant factor in the overall economic impact of an airport. This is because the wider impact of an airport is seen by policymakers and other stakeholders as being, in the context of high employment and the types of jobs generated, potentially even more important than the readily quantifiable direct, indirect and induced employment and income impacts.

7.65 The wider impact of the Airport has been assessed by drawing on a recent study undertaken by York Aviation published in February 2011<sup>28</sup> and attached as Appendix 7.1. This study set out to assess:

- a) the role of the Airport in the economic development of Docklands, the extent to which the Airport has been a critical factor in inward investment decisions, and the importance of the Airport in anchoring major financial and professional services firms within the area;
- b) the extent to which the Airport drives business productivity through journey time and other savings, which support the financial services clusters in Canary Wharf and the City;
- c) how the Airport supports the wider economy by facilitating additional transport investment which has led in turn to increased property values; and
- d) how the Airport and the transport connectivity it supports has led to increased inward investment and additional overseas tourism spend (business and leisure) in the local area.

#### Social Impact

7.66 The baseline social impact of the Airport on the local community has been considered in terms of how the Airport supports local employment and contributes to diversity in the local labour market by helping local people find a route back to employment and by creating new career paths; as well as the social benefits associated both with the Airport directly and with improved public transport services, such as additional DLR connections, brought about because of the Airport. The impact of the proposed development on watersports in the Docks, has also been considered.

7.67 In assessing this baseline social impact, the analysis draws on the results of a social survey undertaken in the autumn of 2010 by a specialist market survey company, McCallum Layton, overseen by York Aviation, which carried out a series of the interviews with local residents. Districts adjacent to the Airport were surveyed, including those which were likely to be affected by overflying aircraft at each end of the runway. The social impacts of the Airport on its surrounding areas are to some degree necessarily bound up with broad economic impacts. However, impacts upon people's lives extend beyond the purely economic into issues of everyday experience and social well-being, as well as into considerations of community and quality of life. These impacts were, at least to some degree, picked up by this social survey. The likely future social impact and potential benefits of the CADP are assessed in the context of this baseline analysis, considering the specific impacts that might arise from the proposed CADP.

7.68 The social effects of the proposed CADP also draw on the conclusions of the assessments of noise, air quality and health effects, which form separate chapters.

### Socio-Economic Impact Significance Criteria

- 7.69 There are no universally accepted significance criteria relating to socio-economic impacts and so the extent to which an impact can be considered significant or otherwise is a matter of judgement. However, to ensure that the assessment of impact is undertaken in as structured a manner as possible, the impact criteria set out in Table 7.2 below have been developed to be applied to the analysis that follows.

**Table 7.2: Socio-Economic Impact Assessment Criteria**

Degree of Significance	Criteria
Substantial Beneficial	The effect is beneficial and an important consideration at the regional or district level. For example, the development will play a role in achieving regional or local economic and social objectives.
Moderate Beneficial	A beneficial effect at the local level, but the gains are less pronounced/measurable at the regional or district level.
Minor Beneficial/Adverse	These effects may be raised as local issues but are unlikely to be of importance in the decision making process. Nevertheless, they are of relevance in the implementation of the the Scheme and the consideration of mitigation or compensation measures.
Moderate Adverse	An adverse effect at the local level, which may be ameliorated through mitigation measures. The development may have a noticeable, but not substantial conflict with a particular economic or social objective.
Substantial Adverse	Adverse effects which are likely to be important considerations at a regional or district level. For example, the development is in direct conflict with a particular economic or social objective.
Not Significant/Negligible:	No effects to conditions, which are beneath levels of perception, within normal bounds of variation or within the margin of forecast error.

### **Baseline Conditions**

#### The Study Area Economy & Labour Force Characteristics

- 7.70 This section briefly analyses the characteristics of the local authorities in the Study Area, in terms of the economically active labour force and unemployment rates.
- 7.71 The unemployment claimant count, as measured by the Office of National Statistics, shows the percentage of the working age population who were unemployed and claiming benefits. Table 7.3 shows the rates for the Study Area at the end of the baseline year in December 2012. The average rate for the Study Area as a whole in December 2012 was 4.6%, higher than for London as a whole (3.9%) and than the UK average (3.7%). Newham's claimant count rate was 5%, Tower Hamlets' 5.6%, and Greenwich had a rate of 4.5%. Barking & Dagenham's rate was the highest in the Study Area at 6%.

**Table 7.3: Claimant Count Percentages in the Study Area Dec 2012**

Local Authority/Area	Dec 2012
Barking and Dagenham	6.0%
Bexley	3.0%
Greenwich	4.5%
Hackney	5.5%
Havering	3.5%
Lewisham	5.2%
Newham	5.0%
Redbridge	3.6%
Southwark	4.9%
Tower Hamlets	5.6%
Waltham Forest	5.3%
Epping Forest District	2.7%
Average Study Area	4.6%
London	3.9%
UK	3.7%
Source: ONS/nomis	

- 7.72 There were approximately 89,000 jobs in the Borough of Newham in 2011 (most recent data from ONS), but a job density (ratio of jobs to population) of only 0.41, as opposed to 0.88 in London as a whole. Newham's Local Economic Assessment 2010 to 2027 (October 2010) notes that Newham fails to achieve its potential in terms of productivity, employment and business turnover, given its size and proximity to central London.
- 7.73 Claimant count percentages in the immediate area around the Airport (the Royal Docks Ward) for 2012 are set out in Table 7.4 below. The Table also shows comparisons with Newham as a whole and with the UK. As can be seen, the claimant count rate was consistently higher in the Royal Docks Ward than in Newham as a whole, and around double the UK average.

**Table 7.4: Claimant Count Percentages in the Royal Docks 2012**

Month	Royal Docks	Newham	UK
Jan	8.0%	5.3%	4.0%
Feb	8.7%	5.4%	4.1%
Mar	8.4%	5.4%	4.1%
Apr	8.1%	5.3%	4.0%
May	8.0%	5.2%	3.9%
June	7.9%	5.1%	3.8%
July	7.3%	5.0%	3.8%
Aug	7.2%	4.8%	3.8%
Sep	7.9%	5.0%	3.8%
Oct	8.0%	5.2%	3.8%
Nov	8.0%	5.2%	3.8%
Dec	8.0%	5.0%	3.7%
Avg 2012	8.0%	5.2%	3.9%
Source: ONS/nomis			

- 7.74 Low skills are also a barrier to getting into work and to raising productivity. The skills profile of the Study Area for Jan-Dec 2012 is shown in Table 7.5 below. The Study Area had a lower percentage of qualified people of working age in NVQ Level 1 and 2 when compared with London as a whole, and a higher percentage with no qualifications at all. Newham had the highest level of working age population with no qualifications at all (15.3%).

**Table 7.5: Skills Levels (16-64 year olds) in the Study Area Jan-Dec 2012**

Local Authority	% NVQ Level 4 or above	% NVQ Level 3 or above	% NVQ Level 2 or above	% NVQ Level 1 or above	% Other Qualific's	% No Qualific's
Barking & Dagenham	26.0	43.6	61.7	75.3	10.9	13.9
Bexley	28.4	51.4	71.9	86.2	6.0	7.7
Greenwich	42.3	60.0	75.5	85.0	6.9	8.1
Hackney	47.6	57.7	70.5	79.7	8.9	11.4
Havering	20.6	43.8	65.7	82.3	9.0	8.6
Lewisham	56.0	70.4	79.7	86.7	6.1	7.3
Newham	39.5	51.9	63.6	69.5	15.2	15.3
Redbridge	43.5	61.0	73.2	80.5	8.2	11.3
Southwark	55.5	66.4	75.7	82.2	8.3	9.5
Tower Hamlets	49.3	60.6	71.6	77.8	8.8	13.4
Waltham Forest	41.4	54.4	65.8	76.1	12.7	11.1
Epping Forest District	33.2	49.2	73.3	86.9	4.1	9.0
<b>Avg Study Area</b>	40.3	55.9	70.7	80.7	8.8	10.6
<b>London</b>	47.6	63.2	75.1	83.6	8.0	8.4
<b>UK</b>	34.2	54.9	71.7	83.8	6.3	9.9
Source: ONS/nomis						

#### Characteristics of Current Passenger Demand

- 7.75 In order to understand the economic and social importance of the Airport to business in London, Civil Aviation Authority (CAA) survey data has been used to examine the types of passengers using the Airport and their journey origins and destinations. This data is taken from the latest available survey of the Airport undertaken in 2012 and is prepared from sample interviews with passengers using the Airport, although it does not cover passengers using the Jet Centre for business aviation trips. Table 7.6 shows that 54% of passengers are travelling for business purposes through London City Airport, which is substantially higher than the average for the other London airports, albeit this may be understated due to the reduced amount of business travel during the Jubilee and the Olympics. This proportion is expected to grow again in future as new business services displace the current middle of the day leisure services. Around 27% of passengers using London City Airport for business travel were foreign resident, compared with around 17% using Heathrow.

**Table 7.6: Percentage of passengers travelling on business at London Airports (2012)**

Airport	International Business		Domestic Business		Total Business
	UK	Foreign	UK	Foreign	
London City	15.0%	26.8%	11.7%	0.5%	54.0%
Heathrow	10.5%	16.8%	2.0%	0.5%	29.8%
Gatwick	5.2%	5.8%	4.0%	0.3%	15.3%
Stansted	5.8%	6.3%	2.4%	0.1%	14.6%
Luton	6.3%	5.2%	3.8%	0.1%	15.5%
Source: CAA Passenger Survey (2012)					

- 7.76 Table 7.7 shows the distribution of business passengers by social grade groups<sup>29</sup> using data for the London airports in 2012. A/B represents higher and intermediate managerial groups; C1 represents supervisory and junior managerial groups; C2 represents skilled manual workers;

and D/E represents semi-skilled and unskilled manual workers, as well as state pensioners and the unemployed. Around 58% of business passengers using London City Airport were from groups A and B in 2012, higher than for any other London airport.

**Table 7.7: Distribution of Business Passengers by Social Grade Groups (2012)**

Airport	A/B	C1	C2	D/E
London City	58.3%	32.7%	5.6%	3.3%
Heathrow	46.1%	39.5%	8.5%	5.9%
Gatwick	37.0%	39.9%	15.8%	7.3%
Stansted	28.9%	44.8%	15.7%	10.6%
Luton	37.9%	36.3%	14.7%	11.1%

Source: CAA Passenger Survey (2012)

#### Baseline Employment

- 7.77 The baseline employment (rounded to the nearest 10 FTEs) and GVA estimates for 2012 are summarised in Table 7.8 below.

**Table 7.8: Baseline Employment & GVA Impact in 2012**

	Direct	Indirect & Induced	Total
Jobs (FTEs)	1,900	570	2,470
GVA (£million)	£84.3	£25.3	£109.6

Source: London City Airport and York Aviation analysis

- 7.78 Terminal passenger throughput in 2012 was 3,029,013<sup>30</sup>, which implies a baseline employment density in 2012 of 626 direct onsite jobs per million passengers.
- 7.79 Table 7.9 shows the structure of on-site employment at the Airport in 2012 and compares this structure with the results of a study carried out by York Aviation for Airports Council International (ACI EUROPE)<sup>31</sup>, covering 58 airports across the continent.

**Table 7.9: Structure of Onsite Employment in 2012**

Employment Category	London City Airport	ACI EUROPE Study	Variance
Airport Operator	28%	14%	+13%
Airline/Passenger Handling	30%	64%	-33%
Freight/Cargo	0%	1%	-1%
Concessionaires	20%	12%	+8%
Control Agencies	12%	6%	+5%
Other	10%	3%	+8%
Total	100%	100%	

Source: York Aviation

- 7.80 The relatively large variance in the proportion of employees working for airlines and handling agents is accounted for by the fact that there are fewer based airlines at the Airport than at most other major airports included in the ACI EUROPE study. There are proportionally more employees working for the Airport Company (i.e. London City Airport Ltd) than at airports in the ACI study, but this is explained by the fact that the Airport undertakes baggage handling in-house and operates the Jet Centre directly.

- 7.81 Whilst no specific analysis has been made of occupational grouping by skill level, experience from other airports suggests that the majority of direct jobs are likely to require either basic skills or supervisory skills at the equivalent of NVQ Levels 1 & 2, with a few managerial jobs at a higher level.
- 7.82 As at December 2012 2,055 people were employed on-site at the Airport (i.e. total full time and part time positions, as opposed to FTEs). Information is available on the area of residence of these employees, with the exception of 242 employees of the Control Authorities such as the Metropolitan Police, Special Branch, UK Border Agency and Department for Transport. Of the remaining 1,813 on-site employees:
- a) 27% resided in the London Borough of Newham;
  - b) 61% lived in the 'Local Area'.
- 7.83 London City Airport Limited (i.e. the Airport owner/operator) is the largest on-site employer with 577 employees as at December 2012, 25% of whom lived in the London Borough of Newham and 67% in the 'Local Area'.

#### The Airport's Engagement with the Local Community on Employment Issues

- 7.84 The Airport takes steps to ensure that jobs at the Airport are accessible to local people. The Airport has set up various initiatives to support local people into work by maintaining links with local employment organisations such as Newham Workplace, Skillsmatch Tower Hamlets, and Greenwich Local Labour & Business.
- 7.85 The Airport also delivers a number of employment-related programmes and activities to local jobseekers to support their job applications. The Airport's Work Experience Scheme runs for 48 weeks a year and offers week-long placements to students over 16 studying a travel industry related course. This programme forms part of the Airport's obligations under the Section 106 Agreement entered into with LBN in connection with the 2009 planning permission, which (among other things) requires the Airport to provide one week of work experience for a minimum of 40 Newham residents and a minimum of 8 residents of the boroughs of Bexley, Barking and Dagenham, Greenwich, and Tower Hamlets.
- 7.86 The Airport launched 'Take Off Into Work' (TOIW) in March 2009 with the objective of significantly increasing the number of Newham applicants for jobs at the Airport. The project is managed through 'Newham Workplace' which helps unemployed Newham residents to engage with employers.
- 7.87 The Airport also invests in its employees by making comprehensive training and development programmes available to its staff.

#### The Airport's Contribution to the Wider Economy

- 7.88 The Airport is an essential part of the proposition that has brought much needed inward investment that will continue to support London's growth eastwards, while still acting as an important gateway for the City of London. It is strategically located in the heart of East London and is well placed to meet the needs of the growing economic base that is developing there, not



only the financial services outpost at Canary Wharf but also in the wider Thames Gateway region. The presence of an airport on the doorstep has been and is a strong selling point for inward investors.

- 7.89 In February 2011, the Airport published a report by York Aviation<sup>32</sup> which set out to assess the value of the economic activity that would not have been attracted to London in the absence of the Airport and on the wider economic activity that the Airport facilitates. The aim was also to present evidence on the key role which the Airport has played in the economic and social development of the Docklands and the wider London economy. The key findings of this report are summarised in the following paragraphs, with data updated to 2012.

#### *Supporting Inward Investment*

- 7.90 The value of the wider impact of the Airport in terms of a contribution to GVA is difficult to quantify. However, it is clear from consultations undertaken during the course of the study referred to above that the Airport is highly valued by its business users and companies across East London and in to the City and is an important part of making London an ideal base for European and global operations. Based on analysis of 2012 CAA Passenger Survey Data, an estimated business fares value of £239 million passed through the Airport in 2012. In addition, passengers departing from the Airport paid in excess of £22 million in Air Passenger Duty in 2012 to the Exchequer.

#### *Driving Business Productivity*

- 7.91 The Airport's location, its easy and rapid accessibility from its key markets, such as the City of London, Canary Wharf and Westminster, and its focus on a streamlined service for business travellers enables companies and individuals to use time and resources effectively, thereby driving business productivity.
- 7.92 In 2012, based on analysis of CAA Survey Data, around 1.6 million business passengers saved an estimated £43 million in surface access time by using London City Airport rather than Heathrow. Furthermore, these passengers saved £30 million of time through the streamlined passenger processing and shorter check-in times at the Airport. This equates to an estimated total time saving benefit of around £73 million in a single year.
- 7.93 This convenience and streamlined processing has made the Airport a preferred choice for those people whose time is of high value. This is apparent from analysis of the CAA Passenger Survey, which identifies that the average income of business passengers at the Airport in 2012 was around £92,000, 41% higher than the next London airport, Heathrow.

#### *Gateway for Inbound Tourism*

- 7.94 The Airport has not only been an important catalyst in making East London a viable and attractive place to do business and to visit, it has been and continues to be an important gateway for overseas visitors. Based on 2012 CAA Survey Data, around 44% of the Airport's passengers were inbound overseas visitors. These visitors and those from other parts of the UK injected a significant amount of expenditure into the London economy as follows:.

- a) the around 440,000 overseas business visitors (880,000 passengers) contributed around £325 million in additional consumer expenditure;
- b) the around 100,000 domestic business visitors (200,000 passengers) contributed around £22 million in additional consumer expenditure;
- c) the around 315,000 overseas leisure visitors (630,000 passengers) contributed around £183 million in additional consumer expenditure;
- d) the around 45,000 domestic leisure visitors (90,000 passengers) contributed around £9 million in additional consumer expenditure.

#### *Levering Transport Investment*

- 7.95 The Airport was a significant factor in the impetus to construct and extend the Docklands transport network, especially in the decision to extend the Docklands Light Railway (DLR) to the Airport and then on to Woolwich Arsenal. The result is that many new sites along this route have been opened up for regeneration opportunities, such as Minoco Wharf, and Barrier Park East. Many new residential units are also planned for this area over the coming years.
- 7.96 The Airport has also been instrumental in improving bus services linking North Woolwich and Silvertown to Plaistow and Stratford and in the provision of a 24 hour service that links Manor Park and East Ham to Canning Town. There are also a considerable number of taxis serving the Airport and driving into and out of the local area as a result of the Airport's presence.
- 7.97 An efficient transport network also facilitates access to jobs for local people and extends the catchment area for jobs in East London. Without the stimulus of the Airport and the consequent DLR extension, access to jobs north of the river for those living in Greenwich and Bexley would have remained much more difficult.
- 7.98 The Airport is now part of the web of transport connectivity that is opening up East London as an increasingly attractive place to be located, both for business and as a place to live. Both the Airport and LBN are supportive of an additional Crossrail station which would further improve connectivity to the Airport.
- 7.99 Further details on the transport connectivity of the Airport are provided in Chapter 11: Surface Transport and Access, and in the Transport Assessment at Appendix 11.1.

#### Baseline Social Impact

- 7.100 The population of Newham was estimated to be around 311,000 in 2012<sup>33</sup> and the Newham Local Economic Assessment 2010 to 2027<sup>34</sup> notes that it is one of the most diverse populations in the country, with some 70% of residents from Black, Asian and Minority Ethnic (BAME) backgrounds. The population is set to grow by approximately 50% over the next 20 years<sup>35</sup>. Newham also has one of the highest rates of population churn (the movement of residents into and out of the Borough) in London. In 2007/08 19.5% of residents either left or entered the Borough, significantly higher than the London average of 13.6%<sup>36</sup>. The Assessment also refers to anecdotal evidence that retaining skilled and entrepreneurial talent is a key issue for Newham, as it does not offer the quality of housing or quality of life to fulfil aspirations<sup>37</sup>.

- 7.101 Analysis of the Department for Communities & Local Government Indices of Deprivation for 2010 (latest data available) shows that of Newham's 159 wards, 133 ranked in the top 20% of deprived areas in the UK, and 50 wards rank within the top 10%. There is also evidence to suggest that the greatest areas of deprivation are concentrated in the south west of the Borough and around North Woolwich<sup>38</sup>.
- 7.102 The social impacts of the Airport on its surroundings are to a large degree bound up with the economic impact detailed above. However, impacts on the social dimension extend beyond the economic into issues of everyday experience. The local community's perception of the social importance of the Airport was evaluated in a survey undertaken by McCallum Layton and overseen by York Aviation in September 2010<sup>39</sup>. The results of this survey provide a 'snap shot' of the views of a representative sample of the local community that live in the immediate vicinity of the Airport about aspects of their day-to-day lives and how the Airport has impacted on them, whether in a positive or negative way.
- 7.103 It is clear from the survey results that the local area in which the Airport is located continues to gain in popularity as a place to move into, with a relatively high proportion of residents having moved into the area in the last 5 to 10 years. This finding is consistent with a previous Social Survey undertaken in 2005<sup>40</sup>, which also suggested a relatively dynamic local population. The Airport was viewed more as a positive than a negative when considering a move into the area.
- 7.104 When prompted to comment on noise in the local area the survey findings suggest that this continues to be a factor in people's perceptions of the area, even though only 2.1% mentioned aircraft noise when asked (unprompted) which factors had got worse over the last 25 years.
- 7.105 Improvements to the local surface transport infrastructure and frequency of service were by far the most valued improvement. It is also significant that a substantial proportion (80%) of respondents expressed a positive opinion that the Airport had played a role in encouraging transport improvements that benefited local people. The most commonly cited example was the DLR extension to Woolwich.
- 7.106 A substantial proportion of respondents also felt that the Airport was important for bringing people in to visit East London and that the Airport is supportive of the wider London economy.
- 7.107 Overall, the Airport appears to have served two distinctive roles: longer terms residents recognise that the Airport has brought economic, social and infrastructure improvements to the area, although they do not place high direct value on the proximity of the Airport. More recent residents have recognised the Airport's role in economic and residential growth and in drawing people into the area to live and work.
- 7.108 Leisure and recreation are also important aspects of the social baseline assessment and an important aspect of facilities in the Royal Docks is watersports. The Royal Docks Management Authority Limited ('RoDMA') owns, maintains and manages the water areas and marine infrastructure of the Royal Docks. Its vision for the western end of the Royal Victoria Dock is for a vibrant, high quality living and leisure destination for Londoners. The central area of the Dock is envisioned to be focused on providing an event and spectacle destination linked to ExCeL, with the eastern portion of the Dock focused on providing a leisure, sailing, watersports and

other event destination. The Royal Albert Basin is intended to be a centre of excellence for the marine industry<sup>41</sup>. There are currently no organised watersports in the King George V Dock and no public access along the Dock.

### Assessment of Potential Effects

- 7.109 The assessment of likely significant effects is based on the methodology set out earlier in this chapter and on the passenger forecasts set out elsewhere in the ES.

#### The 2019, 2021 and 2023 Scenarios with and without the Proposed CADP

- 7.110 The employment estimates for the three reference years, both with and without the proposed CADP, are set out in Table 7.10 below. Employment figures are rounded to the nearest 10.

**Table 7.10: Employment Impact**

Employment Impact without the Proposed CADP (FTEs)			
	Direct	Indirect & Induced	Total
Baseline (2012)	1,900	570	2,470
2019	2,190	660	2,840
2021	2,220	670	2,890
2023	2,160	650	2,810
Employment Impact with the Proposed CADP (FTEs)			
	Direct	Indirect & Induced	Total
Baseline (2012)	1,900	570	2,470
2019	2,570	770	3,340
2021	2,790	840	3,630
2023	2,860	860	3,720
Additional Jobs Arising from the Proposed CADP (FTEs)			
	Direct	Indirect & Induced	Total
2019	380	110	500
2021	570	170	740
2023	700	210	910
Source: York Aviation (figures may not sum exactly due to rounding)			

- 7.111 The proposed CADP will support an additional 960 direct onsite FTE jobs at 2023 compared with the baseline level of direct onsite FTE jobs. The proposed CADP will support an additional 700 direct onsite FTE jobs at 2023 when compared with no development, and an additional 910 FTE jobs overall at 2023. This would be a 'substantial beneficial' effect in the context of the definitions set out in Table 7.2.
- 7.112 The GVA estimates for the three reference years, both with and without the proposed CADP, are set out in Table 7.11 below.

**Table 7.11: GVA Impact**

<b>GVA Impact without the Proposed CADP (£millions)</b>			
	<b>Direct</b>	<b>Indirect &amp; Induced</b>	<b>Total</b>
Baseline (2012)	£84.3	£25.3	£109.6
2019	£113.3	£34.0	£147.3
2021	£119.8	£35.9	£155.7
2023	£121.0	£36.3	£157.3
<b>GVA Impact with the Proposed CADP (£millions)</b>			
	<b>Direct</b>	<b>Indirect &amp; Induced</b>	<b>Total</b>
Baseline (2012)	£84.3	£25.3	£109.6
2019	£132.9	£39.9	£172.8
2021	£150.4	£45.1	£195.5
2023	£160.3	£48.1	£208.4
<b>Additional GVA Arising from the Proposed CADP (£millions)</b>			
	<b>Direct</b>	<b>Indirect &amp; Induced</b>	<b>Total</b>
2019	£19.6	£5.9	£25.4
2021	£30.6	£9.2	£39.8
2023	£39.3	£11.8	£51.0
Source: York Aviation (figures may not sum exactly due to rounding)			

- 7.113 The proposed CADP will support an additional £98.8m of GVA in the Study Area at 2023 compared with the baseline impact. The additional GVA impact at 2023 with the proposed CADP, compared with no development, is £51m. This would be a 'substantial beneficial' effect in the context of the definitions set out in Table 7.2.
- 7.114 It is important to note that the effects described here are 'gross' in the sense that they do not take into account the impact of the PSZ (see Table 7.12 below).

#### Impact of the Hotel

- 7.115 The figures shown above do not include the potential impact of the proposed construction of a Hotel on the Airport site. The proposed Hotel is envisaged to be a 3 Star Hotel, with the potential for up to 260 bedrooms.
- 7.116 It is estimated that such a development could support up to 130 additional direct (onsite) jobs from the point when the hotel is opened and £5.8m of GVA. There would also be further indirect and induced jobs arising from the operation of the hotel and we estimate this could be around 70 indirect and induced jobs. Overall, this would constitute a 'moderate beneficial' effect in the context of the definitions set out in Table 7.2.

#### Employment Impact from Construction

- 7.117 It is estimated that 344 FTE direct onsite construction jobs will be supported over the life of the project, with a further 103 indirect and induced FTE jobs, making a total of 448 FTE jobs. This equates to around £234m of direct GVA and £70m of indirect and induced GVA making a total of £304m. These estimates exclude the construction impact of the hotel, which is described in Chapter 6 of the ES.

7.118 It is important to note that the effects from construction employment and GVA are transitory in the sense that they are calculated for the life of the construction project only. The effects are still important, but are of a different kind from the permanent employment and GVA supported by the completion of the proposed CADP.

7.119 These effects would constitute a 'moderate beneficial' effect in the context of the definitions set out in Table 7.2

#### Total Employment Impact

7.120 Overall, taking all types of employment into account, the CADP proposals would generate an increase in local employment of approximately 1,500 compared to 2012, when the full impact of the hotel is taken into account. This is made up of 1,250 jobs as a result of the increase in operational activity at the Airport and around 200 jobs in total related to the hotel and other elements of CADP2.

#### Impact of the PSZ

7.121 The estimated employment and GVA impact of the PSZ consequent on the proposed CADP is based on the detailed assessment prepared by Quod of the potential development sites that are partially infringed by the projected 'with development' PSZ referred to earlier in this chapter. The methodology used to calculate the potential effects was outlined earlier in this chapter. The potential employment and GVA effects are set out in Table 7.12 below.

**Table 7.12: Potential PSZ Effects with and without Development**

	Employment space potentially foregone (m <sup>2</sup> )	Intended Use	Assumed Employment Density (m <sup>2</sup> per FTE)	FTEs at risk	GVA (£m)
<b>With Development</b>					
Corniche Floating Village	916	A3	18	51	
	61	A4	18	3	
	630	D2	75	8	
Thames Wharf	3,426	-	35	98	
Total				<b>160</b>	<b>7.1</b>
<b>Without Development</b>					
Corniche Floating Village	1,018	A3	18	57	
	68	A4	18	4	
	700	D2	75	9	
Thames Wharf	8,033	-	35	230	
Total				<b>300</b>	<b>13.3</b>
Source: Quod and York Aviation analysis					

7.122 The potential effects of the 'with development' PSZ could be to place 160 FTE jobs and £7.1m of GVA at risk, and in the 'without development' PSZ this rises to 300 FTE jobs and £13.3m of GVA. As noted earlier, the 'with development' PSZ contours are smaller than the 'without development' contours, which leads to the employment and GVA effects of the 'without development' scenario being greater than the 'with development' scenario.

- 7.123 It should be emphasised, however, that the affected sites do not yet have firm redevelopment plans and so the potential effects described here jobs are no more than a theoretical worst case at this stage. Furthermore, it may be possible to arrange future development on these sites to maximise employment in the area outside the PSZ, such that jobs might not need to be foregone or displaced at all.

#### Impact on Retail Businesses in North Woolwich

- 7.124 An appendix to the Planning Statement submitted with the planning application for the proposed CADP was prepared by Quod in response to certain matters raised by LBN in its EIA Scoping Opinion of 4 December 2012. In this Scoping Opinion the Council requested that an assessment be undertaken of the impact of the proposed terminal retail development on nearby shops at North Woolwich. The assessment is attached as Appendix 7.4 and its conclusions are summarised below.
- 7.125 The Application proposals will result in an additional 801m<sup>2</sup> of landside retail and catering provision at the Airport. This additional provision includes a range of facilities to complement and enhance existing provision in conjunction with the CADP scheme. Analysis indicates that North Woolwich Local Centre meets the needs of its surrounding population, being of neighbourhood importance and attracting limited levels of expenditure from beyond this localised catchment. The application proposals are not likely to adversely affect the North Woolwich Local Centre for the following reasons:
- a) the proposals will expand on the existing retail provision within the landside airport areas, but will predominantly draw trade from passengers departing from, and arriving at, the Airport; no concerns appear to have been raised in the past over the existing landside retail provision drawing trade from local areas, and the existing provision is not mentioned in the LBN Town Centre & Retail Study<sup>42</sup>;
  - b) the type, range and quality of retail and catering facilities proposed are not directly comparable to those located at the North Woolwich Centre and will remain distinct from them;
  - c) the LBN Town Centre & Retail Study indicates that there is future planned investment within North Woolwich which will enhance its appearance and reinforces its position as a centre of neighbourhood importance.

- 7.126 The effect of the proposed CADP on retail businesses in Woolwich can therefore be considered 'not significant/negligible' in the context of the definitions set out in Table 7.2.

#### Wider Economic Benefits

- 7.127 As noted earlier, whilst it is possible to make robust quantitative estimates of the direct, indirect and induced impacts of airports, the same is not the case in relation to wider economic (catalytic) benefits. Nevertheless, these wider benefits are an increasingly significant factor in the economic impact of an airport and this is particularly the case at London City Airport, which is now an integral part of the East London proposition, supporting the business community in Canary Wharf and elsewhere and the continuing regeneration of the Royal Docks. The earlier section on Baseline Conditions noted that this was brought about in the way that the Airport:

- a) supports inward investment;
- b) drives business productivity;
- c) acts as a gateway for inbound tourism; and
- d) leverages transport investment.

7.128 The continued development of the Airport and the changing face of the Royal Docks have been concurrent and, although it could not be claimed that the regeneration of the Royal Docks and the establishment of the strong business and financial services cluster at Canary Wharf was only made possible because of the existence of the Airport, it is clear from an analysis of the history of development in the area that confidence to invest has been underpinned in part by the Airport's presence and growth. Without the Airport, the costs to business and to residents in terms of access to air travel would have been substantially greater, with obvious implications for the productivity of business enterprises and their decisions to locate in the area.

7.129 Although it is not possible to quantify all of the wider economic benefits that would accrue from the Airport's ability to reach its movement limits through the proposed CADP, there can be little doubt that the proposed CADP will facilitate continued economic growth and inward investment in Newham and the wider East London economy. This would therefore constitute a 'substantial beneficial' effect in the context of the definitions set out in Table 7.2

#### Social Impacts

7.130 The results of the Social Survey undertaken in 2010, referred to earlier, suggest that the local area contains a relatively dynamic population, many of whom see the Airport as a positive factor when considering a move into the area, and recognise the Airport's continuing contribution to the economic prosperity of the local area. The proposed CADP will see the maximisation of the Airport's potential to offer air connectivity to a wide range of destinations within its current movement limit and survey evidence suggests that this will add to the attractiveness of the local area as a place to live. In this way the proposed CADP can make a contribution to retaining skilled and entrepreneurial individuals in the local area, which has been highlighted earlier as a key issue for Newham.

7.131 The key contribution that the Airport will be able to make to social benefits through the proposed CADP is by supporting employment growth, both in terms of the numbers quantified above and also in terms of proactively supporting local people into work.

7.132 The Airport's 'Community and Environment Review 2012' sets out the wide range of initiatives currently undertaken by the Airport, including programmes in primary, secondary and higher education that help local young people into employment, local training initiatives, the Take Off Into Work programme which has helped over 300 people into work since March 2009, and a range of other community outreach initiatives. The Airport intends to maintain this proactive engagement with the local community going forward, in order to balance its environmental, economic and social impacts:

*"Since opening, the airport has striven to be a good neighbour, developing long-term relationships and partnerships with a wide variety of local organisations. As the airport*



*continues to grow, we will remain focused on the community and the environment to ensure that local people are a part of, and benefit from, the airport's success.*"<sup>43</sup>

- 7.133 Consultation meetings have been held with RoDMA to address the impact of the CADP on the narrow part of the King George V Dock between the terminal and the RVP pontoon. However, the existing and potential water-sports usefulness of this area has always been low.
- 7.134 The Noise Assessment (see Chapter 8 of this ES) concludes that there is only a slight increase in noise level resulting from the proposed CADP, generally in the range of 0.5 to 1.0 dB, giving rise to a negligible impact when comparing the 'with development' and 'without development' scenarios in 2023 and considering the change in impact. In addition, the Airport will continue to operate and, where appropriate, seek to improve the various noise mitigation measures in place at the Airport that have successfully ensured that noise effects to the local community have been, and will continue to be, controlled to acceptable levels. It is envisaged, therefore that the overall air noise impacts associated with the CADP will be of a minor adverse nature.
- 7.135 The assessment notes that properties on Woodman Street, which is the closest residential area to the new access road, will be exposed to a major increase in road traffic noise. The absolute level of road traffic noise is low and a noise barrier along Woodman Street will reduce the levels further. The residual road traffic noise impact has been assessed as negligible adverse. The residual construction noise impact has been assessed as negligible adverse for the daytime and minor to significant adverse for evening/night time/weekend works.
- 7.136 The air quality assessment judges the overall air quality impact of the proposed CADP is as insignificant. This takes into account that all predicted concentrations are below the objectives and limit values, and that the impacts are negligible at the majority of receptor locations, with slight adverse impacts at a small number of receptors. A small number of properties in close proximity to the apron area will be at increased risk of being affected by odours due to the increased numbers of aircraft operations associated with the proposed CADP. However, there is some uncertainty with the predictions which are likely to be overstated as no account has been taken of the considerable shielding effect afforded by the terminal buildings, piers and DLR infrastructure. Taking this uncertainty into account, the effects are judged to be insignificant.
- 7.137 The Health Impact Assessment notes that construction of the proposed CADP presents a number of potential health pathways, but taking into account the level of emissions (air and noise) generated on-site, their intermittent nature/duration and minimal opportunity for community exposure, the risk to community health is not of a level to quantify any meaningful adverse health outcome, and would be further managed through bespoke mitigation detailed in the Environmental Statement, alongside on-going Airport engagement and community support initiatives. The assessment also notes that construction of the CADP would generate significant direct, indirect and induced income and employment at the local level, with subsequent socio-economic health benefits. The Health Action Plan outlines the proposed mitigation and initiatives to further support the uptake of such benefits locally. Such support, coupled with local employment strategies, would aid in addressing pockets of local socio-economic deprivation and associated pockets of poor health in the area.

### Competition from Other Airports

- 7.138 In its Scoping Opinion of 4 December 2012, LBN requested that reference be made in this assessment to any potential effect on the socio-economic impacts identified that might arise from competition for passengers and routes from other airports in the South East as the Airport grows towards its permitted movement limit.
- 7.139 The proposed CADP is driven by three factors: an increase in the peak period demand mainly to service the business market, which is unlikely to be affected by competition due to the Airport's unique position in terms of reduced journey and processing times; the introduction of physically larger aircraft, which is expected to occur independently of any competition from other airports due to advances in technology; and the consequent increase in passengers using the terminal, which will arise because of the other two factors and therefore again is not related to other airports.
- 7.140 Furthermore, the forecasts on which this socio-economic impact are based have been derived from a robust analysis of the wider market for air services at airports in the South East, as well as the likelihood of the Airport being able to attract and sustain particular routes and frequencies. Further information is provided in the separate Need Assessment document.
- 7.141 The effects of competition from other airports have been factored into existing forecasts and any additional effect can therefore be considered 'not significant/negligible' in the context of the definitions set out in Table 7.2.

### **Overall Conclusions**

- 7.142 From this analysis it can be concluded that the likely socio-economic effects of the proposed CADP would constitute a 'substantial beneficial' effect in the context of the definitions set out in Table 7.2.

### **Further Mitigation**

- 7.143 Given the beneficial economic and social effects of granting the application, additional mitigation is not required.

### **Cumulative Effects**

- 7.144 The cumulative effects are the combined assessed socio-economic effects of the proposed CADP in combination with other proposed major developments in the vicinity of the Airport. The effects of the proposed CADP at the Airport and these other proposed developments in the vicinity of the Airport are likely to be mutually supportive, in the sense that the wider effects of the proposed CADP, as set out earlier, would support positive socio-economic impacts in the wider local economy. An example of this would be the likelihood of growth of air services at the Airport being a positive factor for a company considering locating to one of the other proposed development sites listed above.

7.145 The exception to this is the adverse effect of the enlarged PSZ, which was considered earlier in this chapter. However, it should be noted that the enlarged PSZ affects both development scenarios and the adverse effects are greater in the ‘without development’ scenario.

7.146 The cumulative effects are summarised in Table 7.13 below.

**Table 7.13: Summary of Effects**

Effect	Description	Significance
Total CADP Employment Impact	Approximately 1,500 direct, indirect and induced jobs.	Substantial Beneficial
Employment (operation)	960 additional direct on-site FTE jobs at 2023 compared with the baseline. 700 additional direct on-site and 126 indirect FTE jobs at 2023 with the development. In total, an additional 910 FTE jobs overall in the Study Area including induced employment.	Substantial Beneficial
GVA (operation)	Additional £98.8m of GVA at 2023 compared with baseline. Additional £51m of GVA at 2023 with the development.	Substantial Beneficial
Employment (hotel)	Additional 200 direct, indirect and induced jobs.	Moderate Beneficial
GVA (hotel)	£5.8m GVA.	Moderate Beneficial
Displacement	In the context of the overall demand for jobs in the Study Area, there is unlikely to be any significant displacement.	Not significant/negligible
Employment (construction)	Additional 448 FTEs over the life of the project.	Moderate Beneficial
GVA (construction)	Additional £304m over the life of the project.	Moderate Beneficial
Employment and GVA (PSZ)	<p>The potential effect of the enlarged PSZ in the ‘with development’ scenario could be to reduce the number of additional FTEs at 2023 by 160 and the GVA by £7.1m.</p> <p>The potential effect in the ‘without development’ scenario could be to reduce the number of additional FTEs at 2023 by 300 and the GVA by £13.3m.</p> <p>In both cases the lost jobs are theoretical as the sites have not been developed.</p>	Moderate Beneficial
Retail businesses in Woolwich	Impact of additional retail development at the Airport on retail businesses in Woolwich.	Not significant/negligible

Social effects	Additional employment arising from the proposed CADP. Noise and air quality effects are likely to be 'not significant/negligible' after mitigation. The risk to community health is not of a level to quantify any meaningful adverse health outcome and would be further managed through bespoke mitigation. The income and employment benefits would also bring health benefits.	Substantial Beneficial effects from additional employment. Noise, air quality and health not significant/negligible after mitigation.
Competition from other airports	The Airport's ability to attract and sustain routes has been factored into the passenger forecasts, as detailed elsewhere in the ES.	Not significant/negligible
Source: York Aviation		

7.147 The overall cumulative/net effects are likely to be 'substantial beneficial' in the context of the definitions set out in Table 7.2.

### Residual Effects

7.148 In the absence of additional mitigation, the residual effects remain as described.

<sup>1</sup> Study into the Impact of London City Airport on the Economy of Docklands and London, York Aviation, February 2011.

<sup>2</sup> London City Airport Social Impact Survey, York Aviation (in association with McCallum Layton), February 2011.

<sup>3</sup> Aviation Policy Framework, March 2013, Foreword by the Secretary of State, page 6.

<sup>4</sup> Ibid, paragraph 1.2.

<sup>5</sup> Ibid, paragraph 1.3.

<sup>6</sup> Ibid, Executive Summary, paragraph 7.

<sup>7</sup> The London Plan (2011), paragraph 6.28.

<sup>8</sup> Royal Docks Vision, The Mayors of London & Newham, July 2010, Foreword.

<sup>9</sup> Ibid, page 20.

<sup>10</sup> Vision 2020, Mayor of London, page 11.

<sup>11</sup> Ibid: pages 66-67.

<sup>12</sup> Planning Obligation by Deed of Agreement under Section 106 of the Town & Country Planning Act relating to London City Airport, July 2009, page 12.

<sup>13</sup> Economic Development Strategy 2010-2027, London Borough of Newham, Executive Summary.

<sup>14</sup> Ibid, page 22

<sup>15</sup> Ibid, page 24

<sup>16</sup> Ibid, page 48

<sup>17</sup> Royal Docks Infrastructure Study (Strategic Transport Study), Transport for London in partnership with the London Borough of Newham, March 2012.

<sup>18</sup> Employment Strategy, Tower Hamlets, Executive Summary, April 2011.

<sup>19</sup> Enterprise Strategy, Tower Hamlets, Executive Summary, May 2012.

<sup>20</sup> Convergence Framework and Action Plan 2011-2015, The Mayor of London and the elected Mayors and Leaders of the six Olympic Host Boroughs, 2011.

<sup>21</sup> English Partnerships Additionality Guide: A Standard Approach to Assessing the Additional Impact of Interventions, 3rd Edition, October 2008, Section 4.3.

<sup>22</sup> Ibid, paragraph 4.3.5.

<sup>23</sup> The Social & Economic Impact of Airports in Europe, York Aviation for ACI EUROPE, January 2004, paragraph 5.29.

<sup>24</sup> Local Economic Assessment 2010 to 2027, LB Newham, October 2010, paragraph 1.9.

<sup>25</sup> Employment Densities Guide, Homes & Communities Agency, 2<sup>nd</sup> Edition 2010.

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- <sup>26</sup> Department for Business, Innovation & Skills; Research to Improve the Assessment of Additionality, October 2009.
- <sup>27</sup> Employment Densities Guide, Homes & Communities Agency, 2<sup>nd</sup> Edition 2010.
- <sup>28</sup> The Impact of London City Airport on the Economy of Docklands and London, York Aviation, February 2011.
- <sup>29</sup> NRS Social Grades: defined at <http://www.nrs.co.uk/lifestyle-data/>
- <sup>30</sup> London City Airport's own figure for 2012.
- <sup>31</sup> The Social & Economic Impact of Airports in Europe, York Aviation, January 2004
- <sup>32</sup> Study into the Impact of London City Airport on the Economy of Docklands and London, York Aviation, February 2011.
- <sup>33</sup> ONS mid-year population estimate from ONS/nomis.
- <sup>34</sup> Local Economic Assessment 2010 to 2027, London Borough of Newham, October 2010.
- <sup>35</sup> Ibid, paragraph 1.8.
- <sup>36</sup> Ibid, paragraph 3.6.
- <sup>37</sup> Ibid, paragraph 3.9.
- <sup>38</sup> Ibid, page 20.
- <sup>39</sup> London City Airport Social Impact Survey, York Aviation (in association with McCallum Layton), February 2011.
- <sup>40</sup> London City Airport Economic & Social Impact Study, York Aviation in association with the University of East London, 2005.
- <sup>41</sup> RoDMA website, <http://www.rodma.co.uk/>, accessed April 2013.
- <sup>42</sup> London Borough of Newham, Town Centre & Retail Study, March 2010.
- <sup>43</sup> London City Airport Community and Environment Review 2012, page 5.

## 8 Noise and Vibration

### Introduction

- 8.1 This chapter, written by Bickerdike Allen Partners (BAP), considers the likely significant effects of noise and vibration predicted to arise from the construction of the City Airport Development Project (CADP) as well as the effects of noise associated with the operation of the Airport, with and without the proposed CADP.
- 8.2 Specifically, this chapter considers the operational noise associated with flights into and out of the Airport (air noise), aircraft operations at the Airport (ground noise) and Airport related road traffic movements. This operational noise is assessed both now and in the future, with and without the CADP.
- 8.3 The effects of construction noise and vibration have also been assessed taking account of their magnitude and also the likely sequence period and daily duration over which they will occur for the affected receptors.
- 8.4 Air noise encompasses that produced by aircraft during their departure and arrival at the Airport. It is produced when an aircraft starts its departure roll, runs along the runway and climbs into the air as well as when an aircraft approaches the Airport, touches down and slows to taxiing speed on the runway. It therefore includes reverse thrust noise when this takes place.
- 8.5 Ground noise encompasses that produced by aircraft activities on the ground, such as during taxiing, manoeuvring, holding on the runway prior to departure, and running engines on the stand. Noise from engine running for test and maintenance purposes is also considered as ground noise.
- 8.6 Road traffic noise includes noise from road vehicles accessing the Airport as well as that from other non-Airport related road vehicles using the roads surrounding the Airport.
- 8.7 Construction noise and vibration relates to that produced by construction traffic accessing and departing from the Airport as well as that produced by demolition, piling and construction plant operating at the Airport during each phase of the construction project.
- 8.8 This chapter commences by describing the noise related planning context against which the CADP proposals will be considered. It goes on to present and discuss the baseline noise at the Airport and then considers the likely significant effects of changes to air, ground, road traffic and construction noise and vibration in both the 'with' and 'without development' scenarios. Within these sections the assessment criteria and methodology are presented, the baseline noise conditions discussed, where relevant, and assessments are made of any impacts (beneficial and adverse) associated with the proposed CADP. Mitigation measures are also described, where appropriate, as are cumulative and residual effects.

## Planning and Noise

### Existing Planning Controls at the Airport

- 8.9 The current Section 106 Agreement dated July 2009 sets out a number of environmental noise control measures at the Airport. These are each briefly described below, many of which are mentioned in more detail in the Airport's current Noise Action Plan<sup>1</sup>.

#### *Number of Aircraft Movements*

- 8.10 The current annual limit on aircraft movements at the Airport is 120,000. This applies to both scheduled aircraft movements as well as corporate aircraft movements associated with the Jet Centre. There are also limits on the number of movements permitted per day (e.g. 592 per weekday, 100 on Saturdays and Sundays) and on various holidays during the year.
- 8.11 There are also limits on the number of movements permissible during specific operational periods; for example, during the early morning period from 06.30 to 06.45h (no more than 2 flights) and from 06.30 to 07.00h (6 flights maximum). Full details of permitted movements are given in Chapter 5: Planning Context and Existing Environmental Controls.

#### *Noise Factored Movements*

- 8.12 The annual limit on Noise Factored Movements (NFM) is 120,000. Aircraft types using the Airport are placed in categories and allocated noise factors depending on their noise reference level (see Table 8.1). The noise reference level is the departure noise level at the four noise categorisation points which are defined as being 2000 metres from the start-of-roll and 300 metres sideline to the extended centre line of the runway. The noise reference level is determined using the mean annual departure noise levels as measured by the noise monitoring system (see paragraph 8.21). The noise factors are multiplying factors applied to the actual number of aircraft movements and are used to obtain the number of factored movements at the Airport.
- 8.13 The number of noise factored movements should also not exceed the permitted number of aircraft movements for that week by more than 25%.

#### *Noise Categorisation*

- 8.14 Aircraft operating at London City Airport are required to be categorised by their departure noise levels which should fall into one of five noise categories as shown in Table 8.1. Since the first year of operation with the extended runway (1992) when the aircraft were provisionally categorised on the basis of manufacturers' data, categorisation has been made with respect to measured data from the Airport's noise monitoring system.

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<sup>1</sup> London City Airport Noise Action Plan 2010 – 2015  
<http://www.londoncityairport.com/content/pdf/LCYNNoiseActionPlan2012.pdf>

**Table 8.1- Noise Categorisation Table**

Category	Noise Ref. level	Noise Factor
A	91.6-94.5	1.26
B	88.6-91.5	0.63
C	85.6-88.5	0.31
D	82.6-85.5	0.16
E	Less than 82.6	0.08

- 8.15 As required under the terms of the current Section 106 Agreement, a review of the current noise categorisation system is currently being undertaken with LBN to reassess the methodology, categories, noise reference levels, noise factors and procedures for categorisation with the objective of providing further incentives for aircraft using the Airport to emit less noise.

*Operating Hours*

- 8.16 No aircraft are permitted to fly at the Airport between 2230h and 0630h during the week, nor between 13.00h on a Saturday and 12.30h on a Sunday, except due to exceptional circumstances. There are also additional limits on operating hours on Bank and Public Holidays See (see Chapter 5).

*Departure and Arrival Procedures*

- 8.17 The following procedures are followed to minimise the noise impact around the Airport:-
- a) Standard noise abatement procedures for aircraft departing from the Airport following the Standard Instrument Departure instructions. These include (unless otherwise instructed by Air Traffic Control (ATC)):
    - i. Aircraft to climb on departure to a minimum height of 1000 feet before turning on track;
    - ii. Aircraft on approach to follow a descent path that would result in the aircraft not being lower at any point that the altitude prescribed by the Instrument Landing System (ILS).
- 8.18 In addition to the above, aircraft follow a glide slope on approach of 5.5 degrees, as opposed to the usual 3 degree approach adopted at most other airports, which ensures aircraft maintain a higher altitude when approaching the Airport.

*Noise Management*

- 8.19 The Airport operates a series of noise management measures to control the use of auxiliary power units (APUs), mobile ground power units (GPUs), and aircraft engine test runs, the logging of aircraft movements and the reporting of measured noise levels to meetings of the London City Airport Consultative Committee (LCACC). The Airport also operates a system to discourage excessively noisy departures using a system of penalties and incentives agreed between the Airport and LBN. Full details of these mitigation measures are presented in the Annual Performance Report produced by the airport in July annually<sup>2</sup>
- 8.20 The Airport is currently introducing additional measures under the NOMMS (Noise Monitoring and Mitigation Strategy) which improves upon and replaces the current noise management

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<sup>2</sup> London City Airport 2011 Section 106 Annual Performance Report, available on [www.londoncityairport.com](http://www.londoncityairport.com)



scheme and noise monitoring system to provide a more robust system of noise monitoring and mitigation. This is to include the measurement and monitoring of ground based sources of noise as well as airborne noise.

#### *Noise Monitoring*

- 8.21 The Airport has operated a four point noise monitoring system since 1991. This was upgraded in 2000 by the addition of a flight track keeping system. The system comprises four noise terminals, arranged in a gateway pair at each end of the runway. Each is located approximately 2000 metres from where the aircraft commences its departure (at the start of roll (SOR) position) and offset by up to 300 metres to the side of the extended centre line of the runway.
- 8.22 The noise and flight track monitoring system is used to measure the noise as an aircraft departs from the Airport, the results of which assist in the operation of the noise categorisation process.
- 8.23 As part of the NOMMS, a new and more robust noise and flight track system is currently being acquired by the Airport with installation planned to commence shortly. This will involve the renewal of the existing four point noise monitoring system and its expansion by the addition of three more monitors to ascertain the airborne and ground noise levels emitted by the aircraft with more accuracy. One monitor will be located near East India Dock, the other on the south side of the Thames in Thamesmead. The third will monitor ground noise from aircraft operations on the apron and runway and will be located close to Building 1000 on the north side of Royal Albert Dock.

#### *Sound Insulation Scheme (SIS)*

- 8.24 Following the planning consent for additional aircraft movements at the Airport in 2009 (ref 07/01510/VAR), the Airport has enhanced its Sound Insulation Scheme (SIS) by introducing a two tier system. The previous scheme (prior to 2009) offering sound insulation treatment to eligible residential properties within the 57 dB  $L_{Aeq,16h}$  noise contour continues but is now supplemented by a second tier where eligible residential properties within the 66 dB  $L_{Aeq,16h}$  noise contour are offered an enhanced sound insulation package offering secondary glazing or a contribution towards high performance thermal double glazing, as well as sound insulating ventilators.
- 8.25 Additionally, for those residential properties that were treated under the scheme at least 10 years ago, a free inspection is offered and rectification works undertaken where appropriate to ensure that the standard of sound insulation does not decline over time.
- 8.26 For Public Buildings in community use, those falling within the 57 dB and 66 dB  $L_{Aeq,16h}$  noise contours are treated on an individual basis following an assessment to determine the function and occupancy of the building.

#### *Purchase Offer*

- 8.27 Any eligible properties that fall within the 69 dB  $L_{Aeq,16h}$  noise contour will receive an offer from the Airport to purchase the property at the open market value within 6 months of the

owner/occupier making an application for the Airport to do so. To date, no properties fall within this noise contour.

#### *Noise Insulation Payment Scheme*

- 8.28 The Airport operates a scheme where any new residential developments within the 57 dB or 66 dB  $L_{Aeq,16h}$  noise contours which received planning permission but had not been built as of 9th July 2009 will benefit from a noise insulation payment scheme that funds during construction any additional works anticipated as a result of the Airport's 2009 planning approval, over and above any pre-agreed planning conditions with regard to external sound insulation.

#### Noise Legislation

##### *Control of Pollution Act 1974*

- 8.29 This Act provides a means for regulating construction noise and vibration. Section 60 sets out the legal powers of a Local Authority to control construction noise. The Local Authority, in acting under this section, would ensure that best practicable means are employed to minimise noise and vibration.
- 8.30 Under Section 61, the person undertaking the construction works may apply for prior consent from the Local Authority over the method by which the works will be carried out and the steps proposed to minimise noise and vibration resulting from the works.

##### *Operating Restrictions Directive 2002/30/EC (March 2002)*

- 8.31 Reducing noise pollution from aircraft and improving the noise climate around airports are key objectives of the European Union air transport policy. The current Directive 2002/30/EC<sup>3</sup> of the European Parliament and Council of 26 March 2002 set out procedures and rules for the introduction of noise related operating restrictions to the busiest of the European airports. The purpose of this Directive is to prevent an overall increase in noise levels in areas around major airports. In the Directive, noise management is to be structured around a balanced approach, including solving noise problems on an 'airport-by-airport' basis and requiring the careful assessment of four key elements:
1. reduction of aeroplane noise at source;
  2. land-use planning and management measures;
  3. noise abatement operational procedures; and
  4. local operating restrictions relating to noise problems.
- 8.32 In the UK, this Directive was implemented as the Aerodromes (Noise Restrictions) (Rules and Procedures) Regulations 2003. London City Airport became a competent authority under the Regulations to apply its own noise related restrictions at this time. As a competent authority, it continues to apply and strives to enhance a strict regime of noise monitoring and management

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<sup>3</sup> Directive 2002/30/EC of the European Parliament and of the Council on the establishment of rules and procedures with regard to the introduction of noise-related operating restrictions at Community Airports.

and produced strategic noise maps and a noise action plan as required by legislation relating to this European Directive.

*Better Airports Package (December 2011)*

- 8.33 The principles of the balanced approach were recently proposed to be extended to all airports. On 1st December 2011 the European Commission launched the Better Airports Package including a proposal to repeal Directive 2002/30/EC and further harmonise and strengthen EU rules on aircraft noise management and assessment. The European Parliament voted further on this package on 12<sup>th</sup> December 2012 and currently it has been referred back to the Parliamentary Committee for further consideration. The Commission's proposals must be approved by the European Parliament and Member State Governments by the "co-decision" procedure, before being adopted.
- 8.34 One of the stated proposals of the package is to allow airports to 'decouple' the growth in air traffic from the level of noise nuisance suffered by local residents, allowing improved noise protection at the same time as preserving growth and the economic contribution which it makes.

*Environmental Noise Directive 2002/49/EC (June 2002)*

- 8.35 The Environmental Noise Directive (END) concerning the assessment and management of environmental noise from transport, came into effect in June 2002<sup>4</sup>. Its aim was to define a common approach across the European Union with the intention of avoiding, preventing or reducing on a prioritised basis the harmful effects, including annoyance, due to exposure to environmental noise. This involves:
- a) informing the public about environmental noise and its effects;
  - b) preparation of strategic noise maps for large urban areas ('agglomerations'), major roads, major railways and major airports as defined in the END; and,
  - c) preparation of action plans based on the results of the noise mapping exercise.
- 8.36 Noise maps and noise action plans aim to manage and reduce environmental noise where necessary, and to preserve environmental noise quality where it is good. Directive 2002/49/EC was implemented in the UK by the Environmental Noise (England) Regulations 2006 (and as amended by the Environmental Noise (England) (Amendment) Regulations 2008, the Environmental Noise (England) (Amendment) Regulations 2009, and the Environmental Noise (England) (Amendment) Regulations 2010).
- 8.37 Under this legislation, London City Airport have produced strategic noise maps in 2007 and 2012 for the Department for Transport as well as a Noise Action Plan<sup>5</sup> covering the period 2010 – 2015.

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<sup>4</sup> Directive 2002/49/EC of the European Parliament and of the Council of 25 June 2002 relating to the assessment and management of environmental noise - Declaration by the Commission in the Conciliation Committee on the Directive relating to the assessment and management of environmental noise.

<sup>5</sup> London City Airport Noise Action Plan 2010-2015 - <http://www.londoncityairport.com/content/pdf/LCYNNoiseActionPlan2012.pdf>

## National Planning Policies

### *Planning Policy Guidance 24 (September 1994)*

- 8.38 National planning policy guidance PPG 24 "Planning and Noise"<sup>6</sup> was withdrawn in March 2012. It dealt with new housing development in relation to existing noise generating development and also developments which generate noise, including measures to alleviate change to development such as airports. It is replaced by the National Planning Policy Framework of March 2012 (see below), which sets out the Government's planning policies for England. However, because PPG24 is referred to in local planning guidance, including that provided by the London Borough of Newham (LBN), it is likely to remain relevant within the timescale of the present application.
- 8.39 LBN's retained policy EQ48 referenced in Newham's Core Strategy<sup>7</sup> states that in considering planning applications for new noise-sensitive development, the council will apply the concept of 'Noise Exposure Categories' (NECS) to assist it in assessing the acceptability of the proposal. NECS were introduced in PPG24 and a summary of the relevant guidance regarding daytime aircraft noise is given in Table 8.2. The guidance given in PPG 24 has historically been considered by Local Authorities in actions and decisions relating to planning applications for dwellings near airports. Similar guidance is also available for roads and railways which, for some of the regeneration and development sites, may be the most significant source of noise and so determine the planning implications.

**Table 8.2- PPG24 Guidance with regard to aircraft noise (daytime)**

<b>dB L<sub>Aeq,16h</sub></b>	<b>Guidance/Experience with regard to aircraft noise (daytime)</b>
< 57	Noise need not be considered as a determining factor in granting planning permission, although the noise level at the high end of the category should not be regarded as a desirable level. PPG 24 Category A.
57 – 66	Noise should be taken into account when determining planning applications and, where appropriate, conditions imposed to ensure an adequate level of protection against noise. PPG 24 Category B.
66 – 72	Planning permission for housing should not normally be granted. Where it is considered that planning permission should be given, for example because there are no alternative quieter sites available, conditions should be imposed to ensure a commensurate level of protection against noise. PPG 24 Category C.
> 72	Planning permission for housing should normally be refused. PPG 24 Category D.

### *White Paper – Future of Air Transport (December 2003)*

- 8.40 The 2003 Air Transport White Paper - 'The Future of Air Transport'<sup>8</sup> set out a strategic framework for the next thirty years. It recognised the benefits of expansion in air travel, and stated the case for development of further airport capacity including steps to provide a corresponding increase in airspace capacity.

<sup>6</sup> Planning Policy Guidance PPG 24 Planning and Noise, 1994, Department of the Environment.

<sup>7</sup> Newham 2027, Newham's Local Plan – The Core Strategy, Adopted Version January 2012.

<sup>8</sup> The Future of Air Transport, Department of Transport, December 2003.

- 8.41 This document has recently been superseded by the publication of the Government's 2013 Aviation Policy Framework (see below).

*Aerodromes (Noise Restrictions) Regulations (August 2003)*

- 8.42 Directive 2002/30/EC was implemented as the Aerodromes (Noise Restrictions) (Rules and Procedures) Regulations 2003 (SI 2003/1742) which came into force on 6th August 2003. The Regulations apply to civil airports in the EU with more than 50,000 movements a year by civil subsonic jet aircraft with a maximum take-off mass of 34,000 kg or more, or with more than 19 passenger seats. It has additional provisions for a small number of "City Airports", including London City Airport, being airports near the centre of a large conurbation and which are considered to operate in a particularly noise-sensitive location.
- 8.43 Where it is proposed to introduce noise-related operating restrictions, the competent authority (at London City, the Airport itself) is required to undertake a detailed assessment of the noise situation in the locality, and the full range of possible measures to address any noise problems identified. At LCY, a strict regime of noise-related operating restrictions has been in place for many years. These restrictions are periodically reviewed and enhanced, normally by way of a planning application and Environmental Impact Assessment, to account for any noise related changes that occur as a result of infrastructure or significant airport operational changes. An example of this is the NOMMS, introduced with the granting of planning permission in 2009 for the airport to operate up to 120,000 aircraft movements per annum.

*Environmental Noise Regulations (October 2006)*

- 8.44 A transposition of EC/2002/49/EC was laid before Parliament in September 2006 as the Environmental Noise (England) Regulations 2006 (SI 2006/2238). These Regulations came into force on 1st October 2006.
- 8.45 London City Airport is both a "major airport" (having more than 50,000 movements per annum) and is located within Greater London. It is therefore required to produce noise maps on a rolling (5 year) basis. The noise maps for the Airport and for 17 other airports in England were published in 2007 and those for the current round were due for completion and issue to Defra in 2012. Noise maps for London City Airport were issued to Defra in October 2012 and are awaiting publication. The maps are used in "*developing co-ordinated and cost-effective action plans to reduce noise*".
- 8.46 The Regulations also require relevant airports to undertake an action planning process. London City's noise action plan covers the five year period 2010 – 2015 and can be found at the airport's website, [www.londoncityairport.com](http://www.londoncityairport.com).

*Noise Policy Statement for England (March 2010)*

- 8.47 The Noise Policy Statement for England (NPSE) provides the framework for noise management decisions to be made that ensure noise levels do not place an unacceptable burden on society.
- 8.48 The stated aims of the Noise Policy Statement for England are to:

- a) Avoid significant adverse impacts on health and quality of life from environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development;
- b) Mitigate and minimise adverse impacts on health and quality of life from environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development; and
- c) Where possible, contribute to the improvement of health and quality of life through the effective management and control of environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development.

*National Planning Policy Framework (NPPF) (March 2012)*

- 8.49 The National Planning Policy Framework (NPPF) published 27th March 2012, sets out the Government's planning policies for England and how these are expected to be applied. It is designed to make the planning system less complex and more accessible, to protect the environment and to promote sustainable growth.
- 8.50 The NPPF consolidates all policy statements, circulars and guidance documents into a single, simpler framework and replaces the planning guidance documents, such as PPG 24, Planning and Noise (1994), which is cancelled by the NPPF.
- 8.51 Government's current planning policy concerning noise is embodied in the National Planning Policy Framework (NPPF), and more specifically the Noise Policy Statement for England
- 8.52 The aim of planning policies and decisions with respect to noise is addressed in paragraph 123 of the NPPF:

*"avoid noise from giving rise to significant adverse impacts<sup>9</sup> on health and quality of life as a result of new development;*

*mitigate and reduce to a minimum other adverse impacts<sup>8</sup> on health and quality of life arising from noise from new development, including through the use of conditions:*

*recognise that development will often create some noise and existing businesses wanting to develop in continuance of their business should not have unreasonable restrictions put on them because of changes in nearby land uses since they were established<sup>10</sup>; and*

*identify and protect areas of tranquillity which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason."*

- 8.53 The above policy refers to "significant adverse impacts" and "other adverse impacts" which are not defined numerically in the case of aviation noise although reference is made to further research being underway in this regard in The Noise Policy Statement for England.

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<sup>9</sup> Refer to Explanatory Note to Noise Policy Statement for England (Defra)

<sup>10</sup> Subject to the provisions of the Environmental Protection Act 1990 and other relevant law.

*Aviation Policy Framework (March 2013)*

- 8.54 The Aviation Policy Framework (APF) was published this year in March by the Department for Transport (DfT). This followed a public consultation which commenced in March 2011 following the issue of a Scoping Report<sup>11</sup>, which generated over 600 responses, and the publication of a Draft Aviation Policy Framework for further consultation in July 2012, generating almost a further 500 responses. The APF replaces the 2003 Future of Air Transport White Paper in conjunction with relevant policies and any decisions which Government may take in response to recommendations made by the Airports Commission which is due to issue its final report and recommendations in 2015.
- 8.55 The APF defines the Government's objectives and policies on the impacts of aviation in the UK and so sets out the parameters within which the Airports Commission will work.
- 8.56 On managing aviation's environmental impacts, and specifically noise, it states in paragraph 3.12 that the Government's overall objective on noise is to
- "limit and where possible reduce the number of people in the UK significantly affected by aircraft noise".*
- 8.57 It advises in paragraph 17 of the Executive Summary that the APF :
- "makes clear that the acceptability of growth in aviation depends to a large extent on the industry continuing to tackle its noise impact and confirms that the Government expects the industry at all levels to continue to address noise". recognising that "the manufacturing industry across Europe has committed to ambitious long-term goals to reduce aviation emissions to one-quarter of 2000 levels by 2050 and to halve perceived aviation noise".*
- 8.58 The APF goes on to state in paragraph 17 that the Government:
- "want to incentivise noise reduction and mitigation, and we also want to encourage better engagement between airports and local communities and greater transparency to facilitate an informed debate".*
- 8.59 Chapter 3, paragraph 3.3 of the APF on noise, states that the Government's intention is:
- "to strike a fair balance between the negative impacts of noise (on health, amenity (quality of life) and productivity) and the positive economic impacts of flights. As a general principle, the Government therefore expects that future growth in aviation should ensure that benefits are shared between the aviation industry and local communities. This means that the industry must continue to reduce and mitigate noise as airport capacity grows. As noise levels fall with technology improvements, the aviation industry should be expected to share the benefits from these improvements."*
- 8.60 For noise control at airports not currently designated for noise management purposes, it states in paragraph 3.11 that:

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<sup>11</sup> Developing a sustainable framework for UK aviation: Scoping Document, DfT, March 2011

*“the Government would like appropriate controls to be agreed locally. For example, local authorities will want to consider whether to set such controls as a planning condition on new airport development. Noise controls at the designated airports will provide examples for other airports to consider as appropriate. Airports should ensure that the effectiveness of their measures to tackle noise is reviewed on a regular basis. For airports required to produce Noise Action Plans under EU legislation, this should be done at least as often as the five-yearly review of these plans. Noise Action Plans and any other noise measures agreed locally should be proportionate to actual noise impacts”.*

### Regional Planning Policies

#### *The London Plan (July 2011)*

- 8.61 The London Plan is the overall strategic plan for London. It sets out a fully integrated economic, environmental, transport and social framework for the development of the capital. London boroughs’ local plans need to be in general conformity with the London Plan, and its policies guide decisions on planning applications by councils and the Mayor.
- 8.62 Policy 7.15 of the London Plan – Reducing noise and Enhancing Soundscapes, states the Mayor’s Policy on Noise is at three levels as follows:
- a) Strategic - The transport, spatial and design policies of this plan will be implemented in order to reduce noise and support the objectives of the Mayor’s Ambient Noise Strategy.
  - b) Planning decisions - Development proposals should seek to reduce noise by: (a) minimising the existing and potential adverse impacts of noise on, from, within, or in the vicinity of, development proposals. (b) separating new noise sensitive development from major noise sources wherever practicable through the use of distance, screening, or internal layout in preference to sole reliance on sound insulation. (c) promoting new technologies and improved practices to reduce noise at source.
  - c) LDF preparation - Boroughs and others with relevant responsibilities should have policies to: (a) reduce the adverse impact of noise through the distribution of noise making and noise sensitive uses, and in highway management and transport policies (see Chapter 6). (b) protect Quiet Areas, to be formally identified under Environmental Noise (England) Regulations 2006 (as amended) and consider protection of spaces of relative tranquillity or high soundscape quality, particularly through borough open space strategies.
- 8.63 In March 2010, the Government published a Noise Action Plan for the London Agglomeration (larger than GLA area) under the Environmental Noise Directive 2002/49/ EC and the Environmental Noise (England) Regulations 2006 (as amended).

### Local Planning Policies

- 8.64 The Airport is located within Newham. Thamesmead in Greenwich, and part of Tower Hamlets, lying close to the airport, are overflown at low altitude by arriving and departing aircraft. Relevant noise policies for each Borough are therefore discussed below, either from the Local Development Framework (LDF) and the Core Policies, or from any relevant saved UDP policies or retained guidance notes.



- 8.65 Newham's new Core Strategy was adopted 26th January 2012. Relevant to London City Airport and planning and noise, it states in page 54 on Spatial Policies:

*"London City Airport is a major employer within the area but the operation of the Airport has impacts on the local environment and also could constrain some types of development in the Public Safety Zone to the east and west of the runway. Any proposals for future expansion will need to be carefully considered in light of these impacts, and the objective to attract people to the new neighbourhoods being planned in the Docks (see INF1). The London Plan (Policy 6.6) emphasises the importance of optimising existing airport capacity for example, improving access and other passenger facilities, and the Council supports this in line with the airport's acknowledged economic role."*

- 8.66 The Infrastructure INF1 Strategic Transport forms part of the Core Strategy and states:

***"London City Airport** - The London Plan (Policy 6.6) emphasises the importance of optimising existing airport capacity, for example, improving access and other passenger facilities, and the Council supports this in line with the Airport's acknowledged economic role. The LCA Masterplan (2006) sets out development plans through to 2030, proposing that the Airport will have 8 million passengers per annum (p.a.) by 2030. This equates to approximately 180,000 air traffic movements p.a. LCA propose this is accommodated by maximising the use of the existing runway, improving flight occupancy and creating better facilities for passengers. Such an increase would also necessitate an enlarged Public Safety Zone, and may impact adversely on the development potential of sites around the Royal Docks. The Airport was granted planning permission in July 2009 for an increase in flight movements to 120,000 p.a. from the previously permitted level of 80,000. As part of this permission, requirements for monitoring air quality and noise impacts have been put in place. Future growth at the Airport in line with the Masterplan will need to be carefully considered to ensure the potential impacts on the Royal Docks and its future role and function are taken into account".*

- 8.67 The policies and proposals of the LBN relating to open spaces and outdoor recreational areas are set out in saved UDP policies, retained following adoption of the Core Strategy in 2012. Whilst not specifically mentioning the effects of noise on open spaces and recreational areas, policies OS7, OS8 and OS10 state that the objectives of the Borough are to: safeguard existing open space and recreational buildings; to secure the improvement of the quality of these facilities and heavily used public open spaces in town centres, as well as damaged and derelict areas of Metropolitan Open Land in the Roding and Lea valleys; to seek the optimum use of these resources; to secure new open space and recreational facilities that will be valued by local people; and, to improve access to a range of open space and recreational facilities for local people.

#### *Greenwich Council Noise and Transportation Policies*

- 8.68 The Local Plan for Greenwich Council is currently under preparation, known formerly as the Local Development Framework (LDF). The Local Plan is proposed to replace the existing extant Unitary Development Plan (UDP) which was adopted on 20th July 2006.
- 8.69 The Greenwich UDP is the statutory development plan for the Borough of Greenwich, setting out current policies. Until the Local Plan is adopted, the “saved” policies of the UDP remain relevant for planning purposes.
- 8.70 Within the UDP, transport policies is saved policy M14 This policy states that the whole Borough is considered sensitive to over flying by all types of aircraft due to its predominantly residential nature, existing or planned. As such, reductions in existing levels of over flying will be sought and proposals generating an increase in noise and/or frequency will normally be opposed. Any planning applications for such a proposal would be required to address and make clear environmental impacts when submitted. Specific reference is made to London City Airport in that proposals for the extension /intensification of use of London City Airport will be assessed. Mention is also made that flights into Heathrow are becoming an increasing issue for the Borough.
- 8.71 Greenwich’s Draft Core Strategy with Development Management Policies 2011 has a new policy C(e) - London City Airport, which has provision for new applications to take account of both safeguarding and noise issues associated with the Airport.

#### *Tower Hamlets Noise and Transportation Policies*

- 8.72 The Tower Hamlets UDP was adopted as the Council's statutory development plan on 2nd December 1998, and will be replaced by the Local Development Framework (LDF). Until the LDF is adopted, the 'saved' policies of the UDP remain relevant for planning purposes.
- 8.73 The Core Strategy Development Plan 2025 provides a 15-year plan for the Borough as part of the LDF. It was found sound by the Planning Inspector and adopted by Tower Hamlets Council 15 September 2010. There are no policies within the Core Strategy or the Environmental and Transport sections of the UDP which make reference to overflying aircraft.

## Baseline Noise and Vibration Conditions

- 8.74 This section provides a description of the general noise and vibration conditions in the vicinity of the Airport. In view of the city location of the Airport, the surrounding community is affected by noise from the local road network and also from some industrial activities. Background and ambient noise data is available from the permanent Noise Monitoring Terminals (NMTs) located around the Airport site which measure continuously. In addition, noise surveys have been undertaken during both the day-time and night-time at various locations to the north and the south of the Airport.
- 8.75 The baseline vibration conditions in the vicinity of residential buildings around London City Airport are generally dictated by localised road traffic conditions. For dwellings along major roads, heavy vehicles such as buses and lorries have the potential when passing to produce perceptible vibration levels within them. For those dwellings located away from busy roads, vibration levels will be low and the occupants are unlikely to be aware of any vibration within their premises from outside sources. As a result, no vibration measurements have been undertaken and it is this low baseline of vibration against which this development will be assessed.
- 8.76 The locations at which the baseline noise conditions have been assessed are shown in Figure 8.1 for the area to the north of the Airport in Beckton and in Figure 8.2 for those areas to the south around North Woolwich. NMTs 1 and 2 have been used to evaluate noise levels to the west of the Airport and NMTs 3 and 4 to evaluate conditions to the east. These noise terminal positions are shown in Figure 8.3.
- 8.77 The noise survey work comprised a combination of attended and unattended noise monitoring undertaken during periods in July, October, November and December 2011 and in January and December 2012. Attended noise monitoring was undertaken at various locations in North Woolwich and Beckton and observations made of the noise climate prevailing at the time. . These attended measurements include the noise contribution of aircraft noise activity as well as non-aircraft related activities. Appendix 8.1 contains details of the noise monitoring procedures, survey dates, observations and results and, for each position identifies the nature of the key contributors to the noise environment. The results are summarised in Table 8.3 to Table 8.5 for the key locations in terms of the ambient noise level ( $L_{Aeq}$ ) and background noise level ( $L_{A90}$ ). All noise sources affect the  $L_{Aeq}$  index which, commonly used to denote the ambient noise level, signifies the single steady average noise exposure level which is equivalent in energy terms to that produced by the various fluctuating noise levels that occur in the given measurement period. In contrast, the  $L_{A90}$  index, also given in the tables below, represents the prevailing background noise level in the absence of any noise from aircraft in flight. This index denotes that level of noise that is exceeded for 90% of the time.

**Table 8.3- Baseline Noise Measurements – North Woolwich (2011)**

Ref	Location	Daytime		Night-time		Comments Daytime activity
		L <sub>A90,T</sub> dB	L <sub>Aeq,T</sub> dB	L <sub>A90,T</sub> dB	L <sub>Aeq,T</sub> dB	
A1	Grassy patch at the corner of Drew Road/Wythes Road	59	63	58	59	Continuous noise from local industry, aircraft activity, frequent road traffic
A2	In park, Muir Street	49	55	48	49	Aircraft activity, occasional lorries and buses on Albert Rd, birdsongs
A3	Corner of Kennard Street/Newland Street	46	54	43	44	Aircraft activity, infrequent road traffic, birdsong, pedestrians
A4	Corner of Woodman Street/Robert Street	48	57	34	39	Aircraft activity, infrequent road traffic, birdsong, pedestrians
A5	Royal Victoria Gardens, on embankment near bowling pitch	47	52	-	-	Aircraft activity, infrequent road traffic, birdsong, children playing
A6	End of Claremont Close	44	54	31	37	Aircraft activity, infrequent road traffic, birdsong, trains
A7	Corner of Brixham Street and Dockland Street	44	53	31	34	Aircraft activity, infrequent road traffic, birdsong, trains
A8	At the corner of Manwood Street and Fernhill Street	47	55	33 - 40	36 - 42	Aircraft activity, infrequent road traffic, birdsong
A9	Drew Road – between Wythes Road and Saville Road	52	66	51	53	Aircraft activity, road traffic on Hartmann Rd, pedestrians and occasionally children activity in playground
A10	Outside Royal Victoria Gardens, south-east corner	-	-	32	41	Road traffic, passing boats
U1	Back garden of 33 Pier Road	48	57	42	48	Unattended measurements

**Table 8.4- Baseline Noise Measurements – North Woolwich (2012)**

Ref	Location	Daytime		Night-time		Comments Daytime activity
		L <sub>A90,T</sub> dB	L <sub>Aeq,T</sub> dB	L <sub>A90,T</sub> dB	L <sub>Aeq,T</sub> dB	
A1	Grassy patch between Albert Road and Wythes Road	61	65	-	-	Continuous noise from local industry, aircraft activity, frequent road traffic
A2	In park, Muir Street	48	49	51	49	Aircraft activity, occasional lorries and buses on Albert Rd, birdsongs
A3	Corner of Kennard Street/Newland Street	55	60	44	48	Aircraft activity, infrequent road traffic, birdsong, pedestrians
A4	Corner of Woodman Street/Robert Street	48	60	37	40	Aircraft activity, infrequent road traffic, birdsong, pedestrians
A5	Royal Victoria Gardens, on embankment near bowling pitch	52	57	-	-	Aircraft activity, infrequent road traffic, birdsong, children playing
A6	End of Claremont Close	47	56	36	47	Aircraft activity, infrequent road traffic, birdsong, trains
A7	Corner of Brixham Street and Dockland Street	47	58	39	43	Aircraft activity, infrequent road traffic, birdsong, trains
A8	At the corner of Manwood Street and Fernhill Street	48	55	41	50	Road traffic
A9	Drew Road – between Wythes Road and Saville Road	55	62	49	52	Continuous noise from the Tate & Lyle factory, infrequent road traffic on Hartmann/Airport Rd
A10	Outside Royal Victoria Gardens, south-east corner	50	54	37	43	Road traffic, passing boats
U1	Back garden of 33 Pier Road	-	-	-	-	

Notes: i) Unattended monitoring, A – Attended monitoring.

ii) Daytime: period from 07.00 - 23.00 hours; Nighttime: period from 23.00 - 07.00 hours

iii) Attended monitoring results are based on a series of 15 minute measurement samples.

8.78 The above tables indicate that the general ambient noise level around the North Woolwich area lies in the range of 55 to 60 dB L<sub>Aeq</sub> during the daytime with an underlying background noise level in the range 45 to 50 dB L<sub>A90</sub>. The noise environment at any given location will depend on its proximity to a major or minor road, the DLR, industrial area and the airport. The Tate and Lyle factory generates a consistent and steady noise around the North Woolwich area and is a major contributor to the background noise level, together with road traffic on major roads in the area. Superimposed on this are the occasional noises produced by passing road vehicles, DLR trains and departing/arriving aircraft at LCY, along with noise from aircraft activity on the ground.

8.79 During the night, ambient noise levels generally lie in the range 40 to 50 dB L<sub>Aeq</sub>, with background levels generally around 5 to 10 dB lower.

**Table 8.5- Noise Measurements – Beckton (2012)**

Ref	Location	Daytime		Night-time		Comments Daytime activity
		L <sub>A90,T</sub> dB	L <sub>Aeq,T</sub> dB	L <sub>A90,T</sub> dB	L <sub>Aeq,T</sub> dB	
B1	Within UEL grounds at the southern site boundary	53	61	48	50	Aircraft activity, construction noise University occupants, birdsong
B2	At the corner of Cyprus Place and Ferndale Street	54	66	43	45	Traffic on Cyprus Place, Aircraft activity, traffic on Albert Way (often masked by noise from traffic on Cyprus Place)
B3a	The end of Agnes Close (Moved from proposed position 3 to avoid proximity construction noise)	55	64	43	50	Aircraft activity, frequent road traffic on Cyprus Place and fairly masked traffic noise from Albert Way, pedestrians, DLR
B4	On pavement of Strait Road on residential side	56	67	44	50	Infrequent road traffic, occasional bus stopping
B5	On grass triangle in the centre of houses near Campion Close	50	58	41	45	Mainly distant traffic, a builder on the phone and infrequent aircraft
B6	Beckton Park	52	60	43	48	Distant traffic, building works and occasional aircraft

- 8.80 For many of these positions in Beckton, road traffic noise from Royal Albert Way and Cyprus Place dominates the ambient and background noise conditions during the daytime. This is evident from the elevated background noise levels, in the range 52 to 56 dB L<sub>A90</sub>, as compared to those in the North Woolwich area. It is against this relatively high background, and ambient noise levels in the range 60 to 67 dB L<sub>Aeq</sub> that aircraft noise will be audible on occasion.
- 8.81 During the night, ambient noise levels lie in the range 45 to 50 dB L<sub>Aeq</sub> with background levels typically around 5 dB lower.
- 8.82 The baseline noise measurements shown in Table 8.6 relate to three separate, one week, periods of unattended noise monitoring at each of the four NMTs. The background noise levels (L<sub>A90</sub> index) are derived from an arithmetic average of the hourly values over the specified period (i.e. 16 hours for the daytime and 8 hours for the night-time). This is a general approximation of the overall background noise level over these periods. In the case of the dB L<sub>Aeq</sub> value labelled as “no events”, this has been derived by firstly subtracting logarithmically all triggered noise events (ie. aircraft events and occasional non-aircraft events that lie above a specified trigger level) from the overall recorded dB L<sub>Aeq</sub>, and secondly, logarithmically averaging the residual dB L<sub>Aeq</sub> levels for each of the continuous one-week periods. This therefore represents the ambient noise level in the absence of aircraft air noise in the vicinity of the four noise monitoring terminals. The daytime and night-time L<sub>Aeq,T</sub> values represent the overall L<sub>Aeq</sub> values for the specified periods, including all triggered noise events.

**Table 8.6- Baseline Noise Measurements – Noise Monitoring Locations**

Ref	Date of Period	Day-time (no events)		Day-time <sup>1)</sup>	Night-time (no events)		Night-time <sup>1)</sup>
		L <sub>A90,T</sub> dB	L <sub>Aeq,T</sub> dB	L <sub>Aeq,T</sub> dB	L <sub>A90,T</sub> dB	L <sub>Aeq,T</sub> dB	L <sub>Aeq,T</sub> dB
NMT 1	11 – 17 July 2011	54	60	68	46	54	57
	17 – 23 Oct 2011	55	60	67	48	55	57
	16 – 22 Jan 2012	56	61	68	49	56	58
NMT 2	11 – 17 July 2011	52	57	66	45	51	55
	17 – 23 Oct 2011	53	57	66	47	52	55
	16 – 22 Jan 2012	54	58	66	47	52	56
NMT 3	11 – 17 July 2011	48	56	64	43	49	53
	17 – 23 Oct 2011	51	59	63	46	51	52
	16 – 22 Jan 2012	52	59	65	48	53	54
NMT 4	11 – 17 July 2011	47	55	62	41	49	51
	17 – 23 Oct 2011	47	56	65	41	48	57
	16 – 22 Jan 2012	50	57	63	41	49	50

1) Includes all triggered noise events recorded by the noise monitoring terminals, including any aircraft events and any other spurious noise events caused, for example, by local noise sources such as the DLR or local roads.

- 8.83 The above results indicate a general ambient noise level during the daytime (in the absence of noise from aircraft in flight) of around 55 to 57 dB L<sub>Aeq</sub> to the south of the airport (NMTs 2 and 4), against a background noise level in the range 47 to 53 dB L<sub>A90</sub>. To the north, at NMT 1 and 3, the noise levels are slightly higher with an ambient in the range 56 to 61 dB L<sub>Aeq</sub> and a background noise level of around 48 to 56 dB L<sub>A90</sub>. The background noise levels (L<sub>A90</sub> values) are consistent with those recorded during the attended surveys.
- 8.84 During the night-time, the ambient noise level lies in the range 48 to 56 dB L<sub>Aeq</sub> against a background of 41 to 49 dB L<sub>A90</sub>.
- 8.85 It is against background and ambient noise levels of this magnitude that the impacts of air, ground, road traffic and construction noise from the development can be assessed where appropriate.

## Air Noise

- 8.86 This section of the ES Chapter assesses how air noise levels are likely to vary in the future under the proposed CADP, as compared to baseline conditions (2012) and the 'without development' base case.

### Air Noise Assessment Criteria

#### *UK Noise Indicators for Air Noise Assessment*

- 8.87 The current convention in the UK is to assess the impact of daytime aircraft noise in terms of daytime  $L_{Aeq,16h}$  noise contours determined from an average summer day of aircraft movements. There is a growing trend in Europe to rate airborne aircraft noise in terms of the unit,  $L_{den}$ , which accounts for traffic during the day, evening and night periods. The development of criteria by which to judge this European index is in its relative infancy compared to the body of knowledge built around the  $L_{Aeq,16h}$  unit, although guidance is continuing to emerge, particularly with regard to noise exposure and potential health effects. The Government have recently consulted through their Draft Aviation Policy Framework (APF) which was finalised in March 2013 this year (referred to above), on whether air noise should continue to be assessed in terms of the  $L_{Aeq,16h}$  index or whether a change to  $L_{den}$  is now appropriate. The Government have confirmed in the finalised APF that their view is to remain with current Government policy, relying on the  $L_{Aeq,16h}$  unit. As a result, emphasis on the assessment of daytime noise in this chapter is placed on the UK methodology and  $L_{Aeq,16h}$  unit. For completeness,  $L_{den}$  contours are also presented and discussed later in the chapter. The Government also acknowledges research in recent years which suggests that the balance of probability is that people are now relatively more sensitive to aircraft noise than in the past, though there is insufficient evidence to indicate a clear threshold noise level denoting the "onset of significant community annoyance". The Government have therefore retained the 57 dB  $L_{Aeq,16h}$  contour as the average level of daytime aircraft noise marking the approximate onset of significant community annoyance.
- 8.88 It is acknowledged that mapping to a lower noise threshold can be useful since it is recognised that impacts still arise at noise exposure levels below 57 dB  $L_{Aeq,16h}$ . In view of this, noise contours have been generated down to 54 dB  $L_{Aeq,16h}$  and presented in this chapter for the various with and without development scenarios.
- 8.89 With regard to what level of air noise constitutes a "significant adverse impact", it is instructive to consider the advice contained within the recently replaced PPG 24: Planning and Noise which advised that, under certain circumstances, it would be possible to construct new housing in areas exposed to a noise level of up to 72 dB  $L_{Aeq,16h}$ . In more recent times, and confirmed in the Aviation Policy Framework, the advice is that for air noise levels reaching 69 dB  $L_{Aeq,16h}$ , people should be offered re-location packages or, under certain circumstances, provided with purchase offers by an airport (as is currently the case at London City Airport). This indicates a reduction in the boundary of the limit of acceptability of air noise (from 72 dB to 69 dB) and also an indication of what, in absolute terms, now constitutes a "significant adverse impact".



- 8.90 Based on Government guidance as described above, the following contour bands are relevant in terms of assessing daytime airborne aircraft noise:-
- a) 54 dB  $L_{Aeq,16h}$  which provides a threshold below which air noise will have limited effects. Previous research<sup>12</sup> has indicated 55 dB  $L_{Aeq}$  as a threshold at which the fraction of the population annoyed by noise stabilises at around 5 to 10 per cent although it is accepted that some people can be annoyed at lower levels of aircraft noise. Accordingly, this constitutes the base level for consideration air noise impacts within this chapter; i.e. Negligible impact
  - b) 57 dB  $L_{Aeq,16h}$  which currently provides an indication of the onset of significant community annoyance; i.e. Minor impact
  - c) 63 dB  $L_{Aeq,16h}$  which denotes moderate levels of significant community annoyance, commonly used at airports as an eligibility criterion for sound insulation grant schemes; ie. Moderate impact; and
  - d) 69 dB  $L_{Aeq,16h}$  for high levels of significant community annoyance where UK Government guidance is for consideration to be given by airports to assist in the costs of re-locating people from exposed dwellings, or, under certain circumstances, to offer to purchase such dwellings; i.e. Substantial impact.
- 8.91 In addition to the significance of the absolute level of aircraft noise discussed above, consideration should also be given to the relative change in noise level. In terms of the perceptibility and significance of changes in air noise exposure around an airport, the following observations have been made:
- a) "a change of less than 2 dB  $L_{Aeq}$  units would not be discernible to most people....,
  - b) changes between 2 and 3 dB  $L_{Aeq}$  units might be discernible, but would not usually be significant...,
  - c) changes of between 6 and 9 dB  $L_{Aeq}$  units would be recorded by most people as significant and noticeable, and, especially at around an increase of 9 dB, as causing a marked deterioration in their environment."
- 8.92 These observations were first reported at the Airport Inquiries:1981-83 by the Inspector Graham Eyre QC<sup>13</sup>. They were adopted at the public inquiries into the second runway at Manchester Airport<sup>14</sup> and at the Inquiry into the conversion of RAF Finningley to become Robin Hood Airport<sup>15</sup>. They were also reiterated in the Aircraft Noise Study prepared for the London Borough of Bromley<sup>16</sup>.
- 8.93 The above is consistent with the Air Transport White Paper and Aviation Policy Framework, which considers a change of 3 dB or more as significant when occurring in conjunction with an absolute noise level of 63 dB  $L_{Aeq,16h}$  or more for those exposed as a result of an airport development. Under these circumstances, as a minimum, the Government expects airport operators to offer financial assistance towards acoustic insulation to residential properties.

<sup>12</sup> The Use of Leq as an Aircraft Noise Index, DORA Report 9023, Civil Aviation Authority, 1990

<sup>13</sup> The Airport Inquiries 1981 – 1983, Chapter 20 and Chapter 42, Inspector's Report.

<sup>14</sup> Manchester Airport : Second Runway: 15 January 1997 : Decision Letter.

<sup>15</sup> Robin Hood Airport (ex. Finningley) : 3 April 2003 : Decision Letter.

<sup>16</sup> Aircraft Noise Study, Cole Jarman Associates, March 1999.

- 8.94 A subjective assessment scale of this type has been previously used successfully in various airport Public Inquiries. On this basis, a significance rating is given in Table 8.7 for indicative purposes, although the absolute significance of a change will also depend on the absolute level associated with it and the noise conditions prior to the change.

**Table 8.7- Subjective importance of changes in noise level**

Change in Level (dB)	Subjective Impression	Impact	Significance
≤ 2	Negligible	Negligible	None
2 to 3	Minor	Minor	Minor
3 to 6	Moderate	Moderate	Significant
6 to 9	Substantial	Substantial	Significant
>9	Very Substantial	Very Substantial	Significant

- 8.95 Noise annoyance ratings can be used as a means of evaluating differences between contour cases. CAP 725<sup>17</sup> provides methods for doing this using the  $L_{Aeq,16h}$  index which, for the centre value of a 3 dB contour band, will denote the percentage of people that are likely to be highly annoyed. The measure considers the general population and it is accepted that some people would be more annoyed or less annoyed for a given noise exposure level. This method of assessment offers some advantages over simply banding a population into “low”, “moderate” and “high” annoyance categories since it recognises that even at relatively low levels of aircraft noise, some people can be highly annoyed. The given relationships between noise dose and the percentage of a population likely to be highly annoyed are presented in Table 8.8 based on CAP 725.

**Table 8.8- Daytime Aircraft Noise (dB  $L_{Aeq,16h}$ ) - Percentage Highly Annoyed**

Noise Contour Band	Mid Value	% Highly Annoyed
54 – 57	55.5	6.6%
57 – 60	58.5	11.1%
60 – 63	61.5	18.0%
63 – 66	64.5	28.0%
66 – 69	67.5	40.7%
69 – 72	70.5	54.9%
72 – 75	73.5	68.2%

- 8.96 The community studies on which this data is based found that below a certain level of noise, there is a relatively steady residual annoyance rating. This was found to occur at a level of around 55 dB in CAA research studies<sup>18, 19</sup>. That is why it is unusual to consider impacts for levels lower than 54 to 57 dB  $L_{Aeq,16h}$ . Table 8.8 is therefore based on the same research that underpins current Government guidance on airborne aircraft noise impacts and provides useful guidance and a tool for comparative studies of different scenarios, where daytime noise is rated in terms of the  $L_{Aeq,16h}$  index.

*European Noise Indicators for Strategic Noise Mapping*

- 8.97 Under the European Directive 2002/49/EC, all member states of the European Community have been required to produce noise maps and noise action plans for major agglomerations. In

<sup>17</sup> CAP 725, CAA Guidance on the Application of the Airspace Change Process, Airspace Change Proposal – Environmental Requirements, Appendix B, Annex 4, 30 March 2007

<sup>18</sup> United Kingdom Aircraft Noise Index Study: main report; DR Report 8402; Civil Aviation Authority, 1985.

<sup>19</sup> The Use of  $L_{eq}$  as an Aircraft Noise Index, DR Report 9023, Civil Aviation Authority, 1990.

the UK, this requirement has been achieved by way of the Environmental Noise Regulations (England) Regulations 2006<sup>20</sup>. The two noise indices used for this purpose are the  $L_{den}$  and the  $L_{night}$ . The  $L_{den}$  is a unit that considers an average annual day of air traffic (although it can be applied equally to either rail or road traffic) over a 24 hour period, providing greater emphasis, by way of adding noise penalties of 5 dB and 10 dB to noise levels arising from evening and night traffic respectively. The  $L_{night}$  equates approximately to the  $L_{Aeq,8h}$  index commonly used to rate night noise in the UK with the exception that it is based on an average annual night mix of aircraft movements rather than an average summer mix.

- 8.98 At London City Airport, there is currently no aircraft activity during the night period other than a very few movements early in the morning, with a permitted maximum of six between 0630 and 0700 hours and with no more than two between 0630 and 0645 hours. No change in this regime is sought as part of the CADP application. The  $L_{Aeq,16h}$  contours presented in this chapter include these aircraft movements (as well as those occurring between 0700 and 2300 hours).
- 8.99 Based on procedures used for strategic noise mapping,  $L_{den}$  and  $L_{night}$  noise contours have also been included in this assessment for the various assessment year scenarios to explore how these indices would vary now and in the future, with and without the proposed CADP.
- 8.100 Emerging guidance from Europe<sup>21</sup> describes how air noise levels, determined in terms of  $L_{den}$ , rates in terms of annoyance, based firstly on research undertaken pre 1990 and secondly post 1990. This information is provided for reference purposes in Appendix 8.6 to this chapter using the  $L_{den}$  and  $L_{night}$  parameters and is supplemental to the annoyance ratings determined using the methodology of CAP 725 which uses the  $L_{Aeq,16h}$  unit, i.e. the unit favoured in the UK.

#### *Variation in Aircraft Noise throughout the Day*

- 8.101 The magnitude of aircraft noise received at a given point during the day will vary according to the noisiness of the given aircraft event and also the number of operations. Whereas air noise contours are based on averages (as required by the Government for planning purposes), it is also relevant to consider how the noise level might vary at a given receptor in a given day. This is often represented by considering the following:
- d) Single mode contours produced assuming either 100% westerly operations or 100% easterly operations; and
  - e) The variation in noise level at representative locations over a typical day,
- 8.102 Consideration has been given to both of these methods within this chapter.

<sup>20</sup> The Environmental Noise (England) Regulations 2006, Statutory Instrument 2006 No. 2238.

<sup>21</sup> Good Practice Guide on noise on noise exposure and health effects, EEA Technical Report No. 11/2010, European Environment Agency, October 2010.

## Air Noise Assessment Methodology

- 8.103 The effects of the proposed CADP have been evaluated over time having regard to the existing noise conditions in the Baseline Year (2012), and also in relation to the situation around the time that the first stage of the CADP is in place. As described in Chapters 1 and 6 of this ES, the first stage of infrastructure works includes the partial construction of the eastern taxilane and three new Code C compliant stands on a new deck over King George V (KGV) Dock. The Facilitating Works for this infrastructure comprise: an extended outbound baggage (OBB) handling facility, a new Coaching Facility to serve the 3 stands, and a noise barrier. These corresponding first stage works are expected to be complete by Year 2/3 (2016-2017).
- 8.104 The later stages of the CADP construction, including 4 additional new stands, completion of the parallel taxilane, the East Pier, Eastern Terminal Extension, East Energy Centre and Hotel are expected to be completed by Year 7 (2021). The noise evaluation presented in this chapter has therefore been undertaken for the following years:-
- a) 2012: Baseline Year.
  - b) 2017: First Phase of the CADP comprising 3 new aircraft stands (approximately 100,000 movements per annum)
  - c) 2019: Transitional Year (approximately 107,000 movements per annum)
  - d) 2021: Design Year = CADP completed but with sub-optimal fleet (approximately 111,000 movements per annum).
  - e) 2023: Principal Assessment Year (approximately 111,000 movements per annum)
- 8.105 For all these assessment years, the number and mix of aircraft has been forecast by York Aviation based on published information about airline fleet replacement to date and on discussions between the airport and key airlines. From a noise impact assessment perspective it could be argued that this represents a worst case scenario as a faster rate of introduction of the new generation quieter aircraft, driven by the attendant economic and environmental advantages for the airlines, could result in a reduction in noise exposure levels happening sooner than predicted. To explore this further, for the Principal Assessment Year of 2023, consideration has also been given, as a sensitivity test, to further re-fleeting of aircraft at LCY. This has been done by considering a mix of aircraft with a larger percentage of the more modern aircraft types, equivalent to that used in the Transport Assessment report in the consideration of passenger traffic throughputs undertaken for Transport for London to the limits of the infrastructure proposed. The industry trend towards such quieter and fuel efficient aircraft is well understood, the only question mark being the timing of such fleet replacement decisions. The Airport, in discussions with key airlines, is receiving indications that the timing of these decisions could occur sooner rather than later.
- 8.106 The methodology used to compute air noise contours is in accordance with current Government Guidance and European guidance. Air noise contours have been generated using the Version 7.0c of the Federal Aviation Administration's Integrated Noise Model (INM)<sup>22</sup>. This modelling

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<sup>22</sup> Federal Aviation Administration, Office of the Environment and Energy. Integrated Noise Model (INM) Version 7.0c.

software is accepted as complying with the methodology set out in ECAC.CEAC Doc 29<sup>23</sup> and suitable for producing airport noise maps used in the Strategic Noise Mapping exercise and production of airport Noise Action Plans as required under the Environmental Noise (England) Regulations 2006.

- 8.107 Air noise has been evaluated and expressed in the form of contours, showing dB  $L_{Aeq,16h}$  day time noise levels for an average day during the summer period, as is the common convention in the UK. These contours are shown in Figures 8.4 to 8.11 in this chapter. The assumptions used to derive air noise contours are set out in Appendix 8.2. Other noise contours have also been produced for sensitivity purposes including the following:
- a) Single mode contours ( $L_{Aeq,16h}$ ), westerly and easterly (Appendix 8.3)
  - b) Day, evening, night contours ( $L_{den}$ ) (Appendix 8.4)
  - c) Night noise contours ( $L_{night}$ ). (Appendix 8.4).
- 8.108 For the noise indices  $L_{den}$  and  $L_{night}$ , the traffic is based on an annual average day rather than a summer's day in order to comply with convention for strategic noise mapping.
- 8.109 Variations in air noise ( $L_{Aeq,16h}$ ) at a given receptor throughout a typical day of the Airport operations have also been assessed for representative locations around the Airport and these are presented in Appendix 8.5.
- 8.110 Annoyance due to air noise, evaluated and expressed in the form of contour bands are presented in Appendix 8.6.
- 8.111 A validation study<sup>24</sup> has been carried out to ensure that the aircraft assumptions used to derive noise contours presented in this chapter are appropriate.
- 8.112 Noise contour predictions have been based on the Baseline Year (2012) aircraft movement data provided by the Airport, and forecast aircraft movement data provided by York Aviation.. These data and aircraft mix assumptions are summarised in Tables 8.9, 8.10, 8.11 and 8.12 below.
- 8.113 The key noise contours presented in this chapter, the  $L_{Aeq,16h}$  noise contours, have been derived using the recognised convention of an average summer day of traffic, based on the 92 day summer period from mid June to mid September. In contrast, the  $L_{den}$  and  $L_{night}$  contours have been derived using the annual, average day for a given year, proportioned across the day, evening and night time periods based on existing aircraft movement data (summarised in Table 8.9).
- 8.114 Day, Evening and Night refer to the periods 0700 to 1900 hours, 1900 to 2300 hours and 2300 to 0700 hours respectively.

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<sup>23</sup> European Civil Aviation Conference, *Report on Standard Method of Computing Noise Contours around Civil Airports*, ECAC.CEAC Doc. 29 (2 vols.), December 2005.

<sup>24</sup> Bickerdike Allen Partners, *Air Noise Contour Prediction using INM, Derivation of Assumptions*, A1125.129-R02-AH, May 2013.

- 8.115 The annual aircraft movements by year for the Baseline Year 2012 and for 2017, 2019, 2021 and 2023 With and Without the CADP development, are set out in Table 8.9 to Table 8.12.

**Table 8.9- Number of Annual Aircraft Movements, Current (2012)**

A/C Type	Current (2012)		
	Day	Eve.	Night
A318	938	0	120
ATR42	1048	420	0
ATR72	4	4	0
BE40	142	12	1
C550	923	149	10
C56X	2228	333	36
D328	3414	1053	5
DH8D	3448	1028	12
E170	7378	1524	31
E190	10969	2682	94
ER3	116	19	3
F50	10626	2463	246
H800XP	1487	177	12
RJ100	5522	1651	413
RJ85	7971	1759	31
<b>Total</b>	<b>70502</b>		

**Table 8.10- Number of Annual Aircraft Movements, Forecast (2017)**

A/C Type	2017		
	Day	Eve.	Night
A318	1220	0	0
ATR72	1941	277	0
BE40	701	0	0
C550	1300	0	260
C56X	2372	1007	0
CS100	6653	1663	554
DH8D	11089	554	0
E135	88	0	0
E170	11089	1663	0
E190	30772	4713	554
F50	9426	2772	0
H800XP	1972	0	0
RJ85	6099	1109	0
<b>Total</b>	<b>99849</b>		

**Table 8.11- Number of Annual Aircraft Movements (With Development), Forecast (2019, 2021 and 2023)**

A/C Type	2019			2021			2023		
	Day	Eve.	Night	Day	Eve.	Night	Day	Eve.	Night
A318	1220	0	0	1220	0	0	1220	0	0
ATR72	4678	312	0	4158	277	0	4713	277	0
BE40	737	0	0	582	0	0	357	0	0
C550	1368	0	274	1081	0	216	635	0	159
C56X	2721	833	0	2711	98	0	1720	0	0
CS100	7762	1663	554	7762	1663	554	10956	2883	577
DH8D	20590	3251	0	24396	3327	0	23287	3327	0
E135	93	0	0	0	73	0	0	45	0
E170	13861	1663	0	14913	1721	0	5822	832	0
E190	36871	5822	554	38064	6298	548	46642	6036	549
H800XP	2075	0	0	1639	0	0	1004	0	0
<b>Total</b>	<b>106902</b>			<b>111301</b>			<b>111039</b>		

**Table 8.12- Number of Annual Aircraft Movements (Without Development), Forecast (2019, 2021 and 2023)**

A/C Type	2019			2021			2023		
	Day	Eve.	Night	Day	Eve.	Night	Day	Eve.	Night
A318	1220	0	0	1220	0	0	1220	0	0
ATR72	22384	3675	0	19526	3206	0	19526	3206	0
BE40	737	0	0	773	0	0	819	0	0
C550	1368	0	274	1435	0	287	1519	0	304
C56X	2721	833	0	2630	1100	0	2932	1017	0
CS100	6653	1663	554	6653	1663	554	6653	1663	554
DH8D	2464	308	0	6607	601	0	6607	601	0
E135	93	0	0	97	0	0	103	0	0
E170	8678	1302	0	11158	1594	0	11158	1594	0
E190	30494	4990	554	30494	4990	554	29556	4836	537
H800XP	2075	0	0	2177	0	0	2305	0	0
<b>Total</b>	<b>93041</b>			<b>97322</b>			<b>96713</b>		

- 8.116 The existing dwelling counts and populations have been determined using data supplied by CACI Ltd. This data, based on census information factored for the current baseline year, consists of dwelling count and population by postcode.
- 8.117 An estimate has also been made of the number of permitted but yet to be built (proposed) dwellings and resulting population likely to lie within noise contours. This has been done by considering those applications for which planning permission has already been granted which have yet to be built around the Airport and taking account of publicly available information on their proposed built form and density. The dwelling and population counts associated with each of these permitted but not yet built developments are set out in Appendix A8.2. For each contour, dwelling and population data is therefore provided in two forms - one relating to the existing status of development around the Airport and the other assuming all proposed developments are built out.

#### Assessment of Effects of Aircraft Noise

##### *Baseline Noise Conditions*

- 8.118 In 2012, there has been a total of 70,502 aircraft movements during the year comprising a mixture of turbo-prop and turbo-jet aircraft types. Typical turbo-prop aircraft include the Fokker 50, Dash 8-400 and Dornier 328. Turbo-jet aircraft include some types that have operated for many years at the Airport, such as the BAe Avro RJ85 and RJ100 as well as more recent types such as the Airbus A318, Embraer 170 and Embraer 190 aircraft.
- 8.119 The current level of activity at the Airport is well below the permitted full usage of the Airport approved through the 2009 planning consent..
- 8.120 Figure 8.4 depicts the noise contours arising for the 2012 Baseline noise profile. The contour representing high levels of annoyance, 69 dB  $L_{Aeq,16h}$ , is completely contained within the Airport site and associated dock area and does not encompass any residential locations in the area.
- 8.121 The contour representing moderate levels of annoyance, 63 dB  $L_{Aeq,16h}$ , in 2012 extends south into the Camel Road area and just encompasses the Millennium Mill in Royal Victoria Dock. The properties located within this contour lie within the Airport's Sound Insulation Scheme and therefore are offered protection from the effects of aircraft noise. The contour representing the

onset of significant community annoyance, 57 dB  $L_{Aeq,16h}$ , in 2012 extends into Thamesmead to the east, Canning Town to the north and Blackwall to the west. To the south, some properties south of the airport's terminal building and piers are exposed, all of which fall into the Airport's existing sound insulation grant scheme. Properties in Britannia Village to the south of Royal Victoria Dock are contained within the contour. Recently built properties in Thamesmead and in North Woolwich also lie within the contour. Many of these new properties will have been built in compliance with planning conditions to ensure sound proofing against aircraft noise is provided to a standard at least comparable with that provided under the Airport's noise insulation scheme.

- 8.122 The Airport operates a complaint system whereby all complaints or enquiries are investigated and responses made to the complainant. The complaint analysis is regularly advised to the local authorities, and reported quarterly and also annually in the Annual Performance Report. Despite the location of this Airport within an urban area, the number of complaints relating to air noise received by the Airport has been low. For example: 16 in 2012, 23 in 2011, 41 in 2010, 66 in 2009, 61 in 2007/8, 47 in 2006/7 and 24 in 2005/6.

*Future Noise Conditions – Interim Stage (2017)*

- 8.123 Figure 8.5 shows the noise contours following the opening of the first three stands and associated infrastructure. The mix of aircraft includes the introduction of the more modern twin engine aircraft at the Airport, such as the Bombardier CS100.
- 8.124 As a result of the increase in the number of movements over the Baseline (2012) situation (100,000 as compared to 70,502), and the change in aircraft mix, increases of typically around 1 to 2 dB are predicted at this time.

*Future Noise Conditions – Without Development*

2019

- 8.125 Figure 8.6 depicts the noise contours in 2019 for the Without Development base case in a year when the proposed 3 new stands and 4 reconfigured stands (Nos 21-24) would otherwise be operational. The contours are larger than those shown in Figure 8.5 (for 2012) primarily due to the increase in movement numbers expected in the preceding six years (from around 68,000 to 93,000).
- 8.126 A further factor affecting the contour size and shape is the change in aircraft mix forecast to occur gradually over the next few years. In particular, the older fleet of RJ aircraft are envisaged to be replaced by more modern twin-engine turbofan aircraft, such as the Embraer 170 and Embraer 190 but also by the introduction of the new Canadair Bombardier CS100 series. Whereas these aircraft produce similar noise to that of the RJ series, the CS100 series in particular offers some noise benefits over current types that will tend to offset, to some extent, the effect of the increase in movement numbers.



## 2021

- 8.127 Figure 8.7 shows the noise contours for the Without Development base case in 2021 when, irrespective of whether the CADP were to proceed, full usage of the Airport is expected. The mix of aircraft alters only slightly over that in 2019 with no scope for the further introduction of the Bombardier CS100 aircraft due to their larger size and the inability of the existing stands and infrastructure to accommodate them.
- 8.128 The noise contours for the base case in 2021 represent the full usage contours in the event that the CADP should not proceed, based on around 97,000 total annual aircraft movements

## 2023

- 8.129 No significant change in aircraft movement number or mix is envisaged in 2023 as the Airport would already (by 2021) be operating at full capacity and the lack of any further apron infrastructure prevents the continued introduction of the newer and larger turbo-fan aircraft. The percentage of Bombardier CS100 aircraft, for example, is restricted to 9% of the mix in this scenario. Figure 8.8 therefore shows the noise contours for this year as being virtually identical to those for the Without Development base case in 2021.

### *Future Noise Conditions – With Development*

#### *Transitional Year 2019*

- 8.130 Figure 8.9 depicts the noise contours in 2019 when the 3 new stands and 4 reconfigured stands (Nos. 21-24) and associated infrastructure are operational. The larger stands will allow the further introduction of larger more modern aircraft such as the Bombardier CS100 Series. These aircraft are now under construction and their engines have been built and tested on other aircraft bodies. Noise data from the manufacturers indicate that these aircraft will perform more quietly than the current crop of similar turbo-fan aircraft at the Airport.
- 8.131 Table 8.13, Table 8.14 and Table 8.15 compare the contour areas, dwelling counts and population counts of the different contour scenarios.

#### *Design Year 2021*

- 8.132 In the With Development scenario, the Airport is expected to operate up to its 120,000 noise factored movement limit by 2021, which will equate to 111,300 actual movements. Figure 8.10 depicts the associated noise contours. The principal change from 2019 is due to the continued introduction of the more modern aircraft, such as the Bombardier CS100 series, which will replace some of the Embraer aircraft that are currently in operation. The Fokker 50 turbo-prop aircraft also ceases operation and is replaced primarily by the Dash 8-400. The noise contours in Figure 8.10 are slightly larger in size than the 2021 Without Development contours shown in Figure 8.7 due primarily to the greater number of aircraft movements in that year with the CADP.
- 8.133 Table 8.13, Table 8.14 and Table 8.15 compare the contour areas, dwelling counts and population counts of the different contour scenarios.

*Principal Assessment Year 2023*

- 8.134 The Airport continues to operate at its noise-factored aircraft movement limit in 2023 although the aircraft mix will change slightly over that in 2021. The modernisation of the aircraft fleet will continue such that the more modern aircraft, such as the Bombardier CS100 aircraft, continue to replace some other aircraft types such as the Embraer 170, contributing around 13% to the aircraft mix. The larger Embraer 190 aircraft will also continue to increase in the fleet mix.
- 8.135 Figure 8.11 depicts the noise contours associated with this mix of aircraft in 2023 which differs little in size from that in 2021.
- 8.136 The area, number of dwellings and population within the  $L_{Aeq,16h}$  day time contour bands for an average day during the busy summer period are shown in Table 8.13, Table 8.14 and Table 8.15 respectively.
- 8.137 Number of dwellings and population have been rounded to the nearest 100 in Table 8.14 and Table 8.15. These counts do not include permitted, but not yet built, residential developments.

**Table 8.13- Contour areas (km<sup>2</sup>),  $L_{Aeq,16h}$  average mode, summer day**

Scenario	Current	2017	2019	2021	2023
Contour, L <sub>Aeq,16h</sub>	(2012)		With dev.	Without dev.	With dev.
57 dB	6.3	8.4	8.7	7.7	9.1
63 dB	1.6	2.2	2.3	2.0	2.4
69 dB	0.5	0.6	0.7	0.6	0.7

**Table 8.14- Approximate number of dwellings in contours (not including permitted developments),  $L_{Aeq,16h}$  average mode, summer day**

Scenario Contour, L <sub>Aeq,16h</sub>	Current (2012)	2017		2019		2021		2023	
				With dev.	Without dev.	With dev.	Without dev.	With dev.	Without dev.
57 dB	8,300	13,700	14,300	12,100	15,100	12,500	15,100	12,400	
63 dB	400	1,100	1,200	900	1,300	900	1,300	900	
69 dB	0	0	0	0	0	0	0	0	

**Table 8.15- Approximate population in contours (not including permitted developments),  $L_{Aeq,16h}$  average mode, summer day**

Scenario Contour, L <sub>Aeq,16h</sub>	Current (2012)	2017	2019	2021		2023		
			With dev.	Without dev.	With dev.	Without dev.	With dev.	Without dev.
57 dB	17,900	30,600	32,200	26,800	34,000	28,100	34,100	27,800
63 dB	1,000	2,400	2,600	2,000	2,800	2,200	2,900	2,100
69 dB	0	0	0	0	0	0	0	0

- 8.138 The number of dwellings and population including permitted but not yet built residential developments are set out in Table 8.16 and Table 8.17.

**Table 8.16- Approximate number of dwellings in contours (including permitted but not yet built residential developments),  $L_{Aeq,16h}$  average mode, summer day**

For built residential developments, $L_{Aeq,16h}$ average mode, summer day								
Scenario	Current	2017	2019	2021		2023		
Contour, $L_{Aeq,16h}$	(2012)		With dev.	Without dev.	With dev.	Without dev.	With dev.	Without dev.
57 dB	8 300	28 200	29 400	25 600	30 600	26 600	30 600	26 400

63 dB	400	6,200	6,300	4,900	6,700	5,500	6,700	5,500
69 dB	0	0	0	0	0	0	0	0

Note: Counts include 5000 dwellings for the permitted Silvertown Quays development although a new scheme is currently proposed containing only around 1500 dwellings.

**Table 8.17- Approximate population in contours (including permitted but not yet built residential developments),  $L_{Aeq,16h}$  average mode, summer day**

Scenario	Current	2017	2019	2021	2023
Contour, $L_{Aeq,16h}$	(2012)		With dev.	Without dev.	With dev.
57 dB	17,900	69,800	72,800	63,500	75,900
63 dB	1,000	16,300	16,500	13,000	17,500
69 dB	0	0	0	0	0

Note: Counts include population for 5000 dwellings for the permitted Silvertown Quays development although a new scheme is currently proposed containing only around 1500 dwellings.

- 8.139 The general picture indicated by the above tables is that in the Without Development scenario the size of the noise contours, and therefore the number of dwellings and population count within them, will rise from now until around 2021. Assuming no currently permitted developments are built out (or assuming all are built out), the number of dwellings lying within the 57 dB  $L_{Aeq,16h}$  contour, which represents the onset of low significant community annoyance, increases from 8,300 in 2012 to 12,500 (26,600) in 2021 without the development. There is a corresponding 22% increase in the 57 dB contour area over this period. For the 63 dB  $L_{Aeq,16h}$  contour, the increase is from 400 dwellings to 900 (5,500 due primarily to the Silvertown Quays development) with a corresponding 25% increase in contour area. No properties lie within the 69 dB  $L_{Aeq,16h}$  high annoyance noise contour now or in the future.
- 8.140 As the fleet mix changes slightly, with an increase in corporate jet activity envisaged, there will be a slight reduction in the number of people within the lower contour bands (57 dB) between 2021 and 2023 without the proposed development, while aircraft movement numbers remain at a similar constrained level, at around a maximum of 97,000 annually.
- 8.141 For the With Development case, the size of the noise contours, and therefore the number of dwellings and population count within them, will also rise from now until around 2021, when the CADP will be fully built. Little change occurs thereafter up until 2023.
- 8.142 As the CADP will allow the Airport to realise a greater number of aircraft movements (i.e. an additional 14,300), the number of dwellings and therefore population exposed to aircraft noise will rise as compared to the Without Development scenario.
- 8.143 By 2023, assuming no currently permitted developments are built out (or assuming all are built out), the number of dwellings lying within the 57 dB  $L_{Aeq,16h}$  contour is predicted to increase from 12,400 (26,400) without the CADP to 15,100 (30,600) with the CADP. The 57 dB contour area also increases from 7.8 km<sup>2</sup> to 9.1 km<sup>2</sup>, an increase of 17%. For the 63 dB  $L_{Aeq,16h}$  contour, the increase in the dwelling count is from 900 (5,500) to 1,300 (6,700) with a corresponding 20% increase in contour area. No properties lie within the 69 dB  $L_{Aeq,16h}$  high annoyance noise contour which increases in area by 17% in 2023 if the CADP is built out.
- 8.144 The noise levels in the Baseline Year (2012) as compared to future years (2019, 2021 and 2023) With and Without the CADP, are set out in Table 8.18 for representative areas around

the Airport. These areas are shown in Figure 8.12. The relative change in air noise level as compared to the Without Development case in 2023 is given in Table 8.19.

**Table 8.18- Air Noise level at key locations (dB L<sub>Aeq,16h</sub>)**

Location	Curr. (2012)	2017	2019		2021		2023	
			With dev.	W/o dev.	With dev.	W/o dev.	With dev.	W/o dev.
(1) Blackwall / A1261	58	59	59	58	59	59	59	59
(2) Britannia Village	62	64	64	63	64	63	64	63
(3) Silvertown / A1020	59	61	61	60	61	60	61	60
(4) Custom House	57	59	59	58	59	59	59	58
(5) Camel Road	64	66	66	65	66	65	66	65
(6) Royal Albert Dock (north)	61	63	64	63	64	63	64	63
(7) North Woolwich (north)	57	59	59	58	60	59	60	59
(8) Thamesmead	59	60	60	60	60	60	60	60
(9) Eastern Quay Apts, Britannia Village	63	65	65	64	65	65	65	64
(10) Coral Apts, Western Gateway	61	62	62	62	62	62	62	62
(11) Silvertown Quays	66	68	68	67	68	67	68	67
(12) Ramada Hotel	64	65	66	65	66	65	66	65

**Table 8.19- Difference in noise levels relative to the 2023 'Without Development' scenario at key locations (dB L<sub>Aeq,16h</sub>)**

Location	Curr. (2012)	2017	2019		2021		2023	
			With dev.	W/o dev.	With dev.	W/o dev.	With dev.	W/o dev.
(1) Blackwall / A1261	-0.7	+0.4	+0.5	-0.1	+0.7	+0.1	+0.7	-
(2) Britannia Village	-1.0	+0.4	+0.6	-0.1	+0.8	+0.1	+0.8	-
(3) Silvertown / A1020	-1.3	+0.4	+0.7	-0.1	+0.9	+0.1	+0.9	-
(4) Custom House	-1.5	+0.3	+0.7	-0.2	+0.9	+0.1	+0.9	-
(5) Camel Road	-1.5	+0.4	+0.8	-0.1	+1.0	+0.1	+1.0	-
(6) Royal Albert Dock (north)	-1.6	+0.4	+0.8	-0.1	+1.0	+0.1	+1.0	-
(7) North Woolwich (north)	-1.7	+0.4	+0.8	-0.2	+1.0	+0.0	+1.0	-
(8) Thamesmead	-0.9	+0.3	+0.3	0.0	+0.5	+0.1	+0.5	-
(9) Eastern Quay Apts, Britannia Village	-1.0	+0.3	+0.5	-0.1	+0.7	+0.1	+0.6	-
(10) Coral Apts, Western Gateway	-0.9	+0.3	+0.4	-0.1	+0.6	+0.0	+0.6	-
(11) Silvertown Quays	-1.1	+0.4	+0.6	-0.1	+0.8	+0.1	+0.8	-
(12) Ramada Hotel	-1.3	+0.4	+0.6	-0.1	+0.8	+0.1	+0.8	-

- 8.145 The changes to noise levels at the positions listed in Table 8.19, comparative to the Baseline Year (2012), are all less than 2 dB. Furthermore, in most cases, noise increases in the With Development scenario are no greater than 1 dB.
- 8.146 Comparing the 'With' and 'Without' development cases, there is only a slight increase in noise level resulting from the proposed CADP, in the range of 0.5 to 1.0 dB, giving rise to a negligible impact of no significance.
- 8.147 None of the above receptors are exposed to a level of 69 dB (the threshold of high levels of significant community annoyance and adverse impacts).
- 8.148 Table 8.20 contains an assessment of the percentage of people likely to be "highly annoyed" as a result of exposure to air noise in 3 dB noise contour bands, derived from data presented in

CAP 725 (discussed above). An analysis of this type can be used to compare both the number of people likely to be highly annoyed and, more importantly, the change in the number of people likely to be highly annoyed, both with and without the development in 2023. This is based on an assessment of the population within existing residential developments. Any permitted developments that are built in the future near the Airport have not been included and will be conditioned to adequately protect the occupants from the effects of aircraft noise. The significant development that has arisen around Docklands, partly as a result of the airport's presence, means that a large number of people will be affected by only a small change in noise, when assessed by this method.

**Table 8.20- Annoyance, dB L<sub>Aeq,16h</sub> % Highly Annoyed**

Noise Contour Band, L <sub>Aeq,16h</sub> dB	% Highly Annoyed	Current (2012)	2019 With dev.	2019 Without dev.	2021 With dev.	2021 Without dev.	2023 With dev.	2023 Without dev.
54 – 57	6.6%	2200	2700	2200	2900	2300	2800	2300
57 – 60	11.1%	1300	2500	2000	2600	2100	2600	2100
60 – 63	18.0%	1000	1300	1200	1400	1200	1500	1200
63 – 66	28.0%	300	500	500	600	500	600	500
66 – 69	40.7%	0	300	100	300	100	300	100
69 – 72	54.9%	0	0	0	0	0	0	0
72 – 75	68.2%	0	0	0	0	0	0	0

8.149 The above table indicates a significant increase in the number of people likely to be highly annoyed by noise over the coming years, irrespective of whether or not the CADP is built. There will be some increase in the number of people likely to be “highly annoyed” as a result of air noise in 2023, should the proposed CADP proceed, since the noise exposure increases slightly over the without development scenario. This includes the effect of noise on people who lie outside the 57 dB noise contour but within the sensitivity 54 dB contour and therefore, in light of comments concerning a threshold level of 55 dB being applicable in paragraph 8.96 above, this is likely to overestimate the numbers affected to some extent. In general terms, based on CAP 725, relative to the entire population within the 54 dB noise contour band without the CADP, there will be an increase of about 2% in the number of people highly annoyed with the CADP in place in 2023.

8.150 The numbers of people that lie within the 54 dB contour band around LCY are expected to continue to grow over the years and evidence<sup>25</sup> indicates that this is likely to occur irrespective of aircraft noise being present, provided noise is controlled to below 69 dB L<sub>Aeq,16h</sub>. This also reflects recent Government planning policy<sup>26</sup> that has generally permitted residential development, subject to suitable noise mitigation, on land affected by aircraft noise up to 66 dB L<sub>Aeq,16h</sub> and, under certain conditions, up to 69 dB L<sub>Aeq,16h</sub>.

#### *Further Re-fleeting by 2023 – Sensitivity Test*

8.151 The infrastructure constructed under the CADP provides the opportunity for the introduction of more modern aircraft at LCY such as the Bombardier CS100 and other similar types which are

<sup>25</sup> Discussion Paper 05: Aviation Noise, Airports Commission, July 2013

<sup>26</sup> Planning Policy Guidance PPG 24: Planning and Noise, September 1994

likely to emerge, for example, the re-engined Embraer 190. These aircraft are expected to operate more quietly than similar sized aircraft currently in operation<sup>27</sup>.

8.152 As the Airport envisages, following discussions with key airline operators, that over the coming years a greater number of updated and more modern variants of the current types will come into operation at LCY, it is possible that the LCY fleet will contain a greater proportion of these aircraft by 2023. It is therefore relevant to investigate how, with time, the noise contours around LCY may alter as a result of the further introduction of these more modern types as replacements for those aircraft operating currently. This has been done by considering a mix of aircraft with a larger percentage of the more modern aircraft types, equivalent to that used in the Transport Assessment report in the consideration of passenger traffic throughputs undertaken for Transport for London to the limits of the infrastructure proposed. This assumes that there would be a ceiling of 8 larger (Code C) aircraft such as the CS100 that could operate on the ground simultaneously in peak periods compared to 5 assumed in the core With Development forecast.

8.153 The mix of aircraft utilised is set out in Table 8.21.

**Table 8.21- Number and Mix of Annual Aircraft Movements – Further Re-fleeting by 2023**

A/C Type	Further Re-Fleeting by 2023		
	Annual	Summer Period	
A318	1220	305	
ATR 42	4990	1248	
BE40	357	98	
C550	794	218	
C56X	1202	329	
CS100	27168	6792	
DH8D	26613	6653	
E Legacy	45	12	
E170	6653	1663	
E190	40474	10119	
H800XP	1004	275	
Falcon7X	300	82	
Learjet 45	219	60	
<b>Total</b>	<b>111039</b>	<b>27854</b>	

8.154 The  $L_{Aeq,16h}$  average mode noise contour for this mix of aircraft is provided in Figure 8.13 which shows a reduction in size compared to the 2023 With Development case. A further case is presented in Figure 8.14 for this further re-fleeting scenario, this time with aircraft movements shown in Table 8.21 above factored downwards to a total of 96,713 to match the number of aircraft movements predicted in 2023 without the CADP. The associated area, dwelling and population counts are included in Table 8.22, Table 8.23 and Table 8.24 respectively.

<sup>27</sup> Revised Future Aircraft Noise Exposure Estimates for Heathrow Airport, ERCD Report 0705, Civil Aviation Authority, 2007

**Table 8.22- Contour areas (km<sup>2</sup>), L<sub>Aeq,16h</sub> average mode, summer day**

Scenario	Further Re-Fleeting by 2023			
Contour, L <sub>Aeq,16h</sub>	With dev.	With dev.	With dev.	Without dev.
Annual mvts	111k	96.7k	111k	96.7k
57 dB	8.1	7.1	9.1	7.8
63 dB	2.1	1.9	2.4	2.0
69 dB	0.6	0.6	0.7	0.6

**Table 8.23- Approximate number of dwellings in contours (not including permitted developments), L<sub>Aeq,16h</sub> average mode, summer day**

Scenario	Further Re-Fleeting by 2023			
Contour, L <sub>Aeq,16h</sub>	With dev.	With dev.	With dev.	Without dev.
Annual mvts	111k	96.7k	111k	96.7k
57 dB	13,000	10,800	15,100	12,400
63 dB	900	700	1,300	900
69 dB	0	0	0	0

**Table 8.24- Approximate population in contours (not including permitted developments), L<sub>Aeq,16h</sub> average mode, summer day**

Scenario	Further Re-Fleeting by 2023			
Contour, L <sub>Aeq,16h</sub>	With dev.	With dev.	With dev.	Without dev.
Annual mvts	111k	96.7k	111k	96.7k
57 dB	29,100	23,700	34,100	27,800
63 dB	2,200	1,700	2,900	2,100
69 dB	0	0	0	0

8.155 The above tables indicate that the introduction of the quieter aircraft as a result of further re-fleeting over time will bring about a clear reduction in the size of the noise contours as compared to those predicted in 2023 using the Principal Assessment Year aircraft mix, assuming the CADP is in place. The contours are very similar, although slightly larger, than those without the CADP in 2023. This is because of the greater number of aircraft movements assumed to operate with the CADP in place (111,000 as against 96,700 without the CADP in 2023). On a direct comparison basis, assuming the same number of aircraft movements, the noise contours under the CADP assuming further re-fleeting (shown in Figure 8.14) are smaller than those resulting in 2023 without the CADP (shown in Figure 8.8), demonstrating the potential benefits brought about by the proposed infrastructure.

8.156 Annoyance ratings for this scenario are given in Table 8.25.

**Table 8.25- Annoyance, dB L<sub>Aeq,16h</sub> % Highly Annoyed – Further Re-fleeting by 2023**

Noise Contour Band, L <sub>Aeq,16h</sub> dB	% Highly Annoyed	Further Re-fleeting by 2023		2023	
		With dev.	With dev.	With dev.	Without dev.
Annual mvts	-	111k	96.7k	111k	96.7k
54 – 57	6.6%	2,369	2,211	2,831	2,323
57 – 60	11.1%	2,209	1,776	2,564	2,131
60 – 63	18.0%	1,260	1,080	1,458	1,170
63 – 66	28.0%	448	392	588	504
66 – 69	40.7%	244	122	326	122
69 – 72	54.9%	0	0	0	0
72 – 75	68.2%	0	0	0	0

- 8.157 The above table indicates a significant reduction in the number of people likely to be highly annoyed as a result of further re-fleeting by 2023 as compared to in 2023 under the Principal Assessment Year mix, as the more modern mix of aircraft is introduced at LCY with the CADP in place. Based on CAP 725, relative to the entire population within the 54 dB noise contour band without the CADP, there will be an estimated increase of 0.3 % in the number of people highly annoyed with the CADP in place as a result of further re-fleeting by 2023, despite the annual number of aircraft movements being around 15% greater than without the CADP in 2023. Maintaining the aircraft movement totals at those in 2023 Without CADP, the further re-fleeting by 2023 With CADP scenario shows a reduction in those people highly annoyed of around 0.7%.

#### L<sub>den</sub> and L<sub>night</sub> Noise Contours

- 8.158 L<sub>den</sub> and L<sub>night</sub> noise contours for the various year scenarios with and without development are presented in Appendix 8 with associated area, dwelling and population counts presented in Appendix 8.4. These noise contours are produced at five yearly intervals by major airports in the UK to comply with legislation that has emerged from Europe concerning strategic noise mapping and noise action planning. They are not normally used for impact assessment studies but have been included here for completeness.
- 8.159 As a result of operations at London City Airport being limited to essentially daytime hours, the L<sub>den</sub> contours are very similar in size to the equivalent value of L<sub>Aeq,16h</sub> noise contour. This can be seen by comparing data at the 60 dB L<sub>den</sub> contour value (in Appendix 8.4) with the equivalent 60 dB L<sub>Aeq,16h</sub> average mode contour value (in Appendix 8.3). For example, the 60 dB L<sub>den</sub> contour in 2023 with CADP has an area of 4.5 km<sup>2</sup> whereas the equivalent 60 dB L<sub>Aeq,16h</sub> average mode contour is 4.8 km<sup>2</sup>.
- 8.160 Appendix 8.6 presents the annoyance ratings based on an assessment using the L<sub>Aeq,16h</sub> index and also based on emerging research from Europe using the L<sub>den</sub> index. The latter method shows a greater percentage of people (for a given noise level) highly annoyed as a result of air noise which appears to reflect a general trend in attitude towards aircraft noise, recognised in the Aviation Policy Framework, that people appear more annoyed by aircraft noise of a given value than in the past.



- 8.161 Of key relevance at LCY is the change in annoyance expected as a result of the proposed development of the CADP and this remains a function of the difference in population exposed to noise with and without the CADP. The choice of annoyance parameter, while affecting the absolute levels of annoyance, will not affect the percentage change in annoyance between one scenario and another. These changes are evident from the data shown in Table 8.20 and 8.25 above.
- 8.162 The  $L_{\text{night}}$  contours have been included in Appendix 8 for completeness but are very small in size given the only operations that occur during the “night time” (23.00 to 07.00 hours) are those during the 06.30 to 07.00 hours slot.

*Variation in Noise Level during the Day*

- 8.163 The impact of air noise on a community is conventionally assessed having regard to the average mode  $L_{\text{Aeq},16\text{h}}$  noise contours discussed above. Appendices 8.3 and 8.5 provide data on the variation in noise that might be expected over a typical day, both now and in the future, with and without the CADP. Specifically, they include:
- a) Single mode contours produced assuming either 100% westerly operations or 100% easterly operations.
  - b) The variation in noise level at representative locations over a typical day.
- 8.164 The single mode contours represent the noise exposure level that would result on any given day of the specified year, when aircraft are operating on either Runway 09 (in an easterly direction) or on Runway 27 (in a westerly direction). These contours are presented as figures and tabular data showing contour areas, dwelling and population counts in Appendix 8.3.
- 8.165 The variation in noise level expected throughout the day for a given year is presented in Appendix 8.5, for average mode as well as single mode activities. This analysis shows that for the representative receptors listed in Table 8.19, a significant variation in hourly  $L_{\text{Aeq},1\text{h}}$  air noise levels occurs now. This variation is in the range 10 dB throughout the day, with peak noise levels occurring in the morning period from 07.00 to 09.00 hours and in the evening period from 17.00 to 19.00 hours. In the future, as activity increases at the Airport, a similar pattern will arise but with a greater proportion of aircraft operations occurring during these peak hours.

*Schools, Colleges and Hospitals*

- 8.166 In order to consider how the proposed CADP might affect future noise levels for schools, colleges and hospitals, a comparison is made in Table 8.26 between baseline (2012) noise levels and the ‘with’ and ‘without’ development cases for 2019, 2021 and 2023.

**Table 8.26- Air Noise Levels at Schools and Colleges (dB L<sub>Aeq,16h</sub>)**

School / College	Curr.	2017	2019		2021		2023	
	(2012)		With dev.	W/o dev.	With dev.	W/o dev.	With dev.	W/o dev.
Britannia Village Primary School	60	62	62	61	62	61	62	61
Calverton Primary School	49	51	52	51	52	51	52	51
Chestnut Nursery School/Tollgate Primary School	43	45	45	44	45	44	45	44
Culloden Primary School	51	53	53	52	53	52	53	52
Discovery Primary School and Childrens Centre	57	58	58	58	58	58	58	58
Drew Primary School	61	63	63	62	64	63	64	63
Edith Kerrison Nursery School and Childrens Centre/Rosetta Primary School	46	48	48	47	48	47	48	47
Faraday School, Trinity Buoy Wharf	59	60	60	59	60	60	60	60
Gallions Primary School	43	46	46	45	46	45	46	45
Hallsville Primary School	54	56	56	55	56	55	56	55
Hawksmoor Primary School	54	55	55	55	55	55	55	55
Jubilee Primary School	53	54	54	54	54	54	54	54
Langdon Park School	51	53	53	52	53	52	53	52
Leapfrog Day Nursery	53	55	55	54	55	54	55	54
Linton Mead Primary School	49	51	51	50	51	51	51	50
Manorfield Primary School	50	52	52	51	52	51	52	51
My Nursery	54	55	55	55	56	55	56	55
O'Farrells Stage School	49	51	51	50	51	51	51	51
Richard House Children's Hospice	50	52	52	51	52	51	52	51
St Joachim's R.C. Primary School	56	58	58	57	58	58	58	57
St Luke's CEVA Primary and Nursery School	54	56	56	55	56	55	56	55
St Margaret Clitherow RC Primary School	57	58	58	58	59	58	59	58
Thamesmead School of Dance	54	56	56	55	56	55	56	55
The Royal Docks Community School	56	58	58	58	59	58	59	58
Windrush Primary School	55	56	56	56	56	56	56	56
Winsor Primary School	53	55	56	55	56	55	56	55
Woolmore Primary School	53	54	55	54	55	54	55	54
University of East London	63	65	66	65	66	65	66	65
Woolwich Polytechnic for Boys	58	59	59	58	59	59	59	58
Storey Road School	58	60	61	60	61	60	61	60
Woodman Community Centre	60	62	62	61	62	61	62	61

8.167 For most of the schools listed above, noise exposure levels resulting from aircraft will be modest and in keeping with the prevailing ambient noise level. For some, levels will remain unaltered from the baseline situation and for others, a marginal increase of around 1 to 2 dB is predicted in the future. For any given year, with the CADP, no more than a 1 dB increase in noise level is predicted over the Without Development scenario. For those schools and colleges experiencing relatively high levels of noise currently, such as Drew Primary School and the University of East London, these have already been built or insulated to cope with higher noise levels from the Airport.

- 8.168 A recent study undertaken on behalf of the European Commission, the RANCH Study<sup>28,29</sup> concludes there is evidence that schools exposed to high levels of aircraft noise could impair cognitive development in children – specifically reading comprehension, although no impairment of working memory, prospective memory, or sustained attention was found. The largest sample of schools considered in this study were single glazed, in contrast to those located close to the Airport (exposed in the future to moderately high noise levels (63 dB L<sub>Aeq</sub> or more) which are already better sound insulated. Further research is required, the study concludes, to investigate this.
- 8.169 The Government suggestion for protecting schools from aircraft noise is set out in the Aviation Policy Framework. This asserts that schools located in the 63 dB L<sub>Aeq,16h</sub> contour and subject to an increase of 3 dB or more resulting from airport development, should be eligible for treatment under a sound insulation scheme, comparable to grant schemes for households in place at various airports in the UK. At London City Airport, continuing the present policy, sound insulation measures will be offered to any existing eligible schools that lie within the 57 dB L<sub>Aeq,16h</sub> contour.
- 8.170 There are no hospitals located inside the 57 dB L<sub>Aeq,16h</sub> noise contours either now or proposed in the future.
- 8.171 Richard House hospice currently lies just within the boundary of the existing Sound Insulation Scheme and is predicted to experience a 1 dB increase in noise by 2023. This is a new building however and should be well insulated against external noise.

*Land Proposed for Regeneration and Development*

- 8.172 Given the location of the Airport within the Royal Docks, there are a number of proposed sites for regeneration and development in the vicinity. Many of these sites include proposed residential development, as described in Chapter 3: EIA Methodology and listed in Table 8.27 below.
- 8.173 Table 8.27 below sets out current and future air noise levels for locations marking the extent of sites around the Airport that are either within 1 km of the boundary of the Airport runway, comprise 100 or more residential units, are considered as EIA development and for which an ES has been published, or have either already received planning permission or a 'resolution to grant'. Additionally, for the purpose of this noise assessment, those sites that have been allocated in the relevant UDP or emerging LDF Core Strategy are considered. Those which include residential development are highlighted using bold text.

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<sup>28</sup> Clark C, Martin R, van Kempen E, Alfred T, Head J, Davies HW, *et al.* Exposure-effect relations between aircraft and road traffic noise exposure at school and reading comprehension: The RANCH project. *Am J Epidemiol* 2006;163:27-37.

<sup>29</sup> Aircraft and road traffic noise and children's cognition and health: a cross national study'. Stansfeld et al, *The Lancet*, 2005;365:1942-49 (the 'RANCH' study)

**Table 8.27- Air Noise Levels at Land Proposed for Regeneration and Development (dB L<sub>Aeq,16h</sub>)**

Development Scheme Location	Curr.	2017	2019		2021		2023	
	(2012)		With dev.	W/o dev.	With dev.	W/o dev.	With dev.	W/o dev.
<b>Silvertown Quays A</b>	<b>59</b>	<b>61</b>	<b>61</b>	<b>60</b>	<b>61</b>	<b>60</b>	<b>61</b>	<b>60</b>
<b>Silvertown Quays B</b>	<b>67</b>	<b>69</b>	<b>69</b>	<b>68</b>	<b>69</b>	<b>69</b>	<b>69</b>	<b>68</b>
Landmark/Siemens	61	62	62	62	62	62	62	62
North side of Albert Dock A	62	64	65	63	65	64	65	64
North side of Albert Dock B	58	60	61	60	61	60	61	60
Royal Albert Basin A	69	70	70	70	70	70	70	70
Royal Albert Basin B	65	66	66	66	66	66	66	66
King George V Dock A	60	62	62	61	63	62	63	61
King George V Dock B	59	61	61	60	61	61	61	61
<b>Barrier Park East A</b>	<b>54</b>	<b>56</b>	<b>57</b>	<b>56</b>	<b>57</b>	<b>56</b>	<b>57</b>	<b>56</b>
<b>Barrier Park East B</b>	<b>59</b>	<b>61</b>	<b>61</b>	<b>61</b>	<b>62</b>	<b>61</b>	<b>62</b>	<b>61</b>
<b>Minoco Wharf A</b>	<b>53</b>	<b>54</b>	<b>55</b>	<b>54</b>	<b>55</b>	<b>54</b>	<b>55</b>	<b>54</b>
<b>Minoco Wharf B</b>	<b>58</b>	<b>59</b>	<b>60</b>	<b>59</b>	<b>60</b>	<b>59</b>	<b>60</b>	<b>59</b>
Peruvian Wharf A	56	57	58	57	58	57	58	57
Peruvian Wharf B	59	60	60	60	60	60	60	60
Thames Wharf	60	61	61	61	62	61	62	61
<b>Unex Site A</b>	<b>54</b>	<b>56</b>	<b>56</b>	<b>55</b>	<b>56</b>	<b>55</b>	<b>57</b>	<b>55</b>
<b>Unex Site B</b>	<b>59</b>	<b>61</b>	<b>62</b>	<b>61</b>	<b>62</b>	<b>61</b>	<b>62</b>	<b>61</b>
Corniche Floating Village	61	63	63	62	63	62	63	62
<b>Gallions Reach A</b>	<b>61</b>	<b>62</b>	<b>62</b>	<b>61</b>	<b>62</b>	<b>61</b>	<b>62</b>	<b>61</b>
<b>Gallions Reach B</b>	<b>60</b>	<b>61</b>	<b>61</b>	<b>61</b>	<b>61</b>	<b>61</b>	<b>61</b>	<b>61</b>
<b>Tripcock Point A</b>	<b>57</b>	<b>59</b>	<b>58</b>	<b>58</b>	<b>59</b>	<b>58</b>	<b>59</b>	<b>58</b>
<b>Tripcock Point B</b>	<b>60</b>	<b>56</b>	<b>56</b>	<b>56</b>	<b>57</b>	<b>56</b>	<b>57</b>	<b>56</b>
<b>Pumping Station, Tidal Basin</b>	<b>61</b>	<b>61</b>	<b>61</b>	<b>60</b>	<b>61</b>	<b>60</b>	<b>61</b>	<b>60</b>
Royals Business Park Site 2.3	61	63	63	63	64	63	64	63
Royals Business Park Site 2.2	60	63	63	63	64	63	64	63
<b>Tidal Basin</b>	<b>63</b>	<b>61</b>	<b>61</b>	<b>60</b>	<b>61</b>	<b>61</b>	<b>61</b>	<b>61</b>
<b>Great Eastern Quays A</b>	<b>53</b>	<b>65</b>	<b>65</b>	<b>65</b>	<b>66</b>	<b>65</b>	<b>66</b>	<b>65</b>
<b>Great Eastern Quays B</b>	<b>57</b>	<b>55</b>	<b>55</b>	<b>54</b>	<b>55</b>	<b>54</b>	<b>55</b>	<b>54</b>
<b>Leamouth Peninsula North A</b>	<b>53</b>	<b>58</b>	<b>58</b>	<b>57</b>	<b>58</b>	<b>58</b>	<b>58</b>	<b>57</b>
<b>Leamouth Peninsula North B</b>	<b>54</b>	<b>54</b>	<b>54</b>	<b>54</b>	<b>55</b>	<b>54</b>	<b>55</b>	<b>54</b>
<b>Aberfeldy Estate A</b>	<b>53</b>	<b>55</b>	<b>55</b>	<b>54</b>	<b>55</b>	<b>55</b>	<b>55</b>	<b>55</b>
<b>Aberfeldy Estate B</b>	<b>57</b>	<b>54</b>	<b>54</b>	<b>54</b>	<b>55</b>	<b>54</b>	<b>55</b>	<b>54</b>
<b>Blackwall Reach</b>	<b>55</b>	<b>58</b>	<b>58</b>	<b>58</b>	<b>58</b>	<b>58</b>	<b>58</b>	<b>58</b>
<b>Canning Town Area 7 &amp; 1C A</b>	<b>51</b>	<b>52</b>	<b>53</b>	<b>52</b>	<b>53</b>	<b>52</b>	<b>53</b>	<b>52</b>
<b>Canning Town Area 7 &amp; 1C B</b>	<b>53</b>	<b>54</b>	<b>54</b>	<b>54</b>	<b>55</b>	<b>54</b>	<b>55</b>	<b>54</b>
<b>Rathbone Market</b>	<b>49</b>	<b>51</b>	<b>51</b>	<b>50</b>	<b>51</b>	<b>50</b>	<b>51</b>	<b>50</b>
<b>Wood Wharf A</b>	<b>53</b>	<b>54</b>	<b>54</b>	<b>54</b>	<b>55</b>	<b>54</b>	<b>55</b>	<b>54</b>
<b>Wood Wharf B</b>	<b>52</b>	<b>53</b>	<b>53</b>	<b>53</b>	<b>54</b>	<b>53</b>	<b>54</b>	<b>53</b>
<b>New Union wharf</b>	<b>48</b>	<b>50</b>	<b>50</b>	<b>50</b>	<b>51</b>	<b>50</b>	<b>51</b>	<b>50</b>

- 8.174 Reviewing the current noise exposure of the above development sites finds that most of them fall into Noise Exposure Category B (NEC B). For sites that lie in NEC B, PPG 24 states that conditions should be imposed to ensure an adequate level of protection against noise.
- 8.175 The current noise exposure also has parts of two sites falling into Noise Exposure Category C (NEC C), although only Silvertown Quays includes residential development. For sites that lie in NEC C, PPG 24 states that planning permission for housing should not normally be granted but where it is considered permission should be given, for example because there are no quieter sites available, conditions should be imposed to ensure a commensurate level of protection against noise.

- 8.176 In view of the general noise climate found in a city such as London, it is commonplace that residential sites, both existing and new, are exposed to noise levels that would place them in NEC C.
- 8.177 Considering the future noise exposure in 2023, with the proposed CADP, most of the sites remain in the same NEC as they are in currently. However, in some cases, the NEC increases including at some future residential sites. In the case of Barrier Park East, the result is that both locations would fall into NEC B whereas one is currently in NEC A. The same situation occurs for the Unex Site. Given that parts of both these sites were already in NEC B their situation is not significantly altered by the proposed CADP.
- 8.178 For Tripcock Point and Blackwall Reach the sites change from being in NEC A currently to being in NEC B with the proposed CADP in 2023. This means that noise should be taken into account when determining their planning applications and, where appropriate, conditions imposed to ensure an adequate level of protection against noise. Such consideration is likely to be required anyway as both sites also fall in NEC B in 2023 without the proposed CADP.
- 8.179 The other site where there is a potential change in category is Great Eastern Quays where the more exposed location increases, from being within NEC B to the threshold of NEC C by 2023 with the proposed CADP. Without the CADP a slightly smaller increase still occurs leaving part of the site at the top end of NEC B. In either case, the noise on the site implies that conditions should be imposed to ensure a commensurate level of protection against noise and it is noted that extensive noise mitigation measures are included in the proposals for this site.

#### *Outdoor Spaces and Recreational Areas*

- 8.180 The World Health Organisation<sup>30</sup> sets out ideal targets for controlling noise within open spaces and outdoor recreational areas. A daytime target value of 55 dB L<sub>Aeq</sub> is suggested although in practice, in town centres and densely populated residential areas, daytime ambient noise levels will generally be at or above this figure, as is the case around the Airport.
- 8.181 The expected noise level in various open spaces and recreational areas in close proximity to the Airport are set out below in Table 8.28. This shows the airborne aircraft noise levels assessed at selected outdoor spaces and recreational areas for the baseline (2012) situation, and for future years both with and without the proposed CADP. As noted above, most of these areas are currently exposed to levels at or approaching the WHO target value with higher levels for Shipman Road and significantly higher levels for Drew Road.
- 8.182 As discussed above, in the Without Development case noise contours will increase slightly producing slightly higher noise levels for open spaces and outdoor recreational areas in the near vicinity of the Airport. With the proposed CADP, the levels increase slightly further compared to this Without Development case.

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<sup>30</sup> Guidelines for community noise, World Health Organisation -1999

**Table 8.28- Air Noise Levels at Outdoor Spaces and Recreational Areas (dB L<sub>Aeq,16h</sub>)**

Outdoor Space/Recreational Area	Curr. (2012)	2017	2019		2021		2023	
			With dev.	W/o dev.	With dev.	W/o dev.	With dev.	W/o dev.
Drew Road	63	65	66	65	66	65	66	65
Winifred Street	55	57	58	57	58	57	58	57
Fernhill Street	54	56	57	56	57	56	57	56
Albert Road	55	57	57	56	57	56	57	56
Royal Victoria Gardens	54	56	56	55	56	56	56	55
New Beckton Park	52	54	55	54	55	54	55	54
Beckton District Park (Playing Fields)	54	56	57	55	57	56	57	56
Shipman Road	58	59	60	59	60	59	60	59

### Mitigation and Enhancement

8.183 The Airport operates many mitigation measures to ensure that air noise is adequately controlled, and these measures will be retained and implemented, such that in future years the noise is contained within projected forecasts of the proposed CADP presented in this ES. These will involve maintaining the successful measures that are in place today and also those being introduced as a result of the measures set out in the current Section 106 Agreement. These include:

- a) Maintaining restrictions on flights outside the daytime period.
- b) The restriction that all aircraft operating at the Airport must lie within one of the categories or noise limits set out in the Aircraft Categorisation System as agreed with the London Borough of Newham. All such aircraft will meet the ICAO Chapter 4 limits<sup>31</sup>
- c) The continued operation of a Noise Monitoring and Flight Track Keeping System.
- d) Maintaining a public noise complaint handling service.
- e) Maintaining an Airport Consultative Committee
- f) Encouraging aircraft operators to adopt quiet operating procedures and to observe published noise abatement procedures.
- g) Maintaining Preferred Noise Routes.
- h) Maintaining an Approach Glide Slope of 5.5 degrees for all aircraft.
- i) Maintaining and improving (see below) an enhanced two tier Sound Insulation Scheme with an eligibility criterion trigger level of 57 dB L<sub>Aeq,16h</sub>, the lowest daytime limit adopted in the UK. (This is in contrast to the eligibility criterion trigger level of 63 dB L<sub>Aeq,16h</sub> recommended by the Central Government for major airports).
- j) Maintaining a Purchase Offer for properties that lie within the high annoyance contour (69 dB) in line with Government recommendations.

8.184 The Airport will continue to operate its present policies for protecting the environment from the effects of air noise and will seek to improve its policy in light of any new quieter operational

<sup>31</sup> International Civil Aircraft Organisation noise certification requirements for aircraft prototypes certified for airworthiness on or after 1 January 2006 and for re-certification of Chapter 3 aircraft.

techniques to ensure that its development to 2023 and beyond is achieved with the minimum practicable noise impact.

- 8.185 It is recognised that the air noise will increase around the airport over the forthcoming years as air traffic growth continues. This will be the case irrespective of whether the CADP will be built. The sound insulation scheme at LCY offers protection to those eligible residential properties that become exposed to 57 dB  $L_{Aeq,16h}$ . This represents the lowest daytime threshold limit adopted by any airport in the UK for sound insulation treatment. Under the CADP however, in recognition of the fact that air noise emissions will increase slightly, at least in the early years, as compared to Without Development, the sound insulation scheme will be upgraded to offer additional benefits to those most affected by noise from the airport.
- 8.186 The Airport currently operates a sound insulation scheme comprising a two tier system. Residential and Community Buildings become eligible under the scheme, subject to when they were built, when first exposed to air noise at the First Tier Eligibility Criterion of 57 dB  $L_{Aeq,16h}$ . For those most affected, that is those that become exposed to air noise at the Second Tier Eligibility Criterion of 66 dB  $L_{Aeq,16h}$ , they are currently offered improved secondary glazing or a monetary contribution of equivalent value towards high acoustic performance thermal double glazing, together with acoustic ventilation. In practice, for those people who prefer the high performance double glazing option, this means they must pay the remaining contribution. This can lead to a situation where people exposed to relatively high levels of noise are not adequately protected since they do not wish to have secondary glazing and also do not wish to pay the extra money for the high performance double glazing. The Airport will therefore enhance the scheme to offer improved secondary glazing or a 100% contribution towards high performance double glazing, together with acoustic ventilation. This will ensure that all of those most affected by noise are afforded the maximum noise protection opportunity.

#### Residual Effects

- 8.187 Due to the limits on aircraft movements and noise factored movements applicable at the Airport, as well as incorporation of the described noise mitigation measures, there are no residual effects anticipated with regard to air noise over and above those identified above.

#### Air Noise – Summary and Conclusions

- 8.188 An assessment of air noise has been undertaken to appraise conditions both now and in the future, for interim years up to 2023, with and without the proposed CADP. Over this period of time, aircraft movements are expected to increase from the current level of activity of 70,502 annual movements (in 2012) to around 97,000 in 2023 for the Without Development case and 111,000 movements if the CADP proceeds. This latter number of movements corresponds to around 120,000 noise factored movements using the current aircraft noise categorisation system. Accordingly, the number of dwellings and corresponding population exposed to aircraft air noise will rise in the future, with or without the CADP.
- 8.189 By 2023, based on the Principal Assessment Year mix of aircraft, assuming no currently permitted developments are built out (or assuming all are built out), the number of dwellings lying within the 57 dB  $L_{Aeq,16h}$  contour is predicted to increase from 12,400 (25,400) without the

CADP to 15,100 (29,600) with the CADP. The 57 dB contour area also increases from 7.8 km<sup>2</sup> to 9.1 km<sup>2</sup>, an increase of 17%. For the 63 dB L<sub>Aeq,16h</sub> contour, the increase in the dwelling count is from 900 (5,500) to 1,300 (6,700) with a corresponding 20% increase in contour area. No properties lie within the 69 dB L<sub>Aeq,16h</sub> high annoyance noise contour which increases in area by 17% in 2023 if the CADP is built out. On this basis, since no properties lie within the 69 dB contour but a significant number lie within the 63 dB contour in 2023, the impact is envisaged to be **moderate adverse** based on absolute levels of noise with the CADP. A similar impact would result should the CADP not be built.

- 8.190 Comparing the 'with' and 'without' development cases in 2023, there is only a slight increase in noise level resulting from the proposed CADP, generally in the range of 0.5 to 1.0 dB, giving rise to a **negligible** impact when comparing the two scenarios directly and considering the change in impact. A negligible change of this magnitude has no significance.
- 8.191 Irrespective of the small increases in noise level described above, more people will become affected by aircraft noise as a result of increasing activity at the Airport (which is in line with current permitted aircraft movement limits) and due to envisaged continuing development around the area. More people will therefore potentially become annoyed by noise. An estimate of the increase in the number of people likely to be "highly annoyed" as a result of air noise in 2023, should the proposed CADP proceed is 2% when compared to the population within the noise contours for the Without Development case in 2023. This includes the effect of noise on people who lie outside the 57 dB noise contour, within the sensitivity 54 dB contour.
- 8.192 The CADP provides the opportunity for the emerging types of more modern aircraft, such as the Bombardier CS100 and re-engined Embraer 190, to continue to replace the existing similar sized turbofan aircraft operating at LCY. The indications are that these more modern aircraft will be quieter in operation. It is expected that over the coming years, and possibly by 2023, the LCY mix will contain a greater proportion of these aircraft than assumed in the 2023 Principal Assessment Year used in this ES. Under these circumstances, based on a like for like number of aircraft movements, the noise contours are predicted to reduce by 2023 under the CADP as compared to without the CADP. Based on this assumption of further re-fleeting by 2023, the number of people likely to be "highly annoyed" by aircraft noise would reduce compared to in 2023 under the CADP assuming the Principal Assessment Year mix. Relative to 2023 without the CADP and the entire population within the 54 dB noise contour, there will be an estimated increase of 0.3 % in the number of people "highly annoyed" with the CADP in place by 2023, despite the annual number of aircraft movements being around 15% greater. If with further re-fleeting by 2023, a direct comparison is made by maintaining the aircraft movement totals at those in 2023 without the CADP, the 2023 With CADP scenario shows a reduction in those people highly annoyed of around 0.7%.
- 8.193 In broad terms therefore, the Principal Assessment Year mix of aircraft in 2023 is envisaged to give rise to a slight increase in noise, generally in the order of 0.5 to 1.0 dB, as compared to what would result without the CADP, despite there being around 15% more movements at this point in time. If however further re-fleeting occurs in the meantime, even allowing for the expected increase in movements up to 111,000 per annum with the CADP in place, the effect of the aircraft mix means the resulting noise contours are little different to those that would arise without the development in 2023 assuming only 96,700 movements per annum. Comparing the



noise situation should the CADP not proceed on a like with like basis in terms of number of aircraft movements operating per annum, this shows that under the further re-fleeting scenario, the air noise resulting with the CADP in place would be less than if the CADP were not to be built.

- 8.194 For those people close to the Airport, and thus most affected by noise, protection has for most properties already been provided as a result of the Sound Insulation Scheme provided for many years by the Airport. The Airport will continue to operate the Sound Insulation Scheme using the most stringent UK airport daytime trigger limit of 57 dB  $L_{Aeq,16h}$  as a First Tier eligibility criterion, whilst also continuing to apply a Second Tier eligibility criterion offering an enhanced scheme at 66 dB  $L_{Aeq,16h}$  thereby protecting all eligible housing and community buildings that come into these contours. In addition, the Airport will improve the scheme by offering those people most affected by noise, that is, those within the 66 dB  $L_{Aeq,16h}$  contour, improved secondary glazing or a 100% monetary contribution towards high acoustic performance thermal double glazing, together with acoustic ventilation. This will ensure that all of those most affected by noise are afforded the maximum noise protection opportunity.
- 8.195 In addition, the Airport will continue to operate and, where appropriate, seek to improve the various noise mitigation measures in place at the Airport that have successfully ensured that noise effects to the local community have been, and will continue to be, controlled to acceptable levels.
- 8.196 In conclusion, more people will become affected by noise as the airport continues to grow within its permitted limits, irrespective of whether the CADP is built or not. This will give rise to a moderate adverse impact with or without the CADP. The introduction of the CADP, as compared to without it, will give rise to a negligible change in noise level with a corresponding negligible impact. Taken as a whole, it is envisaged that the air noise impacts associated with the CADP will be of a **minor adverse** nature.

## Ground Noise

- 8.197 This section of the report assesses aircraft ground noise levels. Noise generated by aircraft other than in flight or during take-off and landing is termed ground noise. The following aircraft activities are assessed as producing ground noise:-
- a) Engine running on a stand after start-up and prior to shutdown
  - b) Taxiing and manoeuvring on aprons, taxiways and runways
  - c) Aircraft waiting at hold positions on taxiways and runways
  - d) Aircraft operating auxiliary power units (APUs) to power aircraft on stands
  - e) Mobile power units operating to power aircraft on stands
  - f) Engine ground running for test and maintenance purposes
- 8.198 Airport ground noise is heard in the context of off-airport ambient and background noise sources. The most dominant non-aviation related contributor to the noise climate in the residential areas surrounding LCY is road traffic and, to a lesser extent, industrial activity. The DLR along the southern perimeter of the airport also contributes to the ambient noise environment.
- 8.199 The proposed scheme will affect the environment by virtue of noise from altered ground operations of aircraft at LCY. The noise levels generated by future aircraft operations will be similar to those noise levels that are currently generated from ground operations. It is however envisaged that in the future, more of the aircraft operations will be carried out by modern turbo-fan type aircraft which are generally quieter when taxiing and manoeuvring than the turbo-prop aircraft. Therefore, irrespective of whether the development proceeds, the future mix of aircraft will provide slightly quieter noise levels from ground operations of individual aircraft than currently exist.
- 8.200 The principle difference between future ground noise levels under the CADP, as compared to those without the scheme, is the change in the distribution of ground noise around the area and therefore the change in the population that will be exposed to ground noise, resulting in increased ground noise levels for some and decreases for others.
- 8.201 There are elements of noise generated by aircraft on the ground which are excluded from the ground noise assessment. Noise generated by aircraft accelerating at departure (Start of Roll) is included in the air noise contours. Similarly noise generated by aircraft decelerating on the runway (reverse thrust or diking) is also included in the air noise contours. The proposed infrastructure associated with the CADP will significantly reduce noise levels from start of roll and reverse thrust for many residents to the south. This is due to the barrier effect provided by the new pier. Airborne aircraft noise contours do not take into account any benefits provided by barriers or screens and therefore this potential benefit cannot be quantified.

### Ground noise assessment criteria

- 8.202 There is no definitive agreement on the method of assessment of aircraft ground noise. Various methods have been adopted in the past, and these have led to the assessment of ground noise in terms of the equivalent continuous sound level,  $L_{Aeq,T}$ . Various time periods have been used, and in this report consideration has been given to the  $L_{Aeq,16h}$  metric for the daytime period: 0700-2300h. This has been accepted by LBN as an appropriate methodology for previous assessments of ground noise.
- 8.203 The ground noise level assessed at various receptors can be compared to the existing ambient environmental noise and published guidelines for the assessment of environmental noise. The World Health Organisation (WHO)<sup>32</sup> recommends a guideline value of 50 dB  $L_{Aeq,16h}$  to prevent “moderate” community annoyance and 55 dB  $L_{Aeq,16h}$  for “serious” community annoyance. The 55 dB  $L_{Aeq,16h}$  guideline is comparable to the daytime aircraft noise level of 57 dB  $L_{Aeq,16h}$  in the recently withdrawn central government planning policy guidance on noise PPG24. Aircraft noise levels below this PPG24 57 dB  $L_{Aeq,16h}$  level are such that noise need not be considered as a determining factor in granting planning permission for new residential development.
- 8.204 To put these guidance criteria into context over half of the population is exposed to levels which exceed the 55 dB  $L_{Aeq}$  guideline for “serious” community annoyance. This was confirmed by the results of the DEFRA funded 2000/2001 National Noise Incidence Study<sup>33</sup>, as shown in Table 8.29. An update of the National Noise Incidence Survey is currently being carried out (2013).

**Table 8.29- Results of 2000/2001 National Noise Incidence Survey**

Environmental Noise Levels in UK, daytime (dB $L_{Aeq,16h}$ )	Population of UK so exposed (%)
50	90
55	54
60	23
65	9

- 8.205 Based on the above, the following guidelines in Table 8.30 will be used to classify the impact of absolute ground noise levels at representative residential receptors in the surrounding communities.

**Table 8.30- Ground noise impact classification – absolute criteria**

Absolute Ground Noise Criteria, $L_{Aeq,16h}$	Impact classification
<50	Negligible
50 - 55	Minor
55 – 60	Significant - moderate
60 -65	Significant - substantial
>65	Significant - severe

- 8.206 The subjective importance of changes in noise level on people relates to the magnitude of the change. An indication of the importance is given in Table 8.31. This semantic scale used to assess changes in ground noise is based on the guidance available for airborne aircraft noise.

<sup>32</sup> Guidelines for community noise, World Health Organisation -1999

<sup>33</sup> The National Noise Incidence Study 2000/2001, BRE - 2002

**Table 8.31- Subjective importance of changes in noise level**

Change in Level (dB)	Subjective Impression	Impact classification
0 to 2	Imperceptible change	Negligible
2 - 3	Barely perceptible change	Minor
3 to 6	Perceptible change	Significant moderate
6 to 9	Up to a halving or a doubling of loudness	Significant substantial
>9 or more	Equal to or more than a halving or doubling of loudness	Significant very substantial

- 8.207 The true impact will depend on many variables including the level of ambient noise from other sources (road traffic/airborne aircraft/DLR/industry). There will also be a significant variation in individual response to ground noise. It is not currently reasonably practicable to take into account these variables when considering the impact on the nearby communities.

#### Ground noise assessment methodology

- 8.208 Ground noise has been assessed using calculated noise levels using the dB  $L_{Aeq,16h}$  noise parameter during the busy summer daytime period. The contours have been computed using the Datakustik CadnaA environmental noise prediction software model. This software model uses the methodology set out in ISO 9613-2: 1996<sup>34</sup>. Predictions have been based on movements for the average summer day (as for air noise contours), taking account of average mode operations.
- 8.209 Ground noise studies have been undertaken regularly at LCY and are also required to be monitored every three years. The results of these are used to ensure that the noise data input into the CadnaA model are appropriate for the aircraft operating. For future candidate aircraft types, such as the Bombardier CS100 aircraft which is not yet in operation, an estimate has been made based on aircraft types currently in operation at LCY. Available evidence on these future aircraft types indicate lower noise levels than those currently operating at LCY. Therefore the current model which is based on ground noise data for the RJ series of aircraft is assumed to be a worst-case model.
- 8.210 The key assumptions used in the preparation of ground noise contours are set out in Appendix 8 7.
- 8.211 Previous assessments of ground noise at London City Airport have been based around 10 representative receptor positions in the nearby communities. For this study, given the proposed change in airport infrastructure and a consequent re-distribution of ground noise around the locality, a more extensive assessment has been undertaken to investigate the changes likely to occur throughout the communities using a much larger number of receptors and taking account of differing receptor heights. The ground noise model utilises approximately 2,400 receptor points to provide a large representative sample of individual dwellings.

<sup>34</sup> ISO 9613-2: 1996 Acoustics – Attenuation of sound propagation outdoors – Part 2 General method of calculation

### Baseline noise conditions

- 8.212 The ground noise model has been used to predict current baseline noise levels based on the 2012 scenario. The ground noise key receptors can be seen in Figure 8.15. The predicted noise levels at the 10 original “key” receptors are shown below in Table 8.32.

**Table 8.32- Ground noise assessment – baseline levels (2012)**

Assessment location	Predicted noise level dB L <sub>Aeq, 16h</sub>	Impact classification Absolute
A – Drew Road	51	Minor
B – North Side of Royal Albert Dock	60	Significant - substantial
C – Camel Road Flats	52	Minor
D – Parker Street	51	Minor
E – Newland Street	52	Minor
F – Storey Road School	49	Negligible
G – Great Eastern Quays / “Norton Pharmaceutical”	48	Negligible
H – University of East London	57	Significant – moderate
I – Royal Docks Business	59	Significant – moderate
J – Brixham Street	47	Negligible

- 8.213 The absolute baseline ground noise impact varies significantly. For most of the residential receptors to the south of the airport the impact is rated as Negligible to Minor. These predictions are to nominal receptor positions 4 m above local ground height. The baseline noise levels will be higher for receptors such as the 8 storey high Camel and Drew Road flats. Significant to substantial baseline noise impacts are predicted for the worst-case top floor flats who benefit less from the screening provided by the Western Pier/Noise Screen.
- 8.214 The three unscreened receptors to the north of the airport are exposed to higher baseline levels of ground noise. Significant impacts are predicted. These receptor locations are one existing office, one proposed development site and one university receptor location. Receptor B is the reference position on the dock edge next to Building 1000, Newham Council Offices, which will have been designed to mitigate external noise. The Royal Docks Business Park is currently undeveloped. Any development on this site will need to be designed to mitigate against aircraft noise. The University of East London was required by planning condition to provide adequate protection against aircraft noise.
- 8.215 As noted above the ten key receptors only provide a snapshot of the overall ground noise impact in the area. Table 8.33 presents the noise impact over the full set of 2390 receptors.

**Table 8.33- Ground noise assessment – baseline conditions**

Impact classification absolute	No. of receptors	% of receptors
Negligible	1643	68.7 %
Minor	495	20.7 %
Significant - moderate	202	8.5 %
Significant - substantial	49	2.1 %
Significant - severe	1	0.0 %

- 8.216 The small 2.1% of receptors currently exposed to substantial levels of baseline ground noise are those on the upper storeys of the tower blocks close to the airport and those in the University of East London halls of residence.

### Ground noise assessment

8.217 In addition to the baseline model, ground noise predictions have been carried out for a number of future scenarios. As well as the baseline scenario contours, shown in Figure 8.16, contours are shown in Figures 8.17 to 8.22 for the following future scenario:

- a) 2019 without development
- b) 2019 transitional assessment year with interim phase of CADP development built (i.e. 3 no. additional stands and extension to noise barrier)
- c) 2021 without development
- d) 2021 design year with full CADP development
- e) 2023 without development
- f) 2023 principal assessment year with full CADP development.

8.218 The following section firstly discusses the 2019 Stage 1 scenarios with and without development and then goes on to consider year 2023, with and without the proposed development. A detailed assessment of all cases can be found in Appendix 8.8.

#### *2019 – Stage 1 - With and Without Development*

8.219 An assessment of the ground noise impact for the 2019 scenarios is shown in Table 8.34.

**Table 8.34- Ground noise assessment – 2019 scenario**

Assessment location	2019 No development	2019 With development	Change	Impact classification Relative
A – Drew Road	51.5	52.2	0.7	Negligible
B – North Side of Royal Albert Dock	60.2	60.6	0.4	Negligible
C – Camel Road Flats	52.4	52.9	0.5	Negligible
D – Parker Street	51.4	51	-0.4	Negligible
E – Newland Street	52	54	2	Adverse Minor
F – Storey Road School	48.9	49.1	0.2	Negligible
G – Great Eastern Quays / “Norton Pharmaceutical”	48.5	48.2	-0.3	Negligible
H – University of East London	57.1	56.8	-0.3	Negligible
I – Royal Docks Business	58.9	60.4	1.5	Negligible
J – Brixham Street	46.8	49.1	2.3	Adverse Minor

8.220 For all of the above ten key receptors the proposed interim phase of the CADP development results in no significant change in ground noise. Both reductions and increases in ground noise are calculated. There are more increases than reductions although increases are generally small.

8.221 Table 8.35 presents an assessment of the 2390 receptors in terms of the impact arising from the absolute level of noise. The levels are comparable to the baseline scenario. Table 8.36 presents the same assessment in terms of percentages of all the ground noise receptors.

**Table 8.35- Ground noise assessment – 2019 absolute criteria**

Impact classification absolute	No. of receptors 2019 no development	No. of receptors 2019 with development	Change
Negligible	1613	1480	-133
Minor	511	596	85
Significant - moderate	207	253	46
Significant - substantial	58	60	2
Significant - severe	1	1	0

**Table 8.36- Ground noise % of receptors impacted – 2019 scenario absolute criteria**

Impact classification absolute	% of receptors 2019 no development	% of receptors 2019 with development	Change
Negligible	67.5%	61.9%	-5.6%
Minor	21.4%	24.9%	3.6%
Significant - moderate	8.7%	10.6%	1.9%
Significant - substantial	2.4%	2.5%	0.1%
Significant - severe	0.0%	0.0%	0.0%

- 8.222 The detailed assessment demonstrates that in 2019, with the Phase 1 development, an additional 46 receptors will be exposed to a significant moderate absolute level of ground noise with 2 additional receptors experiencing a significant substantial absolute level as compared to the no development scenario.
- 8.223 The impact of the CADP development can also be assessed by considering the change in daytime ground noise. Table 8.37 presents a summary of the changes in ground noise level. The table below presents the number of receptors exposed to various changes in ground noise. For example 510 or 21% of the 2490 receptors are predicted to be exposed to a negligible reduction in noise of up to 2dB.

**Table 8.37- Ground noise assessment – 2019 scenario relative criteria**

Impact classification absolute	No. of receptors	% of receptors Change
Significant very substantial beneficial	0	0.00%
Significant substantial beneficial	0	0.00%
Significant moderate beneficial	0	0.00%
Minor beneficial	0	0.00%
Negligible beneficial	510	21.34%
Negligible adverse	1592	66.61%
Minor adverse	218	9.12%
Significant moderate adverse	70	2.93%
Significant substantial adverse	0	0.00%
Significant very substantial adverse	0	0.00%

- 8.224 The above assessment demonstrates that the proposed development will result in both beneficial and adverse impacts. The bulk (97%) of the receptors will be exposed to a negligible or minor decrease or increase in ground noise.
- 8.225 A small number, around 70 (or 3%) of the receptor locations will be adversely affected by a significant increase in ground noise. These are generally located in the residential area close to the eastern end of the proposed interim apron extension. Use of the 3 additional stands will

result in increases at these locations. Despite this significant increase in noise, the absolute levels of noise at these locations will be low.

8.226 For the 2019 scenario absolute levels of ground noise are generally low and the impact is comparable to baseline levels. For the baseline scenario 252 or 11% of the receptors are exposed to ground noise levels in excess of 55 dB  $L_{Aeq, 16h}$ . This is a significant level of ground noise. A very similar number, 314 or 13% of the receptors will be exposed to significant levels of noise in excess of 55 dB  $L_{Aeq, 16h}$  for the 2019 with the CADP development scenario.

8.227 The overall ground noise impact of the 2019 Phase 1 development has been assessed as **negligible to minor adverse** with a small number of properties exposed to significant adverse increases in ground noise.

#### *2023 – With and Without Full Development*

8.228 An assessment of the ground noise impact for the 2023 scenarios is presented below. Table 8.38 presents an assessment for the 10 key receptors for 2023.

**Table 8.38- Ground noise assessment –2023 scenario**

Assessment location	2023 No development	2023 With development	Change	Impact classification Relative
A – Drew Road	51.6	52.0	0.4	Negligible
B – North Side of Royal Albert Dock	60.3	60.5	0.2	Negligible
C – Camel Road Flats	52.5	53.2	0.7	Negligible
D – Parker Street	51.4	51.9	0.5	Negligible
E – Newland Street	52.1	47.9	-4.2	Beneficial Significant Moderate
F – Storey Road School	48.9	50.7	1.8	Negligible
G – Great Eastern Quays / “Norton Pharmaceutical”	48.6	49.9	1.3	Negligible
H – University of East London	57.1	58.3	1.2	Negligible
I – Royal Docks Business	59	61	2.0	Adverse Minor
J – Brixham Street	46.9	50.8	3.9	Adverse Significant Moderate

8.229 For most of the above ten key receptors the proposed development results in no significant change in ground noise. Both reductions and increases in ground noise are calculated. There are more increases than reductions although increases are generally small. Two receptors are exposed to significant changes in ground noise level. The Newland Street receptor will be exposed to a significant reduction in ground noise. This is due to the increased noise screening provided by the development. The Brixham Street receptor will be exposed to a significant increase in ground noise. This is due to the closer proximity of this site to the new aircraft stands for the with development case.

8.230 Table 8.39 presents an assessment of the 2390 receptors in terms of the impact arising from the absolute level of noise. The levels are comparable to the baseline scenario. Table 8.40 presents the same assessment in terms of percentages of all the ground noise receptors.



**Table 8.39- Ground noise assessment – 2023 absolute criteria**

Impact classification absolute	No. of receptors 2023 no development	No. of receptors 2023 with development	Change
Negligible	1605	1425	-180
Minor	514	610	96
Significant - moderate	212	257	45
Significant - substantial	58	97	39
Significant - severe	1	1	0

**Table 8.40- Ground noise % of receptors impacted – 2023 scenario absolute criteria**

Impact classification absolute	% of receptors 2023 no development	% of receptors 2023 with development	Change
Negligible	67.2%	59.6%	-7.5%
Minor	21.5%	25.5%	4.0%
Significant - moderate	8.9%	10.8%	1.9%
Significant - substantial	2.4%	4.1%	1.6%
Significant - severe	0.0%	0.0%	0.0%

8.231 The detailed assessment demonstrates that in 2023, with the development complete, around an additional 45 receptors will be exposed to a significant moderate absolute level of ground noise with around 39 additional receptors experiencing a significant substantial absolute level as compared to the no development scenario.

8.232 The impact of the development can also be assessed by considering the change in daytime noise. Table 8.41 presents a summary of the changes in ground noise level.

**Table 8.41- Ground noise assessment – 2023 scenario relative criteria**

Impact classification absolute	No. of receptors	% of receptors Change
Significant very substantial beneficial	0	0.00%
Significant substantial beneficial	29	1.21%
Significant moderate beneficial	117	4.90%
Minor beneficial	116	4.85%
Negligible beneficial	420	17.57%
Negligible adverse	1012	42.34%
Minor adverse	487	20.38%
Significant moderate adverse	207	8.66%
Significant substantial adverse	2	0.08%
Significant very substantial adverse	0	0.00%

8.233 The above assessment demonstrates that the proposed development will result in both beneficial and adverse impacts. The bulk (85%) of the receptors will be exposed to a negligible or minor decrease or increase in ground noise.

8.234 146 (or 6%) of the receptor locations will benefit from a significant reduction in ground noise levels. These are generally located in the North Silvertown residential area close to the airport Terminal. This area will benefit as a result of the substantial noise barrier provided by the terminal extension.

8.235 A similar number, 209 (or 9%) of the receptor locations will be adversely affected by a significant increase in ground noise. These are generally located in the North Woolwich

residential area close to the eastern end of the proposed apron extension. Use of the additional stands will result in increases at these locations. Despite this significant increase in noise, the absolute levels of noise at these locations will be low.

- 8.236 For the 2023 scenario with CADP absolute levels of ground noise are generally low and the impact is comparable to without CADP. For the with CADP scenario 355 or 14% of the receptors are exposed to levels of ground noise in excess of 55 dB  $L_{Aeq,16h}$ , a significant level of ground noise. A similar number, 271 or 11% of the receptors will be exposed to significant levels of noise for the 2023 without CADP development scenario.
- 8.237 The overall ground noise impact of the development has been assessed as negligible to minor adverse with a small number of properties exposed to significant adverse increases in ground noise.
- 8.238 There are various mitigation measures to reduce the ground noise impact, both existing and proposed. These are discussed below.

#### Mitigation Measures

- 8.239 The Airport has developed and implemented measures to ensure that ground operations are carried out as quietly as practicable to minimise impact. These measures are proven and well understood: either they have/will be secured by planning obligation or condition or they form an integral part of the CADP design. Therefore these measures have already been included in the ground noise assessment.
- 8.240 These include:
- a) The substantial height 16m of the terminal extension will act as a noise barrier reducing ground noise levels to those closest to the existing eastern apron stands where there is an 8m noise screen currently.
  - b) The new pier structure provides a substantial reduction in ground noise to protect the nearest dwellings to the south of the airport from the effects of ground noise.
  - c) Encouraging the minimum use of reverse thrust on landing, consistent with safety constraints.
  - d) Except in emergencies, engine testing will be (as now) restricted to areas designated for that purpose.
  - e) Maintaining a noise limit for policing the level of high powered ground runs for engine testing and maintenance purposes.
  - f) Limiting engine test and maintenance activities to those associated with engine rectification, rather than routine testing.
  - g) Limiting the use of APUs to no more than 10 minutes prior to departure and 10 minutes after landing.
  - h) Providing fixed ground power to apron stands to minimise the use of mobile units or APUs.
- 8.241 The ground noise assessment has demonstrated that, both now and in the future, some areas around the airport are exposed to significant adverse impacts due to ground noise. These are generally unscreened locations north of the docks (Building 1000 and UEL buildings) and houses and flats close to the eastern end of the proposed apron extension. These buildings will have already been soundproofed to control aircraft noise levels. Houses and flats that are close

enough to the airport to experience significant levels of ground noise should have already been treated under the airport's sound insulation scheme. There may be some isolated properties which have refused sound proofing works and still have single glazed windows. As per current practice the airport will offer sound proofing works to these properties above and beyond current planning obligations. Newly constructed dwellings require double glazed windows to comply with Building Regulations irrespective of any noise related planning conditions. The more recent university and office buildings will have incorporated adequate sound insulation measures as required by planning condition to meet local standards.

#### Residual impacts

- 8.242 The overall ground noise impact of the development has been assessed as negligible to minor adverse with a small number of properties exposed to significant adverse increase in ground noise. Many of the mitigation measures forming the design of the CADP had already been taken into account when assessing the impact. The receptors exposed to significant adverse impacts due to an increase in ground noise will have been provided with sound proofing either from the airport or as required by planning condition.
- 8.243 The residual ground noise impact is therefore assessed as **negligible to minor adverse**.

#### Ground Noise – Summary and Conclusions

- 8.244 The ground noise assessment has been carried out using a noise prediction model. This uses proprietary software, Datakustik CadnaA. The software creates noise maps using the methodology set out in ISO 9613-2: 1996<sup>35</sup>. The noise modelling software has been used to create a ground noise model which utilises approximately 2,400 receptor points to provide a large representative sample of the nearby communities.
- 8.245 No universally agreed criteria are available for the assessment of aircraft ground noise. The ground noise impact has been tested using standard environmental noise criteria. These criteria have been used previously at London City Airport. The assessment tests the ground noise impact both in terms of absolute level of ground noise and the change in ground noise level.
- 8.246 Baseline conditions vary for the noise sensitive receptors close to the airport. The majority, 89%, of receptors are currently exposed to negligible or minor noise impacts. A small proportion, 11%, is currently exposed to significant levels of ground noise. Noise sensitive receptors around the airport comprise both recently constructed buildings and those constructed long before the airport was operational. Nearby receptors will have either been offered mitigation works through the Sound Insulation Scheme or have been required to incorporate adequate sound insulation measures as required by planning condition to meet local standards.
- 8.247 The CADP works will change the ground noise levels around the airport. A reduction in ground noise is predicted at some receptors. An increase is predicted at others. For the with CADP

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<sup>35</sup> ISO 9613-2:1996 Acoustics - Attenuation of sound during propagation outdoors -- Part 2: General method of calculation.

scenario, 355 or 14% of the receptors are exposed to levels of ground noise in excess of 55 dB L<sub>Aeq,16h</sub>, a significant level of ground noise. A similar number, 271 or 11% of the receptors will be exposed to significant levels of noise for the 2023 without CADP development scenario.

- 8.248 The assessment includes operational mitigation measures such as APU running time restrictions. The assessment also includes physical mitigation measures such as the substantial noise barriers and terminal buildings.
- 8.249 Proposed major developments around the airport will not significantly change the cumulative level of ground noise at the receptors. The Land to the North of Albert Dock development has the potential to result in reductions in aircraft ground noise for the residential properties in Beckton. The buildings on this development will act as local noise barriers. Any reductions will however be small.
- 8.250 The residual ground noise impact has been assessed as **negligible to minor adverse**.

## Road Traffic Noise

- 8.251 No increase in aircraft movements over that permitted by the 2009 planning consent will occur under the proposed CADP, although the modernisation of the fleet is expected to bring larger aircraft and, as a result, the potential for more passengers and associated road traffic, as set out in Chapter 7 (Socio-economics) and Chapter 11: Traffic and Transport. The CADP will therefore affect the environment by virtue of noise from road traffic derived from a greater number of staff and passengers using the Airport in 2023.
- 8.252 The environmental assessment of future road traffic noise is set out below using traffic data provided by Vectos and reported in Chapter 11 and the full Transport Assessment (Appendix 11.1). Surface access improvements as part of the CADP include opening up the access road between the Airport and Woolwich Manor Way to the east. The Airport would therefore be accessible from both the east and west. Access is currently restricted to the western entrance from Hartmann Road only. Therefore, although there will be an increase in staff and passenger journeys to the Airport, this will be distributed via both entrances, thereby reducing the Airport related traffic on some surrounding roads.

### Road traffic noise assessment criteria

- 8.253 The criteria used in the analysis here takes into account the objective guidance given in the recently withdrawn PPG 24<sup>36</sup> which relied upon noise criteria within the Noise Insulation Regulations 1975<sup>37</sup> (as amended 1988)<sup>38</sup>. Environmental impact assessment criteria have also been taken from the current noise chapter of the Design Manual for Roads and Bridges<sup>39</sup>.
- 8.254 A summary of the PPG 24 guidance regarding daytime road traffic noise is given in Table 8.42 below. The guidance given in PPG 24 has historically been considered by local authorities in

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<sup>36</sup> Department of the Environment, Transport and the Regions, September 1994, Planning Policy Guidance PPG24: Planning and Noise,

<sup>37</sup> SI 1975 No 1763, Building and buildings – The Noise Insulation Regulations 1975

<sup>38</sup> SI 1998 No 2000, Building and buildings – The Noise Insulation (Amendment) Regulations 1988

<sup>39</sup> Department for Transport, Design Manual for Roads and Bridges, Part 7, HD 213/11 Revision 1 2011

actions and decisions relating to planning applications for dwellings near roads. In the absence of comparable up to date objective planning guidance, this withdrawn guidance is still used by local authorities to assess environmental noise levels.

**Table 8.42- PPG24 Guidance with regard to road traffic noise (daytime)**

<b>L<sub>Aeq,16h</sub> dB</b>	<b>Guidance/Experience with regard to road traffic noise (daytime)</b>
< 55	Noise need not be considered as a determining factor in granting planning permission, although the noise level at the high end of the category should not be regarded as a desirable level. PPG 24 Category A.
55 – 63	Noise should be taken into account when determining planning applications and, where appropriate, conditions imposed to ensure an adequate level of protection against noise. PPG 24 Category B.
63 – 72	Planning permission for housing should not normally be granted. Where it is considered that planning permission should be given, for example because there are no alternative quieter sites available, conditions should be imposed to ensure a commensurate level of protection against noise. PPG 24 Category C.
> 72	Planning permission for housing should normally be refused. PPG 24 Category D.

8.255 The PPG24 guidance uses noise measured in terms of L<sub>Aeq,16h</sub> to assess the noise situation. For road traffic noise, using guidance from the Noise Insulation Regulations, the trigger level for introducing a noise insulation scheme is expressed as a façade level of 68 dB L<sub>A10,18h</sub>. A correction of -3 dB(A) is applied to convert from the façade level to a free-field level, and a further correction of -2 dB(A) approximately converts from the L<sub>A10,18h</sub> to the L<sub>Aeq,16h</sub> metric. The resulting level of 63 dB L<sub>Aeq,16h</sub> is therefore taken to be the upper limit of PPG 24 Category B.

8.256 Based on the above, the absolute criteria given in Table 8.43 have been adopted for use in this assessment:

**Table 8.43- Daytime road traffic absolute impact assessment criteria**

<b>Absolute noise levels at Façade, L<sub>A10,18h</sub></b>	<b>Impact classification (absolute)</b>
≤ 60 dB L <sub>A10,18h</sub>	Minor
61 – 68 L <sub>A10,18h</sub>	Significant moderate
> 68 dB L <sub>A10,18h</sub>	Significant substantial

8.257 The subjective importance of changes in the road traffic noise level on people relates to the magnitude of the change and, to some extent, when it occurs. An indication of the importance is given in Table 8.44 and Table 8.45 for road traffic noise, derived from an interpretation of change criteria from the Department of Transport Design Manual for Roads and Bridges. The importance depends on whether the change occurs all of a sudden, or gradually.

**Table 8.44- Classification of magnitude of road noise impacts in the short term**

<b>Noise change dB L<sub>A10,18h</sub></b>	<b>Magnitude of Impact</b>
0	No change
0.1 – 0.9	Negligible
1.0 – 2.9	Significant minor
3.0 – 4.9	Significant moderate
≥ 5.0	Significant major

**Table 8.45- Classification of magnitude of noise impacts in the long term**

Noise change dB $L_{A10,18h}$	Magnitude of Impact
0	No change
0.1 – 2.9	Negligible
3.0 – 4.9	Significant minor
5.0 – 9.9	Significant moderate
$\geq 10$	Significant major

#### Road Traffic Noise Assessment Methodology

- 8.258 The assessment of road traffic noise has been undertaken using the calculation method given in the Department of Transport Calculation of Road Traffic Noise publication (CRTN)<sup>40</sup>. The details of the input data and assumptions utilised in this assessment are provided in Appendix 8.9.
- 8.259 Predictions of road traffic noise have been undertaken for the current conditions to assess the baseline against which to judge future road traffic noise levels with and without the development in 2023 when the passenger throughput is expected to be at its maximum. Future road traffic forecast methodology takes account of traffic from both permitted developments and planned but not yet permitted development. A traffic growth factor has also been applied to take account of developments within the wider area which also do not yet have planning permission. The traffic forecast methodology is outlined fully in Chapter 11.

#### Baseline and Future Road Traffic Noise Conditions

- 8.260 Table 8.46 shows the predicted road traffic noise levels at selected receptors along the roads which have been assessed. For each road assessed the  $L_{A10,18h}$  noise level has been calculated at a distance of 10 m and at the worst affected property or properties. The distance to the nearside kerb has been presented. Figure 8.23 indicates the locations of the noise sensitive receptors.

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<sup>40</sup> Department of Transport Welsh Office HMSO, 1988, Calculation of Road Traffic Noise.

**Table 8.46- Predicted road traffic noise levels (free-field)**

Assessment location	Distance to nearside kerb (m)	Daytime noise level, dB L <sub>A10,18h</sub>			Diff. dB	Long term impact
		2011 Baseline	2023 Without dev.	2023 With dev.		
Connaught Bridge	10	72.1	73.6	73.9	+0.3	Neg.
Connaught Bridge PH (A)	16	70.5	72.1	72.3	+0.2	Neg.
Hartman Road	10	67.4	68.5	67.6	-0.9	Neg.
2 Camel Road (B)	14	66.3	67.4	66.5	-0.9	Neg.
Connaught Road	10	65.8	67.8	67.0	-0.8	Neg.
Connaught Road (C)	4	68.3	70.3	69.5	-0.8	Neg.
Royal Albert Way East	10	72.0	73.8	73.1	-0.7	Neg.
Royal Albert Way East (D1)	28	68.3	70.2	69.5	-0.7	Neg.
Royal Albert Way East (D2)	33	67.7	69.5	68.8	-0.7	Neg.
Royal Albert Way West	10	72.2	73.9	73.3	-0.6	Neg.
Royal Albert Way West (E)	40	67.1	68.9	68.3	-0.6	Neg.
Woolwich Manor Way	10	68.6	69.4	71.0	1.6	Neg.
Woolwich Manor Way (F1)	11	68.2	69.1	70.7	1.6	Neg.
Woolwich Manor Way (F2)	15	67.2	68.1	69.7	1.6	Neg.
29 Woodman St (G)	26	N/A	N/A	60.5	≥ 10	Major

- 8.261 For the relatively few properties that are located within 10 metres of local roads around the airport, the absolute noise levels are currently sufficiently high as to give rise to a substantial impact. However, most properties are located farther back from the roads than 10 metres, where road traffic noise levels are lower with correspondingly less impact. Also, a proportion of those properties will have received treatment under the airport's Sound Insulation Scheme.
- 8.262 In 2023, with the exception of properties on Woodman Street, changes in road traffic noise are predicted to generate a change of less than 1.6 dB, giving rise to a **minor adverse** impact when considered in the short term, and a **negligible** adverse impact over the long term.
- 8.263 Some areas considered in this assessment will see a reduction in traffic noise as a result of the proposed development of up to 0.9 dB due to a reduction of traffic forecast to the west of the airport. This is a result of the easterly access road being opened up taking traffic away from roads to the west.
- 8.264 Properties on Woodman Street, which is the closest residential area to this access road, will however be exposed to a new traffic source. Properties west of Woodman Street will benefit from the purpose built noise barrier created for the Docklands Light Railway (DLR). Properties at the eastern end of Woodman Street in contrast will have a direct line of sight to the new access road.
- 8.265 These properties on Woodman Street are within the airport's Sound Insulation Scheme, and should therefore have the benefit of treatment under the airport's sound insulation scheme. As the eastern access road is not currently used, once it is opened under the CADP, it will give rise to a substantial increase in road traffic noise for these few properties at the eastern end of Woodman Street. The absolute levels of road traffic noise however are low, typically around 60 dB L<sub>A10,18h</sub> and not significant,.

#### Mitigation and enhancement

- 8.266 No specific additional mitigation measures are required to address the minor increases in road traffic. In practice, any properties treated under the Airport's existing Sound Insulation Scheme that lie close to major roads around the airport site will benefit from protection from traffic noise in addition to aircraft noise.
- 8.267 For Hartmann Road, the existing noise barrier erected along the southern edge of the road provides some protection to nearby residential properties in the Camel Road area.
- 8.268 For many properties that lie close to the eastern access road, the presence of the DLR infrastructure provides a useful noise barrier against the effects of road traffic along this newly opened road associated with the CADP.

#### Residual effects

- 8.269 With the exception of the properties at the eastern end of Woodman Street, no significant adverse noise impact is predicted. The properties in Woodman Street will only be exposed to a minor absolute level of road traffic noise and will have qualified for noise protection treatment under the airport's Sound Insulation Scheme.

#### Road Traffic Noise – Summary and Conclusions

- 8.270 The road traffic noise assessment has been carried out using predictions adopting the official Department of Transport Calculation of Road Traffic Noise method (CRTN). Predictions have been carried out to a number of representative noise sensitive receptors.
- 8.271 The impact has been tested using standard road traffic noise assessment criteria. The assessment tests the impact both in terms of absolute level of road traffic noise and the change in road traffic noise.
- 8.272 For the relatively few properties that are located within 10 metres of local roads, the absolute noise levels are currently sufficiently high as to give rise to a substantial impact. Most properties are located further back from the roads than 10 metres, where road traffic noise levels are lower with correspondingly less impact.
- 8.273 The CADP works will change slightly the road traffic noise levels around the airport. A reduction in road traffic noise is predicted at some receptors. An increase is predicted at others. With the exception of properties on Woodman Street, changes in road traffic flow are predicted to generate a change of less than 1.6 dB. This is a minor adverse impact when considered in the short term, and a negligible adverse impact over the long term.
- 8.274 Properties at the eastern end of Woodman Street, which is the closest residential area to the new access road, will be exposed to a major increase in road traffic noise. The absolute level of road traffic noise is however low and the absolute impact rated as minor.
- 8.275 The residual road traffic noise impact has been assessed as negligible adverse.



## Construction Noise and Vibration

- 8.276 The construction of the CADP infrastructure, which is proposed to occur intermittently over a significant period of time, will give rise to noise and vibration levels that have the potential to cause disturbance to the local communities around the airport, particularly during the night when some of the works will take place.
- 8.277 Relatively recent infrastructure works at the Airport, undertaken as part of its 2003 consented Operational Improvements Programme (OIP), provide a useful benchmark for the likelihood of adverse noise effects and associated complaints. These OIP works comprised the construction of the eastern apron extension (stands 21-24) with associated link to the runway, extension of the pier/noise mitigation barrier, and construction of the Runway Hold 27. These construction projects involved the production of noise and vibration levels at night which, with appropriate mitigation, were adequately controlled with minimal complaint. The night time piling works for the runway 27 hold position (in 2003) resulted in 3 complaints to the Airport regarding construction noise, and the eastern apron extension (in 2007-8) resulted in 5 complaints to the Airport.
- 8.278 This section considers the construction works required to construct the infrastructure for the CADP (as detailed in Chapter 6 of this ES) and sets out predictions of noise and vibration levels likely to arise, together with the measures proposed to mitigate their effects.

### Construction noise assessment criteria

- 8.279 The assessment method used to determine levels of construction noise expected from each phase of development is BS 5288-1: 2009<sup>41</sup>.
- 8.280 There are no universally recognised or mandatory UK standards or guidelines that set out limits for construction noise. Therefore it is common practice to draw upon guidelines adopted by local authorities and noise limits used on other major developments involving significant long term construction activities such as Channel Tunnel Rail Link, Cross Rail and Thameslink 2000. BS 5228:2009 also provides some guidance on noise limits.
- 8.281 At London City Airport, recent infrastructure works have been controlled by noise limits agreed with the LBN, which are set out in the 2009 Section 106 Agreement (Ninth Schedule Part 2) relating to the then remaining works associated with the operational improvements which were originally permitted in 2003. The construction noise limits vary according to whether the receiving dwelling has been treated under the airport's sound insulation scheme (SIS). These noise limits are given in Table 8.47 and Table 8.48.

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<sup>41</sup> BS 5228-1: 2009 Code of practice for noise and vibration control on open sites – Part 1: Noise

**Table 8.47- Limits at the façade of any residential property (NO TREATMENT under SIS)**

Period		Hours	Construction Noise Limit, dB $L_{Aeq,T}$	Time Period, T
Daytime	Monday – Friday	08.00 – 18.00	75	10 h
		18.00 – 23.00	55	1 h
	Saturday	08.00 – 13.00	75	5 h
	Saturday	13.00 – 23.00	55	1 h
	Sunday	08.00 – 23.00	55	1 h
Night-time	Any day	23.00 – 08.00	55	15 min

**Table 8.48- Limits at the façade of any residential property (TREATED under SIS)**

Period		Hours	Construction Noise Limit, dB $L_{Aeq,T}$	Time Period, T
Daytime	Monday – Friday	08.00 – 18.00	75	10 h
		18.00 – 23.00	65	1 h
	Saturday	08.00 – 13.00	75	5 h
	Saturday	13.00 – 23.00	65	1 h
	Sunday	08.00 – 23.00	65	1 h
Night-time	Any day	23.00 – 08.00	65	15 min

- 8.282 For the purpose of this assessment, the above construction noise criteria have been adopted as the threshold for a significant ‘moderate’ impact and in order to rate the likely effects of the CADP construction works.
- 8.283 Noise levels due to construction have also been assessed using the methods and significance criteria given in Annex E of BS 5228-1:2009. For guidance, this standard sets out both fixed noise limits (of the type set out in the Section 106 Agreement) and also change related criteria, that take account of the underlying ambient noise levels in the absence of construction noise. For the critical night-time period, the ambient noise level (from baseline noise monitoring results, see Table 8.6) around LCY typically lies above 45 dB  $L_{Aeq,8h}$  during the night. On this basis, under BS 5228, a threshold noise limit of 55 dB would be applicable, consistent with what has been adopted in this assessment for any residential property with no treatment under the airport’s sound insulation scheme.
- 8.284 The noise impact is assessed at a number of “worst-case” receptors closest to the construction activities. These properties will have already been offered treatment under the airport’s sound insulation scheme. The significance magnitude classification for assessing construction noise is set out in Table 8.49.

**Table 8.49- Construction noise – significance magnitude classification**

Period	Noise level	Classification
Daytime Monday to Friday 08.00 - 18.00 Saturday - 08.00 – 13.00	≥ 85 dB L <sub>Aeq, 10/5h</sub>	Significant substantial - adverse
	≥ 75 dB L <sub>Aeq, 10/5h</sub>	Significant Moderate <sup>(1)</sup> – adverse
	≥ 65 dB L <sub>Aeq, 10/5h</sub>	Minor – adverse
	<65 dB L <sub>Aeq, 10/5h</sub>	Negligible – adverse
Evening Monday to Friday 18.00-23.00 Saturday 13.00 - 23.00 Sunday 08.00 23.00	≥ 75 dB L <sub>Aeq, 1h</sub>	Significant substantial - adverse
	≥ 65 dB L <sub>Aeq, 1h</sub>	Significant Moderate <sup>(1)</sup> – adverse
	≥ 55 dB L <sub>Aeq, 1h</sub>	Minor – adverse
	<55 dB L <sub>Aeq, 1h</sub>	Negligible – adverse
Night 23.00 – 08.00	≥ 75 dB L <sub>Aeq, 15min</sub>	Significant substantial - adverse
	≥ 65 dB L <sub>Aeq, 15min</sub>	Significant Moderate <sup>(1)</sup> – adverse
	≥ 55 dB L <sub>Aeq, 15min</sub>	Minor – adverse
	<55 dB L <sub>Aeq, 15min</sub>	Negligible – adverse

Note - If the threshold for moderate magnitude classification is exceeded for a period of 10 or more days of working in any fifteen consecutive days or for a total number of days exceeding 40 in any 6 month period the magnitude classification is rated as substantial.

#### Construction vibration assessment criteria

- 8.285 Vibration levels due to construction have been assessed using the methods and significance criteria given in BS 5228-2:2009.
- 8.286 The vibration magnitude assessment criteria are given in Table 8.50 and have been based primarily on human response to vibration, as opposed to building damage, as these are the most stringent criteria. The upper vibration limit categories quoted relate to building damage.

**Table 8.50- Construction vibration – significance magnitude classification**

Vibration level, PPV, mm/s	Effect (BS 5228-2)	Classification
50	Guide value for cosmetic damage of residential or industrial and heavy commercial buildings	Significant – severe
15 at 4Hz rising to 20 at 15Hz	Guide value for cosmetic damage of residential or light commercial buildings	Significant – severe
≥10.0	Vibration is likely to be intolerable for any more than a brief exposure to this level.	Significant - substantial
1.0-10	It is likely that vibration of this level in residential environments will cause complaint, but can be tolerated if prior warning and explanation has been given to residents.	Significant - moderate
0.3-1.0	Vibration might just be perceptible in residential environments.	Minor
0.14 – 0.3	Vibration might just be perceptible in the most sensitive situations for most vibration frequencies associated with construction.	Negligible
≤ 0.14	Vibration unlikely to be perceptible.	None

#### Construction noise assessment method

- 8.287 Construction noise levels have been predicted to a number of key noise sensitive receptors. These can be seen in Figure 8.24 and are described in Table 8.51.

**Table 8.51- Construction noise sensitive receptors**

Construction noise receiver	Location	Notes
A	19 Camel Road	Residential area. Low level housing benefiting from substantial road traffic noise barrier and noise barrier provided by Pier. Nearby high level flats will have limited screening.
B	Drew Road Primary School	Primary school – recently constructed with mitigation measures to control airborne aircraft noise.
C	40 Newland Street	Residential area. Housing benefits from noise screening due to DLR noise barrier, Eastern Apron noise barrier and topography.
D	86 Winifred Street Flats	Residential area. Housing benefits from noise screening due to DLR noise barrier.
E	38 Campion Close	Residential area. Housing benefits from limited noise screening due to topography of Royal Albert Way.
F	32 Brixham Street	Residential area. Housing benefits from noise screening due to DLR noise barrier.
G	30 Renfrew Close	Residential area. Housing benefits from limited noise screening due to topography of Royal Albert Way.
H	Storey Street School	Residential area including Storey Street School, Woodman Street Community Hall both already treated under the Sound Insulation Scheme. High level flats on Woodman Street will overlook docks.
I	UEL halls of residence	Recently constructed university constructed to mitigated airborne aircraft noise
J	3 Weaver Close	Residential area. Housing benefits from limited noise screening due to topography of Royal Albert Way.
K	43 Felixstowe Court	Residential area constructed to mitigate airborne aircraft noise

8.288 All of the receptors have been constructed with mitigation measures to control airborne aircraft noise. This has been achieved by either retrospective sound insulation works undertaken as part of the airport's sound insulation scheme or by planning condition, since the newer properties were granted planning consent within the airport's existing noise contours.

8.289 Details of the CADP construction activities are given in Section 6.0 *Development programme and construction* and are summarised below. In assessing the potential environmental effects of the construction phase it was necessary to split construction activities into various categories. These are listed below. The noise emission values have been predicted using the methods given in BS 5228-1:2009<sup>42</sup>. A full list of detailed assumptions can be found in Appendix 8.10.

*(CN-1) Site preparation & construction compound*

8.290 The construction compound area will be established in Year 1 on land to the South of the King George V (KGV) dock. The location is shown in Figure 6.5 in Chapter 6. This area will accommodate offices, parking materials lay-down, site fabrication and temporary barge berths to allow some materials to arrive by barge. Main items of plant include cranes, tug boats, dump trucks, mobile generators and hand tools.

*(CN-2) Breaking out of KGV dock walls*

<sup>42</sup> BS522801: 2009 Code of practice for noise and vibration control on construction and open sites – Part 1: Noise

- 8.291 The level of the apron dictates the extent and position of the stands as the tails of the aircraft on the stand need to be beneath the runway transitional surface. With these constraints it is necessary to cut down the existing dock wall. To mitigate the impact of this noisy activity it is proposed to only carry this out during daytime hours during the weekend. Main items of plant include tracked excavators, pulverisers, wheeled backhoe loaders with breakers, dump trucks and road sweepers.

*(CN-3) Auger piling*

- 8.292 The piling works will be comparable to that undertaken for the runway 27 hold and eastern apron extension. Auger piling rigs will be used on a floating platform. The piling method has been selected to minimise the noise generated. Piling requires working at height within the airport's transitional areas. Therefore 90% of the piling will need to be carried out at night or during the weekends. Main items of plant include auger piling rigs, cranes, generators, pumps, gas cutters and vibratory drivers.

*(CN-4) Concrete deck*

- 8.293 Similar to the existing Eastern Apron extension, the concrete deck will be constructed using off site precast beam and plank elements which will be delivered to the on-site materials storage facility by barge and/or road. These precast concrete components will then be moved to the active construction area using floating platforms. Main items of plant include barges, floating platforms, cranes and generators for floodlights.

*(CN-5) Drainage and services*

- 8.294 Following the installation of the pre-cast concrete elements the drainage and electrical infrastructure will be installed within the deck. Main items of plant include tracked excavators, pulverisers, wheeled backhoe loaders with breakers, dump trucks and road sweepers.

*(CN-6) Deck concreting*

- 8.295 Concreting works will be carried out to provide an in-situ topping on the precast beams and the original dock wall. Main items of plant include concrete mixer trucks, pumps, poker vibrators, compressors, cranes and vibrating finishing beams.

*(CN-7) Pavement works*

- 8.296 Using comparable equipment to that for CN-5, drainage and services, additional cutting of the dock wall will be required to enable services infrastructure to connect to the dock wall to the suspended deck. Main items of plant include tracked excavators, pulverisers, wheeled backhoe loaders with breakers, dump trucks and road sweepers.

- 8.297 The CADP includes a number of buildings, structures and surface works. These include the Eastern Terminal Extension, the East Energy Centre, Hotel, Forecourt, decked and surface car parks. Construction of these elements of the CADP is likely to mainly take place during normal daytime hours. The associated works have been split into the following categories.

*(CN-8) Buildings – site prep, excavation*

(CN-9) Buildings, piling

(CN-10) Buildings, sub and superstructure

(CN-11) Buildings, envelope and fit out

- 8.298 Construction noise levels will vary considerably depending on activity and location. Table 8.52 illustrates the potential phasing of works.

**Table 8.52- Construction – indicative construction phases**

Construction activity	Construction Phase				
	Year 1 4 Stand Deck (I) and Runway Link	Year 2 and 3 4 Stand Deck(II) , Taxiway Hotel & Parking	Year 4 4 Stand Deck, Taxiway Hotel East Energy Centre East terminal extension	Year 5 East Pier and East terminal extension	Year 6 Western Terminal 2 extension
Site prep and compound	✓	✓	✓	-	-
Breaking out dock walls	✓	✓	✓	-	-
Auger Piling	✓	✓	✓	-	-
Concrete deck – precast beam and plank	✓	✓	✓	-	-
Deck drainage and services	✓	✓	✓	-	-
Concrete deck – in-situ topping	✓	✓	✓	-	-
Pavement works	✓	✓	✓	-	-
Buildings - site prep- excavation		✓	✓	✓	✓
Buildings – piling	-	✓	✓	✓	✓
Buildings – sub and superstructure	-	✓	✓	✓	✓
Buildings – envelope and fit-out	-	✓	✓	✓	✓
Landside infrastructure concrete and general works	-	✓	✓	✓	✓
Night time/evening works	Piling and deck	Piling and deck (potential)	Piling and deck	Limited	Limited

*Assessment of effects of construction noise*

- 8.299 Noise levels have been predicted at the facade of eleven receptors located around the application site, as shown in Figure 8.23. For each of the construction activities listed above, the assumptions concerning the plant proposed, the duration of the activity and associated noise level are given in Appendix 8.10.
- 8.300 Predictions have been made for three scenarios. These are shown in Table 8.53 to Table 8.63. The first scenario is Year 1 during which an interim stage of the CADP will commence. This includes the construction of the apron extension and noise barrier for 3 aircraft stands with an associated taxiway link and commencement of terminal works. The second scenario is Year 4 (the Peak Construction Year) during which the Eastern Terminal Extension will be under construction along with 4 additional new aircraft stands, the Hotel and Eastern Energy Centre.

The third scenario is Year 6 during which construction activity will be limited to the continuing construction of the new East Pier and Eastern Terminal Extension.

- 8.301 The predicted construction noise levels are tested against the impact significance criteria presented in Table 8.49. These are based on construction noise limits agreed with LBN for properties which have already been treated under the Sound Insulation Scheme. The daytime limits are identical for daytime works, irrespective of whether a property has received sound insulation treatment under the airport's sound insulation scheme. For evening, weekend and night time works however, the construction noise limits are 10 dB(A) more stringent for properties that are untreated.
- 8.302 During the Operational Improvements Project (OIP) properties exposed to potentially significant levels of night time construction noise were treated under the Sound Insulation Scheme. This was based on a qualifying exposure limit of 55 dB  $L_{Aeq,15min}$  at night. Those properties located closest to the areas of night time construction works were identified as eligible under the scheme. Most of these properties were owned by LBN and the take up rate for treatment was high. Around 200 properties were included in the scheme with only around 50 refusals. These refusals occurred as a result of tenants not allowing access to the Sound Insulation Contractor to carry out works despite the property owner, LBN, consenting for the sound insulation works to be carried out. These properties are in the Woodman Street, Pier Road area and were exposed to noise from night time piling associated with the construction of the Runway 27 hold area.
- 8.303 In addition to these 50 or so properties which refused Sound Insulation Works, it is estimated that approximately 100 more dwellings in the Newland Street area may be exposed to construction noise at night of 55 dB  $L_{Aeq,15min}$  or more as a result of CADP. These dwellings will have been offered Sound Insulation Works under earlier schemes and who have to date refused these works.
- 8.304 There will therefore be a relatively small number of properties untreated under the airport's sound insulation scheme that will be exposed to potentially significant levels of construction noise. The noise impact for dwellings not treated under the scheme is presented in Table 8.56, Table 8.60 and Table 8.64. It can be seen that significant noise impacts are predicted. In order to mitigate these significant impacts it is proposed to offer these residents a further opportunity to accept sound insulation works under the airport's sound insulation scheme. This chapter therefore considers below the impacts of construction noise assuming, as is the case for the majority of properties closest to the airport, that they have been treated under the airport's sound insulation scheme.

**Table 8.53- Construction – Interim Stage (Year 1) construction noise predictions ( $L_{Aeq,T}$ )**

Construction activity	Noise sensitive receptor										
	A	B	C	D	E	F	G	H	I	J	K
Site prep and compound	35	36	38	41	39	43	41	63	50	42	57
Breaking out dock walls	52	55	59	60	53	57	50	55	54	48	52
Auger Piling	46	48	53	54	47	51	44	49	48	41	46
Concrete deck – precast beam and plank	42	45	50	51	43	48	41	46	45	38	43
Deck drainage and services	52	55	59	60	53	57	50	55	54	48	52
Concrete deck – in-situ topping	46	49	53	54	47	51	44	49	48	42	46
Pavement works	52	55	59	60	53	57	50	55	54	48	52
Buildings – site prep-excavation	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Buildings – piling	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Buildings – sub and superstructure	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Buildings – envelope and fit-out	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Landside infrastructure concrete and general works	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

**Table 8.54- Construction – Interim Stage (Year 1) construction noise predictions comparison with daytime criteria**

Construction activity	Noise sensitive receptor										
	A	B	C	D	E	F	G	H	I	J	K
Site prep and compound	negligible	negligible	negligible	Negligible	negligible	negligible	negligible	negligible	negligible	negligible	negligible
Breaking out dock walls	negligible	negligible	negligible	negligible	negligible	negligible	negligible	negligible	negligible	negligible	negligible
Auger Piling	negligible	negligible	negligible	negligible	negligible	negligible	negligible	negligible	negligible	negligible	negligible
Concrete deck – precast beam and plank	negligible	negligible	negligible	negligible	negligible	negligible	negligible	negligible	negligible	negligible	negligible
Deck drainage and services	negligible	negligible	negligible	negligible	negligible	negligible	negligible	negligible	negligible	negligible	negligible
Concrete deck – in-situ topping	negligible	negligible	negligible	negligible	negligible	negligible	negligible	negligible	negligible	negligible	negligible
Pavement works	negligible	negligible	negligible	negligible	negligible	negligible	negligible	negligible	negligible	negligible	negligible
Buildings - site prep-excavation	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Buildings – piling	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Buildings – sub and superstructure	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Buildings – envelope and fit-out	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Landside infrastructure concrete and general works	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A



**Table 8.55- Construction – Interim Stage (Year 1) construction noise predictions comparison with night time/evening/weekend criteria**

Construction activity	Noise sensitive receptor										
	A	B	C	D	E	F	G	H	I	J	K
Site prep and compound	negligible	negligible	negligible	negligible	negligible	negligible	negligible	minor	negligible	negligible	minor
Breaking out dock walls	negligible	negligible	minor	minor	negligible	minor	negligible	minor	negligible	negligible	negligible
Auger Piling	negligible	negligible	negligible	negligible	negligible	negligible	negligible	negligible	negligible	negligible	negligible
Concrete deck – precast beam and plank	negligible	negligible	negligible	negligible	negligible	negligible	negligible	negligible	negligible	negligible	negligible
Deck drainage and services	negligible	negligible	minor	minor	negligible	minor	negligible	minor	negligible	negligible	negligible
Concrete deck – in-situ topping	negligible	negligible	negligible	negligible	negligible	negligible	negligible	negligible	negligible	negligible	negligible
Pavement works	negligible	negligible	minor	minor	negligible	minor	negligible	minor	negligible	negligible	negligible
Buildings - site prep-excavation	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Buildings – piling	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Buildings – sub and superstructure	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Buildings – envelope and fit-out	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Landside infrastructure concrete and general works	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

**Table 8.56- Construction – Interim Stage (Year 1) construction noise predictions comparison with night time/evening/weekend criteria, dwellings without SIS protection**

Construction activity	Noise sensitive receptor										
	A	B	C	D	E	F	G	H	I	J	K
Site prep and compound	negligible	negligible	negligible	negligible	negligible	negligible	negligible	significant moderate	minor	negligible	significant moderate
Breaking out dock walls	minor	minor	significant moderate	significant moderate	minor	significant moderate	minor	significant moderate	minor	minor	minor
Auger Piling	minor	minor	minor	minor	minor	minor	negligible	minor	minor	negligible	minor
Concrete deck – precast beam and plank	negligible	minor	minor	minor	negligible	minor	negligible	minor	negligible	negligible	negligible
Deck drainage and services	minor	minor	significant moderate	significant moderate	minor	significant moderate	minor	significant moderate	minor	minor	minor
Concrete deck – in-situ topping	minor	minor	minor	minor	minor	minor	negligible	minor	minor	negligible	minor
Pavement works	minor	minor	significant moderate	significant moderate	minor	significant moderate	minor	significant moderate	minor	minor	minor
Buildings - site prep-excavation	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Buildings – piling	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Buildings – sub and superstructure	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Buildings – envelope and fit-out	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Landside infrastructure concrete and general works	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

**Table 8.57- Construction – Peak Construction Year (Year 4) construction noise predictions (L<sub>Aeq,T</sub>)**

Construction activity	Noise sensitive receptor										
	A	B	C	D	E	F	G	H	I	J	K
Site prep and compound	35	36	38	41	39	43	41	63	50	42	57
Breaking out dock walls	49	50	53	60	53	61	52	60	58	50	55
Auger Piling	43	44	47	54	47	55	46	53	51	44	48
Concrete deck – precast beam and plank	40	41	43	51	43	52	43	50	48	40	45
Deck drainage and services	49	50	53	60	53	61	52	60	58	50	55
Concrete deck – in-situ topping	43	44	47	54	47	55	46	54	52	44	49
Pavement works	49	50	53	60	53	61	52	60	58	50	55
Buildings - site prep-excavation	46	48	56	54	42	53	41	48	45	37	41
Buildings – piling	49	52	60	58	45	56	44	51	48	40	45
Buildings – sub and superstructure	48	51	59	57	44	55	43	50	47	39	44
Buildings – envelope and fit-out	47	50	58	56	43	54	42	49	46	38	43
Landside infrastructure concrete and general works	59	61	69	67	55	66	54	61	58	50	55

**Table 8.58- Construction – Peak Construction Year (Year 4) construction noise predictions comparison with daytime criteria**

Construction activity	Noise sensitive receptor										
	A	B	C	D	E	F	G	H	I	J	K
Site prep and compound	negligible	negligible	negligible	negligible	negligible	negligible	negligible	negligible	negligible	negligible	negligible
Breaking out dock walls	negligible	negligible	negligible	negligible	negligible	negligible	negligible	negligible	negligible	negligible	negligible
Auger Piling	negligible	negligible	negligible	negligible	negligible	negligible	negligible	negligible	negligible	negligible	negligible
Concrete deck – precast beam and plank	negligible	negligible	negligible	negligible	negligible	negligible	negligible	negligible	negligible	negligible	negligible
Deck drainage and services	negligible	negligible	negligible	negligible	negligible	negligible	negligible	negligible	negligible	negligible	negligible
Concrete deck – in-situ topping	negligible	negligible	negligible	negligible	negligible	negligible	negligible	negligible	negligible	negligible	negligible
Pavement works	negligible	negligible	negligible	negligible	negligible	negligible	negligible	negligible	negligible	negligible	negligible
Buildings - site prep-excavation	negligible	negligible	negligible	negligible	negligible	negligible	negligible	negligible	negligible	negligible	negligible
Buildings – piling	negligible	negligible	negligible	negligible	negligible	negligible	negligible	negligible	negligible	negligible	negligible
Buildings – sub and superstructure	negligible	negligible	negligible	negligible	negligible	negligible	negligible	negligible	negligible	negligible	negligible
Buildings – envelope and fit-out	negligible	negligible	negligible	negligible	negligible	negligible	negligible	negligible	negligible	negligible	negligible
Landside infrastructure concrete and general works	negligible	negligible	minor	minor	negligible	minor	negligible	negligible	negligible	negligible	negligible

**Table 8.59- Construction – Peak Construction Year (Year 4) construction noise predictions comparison with night time/evening/weekend criteria**

Construction activity	Noise sensitive receptor										
	A	B	C	D	E	F	G	H	I	J	K
Site prep and compound	negligible	negligible	negligible	negligible	negligible	negligible	negligible	minor	negligible	negligible	minor
Breaking out dock walls	negligible	negligible	negligible	minor	negligible	minor	negligible	minor	minor	negligible	negligible
Auger Piling	negligible	negligible	negligible	negligible	negligible	minor	negligible	negligible	negligible	negligible	negligible
Concrete deck – precast beam and plank	negligible	negligible	negligible	negligible	negligible	negligible	negligible	negligible	negligible	negligible	negligible
Deck drainage and services	negligible	negligible	negligible	minor	negligible	minor	negligible	minor	minor	negligible	negligible
Concrete deck – in-situ topping	negligible	negligible	negligible	negligible	negligible	minor	negligible	negligible	negligible	negligible	negligible
Pavement works	negligible	negligible	negligible	minor	negligible	minor	negligible	minor	minor	negligible	negligible
Buildings - site prep-excavation	negligible	negligible	minor	negligible	negligible	negligible	negligible	negligible	negligible	negligible	negligible
Buildings – piling	negligible	negligible	minor	minor	negligible	minor	negligible	negligible	negligible	negligible	negligible
Buildings – sub and superstructure	negligible	negligible	minor	minor	negligible	negligible	negligible	negligible	negligible	negligible	negligible
Buildings – envelope and fit-out	negligible	negligible	minor	minor	negligible	negligible	negligible	negligible	negligible	negligible	negligible
Landside infrastructure concrete and general works	minor	minor	significant moderate	significant moderate	negligible	significant moderate	negligible	minor	minor	negligible	negligible

**Table 8.60- Construction – Peak Construction Year (Year 4) construction noise predictions comparison with night time/evening/weekend criteria, dwellings without SIS protection**

Construction activity	Noise sensitive receptor										
	A	B	C	D	E	F	G	H	I	J	K
Site prep and compound	negligible	negligible	negligible	negligible	negligible	negligible	negligible	significant moderate	minor	negligible	significant moderate
Breaking out dock walls	minor	minor	minor	significant moderate	minor	significant moderate	Minor	significant moderate	significant moderate	minor	minor
Auger Piling	negligible	negligible	minor	minor	minor	significant moderate	Minor	minor	minor	negligible	minor
Concrete deck – precast beam and plank	negligible	negligible	negligible	minor	negligible	minor	negligible	minor	minor	negligible	minor
Deck drainage and services	minor	minor	minor	significant moderate	minor	significant moderate	Minor	significant moderate	significant moderate	minor	minor
Concrete deck – in-situ topping	negligible	negligible	minor	minor	minor	significant moderate	Minor	minor	minor	negligible	minor
Pavement works	minor	minor	minor	significant moderate	minor	significant moderate	Minor	significant moderate	significant moderate	minor	minor
Buildings - site prep-excavation	minor	minor	significant moderate	minor	negligible	minor	negligible	minor	negligible	negligible	negligible
Buildings – piling	minor	minor	significant moderate	significant moderate	negligible	significant moderate	negligible	minor	minor	negligible	negligible
Buildings – sub and superstructure	minor	minor	significant moderate	significant moderate	negligible	minor	negligible	minor	minor	negligible	negligible
Buildings – envelope and fit-out	minor	minor	significant moderate	significant moderate	negligible	minor	negligible	minor	minor	negligible	negligible
Landside infrastructure concrete and general works	significant moderate	significant moderate	significant substantial	significant substantial	minor	significant substantial	Minor	significant moderate	significant moderate	minor	minor

**Table 8.61- Construction – Year 6 construction noise predictions (L<sub>Aeq,T</sub>)**

Construction activity	Noise sensitive receptor										
	A	B	C	D	E	F	G	H	I	J	K
Site prep and compound	35	36	38	41	39	43	41	63	50	42	57
Breaking out dock walls	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Auger Piling	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Concrete deck – precast beam and plank	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Deck drainage and services	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Concrete deck – in-situ topping	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Pavement works	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Buildings - site prep-excavation	46	48	56	54	42	53	41	48	45	37	41
Buildings – piling	49	52	60	58	45	56	44	51	48	40	45
Buildings – sub and superstructure	48	51	59	57	44	55	43	50	47	39	44
Buildings – envelope and fit-out	47	50	58	56	43	54	42	49	46	38	43
Landside infrastructure concrete and general works	59	61	69	67	55	66	54	61	58	50	55

**Table 8.62- Construction – Year 6 construction noise predictions comparison with daytime criteria**

Construction activity	Noise sensitive receptor										
	A	B	C	D	E	F	G	H	I	J	K
Site prep and compound	negligible	negligible	negligible	negligible	negligible	negligible	negligible	negligible	negligible	negligible	negligible
Breaking out dock walls	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Auger Piling	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Concrete deck – precast beam and plank	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Deck drainage and services	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Concrete deck – in-situ topping	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Pavement works	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Buildings - site prep-excavation	negligible	negligible	negligible	negligible	negligible	negligible	negligible	negligible	negligible	negligible	negligible
Buildings – piling	negligible	negligible	negligible	negligible	negligible	negligible	negligible	negligible	negligible	negligible	negligible
Buildings – sub and superstructure	negligible	negligible	negligible	negligible	negligible	negligible	negligible	negligible	negligible	negligible	negligible
Buildings – envelope and fit-out	negligible	negligible	negligible	negligible	negligible	negligible	negligible	negligible	negligible	negligible	negligible
Landside infrastructure concrete and general works	negligible	negligible	minor	minor	negligible	minor	negligible	negligible	negligible	negligible	negligible

**Table 8.63- Construction – Year 6 construction noise predictions comparison with evening/weekend criteria**

Construction activity	Noise sensitive receptor										
	A	B	C	D	E	F	G	H	I	J	K
Site prep and compound	negligible	negligible	negligible	negligible	negligible	negligible	negligible	minor	negligible	negligible	minor
Breaking out dock walls	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Auger Piling	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Concrete deck – precast beam and plank	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Deck drainage and services	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Concrete deck – in-situ topping	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Pavement works	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Buildings - site prep-excavation	negligible	negligible	minor	negligible	negligible	negligible	negligible	negligible	negligible	negligible	negligible
Buildings – piling	negligible	negligible	minor	minor	negligible	minor	negligible	negligible	negligible	negligible	negligible
Buildings – sub and superstructure	negligible	negligible	minor	minor	negligible	negligible	negligible	negligible	negligible	negligible	negligible
Buildings – envelope and fit-out	negligible	negligible	minor	minor	negligible	negligible	negligible	negligible	negligible	negligible	negligible
Landside infrastructure concrete and general works	minor	minor	significant moderate	significant moderate	negligible	significant moderate	negligible	minor	minor	negligible	negligible

**Table 8.64- Construction – Year 6 construction noise predictions comparison with evening/weekend criteria, dwellings without SIS protection**

Construction activity	Noise sensitive receptor										
	A	B	C	D	E	F	G	H	I	J	K
Site prep and compound	negligible	negligible	negligible	negligible	negligible	negligible	negligible	significant moderate	minor	negligible	significant moderate
Breaking out dock walls	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Auger Piling	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Concrete deck – precast beam and plank	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Deck drainage and services	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Concrete deck – in-situ topping	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Pavement works	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Buildings - site prep-excavation	minor	minor	significant moderate	minor	negligible	minor	negligible	minor	negligible	negligible	negligible
Buildings – piling	minor	minor	significant moderate	significant moderate	negligible	significant moderate	negligible	minor	minor	negligible	negligible
Buildings – sub and superstructure	minor	minor	significant moderate	significant moderate	negligible	minor	negligible	minor	minor	negligible	negligible
Buildings – envelope and fit-out	minor	minor	significant moderate	significant moderate	negligible	minor	negligible	minor	minor	negligible	negligible
Landside infrastructure concrete and general works	significant moderate	significant moderate	significant substantial	significant substantial	minor	significant substantial	minor	significant moderate	significant moderate	minor	minor

- 8.305 During Interim Stage (Year1), no significant adverse impacts are predicted for daytime working hours. The noise sources are a considerable distance away from the nearby community. Minor adverse noise impacts are predicted for the closest residential properties to the new stands. This is due to the more stringent assessment criteria for night/evenings/weekends.
- 8.306 During Year 4 (the 'Peak Construction Year') no significant adverse impacts are predicted for daytime working hours. Some minor adverse impacts are predicted for landside infrastructure works close to the nearby community. Minor and significant moderate adverse noise impacts are predicted for the night time/weekend piling and deck works.
- 8.307 During Year 6 no significant adverse impacts are predicted. The deck works over the dock will have been completed and the construction will be limited to daytime building and landside infrastructure works. Minor and significant moderate adverse noise impacts are predicted for the closest residential properties to the new stands. This is due to the more stringent assessment criteria for evenings and weekends.

#### Construction Haul road

- 8.308 The above assessment excludes noise from delivery HGVs arriving to and departing from the site.
- 8.309 Traffic information from Vectos indicates that the contractor's compounds will be accessed via the Eastern Access Road off Woolwich Manor Road. 146 arrivals and 146 departures are predicted for both 2019 and 2021 construction periods. It is understood that deliveries will be restricted to daytime hours only (provisionally proposed as 07:00 to 20:00 Monday-Friday, 08:00 to 20:00 Saturday and 08:00 to 12:30 Sunday).
- 8.310 The proposed development will include the use of river access via barges. However, as a worst-case, an assessment has been made of the noise impact assuming all deliveries are made by HGV with no barges. This increases the number of daily HGVs from 146 to 156.
- 8.311 The majority of the closest noise sensitive receptors to the proposed haul road will benefit from the existing purpose built noise barriers (constructed for the DLR) which will provide a substantial reduction in construction noise. These noise barriers do not run along the entire length of the haul road. Residential properties to the eastern end of Woodman Street and Storey Road School do not currently benefit from any barriers.
- 8.312 Predictions of road traffic noise at these worst-affected unscreened properties indicate a noise level of around 62 dB  $L_{Aeq,T}$  from haul road construction traffic. The predicted noise level from the nearby site compound is 63 dB  $L_{Aeq,T}$  at Woodman Street. The combined cumulative level is 66 dB  $L_{Aeq,T}$ . This predicted level exceeds the 65 dB threshold for a minor adverse impact during normal daytime hours (Mon-Friday 08:00-18:00 and Saturday 08:00-13:00) and a significant adverse impact during evenings (18:00-20:00), Saturday afternoons (13:00-20:00) and Sundays (08:00 to 12:30).

### Construction Mitigation Measures

- 8.313 As some site construction activities will temporarily have the potential to cause adverse effects on residents, Best Practicable Means (as defined under Section 72 of the 1974 Control of Pollution Act) would be used by the Contractor to achieve compliance set out within relevant legislation and standards. The Control of Pollution Act formally adopts the 1997 version of BS5228. The current version of the relevant British Standard BS 5228-1:2009 (Part 1) is not an adopted Code of Practice under the Control of Pollution Act 1974.
- 8.314 Measures to be considered in implementing Best Practicable Means, adopted as part of the Construction Environmental Management Plan (described in Chapter 6) would be consistent with the recommendations of both BS 5228:1997 and BS 5228-1:2009.
- 8.315 Due to the scale of the construction works it is anticipated that the details of the construction noise mitigation measures will need to be agreed with the local authority under a Section 61 agreement under the Control of Pollution Act. The detailed Construction Environmental Management Plan (CEMP) will include the following mitigation measures:
- a) Project supervision – The project will include the designation of a Project Environmental Manager to supervise the implementation of the CEMP
  - b) Site Personnel Training – informing site personnel about the need to minimise noise and advising on the proper use and maintenance of tools and equipment and the positioning of machinery to reduce noise emission to the neighbourhood.
  - c) Site Location – setting noise emission limits with due regard to the proximity of noise sensitive premises.
  - d) Programme - Details of operations that are likely to result in disturbance, with an indication of the expected duration of each phase and key dates, including a procedure for prior notification of LBN and relevant statutory and non-statutory (including neighbours) parties so that local arrangements can be agreed.
  - e) Type of Plant – consideration will be given to using quiet techniques taking account of practical site constraints and best practicable means. Where reasonably practicable, quiet working methods will be employed, including use of the most suitable plant, reasonable hours of working for noisy operations, and economy and speed of operations.
  - f) Monitoring - On-site noise levels will be monitored regularly, particularly if changes in machinery or project designs are introduced, by a suitably qualified person appointed specifically for the purpose. Methods of noise measurement will be agreed prior to commencement of site works.
  - g) Community Relations – A procedure to ensure communication is maintained with LBN and the local community will be agreed to provide information on any operations likely to cause disturbance (through, for example, meetings and newsletters and provisions made for affected parties to register complaints and the procedures for responding to complaints.
- 8.316 In view of the location of the site compound, in the vicinity of Woodman Street, the location of a noise screen/barrier is required around the compound to protect local housing from construction noise effects. In addition, to mitigate the combined significant impact of construction compound and haul road noise for the worst affected properties at the eastern end of Woodman Street, a temporary hoarding will be installed along the southern curtilage of the site to operate as a noise barrier.



- 8.317 Based on the above, the residual construction noise impact has been assessed as negligible adverse for the daytime and minor to significant adverse for evening/night time/weekend works.

#### Construction Vibration

- 8.318 Piling will take place during the construction of the new apron. It has been advised that auger piling is to be the method that will be used. Levels of vibration associated with this method are low.
- 8.319 Examples of vibration resulting from auger piling activities at various distances are given in Table 8.65 and have been taken from British Standard BS 5228 Part 2<sup>43</sup>.

**Table 8.65- Example vibration levels, auger piling PPV mm/s**

Source of info	Piling Method	PPV (mm/s)	Distance from piling rig (m)
BS 5228 Ref	Casing vibrators	4.0	10
		1.5	25
BS 5228 Ref 102	Augering	0.2	9
BS5228 Ref 103	Auger	0.4	10
	Dollying casing	1.1	10
	Auger hitting base of hole	1.0	10
	Spinning off	0.6	10
BS5228 Ref 104	Augering	0.4	10
	Auger hitting base of hole	0.3	10
	Mudding in	0.3	10
	Spinning off	0.3	10
	Dollying casing	1.0	10
BS5228 Ref 106	Augering	0.5	5
	Surging casing	0.4	10
	Twisting in casing	0.2	10
	Spinning off	0.4	10
	Boring with rock auger	0.4	10

- 8.320 It can be seen that even at these relatively short reference distances of up to 10 metres, the majority of PPV values are well below those likely to cause any damage to buildings. At this distance away, the occupants of any buildings would experience some slight impact. While the unpredictable make-up of the medium makes predicting the degree of attenuation difficult, ground-borne vibration levels can be expected to decrease with distance. All residential buildings surrounding the development site will be located further than 10m from the piling works thus if any impact arises, this will only be slight. Nevertheless all plant is to be operated in line with usual good practice.

#### Cumulative effects

- 8.321 There are a number of major developments surrounding London City Airport which have the potential to increase the cumulative impact of temporary construction noise on nearby noise sensitive receptors. These are described below. Construction vibration impacts are limited to receptors very close to construction activity. No significant cumulative effect as a result of construction vibration is expected.

<sup>43</sup> BS 5228-2: 2009 Code of practice for noise and vibration control on construction and open sites – Part 2: Vibration

- 8.322 The Cross Rail development is estimated to be complete by June 2015. This is before the anticipated start of the CADP works and therefore no cumulative impact is expected.
- 8.323 Major developments are proposed around the Albert Basin. These include the Royal Albert Basin, Ivax Quays and Great Eastern Quays sites. It is not known when these developments will be constructed. However it is possible that the construction of some of these sites could take place at the same time as some elements of the CADP. This could increase temporary construction noise levels for the closest noise sensitive receptors at Gallions Point in North Woolwich (Receptor K). This could also increase construction noise levels for the nearest noise sensitive receptors at UEL and Beckton (Receptors I and J). The construction noise levels predicted from the CADP works at these receptors are low, generally less than 55 dB  $L_{Aeq}$ . The CADP construction noise levels will therefore not significantly contribute to any noise impact from these major developments. The impact of construction noise from these developments will also need to be mitigated to meet local requirements.
- 8.324 A similar conclusion can be drawn with regard to the proposed major development on the “land to the north side of Albert Dock” site. This development site is close to the noise sensitive receptors at UEL and Beckton (Receptors I and J). The construction noise levels predicted from the CADP works at these receptors are low and the CADP construction noise levels will therefore not significantly contribute to any construction noise impact arising from the development of this site.
- 8.325 The “land to the north side of Albert Dock” development could result in a beneficial impact in terms of noise. If this site is developed prior to the construction and/or operational phase of the CADP development the buildings are likely to act as local noise barriers. This will reduce construction and/or operational ground noise from the airport for those residential buildings in Beckton that become consequently shielded as a result of this development site. These reductions in construction or operational noise will however be small.

#### Construction Noise – Summary and Conclusions

- 8.326 The construction noise assessment has been carried out using predictions adopting the method provided in BS 5228-1:2009. Predictions have been carried out to a number of representative noise sensitive receptors. The construction vibration assessment has been carried out using data provided in BS 5228-2:2009.
- 8.327 The impact has been tested using S106 construction noise limits and guideline impact significance criteria in BS 5228-1:2009.
- 8.328 No significant adverse impacts are predicted from construction vibration.
- 8.329 There will be a relatively small number of properties untreated under the airport’s sound insulation scheme that will be exposed to potentially significant levels of out of hours construction noise. In order to mitigate these significant impacts it is proposed to offer these residents a further opportunity to accept sound insulation works under the airport’s sound insulation scheme. Assessing the impacts of construction noise therefore, assuming, as is the case for the majority of properties close to the airport, that they have been treated under the airport’s sound insulation scheme, no significant adverse noise impacts are predicted for

daytime working hours. Minor adverse noise impacts are predicted for the evening/night time/weekend works. Landside infrastructure concrete and general works have the potential to cause short term significant adverse noise impacts when works are carried out close to the nearby dwellings during evening/weekend/night periods when more stringent noise limits apply.

- 8.330 In view of the location of the site compound and haul road in the vicinity of the eastern end of Woodman Street a noise screen/barrier is required. This will mitigate the combined significant impact of construction compound and haul road noise.
- 8.331 The Principal Contractor will develop and implement a site specific Construction Environmental Management Plan (CEMP) covering demolition and new construction. This will ensure that best practicable means are used to mitigate construction noise impacts.
- 8.332 The residual construction noise impact has been assessed as negligible adverse for the daytime and minor to significant adverse for evening/night time/weekend works.

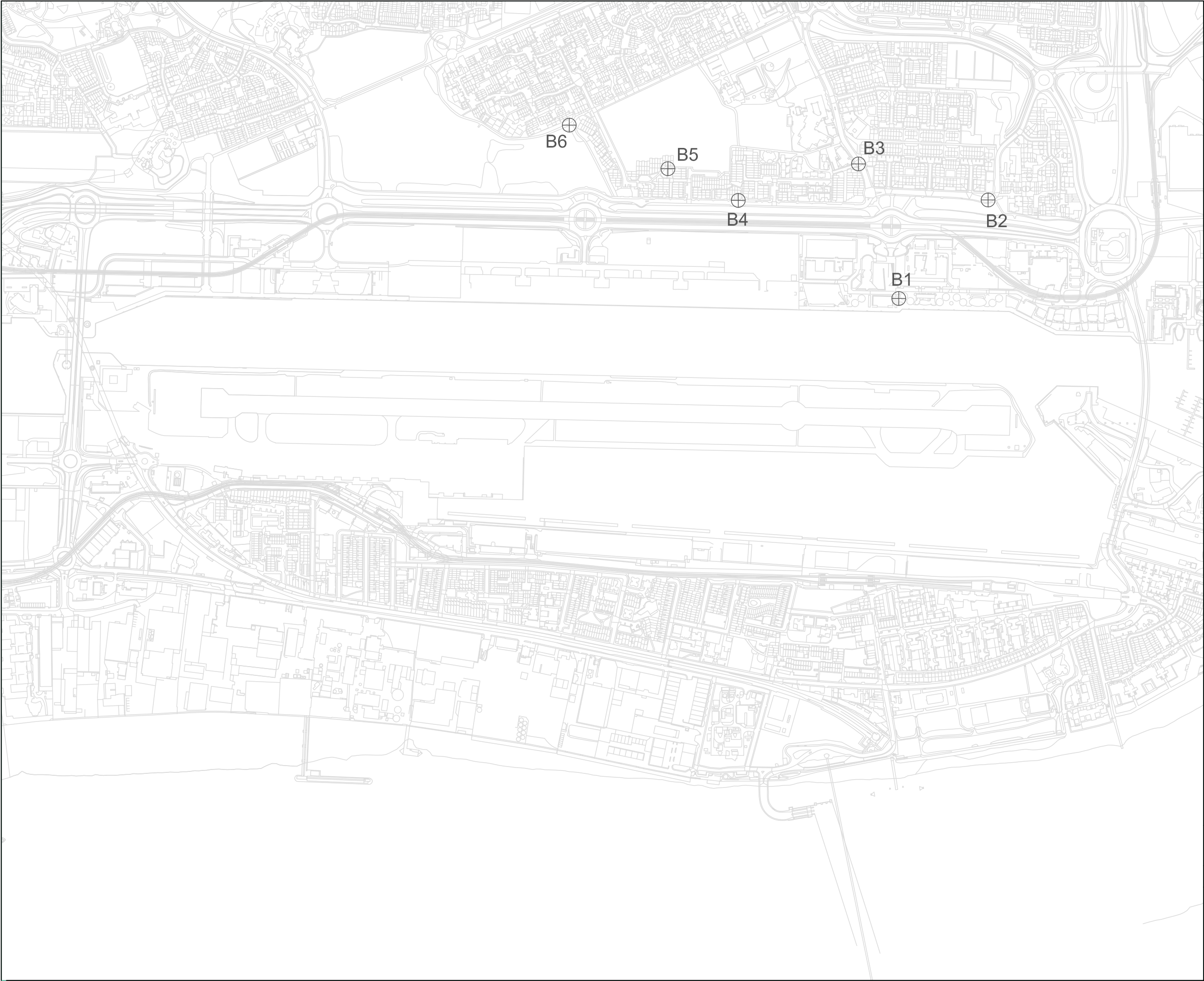
## Summary

- 8.333 Bickerdike Allen Partners (BAP) have carried out an assessment of noise and vibration effects of the construction and operation of the City Airport Development Project (CADP).
- 8.334 In the Principal Assessment Year of 2023, the CADP will allow the Airport to realise a greater number of aircraft movements – approximately 14,300 more than the Without Development case, but will remain within its permitted limit of 120,000 noise factored movements per annum. Accordingly, the number of dwellings and corresponding population exposed to aircraft air noise will rise. A factor affecting the air noise contour size and shape is the change in aircraft mix forecast to occur gradually over the next few years. In particular, the older fleet of RJ aircraft are envisaged to be replaced by more modern twin-engine turbofan aircraft, such as the Embraer E170 and Embraer E190 but also by the introduction of the new Canadair Bombardier CS-100 series. Whereas these aircraft produce similar noise to that of the RJ series, the CS-100 series in particular offers some noise benefits over current types that will tend to offset, to some extent, the effect of the increase in movement numbers.
- 8.335 The noise impact from airborne aircraft has been assessed using predicted contours and assessment of key noise sensitive receptors. The 57 dB  $L_{Aeq,16h}$  contour represents the onset of significant community annoyance. By 2023, assuming no currently permitted developments are built out (or assuming all are built out), the number of dwellings lying within the 57 dB  $L_{Aeq,16h}$  contour is predicted to increase from 12,400 (25,400) without the CADP to 15,100 (29,600) with the CADP. The 57 dB contour area also increases from 7.8 km<sup>2</sup> to 9.1 km<sup>2</sup>, an increase of 17%. For the 63 dB  $L_{Aeq,16h}$  contour, representing moderate annoyance, the increase in the dwelling count is from 900 (5,500) to 1,300 (6,700) with a corresponding 20% increase in contour area. No properties lie within the 69 dB  $L_{Aeq,16h}$  high annoyance noise contour which increases in area by 17% in 2023 if the CADP is built out. On this basis, since no properties lie within the 69 dB contour but a significant number lie within the 63 dB contour in 2023, the impact is envisaged to be moderate adverse based on absolute levels of noise with the CADP. A similar impact would result should the CADP not be built.

- 8.336 Comparing the 'with' and 'without' development cases in 2023, there is only a slight increase in noise level resulting from the proposed CADP, generally in the range of 0.5 to 1.0 dB, giving rise to a negligible impact when comparing the two scenarios directly and considering the change in impact. A negligible change of this magnitude has no significance.
- 8.337 Over the coming years, and possibly by 2023, it is expected that the proportion of more modern aircraft will increase at the Airport with the CADP in place over what has been assumed for the Principal Assessment Year of 2023 in this ES. As a result, the air noise is predicted to reduce. When this further re-fleeting occurs, even allowing for the expected increase in movements up to 111,000 per annum with the CADP in place, the effect of the aircraft mix means the resulting noise contours are little different to those that would arise without the development in 2023 assuming only 96,700 movements per annum. Comparing the noise situation should the CADP not proceed on a like with like basis in terms of number of aircraft movements operating per annum, this shows that under the further re-fleeting scenario, the air noise resulting with the CADP in place would be less than if the CADP were not to be built.
- 8.338 For those people close to the Airport, and thus most affected by noise, protection has for most properties already been provided as a result of the Sound Insulation Scheme provided for many years by the Airport. The Airport will continue to operate the Sound Insulation Scheme using the most stringent UK airport daytime trigger limit of 57 dB  $L_{Aeq,16h}$  as a First Tier eligibility criterion, whilst also continuing to apply a Second Tier eligibility criterion offering an enhanced scheme at 66 dB  $L_{Aeq,16h}$  thereby protecting all eligible housing and community buildings that come into these contours. In addition, the Airport will improve the scheme by offering those people most affected by noise, that is, those within the 66 dB  $L_{Aeq,16h}$  contour, improved secondary glazing or a 100% monetary contribution towards high acoustic performance thermal double glazing, together with acoustic ventilation. This will ensure that all of those most affected by noise are afforded the maximum noise protection opportunity.
- 8.339 In addition, the Airport will continue to operate and, where appropriate, seek to improve the various noise mitigation measures in place at the Airport that have successfully ensured that noise effects to the local community have been, and will continue to be, controlled to acceptable levels.
- 8.340 In conclusion, more people will become affected by noise as the Airport continues to grow within its permitted limits, irrespective of whether the CADP is built or not. This will give rise to a moderate adverse impact with or without the CADP. The introduction of the CADP, as compared to without it, will give rise to a negligible change in noise level with a corresponding negligible impact. Taken as a whole, it is envisaged that the air noise impacts associated with the CADP will be of a minor adverse nature.
- 8.341 The principle difference between future ground noise levels under the CADP, as compared to those without the scheme, is the change in the distribution of ground noise around the area and therefore the change in the population that will be exposed to ground noise, resulting in increased ground noise levels for some and decreases for others.

- 8.342 The noise levels generated by future aircraft operations will be similar to those noise levels that are currently generated from ground operations. It is however envisaged that in the future, more of the aircraft operations will be carried out by modern turbo-fan type aircraft which are generally quieter when taxiing and manoeuvring than the turbo-prop aircraft. Therefore, irrespective of whether the development proceeds, the future mix of aircraft will provide slightly quieter noise levels from ground operations of individual aircraft than currently exist.
- 8.343 Noise from aircraft on the ground has been assessed using predicted noise contours and assessment of key noise sensitive receptors. Baseline conditions vary for the noise sensitive receptors close to the airport. The majority, 89%, of receptors are currently exposed to negligible or minor noise impacts. A small proportion 11%, are currently exposed to significant levels of ground noise.
- 8.344 The CADP works will change the ground noise levels around the airport. A reduction in ground noise is predicted at some receptors. An increase is predicted at others. The overall impact will be comparable to the baseline scenario. 85% of nearby receptors will be exposed to a negligible or minor adverse ground noise impact. 15% will be exposed to a significant ground noise impact. The assessment includes operational and physical mitigation measures. The residual ground noise impact has been assessed as negligible to minor adverse.
- 8.345 The road traffic noise assessment has been carried out using predictions to a number of key representative noise sensitive receptors. The CADP works will change the road traffic noise levels around the airport. A reduction in road traffic noise is predicted at some receptors. An increase is predicted at others. With the exception of one area near the eastern access road, changes in road traffic flow are predicted to generate a change of less than 1.6 dB. For the eastern end of Woodman Street, some properties will experience a significant change in noise as a result of the opening of the new eastern access road with the CAPD. The absolute levels of noise associated with this road will however be of a low magnitude and the houses in Woodman Street will have benefitted from qualifying for sound insulation treatment under the airport's sound insulation scheme.
- 8.346 The residual road traffic noise impact has been assessed as negligible adverse.
- 8.347 The construction noise assessment has been carried out using predictions to a number of representative noise sensitive receptors.
- 8.348 There will be a relatively small number of properties untreated under the airport's sound insulation scheme that will be exposed to potentially significant levels of out of hours construction noise. In order to mitigate these significant impacts it is proposed to offer these residents a further opportunity to accept sound insulation works under the airport's sound insulation scheme.
- 8.349 No significant adverse impacts are predicted for daytime working hours.
- 8.350 During evening/weekend/night periods when more stringent noise limits apply, construction works have the potential to cause short term significant adverse noise impacts when works are carried out close to the nearby dwellings

- 8.351 A temporary hoarding will be provided to operate as noise barriers around the site compound and also along the southern curtilage of the site at the eastern end of Woodman Street, to mitigate the combined significant impact of construction compound and haul road noise.
- 8.352 No significant adverse impacts are predicted from construction vibration.
- 8.353 The Principal Contractor will develop and implement a site specific Construction Environmental Management Plan (CEMP) covering demolition and new construction. This will ensure that best practicable means are used to mitigate construction noise impacts.
- 8.354 The residual construction noise impact has been assessed as negligible adverse for the daytime and minor to significant adverse for evening/night time/weekend works.



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Allen  
Partners**  
Architecture  
Acoustics  
Technology

121 Salusbury Road, London, NW6 6RG  
Email: mail@bickerdikeallen.com T: 0207 625 4411  
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Assessment position

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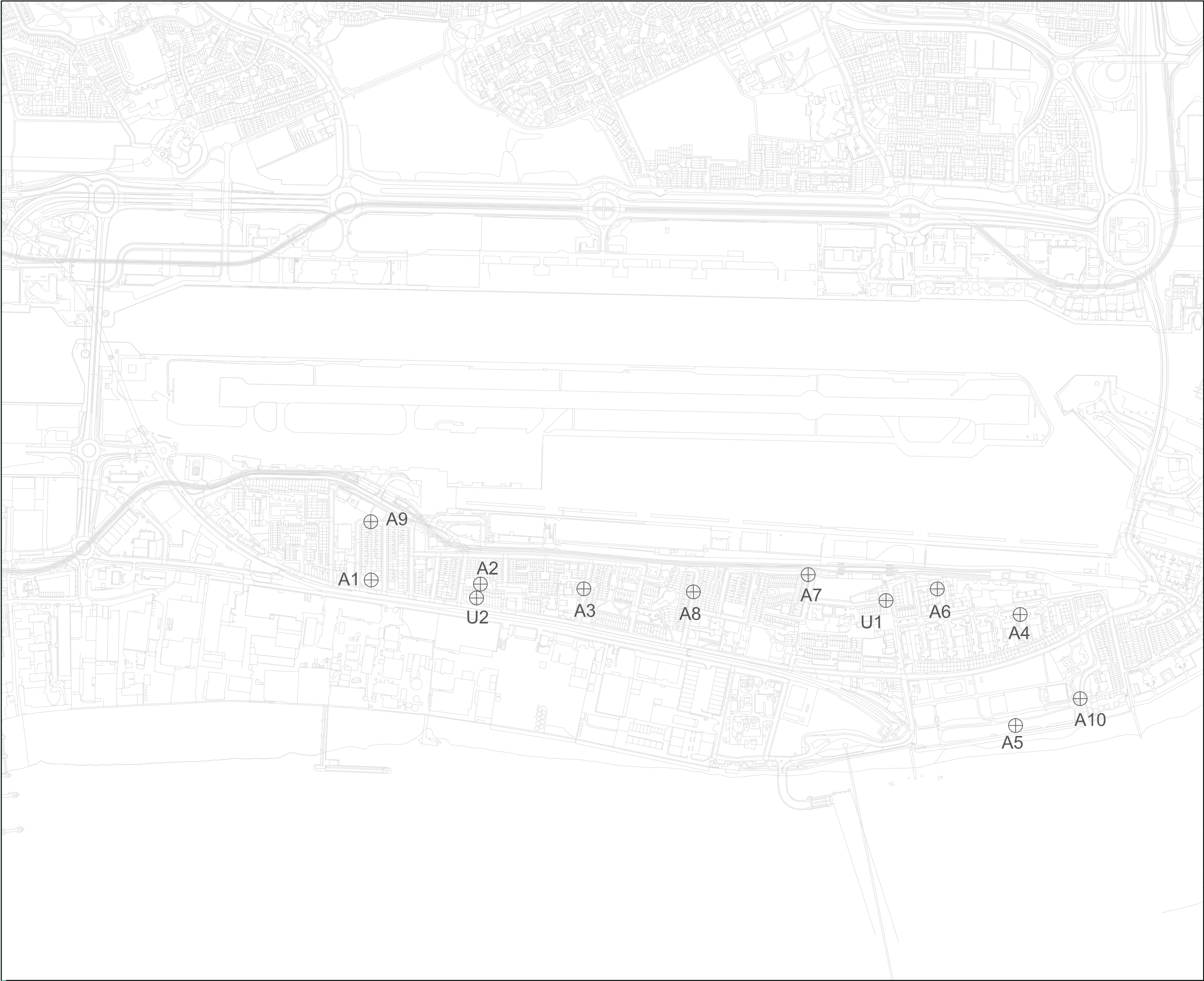
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**LONDON CITY AIRPORT**  
  
**Baseline Noise Assessment Positions  
North (Beckton)**

Scale at A3  
**Not to scale**

Date: June 2013

Drawing Number  
  
**Figure-8.1**





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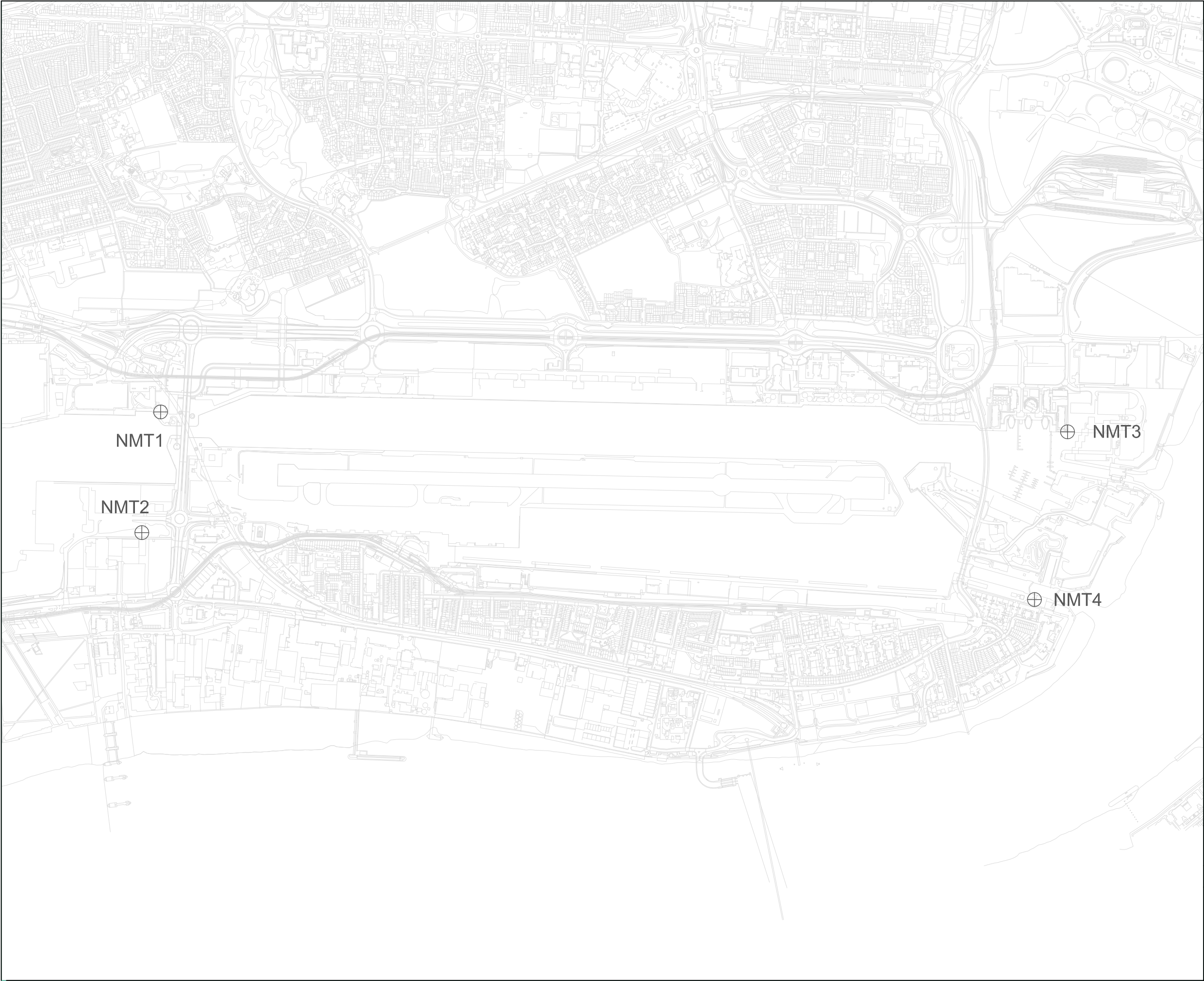
**Baseline Noise Assessment Positions  
South (N. Woolwich)**

Scale at A3  
**Not to scale**

Date: June 2013

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**Figure-8.2**





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NMT position

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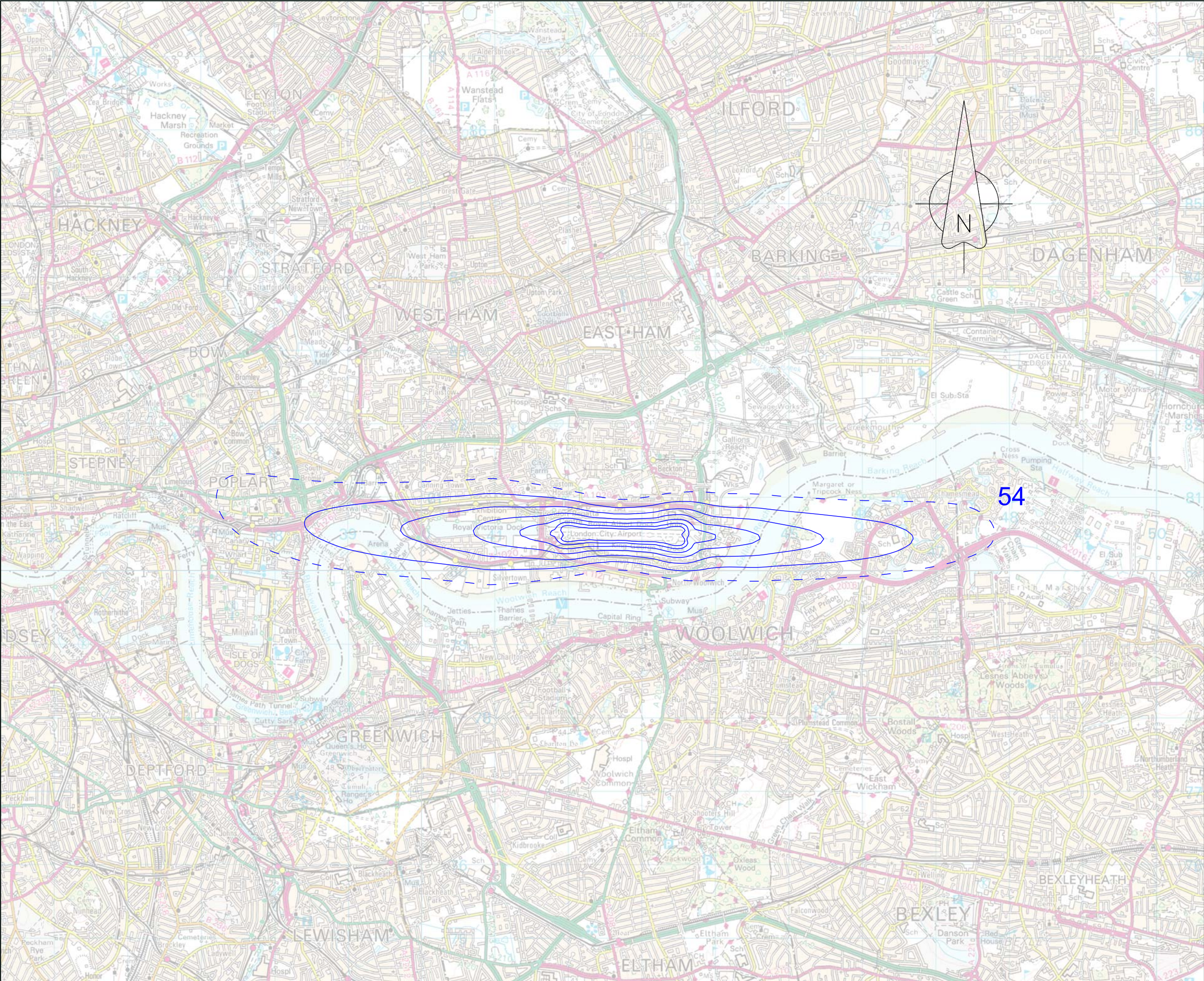
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**Baseline Noise Measurement  
Locations- NMTs 1 - 4**

Scale at A3  
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**Figure-8.3**





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Drawing Title  
**LONDON CITY AIRPORT**

**L<sub>Aeq,16h</sub> airborne aircraft noise contours**

**54 - 72 in 3 dB steps**

**2012 - Summer Average Mode**

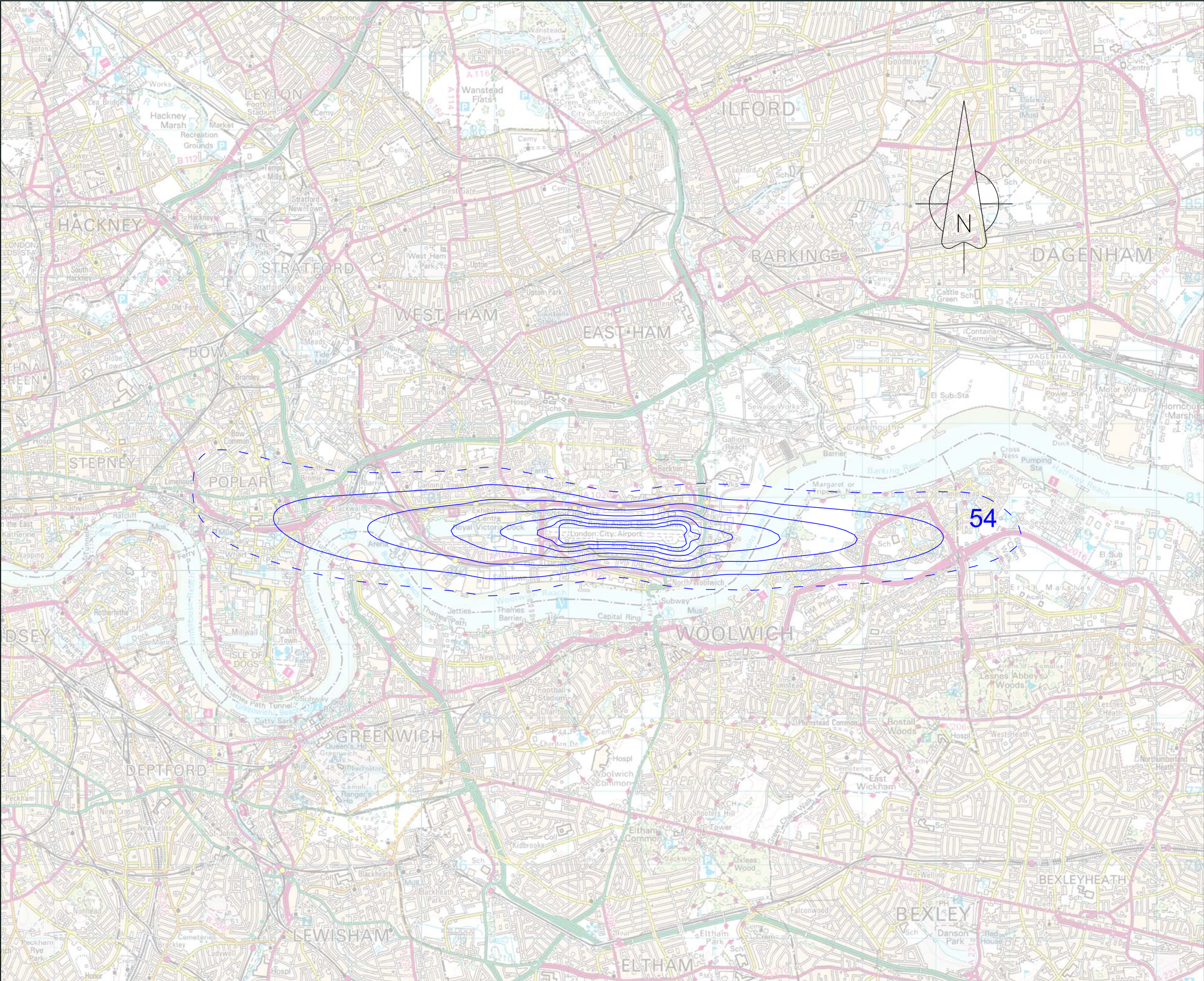
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Date: **June 2013**

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**Figure-8.4**





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**L<sub>Aeq,16h</sub> airborne aircraft noise contours**  
**54 - 72 in 3 dB steps**

**2017 - Summer Average Mode**  
**Interim phase CADP**

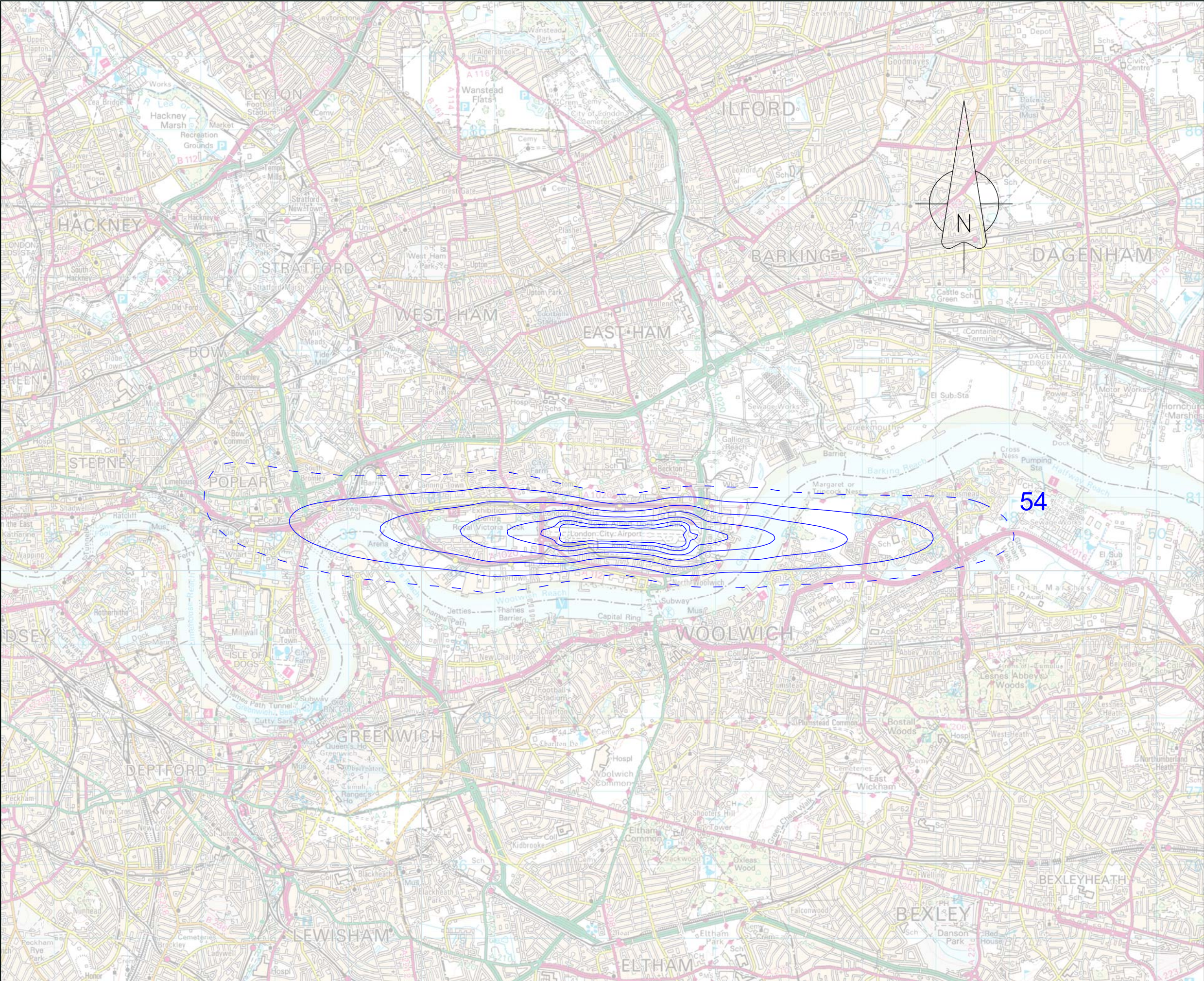
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Date: **June 2013**

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**Figure-8.5**





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**LONDON CITY AIRPORT**

**L<sub>Aeq,16h</sub> airborne aircraft noise contours**  
**54 - 72 in 3 dB steps**

**2019 - Summer Average Mode**  
**Without CADP**

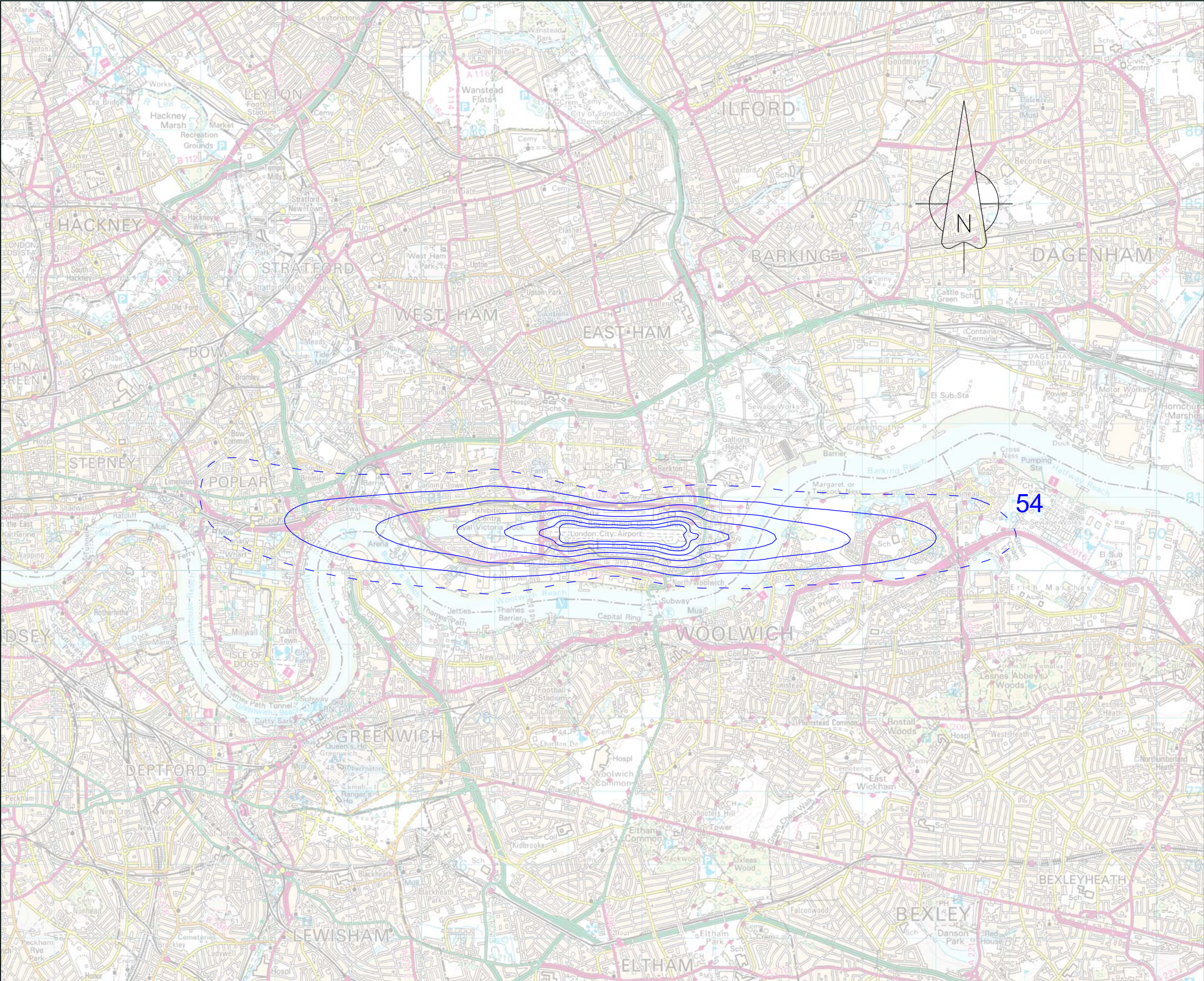
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Date: **June 2013**

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**Figure-8.6**





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**LONDON CITY AIRPORT**

**L<sub>Aeq,16h</sub> airborne aircraft noise contours**  
**54 - 72 in 3 dB steps**

**2021 - Summer Average Mode**  
**Without CADP**

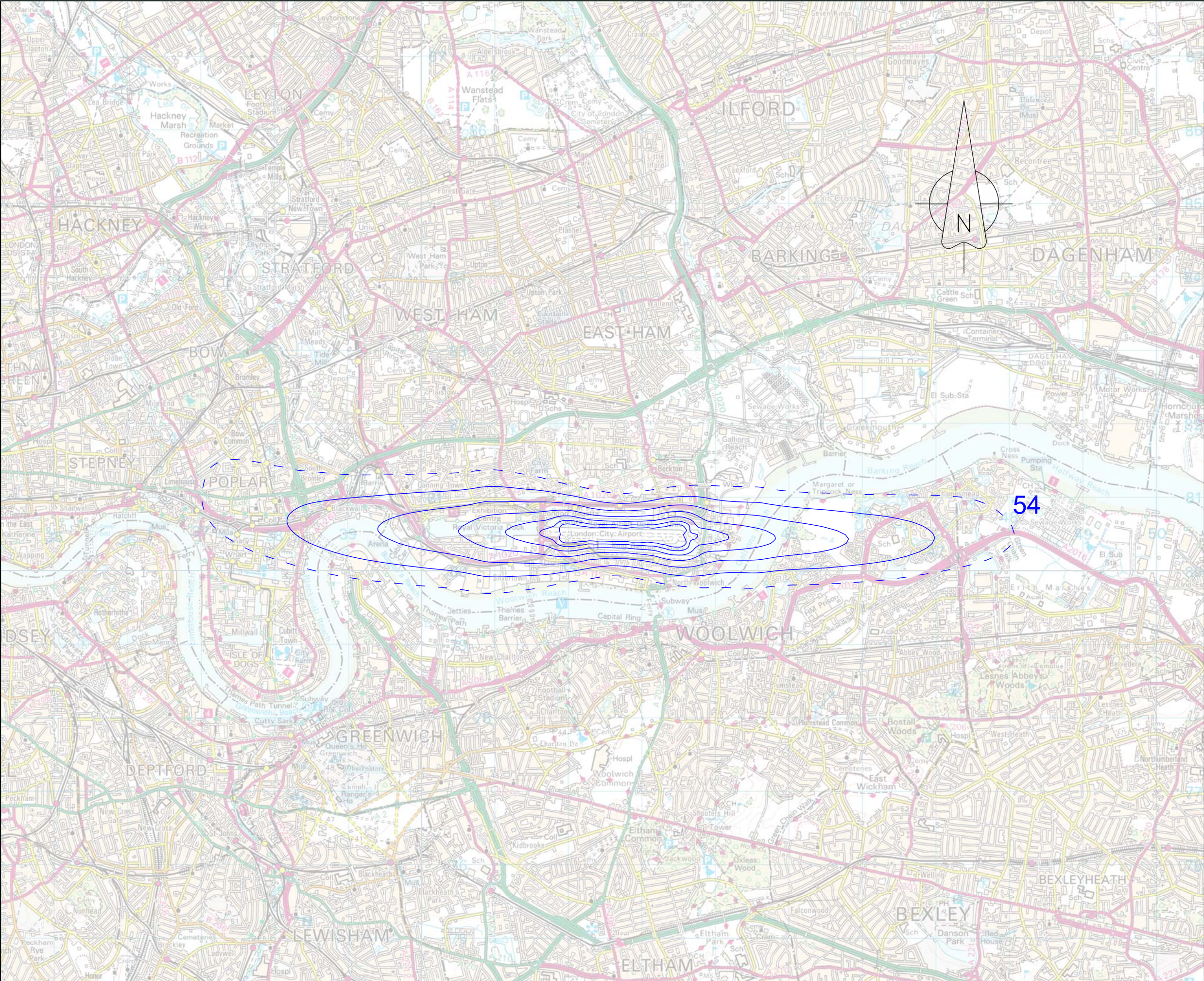
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**Figure-8.7**





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**LONDON CITY AIRPORT**

**L<sub>Aeq,16h</sub> airborne aircraft noise contours**  
**54 - 72 in 3 dB steps**

**2023 - Summer Average Mode**  
**Without CADP**

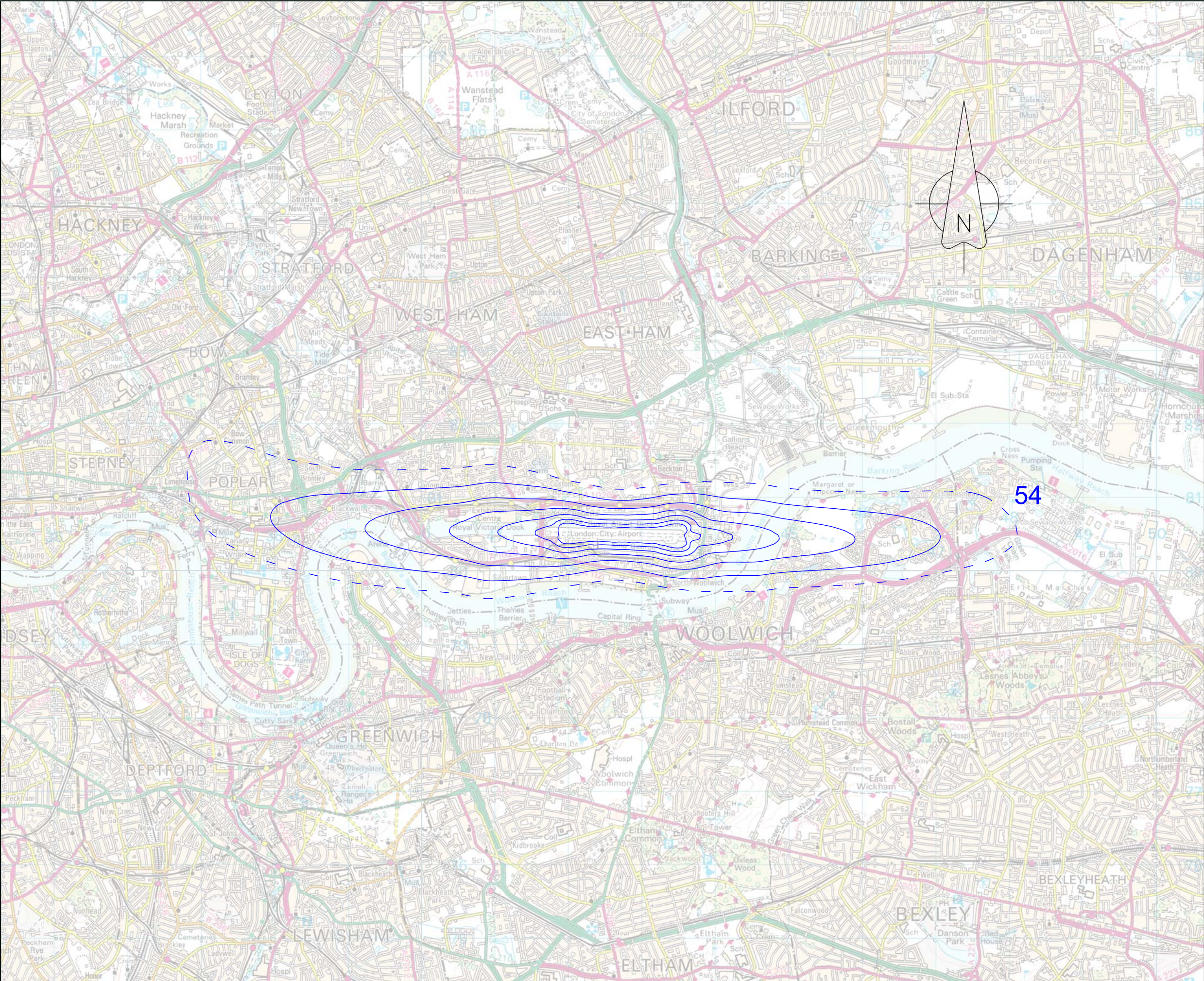
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**Figure-8.8**





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**L<sub>Aeq,16h</sub> airborne aircraft noise contours**  
**54 - 72 in 3 dB steps**

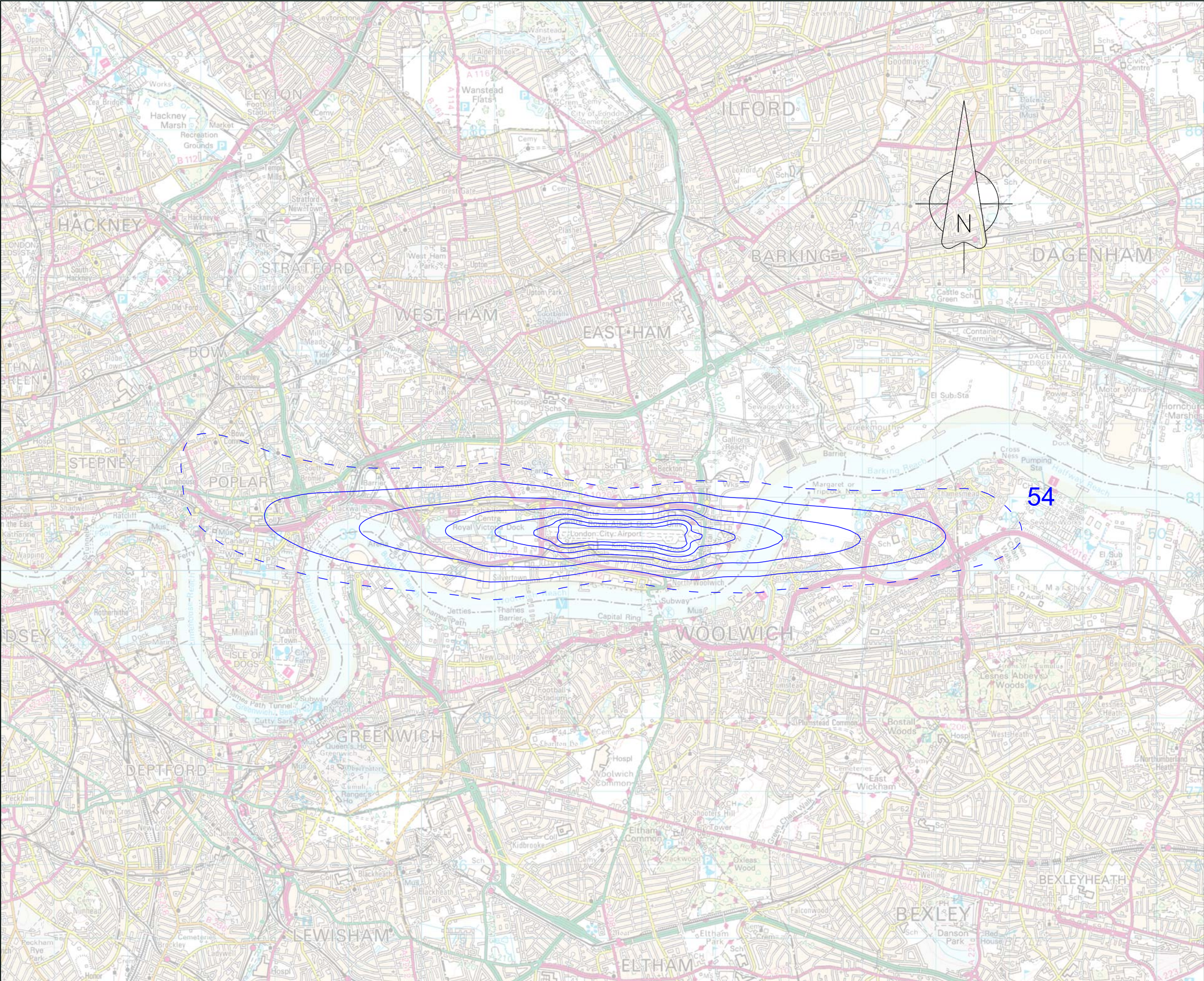
**2019 - Summer Average Mode**  
**With CADP**

Scale at A3  
**1:50,000**

Date: **June 2013**

Drawing Number  
**Figure-8.9**





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**L<sub>Aeq,16h</sub> airborne aircraft noise contours**  
**54 - 72 in 3 dB steps**

**2021 - Summer Average Mode**  
**With CADP**

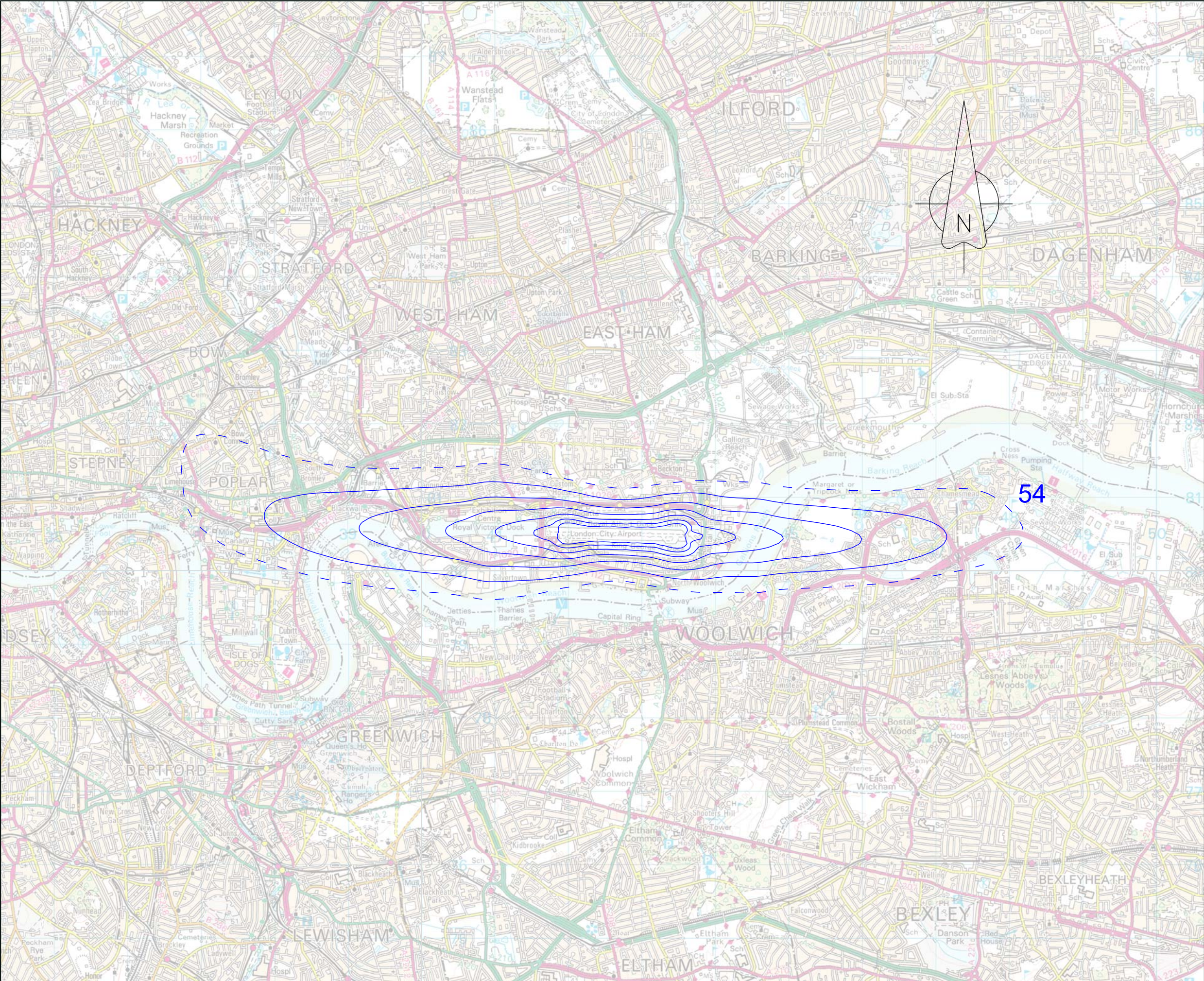
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**Figure-8.10**





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**LONDON CITY AIRPORT**

**L<sub>Aeq,16h</sub> airborne aircraft noise contours**  
**54 - 72 in 3 dB steps**

**2023 - Summer Average Mode**  
**With CADP**

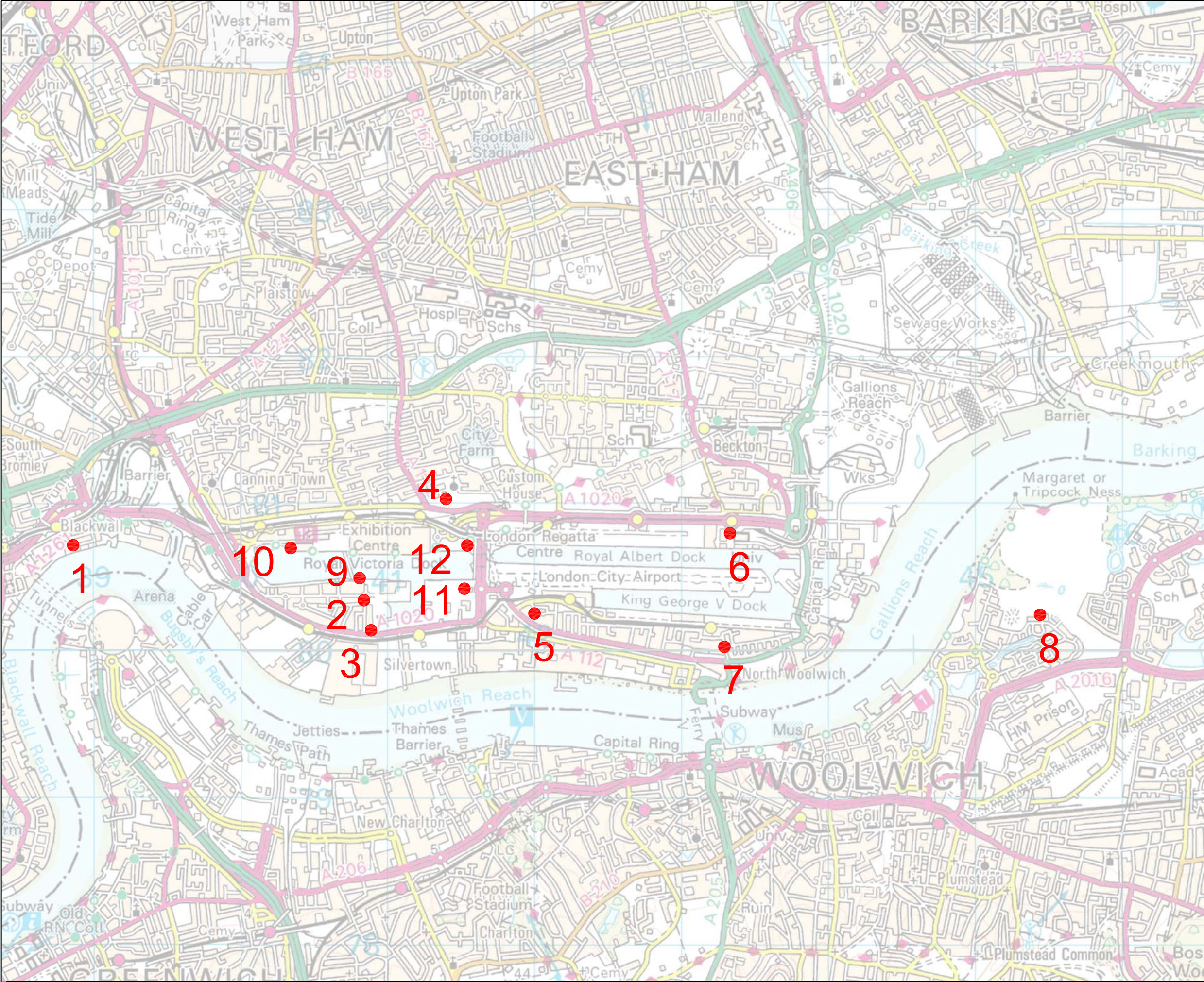
Scale at A3  
**1:50,000**

Date: **June 2013**

Drawing Number

**Figure-8.11**





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Legend

- 1. Blackwall, A125
- 2. Britannia Village
- 3. Silvertown, A1020
- 4. Custom House
- 5. Camel Road
- 6. Royal Albert Dock (north)
- 7. North Woolwich (north)
- 8. Thamesmead
- 9. Eastern Quay Apartments, Britannia Village
- 10. Coral Apartments, Western Gateway
- 11. Silvertown Quays
- 12. Ramada Hotel

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Drawing Title  
**LONDON CITY AIRPORT**

**Air Noise Assessment Locations**

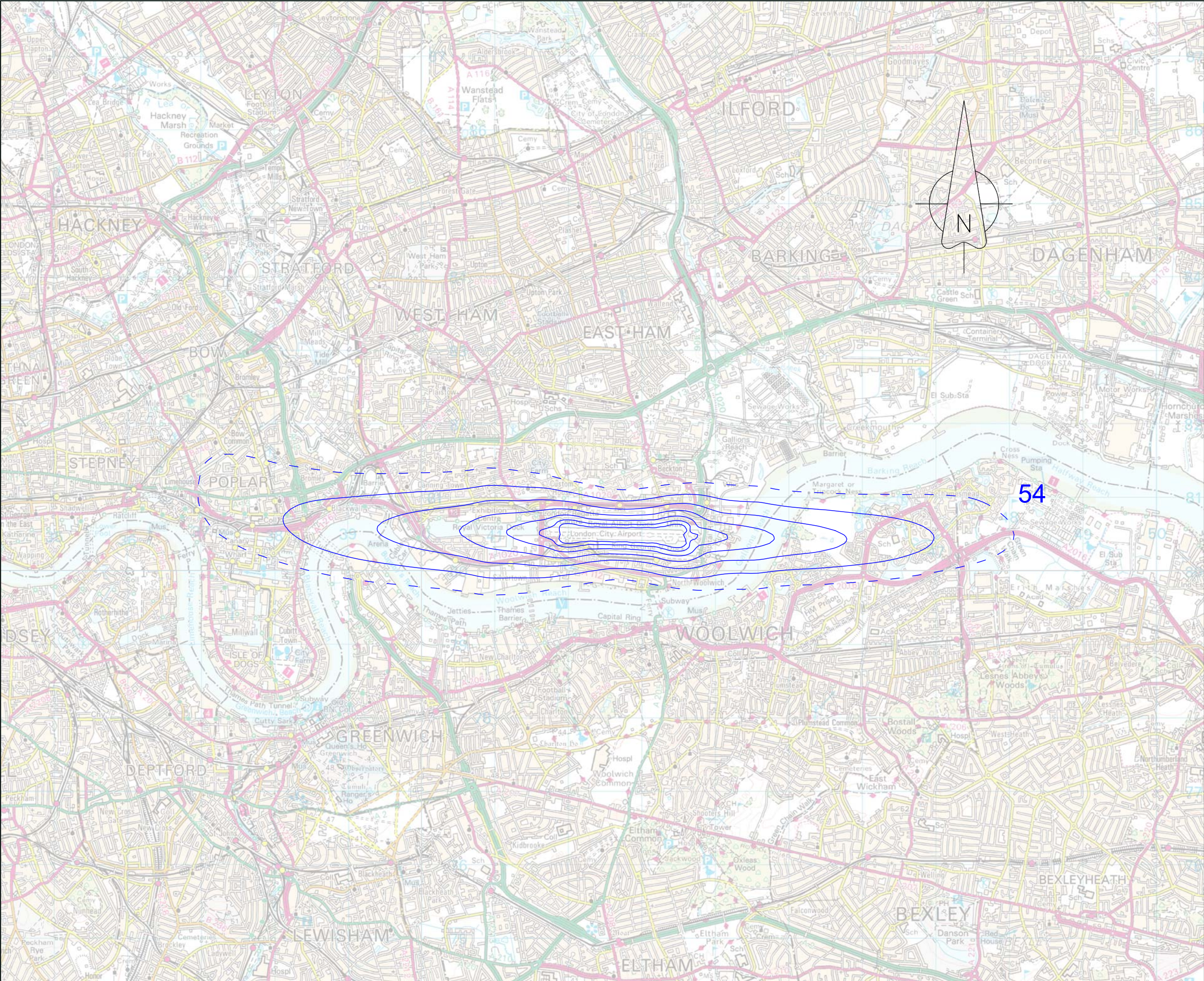
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Date: **June 2013**

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**Figure-8.12**





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Drawing Title  
**LONDON CITY AIRPORT**

**L<sub>Aeq,16h</sub> airborne aircraft noise contours**  
**54 - 72 in 3 dB steps**

**Further Re-fleeting by 2023 - Summer**  
**Average Mode**  
**Sensitivity Mix**  
**With CADP**

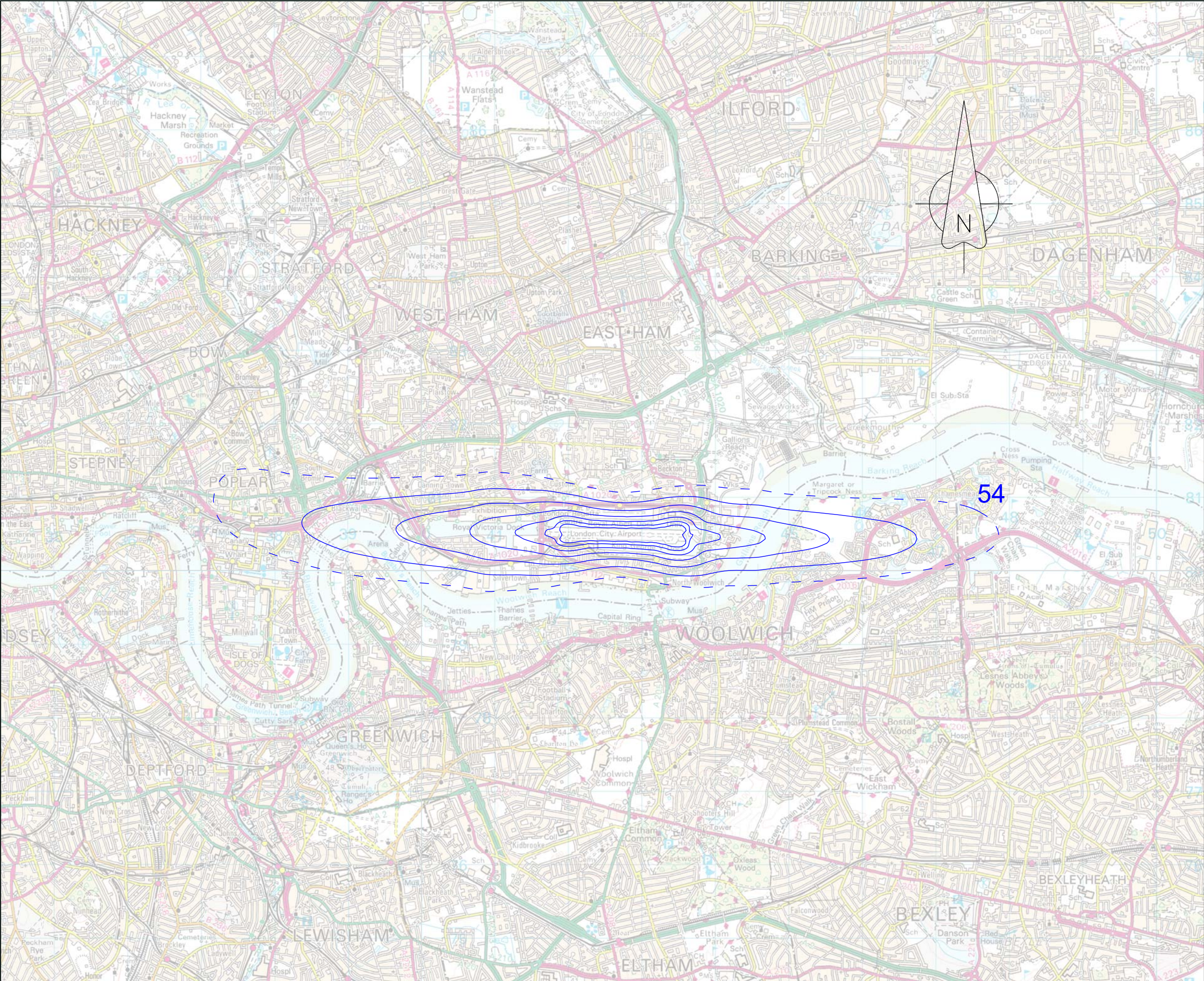
Scale at A3  
**1:50,000**

Date: **June 2013**

Drawing Number

**Figure-8.13**





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Drawing Title  
**LONDON CITY AIRPORT**

**L<sub>Aeq,16h</sub> airborne aircraft noise contours**  
**54 - 72 in 3 dB steps**  
**Further Re-fleetling by 2023 - Summer**  
**Average Mode**  
**Sensitivity Mix**  
**With CADP**  
**96.7k annual movements**

Scale at A3  
**1:50,000**

Date: **June 2013**

Drawing Number

**Figure-8.14**



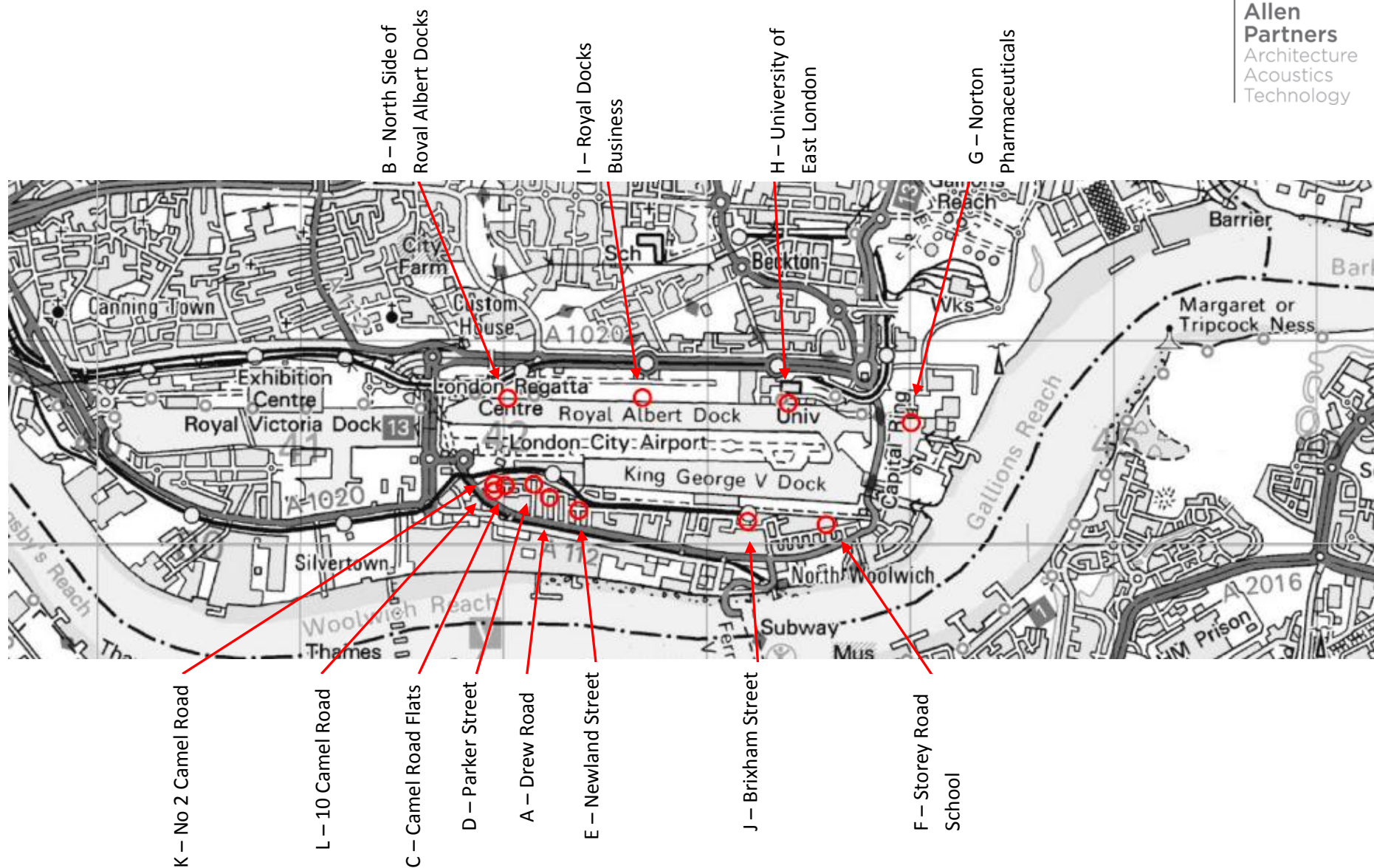
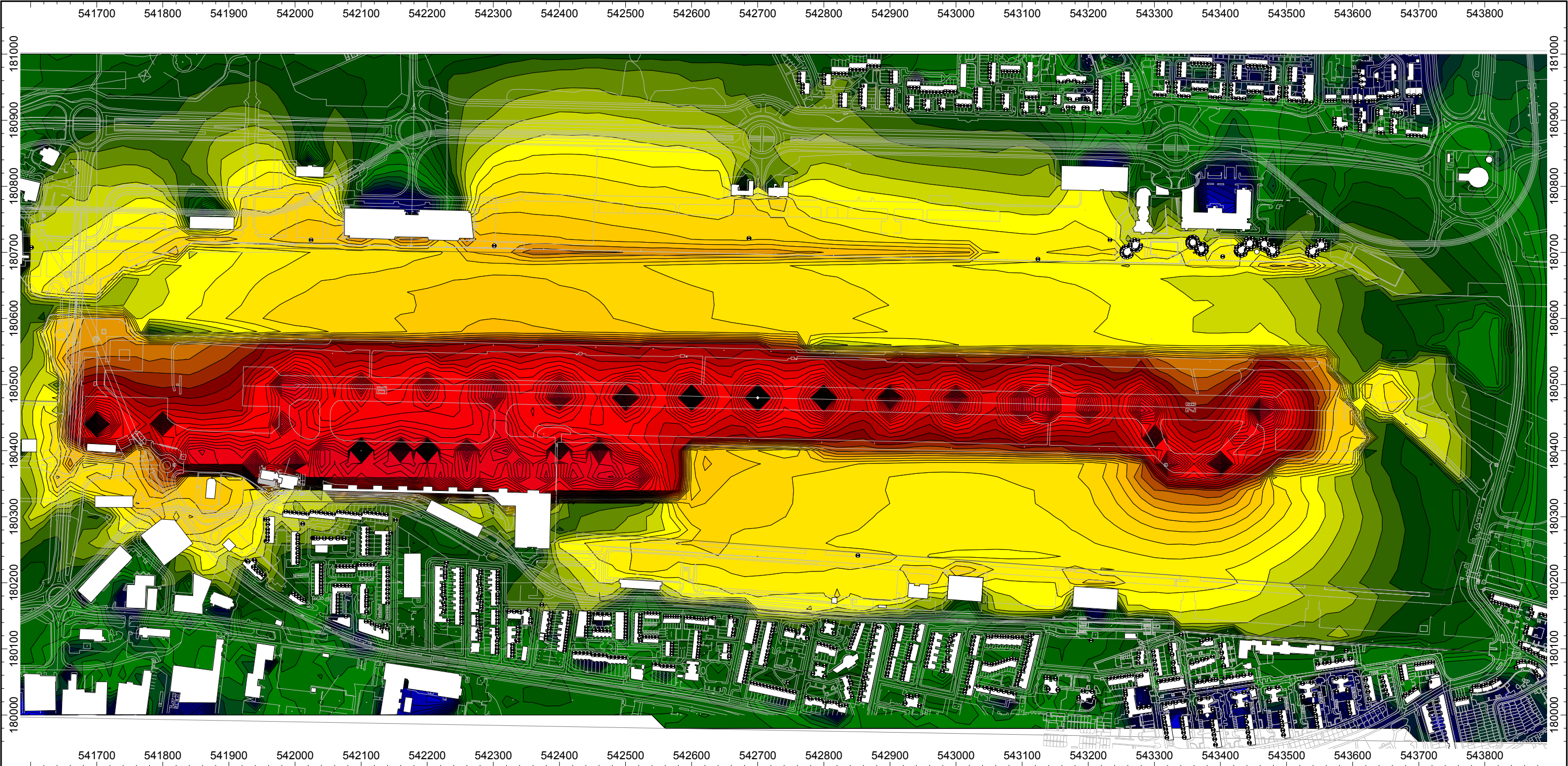


Figure 8.15 – Location of key receptors for ground noise assessment





Ground Noise LAeq, 16h dB(A)  
Receiver height 4m  
Grid spacing 20 x 20 m

Not to scale

A9575 v1.0 05.07.2013

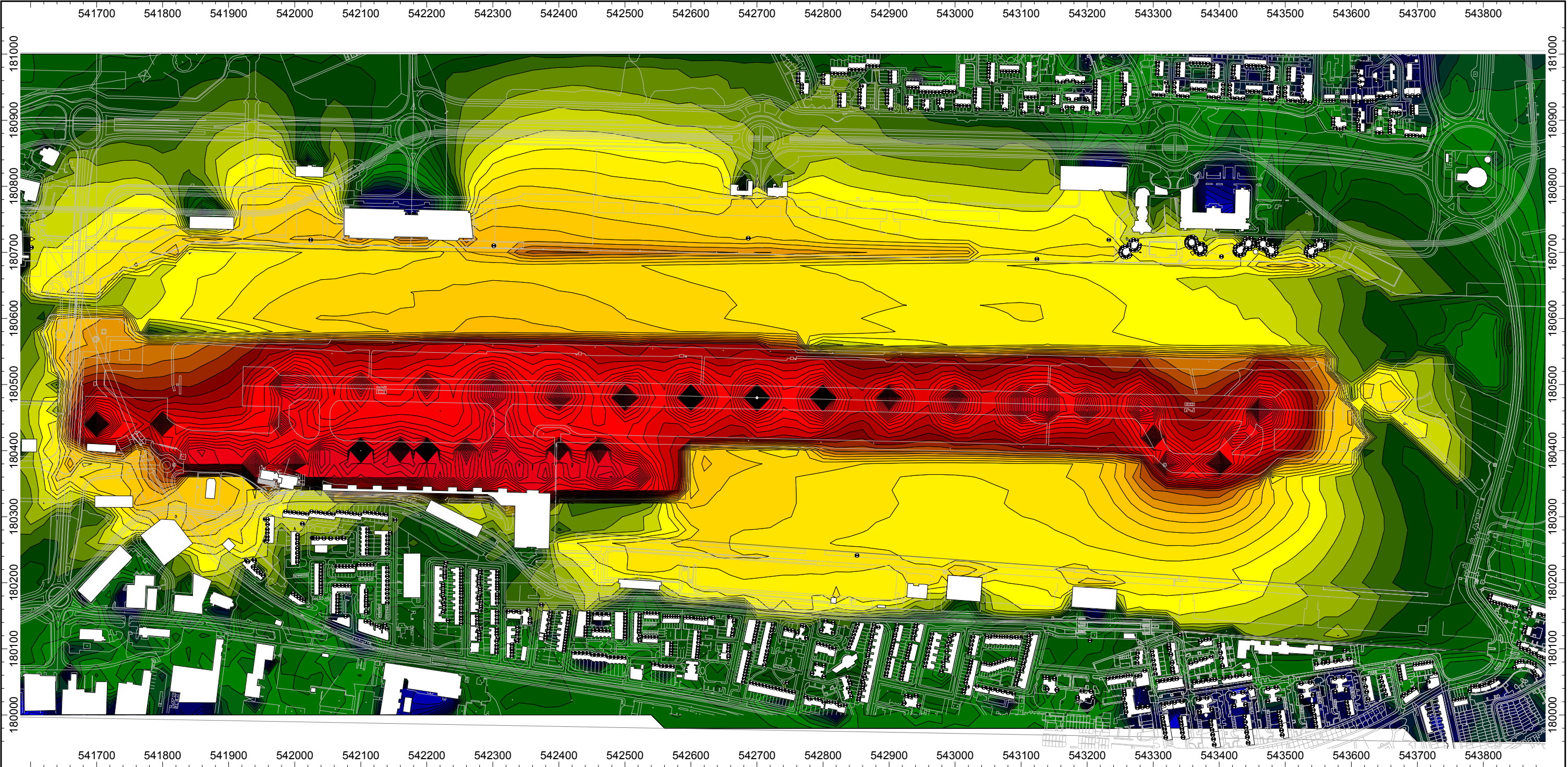
A9575 - London City Airport - Ground Noise Figure 1.16

**London City Airport - 2012 Baseline**

CadnaA Aircraft ground noise contours

- >= 30.0 dB(A)
- >= 35.0 dB(A)
- >= 40.0 dB(A)
- >= 45.0 dB(A)
- >= 50.0 dB(A)
- >= 55.0 dB(A)
- >= 60.0 dB(A)
- >= 65.0 dB(A)
- >= 70.0 dB(A)





Ground Noise LAeq, 16h dB(A)  
Receiver height 4m  
Grid spacing 20 x 20 m

Not to scale

A9575 v1.0 05.07.2013

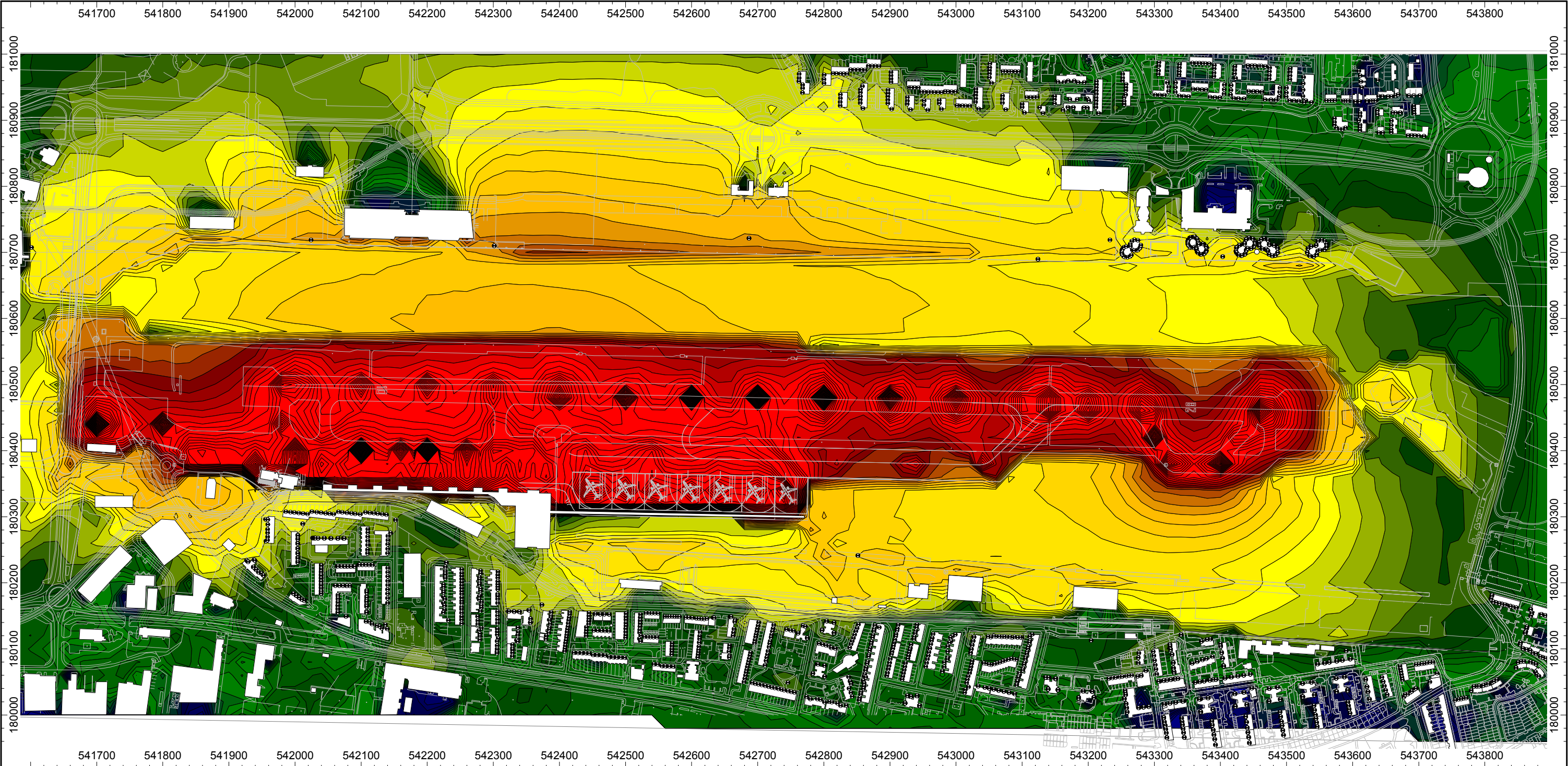
A9575 - London City Airport - Ground Noise Figure 8.17

**London City Airport - 2019 Without Development**

CadnaA Aircraft ground noise contours

- >= 30.0 dB(A)
- >= 35.0 dB(A)
- >= 40.0 dB(A)
- >= 45.0 dB(A)
- >= 50.0 dB(A)
- >= 55.0 dB(A)
- >= 60.0 dB(A)
- >= 65.0 dB(A)
- >= 70.0 dB(A)





Ground Noise LAeq, 16h dB(A)  
Receiver height 4m  
Grid spacing 20 x 20m

Not to scale

A9575 v1.0 05.07.13

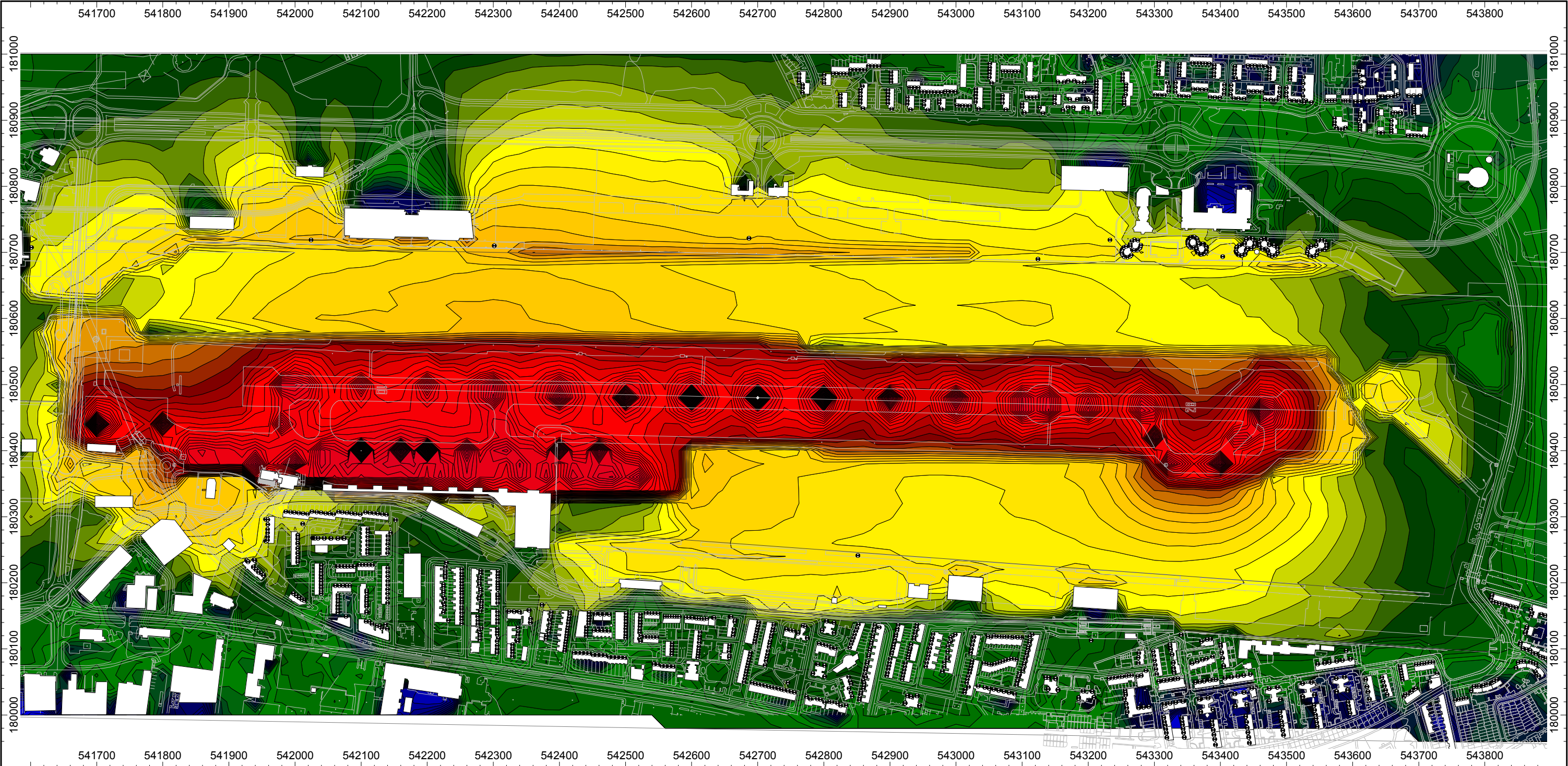
A9575 - London City Airport - Ground Noise Figure 8.18

**London City Airport - 2019 With Development**

CadnaA Aircraft ground noise contours

- >= 30.0 dB(A)
- >= 35.0 dB(A)
- >= 40.0 dB(A)
- >= 45.0 dB(A)
- >= 50.0 dB(A)
- >= 55.0 dB(A)
- >= 60.0 dB(A)
- >= 65.0 dB(A)
- >= 70.0 dB(A)





Ground Noise LAeq, 16h dB(A)  
Receiver height 4 m  
Grid spacing 20 x 20 m

Not to scale

A9575 v1.0 05.07.2013

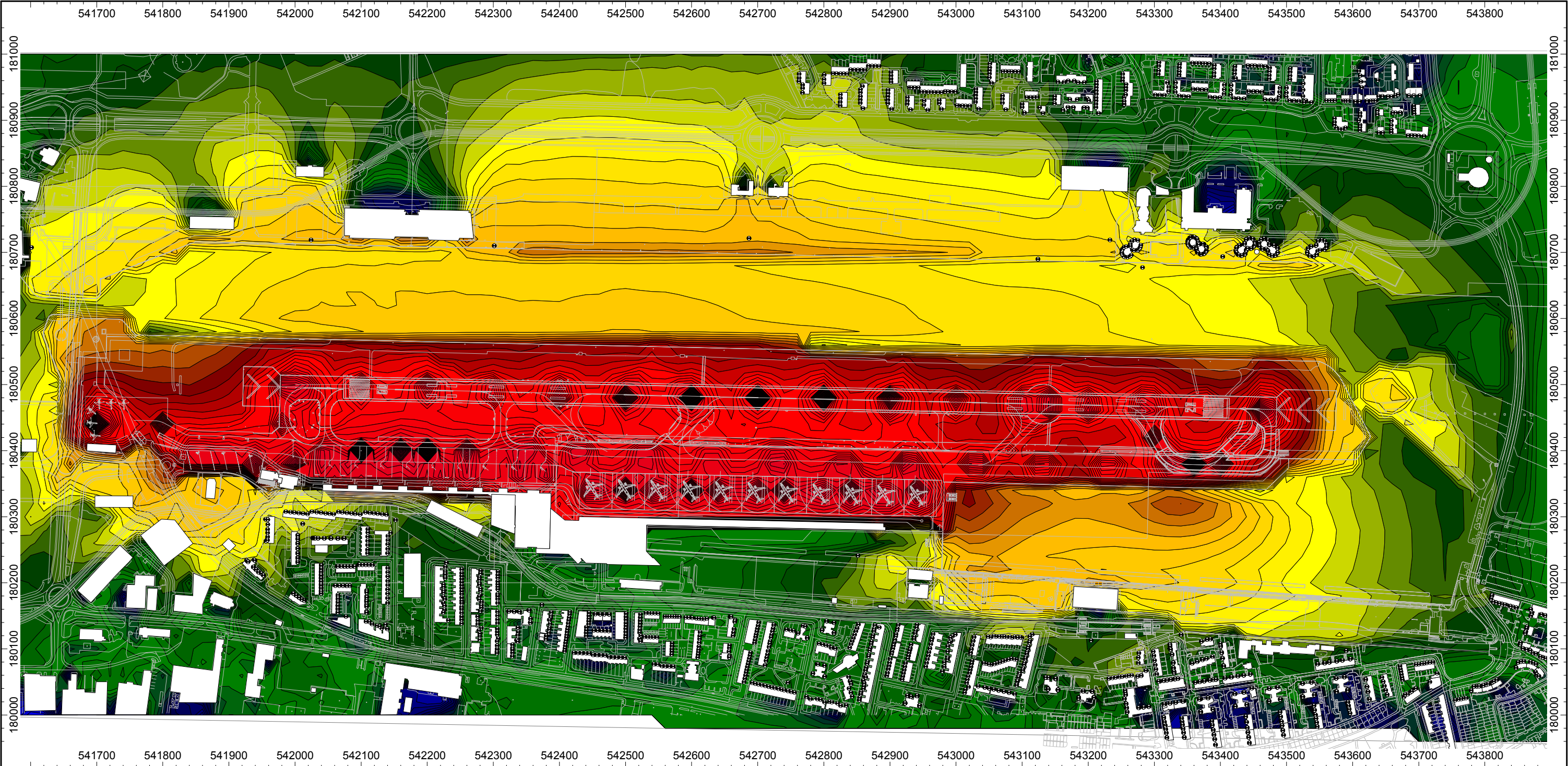
A9575 - London City Airport - Ground Noise Figure 8.19

London City Airport - 2021 Without Development

CadnaA Aircraft ground noise contours

- >= 30.0 dB(A)
- >= 35.0 dB(A)
- >= 40.0 dB(A)
- >= 45.0 dB(A)
- >= 50.0 dB(A)
- >= 55.0 dB(A)
- >= 60.0 dB(A)
- >= 65.0 dB(A)
- >= 70.0 dB(A)





Ground Noise LAeq, 16h dB(A)  
Receiver height 4 m  
Grid spacing 20 x 20 m

Not to scale

A9575 GN v1.2 05.07.2013

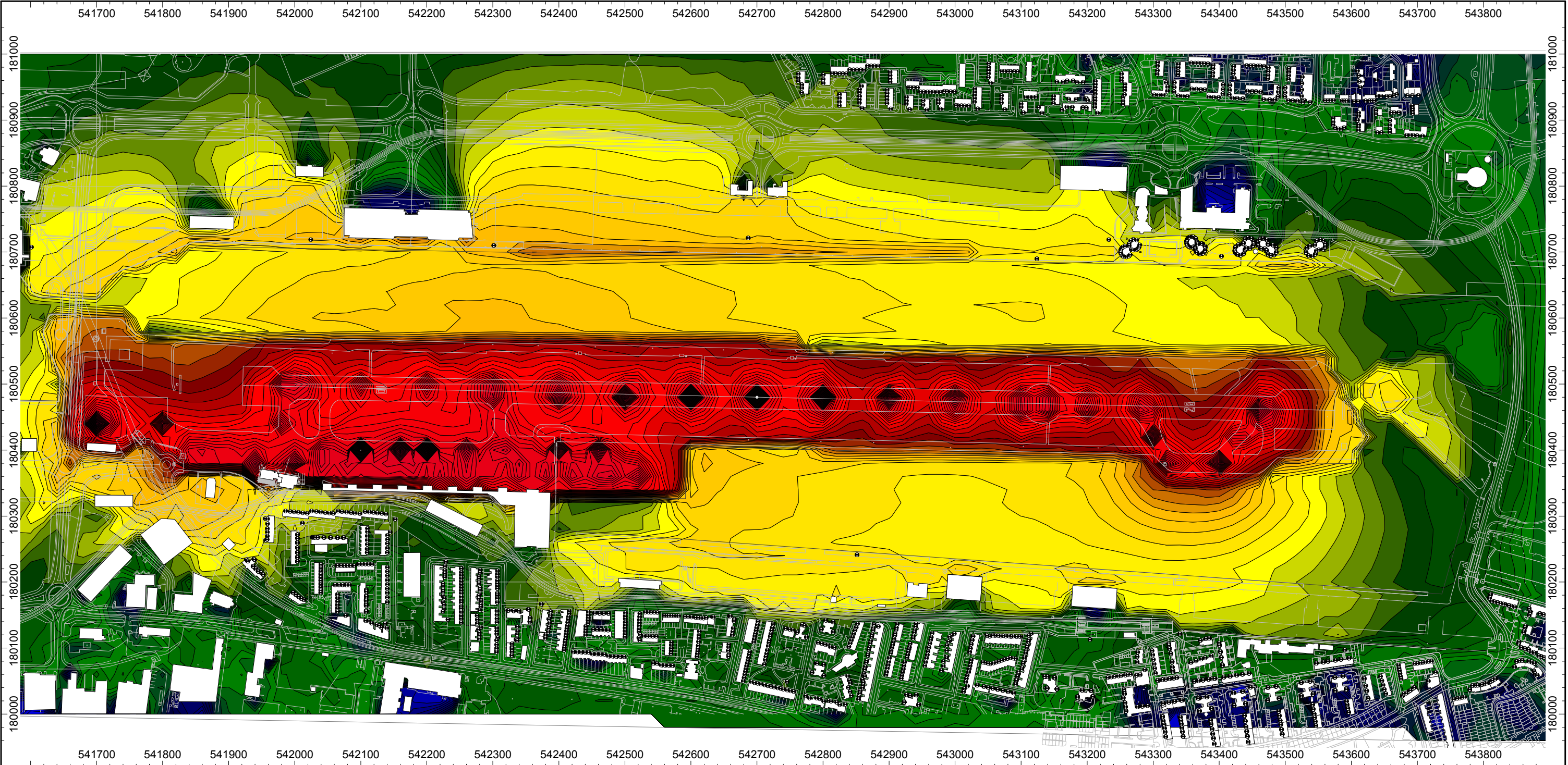
A9575- London City Airport - Ground Noise Figure 8.20

London City Airport - 2021 With Development

CadnaA Aircraft ground noise contours

- >= 30.0 dB(A)
- >= 35.0 dB(A)
- >= 40.0 dB(A)
- >= 45.0 dB(A)
- >= 50.0 dB(A)
- >= 55.0 dB(A)
- >= 60.0 dB(A)
- >= 65.0 dB(A)
- >= 70.0 dB(A)





Ground Noise LAeq, 16h dB(A)  
Receiver height 4m  
Grid spacing 20 x 20 m

Not to scale

A9575 v1.0 05.07.2013

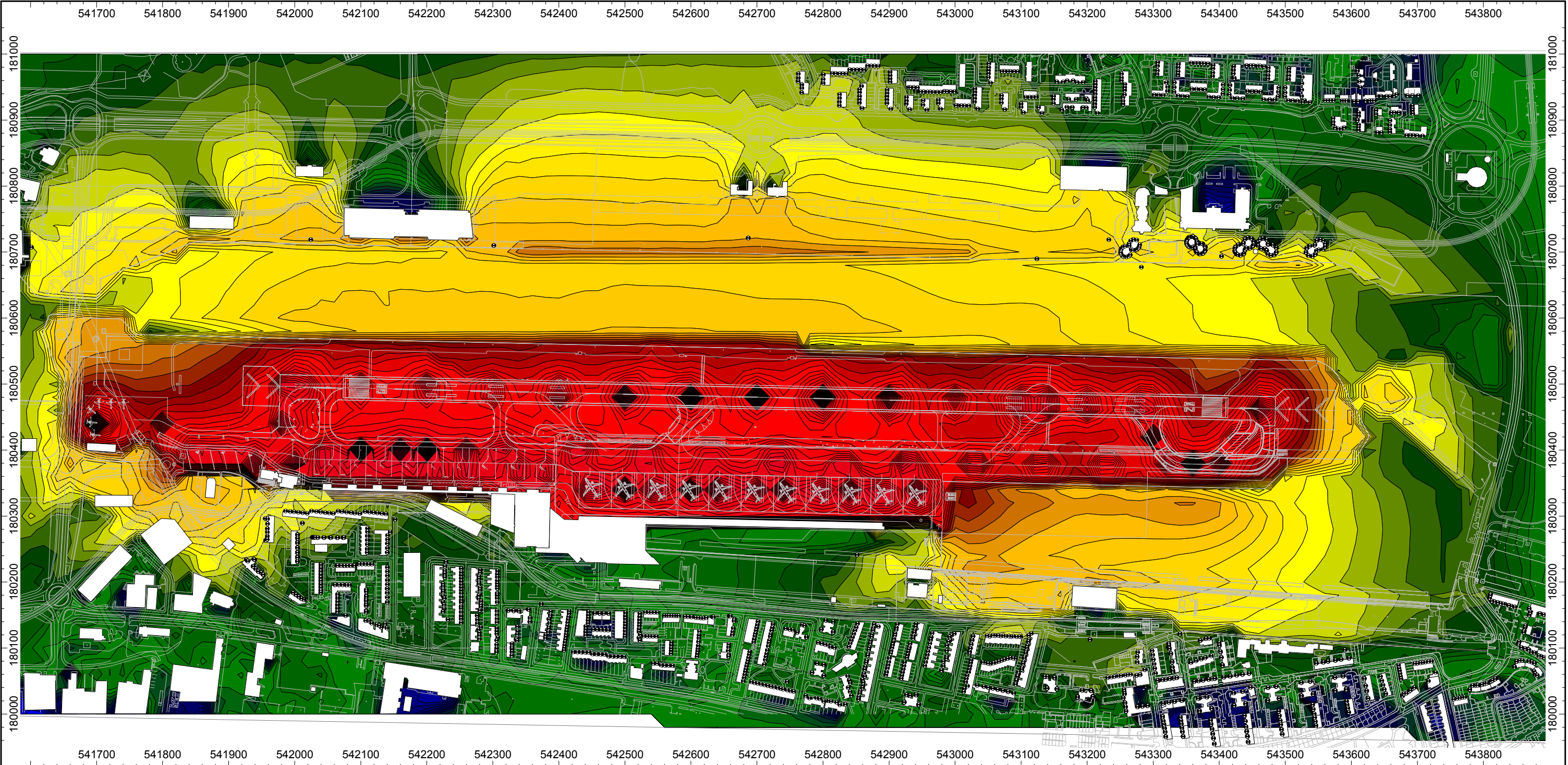
A9575 - London City Airport - Ground Noise Figure A8.21

**London City Airport - 2023 Without Development**

CadnaA Aircraft ground noise contours

- >= 30.0 dB(A)
- >= 35.0 dB(A)
- >= 40.0 dB(A)
- >= 45.0 dB(A)
- >= 50.0 dB(A)
- >= 55.0 dB(A)
- >= 60.0 dB(A)
- >= 65.0 dB(A)
- >= 70.0 dB(A)





Ground Noise LAeq, 16h dB(A)  
Receiver height 4 m  
Grid spacing 20 x 20 m

Not to scale

A9575 GN v1.2 05.07.13

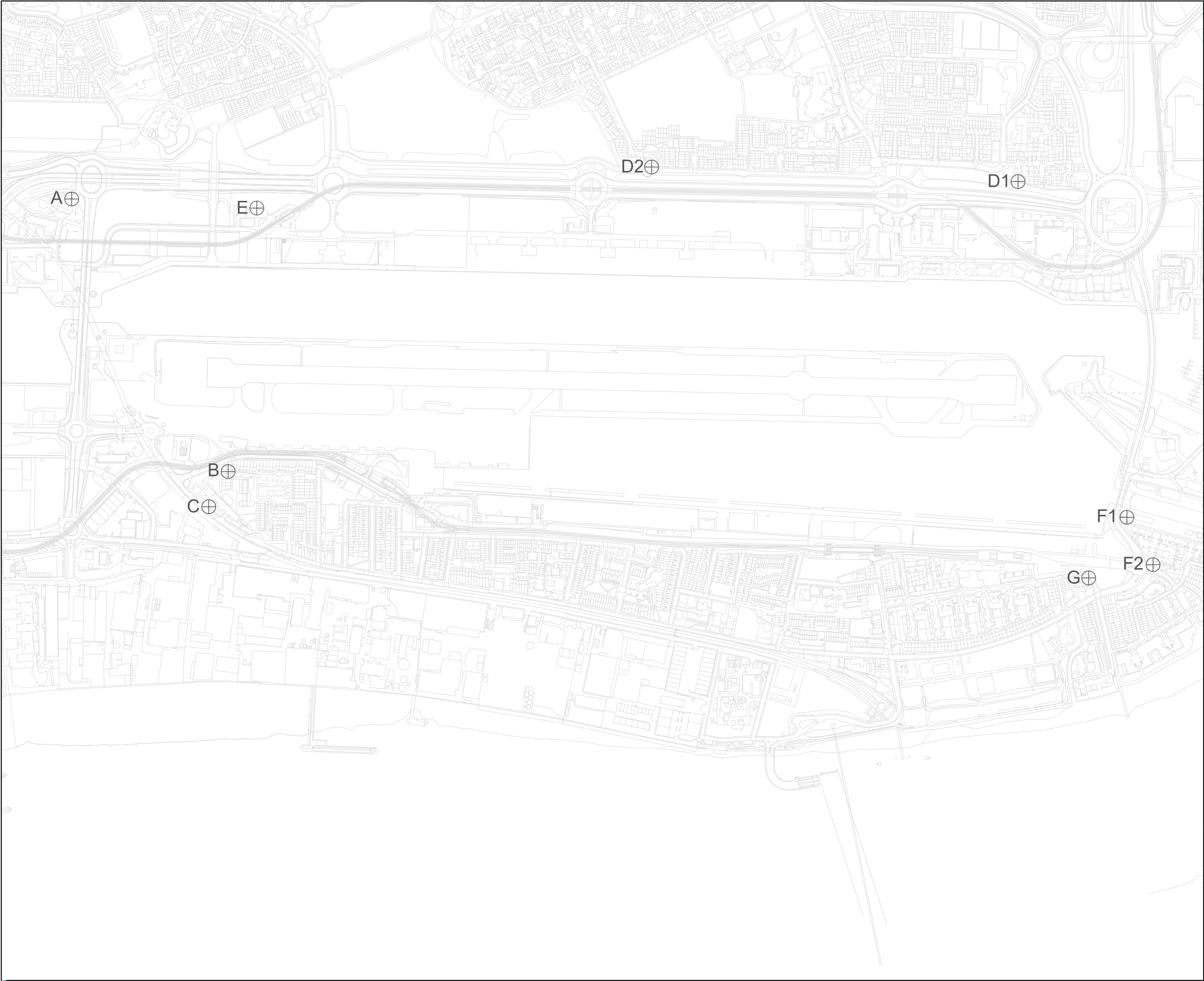
## A9575- London City Airport - Ground Noise Figure 8.22

### London City Airport - 2023 With Development

CadnaA Aircraft ground noise contours

- >= 30.0 dB(A)
- >= 35.0 dB(A)
- >= 40.0 dB(A)
- >= 45.0 dB(A)
- >= 50.0 dB(A)
- >= 55.0 dB(A)
- >= 60.0 dB(A)
- >= 65.0 dB(A)
- >= 70.0 dB(A)





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Legend

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Assessment position

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**Road Traffic Noise Assessment  
Locations**

Scale at A3  
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Date: June 2013

Drawing Number  
**Figure-8.23**



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Assessment position

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Drawing Title  
**LONDON CITY AIRPORT**  
**Construction Noise Assessment  
Locations**

Scale at A3  
**Not to scale**

Date: June 2013

Drawing Number  
**Figure-8.24**

## 9 Air Quality

### Introduction

- 9.1 This chapter describes the likely significant effects of the proposed CADP with respect to local air quality, during both the construction and operational phases. The study has been carried out by Air Quality Consultants Ltd (AQC) on behalf of the Airport.
- 9.2 A detailed description of the proposed CADP is provided in Chapter 2: Site Context and Scheme Description, of this ES. In terms of this air quality assessment, the most pertinent features of the proposals are:
- a) The construction of seven new aircraft stands, parallel taxiway, and associated infrastructure to the east of the existing terminal building, with associated dust and pollutant emissions during the construction works, and changes in the spatial distribution of pollutant emissions during operation;
  - b) Increased passenger numbers and associated changes to surface access (road traffic movements);
  - c) Changes in aircraft emissions during operation due to predicted changes in fleet mix and the introduction of a new type of aircraft; and
  - d) The construction of new passenger facilities, hotel, surface-level and decked car parking facilities and a taxi feeder park.
- 9.3 As described in Chapter 2, the Airport has recently received planning permission for the re-provision of Stand 11 to the western edge of the apron, adjacent to the Jet Centre. The soon to be re-provided Stand 11 has thus been included in all future year scenarios.
- 9.4 The Airport lies outside of, but adjacent to, an Air Quality Management Area (AQMA) which has been designated by the London Borough of Newham (LBN) for exceedences of the annual mean objective for nitrogen dioxide and the daily mean objective for PM<sub>10</sub> (see Figure 9.1). Developments within or close to AQMA's require particular attention to be paid to any potential air quality effects. The extent to which the proposed CADP could affect measures within the local authority's Air Quality Action Plan (AQAP) also needs to be considered.
- 9.5 The assessment focuses on two pollutants with respect to potential human health effects, namely nitrogen dioxide (NO<sub>2</sub>) and fine particles (PM<sub>10</sub> and PM<sub>2.5</sub>), as these pollutants are of greatest concern within LBN. Consideration is also given to the potential for odour nuisance.
- 9.6 There are unlikely to be any significant effects arising from emissions of benzene, 1,3-butadiene, carbon monoxide, lead or sulphur dioxide. It is widely acknowledged that problems with these pollutants are only likely to occur in the vicinity of specific industrial processes, and exceedences of the health-based standards do not occur even in the vicinity of major airports such as Heathrow <sup>(1)</sup>. They have therefore been scoped out of the assessment.



- 9.7 This assessment takes into account all relevant local and national guidance and regulations, and takes into account comments received from LBN through the formal EIA Scoping process.

**Figure 9.1 – LB Newham AQMA Boundary.** Crown Copyright © 2013. All rights reserved.  
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## Legislative Context and National Planning Policy

### European Legislation

- 9.8 Directive 2008/50/EC <sup>(2)</sup> *Ambient Air Quality and Cleaner Air for Europe*, entered into force on 11 June 2008, with Member States required to incorporate the provisions into national legislation before 11 June 2010. The principal aim of the Directive is to protect human health and the environment by avoiding, reducing or preventing harmful concentrations of air pollutants, by the establishment of limit and target values; by the assessment of air quality in a uniform manner; by making air quality information available to the public; and by setting out plans and programmes to maintain or improve ambient air quality conditions.

### National Regulations

- 9.9 The 2007 Air Quality Strategy <sup>(3)</sup> provides the policy framework for air quality management and assessment in the UK. It provides air quality standards and objectives for key air pollutants, which are designed to protect human health and the environment. It also sets out how the different sectors, industry, transport and local government, can contribute to achieving the air quality objectives. Local authorities are seen to play a particularly important role. The Strategy describes the Local Air Quality Management (LAQM) regime that has been established, whereby every authority has to carry out regular Reviews and Assessments of air quality in its area to identify whether the objectives have been, or will be, achieved at relevant locations, by the applicable date. If this is not the case, the authority must declare an Air Quality Management Area (AQMA), and prepare an action plan that identifies appropriate measures that will be introduced in pursuit of the objectives.
- 9.10 The objectives defined in the Strategy are linked to the air quality Limit Values set at a European level in the Ambient Air Quality Directive.

### *Aviation Policy Framework (2013)*

- 9.11 The Aviation Policy Framework <sup>(4)</sup> sets out the Government's high level strategy and overall objectives for aviation, and replaces the 2003 Air Transport White Paper <sup>(5)</sup>. With regards to air quality, the policy is to seek improved international standards to reduce emissions from aircraft and vehicles, and to work with airports and local authorities to improve air quality, including encouraging transport operators to introduce less polluting vehicles. The Framework places a particular importance on areas where the EU limit values and air quality objectives are exceeded, but recognises that nitrous oxides (NOx) concentrations from aviation-related activities reduce rapidly beyond the immediate area of the runway, and places emphasis on reducing emissions associated with surface access. In particular, the preparation of Airport Surface Access Strategies (ASASs) is strongly encouraged, together with the development of targets to reduce the air quality impacts of surface access.

### National Planning Policy

- 9.12 The National Planning Policy Framework (NPPF) <sup>(6)</sup> introduced in March 2012 sets out planning policy for the UK in one document. It replaces the majority of previous Planning Policy Statements, including PPS23 on Planning and Pollution Control. The NPPF contains advice on when air quality should be a material consideration in development control decisions. Existing, and likely future, air quality should be taken into account, as well as the EU limit values and national objectives, the presence of any AQMAs, and the appropriateness of both the development for the site, and the site for the development.
- 9.13 The NPPF places a general presumption in favour of sustainable development, stressing the importance of local development plans, and states that the planning system should perform an

environmental role to minimise pollution. One of the twelve core planning principles notes that planning should “contribute to...reducing pollution”.

- 9.14 To prevent unacceptable risks from air pollution, planning decisions should ensure that new development is appropriate for its location. The NPPF states that the effects of pollution on health and the sensitivity of the area and the development should be taken into account.
- 9.15 The need for compliance with any statutory air quality limit values and objectives is stressed, and the presence of AQMAs must be accounted for in terms of the cumulative impacts on air quality from individual sites in local areas. New developments in AQMAs should be consistent with local air quality action plans.

#### Regional Planning Policy and Guidance

##### *The London Plan (2011)*

- 9.16 The London Plan 2011 <sup>(7)</sup> sets out the spatial development strategy for London. It brings together all relevant strategies, including those relating to air quality.
- 9.17 Policy 7.14, ‘Improving Air Quality’, addresses the spatial implications of the Mayor’s Air Quality Strategy (described below) and how development and land use can help achieve its objectives. It recognises that Boroughs should have policies in place to reduce pollutant concentrations, having regard for the Mayor’s Air Quality Strategy. With respect to planning decisions, it states that:

*“Development proposals should:*

- a) minimise increased exposure to existing poor air quality and make provision to address local problems of air quality (particularly within AQMAs or where development is likely to be used by large numbers of those particularly vulnerable to poor air quality, such as children or older people) such as by design solutions, buffer zones or steps to promote greater use of sustainable transport modes through travel plans (see Policy 6.3);*
- b) promote sustainable design and construction to reduce emissions from the demolition and construction of buildings following the best practice guidance in the GLA and London Councils “The control, of dust and emissions from construction and demolition”;*
- c) be at least “air quality neutral” and not lead to further deterioration of existing poor air quality (such as areas designated as Air Quality Management Areas (AQMAs);*
- d) ensure that where provision needs to be made to reduce emissions from a development, these usually are made on site. Where it can be demonstrated that on-site provision is impractical or inappropriate, and that it is possible to put in place measures having clearly demonstrated equivalent air quality benefits, planning obligations or planning conditions*

*should be used as appropriate to ensure this, whether on a scheme by scheme basis or through joint area-based approaches;*

- e) *where the development requires a detailed air quality assessment and biomass boilers are included, the assessment should forecast pollutant concentrations. Permission should only be granted if no adverse air quality impacts from the biomass boiler are identified.”*

*The Mayor's Air Quality Strategy (2010)*

9.18 The revised Mayor's Air Quality Strategy (MAQS) was published in December 2010 <sup>(8)</sup>. The overarching aim of the Strategy is to reduce pollution concentrations in London to achieve compliance with the EU limit values as soon as possible. The Strategy commits to the continuation of measures identified in the 2002 MAQS and sets out a series of additional measures, including:

- a) **Policy 1:** Encouraging smarter choices and sustainable travel;
  - i. Measures to reduce emissions from idling vehicles focusing on buses, taxis, coaches, taxis, PHVs and delivery vehicles;
  - ii. Using spatial planning powers to support a shift to public transport; and
  - iii. Supporting car free developments.
- b) **Policy 2:** Promoting technological change and cleaner vehicles:
  - i. Supporting the uptake of cleaner vehicles.
- c) **Policy 4:** Reducing emissions from public transport:
  - i. Introducing age limits for taxis and PHVs.
- d) **Policy 5:** Schemes that control emissions to air:
  - i. Implementing Phases 3 and 4 of the LEZ from January 2012
  - ii. Introducing a NOx emissions standard (Euro IV) into the Low Emission Zone (LEZ) for HGVs, buses and coaches, from 2015.
- e) **Policy 7:** Using the planning process to improve air quality:
  - i. Minimising increased exposure to poor air quality, particularly within AQMAs or where a development is likely to be used by a large number of people who are particularly vulnerable to air quality;
  - ii. Ensuring air quality benefits are realised through planning conditions and section 106 agreements and Community Infrastructure Levy.
- f) **Policy 8:** Creating opportunities between low to zero carbon energy supply for London and air quality impacts:
  - i. Applying emissions limits for biomass boilers across London;



- ii. Requiring an emissions assessment to be included at the planning application stage.

#### *Low Emission Zone (LEZ) (2008)*

- 9.19 A Low Emission Zone (LEZ) for London was introduced under the Strategy on 4<sup>th</sup> February 2008. All roads within Greater London, excluding those parts of the M25 located within the Greater London boundary, are included within the LEZ. This entails charges for vehicles entering Greater London not meeting certain emissions criteria, and affects older, diesel-engine lorries, buses, coaches, large vans, minibuses and other specialist vehicles derived from lorries and vans.
- 9.20 The timescale for implementation of the LEZ was 2008 for diesel heavy goods vehicles (HGVs), coaches and buses; and 2010 for the heaviest, most polluting large vans and minibuses (a standard of Euro III). From January 2012, a standard of Euro IV was implemented for lorries over 12 tonnes, buses and coaches, with larger vans and minibuses also brought into the scheme. Cars and lighter goods vehicles (LGVs) are excluded. A NO<sub>x</sub> emissions standard (Euro IV) will be included into the LEZ for TfL operated buses from 2015.

#### Local Policies and Plans

- 9.21 The Newham Core Strategy was adopted in January 2012 <sup>(9)</sup>. This forms part of the Local Development Framework (LDF) that will replace the Unitary Development Plan. Policy EQ46 of the UDP which had previously been saved, and which related to air quality, has now been superseded by the Core Strategy.
- 9.22 Core Strategy, Policy SP2: Healthy Neighbourhoods states that;

*“The Council supports health care partners’ efforts to promote healthy lifestyles and reduce health inequalities and recognises the role of planning in doing so through the creation of healthy neighbourhoods and places. To this end, development proposals which respond to the following contributors to health and well-being will be supported:*

*The need to improve Newham’s air quality, reduce exposure to airborne pollutants and secure the implementation of the Air Quality Action Plan having regard to national and international obligations.”*

#### Air Quality Action Plans

- 9.23 Following the declaration of the Air Quality Management Area in the London Borough of Newham, a consultation Air Quality Action Plan <sup>(10)</sup> was published in 2003. A number of measures relate specifically to the Airport’s operations – a summary of these and the progress made to date is summarised in Table 9.1 below.

**Table 9.1 - Summary of Progress on Airport-Related Measures in LBN Action Plan**

Measure	Progress
The Airport to carry out a detailed study of the impact of the airport on local air quality conditions.	As part of the 2007 planning application (07/01510/VAR) for expansion of operations to 120,000 'noise factored' movements per annum, a detailed air quality assessment was undertaken by the Airport to quantify the impact of Airport operations.
Green Transport Plan to be regularly updated	An updated Travel Plan was submitted by the Airport to LBN in June 2010.
LBN to liaise with the Airport for the Vehicle Inspectorate to carry out random emission checks of queuing taxis at the Airport.	The Airport has indicated its willingness to support emissions testing. LBN is still in discussions with the Vehicle Inspectorate.
The Airport to meet its commitments under the s106 agreements to carry out a programme of air quality monitoring.	The Airport carries out an extensive Air Quality Monitoring Programme that goes above and beyond the previous and existing legal obligations.
LBN and the Airport to continue to lobby for a Crossrail proposal that includes access to the Airport.	The Airport continues to lobby for appropriate facilities to be provided at Custom House station to accommodate a shuttle bus service to the Airport.

9.24 In June 2012, the Airport published its Air Quality Action Plan that sets out a range of measures to minimise pollutant emissions over the next three years <sup>(11)</sup>. The Action Plan has been approved by LBN, and the Airport is required to report on progress each year. The Action Plan focuses on measures to reduce emissions of NO<sub>x</sub> from Airport-related sources, including:

- a) Aircraft operations;
- b) Ground Support Equipment (e.g. Mobile Ground Power Units);
- c) Airside vehicles; and
- d) Black cabs (taxis).

#### Summary of Regulations and Policies Relating to Air Quality

9.25 The key message arising from national, regional and local regulations and policies is that considerable care needs to be taken with developments that have potential to materially affect air pollution at locations that are within, or close to, Air Quality Management Areas (AQMAs). It is necessary to ensure that new developments do not further deteriorate existing poor air quality conditions. It is also important to ensure that new development does not conflict with or hinder any measures that are introduced to improve local air quality conditions.

#### **Assessment Criteria**

##### Health Criteria

9.26 The Government has established a set of air quality standards and objectives to protect human health. The 'standards' are set as concentrations below which effects are unlikely even in sensitive population groups, or below which risks to public health would be exceedingly small. They are based purely upon the scientific and medical evidence of the effects of an individual pollutant. The

'objectives' set out the extent to which the Government expects the standards to be achieved by a certain date. They take account of economic efficiency, practicability, technical feasibility and timescale. The objectives for use by local authorities are prescribed within the Air Quality Regulations 2000 <sup>(12)</sup> and Amending Regulations 2002 <sup>(13)</sup>.

- 9.27 Local Air Quality Management Technical Guidance *LAQM.TG(09)* <sup>(14)</sup> provides evidence that the 1-hour nitrogen dioxide objective is unlikely to be exceeded where the annual mean concentration is below 60 µg/m<sup>3</sup>. Therefore, 1-hour mean nitrogen dioxide concentrations need normally only be considered if the annual mean concentration is above this level.
- 9.28 More recently, health criteria have been introduced for PM<sub>2.5</sub>. The 2007 Air Quality Strategy sets out both an exposure-reduction approach and a "backstop" annual mean objective for PM<sub>2.5</sub>. The former is an objective focused on reducing average exposures across the most heavily populated areas of the country, and is not directly applicable to individual schemes. It is supported by the "backstop objective" or concentration cap to ensure a minimum environmental standard.
- 9.29 The objectives apply at locations where members of the public are likely to be regularly present and are likely to be exposed over the averaging period of the objective. Defra explains where these objectives will apply in its Local Air Quality Management Technical Guidance. The annual mean objectives for nitrogen dioxide and PM<sub>10</sub> are considered to apply at the façades of residential properties, schools, hospitals etc.; they do not apply at hotels. The 24-hour objective for PM<sub>10</sub> is considered to apply at the same locations as the annual mean objective, as well as in gardens of residential properties and at hotels. The 1-hour mean objective for nitrogen dioxide applies wherever members of the public might regularly spend 1-hour or more, including outdoor eating locations and pavements of busy shopping streets
- 9.30 The European Union has also set limit values for nitrogen dioxide, PM<sub>10</sub> and PM<sub>2.5</sub> which are defined in the Ambient Air Quality Directive. These limit values have been incorporated into UK legislation via the Air Quality Standards Regulations 2010 <sup>(15)</sup>. Achievement of these values is a national obligation rather than a local one. The limit values for nitrogen dioxide are the same levels as the UK objectives, and were to be achieved by 2010. The limit values for PM<sub>10</sub> are also the same level as the UK statutory objectives, and were to be achieved by 2005. The Directive also includes a national exposure reduction target, a target value and a limit value for PM<sub>2.5</sub>.
- 9.31 The relevant objectives and limit values for this assessment, as defined within the Regulations, are provided in Table 9.2.

**Table 9.2 - Air Quality Objectives and European Directive Limit Values**

Pollutant	Concentration Measured As	Obligation	To Be Achieved By
<b>Air Quality Objectives</b>			
Nitrogen dioxide	Annual mean	40 µg/m <sup>3</sup>	31 December 2005
	1 hour mean	200 µg/m <sup>3</sup>	31 December 2005
PM <sub>10</sub>	Annual mean	40 µg/m <sup>3</sup>	31 December 2004
	1 hour mean	200 µg/m <sup>3</sup>	31 December 2004
PM <sub>2.5</sub>	Annual mean	25 µg/m <sup>3</sup>	2020
	3 year running annual mean	15% reduction in concentrations measured at urban background sites	Between 2010 and 2020
<b>European Directive Limit and Target Values</b>			
Nitrogen dioxide	Annual mean	40 µg/m <sup>3</sup>	01 January 2010
	1 hour mean	200 µg/m <sup>3</sup>	01 January 2010
PM <sub>10</sub>	Annual mean	40 µg/m <sup>3</sup>	01 January 2005
	1 hour mean	200 µg/m <sup>3</sup>	01 January 2005
PM <sub>2.5</sub>	Annual mean	Target value of 25 µg/m <sup>3</sup>	2010
	Annual mean	Limit value of 25 µg/m <sup>3</sup>	2015
	Annual mean	Stage 2 indicative Limit value of 20 µg/m <sup>3</sup>	2020
	3 year Average Exposure Indicator (AEI) <sup>a</sup>	Exposure reduction target relative to the AEI depending on the 2010 value of the 3 year AEI (ranging from a 0% to a 20% reduction)	2020
	3 year Average Exposure Indicator (AEI)	Exposure concentration obligation of 20 µg/m <sup>3</sup>	2015

#### Construction Dust Criteria

9.32 There are no formal assessment criteria for dust arising from construction activities. In the absence of formal criteria, the approach developed by the Institute of Air Quality Management<sup>1</sup> (IAQM) has been used<sup>(16)</sup>. This approach divides the activities on construction sites into four types to reflect their different potential impacts (i.e. demolition, earthworks, construction and trackout<sup>2</sup>) and then takes a phased approach to the assessment:

- a) **STEP 1:** Screen the need for a detailed assessment.
- b) **STEP 2:** Assess the risk of dust effects occurring.
- c) **STEP 3:** Identify the need for site specific mitigation.
- d) **STEP 4:** Define effects and their significance.

9.33 The significance for each activity is determined using professional judgement, taking account of the factors that define the sensitivity of the surrounding area and the overall pattern of potential risks. The overall significance of the effects arising from the construction phase of a proposed

<sup>1</sup> The Institute of Air Quality Management (IAQM) is the professional body for air quality practitioners in the UK.

<sup>2</sup> This refers to dust that is transported outside of the site by way of vehicles on the local road network.



development is based on professional judgement but takes into account of the significance of the effects for each of the four activities.

- 9.34 Full details of this approach are provided in Appendix 9.1 to this ES.

#### Descriptors for Air Quality Impacts and Assessment of Significance of Operational Heath-Based Effects

- 9.35 There is no official guidance in the UK on how to describe the nature of air quality impacts, nor how to assess their significance. The approach developed by the Institute of Air Quality Management (IAQM) <sup>(17)</sup>, and incorporated in Environmental Protection UK's (EPUK) guidance document on planning and air quality <sup>(18)</sup>, has therefore been used. This involves three distinct stages: Stage 1 - the application of descriptors for magnitude of change; Stage 2 - the description of the impact at each sensitive receptor; and Stage 3 - the assessment of overall significance of the scheme.
- 9.36 The definition of impact magnitude is solely related to the degree of change in pollutant concentrations, expressed in microgrammes per cubic metre, but originally determined as a percentage of the air quality objective. Impact description takes account of the impact magnitude and of the absolute concentrations and how they relate to the air quality objectives or other relevant standards. The descriptors for the magnitude of change due to the scheme are set out below in Table 9.3.
- 9.37 Table 9.4 sets out the impact descriptors. These tables have been designed to assist with describing air quality impacts at each specific receptor. They apply to the pollutants relevant to the CADP and the objectives against which they are being assessed.

**Table 9.3 - Definition of Impact Magnitude for Changes in Ambient Pollutant Concentrations**

Magnitude of Change	Annual Mean NO <sub>2</sub> /PM <sub>10</sub>	No. days with PM <sub>10</sub> concentration greater than 50 µg/m <sup>3</sup>	Annual Mean PM <sub>2.5</sub>
<b>Large</b>	Increase/decrease ≥4 µg/m <sup>3</sup>	Increase/decrease >4 days	Increase/decrease ≥2.5 µg/m <sup>3</sup>
<b>Medium</b>	Increase/decrease 2 - <4 µg/m <sup>3</sup>	Increase/decrease 3 or 4 days	Increase/decrease 1.25 - <2.5 µg/m <sup>3</sup>
<b>Small</b>	Increase/decrease 0.4 - <2 µg/m <sup>3</sup>	Increase/decrease 1 or 2 days	Increase/decrease 0.25 - <1.25 µg/m <sup>3</sup>
<b>Imperceptible</b>	Increase/decrease <0.4 µg/m <sup>3</sup>	Increase/decrease <1 day	Increase/decrease <0.25 µg/m <sup>3</sup>

**Table 9.4 - Air Quality Impact Descriptors for Changes to Annual Mean Nitrogen Dioxide, PM<sub>10</sub> and PM<sub>2.5</sub> Concentrations and Changes to Number of Days with PM<sub>10</sub> Concentration Greater than 50 µg/m<sup>3</sup> at a Receptor<sup>a</sup>**

Absolute Concentration <sup>b</sup> in Relation to Objective/Limit Value	Change in Concentration/No. Days <sup>c</sup>		
	Small	Medium	Large
Above Objective/Limit Value <sup>d</sup>	Slight	Moderate	Substantial
Just Below Objective/Limit Value <sup>e</sup>	Slight	Moderate	Moderate
Below Objective/Limit Value <sup>f</sup>	Negligible	Slight	Slight
Well Below Objective/Limit Value <sup>g</sup>	Negligible	Negligible	Slight

- <sup>a</sup> Criteria have been adapted from the published criteria to remove overlaps at transitions.
- <sup>b</sup> The 'Absolute Concentration' relates to the 'With-Scheme' air quality where there is an increase in concentrations and to the 'Without-Scheme' air quality where there is a decrease in concentrations.
- <sup>c</sup> Where the Impact Magnitude is Imperceptible, then the Impact Description is Negligible.
- <sup>d</sup> Above: > 40 µg/m<sup>3</sup> of annual mean NO<sub>2</sub> or PM<sub>10</sub>, or > 35 days with PM<sub>10</sub> > 50 µg/m<sup>3</sup>.
- <sup>e</sup> Just below: 36 – <40 µg/m<sup>3</sup> of annual mean NO<sub>2</sub> or PM<sub>10</sub>, or 32 – <35 days with PM<sub>10</sub> > 50 µg/m<sup>3</sup>.
- <sup>f</sup> Below: 30 – <36 µg/m<sup>3</sup> of annual mean NO<sub>2</sub> or PM<sub>10</sub>, or 26 – <32 days with PM<sub>10</sub> > 50 µg/m<sup>3</sup>.
- <sup>g</sup> Well below: < 30 µg/m<sup>3</sup> of annual mean NO<sub>2</sub> or PM<sub>10</sub>, or < 26 days with PM<sub>10</sub> > 50 µg/m<sup>3</sup>.

- 9.38 The IAQM guidance is that the assessment of significance should be based on professional judgement. The descriptors for classifying the significance of air quality effects have been modified from the specific wording in the IAQM guidance to provide consistency across the ES. The overall significance of the effects has been classified as “negligible”, “minor adverse/beneficial”, “moderate adverse/beneficial” or “substantial adverse/beneficial”.
- 9.39 In drawing these conclusions, IAQM recommends that the factors set out in Table 9.5 should be taken into account. A summary of the professional experience of staff contributing to this assessment is provided in Appendix 9.2 of this ES.

**Table 9.5 - Factors Taken into Account in Determining Air Quality Significance**

Factors
Number of people affected by increases and/or decreases in concentrations and a judgement on the overall balance.
The magnitude of the changes and the descriptions of the impacts at the receptors i.e. using the findings based on Table 9.4
Whether or not an exceedence of an objective or limit value is predicted to arise in the study area where none existed before or an exceedence area is substantially increased.
Whether or not the study area exceeds an objective or limit value and this exceedence is removed or the exceedence area is reduced.
Uncertainty, including the extent to which worst-case assumptions have been made
The extent to which an objective or limit value is exceeded, e.g. an annual mean NO <sub>2</sub> of 41 µg/m <sup>3</sup> should attract less significance than an annual mean of 51 µg/m <sup>3</sup>

- 9.40 Guidance on how a local authority might determine whether an application is significant in terms of air quality was issued by the London Councils in 2007 <sup>(19)</sup>. Although the London Councils guidance

precedes that issued by IAQM/EPUK by a number of years, LBN specifically requested within its Scoping Opinion that reference be made to it (see Appendix 3.2 of this ES). The guidance notes that it is important that an air quality assessment evaluates modelled air quality in terms of “*changes in pollution concentrations*” where there is relevant public exposure.

- 9.41 The guidance is founded on the use of a flowchart which is intended to determine the significance of a development, based on the professional judgement of a local authority officer. Reference is also made to Air Pollution Exposure Criteria (APEC) with regard to the determination of significance and the level of mitigation required; however, there is no clear link between the flowchart and the APEC table. In addition the APEC values are predicated on the assumption that a downward trend in pollutant concentrations has been established. As discussed later within this Chapter, there is no strong evidence to support a downward trend in pollutant concentrations at many locations, and as such, the APEC values are not strictly applicable. A summary of the London Councils guidance is provided in Appendix 9.3.

#### Criteria for the Assessment of Odours

- 9.42 In considering the potential for odour effects, an important distinction should be drawn between the occasional detection of an odour and a loss of amenity due to odour, the latter generally being associated with persistent and long-lived problems.
- 9.43 Guidance note H4 Odour Management, published by the Environment Agency, provides a useful approach to quantifying odour effects <sup>(20)</sup>. Odour concentrations are measured in European odour units ( $\text{OU}_E/\text{m}^3$ ). The odour concentration at the detection threshold is  $1 \text{ OU}_E/\text{m}^3$ .
- 9.44 Guidance Note H4 suggests that there is a likelihood of unacceptable odour pollution occurring where the 98<sup>th</sup> percentile of 1-hour mean odour concentrations exceeds  $1.5 \text{ OU}_E/\text{m}^3$  for the most offensive odours,  $3 \text{ OU}_E/\text{m}^3$  for moderately offensive odours and  $6 \text{ OU}_E/\text{m}^3$  for less offensive odours.
- 9.45 The perception of the offensiveness of odours is highly subjective, but airport-related odours cannot reasonably be classified as most offensive (a category which includes decaying animal remains and septic effluent). For the purpose of this assessment it is assumed that airport-related odours fall within the less to moderately offensive categories (which includes breweries, livestock rearing and food processing).

### **Assessment Methodology**

#### Study Area

- 9.46 The study area is effectively defined by an approximately 1km radius around the runway (beyond which any effects are unlikely to be discernible) and the extent of the road transport network considered within the Transport Assessment (as shown in Figure 9.3).

### Baseline Conditions

- 9.47 Information on existing air quality has been obtained by collating the results of monitoring carried out by both The Airport and the local authorities. This covers both the study area and nearby sites, the latter being used to provide context for the assessment. The background concentrations across the study area have been defined using the national pollution maps published by Defra <sup>(21)</sup>. These cover the whole country on a 1x1 km grid.
- 9.48 Records of complaints related to local air quality issues (odours, smoke and black smut deposits) are maintained by the Airport and reported annually to LBN. These complaint records have been reviewed to inform the assessment.

### Construction Effects

- 9.49 Potential effects during construction may arise from emissions from construction traffic and on-site plant, and emissions of dust associated with the construction activities.
- 9.50 Locations sensitive to dust emitted during construction will be places where members of the public are regularly present. Residential properties and commercial operations close to the construction works will be most sensitive to construction dust. Any areas of sensitive vegetation or ecology that are very close to the dust sources may also be susceptible to some negative effects.
- 9.51 As discussed above, it is very difficult to quantify emissions from construction activities and it is thus common practice to provide a qualitative assessment of potential effects, making reference to the assessment criteria set out in Appendix 9.1.

### Sensitive Receptors

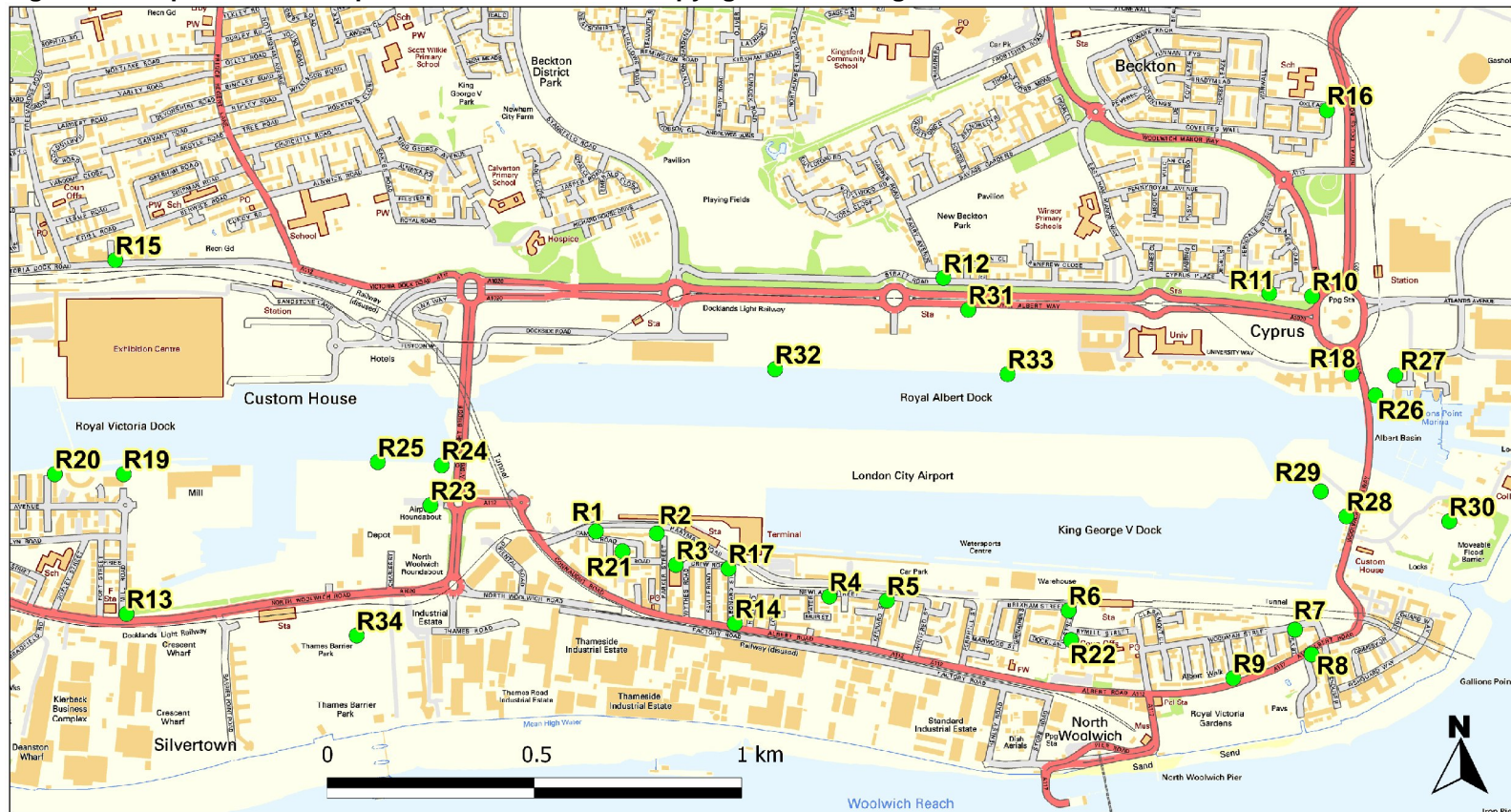
- 9.52 Sensitive receptors during the construction phase will be restricted to properties within the appropriate distance bands as set out in Appendix 9.1. Receptors at greatest risk of being affected by dust emissions are those residential properties that lie immediately to the south of Newland Street and Brixham Street, and the community facilities (The Storey Centre, Woodman Community Centre and Fight for Peace) which lie just to the south of the construction compound at the eastern end of the site. There are no sensitive ecological receptors that might be adversely affected, as described in Chapter 13: Ecology and Biodiversity.
- 9.53 Sensitive receptors during the operational phase are places where members of the public might be expected to be regularly present over the averaging periods of the objectives/limit values. For the annual mean and daily mean objectives/limit values, that are the principal focus of this assessment, sensitive receptors will generally be residential properties, schools, nursing homes etc.
- 9.54 A total of 22 existing sensitive receptors have been selected for the operational assessment. Where appropriate, these include additional receptors at height to account for blocks of flats. Additional receptor locations have been included for all future scenarios to account for proposed developments at Silvertown Quays, North Side of Albert Dock, Royal Albert Basin and Barrier Park



East. These have been selected to coincide with new developments within 1km of the Airport runway, and along the road network potentially affected by the proposed CADP. As the design details for these new developments are not yet finalised, it has been necessary to make assumptions regarding the likely heights of the buildings in the new developments.

9.55 The operational receptor locations are shown in Figure 9.2 and described in Table 9.6 below.

**Figure 9.2 – Operational Receptor Locations © Crown Copyright 2013. All rights reserved. Licence number 100020449**



**Table 9.6 – Sensitive Operational Receptor Locations (1.5m elevation unless stated)**

Receptor ID	Description	OS Grid Ref
<b>Existing Locations</b>		
R1	Camel Road/Hartmann Road	541986, 180309
R2	Camel Road/Parker Street	542133, 180304
R3	Parker Street ( Portway Primary School)	542179, 180228
R4	Newland Street (opposite entrance to LCY car park)	542549, 180152
R5	Newland Street/Kennard Street	542688, 180142
R6	Brixham Street/Dockland Street	543126, 180118
R7	Plattens Court/Billingway Dock Head	543672, 180072
R8	Albert Road/Woolwich Manor Way	543712, 180012
R9	Robert Street adj Albert Road (north side)	543523, 179955
R10	Collier Close adj Gallions Way Roundabout (eastern side)	543713, 180876
R11	Yeoman Close adj Royal Albert Way	543610, 180883
R12	Straight Road/Campton Close	542824, 180920
R13	Mill Rd adj North Woolwich Road (west)	540854, 180110
R14	Connaught Road/Leonard Street	542321, 180087
R15	Victoria Dock Road (between Chantler and Freemasons Roads)	540827, 180963
R16	Gallions Primary School adj Royal Docks Road	543749, 181324
R17	Drew Road/Leonard Street	542306, 180219
R18	Woolwich Manor Way (UEL)	543809, 180688
R19	West Silvertown 1 (1.5 m and 20 m elevation)	540847, 180447
R20	West Silvertown 2 (1.5 m and 20 m elevation)	540681, 180447
R21	Flats on Drew Road (20 m elevation)	542050, 180261
R22	Flats on Docklands Street (40 m elevation)	543132, 180047
<b>Proposed/Committed Developments</b>		
R23	Silvertown Quays (30 m from Connaught Bridge)	541587, 180372
R24	Silvertown Quays 1 (1.5 m and 20 m elevation)	541614, 180468
R25	Silvertown Quays 2 (1.5 m and 20 m elevation)	541460, 180476
R26	Royal Albert Basin 1 (1.5 m and 20 m elevation)	543866, 180637
R27	Royal Albert Basin 2 (1.5 m and 20 m elevation)	543914, 180685
R28	Royal Albert Basin 1 (1.5 m and 20 m elevation)	543796, 180345
R29	Royal Albert Basin (1.5 m and 20 m elevation)	543734, 180405
R30	Royal Albert Basin (1.5 m and 20 m elevation)	544044, 180333
R31	North side of Royal Albert Dock (10m from Royal Albert Way)	543809, 180688
R32	North Side of Royal Albert Dock (1.5 m and 20 m elevation)	542418, 180700
R33	North Side of Royal Albert Dock (1.5 m and 20 m elevation)	542979, 180688
R34	Barrier Park East (1.5 m and 20 m elevation)	541409, 180058

#### Operational Effects – Airport Operations and Road Traffic

##### *Assessment Years and Scenarios*

- 9.56 Predictions of nitrogen dioxide, PM<sub>10</sub> and PM<sub>2.5</sub> concentrations have been carried out for the Baseline Year (2012) and three future assessment years, 2019, 2021 and 2023, in accordance with the assumptions set out in Chapter 3: EIA Methodology. For the future year assessments, predictions have been made both assuming that the proposed CADP does proceed (“With Development”) and does not proceed (“Without Development”) so that the incremental effects can be quantified.

- 9.57 Further sensitivity tests for 2019 have been carried out for nitrogen dioxide that involves assuming no reduction in emission factors for road traffic from the Baseline Year (2012). This is to address the issue recently identified by Defra <sup>(22)</sup> that road traffic emissions have not been declining as expected (see later section on Uncertainty). Nitrogen dioxide concentrations in 2019, with and without the proposed CADP, are thus presented for two scenarios: 'With Emissions Reduction' and 'Without Emissions Reduction'. In 2021 (the 'Design Year') and 2023 (the 'Principal Assessment Year') it is assumed that emissions controls on new vehicles will be effective and thus only 'With Emissions Reduction' predictions are presented.
- 9.58 Predictions have been carried out for all scenarios to quantify potential odour effects from ground-based aircraft operations.
- 9.59 In addition, consideration has also been given to the Facilitating Works and the initial stage of CADP infrastructure (Years 2 and 3) as described in Chapter 6: Development Programme and Construction, whereby it is expected there will be 3 additional stands operational by 2017.

#### *Air Quality Model*

- 9.60 The predictions have been carried out using the ADMS-Airports model. This model incorporates a jet module specifically designed to represent the dispersion of emissions from moving aircraft, and was selected by the Project for the Sustainable Development of Heathrow (PSDH) for use at Heathrow airport.
- 9.61 The model requires the user to provide a variety of input data, which describe the pollutant emissions arising from the proposed development, the meteorological conditions, and the background contribution (i.e. the contribution to pollutant concentrations from all sources not explicitly included in the model).
- 9.62 Pollutant emissions arise from a number of Airport-related sources, and the following were taken into consideration in this assessment:
- a) Aircraft main engines operating within the Landing and Take-off (LTO) Cycle, Auxiliary Power Units (APUs) and engine testing;
  - b) Airside support vehicles and plant (e.g. Mobile Ground Power Units);
  - c) Airport boiler plant and CHP;
  - d) Fire training ground;
  - e) Staff and passenger vehicle movements within the car parks; and
  - f) Road traffic on Airport landside roads and on the local road network.
- 9.63 The approach to quantifying emissions from the Airport sources has been based on generally accepted methodologies, and, as far as was practicable, follows the sophisticated or advanced approach recommended by the International Civil Aviation Organisation (ICAO) in its *Airport Air*



*Quality Manual*<sup>(23)</sup>. For all airside sources, emissions of PM were assumed to represent both the PM<sub>10</sub> and PM<sub>2.5</sub> fractions, based on the expected size distributions.

#### *Aircraft Operations – Landing and Take-off Cycle (LTO)*

- 9.64 The emissions arising from each aircraft movement have been calculated as the sum of the emissions for each part of the LTO cycle. Records of Baseline Year aircraft mix and numbers of aircraft movements were derived from the 2012 Annual Performance Report<sup>(24)</sup>. Forecast movements and aircraft mix for all future scenarios were derived from the Need Statement prepared by York Aviation. A summary of the aircraft data used in this assessment is provided in Tables A4.1 to A4.5 (Appendix 9.4).
- 9.65 Aircraft engines with a rated power greater than 26.7 kN are certified by the International Civil Aviation Organisation (ICAO) for emissions of NO<sub>x</sub>, HC and Smoke Number. For each type of aircraft, emissions per aircraft movement have been calculated using emission factors in grammes of pollutant per kilogram of fuel burnt, together with fuel flow in kilogrammes per second, based on the following equation:

$$E_{ij} = \sum (TIM_{jk} * 60) * (FF_{jk}) * (EI_{jk}) * (NE_j) \quad \text{Equation [1]}$$

Where:

$E_{ij}$  = Emissions of pollutant  $i$  in grammes, produced by aircraft type  $j$  for each LTO cycle;

$TIM_{jk}$  = Time-in-mode for mode  $k$  (e.g. idle, approach, climb-out or take-off) in minutes for aircraft type  $j$

$FF_{jk}$  = Fuel flow for mode  $k$  (e.g. idle, approach, climb-out or take-off) in kg/sec for each engine on aircraft type  $j$

$EI_{jk}$  = Emissions index for each pollutant  $i$  in grammes per kilogram of fuel, in mode  $k$ , for each engine used on aircraft type  $j$

$NE_j$  = Number of engines on aircraft type  $j$

- 9.66 The emissions indices have been primarily derived from the Federal Aviation Administration (FAA) *Emissions and Dispersion Modelling System* (EDMS)<sup>(25)</sup> and the International Civil Aviation Organisation (ICAO) *Engine Exhaust Emissions Data Bank*<sup>(26)</sup>. Airframe/engine assignments in 2012 were based on actual data for all aircraft.
- 9.67 For the 2012 Baseline Year, the aircraft were assigned into “groups” of similar characteristics (e.g. numbers of engines, engine types, engine mounting and wake category) with a “lead” aircraft selected to represent each group. These group assignments are shown in Table A4.6 (Appendix 9.4). The emissions, and input parameters for the ADMS-Airport model, were then based on the assumption that the total number of movements within each group was represented by the lead aircraft. As a sensitivity test, a comparison between the NO<sub>x</sub> emission rate for each group (assuming the individual aircraft types and movements) and the assumed, lead aircraft type and

- movements was carried out; a summary of these calculations is shown in Table A4.7 (Appendix 9.4). There is little difference between the NOx emission rates, and it was concluded that the grouping of the aircraft would have no significant effect on the assessment.
- 9.68 The approach used for the estimation of PM emissions arising from aircraft engines has undergone development in recent years. The original approach, based on the ICAO reported maximum Smoke Number, only estimated the non-volatile fraction of PM. To address this problem, the contribution of PM emissions from the volatile fraction was considered by a CAEP Working Group, and a First Order Approximation (FOA) method was derived; this approach estimates the non-volatile portion using the ICAO Smoke Number, but also estimates the volatile portion associated with the fuel sulphur content, fuel-based organics and lube oil. Version 3 of the FOA is now available (FOA v3.0) and is the approach recommended in the ICAO *Airport Air Quality Manual*. The EDMS database includes estimates of PM emissions based on FOA v3.0 for a large number of aircraft types, and these estimates have been used where available. Where these data were not directly available in EDMS, estimates of PM emissions were based on similar engine types.
- 9.69 Recent research comparing the FOA v3.0 approach with measurements has identified a discrepancy in both the organic carbon and black carbon emissions indices <sup>(27)</sup>. Combined, these discrepancies result in a 3.4 factor underestimate of total PM<sub>2.5</sub> emissions. Accordingly, to account for this potential uncertainty, the FOA v3.0 emissions indices for PM (both PM<sub>10</sub> and PM<sub>2.5</sub>) have been factored up by 3.4.
- 9.70 Emissions of PM from the smaller aircraft, where no data are available, have been disregarded, but these are considered to be negligible.
- 9.71 The forthcoming Bombardier C100 aircraft will be equipped with two Pratt & Whitney PW1524G engines. The emissions from these engines have not yet been certified by ICAO, and there is no information in the emissions databases referenced above. Pratt & Whitney have stated to the Airport that the engine will meet a 45% margin below the CAEP6 standard for NOx, and a 50% margin below the CAEP6 standard for both hydrocarbons and Smoke Number. Information on emission rates of NOx and HC was provided by Bombardier for each mode of the LTO cycle, together with the Maximum Smoke Number, and are shown in Table A4.8 (Appendix 9.4). The emission rates were used directly, while PM emissions were estimated by comparison to engines with similar Smoke Number.
- 9.72 The International Civil Aviation Organisation (ICAO) has defined a specific LTO cycle with four modal phases, extending to a ceiling height of 3,000 feet (915 metres). Emission factors are provided for 'take-off' (100% thrust), 'climb-out' (85% thrust), 'approach' (30% thrust) and 'idle' (7% thrust). In reality, aircraft rarely take-off at 100% thrust - the actual take-off thrust used being dependent on a combination of factors including take-off weight and weather conditions. Following discussion with the Airport, and in consideration of the short runway, a take-off thrust of 100% was used for all aircraft departures, but is likely to represent a worst-case assumption.

- 9.73 Take-off roll along runway, and initial climb to 1500ft (457.5m) was assumed to be at 100% thrust setting. Climb-out after throttle back from 1500-3000ft (457.5-915m) was assumed to be at 85% thrust.
- 9.74 Apart from the Avro RJ series and BAe-146 series aircraft, all current commercial jet aircraft operating at the Airport have reverse thrust capability. In addition, some of the smaller General Aviation aircraft operating from the Jet Centre have this capability. New scheduled aircraft introduced into the fleet mix by 2019 and beyond will also have reverse thrust capability.
- 9.75 It has been assumed that all jet aircraft with reverse thrust capability use a 60% reverse thrust for 19 seconds on landing. This assumption of reverse thrust is considered to be worst-case, as braking systems have improved, and airlines try to avoid use of reverse thrust to minimise fuel consumption; this will have substantially overestimated emissions from this source.
- 9.76 The ICAO certification does not include fuel flow data and emission indices for 60% thrust. The ICAO *Airport Air Quality Manual* <sup>(28)</sup> suggests an advanced approach to calculate emissions for intermediate thrust settings based on a twin quadratic equation to calculate fuel flow at the required thrust, and then applying the corresponding emissions indices calculated using the *Boeing Fuel Flow Model v2* (BFFM2) curve fitting methodology. However, this latter approach is predominantly required to calculate emissions from aircraft throughout the entire flight envelope (when the engine is operating in substantially different conditions from that used for certification, i.e. sea-level and static). The BFFM2 approach notes that NO<sub>x</sub> emissions increase “somewhat linearly” with increasing power. Therefore, for the purpose of this assessment, a hybrid approach has been adopted. The fuel flow for 60% thrust settings has been derived from the twin quadratic equation based on the 7%, 30% and 85% thrusts and associated fuel flow points. Emissions were then assumed to be linear between the 30% and 85% thrust settings in order to obtain representative indices (in g/kg fuel) for a 60% thrust setting. The pollutant emission rate was then calculated using the approach described in Equation [1] above.
- 9.77 Emission factors within the EDMS and ICAO databases are usually stated for new engines. Based on PSDH recommendations to account for engine deterioration, NO<sub>x</sub> emissions have been increased by 4.5% while, for all other pollutants, the fuel flow and subsequent calculation of emissions has been increased by 4.3%.
- 9.78 Times-in-mode for take-off, approach and climb-out have been derived from information provided by the Airport. For ground operations in 2012, information has been derived from the Electronic Flight Progress System (EFPS) that monitors the time that aircraft operate engines on the ground from engine start-up to start-of-roll at departure, and following aircraft touch down until engine shut-down on stand, on arrival. A summary of these data is provided in Table A4.9 (Appendix 9.4). For the future “Without Development” scenarios, these times-in-mode were assumed to remain unchanged. For the future “With Development” scenarios, the times-in-mode for taxi-in and taxi-out were adjusted in discussion with the Airport, in order to account for the new stand layouts and new parallel taxiway.

- 9.79 Emissions during climb-out and approach have been calculated to a ceiling height of 915 metres.

*Brake & Tyre Wear*

- 9.80 An allowance has also been made for PM emissions arising from brake and tyre wear based on a methodology developed during the PSDH work <sup>(29)</sup>. For brake wear, an emission factor of  $2.51 \times 10^{-7}$  kg PM<sub>10</sub> per kg MTOW<sup>3</sup> was assumed. For tyre wear, the following relationship was used:

$$\text{PM}_{10} \text{ (kg) per landing} = 2.23 \times 10^{-6} \times (\text{MTOW kg}) - 0.0874 \text{ kg} \quad \text{Equation [2]}$$

- 9.81 Emissions were calculated for all large aircraft. The relationship is not applicable to smaller aircraft, below 55,000 kg, and it was assumed the PM emissions from tyre wear follow a linear relationship between MTOW = 55,000 kg to MTOW = 0 kg.

*Auxiliary Power Units*

- 9.82 Auxiliary Power Units (APUs) are used to provide power to larger aircraft when the main engines are not running. APUs are used to condition the aircraft cabin when temperatures are uncomfortable, and are also required to start the main engines on some of the newer aircraft. Other requirements for APU use occur if there is an incompatibility between the aircraft system and the Fixed Electrical Ground Power (FEGP) or Mobile Ground Power Unit (MGPU) supplies, or if there is a technical fault.
- 9.83 Operational and Safety Information Notice (OSIN 04/12), issued by the Airport, requires the use of FEGP or MGPU whenever available and serviceable. APUs are required to be shut down as soon as practicable following arrival and not restarted until 10 minutes prior to departure, except when the ambient air temperature is below +5°C or above +20°C. Operators wishing to use APU when these temperature thresholds are exceeded, or where there are technical faults, are required to contact Air Traffic Control (ATC) who maintain a log of such events. An analysis of data for May-Oct 2012 indicates that such events are very uncommon, representing only about 0.35% of all aircraft movements (see Table A4.10, Appendix 9.4).
- 9.84 APU running times on arrival are dependent upon the availability of FEGP or MGPU; running times range from 1 to 5 minutes depending on how busy the Airport is. For the purpose of this assessment, a total APU running time of 13 minutes per LTO cycle has been assumed, which is likely to represent a worst case. Emissions for APUs have been calculated using the advanced approach as defined in the ICAO *Airport Air Quality Manual*. This assigns different emission indices to different APU operating loads, i.e. start-up (no load), normal running (maximum Environmental Control System (ECS)), and high load (Main Engine Start (MES)). The assumed Times-in-Mode, and assigned NOx, HC and PM emission rates are shown in Tables A4.11 to A4.13 (Appendix 9.4).

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<sup>3</sup> Maximum Take Off Weight



### *Engine Testing*

- 9.85 Ground running of aircraft engines is occasionally required for testing and maintenance purposes. Emissions for the 2012 Baseline Year were derived from the records of ground running provided to the Council in the 2012 Annual Progress Report <sup>(30)</sup>. These records include the number, duration and power settings of ground runs, the aircraft involved, and the stands used.
- 9.86 Ground running emissions were calculated from the duration of the run, and the associated fuel use and emission indices for the power setting used (100% or 7%). The total annual ground running emissions were then apportioned as an average emission rate and included in an area source across the apron area.
- 9.87 For all future scenarios, pollutant emissions from ground running were estimated by scaling up the 2012 Baseline Year emissions based on the projected increase in aircraft movements, taking account of the new aircraft types.

### *Airside Vehicles and Mobile Ground Power Units*

- 9.88 Emissions from airside vehicles are associated with the transport of passengers and cargo to aircraft, and servicing and refuelling of aircraft, etc. Mobile Ground Power Units (MGPUs) provide auxiliary power for those aircraft without access to FEGP, when necessary.
- 9.89 An estimate of emissions from these sources has been based upon fuel (untaxed “red” diesel) consumption statistics for 2012 provided by the Airport, with the data disaggregated by user group (e.g. Ramp Services, Operations etc.). A list of vehicles with permanent airside passes for each user group was also provided, including the vehicle registration number and vehicle type<sup>4</sup>. Estimates of the Euro Standard distribution of these vehicles was based on the year of registration. An estimate of the average NO<sub>x</sub> and PM<sub>10</sub> emissions from airside vehicles was made using fuel consumption data and DfTs emission factor spread sheet <sup>(31)</sup>, assuming an average vehicle speed of 20 kph.
- 9.90 An inventory of MGPUs was also provided by the Airport, including the model number and age which allowed them to be categorized as Uncontrolled, Stage I, Stage II or Stage IIIA according to EU Directive 2004/26/EC.
- 9.91 Emission factors (in g/kWh) have been obtained from the EMEP/Corinair *Emissions Inventory Guidebook* (Section 8 – Other mobile sources and machinery, Tables 8-3 to 8-5b) <sup>(32)</sup>. Emission factors are given for a range of diesel-engine power ratings. The total annual volume of red diesel used by the MGPUs (in 2012), was used to calculate the average unit annual run-time, based on the fuel efficiency of the units (in litres per hour) at their operational load rating. It has been assumed that each of the MGPUs operates at an average load rating of 75% in accordance with the guidance issued by the FAA <sup>(33)</sup>. Fuel efficiencies of the MGPUs at various load ratings were

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<sup>4</sup> For the purpose of this assessment, the winter equipment vehicles (e.g. tractors used for snow ploughs and de-icing equipment etc.) were ignored, as it is difficult to gauge their operational use in any given year. All fuel use was apportioned to those vehicles in constant operational use

provided by the MGPU manufacturer (Houchins). Total annual emissions from the MGPUs were then calculated by multiplying the total annual unit run-time, by the unit power rating (in kWh, provided by the Airport) and the emission rate obtained from the Corinair Guidebook. It was assumed that each of the 20 MGPUs is used for an equal number of hours each year.

- 9.92 For the future year cases for airside vehicles, the total amount of fuel used in 2012 was scaled upwards by the ratio of the total number of passengers in each future-year case to the total number of passengers in 2012. The Airport has committed within its Air Quality Action Plan to ensuring that all airside vehicles will comply with the London Low Emissions Zone by the end of 2015<sup>5</sup>, and that all replacement vehicles must comply with the latest Euro Standards. All non-LEZ compliant vehicles in 2012 were assumed to have been replaced by Euro 6/VI standard vehicles in all future cases. In addition, an adjustment was made to account for the age-related replacement of vehicles that are currently LEZ-compliant, such that the distribution of age in each future-year case remained unchanged (i.e. the number of years since manufacture). This approach takes account of Euro standards that have already been agreed within EU Directives, but not any future standards that may be implemented.
- 9.93 The Airport is currently undertaking refurbishment of all FGEP on Stands 1-10, and has committed to installing FEGP on Stands 21-24, and on any new stands constructed as part of any apron improvements. The Airport has further committed to decommissioning all MGPUs that do not comply with a minimum of EU Stage II emissions limits. As FEGP will be available on most stands, the use of MGPU should be reduced in the future to principally that of backup supply. For all future year cases, it was assumed that all MGPUs would be Stage II compliant or above, and that MGPU fuel use would be reduced to 50% of that in 2012, which is likely to represent a worst case.

#### *Fire Training*

- 9.94 Emissions associated with fire training exercises make a very small contribution compared to other Airport-related sources, but have been included in this assessment for completeness. The Fire Service at the Airport provided details on current operations:
- a) Fire training for fuel spills is carried out approximately three times per month. Either aviation kerosene or red diesel is used, with approximately 20-30 litres of fuel consumed over a 2 minute period.
  - b) The majority of fire training exercises use LPG. The volume of LPG consumed in 2012 (7,470 litres) was provided by the Airport.
- 9.95 Emissions data for the uncontrolled combustion of aviation kerosene and LPG were derived from the *FAA Air Quality Handbook* <sup>(34)</sup>. The location of the fire test rig, to the north of the Jet Centre, and the frequency of fire training operations, were assumed to remain unchanged in future years.

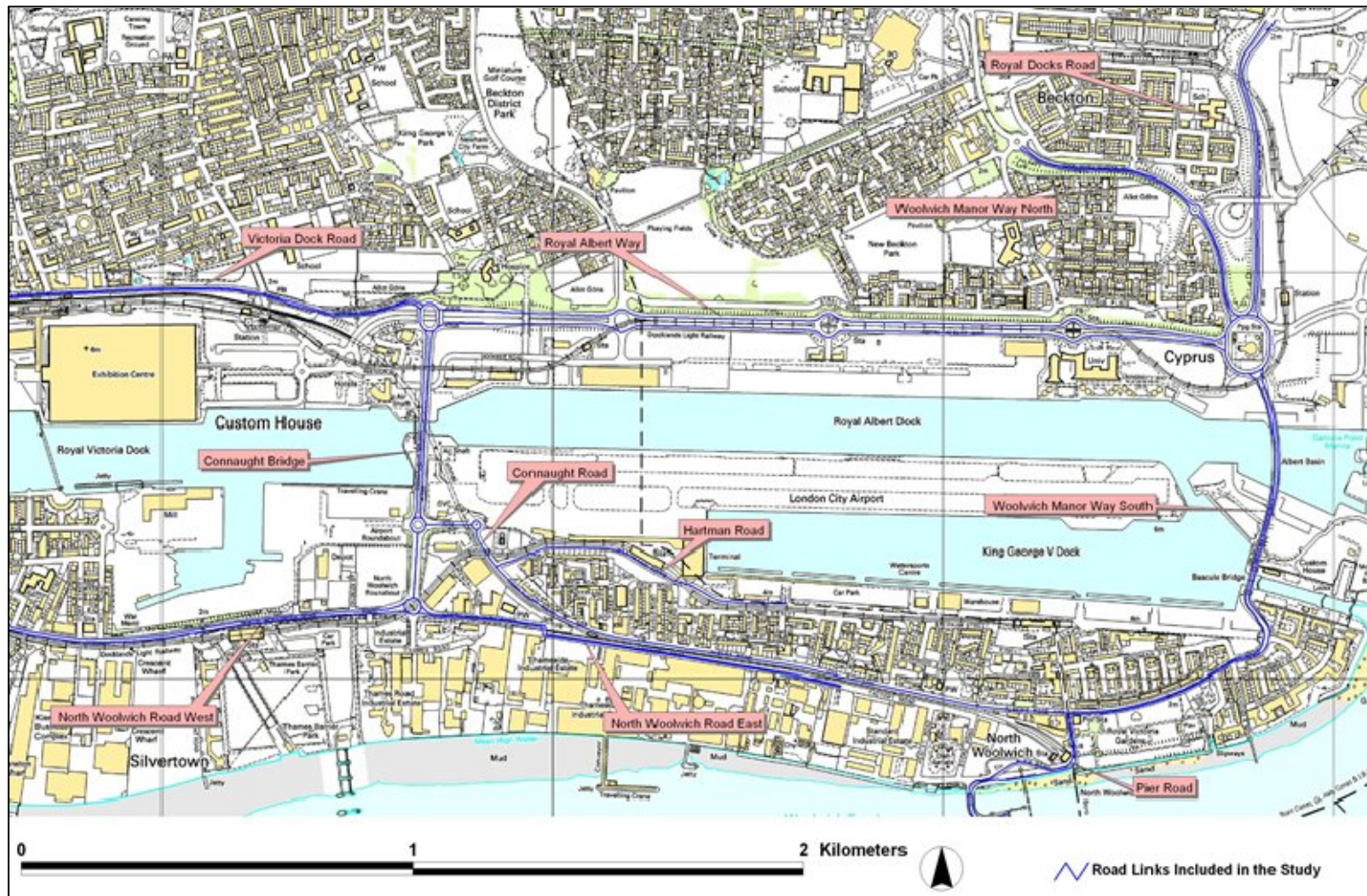
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<sup>5</sup> This excludes certain types of specialist vehicles such as items of winter equipment and fire tenders, but this use only a very small proportion of total fuel in each year.

### *Road Traffic*

- 9.96 Emissions arising from traffic on the local road network have been calculated using the ADMS-Roads (v3.1) dispersion model. Predictions are based on vehicle flow, composition and speed using the same emission factors published within the Emission Factor Toolkit (EFT, version 5.1.3) <sup>(35)</sup>. The emission rates account for emissions of PM<sub>10</sub> and PM<sub>2.5</sub> arising from brake and tyre wear and from road abrasion. Whilst PM emissions from entrainment (or “re-suspension”) of other materials on the road are also widely considered to be important, there are currently no data upon which robust emission rates can be calculated; any re-suspension component has therefore been necessarily ignored.
- 9.97 Annual average daily traffic (24 hr-AADT) flows, the proportions of Heavy Duty Vehicles (HDV) and average speeds for each road link were provided by Vectos for the 2012 Baseline Year and all future year scenarios, and are shown summarised in Tables A4.14 to A4.17 (Appendix 9.4). Additional information on the proportion of black cabs using the Airport access road (Hartmann Road) was also provided. The CADP proposals include for the provision of a new access road to the Airport, along Hartmann Road east from Woolwich Manor Way; this new link has been included for the 2021 and 2023 future With Development scenarios. The road links included in the assessment are shown in Figure 9.3 (NB – for the 2021 and 2023 With Development scenarios, public access to Hartmann Road via Woolwich Manor Way would be provided, but is not shown in this Figure).

Figure 9.3 – Road Links Included in the Assessment © Crown Copyright 2013. All rights reserved. Licence number 100020449





- 9.98 Taxis (black cabs) currently picking up passengers from the Airport do so via a small rank on the terminal forecourt. This rank can only accommodate about 10 taxis, and so, during busy periods, a line of queuing taxis extends eastwards down Hartmann Road. A short survey related to taxi idling was carried out in April 2010 to inform the development of the Airport's Air Quality Action Plan. It is difficult to determine when a taxi is "unnecessarily idling", or is just in a slowly-moving queue, and so taxis were only considered to be "idling" if stationary, with engines running, for more than two minutes. Idling was not found to be a common occurrence along Hartmann Road; within the rank it was more frequently observed.
- 9.99 Emissions associated with queuing taxis in 2012 were derived from the total number of taxi movements per year, the assumed time queuing per movement (240 seconds), and a queuing emission rate. This emission rate was derived using the AIRE instantaneous emissions model<sup>6</sup> to calculate an idling emission rate for specific Euro standard taxis, and then calculating a weighted average of these emission rates using the London taxi fleet composition within the Emission Factor Toolkit (EFT).
- 9.100 For the future Without Development scenarios, a similar approach to calculating taxi emissions was made, taking into account the revised forecast of taxi movements provided by Vectos. For the Without Development scenarios, the Airport has confirmed that the operation of the taxi rank is to be commercialised from July 2013 onwards, and that stationary idling along Hartmann Road will be prohibited by marshals at both the east end feeder zone and the forecourt rank. For the With Development scenarios, a new marshalled taxi feeder park is to be established at the eastern end of the Airport. Stationary idling within the feeder park and along Hartmann Road will be prohibited.

#### *Car Parks*

- 9.101 Information on car park flows for the Baseline Year (2012) and all future year scenarios were provided by Vectos, and are shown in Tables A4.18 and A4.21 (Appendix 9.4). For the Without Development scenarios, the existing car park layouts were assumed to remain unchanged. For the With Development scenarios, the new decked and surface car park layouts were taken into consideration.
- 9.102 The car park emissions for NO<sub>x</sub> and PM<sub>10</sub> have been calculated using speed-related emissions factors contained within the EFT, to take account of travelling vehicles.
- 9.103 The travelling distance for a vehicle entering or leaving the car park has been assumed to be the length of the perimeter of the parking area, assuming an average vehicle speed of 20 km/h.
- 9.104 Specific consideration has also been given to "cold start" emissions for vehicles leaving the car park. Vehicles with cold engines emit more pollution than those with warm engines. To account

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<sup>6</sup> <http://www.sias.com/ng/AIRE/AIRE.htm>

for this, the additional emissions from cold starts have been calculated using the EXcess Emissions Planning Tool (EXEMPT) developed by AEA Technology<sup>(36)</sup>.

- 9.105 Emissions of PM<sub>2.5</sub> have been assumed to be the same as for PM<sub>10</sub>, as a worst-case assumption.

#### *Stationary Sources*

- 9.106 Emissions arising from stationary sources at the Airport (e.g. gas-fired heating plant) were calculated from gas consumption data for 2012 provided by the Airport. Data are only available in an aggregated form for the terminal building, which includes use by the two main gas boilers and various cooking appliances used by the caterers. Emission rates for combustion of gaseous fuels have been obtained from the EMEP/EEA *Emission Inventory Guidebook*<sup>(37)</sup>, which gives emission rates in grammes of pollutant per gigajoule of energy (as fuel consumption). This has been used to calculate average annual emission rates based on the annual gas consumption, and assuming continuous operation throughout the year.
- 9.107 For future Without Development scenarios, the Airport confirmed that there is currently no intention to increase boiler plant capacity, but to provide a conservative approach it was assumed that gas consumption increased in proportion to the total number of passengers in each case as compared with the 2012 Baseline Year (see Table A4.22, Appendix 9.4).
- 9.108 For the future With Scheme scenarios, new gas boiler plant and a small (35 kWt) CCHP unit will be incorporated into the Western Energy Centre, in about 2016. The Eastern Energy Centre, comprising of four CCHP units (providing approximately 230kWt for the East Terminal extension and 330 kWt for the Hotel) and additional gas boilers, will then be phased in from about 2019 onwards. All gas boilers will conform to the “ultra-low” NOx emission standard of 40 mg/kWh. At some stage, the CCHP unit in the Western Energy Centre may be decommissioned, but the timing is unknown at this stage, and the precise requirements for the Eastern Energy Centre are still to be confirmed. To account for these uncertainties, all With Development scenarios have assumed that gas consumption from the terminal area increases in proportion to the total number of passengers in each case as compared with the 2012 Baseline Year (see Table A4.22, Appendix 9.4) and that the Eastern Energy Centre CCHP is operational, 24 hours per day, at full (100%) load, from 2019 onwards (see Table A4.23, Appendix 9.4). This will have overstated the NOx emissions in future years, and represents a conservative approach.
- 9.109 The Tate & Lyle factory, which lies to the south of the Airport, operates gas and gas-oil boilers. Due to the location of this installation relative to the Airport, and the height of the stacks, the emissions arising from these boilers have also been included within the model for completeness. Emission rates and stack parameters were provided by the Environment Agency and are summarised in Table A4.24 (Appendix 9.4). Emissions from the Tate & Lyle plant were assumed to remain unchanged for all future scenarios.

### *Consideration of Peak Hour Activities*

- 9.110 The modelling methodology described above has focused on predicting annual mean pollutant concentrations. The air quality objectives and limit values for nitrogen dioxide, PM<sub>10</sub> and PM<sub>2.5</sub> are expressed as annual mean values, but there are also shorter-term criteria that need to be taken into account (specifically a 1-hour mean objective and limit value for nitrogen dioxide, and a 24-hour mean objective and limit value for PM<sub>10</sub>).
- 9.111 Modelling of these shorter-term metrics introduces additional uncertainties into the assessment, and as noted by Defra in LAQM.TG(09): “*dispersion models are inevitably poorer at predicting short-term peaks than they are at predicting annual mean concentrations, and the process of model verification is extremely challenging*”. For this reason, assessments of airport operations typically focus on predicting annual mean concentrations. The approach adopted for this study is that, as appropriate, these shorter-term metrics have been calculated from the annual mean using the empirical relationships recommended by Defra.
- 9.112 However, within its Scoping Opinion, LBN specifically requested that the assessment give consideration to the impacts arising from any increase to the maximum number of aircraft departures and arrivals. Given the concerns with modelling of short-term concentrations (and specifically the 1-hour mean concentrations for nitrogen dioxide) this has been dealt with by a screening approach as described below.
- 9.113 Information on the timetabling of aircraft movements for all future years has been derived from the Needs Statement prepared by York Aviation. These data have been analysed to provide an hour-by-hour analysis of aircraft movements for each assessment year, for both the Without and With Development scenarios. This analysis is shown in Table A4.25 (Appendix 9.4).
- 9.114 For each scenario, the peak hours are 0800-0900h and 1800-1900h. Peak-hour movements are forecast to increase from 31 (2012 Baseline Year) to 36 (2023, Without Development) and to 45 (2023, With Development). These movements exclude Jet Centre operations, as the smaller aircraft make only a very small contribution to NO<sub>x</sub> emissions<sup>7</sup>. It should also be borne in mind that these movements represent both arrivals and departures (approximately a 50% split in each peak hour), and that NO<sub>x</sub> emissions are substantially higher on departure due to the requirement for 100% engine thrust on take-off; emissions on arrival are relatively small compared with departure. The incremental change to the number of peak-hour departures between the 2012 Baseline Year and the 2023 With Development scenario is thus about 7.
- 9.115 There have been no recorded exceedences of the 1-hour mean objective/limit value at either of the automatic monitoring sites operated by the Airport, and in the majority of years, the maximum recorded level has been well below the 200 µg/m<sup>3</sup> threshold (see Table 9.7 and Figure 9.5).

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<sup>7</sup> It should be noted that the Jet Centre peak-hour movements decrease for the With Scheme scenarios.

- 9.116 A comparison may also be drawn with Heathrow Airport, which in 2012 operated at approximately 70 mppa with a total of 471,000 movements (using substantially larger aircraft than operate at LCY). This compares with 111,000 movements and approximately 6 mppa at the Airport for the With Development scenario in 2023.
- 9.117 At Heathrow Airport, a monitoring site (LHR2) is located 180 metres to the north of the centre of the northern main runway (and in the prevailing downwind direction), and 18 metres from the centre of the Northern Perimeter Road. There have been no recorded exceedences of the 1-hour mean objective/limit value at this site since 1997, and in the majority of years, the maximum recorded level has been well below the 200  $\mu\text{g}/\text{m}^3$  threshold.
- 9.118 Therefore, based on empirical monitoring evidence, it is considered extremely unlikely that the small increase in peak-hour aircraft movements at the Airport resulting from the CADP would cause any exceedences on the 1-hour mean objective/limit value for nitrogen dioxide. Accordingly, the requirement for any detailed modelling has been scoped out.

#### Background Contributions

- 9.119 The ADMS-Airport model predicts pollutant concentrations from those sources of emissions that have been explicitly included in the model (as defined above). It is also necessary to take account of the contribution from other pollutant sources that are not explicitly included – normally referred to as the “background contribution”.
- 9.120 Background pollutant concentrations were obtained from national background pollutant maps published by Defra. These include modelling background concentrations for the whole country, published in a 1 x 1 km grid. These are published as total background pollutant concentrations, but are broken down by source contribution including road, rail, airport, domestic, industrial and rural sources.
- 9.121 In order to improve the spatial representation of the background pollutant concentrations, receptor-specific background concentrations have been calculated by interpolation of the mapped background concentrations using “kriging”<sup>8</sup>. This has been carried out using the Surfer 8 geostatistical software.
- 9.122 In order to avoid ‘double counting’ of airport-related pollution sources, the ‘airport’ contributions to the background mapped concentrations have been removed. This has been carried out using the Background Sector Removal Tool, which is published by Defra for use with the background maps<sup>(38)</sup>. The ‘in-square’ contributions of motorways, trunk roads and principal roads have also been removed from the background map calculations, as these sources are all explicitly included in the ADMS-Roads traffic model.

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<sup>8</sup> “Kriging is a geostatistical gridding method that is used to prepare contour maps.



## Odours

- 9.123 There is no straightforward way to quantify the potential odour effects associated with airport operations. There is no published evidence to suggest that there are any physiological health effects associated with exposure to VOCs at the concentrations at which airport odours are detectable, and the principal concern is related to nuisance or loss of amenity. A number of studies have attempted to draw comparison between an expansion in airport operations and the number of complaints that are received. One of the largest reported surveys was undertaken by Stansted Airport Ltd between August and November 2005 <sup>(39)</sup>, during which period the airport invited some 14,000 local residents to report any incidents of odour annoyance. During the survey period, only a very small number (99 in total) of responses were received, the majority of these from residents living a relatively large distance from the airport. The study concluded that:

*“One of the critical aspects of the work has been the low levels of data and information gathered following requests to the local community. There are no persistent reports of odour as there are with noise for example.*

*Without further accurate data and information it is not possible to draw many conclusions about correlations between odour and other factors such as meteorological data because any such correlations would not stand up to statistical challenge and would be supposition. So, although general trends have been found that when prompted, a small number of people living locally will indicate that they have experienced an odour occurrence, it has not been possible to deduce any of the causes or factors related to odour occurrences from this study”*

- 9.124 The Stansted study also included an assessment of the relationship between odour complaints and the number of air traffic movements at four major airports (Heathrow, Gatwick, Manchester and Birmingham). The study concluded that there was no clear relationship between odour complaints and the number of aircraft movements, and that the number of complaints recorded each year, even at large airports such as Gatwick and Birmingham, are extremely low and in single figures.
- 9.125 As part of the legal agreement associated with the 2009 planning approval, the Airport commissioned a pilot study to investigate Volatile Organic Compounds (VOC) concentrations and the prevalence of airport-related odours <sup>(40)</sup>. The study comprised of walk-around surveys to record the presence of odours, and included VOC monitoring using a low sensitivity (ppb) Photo-ionisation Detector (PID). Several important conclusions were drawn from this study:
- a) Airport-related odours were perceived in the vicinity of the Airport at times when measured VOC concentrations remained at background concentrations. Given the relatively high odour threshold of aviation kerosene (1,000 to 10,000 ppb), it was concluded airport-related odours are probably associated with organic hydrocarbons produced by the pyrolysis of kerosene in the jet engine, i.e. associated with what are sometimes called ‘burnt’ hydrocarbons; and
  - b) The greatest potential for odour emissions is believed to occur during aircraft taxi movements after landing, when thrust settings are low and the engine components are very hot.

- 9.126 A commonly-applied approach in some airport assessments is to base the odour assessment on the change in aircraft-related VOC emissions. However, there is no evidence to correlate total aircraft-related VOC concentrations with the human perception of odours. Moreover, given that airport-odours are unlikely to be related to total VOCs, any such correlation is expected to be very weak.
- 9.127 A variation on this general modelling approach was undertaken at Copenhagen Airport in 2002<sup>(41)</sup>. This study quantified odour emissions from aircraft engines using actual fuel flow and emissions measurements, odour panel results, engine specific data and aircraft operational data, and used this information to predict odour concentrations. Important outcomes from the study were a calculated odour emission rate from the aircraft engines of 57 Odour Units (OU<sub>E</sub>)<sup>9</sup> per milligramme of hydrocarbon, and the identification that the majority of the odorous emissions (97%) occurred whilst aircraft engines were running at idle. The calculations were carried out for only a limited number of engine types (predominantly the JT8D-219, which is not in use at The Airport) and the study recognised that *“the uncertainties become large when the experimental data is used to estimate the odour emissions for all aircraft engines”*.
- 9.128 Notwithstanding the above caveats, the outcome of the Copenhagen study has recently been used in a study to assess potential odour effects at Farnborough Airport<sup>(42)</sup>. The study included measurements of VOCs and an olfactometry study, but the results were inconclusive and no use was made of the data in forming any conclusions. The study also used the odour emission rate derived from the Copenhagen study, only taking account of aircraft emissions during idle mode (on stand and taxiing), which produced results that seemed credible in comparison to the records of odour complaints.
- 9.129 A similar approach has been adopted for this assessment. Hydrocarbon emissions have been quantified from aircraft operations in idle mode using the approach outlined above. An odour emission rate of 57 OU<sub>E</sub>/mg HC has then been applied.

#### Meteorological Data

- 9.130 Hourly sequential meteorological data for the most recent three years (2010-2012) were obtained from the Meteorological Office station at the Airport. Wind roses for each year are shown in Appendix 9.5. The 2012 Baseline Year assessment was undertaken using the 2012 meteorological data (together with the 2012 emissions inventory); a sensitivity test was then carried out to determine the “worst-case” meteorological dataset for future year scenarios, as described in Appendix 9.5.
- 9.131 Runway use at the Airport is determined by weather conditions. Runway 27 (westerly) is the preferred runway, with 71% of operations in 2012; however, when the wind direction is from the

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<sup>9</sup> In simple terms, olfactometry is the technique used to measure the concentration of an odour by taking samples of odorous air and then evaluating the number of dilutions at which the sample is only detected by 50% of the odour panel. The number of dilutions required to achieve this odour threshold is expressed as odour units per cubic metre.

east, runway 09 (easterly) is used. The Airport provided details of runway allocation for each departure and arrival during 2012. These data showed a strong correlation demonstrating that during easterly wind conditions (between 0 degrees and 180 degrees), aircraft operated from Runway 09, whereas during westerly wind conditions (between 180 degrees and 360 degrees), aircraft operated from Runway 27. Therefore, in the ADMS-Airport model, runway allocation has been determined by wind direction. During hours where winds occur in the sectors 0 - 180°, Runway 09 is assumed to be in use, and sources using Runway 27 are “switched off”. During hours with winds occurring in the sectors 180 – 360°, Runway 27 is assumed to be in use and sources using Runway 09 are “switched off”.

#### NOx to NO<sub>2</sub> Relationship

- 9.132 Nitrogen dioxide (NO<sub>2</sub>) concentrations have been calculated from the predicted NOx concentrations using the NO<sub>2</sub> from NOx calculator available on the Defra air quality website <sup>(21)</sup>. This calculator requires an estimate of the proportion of primary NO<sub>2</sub> (*f*-NO<sub>2</sub>). This was calculated individually for each receptor (including each gridded receptor for contour plotting) based on the relative contribution of different sources to total locally-generated NOx concentrations. For road vehicles, representative values of *f*-NO<sub>2</sub> are contained within the ‘NO<sub>2</sub> from NOx calculator’. For aircraft, *f*-NO<sub>2</sub> values obtained from the National Atmospheric Emissions Inventory were used <sup>(43)</sup>. For all other sources, including APUs, MGPUs, training fires and terminal boiler plant, an *f*-NO<sub>2</sub> value of 5% was assumed.

#### Number of Days with PM<sub>10</sub> Concentrations > 50 µg/m<sup>3</sup>

- 9.133 The number of exceedences of 50 µg/m<sup>3</sup> as a 24-hour mean PM<sub>10</sub> concentration has been calculated from the modelled total annual mean concentration following the relationship advised by Defra in LAQM.TG(09):

$$A = -18.5 + 0.00145 B^3 + (206/B) \quad \text{Equation [3]}$$

Where A is the number of exceedences of 50 µg/m<sup>3</sup> as a 24-hour mean PM<sub>10</sub> concentration, and B is the annual mean PM<sub>10</sub> concentration. The relationship is only applied to annual mean concentrations greater than 16.5 µg/m<sup>3</sup>; below this concentration, the number of 24-hour mean exceedences is assumed to be zero.

#### Spatial and Temporal Representation of Emissions

- 9.134 Emissions occur at different locations and over different time periods. The spatial representation of sources has been undertaken using a combination of line, point and area sources. Aircraft taxiing and holding emissions were represented as line sources based on schematic taxi routes from the stands, to and from the runway. Emissions during take-off roll were distributed between the start-of-roll point on the runway and the estimated point of ‘wheels-off’.
- 9.135 Aircraft movements, including taxiing, take-off, initial climb, climb-out, approach and landing roll-out are all contained within an “airfile” in ADMS-Airport. This file contains information on the

- geometry of individual aircraft, the engine exhaust parameters (exit velocity, temperature and diameter), the geometry of the LTO cycle (e.g. taxiway start and end points, take-off start and end points, approach start and end points etc.), the times in mode, and the aircraft emissions.
- 9.136 Each aircraft movement between spatial nodes is included as a separate line in the airfile. ADMS-Airport then treats each source as a series of fixed jet sources between each node point. Each line of the airfile is assigned an “NT number”, which is the number of fixed jet sources along its length. For each part of the LTO cycle, there is a maximum jet source spacing, which is used to calculate NT. i.e.  $NT = (\text{distance between aircraft start and end points}) / (\text{max jet-source spacing})$ .
- 9.137 The emission rates contained within the airfile are annual average emission rates based on the number of movements of a particular aircraft or group of aircraft, assuming 100% usage of both Runway 09 and Runway 27. A time-varying emission file was then used to apportion the movements to the runways on an hour-by-hour basis, depending on wind direction.
- 9.138 The Airport is permitted to operate flights between 0630-2230 hrs (weekdays), 0630-1300 hrs (Saturdays) and 1230-2230 hrs (Sundays). All emissions arising from Airport-related sources have been assumed to take place between these hours. The exception is emissions arising from the terminal gas boilers (assumed to include Western Energy Centre emissions), the Eastern Energy Centre, and all landside traffic, which were assumed to operate continuously.
- 9.139 Climb-out and approach trajectories have been calculated from information provided by The Airport. This includes the minimum angle of approach (5.5 degrees) as well as indicative times between lift-off and throttle-back, approach and landing, and estimated aircraft speeds during these movements.
- 9.140 Emissions from airside ground activities, including the use of APUs and MGPUs, airside vehicle movements, and aircraft ground runs, have been modelled as a series of four area and four volume sources, covering the three main aprons (Stands 1-14, Stands 21-24, and the Jet Centre), and the area of hard standing between the Jet Centre and Stand 1. Airside vehicle emissions and MGPU emissions are low-level and have therefore been modelled as area sources. APU and aircraft ground running emissions have an initial release height, as the jet engines/APU units are elevated on the aircraft fuselage, and the emissions are hot, giving them a degree of buoyancy. To account for this, APU and aircraft ground running emissions have been modelled as volume sources with a depth of 5m. The area and volume sources have been included in the time-varying emission file such that the emissions are switched off outside of Airport opening hours.
- 9.141 For the With Development scenarios, a fifth area and volume source has been added to the model to represent the new eastern apron. Emissions from the terminal building, car parks and taxi feeder park were represented as area sources, at terminal roof or ground level height as appropriate. Emissions from the fire training area were represented as a volume source with a depth of 5m to account for the initial buoyancy of hot LPG combustion emissions. Emissions from the Tate & Lyle gas and gas-oil boilers were represented as point sources.



9.142 Emissions from the landside road network were calculated and assigned on a link-by-link basis. Road speeds were based on local speed limits, and were reduced close to junctions to take account of decelerating and accelerating vehicles, queuing and congestion.

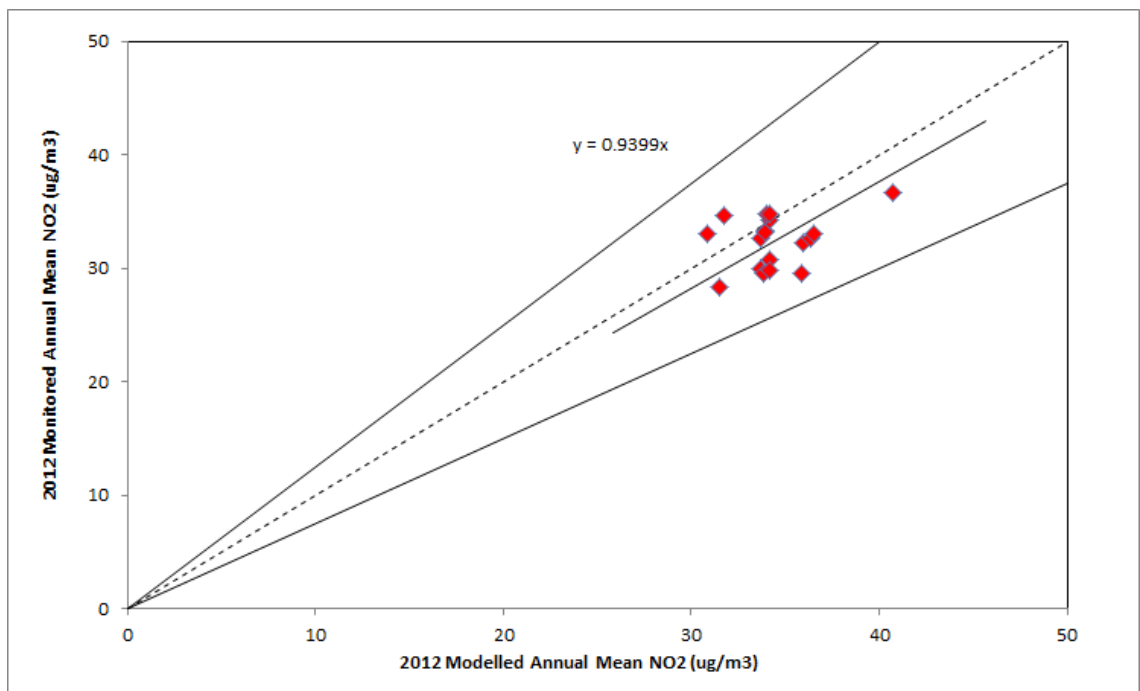
9.143 Emissions from the taxi ranks servicing the Airport were modelled as a line source.

#### Model Verification

9.144 The process of model verification refers to a comparison between the predicted and locally-measured pollutant concentrations. Model verification may or may not result in an adjustment of predicted results depending on the outcomes and/or the source types being considered.

9.145 Comparison of the annual mean modelled nitrogen dioxide concentrations in 2012 with monitored concentrations at sites within the Airport's Air Quality Measurement Programme<sup>10</sup> (16 diffusion tube sites and two continuous sites) in 2012, shows the model over-predicts concentrations by around 6%, on average, as shown in Figure 9.4.

**Figure 9.4 – Nitrogen Dioxide – Monitored vs Modelled NO<sub>2</sub> (µg/m<sup>3</sup>)**



9.146 LAQM.TG(09) provides guidance on the evaluation of model performance. Based on the data shown in Figure 9.4, the calculated correlation coefficient is 0.33, the Root Mean Square Error (RMSE) is 3.13 µg/m<sup>3</sup>, and the Fractional Bias is -0.06. LAQM.TG(09) notes that where RMSE

<sup>10</sup> Sites LCA04 and LCA16 were excluded from the analysis as they were identified as outliers. LCA04 is very closely located to the LCA-ND automatic monitoring site that was included in the verification process, while LCA16 is thought to have been significantly affected by the Olympics coach park and shipping-related emissions in 2012.

values are above 25% of the objective ( $10 \mu\text{g}/\text{m}^3$ ) that model inputs and verification should be checked. It further notes that *“ideally an RMSE value within 10% of the objective ( $4 \mu\text{g}/\text{m}^3$ ) should be achieved”*. The model performance in this assessment complies with this guidance, and is considered to be good.

- 9.147 The ideal value for the Fractional Bias is 0.0; the calculated value of -0.06 is not large and represents the model over-predicting concentrations. The model has not been adjusted for this small bias, and represents a conservative assumption.
- 9.148 The Airport undertakes  $\text{PM}_{10}$  monitoring at City Aviation House (CAH). The annual mean  $\text{PM}_{10}$  concentration measured at this site was  $21 \mu\text{g}/\text{m}^3$  in 2012; this compares with a predicted concentration of  $21 \mu\text{g}/\text{m}^3$ . The model results for  $\text{PM}_{10}$  have therefore not been adjusted.
- 9.149 There is no local monitoring of  $\text{PM}_{2.5}$  against which a comparison of modelling results can be made. The modelled  $\text{PM}_{2.5}$  concentrations have therefore not been adjusted, in line with the modelled concentrations of nitrogen dioxide and  $\text{PM}_{10}$ .

#### Uncertainty in Modelling Predictions

- 9.150 There are many components that contribute to the uncertainty of modelling predictions. The model used in this assessment is dependent upon the data that have been input, which will have inherent uncertainties associated with them. There are then additional uncertainties, as the model is required to simplify real-world conditions into a series of algorithms. An important stage in the process is model verification, which involves comparing the model output with measured concentrations (see above). The level of confidence in the verification process is necessarily enhanced when data from an automatic analyser have been used, as has been the case for this assessment. Because the model has been verified and shown to be performing well, there can be reasonable confidence in the prediction of Baseline Year (2012) concentrations.
- 9.151 Predicting pollutant concentrations in a future year will always be subject to greater uncertainty. For obvious reasons, the model cannot be verified in the future, and it is necessary to rely on a series of projections as to what will happen to aircraft and road vehicle emissions, aircraft and road traffic volumes, and background pollutant concentrations. Recently, however, a disparity between the road transport emission projections and measured annual mean concentrations of nitrogen oxides and nitrogen dioxide has been identified by Defra<sup>(18)</sup>. This applies across the UK, although the effect appears to be greatest in inner London; there is also considerable inter-site variation. Whilst the emission projections suggested that both annual mean nitrogen oxides and nitrogen dioxide concentrations should have fallen by around 15-25% over the past 6 to 8 years, at many monitoring sites levels have remained relatively stable, or have even shown a slight increase. This pattern is mirrored in some of the monitoring data assembled for this study, as set out below, although there does appear to be a slight downward trend at the diffusion tube sites within the Airport's Air Quality Measurement Programme.

- 9.152 This disparity led to a detailed review of the emission factors and fleet mix for UK conditions, and in July 2012, Defra issued an updated Emissions Factors Toolkit (ETFv5.1.3) which utilises revised nitrogen oxides emissions factors derived from COPERT 4 (v8.1) and also incorporates changes to the vehicle fleet composition in terms of the proportion of vehicle-km travelled by each Euro standard, technology mix, vehicle size and vehicle category <sup>(44)</sup>. Whilst these revised emissions factors represent a considerable improvement, Defra still anticipate that the emissions projections from the road transport sector may be overly-optimistic in the near term (i.e. the next five years or so).
- 9.153 The reason for the disparity is thought to relate to the on-road performance of modern diesel vehicles. New vehicles registered in the UK have to meet progressively tighter European type approval emissions categories, referred to as "Euro" standards. While the nitrogen oxides emissions from newer vehicles should be lower than those from equivalent older vehicles, the on-road performance of some modern diesel vehicles is often no better than that of earlier models. The best current evidence is that, where previous standards have had limited on-road success, the 'Euro VI' and 'Euro 6' standards that new vehicles will have to comply with from 2013/15 will achieve the expected on-road improvements, as, for the first time, they will require compliance with the World Harmonized Test Cycle, which better represents real-world driving conditions and includes a separate slow-speed cycle for heavy duty vehicles.
- 9.154 The implications for this assessment are that the absolute nitrogen dioxide concentrations predicted in 2019 may be higher than shown, when based on the revised emissions reduction forecasts. To account for this uncertainty in the projections, sensitivity tests have been conducted assuming that the future (2019) road traffic emissions per vehicle are unchanged from 2012 values. The predictions within this sensitivity test are likely to be over-pessimistic, as new vehicles meeting more stringent standards (Euro 6/VI) will be on the road from 2013/14. The Defra forecast figures indicate by 2019 there will be a roughly 60-80% penetration of Euro VI HDVs (the most polluting vehicles), and a roughly 45-50% penetration of Euro 6 LDVs. These new vehicles are expected to deliver real on-road reductions in nitrogen oxides emissions.
- 9.155 By 2021, Defra forecast that there will be an 80-90% penetration of Euro VI HDVs, and a 60% penetration of Euro 6 LDVs in London. It was therefore not considered appropriate to include sensitivity tests for the 2021 and 2023 assessment years.
- 9.156 It must also be borne in mind that the predictions in all future years are based on worst-case assumptions regarding the increase in traffic flows, such that all planned/committed developments that may have an impact on the study area are assumed to be fully operational, and an additional "growth factor" has been applied to take account of other potential developments in the area. This is likely to have overestimated the effects, which will, in part, offset any potential underestimation as described above.

### **Baseline Conditions (2012)**

- 9.157 LBN has investigated air quality within its area as part of its responsibilities under the LAQM regime and has identified road traffic as the primary source of poor air quality in the borough. In 2002, the Council concluded that it would not meet the statutory objectives for two pollutants, nitrogen dioxide (annual mean) and PM<sub>10</sub> (24 hour mean) and designated an Air Quality Management Area (AQMA) extending alongside the major roads in the Borough including North Woolwich Road, Connaught Crossing, Silvertown Way, Royal Albert Way and Royal Docks Road. However, the Airport and the roads to the south of it, including Hartmann Road and Albert Road, lie outside the AQMA boundary.

#### Monitoring At and Around the Airport

- 9.158 Information on existing pollutant concentrations in the vicinity of the Airport has been derived from a number of sources. These include:
- a) Monitoring carried out by the Airport as part of its legal agreement associated with the 2009 planning permission to expand to 120,000 “noise-factored” movements;
  - b) Monitoring carried out in the LBN and adjacent local authorities; and
  - c) Estimated background concentrations for the study area derived from national maps available on the Air Quality Archive <sup>(45)</sup>.

#### *Monitoring Carried out by the Airport*

- 9.159 A programme of ambient air quality monitoring was established by the Airport in 2006. This monitoring programme has now been incorporated into the legal agreement associated with the 2009 planning permission, and forms part of the Air Quality Measurement Programme (AQMP). The AQMP includes an automatic monitoring station situated on the roof of City Aviation House (‘LCA-CAH’) which measures concentrations of nitrogen dioxide and PM<sub>10</sub>, and a network of nitrogen dioxide diffusion tubes located around the Airport and close to local housing. It is important to note that not all of the diffusion tube sites represent relevant public exposure, and they have been included in the AQMP to provide a better understanding of the spatial distribution of nitrogen dioxide concentrations in the vicinity of the Airport. In particular, there is no relevant exposure in terms of the annual mean objective at the waterfront to the north of Royal Albert Dock (sites LCA04, LCA11, LCA14, LCA16 and LCA17), at the Jet Centre apron (LCA10), or within Silvertown Quay (LCA03), as denoted on Figures 9.5 and 9.6 (see below).
- 9.160 In addition to the formal requirements of the AQMP, the Airport has commissioned a second automatic monitoring station adjacent to the Newham Dockside building, which is to the north of the Royal Albert Dock. This station (LCA-ND) measures nitrogen dioxide.
- 9.161 The location of the automatic monitors and the diffusion tube sites is shown in Figures 9.4 and 9.5. A summary of the automatic monitoring data collected over the period January 2008 to



December 2012 is provided in Tables 9.7 and 9.8; the diffusion tube data are summarised in Table 9.9.

**Table 9.7 - Summary of Nitrogen Dioxide (NO<sub>2</sub>) Monitoring in LCY AQMP (2008-2012)**

Site	2008	2009	2010	2011	2012
	Annual Mean				
LCA-CAH	37	34	35	33	35
LCA-ND	-	36	39	30 <sup>1</sup>	30
	No. Hours > 200 µg/m <sup>3</sup>				
LCA-CAH	0	0	0	0	0
LCA-ND	-	0	0	0	3

1. Data capture in 2011 was low (63%) due to an instrument fault. The measured value has been annualised according to procedures recommended by Defra in LAQM.TG(09)

**Table 9.8 - Summary of PM<sub>10</sub> Monitoring in LCY AQMP (2008-2012)<sup>1</sup>**

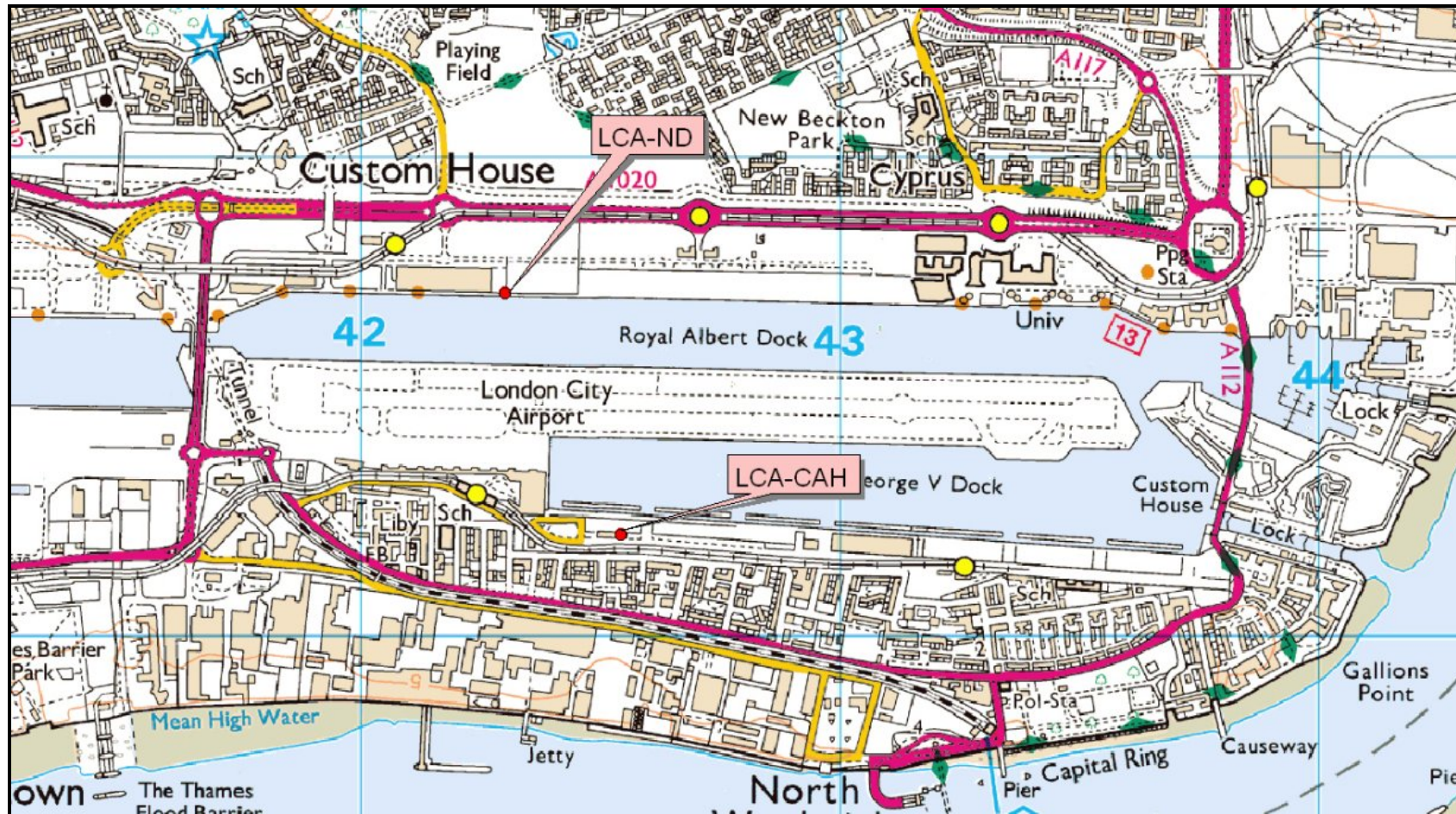
Site	2008	2009	2010	2011	2012
	Annual Mean				
LCA-CAH	21	23	22	24	21
	No. Days > 50 µg/m <sup>3</sup>				
LCA-CAH	4	5	2	16	9

**Notes**

1. Concentrations reported as Volatile Correction Method (VCM) adjusted TEOM values

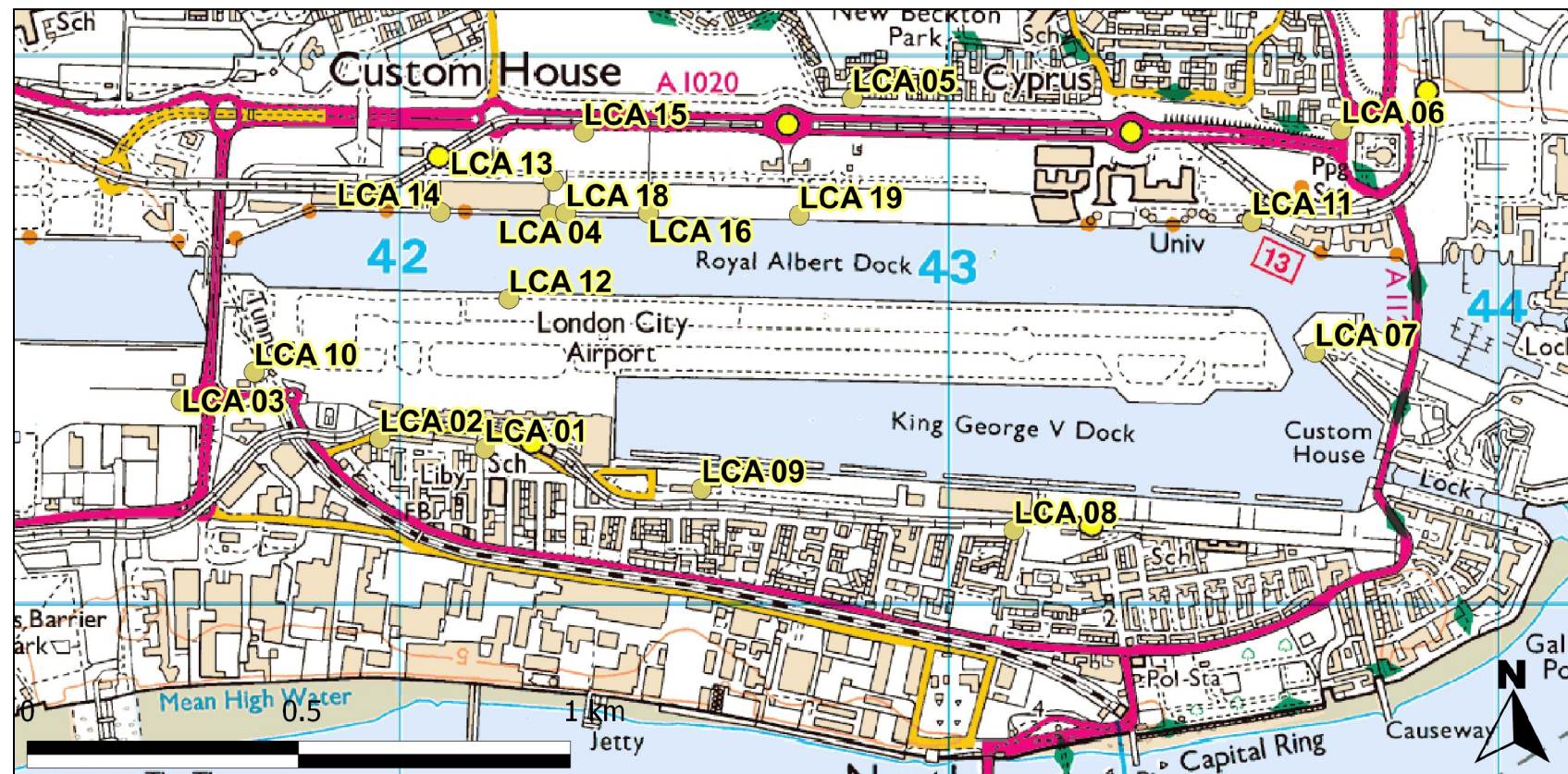
- 9.162 There have been no recorded exceedences of the nitrogen dioxide or PM<sub>10</sub> objectives at the automatic sites since monitoring commenced. There were a number of recorded exceedences of the annual mean nitrogen dioxide objective at some of the diffusion tubes sites in 2008, 2011 and 2012 but none of these were at locations relevant to public exposure.

**Figure 9.5 – Automatic Monitoring Sites in LCY AQMP.** © Crown Copyright 2013. All rights reserved. Licence number 100020449.





**Figure 9.6 - Diffusion Tube Monitoring Locations in LCY AQMP.** © Crown Copyright 2013. All rights reserved. Licence number 100020449.



**Table 9.9: Summary of LCY AQMP Nitrogen Dioxide Diffusion Tube Data 2008-2012**

Site ID	Site Description	Annual Mean Nitrogen Dioxide Concentration ( $\mu\text{g}/\text{m}^3$ )				
		2008	2009	2010	2011	2012
LCA01	Top of Parker Street, adjacent to housing	36.0	31.8	34.2	31.5	32.2
LCA02	Camel Road, adjacent to nearest property on Hartmann Street	37.9	29.4	37.2	33.3	32.7
LCA03	Access road in Silvertown Quay. Approx. 36 metres from kerbside of main road	<b>42.0</b>	31.2	34.4	32.6	33.0
LCA04	Waterfront to east end of Newham Dockside	<b>47.9</b>	38.3	39.9	<b>41.1</b>	<b>43.2</b>
LCA05	Straight Road, at kerbside	35.8	30.5	31.7	28.9	29.9
LCA06	Pedestrian walkway adjacent to nearest housing at Gallions Way	37.8	32.5	33.0	33.5	32.7
LCA07	Landing Lights	39.0	32.4	33.3	32.8	33.1
LCA08	Brixham Street	33.4	29.2	29.3	28.7	28.4
LCA09	City Aviation House	37.5	31.5	34.1	31.1	30.8
LCA10	Jet Centre – airside	<b>42.9</b>	36.8	38.4	39.4	36.7
LCA11	Waterfront, eastern end of the University of East London	41.7	36.3	37.7	36.4	34.7
LCA12	ILS, to north of runway and south of Royal Albert Dock	38.0	31.3	32.4	32.3	29.5
LCA13	North west corner of Newham Dockside	36.9	25.7	35.2	33.7	29.6
LCA14	Waterfront at western end of Newham Dockside	38.3	33.5	37.4	36.1	33.3
LCA15	Kerbside (approx 1 m) of Royal Albert Way	38.1	33.2	36.7	31.3	33.2
LCA16	Waterfront, approx 180 m east of Newham Dockside	<b>44.0</b>	36.8	35.7	33.6	<b>43.5</b>
LCA17	North west of site 16, approx 85 m back from Waterfront	<b>40.6</b>	34.5	36.9	36.6	-
LCA18	Newham Dockside analyser	-	-	-	34.0	34.2
LCA19	Waterfront, approximately 460m east of Newham Dockside	-	-	-	37.7	34.8

**Notes**

1. Exceedences of the objective ( $40 \mu\text{g}/\text{m}^3$ ) are shown in bold.
2. All data bias-adjusted using local factors derived from co-located triplicate tubes at LCA-CAH and (from 2009) a single tube at LCA-ND.
3. Land between the Royal Dock and the A1020 was used as an Olympic Coach Park during July and August 2012, and there was intermittent use of this site from January 2012 onwards. In addition, there were also berthed ships in the Dock and generators in the Coach Park. Emissions from these local sources may have affected measured concentrations at some sites in 2012, notably LCA04 and LCA16.

*Monitoring Carried Out by Local Authorities*

- 9.163 Air quality monitoring is also carried out by LBN and other, nearby local authorities (London Boroughs of Tower Hamlets and Greenwich). Data from a number of automatic monitoring sites within the proximity of the Airport have been derived from the London Air Quality Network <sup>(46)</sup>. These include Greenwich Millennium Village (classified as an “Industrial” site), Newham Wren Close and Tower Hamlets Poplar (Urban Background), Newham Cam Road, Greenwich Burrage Grove, Greenwich Woolwich Flyover and Tower Hamlets Blackwall (Roadside). The data are summarised in Tables 9.10, 9.11 and 9.12 for nitrogen dioxide,  $\text{PM}_{10}$  and  $\text{PM}_{2.5}$  respectively.
- 9.164 Monitoring of nitrogen dioxide concentrations is also carried out by LBN using diffusion tube samplers. There are two sites in close proximity to the Airport, one located on the western side

of the main access road into the Airport car parks, and one close to the Gallions Way roundabout. The annual mean concentrations for 2007 to 2012 are shown in Table 9.13. It should be noted that the site at the Airport car park is not representative of public exposure.

**Table 9.10 - Summary of Nitrogen Dioxide (NO<sub>2</sub>) Monitoring at Local Authority Sites (2007-2012)**

Site	2007	2008	2009	2010	2011	2012
Annual Mean (µg/m <sup>3</sup> )						
Greenwich Millennium Village	37.4	36.5	36.4	35.7	33.0	37
Newham Wren Close	<b>40.7</b>	39.9	38.4	38.4	39.0	38
Tower Hamlets Poplar	36.8	37.9	36.2	39.8	N/A	33
Newham Cam Road	<b>53.9</b>	<b>54.8</b>	<b>52.8</b>	<b>52.5</b>	<b>47</b>	<b>43</b>
Greenwich Burrage Grove	<b>57.6</b>	<b>50.8</b>	<b>49.1</b>	<b>52.7</b>	<b>43</b>	<b>45</b>
Greenwich Woolwich Flyover	<b>70.8</b>	<b>70.3</b>	<b>82.5</b>	<b>73.5</b>	<b>67</b>	<b>71</b>
Tower Hamlets Blackwall	<b>73.4</b>	<b>63.1</b>	<b>63.9</b>	<b>72.8</b>	<b>63</b>	<b>61</b>
No. Hours > 200 µg/m <sup>3</sup>						
Greenwich Millennium Village	5	2	0	0	0	2
Newham Wren Close	4	0	1	2	0	0
Tower Hamlets Poplar	8	0	0	<b>22</b>	N/A	0
Newham Cam Road	<b>23</b>	4	4	13	0	0
Greenwich Burrage Grove	7	1	3	1	1	1
Greenwich Woolwich Flyover	<b>58</b>	<b>41</b>	<b>53</b>	<b>38</b>	6	27
Tower Hamlets Blackwall	8	3	2	7	0	0

**Table 9.11 - Summary of PM<sub>10</sub> Monitoring at Local Authority Sites (2007-2012)<sup>1</sup>**

Site	2007	2008	2009	2010	2011	2012
Annual Mean (µg/m <sup>3</sup> )						
Greenwich Millennium Village	-	23.2	19.6	22.1 <sup>2</sup>	25 <sup>2</sup>	23 <sup>2</sup>
Newham Wren Close	25.1	22.8	23.6	21.7 <sup>2</sup>	27 <sup>2</sup>	N/A
Tower Hamlets Poplar	23.0	22.9	22.0	21.7	23 <sup>2</sup>	21 <sup>2</sup>
Newham Cam Road	30.3	28.0	27.2	26.7 <sup>2</sup>	28 <sup>2</sup>	N/A
Greenwich Burrage Grove	24.1	25.7	25.1	27.8	28 <sup>2</sup>	27 <sup>2</sup>
Greenwich Woolwich Flyover <sup>1</sup>	37.2	<b>40.9</b>	37.0	32.5 <sup>2</sup>	35 <sup>2</sup>	32 <sup>2</sup>
Tower Hamlets Blackwall	35.5	35.7	34.1	29.2 <sup>2</sup>	28 <sup>2</sup>	26 <sup>2</sup>
No. Days > 50 µg/m <sup>3</sup>						
Greenwich Millennium Village	-	18	12	9 <sup>2</sup>	25 <sup>2</sup>	21 <sup>2</sup>
Newham Wren Close	19	13(38.6)	7(37)	3 <sup>2</sup>	14(42.7) <sup>2</sup>	N/A
Tower Hamlets Poplar	19	15	7	6	18 <sup>2</sup>	9 <sup>2</sup>
Newham Cam Road	38	19	10	12(39.2) <sup>2</sup>	16(45) <sup>2</sup>	N/A
Greenwich Burrage Grove	21	13	0	17	32 <sup>2</sup>	28 <sup>2</sup>
Greenwich Woolwich Flyover	<b>61</b>	<b>81</b>	<b>44</b>	33 <sup>2</sup>	<b>42<sup>2</sup></b>	30 <sup>2</sup>
Tower Hamlets Blackwall	<b>61</b>	<b>59</b>	<b>43</b>	18 <sup>2</sup>	32 <sup>2</sup>	25 <sup>2</sup>

**Notes**

1. Concentrations reported as Volatile Correction Method (VCM) adjusted TEOM values unless otherwise stated.
2. Concentrations measured using FDMS in 2010 - 2012.
3. For years where the data capture is less than 90%, the 90<sup>th</sup> percentile of 24-hour means is given in parentheses.



**Table 9.12 - Summary of PM<sub>2.5</sub> Monitoring at Local Authority Sites (2007-2012)<sup>1</sup>**

Site	2007	2008	2009	2010	2011	2012
	Annual Mean (µg/m <sup>3</sup> )					
Greenwich Millennium Village	-	15.1	15.5	16.5	19.1	15.2
Greenwich Burrage Grove	-	17.2	19.6	19.9	24.7	17.6
Tower Hamlets Blackwall	19.7	18.4	19.1	18.1	N/A	15.2

**Notes**

1. Concentrations measured using FDMS in 2010 - 2012.

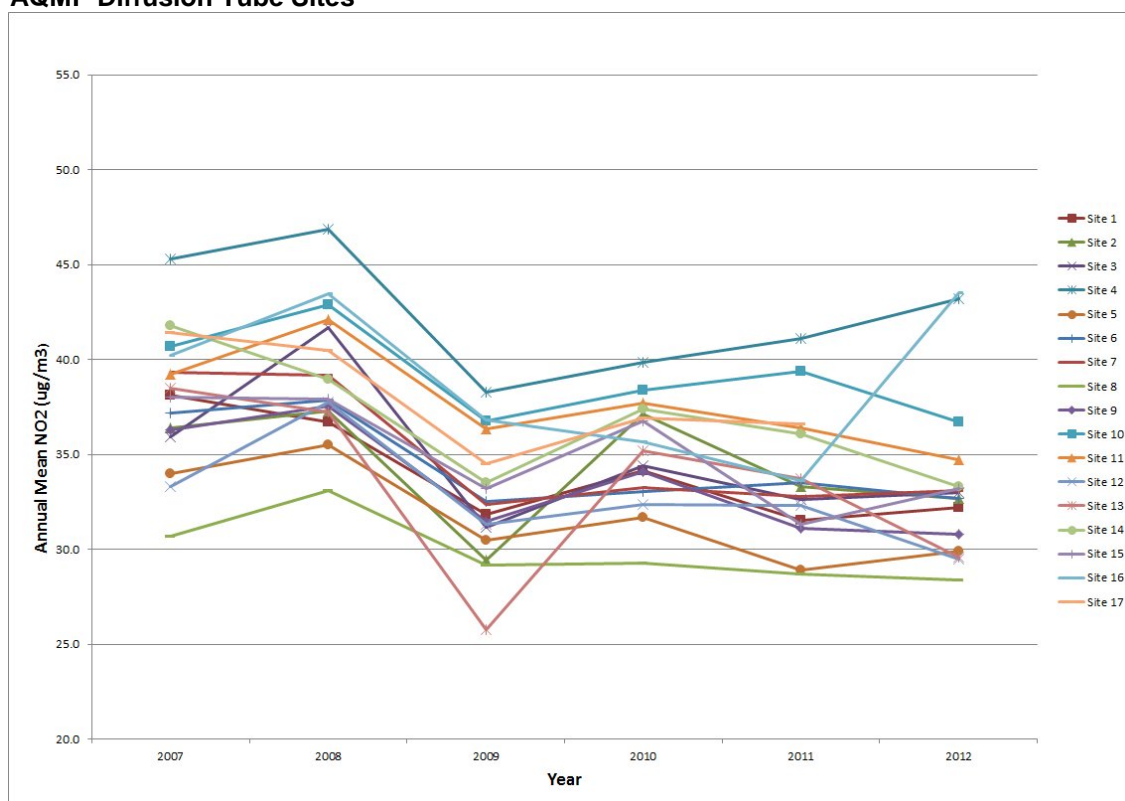
**Table 9.13 - LBN Annual Mean Nitrogen Dioxide (µg/m<sup>3</sup>) Diffusion Tube Monitoring (2008-2012). Data have been bias-adjusted by LBN**

Site	2008	2009	2010	2011	2012
Airport Car Park	<b>40.7</b>	39.6	37.1	33.5	
Galleons Way Roundabout	<b>40.7</b>	37.9	36.9	34.0	

*Trends in Measured Concentrations*

- 9.165 A detailed analysis of trends in measured annual mean nitrogen dioxide concentrations has been carried out for monitoring sites in east London, in the 2012 Annual Report for the AQMP (<sup>47</sup>). This has shown a statistically significant downward trend at three monitoring sites (Greenwich Burrage Grove, Greenwich Millennium Village and Newham Cam Road), but no downward trend at five other sites, including City Aviation House. There does, however, appear to be evidence of a downward trend in concentrations measured at some of the diffusion tube sites in the AQMP (see Figure 9.7). There also appears to be evidence of a slight downward trend in annual mean PM<sub>10</sub> concentrations at all sites. The implications of this are discussed in the section on Uncertainty (see above).

**Figure 9.7 – Trends in Annual Mean Nitrogen Dioxide Concentrations (2007-2012) at AQMP Diffusion Tube Sites**



#### Mapped Background Concentrations

- 9.166 The background concentrations across the study area have been defined using the national pollution maps (“background maps”) published by Defra<sup>(48)</sup>. These cover the whole country on a 1x1 km grid and are published for each year from 2010 until 2025. The maps include the influence of emissions from a range of different sources, one of which is road traffic. As noted above, there are some concerns that Defra may have over-predicted the rate at which road traffic emissions of nitrogen oxides will fall in the near future. The maps currently in use were verified against measurements made during 2010 at a large number of automatic monitoring stations and so there can be reasonable confidence that the maps are representative of conditions during 2010. Similarly, there is reasonable confidence that the reductions which Defra predicts from other sectors (e.g. rail and industry etc.) will be achieved.
- 9.167 Measured 2012 background concentrations from across east London have been compared with concentrations derived from the background maps. These comparisons are shown in Appendix 9.6. The mapped 2012 concentrations of nitrogen dioxide correlate well with the measured concentrations and therefore the raw, mapped 2012 background concentrations have been used in the assessment. Mapped PM<sub>10</sub> concentrations are slightly higher (+3.5%) than the measured data, but no adjustment has been made, representing a conservative assumption.
- 9.168 Two separate sets of 2019 background nitrogen dioxide and nitrogen oxides concentrations have been used for the future-year assessment. The 2019 background ‘without emissions reduction’ has been calculated using road traffic components of background nitrogen oxides held constant at 2012 values, whilst 2019 data are taken for the other components. Nitrogen dioxide has then been calculated using Defra’s background nitrogen dioxide calculator<sup>(49)</sup>. The

2019 background ‘with emissions reduction’ assumes that Defra’s revised background reductions occur as predicted.

- 9.169 As explained in the section on model uncertainty, it would be unrealistic to assume no change in vehicle emissions post-2020, as there will be a substantial penetration of Euro VI/6 vehicles by this time. Defra’s predicted reductions in background nitrogen oxides and nitrogen dioxide concentrations have thus been assumed to apply in both 2021 and 2023.
- 9.170 For PM<sub>10</sub> and PM<sub>2.5</sub>, there is no strong evidence that Defra’s predictions are unrealistic and so the year-specific mapped concentrations have been used in this assessment

#### Complaints

- 9.171 The Airport operates an environmental complaint handling procedure by which anyone can contact the Airport to register a complaint or request information about Airport operations. Complaints or requests for information can be registered by telephone, post, email or via the Airport website. Each complaint or request for information is registered by the Airport, and then investigated and resolved where practical. All environmental complaints and enquiries are reported to the London Borough of Newham. A summary of the complaints related to air quality issues since April 2000 is shown in Table 9.14 below. Very few complaints are recorded in each year, and there is no evidence that there has been any increase over the past 10 years.

**Table 9.14 - Summary of Recorded Complaints at LCY**

Period	No. Complaints	Nature of Complaint
Apr 2001 – Mar 2002	1	Airport odours
Apr 2002 – Mar 2003	1	Airport odours
Apr 2003 – Mar 2004	0	
Apr 2004 – Mar 2005	2	Smoke
Apr 2005 – Mar 2006	2	Airport odours
Apr 2006 – Mar 2007	1	Airport odours
Apr 2007 – Mar 2008	1	Airport odours
Apr 2008 – Mar 2009	0	
Apr 2009 – Mar 2010	1	Airport odours
Apr 2010 – Mar 2011	0	
Apr 2011 – Mar 2012	0	

#### **Modelled Baseline (2012) Concentrations**

- 9.172 The ADMS-Airport model has been used to predict 2012 Baseline pollutant concentrations at each of the existing sensitive receptor locations identified in Table 9.6. The results are shown in Tables 9.15 to 9.18. The annual mean nitrogen dioxide (µg/m<sup>3</sup>) concentrations are also shown as an isopleth in Figure A7.1 (Appendix 9.7).
- 9.173 All predicted annual mean nitrogen dioxide, PM<sub>10</sub> and PM<sub>2.5</sub> concentrations are below the objective. All of the predicted annual mean nitrogen dioxide concentrations are well below the 60 µg/m<sup>3</sup> threshold identified by Defra, and thus exceedences of the 1-hour mean objective are unlikely. These results are consistent with the measured concentrations in the Airport’s AQMP.

9.174 The highest predicted 98<sup>th</sup> percentile of 1-hour mean odour concentrations is just below 2.4 OU<sub>E</sub>/m<sup>3</sup>, at Hartmann Road, to the south of the terminal. This is below the threshold for complaints related to moderately offensive odours, and is consistent with the very small number of complaints related to “airport odours”.



**Table 9.15 – Modelled Annual Mean Concentrations of NO<sub>x</sub> and NO<sub>2</sub> for 2012 Baseline (µg/m<sup>3</sup>)**

Receptor ID	Description	OS Grid Ref	Airport NO <sub>x</sub> <sup>1</sup>	Road NO <sub>x</sub> <sup>2</sup>	Background NO <sub>2</sub>	Total NO <sub>2</sub>
R1	Camel Road/Hartmann Road	541986, 180309	6.9	5.9	33.2	38.6
R2	Camel Road/Parker Street	542133, 180304	7.2	4.4	33.3	38.2
R3	Parker Street ( Portway Primary School)	542179, 180228	3.0	1.9	33.4	35.5
R4	Newland Street	542549, 180152	2.1	2.7	33.0	35.2
R5	Newland Street/Kennard Street	542688, 180142	1.6	1.1	32.6	33.9
R6	Brixham Street/Dockland Street	543126, 180118	1.0	0.5	31.0	31.7
R7	Platterns Court/Billingway Dock Head	543672, 180072	0.7	1.2	29.3	30.2
R8	Albert Road/Woolwich Manor Way	543712, 180012	0.6	4.1	29.1	31.3
R9	Robert Street adj Albert Road	543523, 179955	0.6	3.7	29.3	31.4
R10	Collier Close adj Gallions Way Roundabout	543713, 180876	1.3	7.3	29.6	33.6
R11	Yeoman Close adj Royal Albert Way	543610, 180883	1.5	3.1	29.8	31.9
R12	Straight Road/Campton Close	542824, 180920	1.6	2.1	31.5	33.2
R13	Mill Rd adj North Woolwich Road	540854, 180110	0.4	5.3	33.9	36.5
R14	Connaught Road/Leonard Street	542321, 180087	1.4	5.0	33.4	36.3
R15	Victoria Dock Road	540827, 180963	0.2	4.0	32.1	34.1
R16	Gallions Primary School adj Royal Docks Road	543749, 181324	0.8	2.2	28.9	30.3
R17	Drew Road/Leonard Street	542306, 180219	3.1	3.4	33.4	36.2
R18	Woolwich Manor Way (UEL)	543809, 180688	1.4	3.5	29.7	31.9
R19	West Silvertown 1 (1.5 metres elevation)	540847, 180447	0.4	0.5	33.0	33.4
R19	West Silvertown 1 (20 metres elevation)	540847, 180447	0.4	0.4	33.0	33.3
R20	West Silvertown 2 (1.5 metres elevation)	540681, 180447	0.3	0.5	33.0	33.4
R20	West Silvertown 2 (20 metres elevation)	540681, 180447	0.3	0.4	33.0	33.4
R21	Flats on Drew Road (20 metres elevation)	542050, 180261	2.6	1.2	33.3	35.0
R22	Flats on Docklands Street (40 metres elevation)	543132, 180047	0.8	0.3	30.9	31.3

**Notes**

1. Airport NO<sub>x</sub> concentration includes all Airport source contributions
2. Road NO<sub>x</sub> concentration includes all landside traffic contributions

**Table 9.16 – Modelled Annual Mean Concentrations of PM<sub>10</sub> (µg/m<sup>3</sup>) and Number of Days > 50 µg/m<sup>3</sup> for 2012 Baseline**

Receptor ID	Description	OS Grid Ref	Airport PM <sub>10</sub> <sup>1</sup>	Road PM <sub>10</sub> <sup>2</sup>	Background PM <sub>10</sub>	Total PM <sub>10</sub>	No. Days >50 µg/m <sup>3</sup>
R1	Camel Road/Hartmann Road	541986, 180309	1.1	0.4	20.5	22.0	6
R2	Camel Road/Parker Street	542133, 180304	1.1	0.3	20.4	21.8	6
R3	Parker Street ( Portway Primary School)	542179, 180228	0.5	0.1	20.4	21.0	5
R4	Newland Street	542549, 180152	0.3	0.2	20.4	20.9	5
R5	Newland Street/Kennard Street	542688, 180142	0.3	0.1	20.4	20.7	4
R6	Brixham Street/Dockland Street	543126, 180118	0.2	<0.1	20.1	20.3	4
R7	Plattens Court/Billingway Dock Head	543672, 180072	0.1	0.1	19.7	19.9	3
R8	Albert Road/Woolwich Manor Way	543712, 180012	0.1	0.3	19.6	20.0	3
R9	Robert Street adj Albert Road	543523, 179955	0.1	0.3	19.8	20.2	4
R10	Collier Close adj Gallions Way Roundabout	543713, 180876	0.2	0.4	19.6	20.2	4
R11	Yeoman Close adj Royal Albert Way	543610, 180883	0.3	0.2	19.7	20.2	4
R12	Straight Road/Campton Close	542824, 180920	0.3	0.2	19.9	20.4	4
R13	Mill Rd adj North Woolwich Road	540854, 180110	0.1	0.4	20.2	20.7	4
R14	Connaught Road/Leonard Street	542321, 180087	0.2	0.3	20.5	21.0	5
R15	Victoria Dock Road	540827, 180963	<0.1	0.3	20.9	21.3	5
R16	Gallions Primary School adj Royal Docks Road	543749, 181324	0.1	0.2	19.5	19.8	3
R17	Drew Road/Leonard Street	542306, 180219	0.5	0.2	20.4	21.1	5
R18	Woolwich Manor Way (UEL)	543809, 180688	0.2	0.2	19.5	20.0	3
R19	West Silvertown 1 (1.5 metres elevation)	540847, 180447	0.1	<0.1	20.3	20.4	4
R19	West Silvertown 1 (20 metres elevation)	540847, 180447	0.1	<0.1	20.3	20.4	4
R20	West Silvertown 2 (1.5 metres elevation)	540681, 180447	0.1	<0.1	20.1	20.2	4
R20	West Silvertown 2 (20 metres elevation)	540681, 180447	0.1	<0.1	20.1	20.2	4
R21	Flats on Drew Road (20 metres elevation)	542050, 180261	0.5	0.1	20.5	21.0	5
R22	Flats on Docklands Street (40 metres elevation)	543132, 180047	0.1	<0.1	20.1	20.3	4

**Notes**

1. Airport PM<sub>10</sub> concentration includes all Airport source contributions
2. Road PM<sub>10</sub> concentration includes all landside traffic contributions

**Table 9.17 – Modelled Annual Mean Concentrations of PM<sub>2.5</sub> for 2012 Baseline (µg/m<sup>3</sup>)**

Receptor ID	Description	OS Grid Ref	Airport PM <sub>2.5</sub> <sup>1</sup>	Road PM <sub>2.5</sub> <sup>2</sup>	Background PM <sub>2.5</sub>	Total PM <sub>2.5</sub>
R1	Camel Road/Hartmann Road	541986, 180309	1.1	0.3	14.8	16.2
R2	Camel Road/Parker Street	542133, 180304	1.1	0.2	14.8	16.1
R3	Parker Street ( Portway Primary School)	542179, 180228	0.5	0.1	14.8	15.4
R4	Newland Street	542549, 180152	0.3	0.1	14.8	15.3
R5	Newland Street/Kennard Street	542688, 180142	0.3	<0.1	14.8	15.1
R6	Brixham Street/Dockland Street	543126, 180118	0.2	<0.1	14.5	14.7
R7	Platterns Court/Billingway Dock Head	543672, 180072	0.1	0.1	14.2	14.3
R8	Albert Road/Woolwich Manor Way	543712, 180012	0.1	0.2	14.1	14.4
R9	Robert Street adj Albert Road	543523, 179955	0.1	0.2	14.2	14.5
R10	Collier Close adj Gallions Way Roundabout	543713, 180876	0.2	0.3	14.1	14.6
R11	Yeoman Close adj Royal Albert Way	543610, 180883	0.3	0.2	14.2	14.6
R12	Straight Road/Campton Close	542824, 180920	0.3	0.1	14.4	14.8
R13	Mill Rd adj North Woolwich Road	540854, 180110	0.1	0.3	14.4	14.7
R14	Connaught Road/Leonard Street	542321, 180087	0.2	0.2	14.8	15.3
R15	Victoria Dock Road	540827, 180963	<0.1	0.2	14.7	14.9
R16	Gallions Primary School adj Royal Docks Road	543749, 181324	0.1	0.1	13.9	14.1
R17	Drew Road/Leonard Street	542306, 180219	0.5	0.2	14.9	15.5
R18	Woolwich Manor Way (UEL)	543809, 180688	0.2	0.1	14.1	14.4
R19	West Silvertown 1 (1.5 metres elevation)	540847, 180447	0.1	<0.1	14.4	14.5
R19	West Silvertown 1 (20 metres elevation)	540847, 180447	0.1	<0.1	14.4	14.5
R20	West Silvertown 2 (1.5 metres elevation)	540681, 180447	0.1	<0.1	14.2	14.3
R20	West Silvertown 2 (20 metres elevation)	540681, 180447	0.1	<0.1	14.2	14.3
R21	Flats on Drew Road (20 metres elevation)	542050, 180261	0.5	0.1	14.8	15.3
R22	Flats on Docklands Street (40 metres elevation)	543132, 180047	0.1	<0.1	14.5	14.7

**Notes**

1. Airport PM<sub>2.5</sub> concentration includes all Airport source contributions
2. Road PM<sub>2.5</sub> concentration includes all landside traffic contributions

**Table 9.18 – Modelled 98th Percentile of 1-hr Mean Odour Concentrations in 2012 (OU<sub>E</sub>/m<sup>3</sup>)**

Receptor ID	Description	OS Grid Ref	98 <sup>th</sup> Percentile (OU <sub>E</sub> /m <sup>3</sup> )
R1	Camel Road/Hartmann Road	541986, 180309	2.36
R2	Camel Road/Parker Street	542133, 180304	1.48
R3	Parker Street ( Portway Primary School)	542179, 180228	0.67
R4	Newland Street	542549, 180152	0.65
R5	Newland Street/Kennard Street	542688, 180142	0.53
R6	Brixham Street/Dockland Street	543126, 180118	0.37
R7	Plattens Court/Billingway Dock Head	543672, 180072	0.30
R8	Albert Road/Woolwich Manor Way	543712, 180012	0.26
R9	Robert Street adj Albert Road	543523, 179955	0.30
R10	Collier Close adj Gallions Way Roundabout	543713, 180876	0.34
R11	Yeoman Close adj Royal Albert Way	543610, 180883	0.37
R12	Straight Road/Campton Close	542824, 180920	0.46
R13	Mill Rd adj North Woolwich Road	540854, 180110	0.20
R14	Connaught Road/Leonard Street	542321, 180087	0.41
R15	Victoria Dock Road	540827, 180963	0.09
R16	Gallions Primary School adj Royal Docks Road	543749, 181324	0.23
R17	Drew Road/Leonard Street	542306, 180219	0.81
R18	Woolwich Manor Way (UEL)	543809, 180688	0.33
R19	West Silvertown 1 (1.5 metres elevation)	540847, 180447	0.22
R19	West Silvertown 1 (20 metres elevation)	540847, 180447	0.21
R20	West Silvertown 2 (1.5 metres elevation)	540681, 180447	0.17
R20	West Silvertown 2 (20 metres elevation)	540681, 180447	0.17
R21	Flats on Drew Road (20 metres elevation)	542050, 180261	1.00
R22	Flats on Docklands Street (40 metres elevation)	543132, 180047	0.26

- 9.175 A summary of the 2012 Baseline Year emissions (tonnes/yr) is shown in Table 9.19. This shows the emissions from different source categories. As described in the methodology section above, Airport-related PM emissions are assumed to represent both the PM<sub>10</sub> and PM<sub>2.5</sub> fractions, and which represents a worst case. Emissions from aircraft dominate, but a direct comparison between Airport and Landside Road Traffic sources should be treated with caution, as the latter is defined by the scale of the road network included in the assessment.

**Table 9.19 – Summary Emissions for 2012 Baseline (te/yr)**

Source Category	NOx (te/yr)	PM <sub>10</sub> (te/yr)	PM <sub>2.5</sub> (te/yr)
<b>Airport Sources</b>			
Aircraft (LTO cycle plus APU and engine testing)	159	6.7	6.7
Airside vehicles, MGPU and fire training	7.0	0.2	0.2
Gas Boilers	0.4	-	-
Taxi Ranks/Car Parks	0.2	0.02	0.02
<i>Total Airport Related</i>	<i>166.6</i>	<i>6.92</i>	<i>6.92</i>
<b>Landside Road Traffic</b>			
Road traffic on local road network in defined study area	41.7	2.9	1.9
<b>Total emissions in assessment area</b>	<b>208.3</b>	<b>9.82</b>	<b>8.82</b>

## Assessment of Construction Impacts

### Construction traffic

- 9.176 Construction materials and equipment are to be delivered by both road and barge. The peak number of monthly HGV movements in Years 2 to 3 of the construction programme is 1170, and in Years 4 to 6, is 1256. Assuming a 30-day working month, this equates to an average of 36-42 HGV movements per day, during the peak period<sup>11</sup>. As described in Chapter 6, these HGV movements would be divided between the two principal access routes:
- a) Route 2 – Airside access, via the A1020 Connaught Bridge Road and the A112 Connaught Road
  - b) Route 3 – Compound and landside access, via the A117 Woolwich Manor Way or Albert Road
- 9.177 A third access route, Route 4, provides secondary compound and landside access, via the A1020 Connaught Bridge Road, the A112 Connaught Road, Camel Road and Hartmann Road, but is intended to be used only under exceptional or emergency circumstances, and HGV construction traffic movements along Camel Road/Hartmann Road will be minimal.
- 9.178 Guidance issued by Environmental Protection UK <sup>(17)</sup> indicates that a detailed air quality assessment is only likely to be required where developments increase HGV movements by more than 200 movements per day. The incremental change to HGV flows falls well below this

<sup>11</sup> The precise quantum of barge movements that will occur in the future cannot be stated with certainty at this stage. The estimated number of HGV movements is based on 14 barge movements/month. If no materials were transported by barge, this would generate an additional 280 HGV movements/month, equivalent to an additional 10 HGV movements/day. This would have no significant effect on the conclusions drawn.



threshold, and any significant impacts associated with increased HGV movements during construction have been scoped out of a detailed assessment

- 9.179 It should be noted that the construction traffic movements in both 2019 and 2021 have been included within the operational traffic movements for those years, and have thus been explicitly considered within the operational assessment.

#### Sensitive Receptors

- 9.180 Dust sensitive receptors have been identified within the various distance bands described in Appendix 9.1, and are shown summarised in Table 9.20 below. It should be noted that these distances relate to the red line boundary of the Application Site, and in practice there will be far fewer sensitive receptors within the actual distances to demolition or construction works.

**Table 9.20 – Number of Dust Sensitive Receptors**

Buffer distance (m)	Number of Receptors
<20	Less than 100
20-50	100 - 500
50-100	100 - 500
100-350	More than 500

- 9.181 In line with the IAQM guidance, the construction activities have been categorised using the criteria presented in Appendix 9.1 to assess the likely impacts from demolition, earthworks, construction and ‘track-out’ activities, and the likely effects on sensitive receptors close to the CADP site.

#### Demolition

- 9.182 There will be a variety of demolition works throughout the period, including the demolition of the existing forecourt, access road and City Aviation House, which is scheduled for an 18 week period at the end of Year 5. The demolition works will be phased and will exceed the 50,000 m<sup>3</sup> threshold for a *large* dust emission class (based on the criteria set out in Appendix 9.1), as further described in Chapter 15: Waste.
- 9.183 There are some sensitive receptors within 20m of some the works. The dust emission class for the demolition works is judged to be ***large***.

#### Earthworks

- 9.184 Various excavations will be required for the new runway link, foundations for the new buildings and associated infrastructures, the new car parking and taxi feeder park, and various landside infrastructure services, as described in Chapters 6 and 15 of this ES.
- 9.185 The total area of earthworks will exceed the 10,000 m<sup>2</sup> threshold for a *large* dust emission class (based on the criteria set out in Appendix 9.1), and there are some sensitive receptors within 20m of the works, although much of the works, with the exception of those required for the new hotel and car parking facilities, will be much further away than this. **The dust emission class for the earthworks is judged to be *large*.**

### Construction

- 9.186 The main element of the works will involve the construction of the new piled deck platforms, together with the new infrastructure including the 7 new stands, taxi-lane, East Pier, and the Western and Eastern Extensions to the Terminal. Additional construction works will be required for the outbound baggage (OBB) extension, hotel, West and East Energy Centres, forecourt reconfiguration, and the surface and deck car parking.
- 9.187 The total building volume will exceed the 100,000 m<sup>3</sup> threshold for a large dust emission class (based on the criteria set out in Appendix 9.1); in addition, there will be substantial piling works, although the majority of piles are to be sunk directly into the KGV dock and there will be minimal potential for dust emissions.
- 9.188 The construction works will be phased, and at times there will be some sensitive receptors within 20m of the works, but the majority of the works, with the exception of the construction of the new hotel and car parking facilities, will be at a much greater distance than this. **The dust emission class for the construction works is judged to be *large*.**

### Trackout

- 9.189 As described above, there will be less than an average of 40 HGV trips in any one day during the peak periods of activity. There are a small number of health and dust sensitive receptors within 20m of the highway, and within 200m of the site. **The dust emission class for the trackout is judged to be *medium*.**

### *Risk and Significance*

- 9.190 Based on the criteria set out in Appendix 9.1, the risk categories for the four construction activities are summarised in Table 9.21.

**Table 9.21 - Summary of Risk of Effects Without Mitigation**

Activity	Dust Soiling (Nuisance)	Ecological Effects	PM <sub>10</sub> Effects (Health)
Demolition	High Risk	None	High Risk
Earthworks	High Risk	None	High Risk
Construction	High Risk	None	High Risk
Trackout	Medium Risk	None	Medium Risk

- 9.191 The sensitivity of the area is judged to be ***high*** for dust soiling and ***medium*** for PM<sub>10</sub> effects during demolition, earthworks, construction and trackout. On this basis, the significance of dust and PM<sub>10</sub> effects, with no mitigation in place, is set out in Table 9.22 below, and is judged to be ***moderate adverse***.

**Table 9.22 – Summary Significance Table Without Mitigation**

Activity	Dust Soiling (Nuisance)	Ecological Effects	PM <sub>10</sub> Effects (Health)
Demolition	Moderate Adverse	None	Moderate Adverse
Earthworks	Moderate Adverse	None	Moderate Adverse
Construction	Moderate Adverse	None	Moderate Adverse
Trackout	Moderate Adverse	None	Slight Adverse
Overall Significance	Moderate Adverse		

## Assessment of Operational Impacts

### Overview

- 9.192 Concentrations of nitrogen dioxide, PM<sub>10</sub> and PM<sub>2.5</sub> have been predicted for 2019, 2021 and 2023, assuming that the proposed CADP does and does not proceed. Future predictions of the 98<sup>th</sup> percentile of 1-hour mean odour concentrations (OUE/m<sup>3</sup>) have also been made.
- 9.193 The approach follows the general methodology for the 2012 Baseline Year assessment. In each case a comparison is drawn with the current (2012) situation and between the Without Development and With Development scenarios in each future year. In addition, a sensitivity test for the 2017 Interim Phase and Facilitating Works (Year 2-3 of the CADP construction programme) has been carried out.

### 2017 CADP Interim Phase Assessment

- 9.194 An assessment of the 2017 Interim Phase has been carried out which provides a comparison with the 2019 With Development scenario. The forecast passenger throughput in 2017 is 4.35 mppa, and, by definition, the number of aircraft and road traffic movements will be lower than when the CADP proposals are nearing completion in 2019 (with 4.87 mppa). As a sensitivity test for the 2019 With Development scenario has been carried out, which assumes no reduction in vehicle emissions between 2012 and 2019, it can thus be reasonably assumed that the predicted impacts associated with road traffic emissions in 2019 will be greater than in 2017.
- 9.195 Although the number of aircraft movements in 2017 is lower than in 2019, the aircraft fleet mix is slightly different between the two years (see Tables A4.2 and A4.3 in Appendix 9.4), and it cannot be automatically assumed that emissions from aircraft operations in 2017 will be lower. The assessment for 2017 has therefore been founded on a comparison of NO<sub>x</sub> and PM<sub>10</sub> emission rates arising within the LTO cycle, in 2017 and 2019.
- 9.196 The calculated NO<sub>x</sub> and PM<sub>10</sub> emission rates, expressed as grammes/second across the period of the LTO cycle, are shown in Table 9.23.

**Table 9.23 – Comparison Between NO<sub>x</sub> and PM<sub>10</sub> Emission Rates Associated With LTO Cycle Operation in 2017 and 2019 With Development**

Year	NO <sub>x</sub> Emission (g/s)	PM <sub>10</sub> Emission (g/s)
2017	17.2	0.42
2019	19.4	0.43

- 9.197 The NO<sub>x</sub> emissions in 2019 are higher than in 2017, and so it can be confidently concluded that air quality impacts predicted for 2019 will represent a worst case. The PM<sub>10</sub> emissions are marginally higher in 2017 (associated with the greater number of Avro aircraft in operation), but the difference is unlikely to be significant. On this basis, it is concluded that a detailed assessment for the 2017 CADP Interim Phase is unwarranted, and the 2019 With Development results will provide a reasonable indication of the impacts in 2017.

#### 2019 (Transitional Year) Assessment

- 9.198 The predicted concentrations of nitrogen dioxide, PM<sub>10</sub> and PM<sub>2.5</sub> at each relevant receptor location for the 2019 Without Development and 2019 With Development scenarios are set out in Tables 9.24 to 9.26 respectively. A more detailed description of the results is provided in Appendix 9.8 (Tables A8.1 to A8.6). The predicted 98<sup>th</sup> percentiles of 1-hour mean odour concentrations are set out in Table 9.27. The annual mean nitrogen dioxide (µg/m<sup>3</sup>) concentrations are also shown as isopleths in Figures A7.2 to A7.5 (Appendix 9.7).

#### *Without Development*

- 9.199 The predicted annual mean concentrations of nitrogen dioxide in 2019 Without Development are lower than in 2012 at all receptor locations, even with the assumption that there is no reduction in road traffic emission factors. This is principally due to existing and agreed measures at both the national and international levels to reduce emissions of nitrogen oxides from a wide range of sectors. The highest predicted concentration (38.5 µg/m<sup>3</sup>) occurs at R1 (Camel Road) for the Without Emissions Reduction scenario, which is below the objective.
- 9.200 Predicted concentrations of PM<sub>10</sub> and PM<sub>2.5</sub> are also lower in 2019 than in 2012. There are no predicted exceedences of the objectives or limit values.
- 9.201 The predicted 98<sup>th</sup> percentiles of 1-hour mean odour concentrations are higher in 2019 than in 2012, reflecting the greater number of aircraft movements. Predicted values are all below the threshold for 'moderately offensive' odours (3 OU<sub>E</sub>/m<sup>3</sup>) apart from at R1 and R2 (Camel Road/Hartmann Road) where concentrations of up to 4.8 OU<sub>E</sub>/m<sup>3</sup> occur. This is still below the threshold for 'less offensive' odours (6 OU<sub>E</sub>/m<sup>3</sup>), as defined previously.

#### *With Development*

- 9.202 The predicted annual mean concentrations of nitrogen dioxide in 2019 With Development are generally lower than in 2012 at all receptor locations, even with the assumption that there is no reduction in road traffic emission factors. The highest predicted concentration (39.0 µg/m<sup>3</sup>) occurs at R1 (Camel Road) for the Without Emissions Reduction scenario, and is just below the objective.
- 9.203 The magnitudes of change in annual mean nitrogen dioxide concentrations range from are all *imperceptible* to *medium*, and thus the impacts are *negligible* at most receptors and *slight adverse* at Receptors 1, 5 and 6, Without Emissions Reduction. With Emissions Reduction, all predicted impacts are *negligible*.

- 9.204 Predicted concentrations of PM<sub>10</sub> and PM<sub>2.5</sub> are lower in 2019 than in 2012. There are no predicted exceedences of the objectives or limit values, and all predicted impacts are *negligible*.
- 9.205 The predicted 98<sup>th</sup> percentiles of 1-hour mean odour concentrations are higher in 2019 than in 2012, reflecting the greater number of aircraft movements. Predicted values are all below the threshold for moderately offensive odours (3 OU<sub>E</sub>/m<sup>3</sup>) apart from at R1 and R2 (Camel Road/Hartmann Road) and R21 (Drew Road) where concentrations of up to 6.0 OU<sub>E</sub>/m<sup>3</sup> occur. This is equivalent to the threshold for 'less offensive' odours, at one location.



**Table 9.24 – Predicted Impacts on Annual Mean Nitrogen Dioxide Concentrations ( $\mu\text{g}/\text{m}^3$ ) - 2019**

Receptor	With Official Emissions Reduction			Without Official Emissions Reduction		
	Without Development	With Development	Impact Descriptor	Without Development	With Development	Impact Descriptor
<b>Existing Receptors</b>						
R1	32.7	33.0	Negligible	38.5	39.0	Slight Adverse
R2	31.9	31.9	Negligible	37.4	37.6	Negligible
R3	27.8	28.1	Negligible	32.9	33.2	Negligible
R4	27.4	28.4	Negligible	32.6	33.8	Negligible
R5	25.9	28.2	Negligible	30.6	33.6	Slight Adverse
R6	24.0	25.9	Negligible	28.9	31.4	Slight Adverse
R7	22.6	23.8	Negligible	28.0	29.7	Negligible
R8	23.6	24.2	Negligible	30.0	30.7	Negligible
R9	23.3	23.7	Negligible	29.2	29.8	Negligible
R10	25.4	25.7	Negligible	32.5	32.9	Negligible
R11	23.8	24.0	Negligible	29.8	30.1	Negligible
R12	24.6	24.7	Negligible	29.9	30.1	Negligible
R13	27.7	27.8	Negligible	34.0	34.2	Negligible
R14	27.9	28.2	Negligible	33.7	34.2	Negligible
R15	25.6	25.6	Negligible	31.7	31.8	Negligible
R16	22.5	22.6	Negligible	28.8	29.0	Negligible
R17	28.7	29.4	Negligible	34.1	34.9	Negligible
R18	24.2	24.6	Negligible	30.6	31.0	Negligible
R19(1.5m)	25.3	25.3	Negligible	30.4	30.4	Negligible
R19 (20m)	25.3	25.3	Negligible	30.3	30.4	Negligible
R20(1.5m)	25.5	25.5	Negligible	30.6	30.6	Negligible
R20 (20m)	25.4	25.5	Negligible	30.5	30.6	Negligible
R21 (20m)	27.9	28.1	Negligible	32.8	33.0	Negligible
R22 (40m)	23.6	23.9	Negligible	28.4	28.8	Negligible
<b>New Receptors</b>						
R23	26.8	26.8	Negligible	32.2	32.3	Negligible
R24(1.5m)	26.3	26.3	Negligible	31.6	31.7	Negligible
R24 (20m)	25.3	25.4	Negligible	30.3	30.4	Negligible
R25(1.5m)	25.0	25.0	Negligible	29.8	29.9	Negligible
R25 (20m)	24.8	24.9	Negligible	29.6	29.7	Negligible
R26(1.5m)	23.3	23.6	Negligible	29.3	29.6	Negligible
R26 (20m)	22.7	22.9	Negligible	28.2	28.5	Negligible
R27(1.5m)	22.9	23.1	Negligible	28.6	28.9	Negligible
R27 (20m)	22.6	22.8	Negligible	28.1	28.4	Negligible
R28(1.5m)	23.0	23.3	Negligible	28.5	28.9	Negligible
R28 (20m)	22.7	22.9	Negligible	28.0	28.3	Negligible
R29(1.5m)	23.1	23.5	Negligible	28.5	28.9	Negligible
R29 (20m)	23.0	23.3	Negligible	28.2	28.6	Negligible
R30(1.5m)	22.2	22.3	Negligible	27.6	27.8	Negligible
R30 (20m)	22.1	22.3	Negligible	27.6	27.7	Negligible
R31	25.8	26.0	Negligible	31.8	32.0	Negligible
R32(1.5m)	25.5	25.7	Negligible	30.3	30.4	Negligible
R32 (20m)	25.3	25.5	Negligible	30.0	30.2	Negligible
R33(1.5m)	25.1	25.6	Negligible	30.0	30.5	Negligible
R33 (20m)	24.9	25.3	Negligible	29.7	30.1	Negligible
R34(1.5m)	26.2	26.3	Negligible	31.6	31.7	Negligible
R34 (20m)	25.9	26.0	Negligible	31.2	31.3	Negligible

**Table 9.25 – Predicted Impacts on Annual Mean PM<sub>10</sub> Concentrations (µg/m<sup>3</sup>) and the number of days PM<sub>10</sub>>50 µg/m<sup>3</sup> in 2019**

Receptor	Annual Mean PM <sub>10</sub>			Days > 50 µg/m <sup>3</sup>		
	Without Development	With Development	Impact Descriptor	Without Development	With Development	Impact Descriptor
<b>Existing Receptors</b>						
R1	21.1	21.1	Negligible	5	5	Negligible
R2	20.7	20.7	Negligible	4	4	Negligible
R3	19.4	19.5	Negligible	3	3	Negligible
R4	19.2	19.5	Negligible	3	3	Negligible
R5	19.0	19.5	Negligible	2	3	Negligible
R6	18.7	19.0	Negligible	2	2	Negligible
R7	18.2	18.4	Negligible	2	2	Negligible
R8	18.5	18.6	Negligible	2	2	Negligible
R9	18.5	18.6	Negligible	2	2	Negligible
R10	18.6	18.7	Negligible	2	2	Negligible
R11	18.5	18.5	Negligible	2	2	Negligible
R12	18.6	18.6	Negligible	2	2	Negligible
R13	19.1	19.1	Negligible	2	2	Negligible
R14	19.3	19.4	Negligible	3	3	Negligible
R15	19.9	19.9	Negligible	3	3	Negligible
R16	18.3	18.3	Negligible	2	2	Negligible
R17	19.6	19.8	Negligible	3	3	Negligible
R18	18.3	18.4	Negligible	2	2	Negligible
R19(1.5m)	18.9	18.9	Negligible	2	2	Negligible
R19 (20m)	18.8	18.9	Negligible	2	2	Negligible
R20(1.5m)	18.8	18.8	Negligible	2	2	Negligible
R20 (20m)	18.8	18.8	Negligible	2	2	Negligible
R21 (20m)	19.6	19.6	Negligible	3	3	Negligible
R22 (40m)	18.6	18.6	Negligible	2	2	Negligible
<b>New Receptors</b>						
R23	19.4	19.4	Negligible	3	3	Negligible
R24(1.5m)	19.5	19.5	Negligible	3	3	Negligible
R24 (20m)	19.2	19.2	Negligible	2	3	Negligible
R25(1.5m)	19.1	19.1	Negligible	2	2	Negligible
R25 (20m)	19.1	19.1	Negligible	2	2	Negligible
R26(1.5m)	18.1	18.2	Negligible	2	2	Negligible
R26 (20m)	18.0	18.0	Negligible	1	1	Negligible
R27(1.5m)	18.0	18.0	Negligible	1	1	Negligible
R27 (20m)	17.9	18.0	Negligible	1	1	Negligible
R28(1.5m)	18.2	18.2	Negligible	2	2	Negligible
R28 (20m)	18.1	18.1	Negligible	1	2	Negligible
R29(1.5m)	18.2	18.3	Negligible	2	2	Negligible
R29 (20m)	18.2	18.2	Negligible	2	2	Negligible
R30(1.5m)	17.8	17.8	Negligible	1	1	Negligible
R30 (20m)	17.8	17.8	Negligible	1	1	Negligible
R31	19.0	19.0	Negligible	2	2	Negligible
R32(1.5m)	18.8	18.9	Negligible	2	2	Negligible
R32 (20m)	18.7	18.8	Negligible	2	2	Negligible
R33(1.5m)	18.8	18.9	Negligible	2	2	Negligible
R33 (20m)	18.7	18.8	Negligible	2	2	Negligible
R34(1.5m)	18.9	18.9	Negligible	2	2	Negligible
R34 (20m)	18.8	18.8	Negligible	2	2	Negligible

**Table 9.26 – Predicted Impacts on Annual Mean PM<sub>2.5</sub> Concentrations (µg/m<sup>3</sup>) in 2019**

Receptor	Annual Mean PM <sub>2.5</sub>		
	Without Development	With Development	Impact Descriptor
<b>Existing Receptors</b>			
R1	15.2	15.3	Negligible
R2	15.0	14.9	Negligible
R3	13.7	13.8	Negligible
R4	13.5	13.7	Negligible
R5	13.3	13.8	Negligible
R6	13.0	13.3	Negligible
R7	12.7	12.8	Negligible
R8	12.8	12.9	Negligible
R9	12.8	12.9	Negligible
R10	12.9	12.9	Negligible
R11	12.8	12.9	Negligible
R12	12.9	13.0	Negligible
R13	13.1	13.1	Negligible
R14	13.5	13.6	Negligible
R15	13.4	13.4	Negligible
R16	12.6	12.6	Negligible
R17	13.9	14.0	Negligible
R18	12.7	12.8	Negligible
R19 (1.5m)	12.9	12.9	Negligible
R19 (20m)	12.8	12.9	Negligible
R20 (1.5m)	12.8	12.8	Negligible
R20 (20m)	12.8	12.8	Negligible
R21 (20m)	13.9	13.9	Negligible
R22 (40m)	12.9	13.0	Negligible
<b>New Receptors</b>			
R23	13.5	13.6	Negligible
R24 (1.5m)	13.6	13.6	Negligible
R24 (20m)	13.3	13.4	Negligible
R25 (1.5m)	13.2	13.2	Negligible
R25 (20m)	13.2	13.2	Negligible
R26 (1.5m)	12.6	12.6	Negligible
R26 (20m)	12.5	12.5	Negligible
R27 (1.5m)	12.5	12.5	Negligible
R27 (20m)	12.4	12.5	Negligible
R28 (1.5m)	12.6	12.7	Negligible
R28 (20m)	12.6	12.6	Negligible
R29 (1.5m)	12.7	12.7	Negligible
R29 (20m)	12.7	12.7	Negligible
R30 (1.5m)	12.4	12.4	Negligible
R30 (20m)	12.4	12.4	Negligible
R31	13.2	13.3	Negligible
R32 (1.5m)	13.2	13.3	Negligible
R32 (20m)	13.1	13.2	Negligible
R33 (1.5m)	13.2	13.3	Negligible
R33 (20m)	13.1	13.2	Negligible
R34(1.5m)	13.1	13.1	Negligible
R34 (20m)	13.0	13.1	Negligible

**Table 9.27 – Predicted 98th Percentile of 1-hour Mean Odour Concentrations (OU<sub>E</sub>/m<sup>3</sup>) in 2019**

Receptor	98 <sup>th</sup> %ile OU <sub>E</sub> /m <sup>3</sup>	
	Without Development	With Development
<b>Existing Receptors</b>		
R1	4.83	6.03
R2	3.51	4.09
R3	1.23	1.43
R4	1.18	1.28
R5	0.94	1.65
R6	0.60	1.13
R7	0.48	0.74
R8	0.41	0.62
R9	0.49	0.72
R10	0.45	0.64
R11	0.51	0.70
R12	0.62	0.76
R13	0.33	0.43
R14	0.78	1.01
R15	0.10	0.14
R16	0.30	0.41
R17	1.46	2.08
R18	0.44	0.64
R19 (1.5m)	0.34	0.45
R19 (20m)	0.33	0.43
R20 (1.5m)	0.28	0.37
R20 (20m)	0.27	0.36
R21 (20m)	2.29	3.02
R22 (40m)	0.43	0.70
<b>New Receptors</b>		
R23	2.15	2.48
R24 (1.5m)	2.26	2.60
R24 (20m)	1.72	2.10
R25 (1.5m)	1.13	1.36
R25 (20m)	1.00	1.24
R26 (1.5m)	0.38	0.56
R26 (20m)	0.36	0.54
R27 (1.5m)	0.35	0.52
R27 (20m)	0.34	0.51
R28 (1.5m)	0.44	0.58
R28 (20m)	0.42	0.54
R29 (1.5m)	0.49	0.70
R29 (20m)	0.46	0.64
R30 (1.5m)	0.25	0.34
R30 (20m)	0.25	0.32
R31	0.76	0.91
R32 (1.5m)	0.71	0.93
R32 (20m)	0.61	0.81
R33 (1.5m)	1.07	1.32
R33 (20m)	0.98	1.17
R34 (1.5m)	0.65	0.83
R34 (20m)	0.61	0.78

### 2021 (Design Year) Assessment

- 9.206 The predicted concentrations of nitrogen dioxide, PM<sub>10</sub> and PM<sub>2.5</sub> at each relevant receptor location for the 2021 Without Development and 2021 With Development scenarios are set out below in Tables 9.28 to 9.30 respectively. A more detailed description of the results is provided in Appendix 9.8 (Tables A8.7 to A8.12). The predicted 98<sup>th</sup> percentiles of 1-hour mean odour unit concentrations are set out in Table 9.31. The annual mean nitrogen dioxide (µg/m<sup>3</sup>) concentrations are also shown as isopleths in Figures A7.6 to A7.7 (Appendix 9.7).

#### *Without Development*

- 9.207 The predicted annual mean concentrations of nitrogen dioxide in 2021 Without Development are lower than in 2012 at all receptor locations. This is principally due to existing and agreed measures at both the national and international levels to reduce emissions of nitrogen oxides from a wide range of sectors. The highest predicted concentration (30.6 µg/m<sup>3</sup>) occurs at R1 (Camel Road), and is below the objective.
- 9.208 Predicted concentrations of PM<sub>10</sub> and PM<sub>2.5</sub> are also lower in 2021 than in 2012. There are no predicted exceedences of the objectives or limit values.
- 9.209 The predicted 98<sup>th</sup> percentiles of 1-hour mean odour concentrations are higher in 2021 than in 2012, reflecting the greater number of aircraft movements. Predicted values are all below the threshold for 'moderately offensive' odours (3 OU<sub>E</sub>/m<sup>3</sup>) apart from at R1 and R2 (Camel Road/Hartmann Road) where concentrations of up to 5.3 OU<sub>E</sub>/m<sup>3</sup> occur. This is still below the threshold for 'less offensive' odours.

#### *With Development*

- 9.210 The predicted annual mean concentrations of nitrogen dioxide in 2021 With Development are lower than in 2012 at all receptor locations. Predicted concentrations are lower at properties along the western extremity of Hartmann Road for the With Development compared to Without Development scenario, as Airport access would by then be granted to the east from the junction with Woolwich Manor Road (thus diverting traffic flows). The highest predicted concentration (30.0 µg/m<sup>3</sup>) occurs at R1 (Camel Road), and is well below the objective.
- 9.211 The magnitudes of change in annual mean nitrogen dioxide concentrations range from are all *imperceptible* to *medium*. The impacts are described as *negligible* at all receptors.
- 9.212 Predicted concentrations of PM<sub>10</sub> and PM<sub>2.5</sub> are also lower in 2021 than in 2012. There are no predicted exceedences of the objectives or limit values, and all predicted impacts are *negligible*.
- 9.213 The predicted 98<sup>th</sup> percentiles of 1-hour mean odour concentrations are higher in 2021 than in 2012, reflecting the greater number of aircraft movements. Predicted values are all below the threshold for moderately offensive odours (3 OU<sub>E</sub>/m<sup>3</sup>) apart from at R1 and R2 (Camel Road/Hartmann Road) and R21 (Drew Road), where concentrations of up to about 6 OU<sub>E</sub>/m<sup>3</sup> occur. This is marginally below the threshold for 'less offensive' odours, at one location.



**Table 9.28 – Predicted Impacts on Annual Mean Nitrogen Dioxide Concentrations ( $\mu\text{g}/\text{m}^3$ ) in 2021**

Receptor	Without Development	With Development	Impact Descriptor
<b>Existing Receptors</b>			
R1	30.6	30.0	Negligible
R2	29.9	29.2	Negligible
R3	25.8	25.8	Negligible
R4	25.3	25.8	Negligible
R5	23.9	25.5	Negligible
R6	22.1	23.2	Negligible
R7	20.7	21.3	Negligible
R8	21.6	21.8	Negligible
R9	21.3	21.5	Negligible
R10	23.1	23.3	Negligible
R11	21.7	21.9	Negligible
R12	22.5	22.6	Negligible
R13	25.5	25.7	Negligible
R14	25.6	25.7	Negligible
R15	23.5	23.5	Negligible
R16	20.6	20.7	Negligible
R17	26.6	26.7	Negligible
R18	22.1	22.6	Negligible
R19 (1.5m)	23.4	23.5	Negligible
R19 (20m)	23.4	23.5	Negligible
R20 (1.5m)	23.6	23.7	Negligible
R20 (20m)	23.6	23.7	Negligible
R21 (20m)	25.9	26.0	Negligible
R22 (40m)	21.7	21.9	Negligible
<b>New Receptors</b>			
R23	24.6	24.5	Negligible
R24 (1.5m)	24.2	24.1	Negligible
R24 (20m)	23.2	23.3	Negligible
R25 (1.5m)	22.9	22.9	Negligible
R25 (20m)	22.7	22.8	Negligible
R26 (1.5m)	21.3	21.7	Negligible
R26 (20m)	20.8	21.0	Negligible
R27 (1.5m)	20.9	21.2	Negligible
R27 (20m)	20.7	20.9	Negligible
R28 (1.5m)	21.0	21.4	Negligible
R28 (20m)	20.7	21.0	Negligible
R29 (1.5m)	21.2	21.6	Negligible
R29 (20m)	21.0	21.3	Negligible
R30 (1.5m)	20.3	20.5	Negligible
R30 (20m)	20.3	20.4	Negligible
R31	23.5	23.6	Negligible
R32 (1.5m)	23.4	23.6	Negligible
R32 (20m)	23.2	23.4	Negligible
R33 (1.5m)	23.1	23.6	Negligible
R33 (20m)	22.9	23.3	Negligible
R34(1.5m)	24.1	24.2	Negligible
R34 (20m)	23.9	24.0	Negligible

**Table 9.29 – Predicted Impacts on Annual Mean PM<sub>10</sub> Concentrations (µg/m<sup>3</sup>) and the number of days PM<sub>10</sub>>50 µg/m<sup>3</sup> in 2021**

Receptor	Annual Mean PM <sub>10</sub>			Days > 50 µg/m <sup>3</sup>		
	Without Development	With Development	Impact Descriptor	Without Development	With Development	Impact Descriptor
<b>Existing Receptors</b>						
R1	20.8	20.7	Negligible	5	4	Negligible
R2	20.5	20.3	Negligible	4	4	Negligible
R3	19.1	19.1	Negligible	2	2	Negligible
R4	18.9	19.1	Negligible	2	2	Negligible
R5	18.7	19.1	Negligible	2	2	Negligible
R6	18.4	18.6	Negligible	2	2	Negligible
R7	18.0	18.1	Negligible	1	1	Negligible
R8	18.2	18.2	Negligible	2	2	Negligible
R9	18.2	18.3	Negligible	2	2	Negligible
R10	18.3	18.3	Negligible	2	2	Negligible
R11	18.2	18.2	Negligible	2	2	Negligible
R12	18.3	18.3	Negligible	2	2	Negligible
R13	18.8	18.9	Negligible	2	2	Negligible
R14	19.0	19.0	Negligible	2	2	Negligible
R15	19.6	19.6	Negligible	3	3	Negligible
R16	18.1	18.1	Negligible	1	1	Negligible
R17	19.3	19.4	Negligible	3	3	Negligible
R18	18.0	18.1	Negligible	1	2	Negligible
R19 (1.5m)	18.6	18.6	Negligible	2	2	Negligible
R19 (20m)	18.6	18.6	Negligible	2	2	Negligible
R20 (1.5m)	18.6	18.6	Negligible	2	2	Negligible
R20 (20m)	18.6	18.6	Negligible	2	2	Negligible
R21 (20m)	19.3	19.3	Negligible	3	3	Negligible
R22 (40m)	18.3	18.3	Negligible	2	2	Negligible
<b>New Receptors</b>						
R23	19.1	19.1	Negligible	2	2	Negligible
R24 (1.5m)	19.2	19.1	Negligible	2	2	Negligible
R24 (20m)	18.9	18.9	Negligible	2	2	Negligible
R25 (1.5m)	18.8	18.8	Negligible	2	2	Negligible
R25 (20m)	18.8	18.8	Negligible	2	2	Negligible
R26 (1.5m)	17.8	17.9	Negligible	1	1	Negligible
R26 (20m)	17.7	17.7	Negligible	1	1	Negligible
R27 (1.5m)	17.7	17.7	Negligible	1	1	Negligible
R27 (20m)	17.6	17.7	Negligible	1	1	Negligible
R28 (1.5m)	17.9	17.9	Negligible	1	1	Negligible
R28 (20m)	17.8	17.8	Negligible	1	1	Negligible
R29 (1.5m)	17.9	18.0	Negligible	1	1	Negligible
R29 (20m)	17.9	17.9	Negligible	1	1	Negligible
R30 (1.5m)	17.5	17.5	Negligible	1	1	Negligible
R30 (20m)	17.5	17.5	Negligible	1	1	Negligible
R31	18.6	18.6	Negligible	2	2	Negligible
R32 (1.5m)	18.5	18.5	Negligible	2	2	Negligible
R32 (20m)	18.4	18.4	Negligible	2	2	Negligible
R33 (1.5m)	18.5	18.6	Negligible	2	2	Negligible
R33 (20m)	18.4	18.5	Negligible	2	2	Negligible
R34 (1.5m)	18.6	18.6	Negligible	2	2	Negligible
R34 (20m)	18.5	18.5	Negligible	2	2	Negligible

**Table 9.30 – Predicted Impacts on Annual Mean PM<sub>2.5</sub> Concentrations (µg/m<sup>3</sup>) in 2021**

Receptor	Annual Mean PM <sub>2.5</sub>		
	Without Development	With Development	Impact Descriptor
<b>Existing Receptors</b>			
R1	15.0	14.8	Negligible
R2	14.7	14.5	Negligible
R3	13.4	13.4	Negligible
R4	13.2	13.4	Negligible
R5	13.0	13.4	Negligible
R6	12.7	12.9	Negligible
R7	12.4	12.4	Negligible
R8	12.5	12.5	Negligible
R9	12.5	12.6	Negligible
R10	12.6	12.6	Negligible
R11	12.5	12.5	Negligible
R12	12.6	12.7	Negligible
R13	12.8	12.8	Negligible
R14	13.2	13.3	Negligible
R15	13.1	13.1	Negligible
R16	12.3	12.3	Negligible
R17	13.6	13.7	Negligible
R18	12.4	12.5	Negligible
R19 (1.5m)	12.6	12.6	Negligible
R19 (20m)	12.6	12.6	Negligible
R20 (1.5m)	12.5	12.5	Negligible
R20 (20m)	12.5	12.5	Negligible
R21 (20m)	13.6	13.6	Negligible
R22 (40m)	12.6	12.7	Negligible
<b>New Receptors</b>			
R23	13.2	13.2	Negligible
R24 (1.5m)	13.3	13.2	Negligible
R24 (20m)	13.0	13.0	Negligible
R25 (1.5m)	12.9	12.9	Negligible
R25 (20m)	12.9	12.9	Negligible
R26 (1.5m)	12.3	12.4	Negligible
R26 (20m)	12.2	12.2	Negligible
R27 (1.5m)	12.2	12.2	Negligible
R27 (20m)	12.2	12.2	Negligible
R28 (1.5m)	12.3	12.4	Negligible
R28 (20m)	12.3	12.3	Negligible
R29 (1.5m)	12.4	12.4	Negligible
R29 (20m)	12.3	12.4	Negligible
R30 (1.5m)	12.1	12.1	Negligible
R30 (20m)	12.1	12.1	Negligible
R31	12.9	12.9	Negligible
R32 (1.5m)	12.9	12.9	Negligible
R32 (20m)	12.8	12.8	Negligible
R33 (1.5m)	12.9	13.0	Negligible
R33 (20m)	12.8	12.9	Negligible
R34(1.5m)	12.8	12.8	Negligible
R34 (20m)	12.7	12.7	Negligible

**Table 9.31 – Predicted 98th Percentile of 1-hour Mean Odour Concentrations (OU<sub>E</sub>/m<sup>3</sup>) in 2021**

Receptor	98 <sup>th</sup> %ile OU <sub>E</sub> /m <sup>3</sup>	
	Without Development	With Development
<b>Existing Receptors</b>		
R1	5.28	5.96
R2	3.86	4.33
R3	1.32	1.44
R4	1.28	1.22
R5	1.02	1.62
R6	0.65	1.08
R7	0.52	0.70
R8	0.45	0.59
R9	0.54	0.69
R10	0.50	0.60
R11	0.55	0.67
R12	0.68	0.73
R13	0.36	0.39
R14	0.84	1.01
R15	0.11	0.12
R16	0.33	0.39
R17	1.57	2.06
R18	0.48	0.60
R19 (1.5m)	0.37	0.41
R19 (20m)	0.36	0.40
R20 (1.5m)	0.30	0.34
R20 (20m)	0.29	0.33
R21 (20m)	2.52	3.05
R22 (40m)	0.47	0.67
<b>New Receptors</b>		
R23	2.32	2.21
R24 (1.5m)	2.43	2.35
R24 (20m)	1.86	1.87
R25 (1.5m)	1.22	1.23
R25 (20m)	1.09	1.12
R26 (1.5m)	0.41	0.53
R26 (20m)	0.40	0.51
R27 (1.5m)	0.39	0.50
R27 (20m)	0.37	0.48
R28 (1.5m)	0.49	0.55
R28 (20m)	0.46	0.51
R29 (1.5m)	0.54	0.66
R29 (20m)	0.50	0.61
R30 (1.5m)	0.28	0.32
R30 (20m)	0.27	0.30
R31	0.83	0.87
R32 (1.5m)	0.77	0.86
R32 (20m)	0.66	0.75
R33 (1.5m)	1.18	1.29
R33 (20m)	1.07	1.14
R34 (1.5m)	0.70	0.75
R34 (20m)	0.67	0.70

### 2023 (Principal Year) Assessment

- 9.214 The predicted concentrations of nitrogen dioxide, PM<sub>10</sub> and PM<sub>2.5</sub> at each relevant receptor location for the 2023 Without Development and 2023 With Development scenarios are set out below in Tables 9.33 to 9.35 respectively. A more detailed description of the results is provided in Appendix 9.8 (Tables A8.13 to A8.18). The predicted 98<sup>th</sup> percentiles of 1-hour mean odour unit concentrations are set out in Table 9.36. The annual mean nitrogen dioxide (µg/m<sup>3</sup>) concentrations are also shown as isopleths in Figures A7.8 to A7.9 (Appendix 9.7).

#### *Without Development*

- 9.215 The predicted annual mean concentrations of nitrogen dioxide in 2023 Without Development are lower than in 2012 at all receptor locations. This is principally due to existing and agreed measures at both the national and international levels to reduce emissions of nitrogen oxides from a wide range of sectors. The highest predicted concentration (28.9 µg/m<sup>3</sup>) occurs at R1 (Camel Road), and is well below the objective.
- 9.216 Predicted concentrations of PM<sub>10</sub> and PM<sub>2.5</sub> are also lower in 2023 than in 2012. There are no predicted exceedences of the objectives or limit values.
- 9.217 The predicted 98<sup>th</sup> percentile of 1-hour mean odour concentrations is higher in 2023 than in 2012, reflecting the greater number of aircraft movements. Predicted values are all below the threshold for moderately offensive odours (3 OU<sub>E</sub>/m<sup>3</sup>) apart from at R1 and R2 (Camel Road/Hartmann Road) where concentrations of up to 5.3 OU<sub>E</sub>/m<sup>3</sup> occur. This is still below the threshold for 'less offensive' odours.

#### *With Development*

- 9.218 The predicted annual mean concentrations of nitrogen dioxide in 2023 With Development are lower than in 2012 at all receptor locations. Predicted concentrations are lower at properties along the western extremity of Hartmann Road for the With Development as compared to Without Development scenario, as Airport access would be granted to the east from the junction with Woolwich Manor Road (thus diverting traffic flows). The highest predicted concentration (28.8 µg/m<sup>3</sup>) occurs at R1 (Camel Road), and is well below the objective.
- 9.219 The magnitudes of change in annual mean nitrogen dioxide concentrations range from are all *imperceptible* to *medium*. The impacts are described as *negligible* at all receptors.
- 9.220** Predicted concentrations of PM<sub>10</sub> and PM<sub>2.5</sub> are also lower in 2023 than in 2012. There are no predicted exceedences of the objectives or limit values, and all predicted impacts are *negligible*.
- 9.221 The predicted 98<sup>th</sup> percentile of 1-hour mean odour concentrations is higher in 2023 than in 2012, reflecting the greater number of aircraft movements. Predicted values are all below the threshold for moderately offensive odours (3 OU<sub>E</sub>/m<sup>3</sup>) apart from at R1 and R2 (Camel Road/Hartmann Road) and R21 (Drew Road) where concentrations of up to 5.8 OU<sub>E</sub>/m<sup>3</sup> occur. This is marginally below the threshold for 'less offensive' odours at one location.



**Table 9.33 – Predicted Impacts on Annual Mean Nitrogen Dioxide Concentrations ( $\mu\text{g}/\text{m}^3$ ) - 2023**

Receptor	Without Development	With Development	Impact Descriptor
<b>Existing Receptors</b>			
R1	28.9	28.8	Negligible
R2	28.2	28.0	Negligible
R3	24.3	24.6	Negligible
R4	23.7	24.5	Negligible
R5	22.5	24.2	Negligible
R6	20.8	21.9	Negligible
R7	19.5	20.1	Negligible
R8	20.2	20.5	Negligible
R9	20.0	20.3	Negligible
R10	21.5	21.8	Negligible
R11	20.3	20.6	Negligible
R12	21.1	21.3	Negligible
R13	24.1	24.3	Negligible
R14	24.0	24.3	Negligible
R15	22.1	22.2	Negligible
R16	19.4	19.6	Negligible
R17	25.0	25.4	Negligible
R18	20.6	21.3	Negligible
R19 (1.5m)	22.2	22.3	Negligible
R19 (20m)	22.2	22.3	Negligible
R20 (1.5m)	22.5	22.6	Negligible
R20 (20m)	22.5	22.6	Negligible
R21 (20m)	24.4	24.8	Negligible
R22 (40m)	20.4	20.8	Negligible
<b>New Receptors</b>			
R23	23.0	23.1	Negligible
R24 (1.5m)	22.7	22.7	Negligible
R24 (20m)	21.8	22.0	Negligible
R25 (1.5m)	21.5	21.6	Negligible
R25 (20m)	21.4	21.5	Negligible
R26 (1.5m)	20.0	20.5	Negligible
R26 (20m)	19.5	19.9	Negligible
R27 (1.5m)	19.6	20.0	Negligible
R27 (20m)	19.4	19.7	Negligible
R28 (1.5m)	19.7	20.2	Negligible
R28 (20m)	19.5	19.9	Negligible
R29 (1.5m)	19.9	20.4	Negligible
R29 (20m)	19.7	20.2	Negligible
R30 (1.5m)	19.2	19.4	Negligible
R30 (20m)	19.1	19.3	Negligible
R31	22.0	22.2	Negligible
R32 (1.5m)	22.0	22.3	Negligible
R32 (20m)	21.9	22.1	Negligible
R33 (1.5m)	21.7	22.4	Negligible
R33 (20m)	21.5	22.1	Negligible
R34(1.5m)	22.8	22.9	Negligible
R34 (20m)	22.6	22.7	Negligible

**Table 9.34 – Predicted Impacts on Annual Mean PM<sub>10</sub> Concentrations (µg/m<sup>3</sup>) and the number of days PM<sub>10</sub>>50 µg/m<sup>3</sup> in 2023**

Receptor	Annual Mean PM <sub>10</sub>			Days > 50 µg/m <sup>3</sup>		
	Without Development	With Development	Impact Descriptor	Without Development	With Development	Impact Descriptor
<b>Existing Receptors</b>						
R1	20.6	20.4	Negligible	4	4	Negligible
R2	20.2	20.1	Negligible	4	4	Negligible
R3	18.9	18.9	Negligible	2	2	Negligible
R4	18.7	18.9	Negligible	2	2	Negligible
R5	18.4	18.8	Negligible	2	2	Negligible
R6	18.2	18.4	Negligible	2	2	Negligible
R7	17.7	17.8	Negligible	1	1	Negligible
R8	18.0	18.0	Negligible	1	1	Negligible
R9	18.0	18.1	Negligible	1	1	Negligible
R10	18.1	18.1	Negligible	1	1	Negligible
R11	18.0	18.0	Negligible	1	1	Negligible
R12	18.1	18.1	Negligible	1	1	Negligible
R13	18.7	18.7	Negligible	2	2	Negligible
R14	18.8	18.8	Negligible	2	2	Negligible
R15	19.5	19.5	Negligible	3	3	Negligible
R16	17.9	17.9	Negligible	1	1	Negligible
R17	19.0	19.2	Negligible	2	2	Negligible
R18	17.8	17.9	Negligible	1	1	Negligible
R19(1.5m)	18.4	18.5	Negligible	2	2	Negligible
R19 (20m)	18.4	18.4	Negligible	2	2	Negligible
R20(1.5m)	18.4	18.4	Negligible	2	2	Negligible
R20 (20m)	18.4	18.4	Negligible	2	2	Negligible
R21 (20m)	19.0	19.1	Negligible	2	2	Negligible
R22 (40m)	18.0	18.1	Negligible	1	1	Negligible
<b>New Receptors</b>						
R23	18.9	18.8	Negligible	2	2	Negligible
R24(1.5m)	18.9	18.9	Negligible	2	2	Negligible
R24 (20m)	18.6	18.6	Negligible	2	2	Negligible
R25(1.5m)	18.6	18.6	Negligible	2	2	Negligible
R25 (20m)	18.5	18.5	Negligible	2	2	Negligible
R26(1.5m)	17.6	17.7	Negligible	1	1	Negligible
R26 (20m)	17.5	17.5	Negligible	1	1	Negligible
R27(1.5m)	17.5	17.5	Negligible	1	1	Negligible
R27 (20m)	17.4	17.5	Negligible	1	1	Negligible
R28(1.5m)	17.7	17.7	Negligible	1	1	Negligible
R28 (20m)	17.6	17.6	Negligible	1	1	Negligible
R29(1.5m)	17.7	17.7	Negligible	1	1	Negligible
R29 (20m)	17.7	17.7	Negligible	1	1	Negligible
R30(1.5m)	17.3	17.3	Negligible	1	1	Negligible
R30 (20m)	17.3	17.3	Negligible	1	1	Negligible
R31	18.4	18.4	Negligible	2	2	Negligible
R32(1.5m)	18.2	18.3	Negligible	2	2	Negligible
R32 (20m)	18.2	18.2	Negligible	2	2	Negligible
R33(1.5m)	18.2	18.3	Negligible	2	2	Negligible
R33 (20m)	18.2	18.2	Negligible	2	2	Negligible
R34(1.5m)	18.4	18.4	Negligible	2	2	Negligible
R34 (20m)	18.3	18.3	Negligible	2	2	Negligible

**Table 9.35 – Predicted Impacts on Annual Mean PM<sub>2.5</sub> Concentrations (µg/m<sup>3</sup>) in 2023**

Receptor	Annual Mean PM <sub>2.5</sub>		
	Without Development	With Development	Impact Descriptor
<b>Existing Receptors</b>			
R1	14.7	14.6	Negligible
R2	14.4	14.3	Negligible
R3	13.2	13.2	Negligible
R4	13.0	13.1	Negligible
R5	12.8	13.1	Negligible
R6	12.5	12.7	Negligible
R7	12.1	12.2	Negligible
R8	12.3	12.3	Negligible
R9	12.3	12.3	Negligible
R10	12.3	12.4	Negligible
R11	12.3	12.3	Negligible
R12	12.4	12.4	Negligible
R13	12.6	12.6	Negligible
R14	13.0	13.0	Negligible
R15	12.9	13.0	Negligible
R16	12.1	12.2	Negligible
R17	13.3	13.4	Negligible
R18	12.2	12.3	Negligible
R19 (1.5m)	12.4	12.4	Negligible
R19 (20m)	12.4	12.4	Negligible
R20 (1.5m)	12.3	12.3	Negligible
R20 (20m)	12.3	12.3	Negligible
R21 (20m)	13.3	13.4	Negligible
R22 (40m)	12.4	12.5	Negligible
<b>New Receptors</b>			
R23	13.0	12.9	Negligible
R24 (1.5m)	13.0	13.0	Negligible
R24 (20m)	12.8	12.7	Negligible
R25 (1.5m)	12.7	12.7	Negligible
R25 (20m)	12.6	12.6	Negligible
R26 (1.5m)	12.1	12.1	Negligible
R26 (20m)	12.0	12.0	Negligible
R27 (1.5m)	12.0	12.0	Negligible
R27 (20m)	11.9	12.0	Negligible
R28 (1.5m)	12.1	12.2	Negligible
R28 (20m)	12.1	12.1	Negligible
R29 (1.5m)	12.1	12.2	Negligible
R29 (20m)	12.1	12.2	Negligible
R30 (1.5m)	11.9	11.9	Negligible
R30 (20m)	11.9	11.9	Negligible
R31	12.6	12.6	Negligible
R32 (1.5m)	12.6	12.7	Negligible
R32 (20m)	12.6	12.6	Negligible
R33 (1.5m)	12.6	12.7	Negligible
R33 (20m)	12.6	12.7	Negligible
R34(1.5m)	12.6	12.6	Negligible
R34 (20m)	12.5	12.5	Negligible

**Table 9.36 – Predicted 98th Percentile of 1-hour Mean Odour Concentrations (OU<sub>E</sub>/m<sup>3</sup>) in 2023**

Receptor	98 <sup>th</sup> %ile OU <sub>E</sub> /m <sup>3</sup>	
	Without Development	With Development
<b>Existing Receptors</b>		
R1	5.32	5.82
R2	3.81	4.52
R3	1.32	1.43
R4	1.30	1.18
R5	1.03	1.53
R6	0.66	1.01
R7	0.53	0.63
R8	0.47	0.54
R9	0.56	0.62
R10	0.51	0.54
R11	0.57	0.60
R12	0.70	0.67
R13	0.37	0.33
R14	0.85	0.98
R15	0.11	0.11
R16	0.34	0.36
R17	1.58	1.99
R18	0.50	0.54
R19 (1.5m)	0.38	0.35
R19 (20m)	0.37	0.34
R20 (1.5m)	0.31	0.29
R20 (20m)	0.30	0.29
R21 (20m)	2.52	2.98
R22 (40m)	0.48	0.61
<b>New Receptors</b>		
R23	2.38	1.82
R24 (1.5m)	2.51	1.92
R24 (20m)	1.93	1.50
R25 (1.5m)	1.26	1.02
R25 (20m)	1.12	0.92
R26 (1.5m)	0.42	0.48
R26 (20m)	0.41	0.46
R27 (1.5m)	0.40	0.45
R27 (20m)	0.38	0.43
R28 (1.5m)	0.50	0.49
R28 (20m)	0.47	0.46
R29 (1.5m)	0.55	0.59
R29 (20m)	0.51	0.55
R30 (1.5m)	0.29	0.29
R30 (60m)	0.28	0.27
R31	0.85	0.81
R32 (1.5m)	0.79	0.75
R32 (20m)	0.68	0.64
R33 (1.5m)	1.20	1.21
R33 (20m)	1.09	1.06
R34 (1.5m)	0.73	0.62
R34 (20m)	0.69	0.58

## Significance of Operational Impacts

### *2019 (Transitional Year)*

- 9.222 The operational air quality impacts in 2019 are judged to be insignificant. This professional judgement is made in accordance with the methodology set out above and taking into account the factors set out in Table 9.37 (below), and also acknowledging the uncertainty over future projections of traffic-related nitrogen dioxide concentrations, which may not decline as rapidly as expected. The latter has been addressed by giving consideration to both sets of modelled results for nitrogen dioxide; those with and without reductions in traffic emissions. It is to be expected that concentrations will fall in the range between the two sets of results, although by 2019 the impacts are likely to be closer to the 'With Reduction' results than the 'Without Reduction' results.
- 9.223 More specifically, the judgement that the air quality impacts will be insignificant takes account of the assessment that concentrations will be below the air quality objectives and all of the impacts are predicted to be *negligible* or *slight adverse*.
- 9.224 The significance of air quality impacts has also been considered using the flow chart provided in the London Councils guidance. This flow chart is intended to assist local authority officers in their decision as to whether a proposed development will have a significant impact on air quality. Table 9.38 (below) provides the outcome of this assessment based on the professional judgement of the authors of this ES chapter - AQC. The conclusion is that air quality is not a significant consideration.
- 9.225 A number of properties in close proximity to the extended apron are at risk of being affected by odours due to the increased number of aircraft movements. Predicted odour concentrations at properties close to the CADP proposals (e.g. R4 and R5) are well below the thresholds at which complaints are likely, and the spatial change to emissions sources is not likely to be significant. Predicted odour concentrations are higher in 2019 than in 2012, and are at the threshold for less offensive odours at one location, in the With Development scenario. It is, however, considered that these predictions are likely to be overstated as no account has been taken of the shielding effect of the terminal buildings and pier, and elevated DLR infrastructure, which will substantially increase the dispersion of any odorous emissions. Taking this uncertainty into account, the impact of odour emissions is judged to be *negligible* to *slight adverse*, and the overall impact is *insignificant*.

### *2021 (Design Year)*

- 9.226 The operational air quality impacts in 2021 are judged to be insignificant. This professional judgement is made in accordance with the methodology set out above and taking into account the factors set out in Table 9.37, also acknowledging the uncertainty over predictions by building a number of worst-case assumptions into the assessment.
- 9.227 More specifically, the judgement that the air quality impacts will be insignificant takes account of the assessment that concentrations will be below the air quality objectives and all of the impacts are predicted to be *negligible*.



- 9.228 The significance of air quality impacts has also been considered using the flow chart provided in the London Councils guidance. Table 9.38 provides the outcome of this assessment based on the professional judgement of AQC. The conclusion is that air quality is not a significant consideration.
- 9.229 A number of properties in close proximity to the extended apron are at risk of being affected by odours due to the increased number of aircraft movements. Predicted odour concentrations at properties close to the CADP proposals are well below the thresholds at which complaints are likely, and the spatial change to emissions sources is not likely to be significant. Predicted odour unit concentrations are higher in 2021 than in 2012, and exceed the threshold for less offensive odours at one location, in the With Development scenario. For reasons stated above, it is considered that these predictions are likely to be overstated. Taking this uncertainty into account, the impact of odour emissions is judged to be *negligible* to *slight adverse*, and the overall impact is insignificant.

*2023 (Principal Year)*

- 9.230 The operational air quality impacts in 2023 are judged to be insignificant. This professional judgement is made in accordance with the methodology set out above taking into account the factors set out in Table 9.37, and also acknowledging the uncertainty over predictions by building a number of worst-case assumptions into the assessment.
- 9.231 More specifically, the judgement that the air quality impacts will be insignificant takes account of the assessment that concentrations will be below the air quality objectives and all of the impacts are predicted to be negligible.
- 9.232 The significance of air quality impacts has also been considered using the flow chart provided in the London Councils guidance. Table 9.38 provides the outcome of this assessment based on the professional judgement of AQC. The conclusion is that air quality is not a significant consideration.
- 9.233 A number of properties in close proximity to the extended apron are at risk of being affected by odours due to the increased number of aircraft movements. Predicted odour unit concentrations at properties close to the CADP boundary are well below the thresholds at which complaints are likely, and the spatial change to emissions sources is not likely to be significant. Predicted odour unit concentrations are higher in 2023 than in 2012, and approach the threshold for 'less offensive' odours at one location, in the With Development case. For reasons set out above, it is considered that these predictions are likely to be overstated. Taking this uncertainty into account, the impact of odour emissions is judged to be *negligible* to *slight adverse*, and the overall impact is *insignificant*.

**Table 9.37 - Factors Taken into Account in Determining Air Quality Significance**

Factors	Outcome of Assessment	
	2019	2021 and 2023
Number of people affected by increases and/or decreases in concentrations and a judgement on the overall balance.	A large number of people would be affected by an imperceptible increase in concentrations With Development, but levels would be lower than in 2012.	A large number of people would be affected by an imperceptible increase in concentrations With Development, but levels would be lower than in 2012. A small number of people along Hartmann Road would experience a decrease in concentrations due to the diversion of traffic.
The magnitude of the changes and the descriptions of the impacts at the receptors	The magnitude of change at most receptor locations is imperceptible. All impacts are negligible to slight adverse.	The magnitude of change at most receptor locations is imperceptible. All impacts are negligible.
Whether or not an exceedence of an objective or limit value is predicted to arise in the study area where none existed before or an exceedence area is substantially increased.	No exceedences of the objectives or limit values are predicted.	No exceedences of the objectives or limit values are predicted.
Whether or not the study area exceeds an objective or limit value and this exceedence is removed or the exceedence area is reduced.	The Airport itself does not lie within the AQMA boundary, but the general study area does. The CADP would not affect the AQMA boundary.	The Airport itself does not lie within the AQMA boundary, but the general study area does. The CADP would not affect the AQMA boundary.
Uncertainty, including the extent to which worst-case assumptions have been made	A number of worst-case assumptions have been built into the assessment, and the uncertainty related to forecast road traffic emissions in 2019 has been considered.	A number of worst-case assumptions have been built into the assessment.
The extent to which an objective or limit value is exceeded, e.g. an annual mean NO <sub>2</sub> of 41 µg/m <sup>3</sup> should attract less significance than an annual mean of 51 µg/m <sup>3</sup>	No exceedences of the objectives or limit values are predicted.	No exceedences of the objectives or limit values are predicted.

**Table 9.38 – Assessment of the Significance of Air Quality Impacts Based On London Councils Guidance**

Effect of Proposed Development	Assessment		
	2019	2021	2023
Is the development located in an AQMA?	The Airport and application site is not located within an AQMA, but the wider study area is. For the purpose of this assessment it is assumed the answer is YES.		
Will it interfere with or prevent implementation of measures in the Air Quality Action Plan?	The CADP proposals will not affect the Council's AQAP. The answer is NO.		
Is it likely to cause a worsening of air quality or introduce new exposure into the AQMA?	Predicted concentrations are generally lower in 2019 than in 2012, even assuming "without emissions reduction" for road vehicles. Concentrations are generally higher With Development in 2019 compared to Without Development scenario, but the incremental change is imperceptible to small at the majority of receptors. The CADP proposals would introduce no new exposure. The answer is NO.	Predicted concentrations are lower in 2021 than in 2012. Concentrations are generally higher With Development in 2021 compared to Without Development scenario, but the incremental change is imperceptible to small at the majority of receptors. A small number of properties on Hartmann Road would experience a reduction in concentrations. The CADP proposals would introduce no new exposure. The answer is NO.	Predicted concentrations are lower in 2023 than in 2012. Concentrations are generally higher With Development in 2023 compared to Without Development scenario, but the incremental change is imperceptible to small at the majority of receptors. A small number of properties on Hartmann Road would experience a reduction in concentrations. The CADP proposals would introduce no new exposure. The answer is NO.
	Air quality is not a significant consideration		

### Total Emissions

- 9.234 A summary of the 2019, 2021 and 2023 emissions (tonnes/yr) is shown in Table 9.39. This shows the emissions from different source categories. As described in the methodology section above, Airport-related PM emissions are assumed to represent both the PM<sub>10</sub> and PM<sub>2.5</sub> fractions, and which represents a worst case. Emissions from aircraft dominate in all years, but a direct comparison between Airport and Landside Road Traffic sources should be treated with caution as the latter is defined by the scale of the road network included in the assessment. It should also be born in mind that emissions from aircraft have been calculated within a ceiling altitude of 915m; emissions at altitude cannot be directly compared with those derived from solely ground-based sources.
- 9.235 Airport source NOx emissions increase by between 22% (2019) and 35% (2023) in the With Development as compared to Without Development case, in broad proportion to the increasing numbers of passengers and scheduled aircraft movements. The increase in Airport source emissions from 2019 to 2023 is in part offset by a reduction in road traffic emissions, but as stated above, this comparison is biased by the scale of the road network included in the assessment.

**Table 9.39 – Summary Emissions for 2019, 2021 and 2023 (te/yr)**

Source Category	NOx (te/yr)		PM <sub>10</sub> (te/yr)		PM <sub>2.5</sub> (te/yr)	
	Without Development	With Development	Without Development	With Development	Without Development	With Development
<b>2019</b>						
<b>Airport Sources</b>						
Aircraft (LTO cycle plus APU and engine testing)	265	322	17.2	20.9	17.2	20.9
Airside vehicles, MGPU and training fires	2.3	2.4	0.09	0.09	0.09	0.09
Gas Boilers/Energy Centre	0.6	2.9	-	-	-	-
Taxi Ranks/Car Parks	0.2	0.6	0.01	0.04	0.01	0.04
<i>Total Airport Related</i>	<i>268.1</i>	<i>327.9</i>	<i>17.3</i>	<i>21.0</i>	<i>17.3</i>	<i>21.0</i>
<b>Landside Road Traffic</b>						
Road traffic on local road network – Without Emissions Reduction	56.9	65.0	N/A	N/A	N/A	N/A
Road traffic on local road network – With Emissions Reduction	32.5	37.5	3.4	3.8	2.0	2.2
<b>2021</b>						
<b>Airport Sources</b>						
Aircraft (LTO cycle plus APU and engine testing)	274	333	18.0	20.7	18.0	20.7
Airside vehicles and MGPU	2.3	2.5	0.09	0.09	0.09	0.09
Gas Boilers/Energy Centre	0.6	3.0	-	-	-	-
Taxi Ranks/Car Parks	0.2	0.7	0.01	0.04	0.01	0.04
<i>Total Airport Related</i>	<i>277.1</i>	<i>339.2</i>	<i>6.38</i>	<i>7.41</i>	<i>6.38</i>	<i>7.41</i>
<b>Landside Road Traffic</b>						
Road traffic on local road network	27.2	28.0	3.4	3.4	1.9	2.0
<b>2023</b>						
<b>Airport Sources</b>						
Aircraft (LTO cycle plus APU and engine testing)	269	361	17.9	20.4	17.9	20.4
Airside vehicles and MGPU	2.3	2.5	0.09	0.09	0.09	0.09
Gas Boilers/Energy Centre	0.6	3.1	-	-	-	-
Taxi Ranks/Car Parks	0.2	0.6	0.01	0.04	0.01	0.04
<i>Total Airport Related</i>	<i>272.1</i>	<i>366.2</i>	<i>6.38</i>	<i>7.41</i>	<i>6.38</i>	<i>7.41</i>
<b>Landside Road Traffic</b>						
Road traffic on local road network	23.1	24.0	3.4	3.5	1.9	1.9



## **Mitigation**

### Construction Mitigation

- 1.223 Measures to mitigate dust emissions will be required during the demolition and construction phase of the development in order to reduce impacts upon nearby sensitive properties. Guidance has been published by IAQM on general mitigation measures to control dust and air emissions <sup>(50)</sup>; these measures are based on the emerging guidance from the Greater London Council, as part of their revision of the '*The control of dust and emissions from construction and demolition: Best Practice Guidance*' <sup>(51)</sup>. Until that guidance is published, IAQM have produced recommended mitigation measures for low, medium, and high risk sites.
- 1.224 IAQM has also published guidance on monitoring during demolition and construction <sup>(52)</sup>. This IAQM guidance reflects best practice experience and has been used, together with the professional experience of the authors (AQC) and the findings of the dust impact assessment, to draw up the following set of measures that should be incorporated into the specification for the works. Mitigation should be straightforward, as most of the necessary measures are routinely employed as 'good practice' on construction sites. Furthermore, as operational airport environments are very sensitive to fugitive dust emissions, strict controls and regular monitoring will be employed to minimise dust arising from the works. These measures will also be incorporated into the CADP Construction Environmental Management Plan (CEMP), as described in Chapter 6 of this ES and Appendix 6.1.

### *Communications*

- a) Implement a stakeholder communications plan that includes community engagement before and during work on site;
- b) Display the name and contact details of person(s) accountable for air quality and dust issues on the site boundary.

### *Dust Management*

- a) Implement a Dust Management Plan (DMP), approved by the Local Authority.

### *Site Management*

- a) Record all dust and air quality complaints, identify cause(s), take appropriate measures to reduce emissions in a timely manner, and record the measures taken;
- b) Record any exceptional incidents that cause dust and/or air emissions, either on- or off-site, and the action taken to resolve the situation in the log book.

### *Monitoring*

- a) Undertake daily on-site and off-site inspection, where receptors (including roads) are nearby, to monitor dust. Record inspection results;
- b) When activities with a high potential to produce dust are being carried out, and during prolonged dry or windy conditions, increase the frequency of inspections;
- c) Carry out regular dust soiling checks of surfaces such as street furniture, cars and window sills within 100m of site boundary;
- d) Agree real-time PM<sub>10</sub> continuous monitoring locations with the Local Authority in line with IAQM guidance on monitoring.

#### *Preparing and maintaining the site*

- a) Plan site layout so that machinery and dust causing activities are located away from receptors, as far as is possible. Use intelligent screening where possible – e.g. locating site offices between potentially dusty activities and the receptor;
- b) Erect solid screens or barriers around the site boundary;
- c) Avoid site runoff of water or mud;
- d) Keep site fencing, barriers and scaffolding clean;
- e) Remove materials that have a potential to produce dust from site as soon as possible, unless being re-used on site.

#### *Operating vehicle/machinery and sustainable travel*

- a) Ensure all on-road vehicles comply with the requirements of the London Low Emission Zone;
- b) Ensure all vehicles switch off engines when stationary;
- c) Avoid the use of diesel or petrol powered generators and use mains electricity or battery powered equipment where practicable;
- d) Impose and signpost a maximum-speed-limit of 15 mph on surfaced and 10 mph on un-surfaced haul roads and work areas.

#### *Operations*

- a) Only use cutting, grinding or sawing equipment fitted or in conjunction with suitable dust suppression techniques such as water sprays or local extraction, e.g. suitable local exhaust ventilation systems;
- b) Ensure an adequate water supply on the site for effective dust/particulate matter suppression/mitigation, using non-potable water where possible;
- c) Use enclosed chutes, conveyors and covered skips, where practicable;
- d) Minimise drop heights from conveyors, loading shovels, hoppers and other loading or handling equipment and use fine water sprays on such equipment wherever appropriate;
- e) Ensure equipment is readily available on site to clean any dry spillages, and clean up spillages as soon as reasonably practicable after the event using wet cleaning methods.

#### *Waste management*

- a) Only use registered waste carriers to take waste off-site
- b) Avoid bonfires and burning of waste materials

#### *Measures specific to demolition*

- a) Soft strip inside buildings before demolition (retaining walls and windows in the rest of the building where possible, to provide a screen against dust);
- b) Ensure effective water suppression is used during demolition operations. Hand held sprays are more effective than hoses attached to equipment as the water can be directed to where

it is needed. In addition high volume water suppression systems, manually controlled, can produce fine water droplets that effectively bring the dust particles to the ground;

- c) Avoid explosive blasting, using appropriate manual or mechanical alternatives;
- d) Bag and remove any biological debris or damp down such material before demolition.

#### *Measures specific to earthworks*

- a) Re-vegetate earthworks and exposed areas/soil stockpiles to stabilise surfaces as soon as practicable. Use Hessian, mulches or trackifiers where it is not possible to re-vegetate or cover with topsoil, as soon as practicable.

#### *Measures specific to construction*

- a) Avoid scabbling if possible;
- b) Ensure sand and other aggregates are stored in bunded areas and are not allowed to dry out, unless this is required for a particular process, in which case ensure that appropriate additional control measures are in place;
- c) Ensure bulk cement and other fine powder materials are delivered in enclosed tankers and stored in silos with suitable emission control systems to prevent escape of material and overfilling during delivery.

#### *Measures specific to trackout*

- a) Use water-assisted dust sweeper(s) on the access and local roads, to remove, as soon as practicable any material tracked out of the site. This may require the sweeper being continuously in use;
- b) Avoid dry sweeping of large areas;
- c) Ensure vehicles entering and leaving sites are covered to prevent escape of materials during transport;
- d) Record all inspections of haul routes and any subsequent action in a site log book;
- e) Install hard surfaced haul routes, which are regularly damped down with fixed or mobile sprinkler systems, or mobile water bowsers and regularly cleaned;
- f) Inspect on-site haul routes for integrity and instigate necessary repairs to the surface as soon as practicable;
- g) Implement a wheel washing system (with rumble grids to dislodge accumulated dust and mud prior to leaving the site);
- h) Ensure there is an adequate area of hard surfaced road between the wheel wash facility and the site exit, wherever site size and layout permits.

#### Operational Mitigation

- 1.225 The assessment has predicted no significant air quality or odour impacts during operation of the CADP during the Interim Phase (2017), the Transitional Year (2019), the Design Year (2021) and the Principal Assessment Year (2021). Therefore, additional mitigation measures

above those already in place, and those embedded in the CADP proposals are not considered necessary.

- 1.226 The Airport published its Air Quality Action Plan in July 2012, which sets out a range of measures to improve local air quality over the next three years. These measures will bring about compliance of all airside vehicles (unless exemption is granted) with the London LEZ, will introduce random emissions testing of all airside vehicles, and will decommission the older MGPUs.
- 1.227 Embedded within the CADP proposals are a number of measures that will reduce pollutant emissions:
- a) The installation of FEGP to all refurbished and new stands will substantially reduce reliance on MGPUs;
  - b) The appointment of a third party transport management company to manage and regulate the taxi rank will marshal all taxis in the forecourt area and taxi feeder park. Idling will not be permitted by stationary vehicles;
  - c) The provision of the eastern access onto Hartmann Road will significantly reduce traffic flows at the western end (close to Camel Road) and will be beneficial in reducing pollutant concentrations at this location;
  - d) The provision of the 560 kWt CCHP plant at the new Eastern Energy Centre will allow emissions of nitrogen oxides to be controlled (the proposed Development includes for 95% catalytic reduction of emissions), and the use of ultra-low NOx boilers (<40mgNOx/kWh) at both the Western and Eastern Energy Centres; and
  - e) The Airport Travel Plan will increase the public transport (DLR) mode share and reduce the impact of road traffic.

## Residual Effects

### Construction

- 1.228 Table 9.42 provides an overall summary of the residual effects of dust and PM<sub>10</sub> during construction with mitigation in place.

**Table 9.42 – Summary Significance Table With Mitigation**

Activity	Dust Soiling (Nuisance)	Ecological Effects	PM <sub>10</sub> Effects (Health)
Demolition	Slight Adverse	None	Negligible
Earthworks	Slight Adverse	None	Negligible
Construction	Slight Adverse	None	Negligible
Trackout	Negligible	None	Negligible
Overall Significance	Slight Adverse		

- 1.229 There is still a risk of slight adverse dust effects during both demolition and construction works, even with mitigation in place, but any effects will be temporary, relatively short lived, and will only arise during periods of dry weather with the wind blowing towards a receptor, and at a time when dust is being generated, and mitigation measures are not fully effective. The overall significance is judged to be *slight adverse*.

### Operation

- 1.230 The mitigation measures as described above are largely embedded in the existing Action Plan or are within the CADP proposals, and have been taken into account in the air quality assessment. The residual effects are therefore unchanged from those stated previously.

### **Cumulative Effects**

- 1.231 The only likely cumulative air quality effects of the CADP proposals are those related to traffic generated by other consented or proposed schemes (as listed in Chapter 3: EIA Methodology). The traffic generated by these schemes has been included in the future baselines and Without Development scenarios) and, as such, has been explicitly considered. In addition, sensitive receptors at these consented or proposed schemes have been included in the assessment.

### **Conclusions**

- 1.232 The air quality impacts associated with the construction and operation of the proposed CADP development have been assessed.
- 1.233 The construction works have the potential to create dust. During demolition and construction it will therefore be necessary to apply a package of measures to minimise dust emissions, as part of the CADP Construction Environmental Management Plan (CEMP). Even with these measures in place, there remains a risk that a number of properties might be affected by occasional dust-soiling impacts. Any effects will be temporary and relatively short-lived, and will only arise during periods of dry weather when the wind is blowing towards a receptor, at a time when dust is being generated and mitigation measures are not fully effective. The overall impacts of the construction works are judged to be *slight adverse*.
- 1.234 During operation, the predicted concentrations of nitrogen dioxide, PM<sub>10</sub> and PM<sub>2.5</sub> are all below the objectives and limit values, whether the proposed CADP proceeds or not. A large number of properties would experience imperceptible increases to pollutant concentrations; however, with the introduction of the new eastern access to Hartmann road, those properties at the western access point (close to Camel Road) would experience a reduction in concentrations.
- 1.235 The overall air quality impact of the proposed CADP is judged to be *insignificant*. This takes into account that all predicted concentrations are below the objectives and limit values, and that the impacts are negligible at the majority of receptor locations, with slight adverse impacts at a small number of receptors. With regard to the London Councils guidance, it is judged that air quality is *not a significant consideration*.
- 1.236 A small number of properties in close proximity to the apron area will be at increased risk of being affected by odours due to the increased numbers of aircraft operations associated with the proposed CADP development. However, there is some uncertainty with the predictions which are likely to be overstated as no account has been taken of the considerable shielding effect afforded by the terminal buildings, piers and DLR infrastructure. Taking this uncertainty into account, the effects are judged to be *insignificant*.
- 1.237 The Airport has already instigated a programme of measures within its Air Quality Action Plan which will further minimise any impacts in future years. In addition, a number of measures to reduce pollutant emissions have been embedded in the CADP proposals. These include the provision of FEGP to all new stands; the introduction of measures to prohibit idling by stationary taxis; the reduction of traffic flows along the western part of Hartmann Road by provision of the



eastern access point; the provision of new Energy Centres with a high level of NO<sub>x</sub> abatement; and the development of an updated Airport Travel Plan.

- 1.238 The proposed CADP is consistent with the NPPF, the Airport Policy Framework, the London Plan and the Mayor's Air Quality Strategy, and relevant policies within the Council's Core Strategy. It does not conflict with any elements of the Council's Air Quality Action Plan, and it is concluded that there are no air quality constraints to the Development.

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# 10 Townscape and Visual Impact

## Introduction

- 10.1 This chapter assesses the likely significant effects of the development of the proposed City Airport Development Programme (CADP), on townscape character and views experienced by people. The likely impacts are assessed during both the construction and operation of the proposed CADP.
- 10.2 This assessment distinguishes between landscape (townscape) effects and visual effects. As the proposed CADP is located within a predominantly urban area the term “townscape” has been used in this assessment when describing urban landscapes, with townscape meaning the landscape within a built up area, including the buildings and relationships between them. The overall assessment is therefore referred to as a townscape and visual impact assessment (TVIA).
- 10.3 Visual receptors include the public or community at large, residents and visitors to the area. The townscape resource includes physical elements, features and characteristics of the existing urban landscape.
- 10.4 The main objectives of this assessment are:
- a) to identify and describe the type and potential sensitivity of visual receptors likely to be most affected by the proposed CADP;
  - b) to identify the landscape resource which could be affected by the proposed CADP and evaluate its sensitivity to change as a result of implementing the type of development proposed;
  - c) to identify the effects brought about by the proposed CADP upon views experienced by people and the character of the townscape resource expressed in terms of individual townscape character areas;
  - d) to estimate the magnitude of effects and assessment of their significance; and
  - e) to minimise adverse effects and where feasible achieve beneficial effects, through optimising the design and layout.
- 10.5 This chapter has been prepared by RPS on behalf of London City Airport (the Airport).

## Planning Policy

- 10.6 This section summarises the national, regional and local policies pertinent to townscape and visual issues, which are of relevance to the proposed CADP. There is no directly applicable legislation relating to such assessments.
- 10.7 This policy overview covers the National Planning Policy Framework (2012); the London Plan (2011); the adopted Newham Core Strategy (2012); the Greenwich Council UDP (2006) and the Greenwich draft Core Strategy with Development Management Policies (Submission Version) (Feb 2013). London City Airport is located within the London Borough of Newham, however the study area for this assessment, extends up to approximately 2km from the tallest proposed buildings, thus also covering part of the area administered by Greenwich Council on the south side of the Thames (see Figure 10.3).. Relevant policies are described below.

## National Planning Policy Framework

- 10.8 The Department for Communities and Local Government published the 'National Planning Policy Framework' (NPPF) document in March 2012. The document consolidates a number of policy statements, circulars and related documents into a single document in an attempt to simplify the planning system and encourage sustainable development. It replaces previous national planning policy in relation to landscape issues.
- 10.9 The NPPF indicates that a set of 12 core land-use planning principles should underpin both plan-making and decision-taking. One of these 12 principles expresses the need to *"take account of the different roles and character of different areas, promoting the vitality of our main urban areas"*.
- 10.10 Section 7 of NPPF (under the heading "Requiring Good Design") indicates, at paragraph 58, that:
- "Local and neighbourhood plans should develop robust and comprehensive policies that set out the quality of development that will be expected for the area. Such policies should be based on stated objectives for the future of the area and an understanding and evaluation of its defining characteristics. Planning policies and decisions should aim to ensure that developments:*
- a) will function well and add to the overall quality of the area, not just for the short term but over the lifetime of the development;*
  - b) establish a strong sense of place, using streetscapes and buildings to create attractive and comfortable places to live, work and visit;*
  - c) respond to local character and history, and reflect the identity of local surroundings and materials, while not preventing or discouraging appropriate innovation;*
  - d) are visually attractive as a result of good architecture and appropriate landscaping."*
- 10.11 Paragraph 59 of Section 7 also states
- "Local planning authorities should consider using design codes where they could help deliver high quality outcomes. However, design policies should avoid unnecessary prescription or detail and should concentrate on guiding the overall scale, density, massing, height, landscape, layout, materials and access of new development in relation to neighbouring buildings and the local area more generally".*
- 10.12 It also emphasise that planning policies and decisions should not attempt to impose architectural styles or particular tastes but that it is *"proper to seek to promote or reinforce local distinctiveness"*.
- 10.13 Paragraph 65 of the NPPF states that:
- "Local planning authorities should not refuse planning permission for buildings or infrastructure which promote high levels of sustainability because of concerns about incompatibility with an*



*existing townscape, if those concerns have been mitigated by good design (unless the concern relates to a designated heritage asset and the impact would cause material harm to the asset or its setting which is not outweighed by the proposal's economic, social and environmental benefits)."*

- 10.14 Paragraph 113 is concerned with protected wildlife or geodiversity sites or landscape areas and paragraph 115 relates to the conservation of landscape and scenic beauty in designated areas such as National Parks and Areas of Outstanding Natural Beauty. As the Airport is within an urban area with no national landscape designations, these policies are not applicable to the proposed CADP.
- 10.15 Paragraph 125 states that *"By encouraging good design, planning policies and decisions should limit the impact of light pollution from artificial light on local amenity, intrinsically dark landscapes and nature conservation."* However, the Airport is within an urban area, with illumination from street lighting and buildings and has no intrinsically dark landscapes, although it has the potential to contribute to increased light pollution.

#### London Plan (2011)

- 10.16 Policy 7.4 (Local Character) indicates that development should have regard to the form, function, and structure of an area, place or street and the scale, mass and orientation of surrounding buildings. It should improve an area's visual or physical connection with natural features. In areas of poor or ill-defined character, development should build on the positive elements that can contribute to establishing an enhanced character for the future function of the area.
- 10.17 Policy 7.30 (London's Canals and Other Rivers and Water spaces) also states:
- "Development within or alongside London's Docks should protect and promote the vitality, attractiveness and historical interest of London's remaining dock areas by: "a) preventing their partial or complete infilling, b) promoting their use by mooring visiting cruise ships and other vessels, c) encouraging the sensitive use of natural landscaping and materials in and around dock areas, d) promoting their use for water recreation, and e) promoting their use for transport".*
- 10.18 Policy 7.11 (London View Management Framework) provides for the designated list of strategic views to be kept under review by the Mayor and describes the concept of protected vistas. Views that contribute towards recognising and appreciating a World Heritage Site will also be identified and protected. No strategic view, protected vista or World Heritage Site extends into the Application Site or into the 2km wider study area or Zone of Theoretical Visibility (ZTV) shown on Figure 10.3.
- 10.19 Policy 7.24 (Blue Ribbon Network) identifies the Royal Docks and River Thames as falling within the Blue Ribbon Network and states that:
- "The Blue Ribbon Network is a strategically important series of linked spaces. It should contribute to the overall quality and sustainability of London by prioritising uses of the water*

*space and land alongside it safely for water related purposes, in particular for passenger and freight transport. Regard should be paid to the Thames River Basin Management Plan.”*

- 10.20 The Blue Ribbon Network is identified as being multifunctional, providing (among other things) important landscapes and views.

- 10.21 Policy 7.28 (Restoration of the Blue Ribbon Network) states that:

*“Development proposals should restore and enhance the Blue Ribbon Network by [...] protecting the open character of the Blue Ribbon Network”.*

- 10.22 On a strategic level, Policy 7.29 (The River Thames) identifies that:

*“The River Thames is a strategically important and iconic feature of London. This role should be protected and promoted.*

- 10.23 In terms of LDF preparation, this policy also advises London Thames-side boroughs to “ *identify a Thames Policy Area within their LDFs and formulate policies and a strategy for this area*”.

*[repetition of para 10.17)*

Newham Council Core Strategy (2012)

- 10.24 Policy SP3 (Quality Urban Design within Places) expects all development proposals to realise a high quality of urban design and states that proposals will be supported where (among other things) they reinforce or create local distinctiveness, whilst securing integration and coherence with the local context. [As part of the LDF being developed for Newham Council, a character study has been carried out (Newham 2027 - Newham Character Study. Final Version 2011). This describes different character areas and typologies within the Borough and these have been used as the basis for the landscape character areas within Newham Borough, that have been used in this townscape assessment, as described below under the sub-heading ‘Baseline Conditions’.

- 10.25 Policy SP5 (Heritage and other Successful Place-Making Assets) supports proposals that (among other things) contribute positively to the composition of the townscape, achieving better integration and enhancement of new and old natural and built environments, infrastructure and living environments.

- 10.26 Policy INF 7 (Blue Ribbon Network) states that Newham Council will protect and enhance the Blue Ribbon Network, contributing to the regeneration of the borough, and that Newham Council will expect a number of measures to be addressed to achieve this objective. Among those measures is one that states, “*Development located adjacent to the Blue Ribbon Network should be set back from the waterway to integrate with and enhance the waterside environment and provide access and improved amenity to the waterfront to facilitate safe and active use of the waterspace*”. It also indicates that “*landscape character, heritage, views and the linear nature of the network will be protected and enhanced*”.

#### *Greenwich Council's UDP*

- 10.27 Policy SO2 (Open spaces) indicates Greenwich Council's intention *"To safeguard, improve and enhance the character of existing public and private open space (Green Belt, Metropolitan Open Land, Community Open Space, small open spaces) that fulfil a specific function for the local and wider community and encourage full use of their facilities"*.
- 10.28 Policy D24 (Historic Landscapes) states that *"Proposals which would adversely affect the character or appearance of historic landscapes will not be permitted"*. There are three sites in Greenwich, which are listed on English Heritage's register of parks and gardens of special historic interest. However, none of which are within the Study Area adopted for this TVIA (see below).
- 10.29 Policy D27 (Local Views) indicates that *"planning permission will be given for development which would not have a seriously adverse effect on the overall perspective and essential quality of the [specified] Local Views"*. Two of these Local Views are situated within the study area, namely: St. Mary's Churchyard towards Mast Pond Wharf and beyond and the Thames side panorama from the Thames Barrier open space, however, neither of these Local Views are located within the ZTV for the proposed CADP (see Figures 10.1 and 10.3).

#### Greenwich Council Draft Core Strategy

- 10.30 Policy DH3 (Heritage Assets) relates to Conservation and Heritage and states that *"The Council will protect and enhance the heritage assets and settings of the Royal Borough including the Maritime Greenwich World Heritage Site, preserving or enhancing the character or appearance of the 20 Conservation Areas, applying a presumption in favour of the preservation of statutory listed buildings, giving substantial weight to protecting and conserving locally listed buildings, protecting the three registered parks and gardens, as well as the Borough's archaeological remains and areas of special character."*
- 10.31 Two Conservation Areas are located within this TVIA study area,, however, only one at Woolwich Arsenal is within the ZTV (see Figures 10.2 and 10.3)
- 10.32 Policy DH(g) (Local Views) states that:

*"Planning permission will be given for development which would not have a materially adverse effect on the overall perspective and essential quality of the Local Views including those from Thames side panorama from the Thames Barrier open space; St. Mary's Churchyard towards Mast Pond Wharf and beyond; and "Others as set out in the Conservation Area Appraisals".*

#### **Assessment Methodology**

##### Applicable Guidance

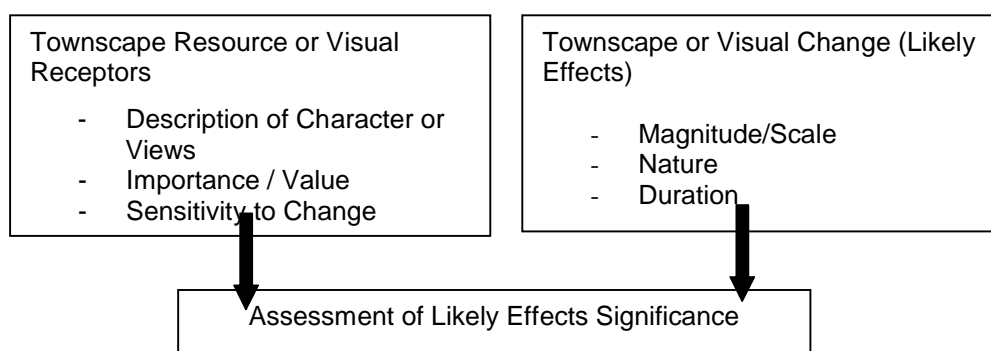
- 10.33 This Townscape and Visual Assessment (TVIA) has been carried out in accordance with the Guidelines for Landscape and Visual Impact Assessment, 3<sup>rd</sup> edition (GLVIA), 2013 produced by the Landscape Institute and Institute of Environmental Management and Assessment.

10.34 The GLVIA, (2013) gives the following definitions:

*“Assessment of landscape effects: assessing the effects on the landscape as a resource in its own right”. “*

*Assessment of visual effects: assessing the effects on specific views and on general visual amenity experienced by people”. Where general visual amenity is taken to mean “the overall pleasantness of the views enjoyed by people.”*

10.35 The likely effects on the townscape resource or visual receptors are assessed by considering the proposed change against the townscape resource or visual receptor as outlined in the diagram below:



10.36 These factors are determined by a combination of quantitative (objective) and qualitative (subjective) assessments using professional judgement. ‘Magnitude of change’ and ‘receptor sensitivity’ are expressed on the scales described in the paragraphs below. Environmental effects can be beneficial (positive) or neutral as well as adverse (negative).

10.37 The assessment has been carried out for both the temporary (six years) construction period and the permanent operational phases of the proposed CADP and takes account of both day and night-time effects during these periods. The assessment of permanent visual and townscape effects is based on the Design Year (2021) of the proposed CADP when all the construction works are expected to be completed.

#### Visual Assessment

10.38 In order to help determine the exact extent of the study area for a TVIA, a Zone of Theoretical Visibility (ZTV) is frequently used. This is a digitally mapped area of visibility described in the GLVIA as *“the area so defined only shows land from which the proposal may theoretically be visible”*.

10.39 The ZTV for the proposed CADP was computer generated using Key Terra-firma software. This is shown on Figure 10.3 at the end of this Chapter. It was modelled using five locations; one at the top of the proposed Western Terminal Extension (height 21.03m AOD), one at the highest point on the proposed Eastern Terminal Extension (24.07m AOD) and two at the top of the proposed East Pier (height 21.48m AOD) - these buildings being the highest proposed new structures within the ‘airside’ elements of CADP. The fifth location is based at the top of the

proposed 5 to 6 storey Hotel south of KGV Dock which, with at a maximum height of up to 32.12m AOD, would be the tallest of all the structures proposed. The proposed Hotel is designed in outline at this stage so the maximum height of this building was used for the assessment, informed by the parameter plans prepared by the project architects (Pascall + Watson).

10.40 A ground model was developed using two types of data formats:

- a) A local area ground model, extending approximately 700m from the existing East Pier, was created from a Digital Surface Model dataset, derived from aerial photography with point data at 2m centres;
- b) For the remaining part of the study area, an extended model was created from Ordnance Survey (OS) Panorama Data, using point data at 50m centres.

10.41 The digital data used for the local area ground model includes information on height and location of existing building structures and significant vegetation.

10.42 With the extended model, buildings and vegetation were added manually using OS 1: 25000 scale maps, aerial photographs and site survey observations. For this extended model, the height of buildings within the study area was assumed to be 9m and that for significant tree vegetation was assumed to be 12m.

10.43 The assumed building height of 9m for the extended model is based on an average roof line height of two storey residential buildings. This is a conservative estimate as many buildings in the area are higher rise residential units and commercial or industrial buildings. The ZTV has also not taken account of the screening effects of individual trees, hedges and other vegetation or smaller built structures. Accordingly, the ZTV presents a 'worst case' scenario and, in reality, views of the proposed CADP from some parts of the ZTV would be obstructed.

10.44 The proposed CADP's visibility has been assessed based on a viewers' eye level height of 1.6m above ground level in the area covered by the extended model. For the local model, account has also been taken of visibility from surrounding buildings and, accordingly, the rooflines of buildings within 700m of the proposed East Pier are also indicated within the ZTV.

10.45 The ZTV indicates the potential for glimpses of the proposed CADP from a few locations adjoining or near to the south bank of the Thames in Greenwich and also from further inland on higher ground in Charlton in excess of 2km from the proposed CADP. However, because of the relatively low height of the proposed CADP compared to the surrounding buildings it is highly unlikely that it would be perceptible at distances greater than 2km from the tallest proposed buildings and the assessment has therefore been restricted to this radius.

10.46 Visual receptors include the public or community at large, residents and visitors to the area. Key viewpoints looking towards the proposed scheme have been selected as representative of residential, traveller, worker and recreational receptors situated in publicly accessible locations within the study area at different distances and directions from the Application Site. These have been used to assess the potential visual effects on the different range of views towards the proposed CADP (see Figure 10.4 – Detailed Viewpoint Location Plan).



10.47 Baseline photographs were taken at eye level from Key Viewpoints, using a digital SLR camera with fixed focal lens equivalent to 50mm focal length lens in 35mm film format. These photographs have been reproduced in this assessment (shown in Photo Location Sheets 1 – 7), together with the viewpoint location plan (Figure 10.4), and a description of the views is provided in the following sections of this Chapter.

10.48 The sensitivity of visual receptors is dependent upon:

- a) The location and context of views;
- b) Whether views are continuous, fragmented or intermittent (i.e. the transient nature of a view gained while travelling through an area); and
- c) The importance of views and the activity or expectations of receptors.

10.49 Influences such as the numbers of receptors affected, popularity of views and the significance of views in relation to valued landscapes, townscapes or features determine the importance of views. The sensitivity levels have been identified for each visual receptor represented by the representative viewpoints, in accordance with the criteria indicated in Table 10.1 below.

**Table 10.1 – Visual Receptor Sensitivity**

Receptor	Rationale	Sensitivity
Residents from residential property, recreational users of public rights of way/ concessionary paths and landscape features or open spaces with public access.	Observers experiencing the view from the windows or gardens of their homes or pursuing quiet outdoor recreation where views of surroundings are an important contributor to the experience are more sensitive to visual change	High
Users of local roads and outdoor workers or people engaged in active sports outdoors	Observers in open areas on quiet routes or engaged in outdoor activities which are not dependant upon appreciation of the landscape are moderately sensitive to visual change	Medium
Users of main roads and workers or people engaged in activities indoors	Observers travelling at speed in vehicles or people focused on indoor activities where outdoor setting is not important to experience are less sensitive to visual change	Low

10.50 The nature of effect or magnitude of change to an existing view has been determined by a number of interrelated factors. These are the scale of change in the view with respect to the loss or addition of features in the view and changes to its composition, including the proportion of the view occupied by the proposed CADP. Consideration has also been given to whether the views will be full, partial or glimpsed and the relative amount of time over which the proposed CADP will be experienced. In addition, consideration was given to the height of visible parts of the proposed CADP relative to the receptor, with reference also to the scale and degree of contrast or integration with the existing or remaining townscape elements. It is assumed that change would be seen in clear visibility and appropriate lighting conditions and the assessment was carried out on that basis. Magnitude of change was then assessed broadly using the criteria shown in Table 10.2, below.

**Table 10.2 – Magnitude of Change: Visual Receptors**

Magnitude of Change	Example
Large	Complete or very substantial change in view: change very prominent involving complete or very substantial obstruction of existing view or complete change in character and composition of baseline, i.e. pre- development, view through removal of key elements or addition of uncharacteristic elements.
Moderate	Moderate change in view: may involve partial obstruction of existing view or partial change in character and composition of baseline, i.e. pre-development, view through the introduction of new elements or removal of existing elements. Change may be prominent but will not substantially alter scale and character of the surroundings and the wider setting. Composition of the views will alter. View character may be partially changed through the introduction of features which, though uncharacteristic, may not necessarily be visually discordant.
Slight	Minor change in baseline, i.e. pre-development, view: change will be distinguishable from the surroundings while composition and character will be similar to the pre-change circumstances.
Negligible	Very slight change in baseline, i.e. pre-development, view: change barely distinguishable from the surroundings. Composition and character of view substantially unaltered
No Change	No visual effects observed

### Townscape Assessment

- 10.51 The combined desktop and field survey information has been drawn together and analysed to identify the characteristic qualities of the townscape and to identify those areas with broadly similar townscape characteristics. Reference has also been made to a character study prepared to inform the Core Strategy document of Newham Council's LDF, (Newham 2027, Newham Character Study, September 2011).
- 10.52 This analysis has identified townscape Character Areas (CAs) within the 2km Study Area (as shown on Figure 10.5 – Character Areas). A description of each CA is set out at Table 10.8 – Character Areas. Each CA has common characteristics based on variations in the influences and interactions of the features described above.
- 10.53 The nature of each CA has been evaluated in in terms of sensitivity. Sensitivity combines judgements of the townscapes susceptibility to the type of change or development proposed and the value attached to the townscape. It is a measure of both the value of the receiving townscape and the townscape's capacity to accommodate change of the type that would result from the proposed development, such as the introduction of new features or the loss of existing features.
- 10.54 To assist with the evaluation of sensitivity, a relative value on a 3 point scale has been applied to each townscape resource or CA as part of the baseline studies, using the following definitions:

**High:** Areas that exhibit a very strong, positive character and which are in excellent or very good condition with valued features that combine to give an experience of unity, richness and harmony. These are townscapes that may be considered to be of particular importance to conserve and which may be particularly sensitive to change if inappropriately dealt with. Frequently, such areas will contain designations such as Conservation Area status, Scheduled Ancient Monuments and Listed Buildings.

**Medium:** Areas that exhibit positive character and are considered to be in good condition with some valued features, but which may have evidence of alteration to/ degradation/erosion of features resulting in areas of more mixed character. Potentially sensitive to change, change may not necessarily be detrimental nor require special attention to detail.

**Low:** Areas generally negative in character, in poor condition with a weak urban structure with few, if any, valued features. Scope for positive enhancement frequently occurs.

- 10.55 A three point scale has also been used to indicate sensitivity as shown in Table 10.3, below. However, this table can only illustrate general categories, the assessment of absolute sensitivity has been determined in relation to the type of development proposed as part of the overall assessment process.

**Table 10.3 – Townscape Sensitivity to Change**

Resource	Rationale	Sensitivity of Resource
Nationally designated and/or valued townscape and townscape features; strong or distinctive character; absence of detractors	Low tolerance to change	High
Locally designated and or valued townscape and townscape features; some distinctive characteristics; few detractors	Medium tolerance to change	Medium
Undesignated townscape and townscape features; absence of distinctive character; presence of detractors	High tolerance to change	Low

- 10.56 GLVIA (2013) guidance indicates that existing landscape sensitivity and capacity studies will not suffice for determination of sensitivity in impact assessments and states:

*“Some of these existing assessments may deal with what has been called ‘intrinsic’ or ‘inherent’ sensitivity, without reference to a specific type of development. These cannot reliably inform assessment of the susceptibility to change since they are carried out without reference to any particular type of development and so do not relate to the specific development proposed. Since landscape effects in LVIA are particular to both the specific landscape in question and the specific nature of the proposed development, the assessment of susceptibility must be tailored to the project. It should not be recorded as part of the landscape baseline but should be considered as part of the assessment of effects.”*

- 10.57 Therefore, the assessment of the sensitivity of each CA to the type of changes that would result from the proposed CADP has been carried out as part of the assessment of likely significant effects rather than as part of the baseline.
- 10.58 On completion of the character assessment and sensitivity evaluation, the various townscape effects of the proposed CADP were identified taking into account the impacts of the removal of any existing townscape elements within the Application Site and the design, scale, layout and appearance of the proposed CADP structures together with the outline landscaping proposals.
- 10.59 The identification of townscape effects distinguishes between direct effects upon the physical resource (landform, vegetation, pattern etc) and those associated with amenity and views so as to avoid double counting. However, where visual effects of, for example, a proposed building would impact on the character of adjacent townscape areas, this has been taken into consideration.

- 10.60 The nature of the effect or magnitude of change was then assessed broadly using the criteria shown in Table 10.4 below.

**Table 10.4 – Townscape Magnitude of Effect Criteria**

Magnitude of Change	Criteria
Large	Total loss of or large alteration to key elements/features/characteristics of the baseline townscape and/or introduction of elements considered to be totally uncharacteristic, when set within the attributes of the receiving townscape
Moderate	Partial loss of/moderate alteration to one or more key elements/features/characteristics of the baseline townscape, and/or introduction of elements that may be prominent, but not necessarily considered substantially uncharacteristic, when set within the attributes of the receiving townscape.
Slight	Slight loss of or slight alteration to one or more key elements/features/characteristics of the baseline townscape, and/or introduction of elements that may not be uncharacteristic when set within the attributes of the receiving townscape
Negligible	Very slight loss of or alteration to key elements/features/characteristics of the baseline townscape, and/or introduction of elements that are not uncharacteristic in the surrounding townscape
No Change	No townscape effects would be observed

#### Assessment of Significance

- 10.61 The significance of effect on views and townscape was evaluated according to a four-point scale: Substantial, Moderate, Slight and Negligible. A description of the significance criteria is provided in Table 10.5 below. These effects can be beneficial or adverse.
- 10.62 In considering the significance of effect of construction activities, the duration of the effect and its temporary nature were taken into account.
- 10.63 In order to assess the relative significance of the townscape and visual effects identified, due regard has been given to the combination of magnitude of the effects in question and the sensitivity to change of the affected townscape resource or visual receptor.
- 10.64 The matrix in Table 10.5 below is intended as a guide to assessment only and significance can vary, depending on individual circumstances and the baseline situation – for example, the presence of landscape designations and/or visual detractors.

**Table 10.5 – Significance Thresholds**

		Sensitivity of Resource		
		Low	Medium	High
Magnitude of Effect	Large	Moderate	Moderate to Substantial	Substantial
	Moderate	Minor	Moderate	Moderate to Substantial
	Slight	Negligible to Minor	Minor	Minor to Moderate
	Negligible	Negligible	Negligible to Minor	Minor
	No Change	Negligible	Negligible	Negligible

- 10.65 These significance of effect categories are accompanied by a list of typical descriptors for guidance as indicated in Tables 10.6 and 10.7 below. :

**Table 10.6- Typical Descriptors of the Visual Significance of Effect Categories**

Significance of Effects	
Substantial Beneficial	Typically the proposed changes would lead to a major improvement in a view from a highly sensitive receptor
Moderate Beneficial	Typically the proposed changes would lead to an obvious improvement to a view from a moderately sensitive receptor or perceptible improvement to a view from a more sensitive receptor
Minor Beneficial	Typically the proposed changes would cause limited improvement to a view from a receptor of high or moderate sensitivity or would cause greater improvement to a view from a receptor of low sensitivity
Negligible	Typically the proposed changes would cause no discernable deterioration or improvement in the existing view
Minor Adverse	Typically the proposed changes would cause limited deterioration to a view from a receptor of moderate or high sensitivity, or cause greater deterioration to a view from a receptor of low sensitivity
Moderate Adverse	Typically the proposed changes would cause obvious deterioration to a view from a moderately sensitive receptor, or perceptible damage to a view from a more sensitive receptor
Substantial Adverse	Typically the proposed changes would lead to a major deterioration to a view or loss of a view from a highly sensitive receptor.

- 10.66 The assessment of significance requires considerable judgement in balancing the complex relationships, especially between the different components of the townscape in question. As such, the definitions in Table 10.7 are to an extent subjective and cannot be considered prescriptive.
- 10.67 With regards to determining the significance of a townscape effect, a higher significance of effect may generally be attached to large scale effects and effects on highly sensitive townscape receptors. However, a judgement could be made, depending on circumstances, that small scale but significant townscape effects on highly sensitive receptors may be more important than large scale effects on less sensitive townscape receptors.

**Table 10.7- Typical Descriptors of the Townscape Significance of Effect Categories**

Significance of Effects	
Substantial Beneficial	Typically the townscape resource has a high sensitivity with the proposals representing a high adverse magnitude of change and/or the proposed changes would: Enhance the character (including value) of the townscape Enable the restoration of characteristic features and elements lost as a result of changes from inappropriate management or development Enable a sense of place to be enhanced
Moderate Beneficial	Typically the townscape resource has a medium sensitivity with the proposals representing a medium adverse magnitude of change and/or the proposed changes would: Enhance the character (including value) of the townscape. Enable the restoration of characteristic features and elements partially lost or diminished as a result of changes from inappropriate management or development. Enable a sense of place to be restored
Minor Beneficial	Typically the townscape resource has a low sensitivity with the proposals representing a low adverse magnitude of change and/or the proposed changes would:



	Complement the character (including value) of the townscape. Maintain or enhance characteristic features or elements. Enable some sense of place to be restored
Negligible	Typically the townscape receptor has a low sensitivity with the proposals resulting in no losses or alterations to the townscape resource. Or the proposed changes would maintain the character (including value) of the townscape. Blend in with characteristic features and elements. Enable a sense of place to be maintained.
Minor Adverse	Typically the townscape resource has a low sensitivity with the proposals representing a low adverse magnitude of change and/or the proposed changes would: Not quite fit the character (including value) of the townscape. Be at variance with characteristic features and elements Detract from sense of place.
Moderate Adverse	Typically the townscape resource has a medium sensitivity with the proposals representing a medium adverse magnitude of change and/or proposed changes would: Conflict with the character (including value) of their townscape. Have an adverse impact on characteristic features or elements. Diminish a sense of place.
Substantial Adverse	Typically the townscape resource has a high sensitivity with the proposals representing a high adverse magnitude of change and/or the proposed changes would: Be at variance with the character (including value) of the townscape. Degrade or diminish the integrity of a range of characteristic features and elements or cause them to be lost. Change a sense of place.

### EIA Significance

- 10.68 For the purposes of this assessment, those effects indicated as being of 'Moderate to Substantial' or 'Substantial' significance are regarded as significant. Effects of 'Moderate' and lesser significance have been identified in the assessment, but are not considered significant. Some changes during the construction phase may have higher significance of effects; however, these would be of a temporary nature.

### Cumulative Effects

- 10.69 With regards cumulative effects methodology, GLVIA (2013) refers to guidance prepared by Scottish National Heritage (SNH 2012), which defines cumulative effects, as *“the additional changes caused by a proposed development in conjunction with other similar developments or as the combined effects of a set of developments taken together”*. Two types of cumulative effect have been defined in SNH (2012) and quoted in GLVIA (2013) as follows:

Cumulative visual effects are *“effects that can be caused by combined visibility, which occurs where the observer is able to see two or more developments from one viewpoint and/or sequential effects which occur when the observer has to move to another viewpoint to see different developments”*.

Cumulative landscape effects are *“effects that can impact on either the physical fabric or character of the landscape, or any special values attached to it”*.

- 10.70 The assessment of cumulative landscape/townscape and visual effects uses a similar approach to that described above and applied to those viewpoints and CAs where the proposed scheme

would be seen in combination with, or is intervisible with, the committed developments identified in Chapter 3: EIA Methodology of the ES.

- 10.71 Intervisibility depends upon general topography, aspect, tree cover, built development or other visual obstruction, elevation and distance. A particular development may be seen in combination with the other committed developments within a single view, or cumulative effects could arise from a succession of views to these developments from a variety of locations..
- 10.72 The proposed CADP structures are of a height that is relatively low compared to any other buildings in the area and cumulative visual and townscape effects are accordingly unlikely to be significant beyond the study area identified above for the CADP. Accordingly the same study area as that for the CADP assessment on its own has been used for the cumulative effects assessment.
- 10.73 GLVIA (2013) identifies two broad types of cumulative visual effect, combined visual effects and sequential visual effects.
- 10.74 Combined visual effects occur "*where the observer is able to see two or more developments from one viewpoint*". These can be experienced 'in combination', i.e. "*where two or more developments are or would be within the observer's arc of vision at the same time without moving her/his head*" or they can be experienced 'in succession' "*where the observer has to turn her/his head to see the various developments*".
- 10.75 Sequential visual effects occur "*when the observer has to move to another viewpoint to see the same or different developments. Sequential effects may be assessed for travel along regularly used routes such as major roads or popular paths*". These can be 'frequently sequential' i.e. "*where the features appear regularly and with short time lapses between instances depending on speed of travel and distance between viewpoints*" or 'occasionally sequential', i.e. "*where longer time lapses between appearances would occur because the observer is moving slowly and/or there are larger distances between the viewpoints*".
- 10.76 GLVIA (2013) indicates that cumulative landscape effects, either additional or combined are likely to include effects: "*on the fabric of the landscape as a result of removal of or changes in individual elements or features. and/or introduction of new elements/features*"; "*on the aesthetic aspects of the landscape*" e.g. scale, sense of enclosure, pattern etc; and "*on the overall character of the landscape*".

### **Baseline Conditions**

- 10.77 This section contains a description of the existing Airport and the Application Site, together with a description of the features that contribute to the townscape character of study area. It also provides a summary of existing local character assessments, and a description of the types of visual receptors within the study area together with twelve key viewpoints that have been selected to represent the effects of the proposed CADP on the visual receptors within the study area.

### Existing Airport and Application Site

- 10.78 This description of the Airport and Application Site is intended to set the townscape and visual context in which the proposed CADP has been assessed. A further account of these existing features of the Airport is provided in Chapter 2: Site Context and Scheme Description.
- 10.79 The Airport Terminal is a relatively discrete flat roofed building, of approximately 12.8m in height with a conning air traffic control (ATC) tower at a maximum height of 14.87m (20.36m AOD), located at the western end of King George V Dock (KGV Dock). The runway is located on a spit of land to the north and east of the Terminal that separates Royal Albert Dock from KGV Dock. The existing aircraft stands are located between the runway and Terminal and are serviced by piers which extend west and east from the Terminal building. The existing East Pier is 9m high and extends along the south side of aircraft stands 21-24, ending in a short length of an 8m high noise barrier which screens aircraft at the eastern end of the aircraft stands. Together with runway hold 27, these structures are formed on a slab constructed over the water of KGV Dock.
- 10.80 The Airport is accessed via a road link from the A112 Connaught Road which terminates in a forecourt area with vehicle drop-off facilities in front of the Terminal building. Further east is an extensive area of short term and long term car parking, to the south of KGV Dock. On the south side of the short term car park is the four storey City Aviation House (roof height 15.6m, 20.27m AOD), which is to be demolished as part of the proposals. To the east of the long stay car park there are two buildings; King George V House and a blue industrial shed. Further east still there is another grey industrial shed. The remaining land between the blue industrial shed and Woolwich Manor Way at the eastern end of KGV Dock is either vacant or used for goods storage and heavy vehicle parking.
- 10.81 Public transport access includes the Docklands Light Railway (DLR) that has a linked station at first floor level at the Airport Terminal. Accordingly, the approaches to the City Airport DLR station are elevated and this elevated structure, together with a combination of walls and fences on the southern side of the DLR, provides separation between the Airport and residential area of Silvertown immediately to the south.
- 10.82 The existing aircraft stand lighting comprises floodlights mounted at 12m equipped with 1000watt MHN-LA lamps. This type of lamp is compact and allows good beam control and minimal amounts of spill light. A lighting assessment has been produced (see Appendix 10.3) which indicates that the existing aircraft stand floodlighting is the predominant light source from the existing Airport when observed from the northern aspect. Aircraft stand floodlighting has an average illuminance of circa 60lux, which is higher than the 20Lux average required by CAP168 - the overriding design code appropriate to airside lighting.
- 10.83 The current lighting elements for the area to the front (south) of the Airport include street lighting and lighting to the forecourt drop-off area and the car parks further east. The existing car park lighting comprises street lighting type columns which are illuminated throughout the night. A further primary source of visible lighting in this area emanates from the DLR.

- 10.84 The Application Site is largely without vegetation having only a few trees consisting of a mixture of small ornamental / non-native trees, largely located near the south-western site boundary and near to the Terminal building and DLR station, in the Airport forecourt area and short stay car park. In addition, there are some areas of pioneer Buddleia at the extreme eastern end of the site near the boundaries with Woodman Street, Albert Road and Woolwich Manor Way. Further details on existing site vegetation are provided in Chapter 13: Ecology and Biodiversity, and within the Tree Survey Report presented at Appendix 13.3.

#### Topography

- 10.85 The landform and drainage features of the study area are illustrated on Figure 10.1. The area lies within the Thames Basin - a syncline of chalk overlain with London Clay, and is drained by the River Thames that runs west-east through the study area. The wide floodplain of the Thames was mostly former marshland that covered much of the study area to the north of the river and large parts to the south. Most of the land within the study area is therefore low lying and relatively flat, the exception being parts of Charlton and Woolwich to the south, where the land rises gradually to approximately 40m AOD at its furthest point from the Thames.
- 10.86 The Royal Docks to the north of the Thames are a prominent man-made feature in the floodplain, built on land raised above the tidal reaches. Other infrastructure development such as gas and sewerage works were also built on raised land within these marshes, however most of the marshland to the north of the river remained until the early 1980s when it was drained for development.

#### Land Use and Vegetation

- 10.87 The land is in urban use with a mixture of clearly defined zones including residential and industrial/commercial areas located on the northern and southern banks of the Thames at Silvertown and North Greenwich in the western part of the study area and a zone of commercial/industrial and utility to the north-east. These different zones (described below) are shown on Figure 10.5: Character Areas, included at the end of this chapter.
- 10.88 A significant area to the south of the river is the former Royal Arsenal at Woolwich that has been converted with infill development and now has a variety of uses including a museum, commercial and residential uses. The eastern part of the Royal Arsenal site has been redeveloped with low rise commercial units.
- 10.89 Significant non-residential uses in areas around the Royal Docks include:
- a) the Airport;
  - b) goods yards, warehouse/industrial units and vacant land to the south of KGV Dock;
  - c) the University of East London (UEL) on the north-east side of the Royal Albert Dock;
  - d) an office development and hotel site under construction at Royals Business Park, plus the London Regatta Centre on the north-west side of the Royal Albert Dock;
  - e) the Excel Exhibition Centre and three adjacent high rise hotels on the northern side of Royal Victoria Dock; and

- f) several areas of vacant land including land to the east of Royal Albert and KGV Docks in the Albert Basin area, and a large expanse of land on the north side of Royal Albert Dock between UEL and Royals Business Park. Some of this land is currently being developed.
- 10.90 A significant proportion of the land within the study area is in residential use. Residential areas include:
- a) a medium to high density area of predominantly 2 storey Victorian and post war terraced houses together with post war flats, mostly 3 storeys high plus two 8 storey high blocks to the south and southwest of the Airport at Silvertown;
  - b) high density, predominantly post war and early 21st century houses and apartment blocks up to 8 storeys high, plus 3 tower blocks up to 18 storeys high to the south-east of the Airport at Silvertown;
  - c) 21<sup>st</sup> century houses and apartment blocks up to 7 storeys high plus a 14 storey tower block at Gallions Point, east of Woolwich Manor Way to the south-east of KGV Dock;
  - d) 21<sup>st</sup> century apartments of varying height up to 9 storeys at Royals Quay, east of Woolwich Manor Way to the north-east of Royal Albert Dock;
  - e) a large area of predominantly late 20<sup>th</sup> century, medium density housing at Beckton interspersed with schools, local centres and open spaces;
  - f) a large area of mid to late 20<sup>th</sup> century medium to high density housing and apartment blocks in the southern part of the study area at Charlton and Woolwich,
  - g) late 20<sup>th</sup> century medium density, predominantly 2 storey housing with some 3 storey apartment blocks, intermixed with open areas at Thamesmead on the south bank of the Thames in the south-eastern part of the study area.
- 10.91 The 2km radius study area also includes the town centre of Woolwich to the south of the Thames, which has a mixture of commercial, residential and institutional uses in a wide variety of building styles.
- 10.92 The study area generally consists of hard urban development contrasting with the open areas of water of the Docks and River Thames. Some areas of soft space with trees and other vegetation exist, however in most locations there is relatively little vegetation. Map EQ3 of the Newham UDP indicates areas with a deficiency of tree coverage which includes the industrial area of Silvertown bordering the Thames, the north side of the Royal Victoria and Albert Docks and most of the north-eastern part of the study area including the land between the east side of KGV Dock and the Thames.
- 10.93 The softest parts of the study area with green open space with trees, include parkland to the north of Royal Albert Way at Beckton, the Royal Victoria Gardens bordering the Thames at Silvertown and the Thames Barrier Park. There is also a significant area of parkland at Charlton in the south-western part of the study area and in the south-east at Thamesmead (see Figure 10.2: Townscape Features and Constraints).
- 10.94 A belt of trees planted along the north side of the Royal Albert Way is also a notable feature of the area. Other significant vegetation is associated with public areas and private gardens within the lower density residential areas, particularly at Beckton, Thamesmead and parts of Charlton and Woolwich.



### Settlement History and Cultural Associations

- 10.95 The text below gives a brief outline of the settlement history in order to provide an understanding of existing cultural associations. A more detailed history of the area is described in Chapter 14: Built Heritage.
- 10.96 The area of the Royal Docks was formerly marshy fen-land, the earliest inhabitants of which were probably Bronze Age or Iron Age fisher folk. Archaeologists believe the area sustained a number of settlements at that time and later the Romans had a burial ground nearby. Evidence also suggests there could have been a Roman road and ferry point and perhaps a look-out post at Gallions Reach.
- 10.97 During medieval times the area was known as Hamme, a name meaning 'flat, low-lying pasture'. By the time of the Domesday Book (1086) Hamme consisted of three separate manors; the eastern one, later to become East Ham and the western one, the nucleus of West Ham.
- 10.98 Little is known about the area pre-1700, although cattle were grazed on what had come to be known as the Plaistow Marshes. By 1800 there was just one house in the area, but in 1847 development commenced with completion of a new railway from Stratford to North Woolwich, which followed the line of what are now Silvertown Way and North Woolwich Road. At this time, the Metropolitan Building Act 1844, which prohibited 'harmful trades' within London, resulted in the movement of factories to this area. One of the first was Samuel Winkworth Silver's former rubber factory that opened in 1852 and gave the name to Silvertown, an industrial area on the north bank of the Thames. Henry Tate and Abram Lyle later brought their refineries to Silvertown and they merged in 1921 to form Tate & Lyle which still operates the large Silvertown Refinery on the banks of the Thames, to the south of the Airport.
- 10.99 The Royal Victoria Dock, which was opened in 1855, was the first dock built expressly for steam ships. The Royal Albert Dock was opened in 1880 and KGV Dock, opened in 1921, was the last of the Royal Docks. These consist of 3 interconnected docks with a combined area of 245 acres and on completion of KGV Dock, they were the largest and one of the busiest dock groups in the World.
- 10.100 With the area becoming a major centre of industry and trade there was a resulting demand for housing to accommodate the workers and their families. This led to the development of new settlements from the 1880s onwards, such as those at Hallsville, Canning Town and North Woolwich and later in much of what is now Custom House, Silvertown and West Silvertown.
- 10.101 The area was badly damaged by war time bombing, however goods traffic through the Royal Docks was maintained and reached its peak in the 1950s and early 1960s. After that, containerisation and other changes led to a rapid decline. In the later 20<sup>th</sup> century the area suffered from economic decline with the eventual closure of the docks.
- 10.102 The Government took over development control for the area setting up the Docklands Joint Committee (DJC) in January 1974 to prepare a strategic plan for the redevelopment of the Docklands area, which was finally adopted in 1976. In 1981, the London Docklands Development Corporation (LDDC) was established to secure the regeneration of the area.

LDDC cleared former railway lines, industry and warehouses to prepare land for redevelopment leaving only fragments of industrial buildings and warehouses. In conjunction with Newham Council it also developed further large new areas of housing to the north of the Docks by draining the remaining marshes and demolishing parts of Beckton Gas Works.

- 10.103 Since then the area has been further transformed by the construction of the Thames Barrier and adjacent park, new development on the northern side of the docks, and the Airport itself in 1985-6.
- 10.104 Woolwich is the oldest settlement within the study area. The first ferry across the Thames was recorded at Woolwich in 1338. While Woolwich had a market, it remained a small Kentish settlement until the founding of a number of military establishments within the parish, after which it started to become a leading military and industrial town. It was home to the Woolwich Dockyard (founded in 1512), the Royal Arsenal (dating back to 1471), the Royal Military Academy (1741) and the Royal Horse Artillery (1793). The town still retains an army base at the Royal Artillery Barracks.
- 10.105 Woolwich continued to expand with industrial and residential development eventually merging as a built entity with neighbouring areas including Charlton in Greenwich borough and Plumstead to the south. In 1889, it became part of London, with the formation of London County Council. Woolwich declined as a town in the late 20th century, starting with the closure of the Siemens factory in 1968 and continuing as the Royal Arsenal scaled back operations and finally closed in 1994. However, with various redevelopment schemes commencing in the 1990s and early 21<sup>st</sup> century, including redevelopment of the former Royal Arsenal, Woolwich now enjoys a small renaissance.

#### Communications

- 10.106 The Royal Albert Dock and KGV Dock are surrounded by a ring of distributor roads - the Royal Albert Way dual carriageway to the north and the A112 Connaught Road to the south, linked by the A1020 on the Connaught Bridge at the western end of the Royal Albert Dock and Woolwich Manor Way at the eastern end. The DLR runs alongside the A112 to the south of KGV Dock and terminates on the south side of the river at Woolwich Arsenal. Other links across the river include the Woolwich Ferry (vehicular) and a pedestrian subway.
- 10.107 Long distance paths within the study area include the Thames Path which is an almost continuous riverside walkway on the southern side of the river. This is linked by the pedestrian underpass at Woolwich to the north of the river where the Capital Ring and North Thames Way system of paths follows parts of the northern bank of the river with a westerly spur passing along part of the north side of Royal Albert Dock. This system is at present incomplete but it will eventually pass along the entire northern side of Royal Albert Dock and link to another part of the Capital Ring path located within Beckton District Park. To the south, the Thames Path follows the banks of the river for most of its length in the study area and also links with the Green Chain Walk, which passes through Maryon Park in Charlton to the south (see Figure 10.2).

### Night Time Character

- 10.108 The Application Site is located within an extensive urban area, the night-time character of which is strongly influenced by artificial light from buildings and street lighting. Illumination from outside the study area results in a strong night sky glow to the west. The illuminated buildings of Canary Wharf and central London are prominent night time features.
- 10.109 The night-time character of the study area itself is also strongly affected by artificial illumination. Light emanates from street lighting, windows of residential, commercial and other buildings and from lighting at the Airport. The Airport itself is a prominent source of artificial light, from the Terminal buildings, DLR station, approach road and forecourt, and adjacent car park area, which is lit by lighting on columns circa 8 to 10m high. However, the brightest source of light arises on the airside of the Airport from lighting to the existing aircraft stands and from the runaway lighting and runway approach lights.
- 10.110 The runway approach lights are on high columns that extend just east of Woolwich Manor Way. These approach lights, together with the runway lighting, are very prominent in night-time views experienced from the eastern and western ends of KGV Dock and Royal Albert Dock in the vicinity of Woolwich Manor Way and Connaught Road. The lighting to the existing aircraft stands consists of multi clusters of lamps on 12m high columns. The lamps are angled downwards to minimise light spill and, as a consequence, this lighting is a recessive feature of night-time views experienced from the south, east and west. Night-time views from southerly locations are more strongly influenced by intervening street lighting and lighting of the Airport forecourt and car park and, from easterly and westerly locations, by the existing runway lighting and street lighting along Woolwich Manor Way and Connaught Road. However, on the north side of Royal Albert Dock and the Royal Albert Way (A1020), the aircraft stand lighting is a prominent feature in southerly night-time views.

### Views

- 10.111 The ZTV, (Figure 10.3), indicates the potential visibility of the tallest proposed CADP structures, namely the Eastern Terminal Extension, the East Pier and the proposed Hotel if they are built to the maximum proposed heights of 19.5m, 17m and 26.6m respectively. Although these would be visible within much of the area enclosed by the Royal Albert Way to the north, Connaught Road to the west, the DLR to the south and Woolwich Manor Way to the east, there is only the potential for glimpses of these structures from a relatively small number of locations beyond this ring of road/rail structures. This is because these road/rail structures form a screen, being either elevated above ground level or associated with other screening structures such as an environmental barrier and other screen walls/fencing to the south of the DLR, and belts of tree planting to the north of Royal Albert Way. Numerous tall buildings around the Airport and docks would also further screen the proposed structures from ground level locations further afield.
- 10.112 Above ground level, where upper floor windows of buildings are orientated towards the Airport, there would also be views of the proposed CADP experienced by residents or other users of these buildings.

10.113 Visual receptors within the ZTV include:

- a) Residents in Silvertown, including 4 and 8 storey blocks around Woodman Street; three tower blocks (18 to 20 storey) around Brixham Street; two 8 storey high apartment blocks in the vicinity of Camel and Drew Roads; and, other lower buildings including 3 and 4 storey apartments and 2 storey housing in Newland Street and streets adjoining it.
- b) Residents in apartments at Gallions Point and Royal Quay; halls of residence of East London University; and, at some rooms to hotels located near to the Excel Centre and at the Travel Lodge to the south-west of the Airport;
- c) Residents on the south side of the river in apartments bordering the Thames in the vicinity of Woolwich Dockyards, the Royal Arsenal and Thamesmead and also further south on higher ground in Woolwich/Charlton;
- d) Users of public paths and open spaces, notably the Capital Ring and other open space on the north side of Royal Albert Dock; the Capital Ring near the Thames to the east of the Royal Docks; and, the Thames Path on the south bank of the Thames;
- e) Visitors to the Royal Arsenal and users of an open space known as Royal Arsenal Riverside;
- f) Visitors to the Airport using the car park and entrance forecourt area;
- g) Users of local residential roads in Silvertown and major roads including Royal Albert Way, Connaught Road and Woolwich Manor Way.
- h) Travellers using boats on the Thames;
- i) Users of elevated parts of the DLR in the vicinity of Royal Albert, Gallions Reach and City Airport stations;
- j) Recreational users of the Docks such as users of jetskis and other water sports in Royal Albert Dock, boat users based at Gallions Lock marina at eastern end of Royal Albert Dock, and boat users based at the London Regatta Centre on the north side of Royal Albert Dock to the west of Connaught Bridge.
- k) People at work outdoors such as in yards on the east side of Royal Albert Dock and KGV Dock and at airport.
- l) People at work indoors and visitors to offices/places of education such as at Royals Business Park; University of East London; local schools such as Drew Primary School; community facilities such as the Storey Centre, the adjoining Fight for Peace London Academy and the Woodman Centre on Woodman Road in North Woolwich; at the airport and in industrial units to the south of the Airport at Silvertown.

10.114 A two-stage process was carried out to select locations for viewpoints within the ZTV that would be representative of views gained by visual receptors in the study area. The first stage involved desktop studies of maps and aerial photographs to identify suitable receptors which would be publicly accessible (e.g. on public footpaths, roads or open spaces). High points from these receptors were selected on the basis that a clear line of vision would be most likely; simple long sections were prepared from candidate sites to ascertain if intervening development and mapped vegetation in the form of tree belts and woodland would obstruct views.

10.115 A shortlist of potential representative viewpoints was developed and site visits were carried out by a landscape architect to verify the suitability of the locations. As a result of the site visits, many of the shortlisted locations were eliminated due to intervening localised visual obstructions such as new structures, hedges, tree groups or individual trees.

10.116 Following the combined desk and site studies, 12 representative viewpoints were selected. These are indicated in Figures 10.3 and 10.4 and listed below in Table 10.7 together with an

evaluation of their sensitivity, in accordance with the criteria outlined in Table 10.1. These viewpoints are representative of the range of visual receptors within the study area described above and the views from other receptors near to these viewpoints are described in Table 10.8.

**Table 10.8 – Representative Viewpoints**

Viewpoint	Distance from Proposed Pier	Sensitivity	Description
1 Connaught Bridge	900m	Low (travelers on bridge)  Medium (Excel Centre hotel residents on floors above 2 <sup>nd</sup> level)	Easterly view from Connaught Bridge, designed for motor vehicle use only and therefore views only experienced by travelers in fast moving vehicles. View partially obscured by parapet for travelers in low vehicles. Open views to Airport and runway for travelers in higher vehicles with water of Royal Albert Dock dominating foreground of most views but at southern end of bridge KGV Dock water is visible behind the Airport. A similar view would be experienced from easterly oriented windows above 2 <sup>nd</sup> floor level in high rise hotels adjacent to Excel Centre (Ramada, Premier Inn and Aloft). At night-time existing runway and aircraft stand lighting is prominent from the bridge with illuminated buildings of built up area forming a backdrop. From hotels road lighting on Connaught Bridge is prominent in foreground.
2 Royals Business Park	600m	High (pedestrians on Dockside)  Medium (travelers on DLR, active recreational users of Regatta Centre)  Low (workers in office building and users of Royal Albert Way)	Southerly view from Dockside walkway adjacent to Newham Council office building. Water of Royal Albert Dock dominates foreground with Airport runway, aircraft stands, Terminal and East Pier clearly visible beyond, although they do not form skyline features. High rise tower blocks, Tate and Lyle factory and steeple of Brick Lane Music Hall (former church) all in Silvertown, are prominent skyline/backdrop features.  Water of KGV Dock not visible from ground level although it would be visible from nearby elevated sections of DLR approaching Royal Albert Station and from 1 <sup>st</sup> to 5th floor windows of Newham Council building.  At night-time existing runway and aircraft stand lighting is prominent with illuminated buildings of built up area forming a backdrop.
3 UEL/ Capital Ring	200m	High (pedestrians and other Dockside users)  Low (students/staff working indoors at UEL and users of Royal Albert Way)	Southerly view from Capital Ring path on northern side Royal Albert Dock adjacent to University of East London (UEL). Water of Royal Albert Dock dominates foreground with the Airport runway, aircraft stands, Terminal and East Pier clearly visible beyond, although these do not form skyline features. High rise tower blocks and Tate and Lyle factory in Silvertown and high rise buildings at Canary Wharf are prominent skyline/backdrop features.  Water of KGV Dock not visible from ground level although it would be increasingly visible from higher elevations on 1 <sup>st</sup> to 4th floor windows of adjacent UEL buildings.  At night-time existing runway lighting is prominent with illuminated buildings of built up area and aircraft stand lighting forming a backdrop.
4 UEL Halls of Residence/	500m	High (pedestrians,	South westerly view from Capital Ring path on Dockside adjacent to UEL Halls of Residence. Water of Royal



Capital Ring		other Dockside users and residents in university Halls)	<p>Albert Dock dominates foreground with Airport runway clearly visible beyond and aircraft stands, Terminal and East Pier discernable in background. High rise tower blocks and Tate and Lyle factory in Silvertown and high rise buildings at Canary Wharf are prominent skyline/backdrop features.</p> <p>Water of KGV Dock not visible from ground level although it would be increasingly visible from higher elevations on 1<sup>st</sup> to 7th floors of adjacent UEL Halls of Residence.</p> <p>At night-time existing runway lighting is prominent with illuminated buildings of built up area and aircraft stand lighting forming a backdrop.</p>
5 Sir Steve Redgrave Bridge Woolwich Manor Way (A117)	600m	<p>High (residents of Royal Quay)</p> <p>Medium (pedestrians and travelers in vehicles using bridge)</p>	<p>South westerly view from elevated position on bridge. Water of Royal Albert Dock dominates foreground, with the Airport runway clearly visible beyond and aircraft stands, Terminal and East Pier discernable in background. High rise tower blocks and Tate and Lyle factory in Silvertown and high rise buildings at Canary Wharf are prominent skyline/backdrop features. Airport Terminal and existing piers are perceptible in distance but do not form skyline features.</p> <p>Water of KGV Dock is visible as a narrow ribbon behind runway. A similar view would be experienced by residents of apartments from nearby Royal Quay development further east from 2nd to 9th floor windows oriented towards KGV Dock. Water of KGV Dock would be increasingly visible from higher elevations.</p> <p>At night-time existing runway lighting is prominent with illuminated buildings of built up area and aircraft stand lighting forming a backdrop. From hotels road lighting on Woolwich Manor Way is prominent in foreground.</p>
6 Gallions Point Lock	900m	High (pedestrians using long distance path)	<p>Westerly view from slightly elevated position on Capital Ring adjacent to lock at Gallions Point, with boating marina at eastern end of Royal Albert Dock visible in middle distance. KGV Dock, Airport runway and most other Airport structures are all screened by intervening vegetation and other structures such as the Sir Steve Redgrave Bridge. However, the approach lighting to the runway can be seen on both sides of the Sir Steve Redgrave Bridge. High rise buildings at Canary Wharf are prominent skyline features.</p> <p>At night-time road lighting on Woolwich Manor Way plus approach runway lighting is prominent in middle distance.</p>
7 East End KGV Dock on Woolwich Manor Way	500m	<p>High (residents of Gallions Point)</p> <p>Medium (pedestrians and travellers in vehicles using Woolwich Manor Way, outdoor workers adjacent to KGV Dock)</p>	<p>North westerly view from elevated position on Woolwich Manor Way at bridge crossing over entrance to KGV Dock. The water of KGV Dock is prominent in foreground with Airport runway prominent to north-west and most other Airport structures visible in background. However, the approach lighting to the runway can be seen on both sides of the Sir Steve Redgrave Bridge. Apartment blocks at Silvertown, Tate and Lyle factory and high rise buildings at Canary Wharf are prominent skyline features.</p> <p>A similar view would be experienced from Tereza Joanne, permanently moored at eastern end of KGV Dock and used for event hire. Also, a similar view at higher elevation would be experienced from apartment windows at Gallions Point residential development.</p> <p>At night-time existing runway lighting is prominent with illuminated buildings of built up area forming a backdrop. From Gallions Point development road lighting on</p>

8 Airport car park	50m	Low (users of Airport car park)	<p>Woolwich Manor Way is prominent in foreground.</p> <p>Northerly view from KGV Dockside adjacent to car park at the Airport. Water of KGV Dock and concrete pontoons are prominent in foreground with the runway clearly visible in middle distance. Royal Quay apartments, UEL, Newham Council offices at Royals Business Park and pylons carrying overhead transmission lines form prominent skyline features. Tree belts bordering north side of Royal Albert Way and southern edge of Beckton Park are also clearly visible in background. Water of Royal Albert Dock is not visible from this elevation.</p> <p>At night-time existing runway lighting is fairly prominent with road lighting on Woolwich Manor Way illuminated buildings of Terminal aircraft stand lighting and built up area beyond forming a backdrop.</p>
9 Kennard Street, Silvertown	300m	<p>High (residents in 2 storey houses and 3 storey flats, also 4 storey flats on corner of Kennard and Newland Streets)</p> <p>Medium users of local roads (including A112 Albert Road)</p>	<p>Northerly view from southern end of Kennard Street with concrete wall to DLR screening views to the Airport car park. However, top of covered canopy pedestrian link to Terminal is just visible above top of wall. Views towards canopy from windows and flats are oblique except for views from 3 no small windows on 1st, 2<sup>nd</sup> and 3rd, floor windows of flats at corner of Kennard and Newland Streets. Also more direct views are experienced from front gardens and the road. A similar view would be experienced from part of the A112 Albert Road which adjoins Kennard Street at this location.</p> <p>At night-time local street lighting and lighting at Airport car park is most prominent source of light in a well lit area.</p>
10 Newland Street, Silvertown	200m	<p>High (residents in 2 and 3 storey houses and flats)</p> <p>Medium (users of local roads and DLR)</p>	<p>North-easterly view down Newland Street taken near to junction with Lord Street, showing fence and wall to elevated section of DLR forming visual boundary between residential area of Silvertown and the Airport. Views to site of proposed CADP from ground and first floor level windows of flats and houses are obscured by intervening structures. City Aviation House also obstructs views from some 2<sup>nd</sup> floor windows of nearby 3 storey apartment blocks, although a few may have glimpses towards the site across Airport forecourt area.</p> <p>Glimpses of the existing East Pier and open water of KGV Dock are obtained by travelers on very short elevated sections of the DLR between the Airport station and City Aviation House and to the east of City Aviation House before the track descends and views from trains are screened by intervening structures.</p> <p>Further east on Newland Street the wall bordering the DLR is lower and views are experienced across Airport car park from some 1<sup>st</sup> floor windows of flats and houses (see Viewpoint 9 above).</p> <p>Further west from playground at Drew Primary School and residential area in vicinity of Drew Road/Leonard Street there are glimpses of the western and southern facades of the Airport Terminal beneath the deck of the DLR and DLR station, filtered through intervening vegetation.</p> <p>At night-time local street lighting is most prominent source of light in a well lit area. From higher elevations lighting at Airport car parks is visible in near distance.</p>
11 Royal	1000m	High	North-westerly view from long distance path on banks of

Arsenal/ Thames Path		(recreational users of path and nearby open space)	Thames adjacent to Royal Arsenal. City Aviation House is visible above satellite dishes in distance and control tower to the Airport is also just discernable. However the prominent skyline features in this view are the Tate and Lyle factory, Woolwich Ferry terminal and apartment blocks in Silvertown.  Night-time views of this urban scene are well lit particularly from buildings and street lighting.
12 Thamesmead	1500m	High (recreational users of path and nearby residents of apartment blocks)	Westerly view from long distance path on banks of Thames adjacent to apartment blocks at Thamesmead. Dock gates are visible on opposite bank of Thames but KGV Dock and Royal Albert Dock are obscured by intervening vegetation and structures as are all structures associated with the Airport. Apartment blocks at Gallions Point and Royal Quay form skyline features together with more distant high rise buildings at Canary Wharf and central London.  Night-time views of this urban scene are well lit particularly from buildings and street lighting.

#### Landscape/Townscape Character

10.117 A landscape character framework has been developed on a national level, based upon an existing character assessment undertaken by the Countryside Agency (now Natural England) (Countryside Character, Volume 6, East of England, 1999). The study area is located within 'Character Area 81 -Greater Thames Estuary'. Most of the key characteristics described for Character Area 81 relate to the rural landscape which covers the majority of the character area and are not pertinent to the urban townscape of the study area. However, this area is described as extending "*fingerlike into London*". The characteristics pertinent to this 'extension' are:

- a) The pervasive presence of water and numerous coastal estuaries extending the maritime influence far inland;
- b) Distinctive military heritage on coastline;
- c) Pressure from urban, industrial and recreational developments;
- d) Area of essentially marshland character subject to activity of major developments including ports, urbanisation, marine dredging and numerous industry-related activities;
- e) Present day soils derived from intertidal alluvial muds and drift geology overlying extensive London Clay.

10.118 At a district level, a character study has been carried out as part of Newham's LDF (Newham 2027, Newham Character Study, September 2011).

10.119 Unlike Newham, a character assessment has not been carried out for Greenwich Council. Therefore, the character areas for Greenwich have been identified specifically for this study and only the character of those areas of Greenwich within the ZTV have been described as part of this assessment (see Table 10.7 below).

10.120 The Newham Character Study identifies Newham-wide components of character and describes Newham as:

*“a borough where the northern part is in general the most historic with intact buildings and street patterns, and in the south and west there is greater evidence of most post-war change”.*

10.121 Four broad zones of historical development have been identified in Newham which gave rise to broad character areas today. Three of these character areas are located within the study area (see Newham wide components of character in Figure 10.5), however, only one of them is located within the ZTV. This character area is bounded by the River Thames to the south and the Newham Way to the north and is described as the *“Royal Docks and former marshes – largely cleared of former operational Docks or drained and developed for housing from early 1980s”*. The two other broad character areas located outside the ZTV are :

- a) An area to the west of the Royal Docks and former marshes described as “Former worker’s slums cleared and redeveloped in the 1930s and 1960s and now being regenerated”.
- b) To the north of the Newham Way the edge of the third broad character area within the study area is described as: *“Largely Victorian to interwar with some post WW2 redevelopment”*.

10.122 In addition to these broad character areas, character typologies have been identified within the borough. Those located within the ‘Royal Docks and former marshes’ broad character area are also encompassed by the ZTV, as described in Appendix 10.2.

#### Riverscape Character

10.123 In addition to the areas of townscape, a large part of the study area is occupied by the tidal reaches of the River Thames, which has an open character contrasting with most of the adjacent urban areas.

#### Character Areas

10.124 For the purpose of this assessment, ten Character Areas (CAs) have been identified. These include nine townscape character areas plus the River Thames. The key characteristics of these CAs are summarised in Table 10.9 below and a value applied in accordance with the criteria described in the methodology above.

**Table 10.9 – Character Areas**

Character Area	Typologies (Newham Only)	Key Characteristics/ Forces for Change	Value
1 Silvertown Mixed Residential	Comprehensive Redevelopment (1960s/70s)  Contemporary Development  Victorian/Edwardian	Original Victorian/Edwardian street pattern largely replaced by comprehensive redevelopment in the 60s. Few original terraced properties remain, mainly replaced by 3 no 60s tower blocks up to 20 storey high, slab apartment blocks circa 9 storey high and 2 storey, predominantly terraced housing. Also more recent development of apartment blocks (3 to 9 storeys) with local shopping centre at ground floor level in Pier Road/Woodman Street area. In this area are some community facilities such as the Storey Centre, the adjoining Fight for Peace London Academy and the Woodman Centre on Woodman Road.  Small area of Victorian/Edwardian terraced houses has been retained adjacent to river in Barge House Road and Woolwich Manor	Medium

		Way. This is recognized by Newham Council as an Area of Townscape Value and together with adjacent Royal Victoria gardens this forms an attractive enclave that is not typical of the area.	
2 Silvertown Low Rise Residential	Victorian/Edwardian  Post War Redevelopment (1960s)  Residential 1980s to Mid 1990s	Original Victorian street pattern predominantly retained, although numerous streets are now culs de sac. Some limited redevelopment in the 1950s and 60s in the form of apartment blocks of 3 storeys plus two atypical, 8 storey slab apartment blocks. Otherwise area is relatively low rise with much Victorian/Edwardian terraced housing retained, interspersed with replacement 2 storey housing and 3 or very occasionally, 4 storey apartment blocks which blend with original character of area. Wall and environmental barrier to DLR on north side of Newland Street is a prominent feature as is elevated section of DLR in north-western part of area and these separate the area from the Royal Docks and Airport. Drew Primary School an associated playground is located on northern edge of the area adjacent to the DLR station.	Medium
3 Silvertown Industrial	Remaining Older Industrial Areas	Area between Factory Road and river with mixture of old industrial units dominated by Tate and Lyle factory, plus more recent redevelopment with generally smaller scale factory, warehouse and business units. Some of the older units are derelict.	Low
4 Royal Docks	Contemporary Development  Older Industrial	The character of this area is fast changing with much modern development. It has an open character dominated by the open waters of the 3, linear shaped, Royal Docks together with the locks which give access to the Thames. There are also large areas of open, vacant land awaiting development, and here the space formed by the areas of open water leaks out indeterminately beyond the confines of the Dock edges, which gives a sense of incompleteness. Other significant features include the Airport with its runway, aircraft stands and Terminal occupying the land between Royal Albert Dock and KGV Dock; modern highways, notably the A1020 Royal Albert Way dual carriageway, the A112 Connaught Road and Bridge and the A117 Woolwich Manor Way plus bridges which span the eastern entrances to the Royal Albert Dock and KGV Dock; the DLR, particularly the elevated sections in vicinity of Royal Albert Dock?, Gallions Reach and City Airport stations. Few older buildings remain, but some enclosure is provided by recent development on the northern side of the Docks, most notably the Excel Exhibition Centre and nearby high rise hotels, UEL campus and the recently developed Royals Business Park currently dominated by a single 5 storey high office block occupied by Newham Council. There is also recent residential development on the land between Woolwich Manor Way and the river, at Gallions Point and at Royal Quay, the latter formed around a sailing marina created in the Albert Basin, at the eastern end of Royal	Medium



		<p>Albert Dock. These are developments of apartment blocks ranging from 3 to 14 storeys high with facilities such as shops, restaurants and bars located on the ground floors.</p> <p>KGV Dock is the smallest of the 3 Docks and also the most secluded due to private industrial/commercial use which borders much of the Dockside area and screens the Dock from surrounding areas. Public access to KGV Dockside is restricted to the area adjoining the Airport car park and a small area on the east side of the Dock.</p> <p>The area is characterised by long, open views, where open water is predominant in foreground and prominent buildings are visible in the middle and long distance. These views are especially notable from the eastern and western ends of the linear Royal Albert Dock and KGV Dock, with those from the eastern end in particular incorporating iconic, contemporary buildings at Canary Wharf and in central London and the O2 Arena.</p>	
5 Beckton Residential	Residential 1980s to Mid 1990s	<p>This area is characterized by LDDC development on drained marshland undertaken by private developers. The area comprises generally low rise (2 storey) medium to low density housing with individual gardens, and brick predominant building material.</p> <p>Local centres with shopping and communal facilities, such as schools, health clinics, transport interchange and places of worship feature. Beckton District Park forms large centrally located area of informal parkland with mounding and dense belts of trees.</p>	Medium
6 Beckton Commercial/Industrial	Modern Industrial Out of Town Retail	<p>This comprises a large area of recent industrial/commercial development in modern purpose built units of varying scale, much of which located on the site of former gasworks. New roads and buildings feature within a part developed area that still includes much vacant land.</p> <p>An out of town retail centre with extensive areas of car parking is located on northern side of this CA.</p>	Medium
7 River Thames	N/A	<p>A broad ribbon of water bounded by mud banks, with numerous jetties, piers and associated shipping, including the Woolwich Ferry located at its edges. The Thames Flood Barrier is a notable feature and the river is bounded by urban development on both banks, much of the latter being modern development with apartments ranging from 3 to 9 storeys high. Older industrial development is also prominent, particularly at Silvertown where the Tate and Lyle complex dominates the river scene. The area is characterised by long distance views, those to the west including iconic features such as the high rise buildings of Canary Wharf, the O2 Arena and in the distance the high rise structures in central London.</p>	High
8 Thamesmead	N/A	This area is characterised by residential	Medium

		development stemming from the late 20 <sup>th</sup> century and 21 <sup>st</sup> century, consisting of 2 storey houses of mainly terraces with small private gardens plus 3 storey apartment blocks with small communal green spaces and some larger apartment blocks up to 9 storeys high with communal spaces. A large area of parkland is located in the north-east. The Thames Path borders the river, immediately behind which are the generally higher rise apartment blocks ranging from 3 to 9 storeys.	
9 Royal Arsenal	N/A	Much of western part of this area consists of retained buildings, many of which are now listed buildings, which are interspersed with some recent high quality modern buildings and areas of high quality open spaces which frequently link to the Thames Path along the banks of the river. Most of the western part of this area is designated as a Conservation Area with older buildings used as museums or converted to residential/commercial uses. The eastern part of this area has been comprehensively redeveloped in recent years with lower quality business units surrounded by areas of car parking.	High
10 Woolwich Residential	N/A	A residential area, predominantly redeveloped from the Woolwich Dockyards from the 1960s through to present. Common built forms are 2 storey terraces with small gardens intermixed with 4 storey apartment blocks dating from late 20th century. In eastern part of the area, on the banks of the Thames, some higher rise apartment blocks of 14 storeys (21 <sup>st</sup> century) and 12 storeys (1960s) are intermixed with lower rise apartments of 3+ storeys. Areas of local open space and car park courts exist, many of which link to the Thames Path along the banks of the river. Local facilities in the form of schools and local shops are common. The Clockhouse is a prominent classical building, one of the few original buildings retained.	Medium

### CADP Proposals and Incorporated Mitigation

- 10.125 The existing East Pier, noise barrier and small parts of the existing Terminal building will be replaced by the Eastern Terminal Extension (highest point 18.4m or 24.07m AOD) which will extend onto part of a 7.5 hectare area of new deck or platform to be constructed over an existing area of open water, on the west and north sides of KGV Dock. This platform will also form the site for the proposed extended taxiway, seven new aircraft stands, new East Pier (height 16m or 21.48m AOD) and a noise barrier (approx 13.5m AOD). The proposals would result in a new southern facade to the terminal building, which will represent an enhancement to the existing façade. This will be complimented by a distinct and contemporary design for the adjacent East Pier.
- 10.126 A smaller Western Terminal Extension (highest point 15.6m, or 21.03m AOD), plus the Western Energy Centre and plant area will adjoin the Terminal building on the north side of the DLR station. Four existing aircraft stands (Nos 21-24) will also be reconfigured as part of the CADP proposals.

- 10.127 The CADP proposals also includes a new Forecourt area with soft landscaping. This Forecourt will extend further east than the existing forecourt into an area currently occupied by a short stay car park, the site of City Aviation House and the western edge of a long stay car park. Accordingly the new Forecourt will represent an enhancement to the existing layout. To the east of this, in an area currently used partly for the long stay car park, a 5 to 6 storey Hotel is proposed. At up to 37.66m AOD, this proposed Hotel will be the tallest proposed structure of the CADP. The soft landscaping proposed as part of the CADP will generally include low level planting and some small scale specimen trees. Although the planting will help soften the proposals, it is not envisaged that it will perform a significant screening function to the new buildings, mainly due to the need to discourage birds nesting in the vicinity of the Airport to enable the safe operation of aircraft.
- 10.128 To the east of the proposed Hotel the remainder of the long stay car park will be used as a decked car park (height approx 15.56m AOD). The new Eastern Energy Centre (height approx 20.36m AOD) is proposed between the existing King George V House and the dock edge. Within the remainder of the land within the Application Site to the south of KGV Dock, two existing industrial sheds will be retained and the existing goods yards and vacant land as far east as Woolwich Manor Way will be used for further car parking, car rental with service buildings (approx 16.06m AOD) and taxi feeder spaces.
- 10.129 In summary, the tallest proposed CADP structures will be the proposed Hotel, the Eastern Terminal Extension to the existing Terminal building and the new East Pier. Part of the proposed Western Terminal Extension to the Terminal building, at 21.03m AOD, will be the same height as the existing Airport control tower and taller than the highest part of the existing Terminal building at 18.22m AOD. From locations to the south, these structures, together with a noise barrier (7.96m high or 13.5m AOD) will largely screen the aircraft utilising the new stands, the tail fins of which will be approximately 13m high.
- 10.130 The aircraft stands and new East Pier will be constructed on a man-made structure erected over the existing water of KGV Dock and, as such, there is no opportunity for screen planting adjacent to these structures. Furthermore, such planting close to the airfield could attract nesting birds which would contravene the Airport bird-strike safeguarding requirements.
- 10.131 Other tall structures of note will be lighting columns required for the new aircraft stands, which will be approximately 15m high, erected on columns or attached to the East Pier walls (i.e. being slightly higher than the 12m existing aircraft stand lighting). The lighting will comply with existing design codes and, as such, light spillage from adjacent areas of the airside facility will be strictly controlled. As with the existing lighting, the lamp units will be directed downwards thus avoiding glare and minimising light spill beyond the aircraft stand areas.
- 10.132 Night-time visual effects arising from lighting to the upgraded aircraft stands, whilst possibly set at a lower Lux level than existing, would lead to an overall increase in light levels as a result of the need to safely illuminate the seven new aircraft stands.
- 10.133 From locations in the study area to the south of the Application Site, aircraft on most of the new aircraft stands and some of the existing runway will be screened by the new Eastern Terminal Extension and East Pier structure. At 18.4m and 16m height respectively, the proposed Eastern

Terminal Extension and East Pier will also screen most aircraft stand lighting from locations to the south. However, the tail fins of aircraft and lighting to the two easternmost aircraft stands would be visible above the proposed noise barrier from locations to the south of these facilities.

- 10.134 The new East Pier will have a strong geometrical form and a mixture of metal cladding and glazed external facades. The new Pier will create a visually significant element of the CADP which is reflected in the proposed architectural treatment of this structure, as described in the Design and Access Statement (DAS) submitted with the planning submission. To accord with this, façade lighting is proposed to both landside and airside elevations of the Pier. On the landside, as with the Eastern Terminal Extension, lighting will be provided by a linear strip of LED which will be concealed within the roof of the projecting upper level corridor. This will have the effect of casting a gentle halo wash of white light up onto the solid volume above. On the airside, it is proposed to illuminate the top level of the structure with a halo wash using a linear LED system surrounding the glazing.
- 10.135 The lighting strategy proposed for the Forecourt comprises a complimentary mix of feature and functional lighting that includes street lighting, bollard lighting, feature lighting to landscape areas and lighting to the Terminal building facades. These proposals are likely to result in a similar level of illumination as is presently provided for the forecourt, City Aviation House and short stay car parks. However, the existing lighting at City Aviation House is at higher elevation and therefore slightly more intrusive from nearby locations to the south than the proposed scheme.
- 10.136 Further east, lighting from the proposed Hotel windows will represent a new source of light at high elevation, but it will be located within the area of the existing long stay car park, which is illuminated to a high standard already. The proposed decked public parking area will be partially located within the existing long stay car park and represents only a slight change to the baseline situation. However, the eastern end of the new car park together with the proposed staff car park, taxi feeder park and car rental areas will represent an increase in illumination at night time as these areas are currently vacant or used for material storage, and therefore relatively dark.

### **Assessment of Potential Effects**

- 10.137 The townscape and visual assessment has taken account of all proposed CADP structures, including both the detailed and outline elements of the planning application. The assessment has been carried out for the 'worst case' scenario with regards the proposed Hotel being constructed with a maximum height of 26.6m (32.12m AOD).
- 10.138 The existing KGV Dock consists of a total of 24 hectares of open water. In order to construct the new aircraft stands, taxilane, Eastern Terminal Extension and East Pier, a concrete deck supported on piles will cover 7.5 hectares of this open water, on the west and north sides of KGV Dock. This concrete deck will form an extension to the existing slab of the Eastern Apron (stands 21-24) at the western end of KGV Dock, and will be at the same level as this structure.

### **Construction Phase**

- 10.139 Construction phase effects will be relatively short term with the construction programme covering a seven year period (Years 1 to 7). Initial work due for completion by Year 2/3 would comprise the partial construction of the eastern taxilane and three new Code C compliant stands on a new deck over KGV Dock. The 'Facilitating Works' for this infrastructure comprise: an extended outbound baggage (OBB) handling facility, a new Coaching Facility to serve the 3 stands, and a noise barrier. During this time, the first phase of the Western Terminal Extension together with the Western Energy Centre will also be developed.
- 10.140 The remainder of the CADP will be built out progressively over the following four years (Year 3 to Year 7) to match demand. The indicative sequence of the CADP works is shown on the 'Indicative Construction Sequence' drawings appended to Chapter 6 of the ES; where Year 1 (Figure 6.3) represents the commencement of construction and Year 7 (Figure 6.7) shows the entire CADP infrastructure developed and fully operational, inclusive of the second phase of the Western Terminal Extension.
- 10.141 As explained in Chapter 6, Year 4 of the CADP has been selected for the consideration of the environmental effects arising from the demolition and construction works on the basis that this is likely to represent the 'worst case' period for potential impacts on sensitive receptors within and around the Airport, including local residents, passengers and members of the public. At this stage, the tallest and therefore most visible of the proposed structures - the Eastern Terminal Extension, East Pier and proposed Hotel, will be under construction.
- 10.142 Although the assessment is primarily based on Year 4, consideration has also been given to any particular works in other phases which may affect specific local receptors. For example, demolition of City Aviation House, which is anticipated during years 2 and 3 of the construction programme, will result in visual effects for residents nearby in Silvertown.
- 10.143 In Year 4, the assessment of townscape and visual effects takes into account the works completed by that time as indicated on Figure 6.5. Ongoing activities have also been assessed having regard to significant infrastructure works such as: piling in KGV Dock and landside; construction of the concrete platforms and, potentially, the construction of the second stage of the taxilane extending to the runway hold at the eastern end of the runway. The visual effects of the construction compound and temporary barge berths, plus associated barge traffic using KGV Dock and the lock to the river, together with HGV traffic using Woolwich Manor Way, Albert Road, Hartman Road and Connaught Road, have also been considered.
- 10.144 The hours of construction of the CADP will be influenced by the operational hours and activities of the Airport. Certain construction works will need to be performed at night and during the 24 hour weekend period when the Airport is closed. Therefore, an assessment has been made of both day and night-time effects. Night-time working hours are likely for specific tasks between 22:00 to 06:30 week days and Saturday night/Sunday morning.
- 10.145 Table 6.1 in Chapter 6 of the ES indicates the indicative plant and equipment to be used during the construction operations. These will include mobile cranes, floating craft with cranes and lifting booms. It is not envisaged that tower cranes will be used because these would breach the 'transitional surfaces' of the Airport. The height of mobile cranes will vary according to the task they perform, but are not envisaged to be taller than 30m.



- 10.146 Temporary floodlighting to landside areas, the airfield, contractors compound, storage areas and other working areas will be provided to ensure safe working at night. This lighting will be designed so as not to interfere with aircraft navigation or create excessive light spill to surrounding areas. However, the potential impacts of temporary construction lighting have been considered within the night-time visual and townscape assessment, presented in Appendix 10.1 of this ES.

#### *Operational Phase*

- 10.147 The length of the visible open water of KGV Dock will be shortened by approximately 120m, as a result of the narrow (approx 50m wide) western end being fully covered over to provide the deck for the Eastern Terminal Extension. The visible width of water within most of the remaining dock will also be reduced and the area of open water will be visually fragmented with the retained, narrower western end visually separated by the proposed RVP pontoon. The existing width of KGV Dock in the area proposed for the new East Pier, aircraft stands and taxilane varies between approximately 150m and 200m. Therefore, with a maximum 115m width being covered over by the new deck, this will leave a relatively narrow width of open water to the west of the proposed pontoon, varying between 35m and 55m wide. To the east of the pontoon, the reduction in width of open water, by a maximum of 45m, will be significantly less leaving a minimum width of 126m.
- 10.148 Many of the proposed buildings, including the 5-6 storey proposed Hotel, the Eastern Terminal Extension and the East Pier will be higher than existing structures at the Airport. However, tall buildings are characteristic of the area and the proposed buildings will be of relatively modest height compared to numerous other structures within the study area, as described in the baseline sections of this chapter. These include numerous apartment blocks of 7 to 9 storeys, the nearby Tate and Lyle factory and other residential tower blocks up to 18 storeys high. Other very tall buildings outside the study area, such as those at Canary Wharf, are also prominent visual features on the skyline.
- 10.149 Other features of the proposed CADP which have been taken into account in the visual assessment include: the proposed decked car parking, surface parking, taxi feeder and car rental areas to the east; the new Forecourt; aircraft utilising the new taxiway and aircraft stands; and, night-time effects arising from lighting of the new buildings and outside spaces, including the aircraft stands, car parks and Forecourt area.

#### Visual Impact Assessment

- 10.150 The predicted magnitude of daytime and night-time visual effects on receptors in the vicinity of each of the 12 representative viewpoints have been assessed for both the construction and operational phases in accordance with the criteria set out in Table 10.2. The significance of such effects has then been determined in accordance with Tables 10.5 and 10.6. The locations of viewpoints are indicated on Figures 10.3 and 10.4, presented at the end of this chapter.
- 10.151 The different types of receptor that each viewpoint represents is described in Appendix 10.1 (Table 1 for the construction phase and Table 3 for the operational phase). In these tables the highest significance of effect for each type of receptor has been indicated. This should not be interpreted as being representative of the general level of effect for all such receptors in the

vicinity of these viewpoints, which will invariably be lower than the worst case indicated. For example, some residential receptors have been identified as experiencing “Moderate to Substantial Adverse” effects. However most residential receptors located in the ZTV in the vicinity of a particular receptor location are likely to experience smaller changes in the view and, accordingly, the significance of effects for these receptors would be less adverse.

10.152 The change in the views at the representative viewpoints arising from the proposed CADP and the assessed effects for each viewpoint during the operational and construction phases are summarised in Table 10.10 below. A full assessment of the likely visual effects is contained in Appendix 10.1, tables 1 and 3.

**Table 10.10 Overview of Likely Visual Effects in Construction and Operational Phases**

Viewpoint (VP)	Receptor (Sensitivity)	Significance of Effects			
		Construction Phase		Operational Phase	
		Day-time	Night-time	Day-time	Night-time
1 Connaught Bridge	Hotel residents (Medium)	Minor Adverse	Negligible to Minor Adverse	Minor Adverse	Negligible to Minor Adverse
	Travellers on bridge (Low)	Negligible to Minor Adverse	Negligible	Negligible to Minor Adverse	Negligible
2 Royals Business Park	Pedestrians on dockside (High)	Minor to Moderate Adverse	Minor to Moderate Adverse	Minor to Moderate Adverse	Minor to Moderate Adverse
	Travellers on DLR and active recreational users of Regatta Centre (Medium)	Minor Adverse	Minor Adverse	Minor Adverse	Minor Adverse
	Workers in office building and travellers on Royal Albert Way (Low)	Negligible to Minor Adverse	Negligible to Minor Adverse	Negligible to Minor Adverse	Negligible to Minor Adverse
3 UEL/ Capital Ring	Pedestrians/other dock users (High)	Moderate to Substantial Adverse	Moderate to Substantial Adverse	Moderate to Substantial Adverse	Moderate to Substantial Adverse
	Students/staff working indoors and travellers on Royal Albert Way (Low)	Minor Adverse	Minor Adverse	Minor Adverse	Minor Adverse
4 UEL Halls of Residence/ Capital Ring	Pedestrians/other dock users and residents at university halls (High)	Minor to Moderate Adverse	Minor to Moderate Adverse	Minor to Moderate Adverse	Minor to Moderate Adverse
5 Sir Steve Redgrave Bridge Woolwich Manor Way (A117)	Residents of Royal Quay (High)	Minor to Moderate Adverse	Minor to Moderate Adverse	Minor to Moderate Adverse	Minor to Moderate Adverse
	Pedestrians/travellers on bridge (Medium)	Minor Adverse	Minor Adverse	Minor Adverse	Minor Adverse
6 Gallions Point Lock	Pedestrians using long distance path (High)	Minor Adverse	Negligible	Minor Adverse	Negligible
7 East End George V Dock on Woolwich Manor Way	Residents at Gallions Point (High)	Minor to Moderate Adverse	Minor to Moderate Adverse	Minor to Moderate Adverse	Minor to Moderate Adverse
	Travellers on Woolwich Manor Way events users of Tereza Joanna boat and outdoor workers (Medium)	Moderate Adverse	Moderate Adverse	Moderate Adverse	Moderate Adverse
8 Airport car park	Users of car park (Low)	Moderate Adverse	Moderate Adverse	Minor Adverse	Minor Adverse

Viewpoint (VP)	Receptor (Sensitivity)	Significance of Effects			
		Construction Phase		Operational Phase	
		Day-time	Night-time	Day-time	Night-time
9 Kennard Street, Silvertown	Residents in Kennard and Newland Street (High)	Substantial Adverse (limited number of 2 <sup>nd</sup> and 3 <sup>rd</sup> floor residents of apartments at corner Kennard Street / Newland Street and 2 <sup>nd</sup> floor apartments further west in Newland Street)  Moderate to Substantial Adverse (2 <sup>nd</sup> floor residents in Newland Street apartments, to east of Kennard Street)  Minor to Moderate Adverse (other residents)	Moderate to Substantial Adverse (limited number of 2 <sup>nd</sup> and 3 <sup>rd</sup> floor residents of apartments at corner Kennard Street / Newland Street and 2 <sup>nd</sup> floor apartments further west in Newland Street )  Minor to Moderate Adverse (other residents in vicinity)	Moderate to Substantial Adverse (limited number of 2 <sup>nd</sup> and 3 <sup>rd</sup> floor residents of apartments in Newland St and at corner Kennard Street and Newland Street)  Minor to Moderate Adverse (other residents in vicinity)	Moderate to Substantial Adverse (limited number of 2 <sup>nd</sup> and 3 <sup>rd</sup> floor residents of apartments in Newland St and at corner Kennard Street and Newland Street)  Minor to Moderate Adverse (other residents in vicinity)
	Users of local roads (Medium)	Minor Adverse	Minor Adverse	Minor Adverse	Minor Adverse
10 Newland Street, Silvertown	Residents (High)	Moderate to Substantial Adverse (residents of 2 <sup>nd</sup> floor flats at 'The Park' in Newland Street)  Minor to Moderate Adverse (other residents)	Minor to Moderate Adverse (residents of 2 <sup>nd</sup> floor flats at 'The Park' in Newland Street )  Minor Adverse (other residents)	Minor to Moderate Adverse (residents)	Minor to Moderate to Adverse (residents with northerly views from 2nd floor windows at 'The Park' Newland Street)  Minor Adverse (other residents)
	Users of local roads and DLR (Medium)	Moderate Adverse (users elevated sections DLR)  Minor Adverse (users of local roads)	Minor Adverse (users elevated sections DLR)  Negligible to Minor Adverse (users of local roads)	Moderate Adverse (users elevated sections DLR)  Negligible to Minor Adverse (users of local roads)	Minor Adverse (users elevated sections DLR)  Negligible to Minor Adverse (users of local roads)
11 Royal Arsenal/ Thames Path	Recreational users of path and open space (High)	Minor Adverse	Negligible	Negligible	Negligible
12 Thamesmead	Recreational users of path and local residents (High)	Negligible	Negligible	Negligible	Negligible

### *Summary of Construction Phase Visual Effects*

- 10.153 Construction phase visual effects would be of a temporary nature covering the duration of the envisaged 7 year construction period, whereas operational phase visual effects would be of a long term nature and would last until the proposed CADP was decommissioned and demolished at some time in future.
- 10.154 During the construction phase, the effects on views would generally be slightly greater than during the operational phase due to the direct effects of ongoing disturbance to landscape features within the Application Site and indirect visual effects arising from demolition and construction activities and views of stored materials and plant, such as cranes. These would potentially be seen in addition to the visual effect of the new structures as they are being constructed, which at the later stages of construction will appear at least as prominently in the landscape as the finished structure. However, the predicted construction phase effects at eight of the representative viewpoints have been assessed as having the same significance as during the operational phase because the additional visual intrusion resulting from the works is not considered sufficiently great to increase the effect by a complete level of magnitude. The effects arising from the completed new structures are described under operational phase visual effects below.
- 10.155 Three of the four representative viewpoints where some increase in adverse effects has been identified during the construction phase, are located very close to the Application Site boundary, and in one case (Viewpoint 8), located within the Site itself. These increases in effects would arise primarily from close proximity to demolition or construction operations and disturbed ground, and from increased visibility of visual detractors such as scaffolding and mobile cranes. At the fourth representative viewpoint, located on the opposite side of the Thames at the Royal Arsenal, a Minor Adverse visual daytime effect was identified rather than the Negligible effect identified in the operational phase. This is due to the marginally greater increased visual intrusion arising from demolition of City Aviation House, views of upper parts of structures under construction with clutter such as scaffolding and intermittent views of mobile cranes.
- 10.156 Substantial Adverse effects were identified at a very small number of dwellings in the vicinity of viewpoint 9 on the north side of Silvertown. The visual receptors affected are located on the 2<sup>nd</sup> and or 3<sup>rd</sup> floors of an apartment block at the junction of Newland and Kennard Streets and from the 2<sup>nd</sup> floor of an apartment block further west on Newland Street. These apartments have upper floor, north facing windows with views over the intervening DLR wall, directly to construction works on the proposed Hotel, Eastern Terminal Extension and East Pier. Existing, fairly extensive, northerly views from these apartments would also be obscured as the new buildings rise from the ground.
- 10.157 A few other 2<sup>nd</sup> floor residential properties east of Viewpoint 9 in Newland Street, and in the vicinity of Viewpoint 10 on Newland Street would also experience Moderate to Substantial Adverse day and night-time effects during the construction phase due to the proximity of demolition works on City Aviation House and the works on the new Hotel under construction.

Also there would be some obscuring of open views over the open docks as the new Eastern Terminal Extension and East Pier are erected.

- 10.158 These visual effects are regarded as likely significant. The small number of residential properties experiencing likely significant visual effects in the construction phase are all located within 100m of the Application Site and represent a very small proportion of the residential properties within the Silvertown area to the south of the airport. Most residential receptors in Silvertown would not experience any adverse effect and no residential properties in any other part of the study area would experience likely significant visual effects. In fact the only other visual receptor identified as experiencing a likely significant visual effect during the construction phase would be pedestrians and other recreational users of the dockside on the north side of Royal Albert Dock, where construction operations, particularly those on the East Pier, would be clearly visible across the open water of this dock.

#### *Operational Phase Visual Effects*

- 10.159 Of the twelve representative viewpoints chosen as the basis of the visual impact assessment, some receptors at two of the viewpoints, (Viewpoints 3, and 9) would experience Moderate to Substantial Adverse effects during the operational phase. These visual effects are regarded as likely significant effects.
- 10.160 Once constructed, the proposed CADP's likely significant effects on views from north facing windows of 2<sup>nd</sup> and or 3<sup>rd</sup> floor dwellings in the vicinity of Viewpoint 9 would reduce in the day-time from Substantial Adverse in the construction phase to Moderate to Substantial Adverse. This is because the completed new buildings would provide a more attractive outlook, however from this small number of dwellings the proposed buildings would still largely obscure the previously open views over the docks to Beckton. Some of the northerly views from 2nd floor windows of "The Park" near Viewpoint 10, would be slightly enhanced compared to the existing situation, as the removal of City Aviation House would result in a slightly more open view.
- 10.161 Other residential properties within Silvertown, in the vicinity of Viewpoints 9 and 10 would experience at worst Minor to Moderate Adverse effects in the operational phase, arising largely from the completed Hotel and East Pier buildings which would be visible above the DLR boundary wall.
- 10.162 Moderate to Substantial Adverse visual effects are regarded as likely significant effects. The few residential properties predicted to experience significant visual effects are all within 100m of the Application Site boundary and are located in Silvertown as represented by Viewpoint 9. This viewpoints is representative of some private dwellings located close to the Airport, on the north side of Silvertown, a very small number of which are apartments at 2<sup>nd</sup> and 3<sup>rd</sup> floor level, where upper floor windows currently have northerly views over the Airport car park and docks to Beckton. These views would either be wholly or partially obscured by the proposed Eastern Terminal Extension, East Pier, noise barrier or Hotel, depending on elevation and precise location of the window.
- 10.163 Only a very small proportion of the dwellings in Silvertown as a whole would experience significant adverse effects. Most dwellings are screened by intervening buildings and the



boundary wall of the elevated DLR, and even where there is no such screen, the majority of dwellings are orientated with windows facing east or west rather than towards the proposed CADP in the north. As a consequence, the vast majority of dwellings in Silvertown and all other properties elsewhere in the study area, would experience Negligible or Minor to Moderate Adverse effects at worst.

- 10.164 Receptors in the vicinity of one other viewpoint has been assessed as experiencing a Moderate to Substantial Adverse effect. This is located in a dockside area used by pedestrians and other recreational users, on the north side of Royal Albert Dock, directly opposite the proposed CADP. It is not anticipated that significant visual effects would be experienced from any other publicly accessible location beyond the general area of this viewpoint.
- 10.165 Within the docks area, the most sensitive visual receptors are residents and recreational users of paths and open spaces. These are located on the north and north-east side of Royal Albert Dock and the eastern side of KGV Dock. From these locations, open dockland water would continue to dominate the foreground view and extended long views down the docks would be retained.
- 10.166 Most visual receptors within the ZTV would not experience significant adverse effects due to the distance from the proposed CADP, the fact that views would be largely obscured by intervening structures and vegetation, or because the angle of view would be very oblique so that the proposed CADP would form a minor part of the view. Effects no higher than Minor to Moderate Adverse and Minor Adverse have been identified at eight of the Viewpoints as well as for less sensitive receptors represented by the four other viewpoint locations where highly sensitive receptors would experience higher significance of adverse daytime effects.
- 10.167 Other less sensitive receptors such as users of the elevated sections of the DLR, travellers on Woolwich Manor Way and local roads, would also not experience significant adverse effects. However, some of these receptors are predicted to experience a Moderate Adverse effect on views where the proposed new CADP structures and reduction in open water at KGV Dock would be apparent.
- 10.168 At 2 receptors located within the vicinity of Viewpoints 11 and 12, on the south side of the river, between 1 and 1.5km from the Application Site, Negligible daytime effects were identified due to the relatively low height of the proposed new structures within the existing built up area, thereby being imperceptible or barely perceptible at such a distance.
- 10.169 The significance of night-time effects has been found to be similar or slightly less than the day-time effects. Where the effects are less than daytime effects this is because intervening sources of light such as on major roads would dominate the foreground view such that the effects from the more distant aircraft stand and other proposed lighting would be negligible in this urban area.

### *Summary*

- 10.170 In summary, within 500m of the Application Site, likely significant visual effects from the proposed CADP have been identified from publicly accessible locations on the north side of Royal Albert Dock. Also, a small number of apartments, within 100m of the Application Site,

with north facing 2nd or 3<sup>rd</sup> floor windows, in Silvertown to the south of the airport, would experience likely significant adverse effects. However, these receptors represent a very small proportion of the total number of dwellings in Silvertown, the majority of which would experience effects ranging between Negligible and Minor to Moderate Adverse and no dwellings in any other part of the study area would experience any likely significant adverse effect.

- 10.171 No significant visual effects have been identified beyond 500m of the Application Site and no significant visual effects were identified on the long distance east to west, open views experienced down the Docks from publicly accessible locations in the vicinity of Woolwich Manor Way and Connaught Bridge.

#### Townscape Assessment

- 10.172 The sensitivity to change of each Character Area (CA) from the type of development represented by the proposed CADP has been evaluated in accordance with Table 10.3 and the predicted daytime and night-time magnitude of effects on each of the 10 character areas have been assessed in accordance with the criteria in Table 10.4. The significance of effect on townscape character has then been determined in accordance with Tables 10.5 and 10.7. The locations of CAs are indicated on Figure 10.5 at the end of this chapter.

- 10.173 The assessment of effects on townscape character has taken into account the direct changes to landscape features within the Application Site arising from the proposals, such as the removal of existing buildings and vegetation, covering of open water in KGV Dock and erection of new structures. The assessment has also taken into account less direct, visual effects on the character of each CA arising from any changes to views from the CA.

#### *Summary of Townscape Effects*

- 10.174 The change in inherent character of the ten CAs within the study area arising from the CADP during the construction and operational phases are indicated in Appendix 10.1 (Tables 2 and 4) and summarised in Table 10.11 below.

**Table 10.11 Overview of Likely Effects on Townscape Character**

Townscape Character Area	Significance of Effects			
	Construction Phase		Operational Phase	
	Day-time	Night-time	Day-time	Night-time
1 Silvertown Mixed Residential	Minor Adverse	Negligible to Minor Adverse	Negligible to Minor Adverse	Negligible to Minor Adverse
2 Silvertown Low Rise Residential	Minor Adverse	Negligible to Minor Adverse	Negligible to Minor Adverse	Negligible to Minor Adverse
3 Silvertown Industrial	Negligible	Negligible	Negligible	Negligible
4 Royal Docks	Moderate Adverse	Minor Adverse	Moderate Adverse	Minor Adverse
5 Beckton Residential	Negligible	Negligible	Negligible	Negligible
6 Beckton Commercial/Industrial	Negligible	Negligible	Negligible	Negligible
7 River Thames	Negligible to Minor Adverse	Negligible to Minor Adverse	Negligible	Negligible to Minor Adverse
8 Thamesmead	Negligible	Negligible	Negligible	Negligible
9 Royal Arsenal	Negligible	Negligible	Negligible	Negligible
10 Woolwich Residential	Negligible	Negligible	Negligible	Negligible

- 10.175 Six of the 10 CAs (Nos. 3, 5,6,8,9,10) in the study area would experience Negligible daytime and night-time effects and a further CA (No.7) would experience Negligible to Minor Adverse effects at night-time and Negligible or Negligible to Minor Adverse effects in the day during both the construction and operational phases. These CAs are generally located in areas that are entirely or almost entirely screened from the proposed CADP by intervening structures and vegetation, or are at such a distance that any visual effects associated with the proposed CADP would either be insufficient to alter the inherent townscape character or would only have a negligible magnitude of effect on character.
- 10.176 Two CAs (Nos. 1 and 2), both residential areas at Silvertown, would experience Minor Adverse daytime construction phase effects and Negligible to Minor Adverse effects in the operational phase and at night-time in the construction phase, as a result of indirect visual impacts, which it is considered would have an effect on the perceived character of these areas. From ground level, the effects on views would arise from visibility of the proposed taller buildings such as the Eastern Terminal Extension, East Pier and the proposed Hotel. However, from some upper floor windows, the existing views of the open water of KGV Dock would also be adversely affected and from a very few of these windows, existing views across the Royal Docks to the north side of Royal Albert Dock would be obscured by new intervening buildings. Conversely, for a few receptors in this area the view would be opened up slightly as a result of the removal of City Aviation House. The additional visual intrusion of mobile cranes and clutter associated with the construction operations accounts for the slightly higher level of adverse effect during the construction phase.
- 10.177 One CA, the River Thames (No.7), would experience Negligible daytime effects in the operational phase. However, at night-time the effects have been assessed as Negligible to Minor Adverse because of the potential for the new aircraft stand lighting to be perceptible from a few locations in this area.
- 10.178 The Royal Docks CA (No.4) would experience Moderate Adverse daytime and Minor Adverse night-time effects during both the construction and operational phases. The proposed CADP would be located within this CA and therefore it would experience permanent direct effects during the operational phase. Approximately 32% of the existing open water area of KGV Dock would be covered over resulting in a large change to this important townscape feature. However, a linear body of open water would be retained and because this Dock is the smallest of the three Royal Docks and the least visible, being located in a discrete and relatively enclosed area to the south of the Airport runway, this impact would be limited to a relatively small part of it.
- 10.179 In addition to the direct effect on the open water of KGV Dock, adverse effects during both phases would also arise from visual impacts on the Royal Docks CA (see effects on Viewpoints 1 to 8). Long, open, easterly and westerly views down the Docks would be retained from the vicinity of both Connaught Bridge and Woolwich Manor Way. The view from part of the north side of Royal Albert Dock would be shortened in part by the proposed Eastern Terminal Extension, East Pier and noise barrier. However, the view of open water would not be affected from ground level and the open character of the Docks as perceived from this area would be retained.

10.180 The Moderate Adverse effects on the character of the Royal Docks CA are not regarded as significant. Visual effects on some parts of this CA, in close proximity to the CADP, would be Moderate to Substantial Adverse and therefore sufficient to result in a localised significant visual effect. However, most of these effects have been identified from a relatively small number of private residential receptors in localised areas and the only significant visual effect identified from a publicly accessible location would be from part of the dockside on the north side of the Royal Albert Dock. This would be insufficient to result in a significant adverse effect on the inherent character of the area as a whole.

### **Cumulative and Combined Effects**

10.181 A number of committed schemes and other proposed schemes have been identified within the ZTV for consideration of their cumulative effect combined with the proposed CADP. These are consistent with the cumulative schemes set out in Chapter 3: EIA Methodology. The relevant committed schemes are:

- a) Business Park on North side of Royal Albert Dock, with permission for 150,000 M<sup>2</sup> B1 uses and up to 9290 M<sup>2</sup> supporting A1, A2, A3 and leisure uses.
- b) Royals Business Park to north side of Royal Albert Dock just west of Royal Albert Station where permission has been granted for a 5 storey hotel, which is under construction.

10.182 Other proposed development within the ZTV, for which detailed planning permission has not yet been granted are:

- a) Silvertown Quays on south side of Royal Victoria Dock with outline permission for a mixed use development including residential, retail, commercial, community, hotel and leisure uses.
- b) Royals Business Park to north side of Royal Albert Dock just west of the 5 storey hotel currently under construction, where permission has been sought for a further 204 bed, 4 storey hotel to provide two linked buildings.
- c) Royal Albert Basin on east side of Royal Albert Dock and KGV Dock, located on both sides of Woolwich Manor Way, which would consolidate existing residential development with a new local centre focused around Gallions Reach DLR Station.

#### **Business Park on North side of Albert Dock and Hotels at Royals Business Park**

10.183 These schemes will be located on vacant land between the existing UEL complex and Connaught Road and would result in further visual enclosure of Royal Albert Dock, with less potential for the proposed CADP to be seen from Royal Albert Way. Overall, it is anticipated that these schemes would enhance the views experienced within the area and would enhance the townscape character of the Royal Docks CA.

10.184 The schemes on the north side of the Royal Albert Dock would be seen cumulatively in combined views with the proposed CADP from upper floor and windows of tall buildings within the study area and sequentially at ground level from publicly accessible paths, roads, open spaces and water areas at the eastern and western ends of the Docks in the vicinity of Woolwich Manor Way and Connaught Road. The beneficial effects arising from the business park would partially offset the adverse visual and townscape effects arising from the proposed CADP. It is not therefore anticipated that in the operational phase, any cumulative effects on

views or townscape character would be more adverse than those assessed for the proposed CADP on its own.

- 10.185 If the construction phases of these schemes coincide with construction of CADP there is the potential for cumulative adverse effects on views and townscape character. However, this would be of a temporary nature.

#### Silvertown Quays

- 10.186 The Silvertown Quays development would be located on the south side of the Royal Victoria Dock, sited mostly on existing goods yards and vacant land. It is anticipated that any development of the type proposed here would improve views and would enhance the townscape character of the Royal Docks CA. This development would largely be screened from the proposed CADP by intervening buildings, Connaught Bridge and the elevated DLR. However, there is the potential for glimpses of the proposed East Pier and noise barrier, which would be seen below the deck of Connaught Bridge from a few ground level locations within the Silvertown Quays site.

- 10.187 The Silvertown Quay development would not be visible in combination with the proposed CADP from other ground level locations. However, some combined views would be gained from elevated windows of tall buildings within the vicinity of the Docks. The beneficial effects arising from Silvertown Quays would partially offset the adverse visual and townscape effects arising from the proposed CADP. Therefore, once the developments are complete, it is not anticipated any cumulative effects on views or townscape character would be more adverse than those assessed for the proposed CADP on its own.

- 10.188 If the construction phase of this scheme overlaps with construction of the CADP there is the potential for cumulative adverse effects on views and townscape character. However, this would be of a temporary nature.

#### Royal Albert Basin

- 10.189 It is anticipated that Royal Albert Basin development once completed would, on balance, enhance areas which currently comprise vacant land, goods yards or land in industrial/warehouse uses. Some existing views across vacant land to the Application Site are also likely to be screened by new structures within the Royal Albert Basin development. Therefore, cumulative visual effects from publicly accessible locations are likely to be less than with the proposed CADP on its own during the operational phase.

- 10.190 The development would be seen in combination with the proposed CADP sequentially, from various ground level locations on the north side of Royal Albert Dock. In-combination views would be also gained from elevated windows of tall buildings on the west, north and east side of the Docks. These beneficial visual effects would partially offset the adverse visual effects arising from the proposed CADP. Therefore, it is anticipated that any cumulative effects on views from these locations would be no more adverse than those assessed for the proposed CADP on its own.



- 10.191 Overall, the effects arising from the Royal Albert Basin are likely to have a beneficial effect on townscape character and accordingly combined effects with the proposed CADP would be no more adverse than those assessed for the CADP on its own.
- 10.192 If the construction phase of this scheme coincides with construction of CADP, there is the potential for cumulative adverse effects on views and townscape character. However, such effects would be of a temporary nature.

### **Further Mitigation**

#### Construction Phase

- 10.193 A temporary 3m high noise barrier is proposed adjacent to the boundary fence adjoining Woodman Street in the residential area of Silvertown and the above assessment has taken into account the fact that this would reduce ground level visual intrusion into this residential area. It is recommended that additional temporary visual screening should also be considered on the southern Site boundary, further west in the Newland Street / Drew Road / Leonard Street area, in order to screen construction works to the Terminal building and Forecourt area from this residential area and Drew Primary School.
- 10.194 Many views of the construction works will be experienced from upper floor windows of apartment buildings and from elevated locations such as the deck of Sir Steve Redgrave Bridge. As such, it will not be possible to provide an effective visual screen from such locations.

#### Operational Phase

- 10.195 Mitigation of townscape and visual effects frequently involves planting which can screen or soften the appearance of a development. However, whilst the aims of the proposed CADP landscape scheme are to provide visual diversity and a 'softening' of both the built form and hard surface treatment, this has been designed to observe the operational constraints of the airfield and to discourage birds which might present a risk of bird strike to aircraft.
- 10.196 The planting strategy for the proposed CADP (as described in the DAS) confirms that in the parking layouts there will be a minimum of 5% planting with shrubs and low hedges and small areas of planting at the end of parking rows. This planting will provide the benefit of some localised screening of the parking areas and other structures. Larger specimen trees, whilst offering the potential benefit of better visual screening, could attract nesting birds and, moreover, are considered an alien feature in the historic dockside environment.
- 10.197 Because of the need to preserve adequate security surveillance, lighting and CCTV in the car parks, denser planting is not feasible or appropriate in this case. Some cube-headed Hornbeam trees will be planted to the south of the Terminal and within the proposed Forecourt – this species has been chosen to discourage nesting and roosting birds and to allow a clear gap between the ground cover planting and the underside of the tree crown, thereby allowing clear views across the Forecourt to assist with way-finding and to meet counter-terrorism requirements

## **Residual Effects**

- 10.198 Any additional screen fencing during the construction phase would help mitigate adverse visual effects experienced by ground level receptors located near to the Airport in the north-western part of Silvertown. However this is unlikely to be sufficient to alter the magnitude of visual effects identified above and the residual effects upon views and townscape in the construction phase would be the same as those described previously.
- 10.199 The proposed landscaping outlined above is unlikely to be able to fully mitigate or reduce the levels of adverse townscape or visual effects identified in this assessment. Accordingly, the residual effects upon views and townscape in the operational phase would be the same as those described previously.

## **Conclusions and Recommendations**

- 10.200 The Townscape and Visual Impact Assessment presented in this chapter and its corresponding appendices (Appendix 10.1 and 10.2) indicate that the proposed CADP will give rise to some likely significant effects on views during both the construction and operational phases. However, negative impacts will be restricted to only a few local views of the Airport. No likely significant effects on townscape character have been identified.
- 10.201 The proposed CADP is located within and adjoining KGV Dock. This Dock is enclosed to the south and south-west by elevated sections of, and boundary treatment to the DLR together with a number of existing buildings. To the west, north and east the Application Site is also enclosed by a variety of existing structures, buildings and vegetation. Accordingly, the ZTV for the proposed CADP would be relatively small, being restricted largely to the area of open Docks enclosed by Woolwich Manor Way, the DLR, Connaught Bridge and Royal Albert Way. Beyond these structures the proposed CADP would only be visible from a few localised areas at ground level and from upper floor windows of a number of buildings.
- 10.202 Of the 12 representative viewpoints chosen as the basis of the visual impact assessment, Moderate to Substantial Adverse day and night time effects were identified during the operational phase of the proposed CADP for some highly sensitive receptors represented by two viewpoints, located within 500m of the Application Site. It is not anticipated that any significant visual effects would be experienced beyond the general area of these two viewpoints. Furthermore, the highest category of visual impact (Substantial Adverse) was only identified during the short term construction phase from a small number of apartments within 100m of the Application Site and has not been identified at any publicly accessible location.
- 10.203 Just one of the two viewpoints identified as experiencing Moderate to Substantial Adverse visual effects in the operational phase is representative of receptors from a publicly accessible location at ground level. These would be pedestrians and other recreational users on the north side of Royal Albert Dock directly opposite the CADP.
- 10.204 The other representative viewpoint with receptors identified as experiencing Moderate to Substantial Adverse visual effects is located the north side of the residential area of Silvertown where are a small number of 2<sup>nd</sup> and 3<sup>rd</sup> floor apartments with north facing windows, located within 100m due south of the Application Site. These properties have existing views over the

Airport car park and water of the Docks towards Beckton. With the new structures introduced by the proposed CADP, these open views would either be wholly or partially obscured, depending on the precise location and elevation of the window. No other residential receptors have been assessed as experiencing any significant adverse visual effect during the operational phase.

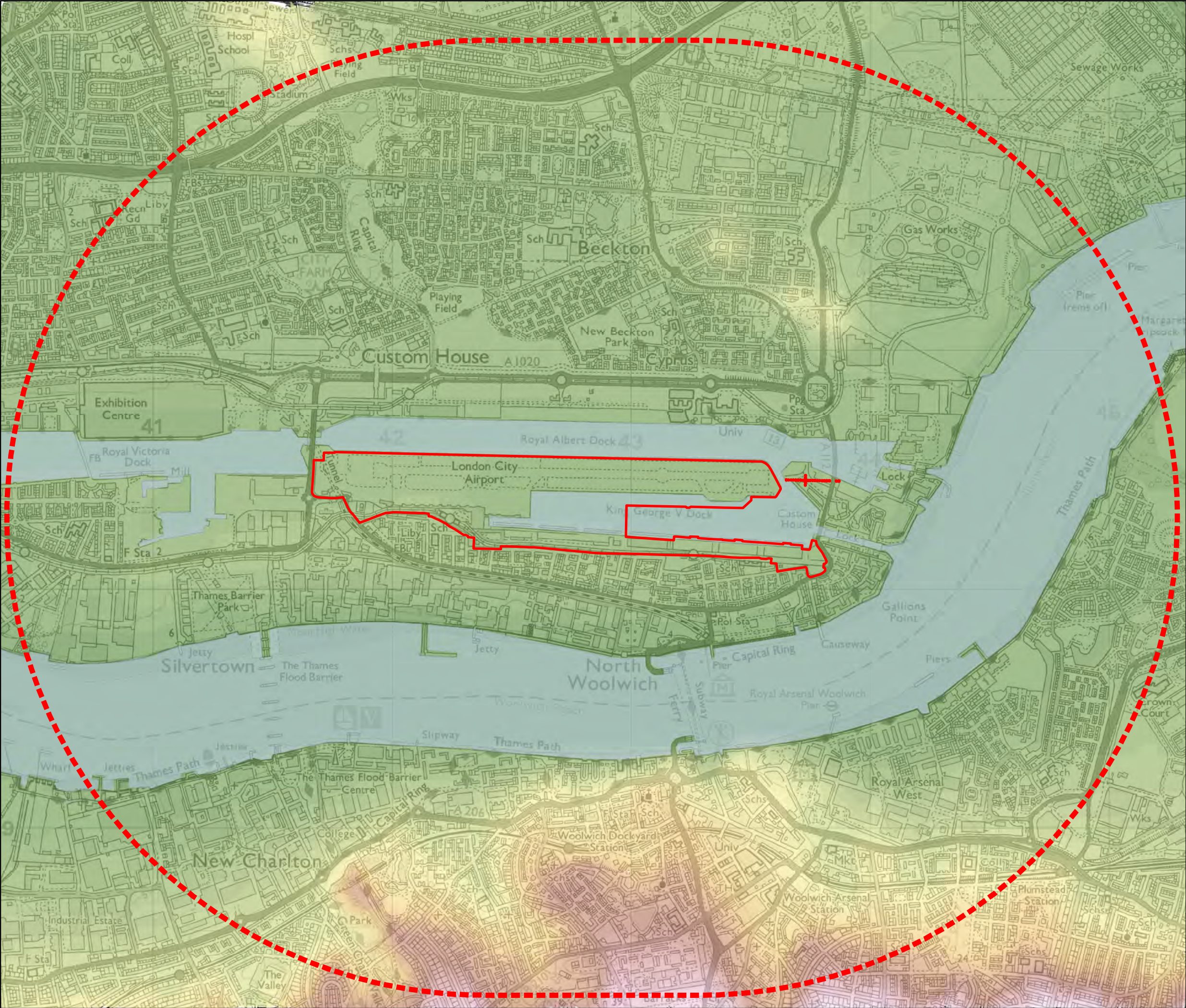
- 10.205 A few apartments with north facing views in Newland Street would experience a slight improvement in view as a result of the removal of City Aviation House which would open up the view slightly, although there would be a temporary adverse effect during the construction phase when the building is being demolished.
- 10.206 The day and night-time effects on views experienced 1km or more from the proposed CADP are considered to be Negligible and no effect greater than Minor to Moderate Adverse will be experienced at any location beyond 500m from the Application Site.
- 10.207 During the construction phase, the significance of effects was found to be the same as for the completed CADP at 8 of the 12 representative viewpoints. Some slightly more adverse effects were identified for receptors in the vicinity of the other four representative viewpoints. However, these additional effects would only be of a temporary, short term nature.
- 10.208 Many views of the construction works will be experienced from upper floor windows of apartment buildings and from elevated locations such as the deck of Sir Steve Redgrave Bridge. As such, it will not be possible to provide an effective visual screen from such locations. However screen fencing in addition to the proposed noise barrier at the south-eastern end of the site in the vicinity of Manwood Street, should be considered at certain other locations on the southern boundary of the Application Site in order to screen construction works from a school and nearby residential areas.
- 10.209 In summary, within 500m of the proposed CADP significant visual effects were identified at a publicly accessible location on the north side of Royal Albert Dock. Also, a small number of apartments with north facing, 2nd and 3<sup>rd</sup> floor windows immediately to the south of the proposed CADP would experience significant adverse visual effects. However, these properties constitute a very small proportion of the dwellings in Silvertown and no significant adverse effects to residential properties in other parts of the study area have been identified. No significant visual effects have been identified beyond 500m and, in particular, none have been identified on the long distance east to west open views experienced down the Docks from publicly accessible locations in the vicinity of Woolwich Manor Way and Connaught Bridge.
- 10.210 Ten townscape Character Areas (CAs) have been identified within the area covered by the ZTV of which only one (the Royal Docks CA) would be directly affected by the proposed CADP. Moderate Adverse daytime and Minor Adverse night-time effects on the character of this CA have been identified during both the construction and operational phases as a result of the loss of the open water area in KGV Dock, increased enclosure arising from the screening effect of the proposed buildings and other effects on views arising from the proposed structures, taxiing and parked aircraft and aircraft stand lighting. However, the linear character of the docks network will be retained.

- 10.211 Three other character areas (Nos. 1, Silvertown Mixed Residential 2, Silvertown Low Rise Residential and 7, River Thames) have been identified as experiencing Negligible to Minor Adverse effects in the operational phase and up to Minor Adverse effects in the construction phase, as a result of indirect visual effects. The other six CAs in the study area would experience Negligible effects. None of the effects on townscape character including those on the Royal Docks CA, are regarded as significant.
- 10.212 A number of committed and other proposed developments have been identified within the ZTV with the potential to result in cumulative visual and townscape effects when considered in combination with the proposed CADP. It is considered likely that these other schemes, once built out, would result in largely beneficial effects on long distance views from public areas. Therefore, in the operational phase in-combination or sequential visual effects and cumulative effects on townscape character are predicted to be no more adverse than those effects identified for the proposed CADP on its own.
- 10.213 The East Pier, Terminal Extensions and proposed Hotel will be the most visually intrusive parts of the proposed CADP and will obstruct existing open views from a few locations to the south. These buildings will also be clearly visible from dockside areas and from residential areas including areas in relative close proximity at Silvertown to the south. The appearance of these buildings will therefore be of importance to the townscape character of the Docks area and in views experienced from locations around the Docks. A high quality of design is therefore proposed, as described in the Design and Access Statement prepared by the architects Pascall + Watson.
- 10.214 During the construction phase it is recommended that additional screen fencing is provided on the southern site boundary in the Newland Street / Leonard Street area of Silvertown. This will act to screen construction works to the Terminal building and Forecourt area from adjacent residential areas.

## References

- 1 'Guidelines for Landscape and Visual Impact Assessment' 2nd Edition. Landscape Institute and Institute of Environmental Management and Assessment (2002)
2. 'Landscape Character and Assessment – Guidance for England and Scotland. The Countryside Agency and Scottish Natural Heritage (2002)
- 3 The Town and Country Planning, Environmental Impact Assessment (England and Wales) Regulations. HMSO (1999)
- 4 Countryside Character Volume 6: 'East of England.' The Countryside Agency, (1999)
- 5 'National Planning Policy Framework', Department for Communities and Local Government, (2012) TSO (The Stationery Office)
- 6 London Plan. Mayor of London, (2011)
- 7 Newham Council LDF Adopted Core Strategy (2012)
- 8 Newham Council LDF, Newham 2027. Newham Character Study: final version September 2011
- 9 Greenwich Council Unitary Development Plan 2006, Saved Policies (2009)
- 10 Greenwich Council Draft Core Strategy with Development Management Policies Submission Version (Feb 2013)
- 11 City Airport Development Programme (CADP) Lighting Impact Assessment, RPS April 2013.
- 12 SNH (2012) Assessing the cumulative impact of onshore wind energy development, Inverness: Scottish National Heritage (2012)





Legend

- Development Boundary Line
- 2km Study Area
- Water
- Levels
  - 0-1m
  - 1-2m
  - 2-3m
  - 3-4m
  - 4-5m
  - 5-6m
  - 6-7m
  - 7-8m
  - 8-9m
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  - 41-42m
  - 42-43m
  - 43-44m
  - 44-45m

A	06/13	Amended to revised proposals	SH	GT
Rev:	Date:	Amendment:	Name:	Checked:

Data Source: RPS 2013  
Status: DRAFT

RPS

Lakesbury House Hillingbury Road Chandlers Ford Hampshire SO53 5SS  
T 02380 8081440 F 02380 8081441 E rpsso@rpsgroup.com W www.rpsplc.co.uk

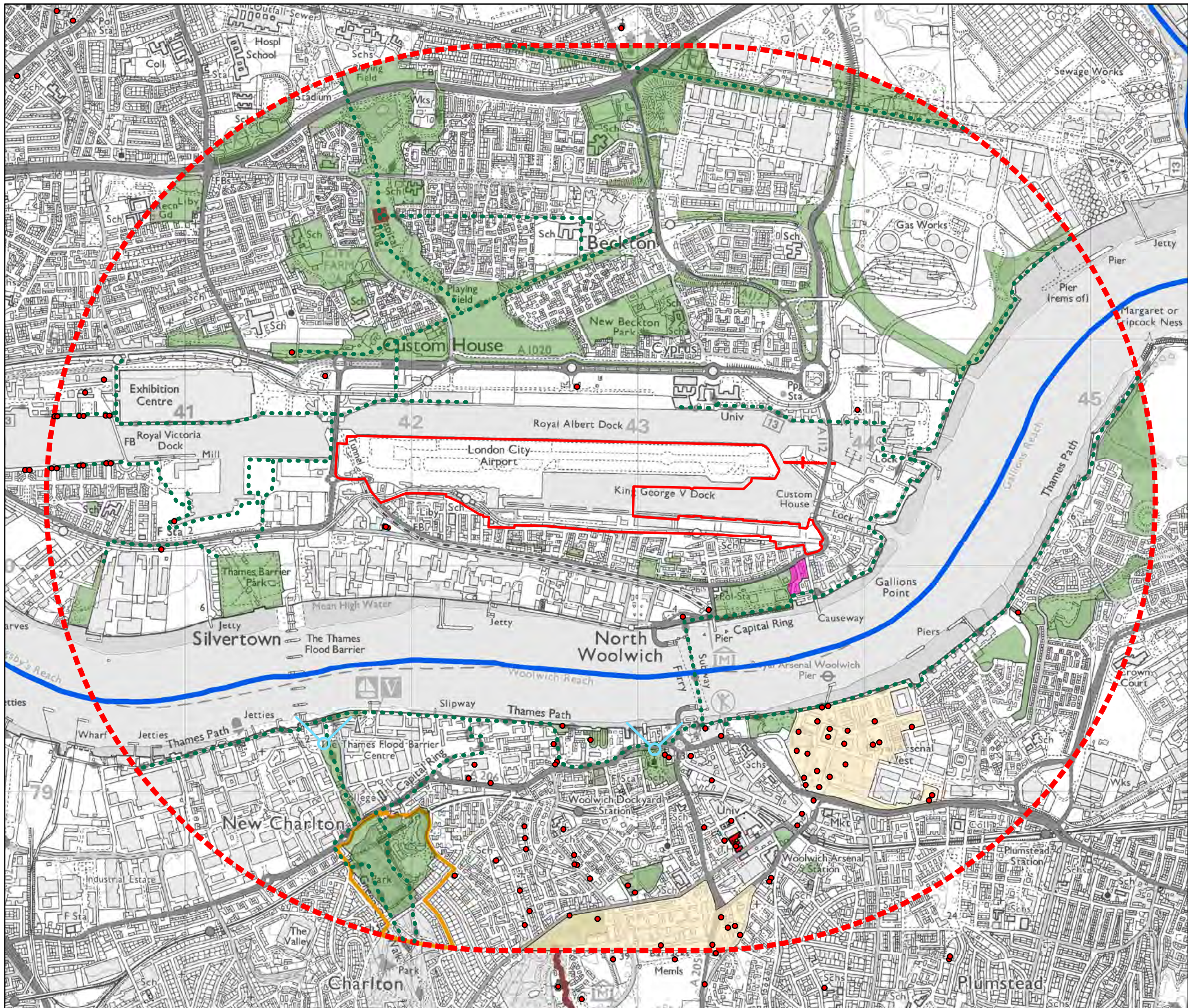
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Date: April 2013 Datum: OSGB36 Paper size: A3  
Drawn: SH Checked: GT Job Ref: SL1890

Figure No: 10.1 Revision: A





- Legend**
- 2km Study Area
  - Development Boundary Line
  - London Borough Boundary
  - Listed Buildings
  - Green Chain/Long distance path  
Capital Ring/Thames Path
  - Area of townscape value
  - Conservation Areas
  - Scheduled Ancient Monuments
  - Public Open Space
  - Area of Special Metropolitan Importance
  - Local Views

A	06/13	Amended to revised proposals	SH	GT
Rev:	Date:	Amendment:	Name:	Checked:

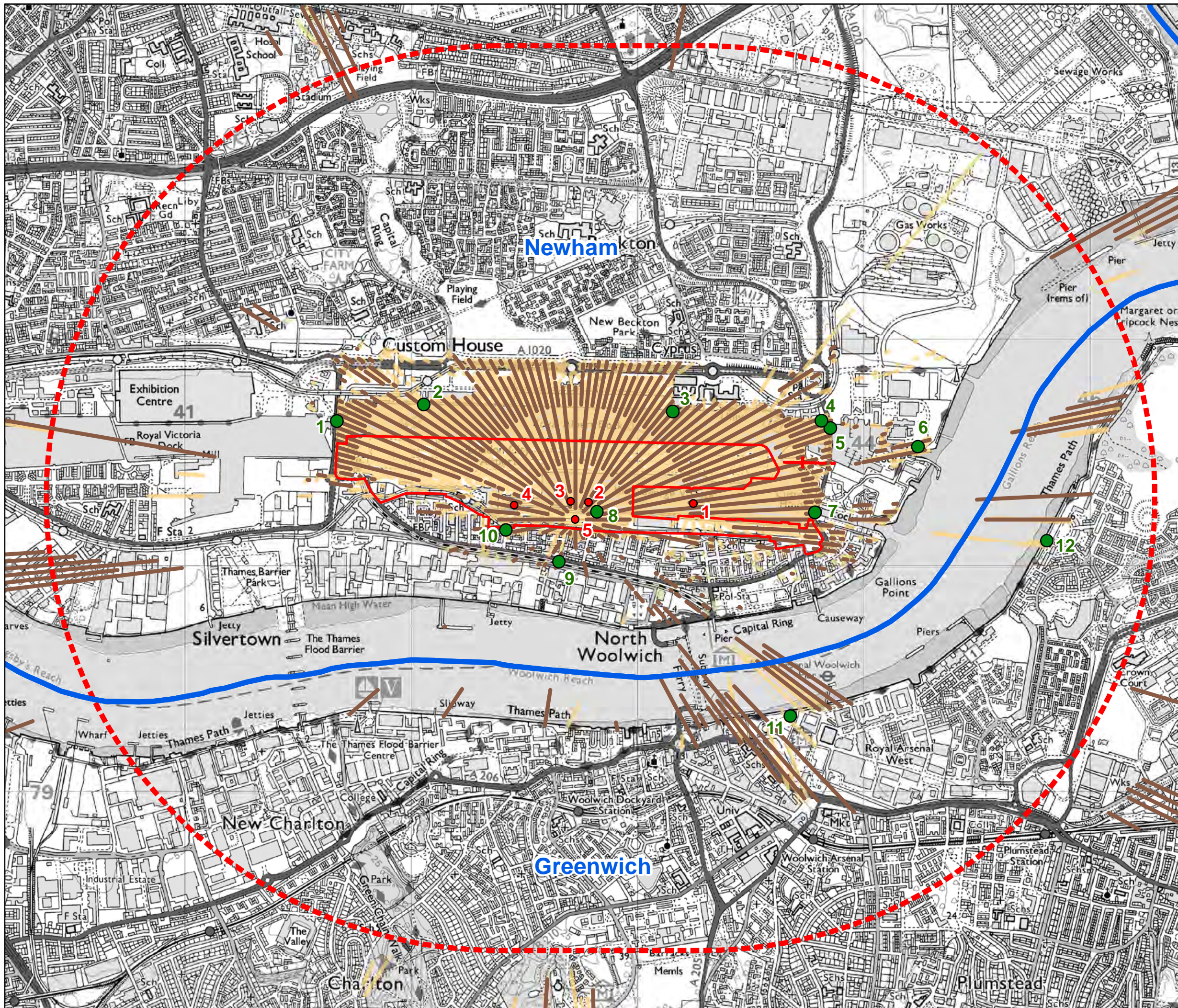
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**RPS**  
Lakesbury House Hillingbury Road Chandlers Ford Hampshire SO53 5SS  
T 02380 8081440 F 02380 8081441 E rpsso@rpsgroup.com W www.rpsplc.co.uk

Client: London City Airport  
Project: London City Airport  
Development Programme  
Title: Townscape Features/Constraints  
Scale @ A3  
Date: April 2013 Datum: OSGB36 Paper size: A3  
Drawn: SH Checked: GT Job Ref: SL1890

Figure No: 10.2 Revision: A





- Legend**
- Development Boundary Line
  - 2km Radius
  - Viewpoint Location
  - London Borough Boundary
  - Zone of Theoretical Visibility (ZTV) New Airport structures
  - Zone of Theoretical Visibility (ZTV) Proposed Hotel
  - ZTV Location Points
  - 1&2 Points on Western Pier at AOD 21.480
  - 3 Point on proposed Eastern Extension at AOD 24.07
  - 4 Point on proposed Eastern Extension at AOD 21.033
  - 5 Point on proposed Hotel at AOD 32.120

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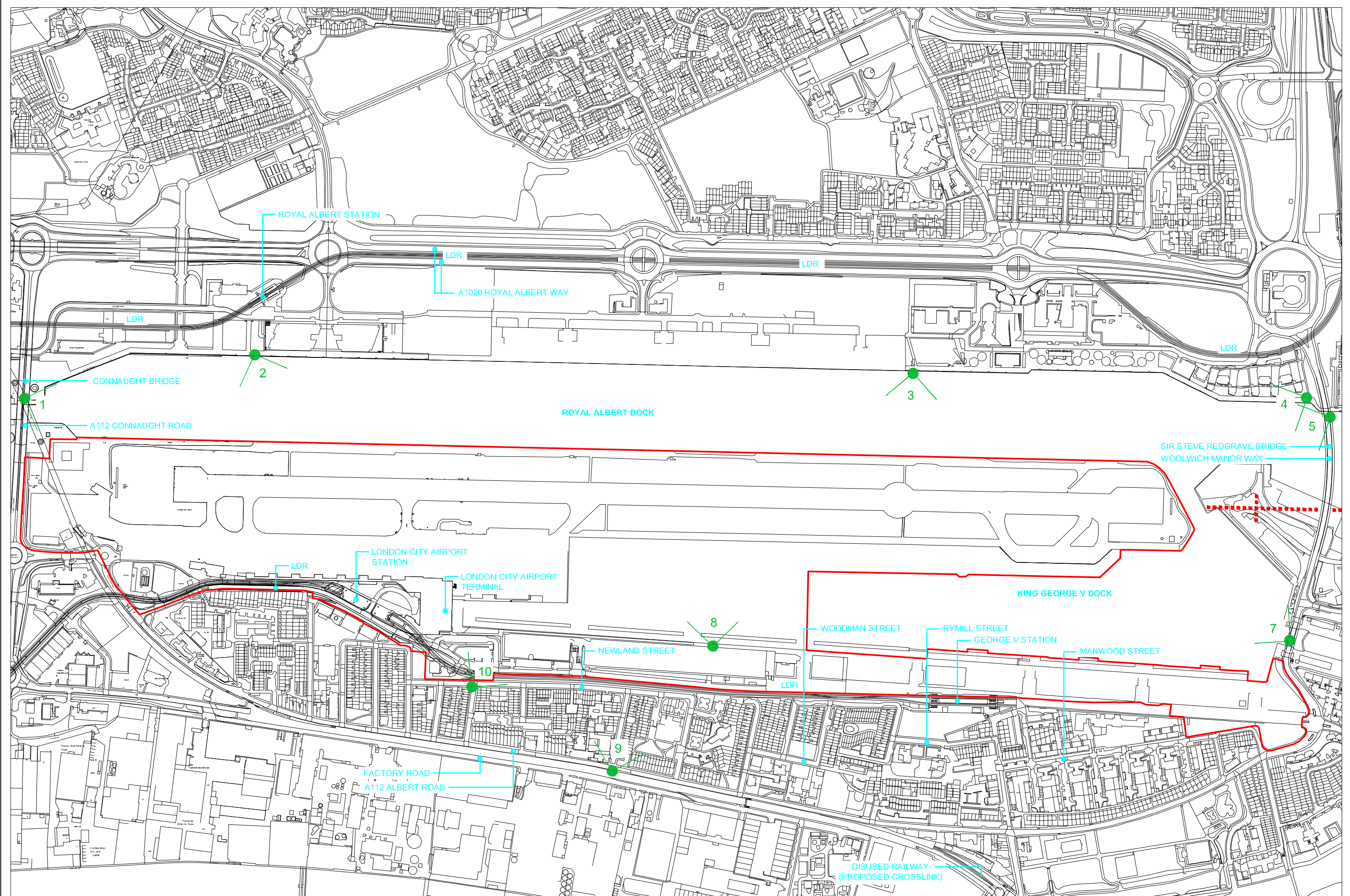
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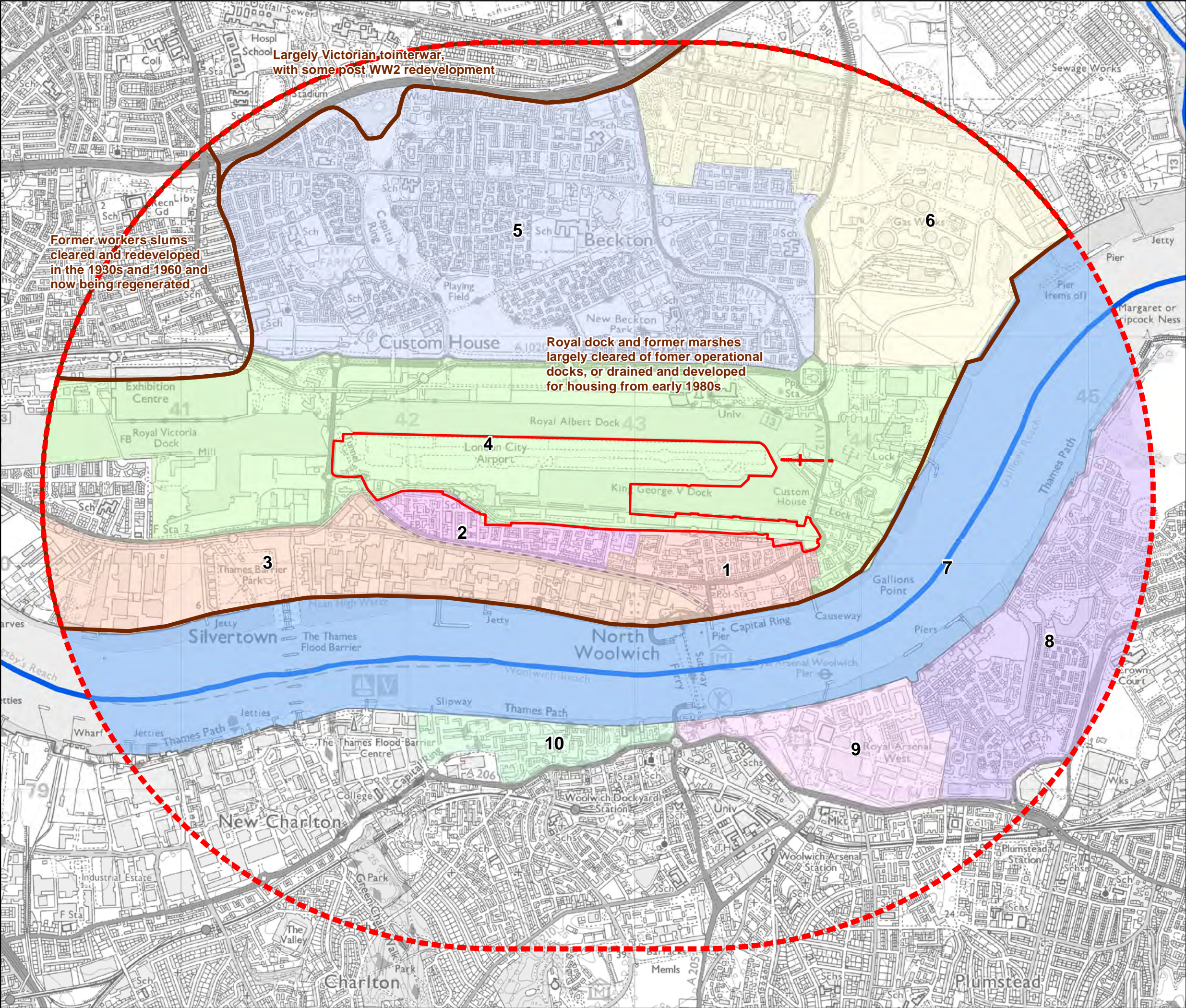
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Date: April 2013 Datum: OSGB36 Paper size: A3  
Drawn: SH Checked: GT Job Ref: SL1890

■ Figure No: 10.3 Revision: A









**Legend**

- Development Boundary Line
- 2km Study Area
- London Borough Boundary
- Newham Character Study - Newham wide Components of Character

**Townscape Character Areas**

- 1 Silvertown Mixed Residential
- 2 Silvertown Low Rise Residential
- 3 Silvertown Industrial
- 4 Royal Docks
- 5 Beckton Residential
- 6 Beckton Commercial/Industrial
- 7 River Thames
- 8 Thamesmead
- 9 Royal Arsenal
- 10 Woolwich Residential

A	06/13	Amended to revised proposals	SH	GT
Rev:	Date:	Amendment:	Name:	Checked:

Data Source: RPS 2013

Status: DRAFT

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Lakesbury House Hillingbury Road Chndlers Ford Hampshire SO53 5SS  
T 02380 8081440 F 02380 8081441 E rpsso@rpsgroup.com W www.rpsplc.co.uk

Client: London City Airport

Project: London City Airport Development Programme

Title: Character Areas

Scale @ A3

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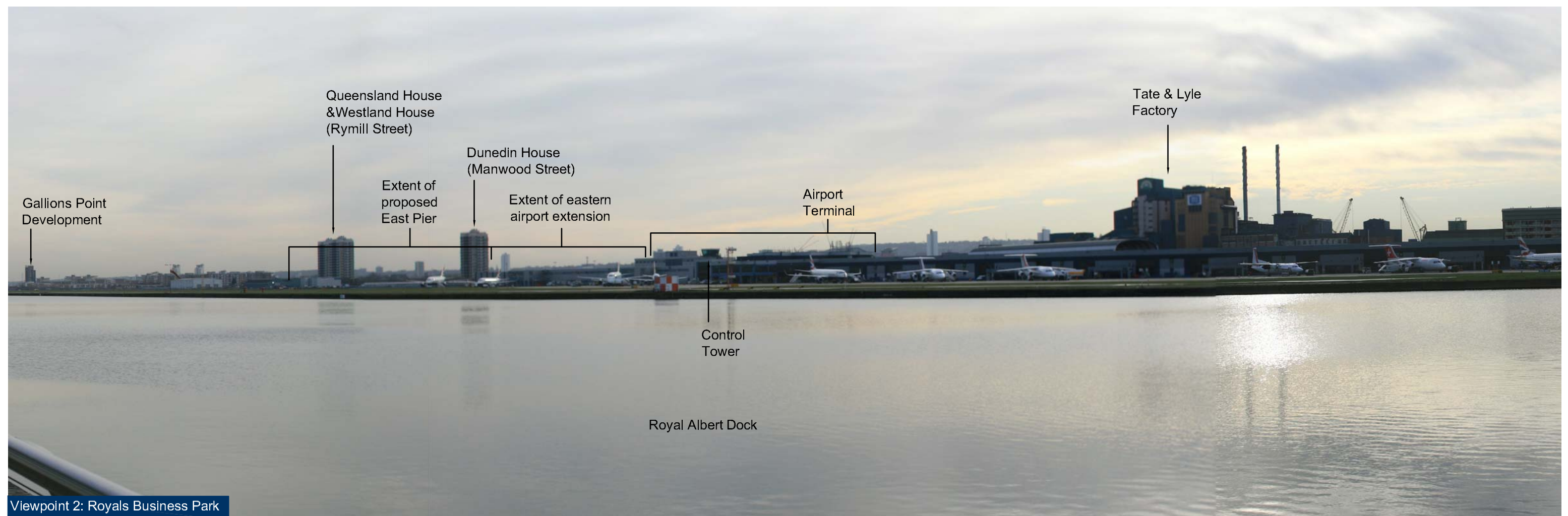
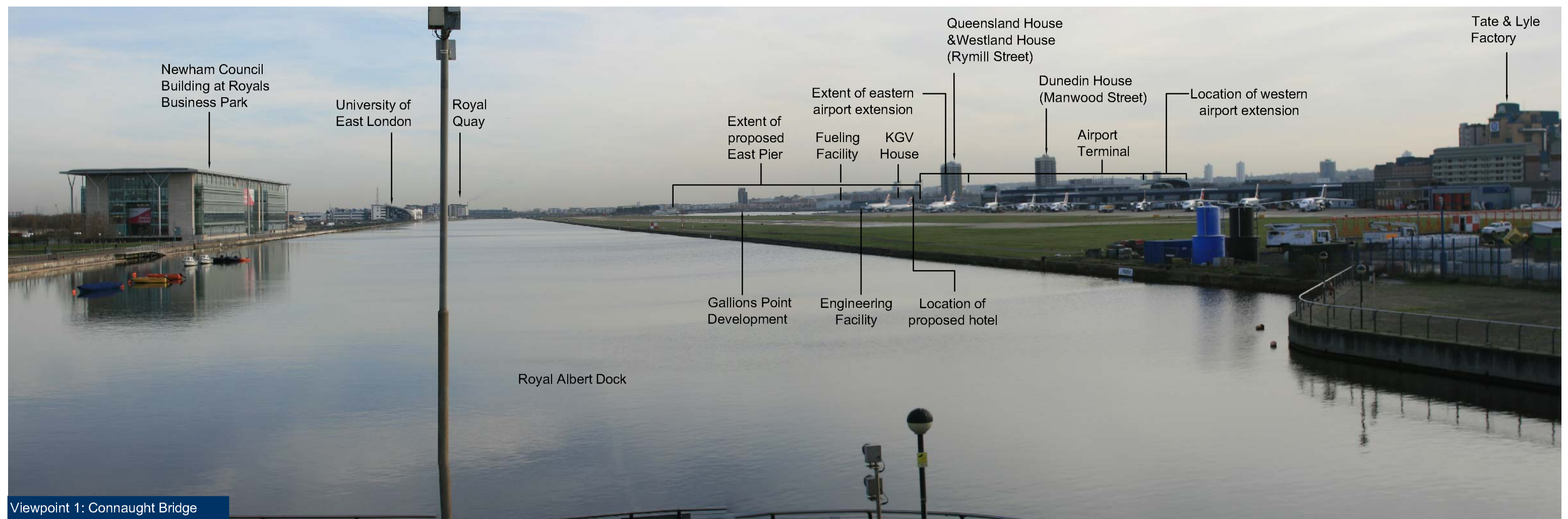
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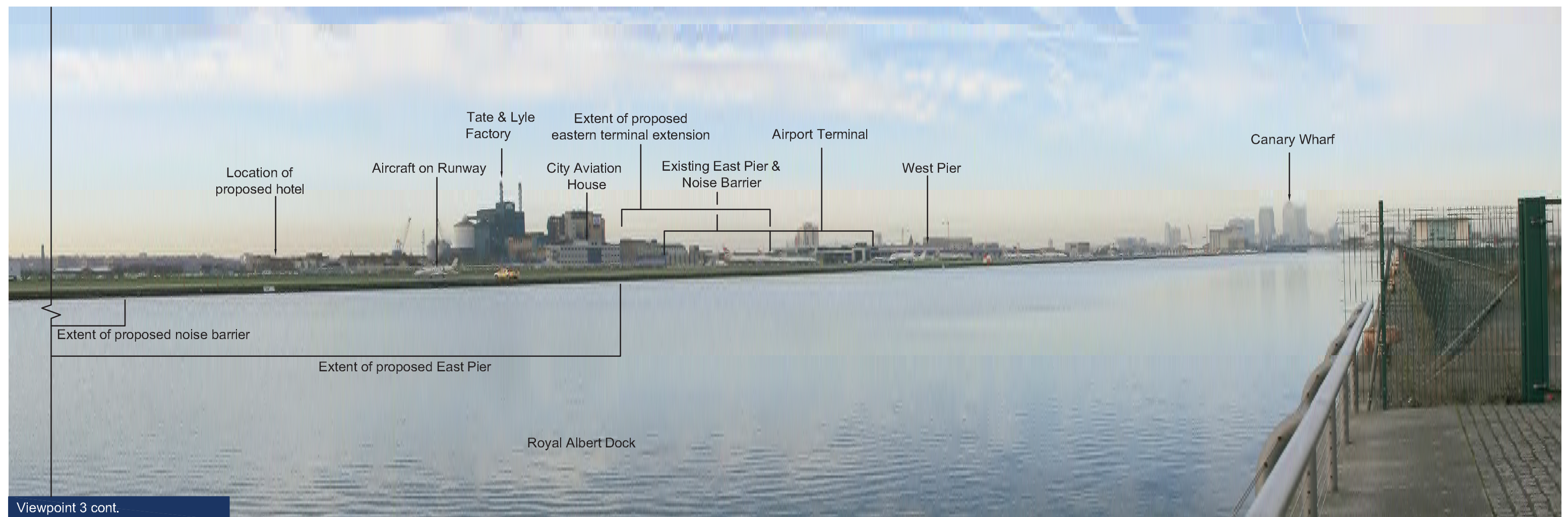
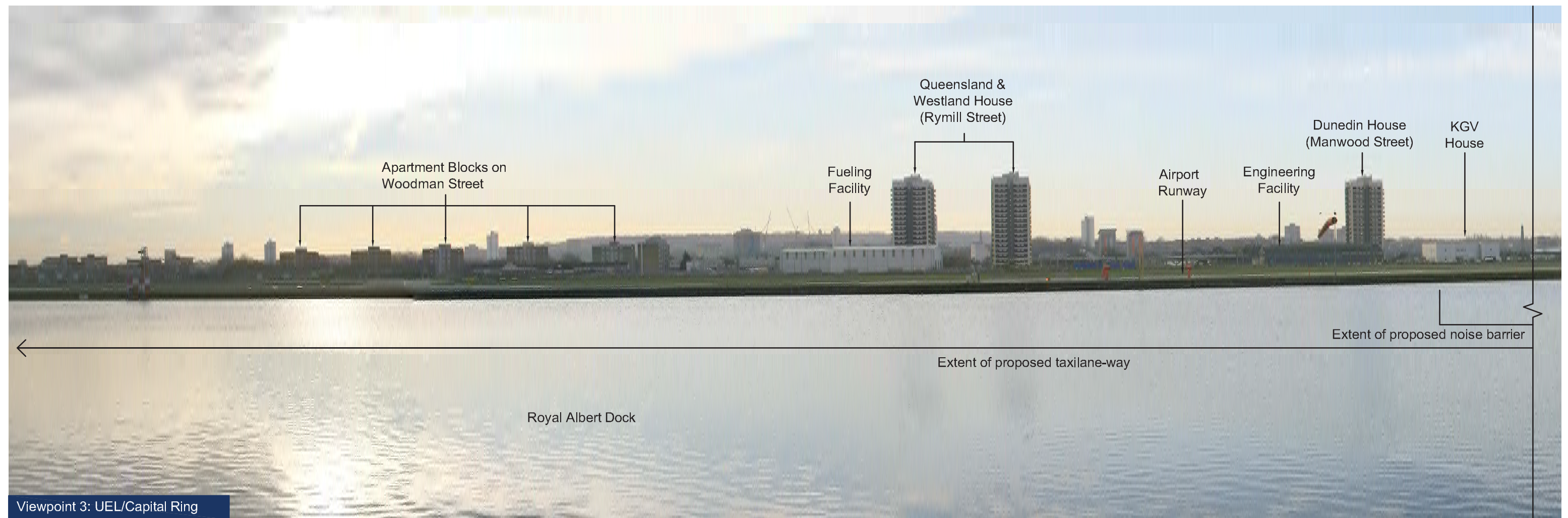
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Revision: A

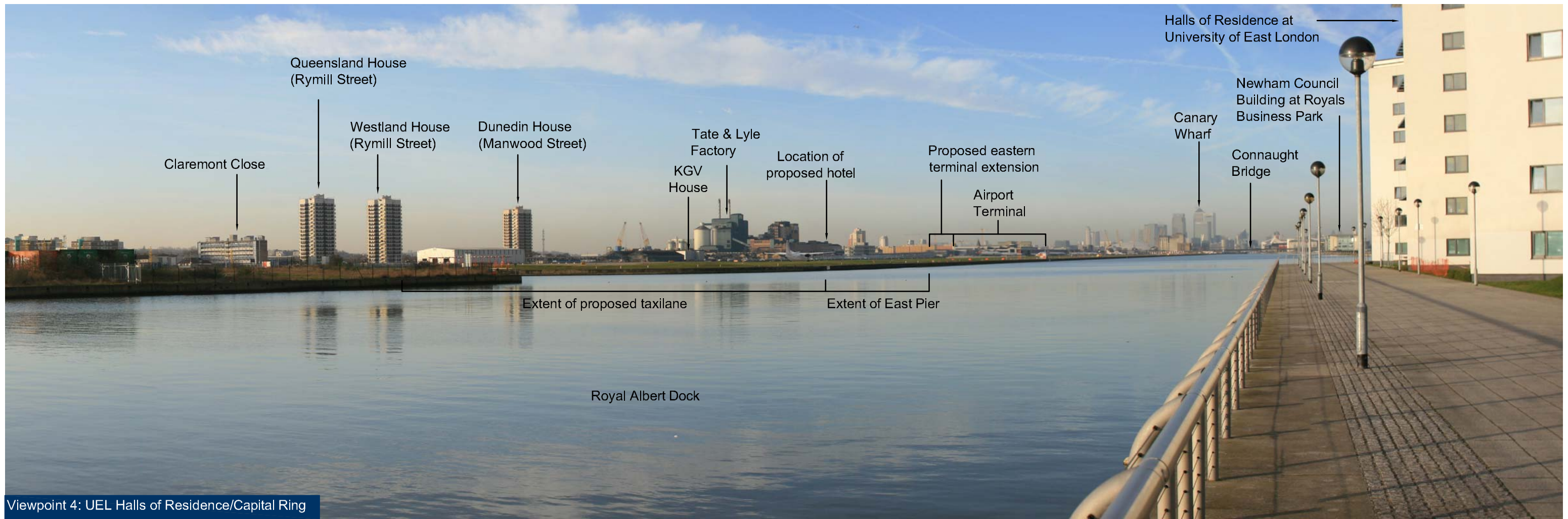




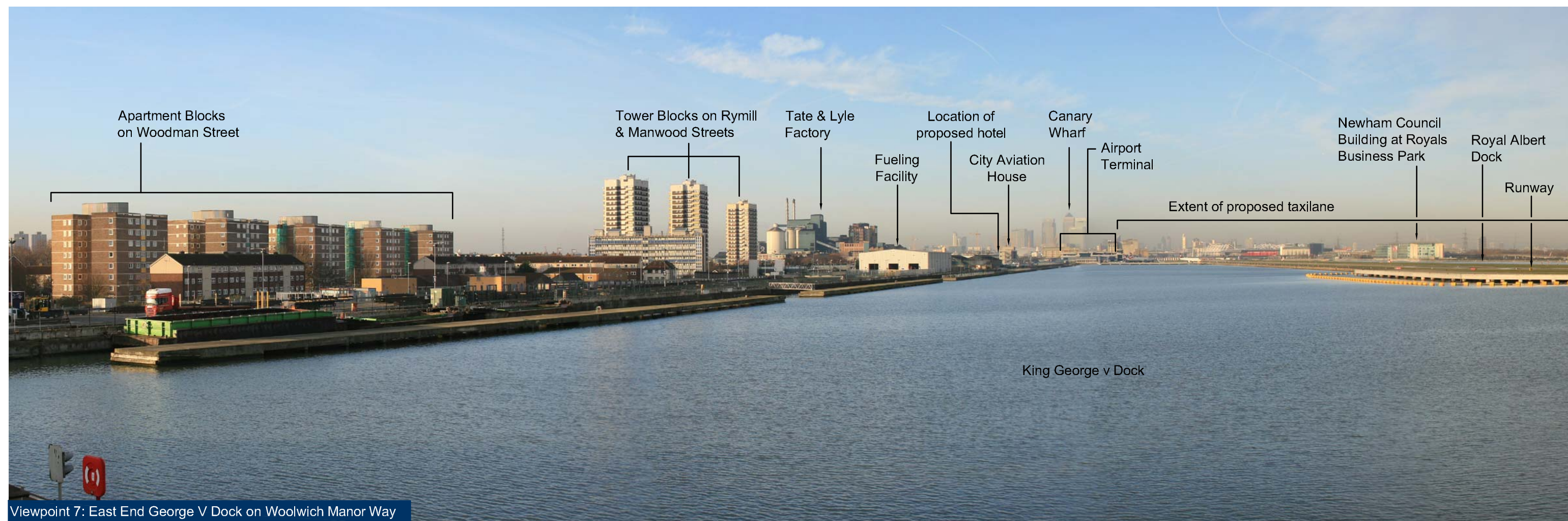
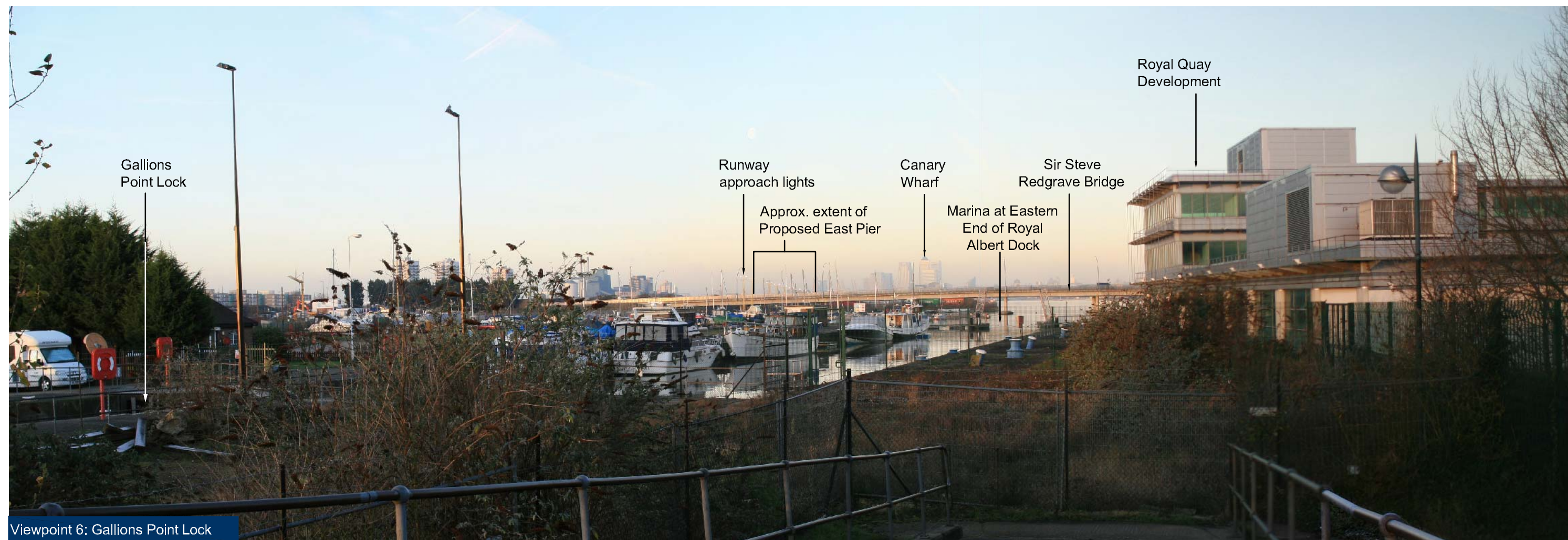
















Viewpoint 8: City Airport Car Park

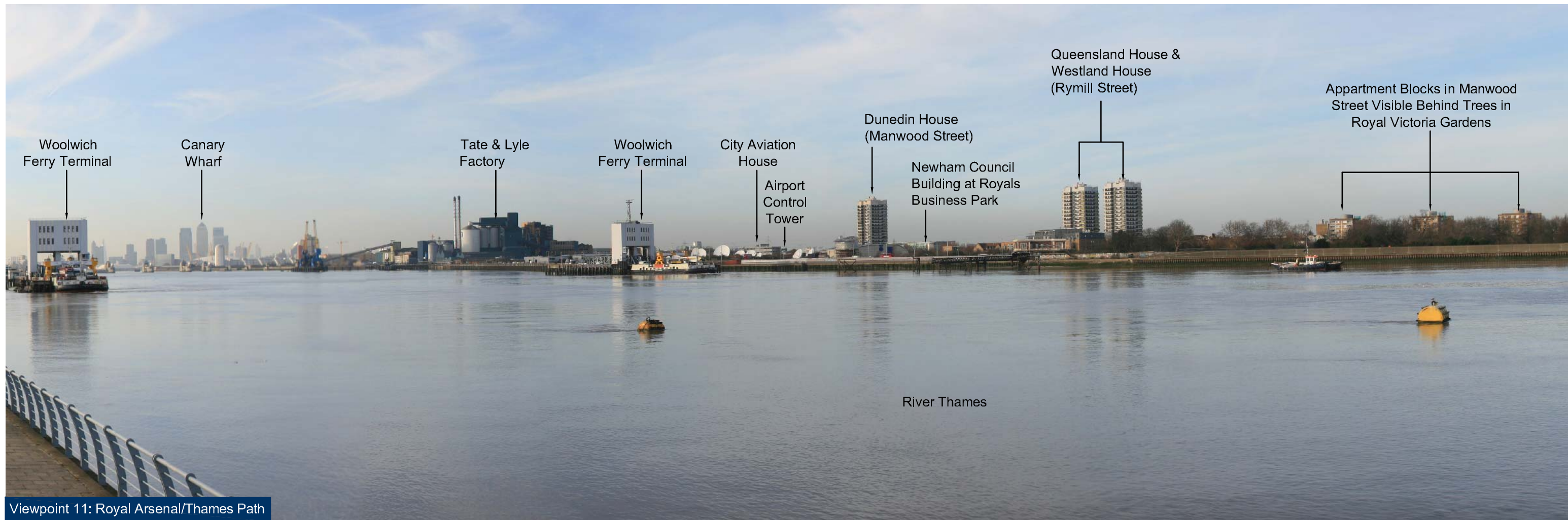


Viewpoint 8: Cont.













# 11 SURFACE TRANSPORT AND ACCESS

## Background

- 11.1 This chapter of the ES has been prepared by Vectos. It assesses the significance of the effects on surface access and the environment arising from the City Airport Development Programme (CADP). The CADP chiefly comprises new passenger facilities and infrastructure that are required to enable the Airport to respond to forecast growth in passenger numbers and accommodate the new generation of aircraft which are physically larger than the current fleet. There is a separate but related outline application for a hotel.
- 11.2 The Airport is an international airport primarily serving the business community of London. After many years of growth at the Airport, the recession contributed to a decline in passenger numbers between 2008 and 2010. Annual passenger numbers are now increasing again and in 2012 approximately 3.03 million passengers per annum (mppa) used the Airport, compared to 3.01 mppa in 2011 and 2.79 mppa in 2010.
- 11.3 As set out in Chapter 1: Introduction, it is important to note that the CADP does not seek to increase the existing permitted number of aircraft movements. The Airport will continue to be permitted to operate up to a maximum limit of 120,000 (noise factored) movements per annum, as approved by LBN in July 2009.
- 11.4 This Chapter describes the methodology used to assess the effects of the CADP on surface access, the baseline conditions currently existing at the Airport and the surrounding area, the potential effects of the CADP, the evaluation of effect significance, the scope for mitigation and the likely residual effects. It should be read in conjunction with the Transport Assessment (TA) which forms part of the CADP planning submission.
- 11.5 The forecasts of passenger numbers both with and without CADP which have been used as the basis of the assessment are shown in **Table 11.1**.

**Table 11.1: Annual Passenger Numbers**

	2012	2021		2023		
	Existing	With Dev.	Without Dev.	With Dev.	Without Dev.	Sensitivity Test
<b>Scheduled Movements</b>	70,502	104,901	88,822	107,119	87,713	107,119
<b>Passengers</b>	3,029,013	5,512,000	4,931,000	5,874,000	4,435,000	6,020,000

Source: York Aviation

- 11.6 Other surface access related issues including Construction, Cumulative Effects, Noise and Air Quality are addressed in other chapters of the ES.

## Planning Policy & Legislative Context

- 11.7 This section sets out the relevant national, regional and local transport policies. It outlines the transport objectives of the relevant documents in terms of accessibility, transport effects, sustainability measures and design.

National Policy Planning Framework (NPPF) (March 2012)

11.8 The National Planning Policy Framework (NPPF) sets out the Government's planning policies for England and how these are expected to be applied.

11.9 One of the 12 core land-use principles within the NPPF includes:

*"[to] actively manage patterns of growth to make the fullest possible use of public transport, walking and cycling, and focus significant development in locations which are or can be made sustainable."*

11.10 Section 4 of the NPPF deals with 'Promoting sustainable transport.' Paragraph 29 states that:

*"the transport system needs to be balanced in favour of sustainable transport modes, giving people a real choice about how they travel."*

Aviation Policy Framework (March 2013)

11.11 Paragraphs 1.96 and 1.97 of the Aviation Policy Framework states that:

*"High quality, efficient and reliable road and rail access to airports contributes greatly to the experience of passengers, freight operators and people working at the airport."*

*We are committed to working with airport operators, transport operators, local authorities and LEPs to improve surface access to airports across the country, whilst taking into account the associated environmental impacts. We are already contributing funding to make this happen."*

11.12 In relation to airport surface access strategies, paragraph 4.20 states:

*"Government attaches a high priority to effective public involvement in local transport policy. Local people, town and parish councils which have qualifying airports within their boundaries, business representatives, health and education providers, environmental and community groups should be involved in the development of airport surface access strategies.... We recommend that ATFs [Air Transport Forums] produce airport surface access strategies to set out:*

- a) targets for increasing the proportion of journeys made to the airport by public transport for both airport workers and passengers*
- b) the strategy to achieve those targets."*

11.13 Paragraph 5.11 goes on to state that:

*"All proposals for airport development must be accompanied by clear surface access proposals which demonstrate how the airport will ensure easy and reliable access for passengers, increase the use of public transport by passengers to access the airport, and minimise congestion and other local impacts."*



#### Mayor's Transport Strategy (May 2010)

- 11.14 With regards airport policy, paragraph 435 of the Mayor's Transport Strategy states that:

*"the Mayor recognises that adequate airport capacity is critical to the continued competitiveness of London's economy. For this reason, the Mayor will consider whether optimum use is being made of existing airport infrastructure."*

#### London Plan (July 2011)

- 11.15 Policy 6.6 of the London Plan deals with aviation. Paragraph b of Part B of the policy states that the Mayor:

*"supports improvements of the facilities for passengers at Heathrow and other London airports in ways other than increasing the number of aircraft movements, particularly to optimise efficiency and sustainability, enhance the user experience, and to ensure the availability of viable and attractive public transport options to access them."*

#### Vision 2020 (June 2013)

- 11.16 In June 2013, the Mayor produced his Vision 2020 – The Greatest City on Earth. This identifies the Royal Docks as an Opportunity Area and the role of London City Airport is serving the Royals:

*"We are returning the Royal Docks to their former glory at the forefront of international trade and exchange. This 125 hectare site - including the regeneration areas of Silvertown Quays, Royal Albert Dock and Royal Albert Basin has £22bn of development potential. Already, innovative and iconic developments are springing up to create a world class business destination - such as The Siemens Crystal and the Emirates Air Line cable car.*

*A new Enterprise Zone will support business ventures creating 6,000 new jobs. A beautiful 'floating village' will host just some of 11,000 new homes built. A £1bn joint public and private investment will create London's first Asian Business Park.*

*We will install transport links to Crossrail 1 at Woolwich and London City Airport."*

#### London Borough of Newham Core Strategy (January 2012)

- 11.17 London Borough Newham's Core Strategy seeks to "ensure that new development will achieve the Council's objective to make Newham a place where people will choose to live, work and stay".

- 11.18 Paragraph 7 of Policy INF2 on Sustainable Transport states that:

*"Major development proposals that generate or attract large numbers of trips, including higher density residential and commercial development, should be located in areas with good public transport accessibility and demonstrate the existence of, or propose new safe, attractive walking and cycling routes to public transport nodes."*

## Assessment Methodology

11.19 The methodology can be summarised as follows:

- a) Gather existing surface access data for the year 2012 (the Existing Case/ Baseline Year);
- b) Forecast the change in the existing situation as a result of current commitments (the Without Development Case) for the future years of 2021 and 2023;
- c) Forecast the changes in travel demand per travel mode as a result of the CADP, for both passengers and staff;
- d) Apply the development forecasts to the Without Development Case (the With Development Case) for the future years of 2021 and 2023;
- e) Assess the effects, based on the difference between the With Development Case and Without Development Case; and
- f) Assess the effects of a sensitivity test on the basis of a reasonable worst case increase in passenger numbers.

11.20 A separate scoping exercise has already taken place to determine the scope of the Transport Assessment. A Transport Scoping Report was prepared in December 2012 in advance of a pre-application meeting with representatives from each of the stakeholders (namely London Borough of Newham (LBN) and Transport for London(TfL)) on 19<sup>th</sup> December 2012. The Transport Scoping Report set out the methodology employed to assess the likely effects on surface access arising from CADP. This included an assessment of the effects on the walking, cycling, public transport and road networks surrounding the Airport, particularly during peak periods. TfL provided a written response to the Transport Scoping Report on 17<sup>th</sup> January 2013. Further meetings have subsequently taken place to update the authorities as the scheme design has progressed.

### Trip Attraction

11.21 In order to calculate the forecasts of passengers in the With and Without Development Cases, the Airport's aviation consultants, York Aviation, provided a profile of flight movements and aircraft occupancy (see Technical Appendix 7.1). From this, the annual and daily number of passengers can be calculated. Similarly, York Aviation provided the forecasts of staff in the With and Without Development Cases. The starting point in estimating the trip attraction associated with the hotel has been to interrogate the TRAVL v8.17 database.

### Sensitivity Test

11.22 Whilst passenger numbers are not forecast to increase above 5.87 mppa in 2023, a reasonable worst case sensitivity test has been undertaken, based on the following assumptions:

- a) A ceiling of 8 larger Code C aircraft on the ground simultaneously during any peak hour compared to 5 in the most likely planning forecast, consistent with the limit on what the infrastructure will accommodate without degrading runway capacity due to additional backtracking by these larger aircraft. For illustrative purposes, we have assumed a change in aircraft type by CityJet following its expected change of ownership but, in practice, an equivalent outcome could be realised by further aircraft type changes by BA, Lufthansa or other airlinespeak period load factor of 90% in the With Development scenario.

- b) An average peak period load factor of 90% in the Sensitivity Test compared to 85% in the With Development Case.

#### Mode Split

- 11.23 The mode split applied to the passenger forecasts in the future year With and Without Development Cases is based on quarterly surveys undertaken on behalf of the Airport in 2012. A further assumption has been made that there will be an additional shift to use of the Docklands Light Railway (DLR), given the Airport's aspiration to maximise the use of public transport and recent trends in DLR usage which indicates a broad increase in the mode share. Specifically, in 2012 the DLR mode share was 55%, whilst the future year With and Without Development Cases assume the mode share is 60%, which has been agreed with DLR during pre-application discussions. It is considered that, with appropriate encouragement and publicity, DLR mode share can realistically increase over time to reach this figure.
- 11.24 The mode split applied to the staff forecasts was obtained from the latest full Travel Plan monitoring survey undertaken by the Airport during September 2011 (see Technical Appendix 7.2) with an assumption being made of a further shift to sustainable modes following the implementation of the new action-focussed Staff Travel Plan. In future years, the Single Occupancy Vehicle mode share has been reduced by 14% from the 2011 level (44% down to 38%), with a proportional increase in sustainable modes.
- 11.25 The mode split applied to hotel visitors has been derived from comparable hotels within the TRAVL v8.17 database.

#### Assessment of Effects – Road Network

- 11.26 The Institute of Environment Management (IEMA) published 'Guidelines for the Environmental Assessment of Road Traffic' guidelines (the guidelines) were used to determine the scope for the road traffic assessment. The guidelines recognise that distinguishing between significant and insignificant changes can be difficult, but note that such a distinction is central to the decision as to whether or not a detailed assessment of the traffic-related environmental effects is necessary. In order to assist the selection process, the IEMA guidelines provide two broad 'rules of thumb' which can be used to determine the need for a detailed assessment.
- 11.27 'Rule 1' suggests that highway links where traffic flows would increase by more than 30%, or the number of heavy vehicles would increase by more than 30%, should be assessed. 'Rule 2' suggests that specifically sensitive areas should be assessed where traffic flows would increase by 10% or more. Specifically sensitive areas include conservation areas, hospitals, links with high pedestrian flows etc.
- 11.28 Given that there are residential properties in proximity to the Airport, Rule 2 has been applied and used as a starting point to determine the scope of the study network. In addition to this, further road links have been assessed to ensure a robust assessment.
- 11.29 Background traffic counts were undertaken on the core study network in 2010 and 2012. The study network is shown on **Figure 11.1**. The traffic counts were then factored to a baseline year of 2012. This collected the data for the Existing (Baseline) Case. In their consultation response

of 17th January 2013, TfL commented that “the data collection that is set out in the scoping note is broadly acceptable.”

11.30 The assessment of the road network for the With and Without Development Cases included committed developments in the vicinity of the Airport which will add a significant quantum of additional traffic. These are:

- a) Barrier Park East;
- b) Canning Town Areas;
- c) Great Eastern Quays;
- d) Leamouth Peninsula;
- e) Minoco Wharf;
- f) Rathbone Market
- g) Silvertown Quays;
- h) Thames Road Industrial Estate (Unex Site);
- i) Royals Business Park; and
- j) Tidal Basin.

11.31 However, there are a significant number of allocated developments within the wider area which do not yet have planning permission. Therefore, a traffic growth factor has been applied to account for this planned growth. Growth factors have been calculated from the Trip End Model Presentation Program TEMPRO version 6.2 with National Transport Model (NTM) 2009 Dataset adjustments. The resultant growth rates are shown in **Table 11.2**.

**Table 11.2: Traffic Growth Factors\***

	Average Weekday	Average Daily
<b>2010 - 2021</b>	1.1617	1.1610
<b>2010 - 2023</b>	1.2087	1.2081
<b>2012 - 2021</b>	1.1497	1.1493
<b>2012 - 2023</b>	1.1962	1.1959

*\* adjusted to take account of committed developments*

11.32 The number of Airport-related vehicles has been calculated based on the forecasts of passenger and staff numbers. Road-based vehicles include private car, private hire minicabs and black taxis.

11.33 Traffic was distributed on the network based on passenger and staff post code data.

#### Assessment of Effects - DLR Network

11.34 It has been agreed with DLR that the effect of CADP will be examined on ‘the Airport Route’ of the DLR network. This comprises the section between Canning Town and Woolwich Arsenal via London City Airport.

11.35 DLR has provided passenger loadings for the Airport Route for the weekday AM peak hour of 08:00 – 09:00. This is the busiest hour of the day on the DLR network.

- 11.36 Airport-related DLR passengers have been distributed according to Origin-Destination data for existing journeys to / from the Airport.
- 11.37 DLR apply crowding factors as a measure of capacity on the DLR network. Crowding factors are calculated on the number of standing passengers per sqm of standing space (ppm<sup>2</sup>). DLR consider that 'planning capacity' is reached at 3 ppm<sup>2</sup>, after which there is potential for passengers to be left behind at stations. However, the actual capacity of a train is reached at 4.6 ppm<sup>2</sup>. DLR reduce the amount of available standing space on the Airport Route by 15% to take account passengers with luggage.
- 11.38 A crowding factor is calculated for each link in both directions on the Airport Route between Canning Town and Woolwich Arsenal.

#### Assessment of Effects – Other Modes

- 11.39 Since only a small proportion of trips arrive by non-car based or DLR modes, a quantitative assessment of the effects on these modes (bus passengers, rail, walking and cycling) has not been undertaken. A qualitative assessment has been made instead.
- 11.40 For pedestrians, at the request of LBN and TfL, a Pedestrian Environment Review System (PERS) walking audit has been undertaken on the key existing pedestrian routes to / from the Airport. PERS is a tool that measures the quality of the pedestrian environment through subjective review, and provides an objective measure to pedestrian quality. The auditing process allows for an overall review of pedestrian accessibility to and from the Airport.
- 11.41 Assessment of Environmental Effects
- 11.42 The guidelines aim to provide a systematic, consistent and comprehensive approach to the assessment of the environmental effects of traffic associated with major development projects.
- 11.43 The guidelines advocate the use of a check-list of potential effects covering noise, vibration, visual effect, severance, driver delay, pedestrian delay, pedestrian amenity, accidents and safety, hazardous loads, air pollution, dust and dirt, ecological effects, and heritage and conservation areas.
- 11.44 The guidelines acknowledge that, for many developments, some of the effects listed may not be widely relevant, but suggest that reasons should be provided for any exclusion.

#### Demolition and Construction

- 11.45 An assessment of the effect of construction traffic on surrounding transport networks was undertaken based on a broad estimate of site traffic during the construction phase, provided by TPS Consultants.
- 11.46 The effect of barges used to transport construction materials on the river is also considered.



### Sensitive Receptors

- 11.47 In determining the significance of effects, consideration was given to potentially sensitive parts of the road and passenger transport networks that could be affected by changes in demand, either during or following completion of the CADP.
- 11.48 As described in Chapter 2: Site Context and Scheme Description, the sensitive receptors in the vicinity of the Airport include residential areas adjacent to the Airport to the south of Hartmann Road.

### Mitigation Measures

- 11.49 Where necessary, mitigation measures were considered to reduce adverse effects of the CADP on the road, public transport, walking and cycling networks.

### Significance Criteria

- 11.50 The effects considered to be significant, prior to and following mitigation, were identified. The significance of residual effects following mitigation reflects judgement as to the importance or sensitivity of the receptor and/or specific surface access issue and the nature and magnitude of any predicted change.
- 11.51 For the highway network, the assessment of the likely effects of the CADP is based on the following seven level scale of significance:
- a) **Substantial Beneficial:** The development will substantially improve the environment for pedestrians and cyclists and promote the use of public transport. It will promote sustainable travel whilst not impacting on congestion on the local highway network, with a greater than 50% reduction in daily traffic flows on one or more roads;
  - b) **Moderate Beneficial:** The development will improve the environment for pedestrians and cyclists and promote travel by sustainable transport modes without causing an increase in congestion on the local highway network, with between 20% to 50% reduction in daily traffic flows on one or more roads;
  - c) **Minor Beneficial:** The development will provide some measures designed to promote sustainable travel without causing a substantial increase in congestion on the local highway network, with between 5% to 20% reduction in daily traffic flows on one or more roads;
  - d) **Negligible:** No change to existing travel patterns or congestion on the highway or public transport network will arise from the development, with <5% change in daily traffic flows on all roads;
  - e) **Minor Adverse:** The development will provide some measures which discourage travel by sustainable modes and/ or cause slightly detrimental effects on conditions on the local highway network, with between a 5% to 20% increase in daily traffic flows on one or more roads;
  - f) **Moderate Adverse:** The development will discourage the use of sustainable modes of travel and / or cause noticeable detrimental effects upon conditions on the local highway network, with between a 20% to 50% increase in daily traffic flows on one or more roads; and
  - g) **Substantial Adverse:** The development will greatly discourage the use of sustainable modes of travel, will degrade the environment for pedestrians and cyclists and will promote travel by the private car. The development will have major detrimental effects on conditions on the local highway network and cause substantial traffic congestion, with a greater than 50% increase in daily traffic flows on any road.

- 11.52 So far as is appropriate, the effects were assessed in a quantitative manner using relevant standards and legislation. Where a quantitative assessment is not possible, a qualitative evaluation of the significance was applied based on professional judgement, with relevant assumptions or uncertainties identified.
- 11.53 For the DLR Network, crowding factors have been used to assess the performance and capacity of the Airport Route. This is based on the following crowding levels:

**Crowding level key**

ppm <sup>2</sup>	
0	No crowding (all passengers seated)
0-1	Slight crowding (some standing)
1-2	Medium crowding
2-3	Heavy crowding
3-4	Severe crowding
4-4.6	Maximal crowding (very close to capacity)
>4.6	Overcrowding* (beyond stated crush loads)

\* NB that overcrowding would more likely result in queuing on platforms instead

Limitations and Assumptions

- 11.54 For the purposes of the surface access assessment, the following assumptions have been made, which could impact the results of the assessment:
- a) **Passenger Mode Split:** It is assumed that it is possible to achieve a further mode shift towards DLR and a shift away from road based vehicles.
  - b) **Staff Mode Split:** It is assumed that the Travel Plan continues to be effective and that a further mode shift to sustainable modes can be achieved.
  - c) **DLR Service:** The existing level of service and capacity of the Airport Route of the DLR network will be maintained in the future year assessments, in both the With and Without Development cases; and
  - d) **Planned Development:** It is assumed that all planned development in the wider area surrounding the Airport is delivered in accordance with the timescales currently envisaged through development plans.

Consultations

- 11.55 The approach to the EIA was first set out within a Scoping Report which was submitted to LBN on 8<sup>th</sup> October 2012, together with a request for a Scoping Opinion in accordance with Regulation 13 of the EIA Regulations 2011 (see Appendix 3.1). The Scoping Report set out the proposed technical scope, methodology and assumptions of the EIA. It also provided a rationale for certain topics to be 'scoped out' from the EIA, as they were judged to be unaffected by the proposed CADP or were unlikely to give rise to significant environmental effects.
- 11.56 LBN provided its Scoping Opinion on 4<sup>th</sup> December 2012. This broadly endorsed the Scoping Report but requested that some additional matters should be included or clarified in the ES. The Scoping Opinion took account of written representations from a number of consultation bodies who had been sent the Scoping Report.

- 11.57 LBN, DLR and TfL have been consulted on a regular basis, through meetings and regular communication, and their feedback has informed the CADP during the build-up to planning submission. Meetings were attended by representatives from DLR and LBN Highways and Transportation Team.
- 11.58 As previously indicated, a Transport Scoping Report was prepared in December 2012 in advance of a pre-application meeting with representatives from London Borough of Newham and TfL on 19<sup>th</sup> December 2012. TfL subsequently provided their pre-application advice in a letter dated 17<sup>th</sup> January 2013. Further meetings have subsequently taken place to update the authorities as the scheme design has progressed, including a follow-up meeting to discuss surface access issues and focusing on DLR took place on 4<sup>th</sup> July 2013.
- 11.59 A technical meeting to discuss the new forecourt took place on 4<sup>th</sup> March 2013 which was attended by representatives within TfL including London Buses and Borough Planning, as well as LBN. A further meeting with the Cab Rank Committee took place on 17<sup>th</sup> June 2013 to discuss the taxi arrangements in the forecourt and feeder park.
- 11.60 LCY engaged with officers at LBN and TfL regarding the Airport's Travel Plan at a meeting on 30<sup>th</sup> April 2013. The purpose of that meeting was to present the Airport's proposal to update the existing Travel Plan, which is focused on creating a 'live' action plan.
- 11.61 CADP has also been the subject of a two stage public consultation between November 2012 and January 2013 and March 2013 and April 2013. Surface access issues were discussed with the public and key stakeholders at the public consultation events. Further details of such events are provided in the Statement of Community Involvement.

## **Baseline Conditions**

### Site Location

- 11.62 A full description of the Airport's location is presented within Chapter 2 of the ES.

### Local Highway Network

- 11.63 Vehicle access to the Airport is provided from Hartmann Road. Hartmann Road is a private road with an east-west orientation. It forms a signalised junction with the A112 Connaught Road at its western end, which currently functions as the single point of access to the Airport from the wider highway network. At its eastern end, Hartmann Road forms a signalised junction with the A117 Woolwich Manor Way, although this junction is presently closed for access to the Airport.
- 11.64 The A112 Connaught Road has an east-west orientation to the south of the Airport, parallel with Hartmann Road. It continues to the A112 Albert Road, which links with the Woolwich Ferry river crossing via Pier Road.
- 11.65 The A1020 Royal Albert Way is a two-lane dual carriageway that links the Airport, via the A1020 Connaught Bridge and A112 Connaught Road, to the A406 / A13 intersection, approximately five kilometres north-east of the Airport.

- 11.66 The main strategic road connections to the Airport are the east-west A13 and the A406 North Circular that connects with the M11 and M25 motorways. The Airport is approximately 1.5 kilometres from the A13 (Prince Regent's Lane junction), five kilometres from the A406 and 25 kilometres from the M25. In addition, the A102(M) crosses the Thames north-south via the Blackwall Tunnel approximately five kilometres from the Airport. This is the nearest road river crossing point to the Airport.

#### Traffic Flows

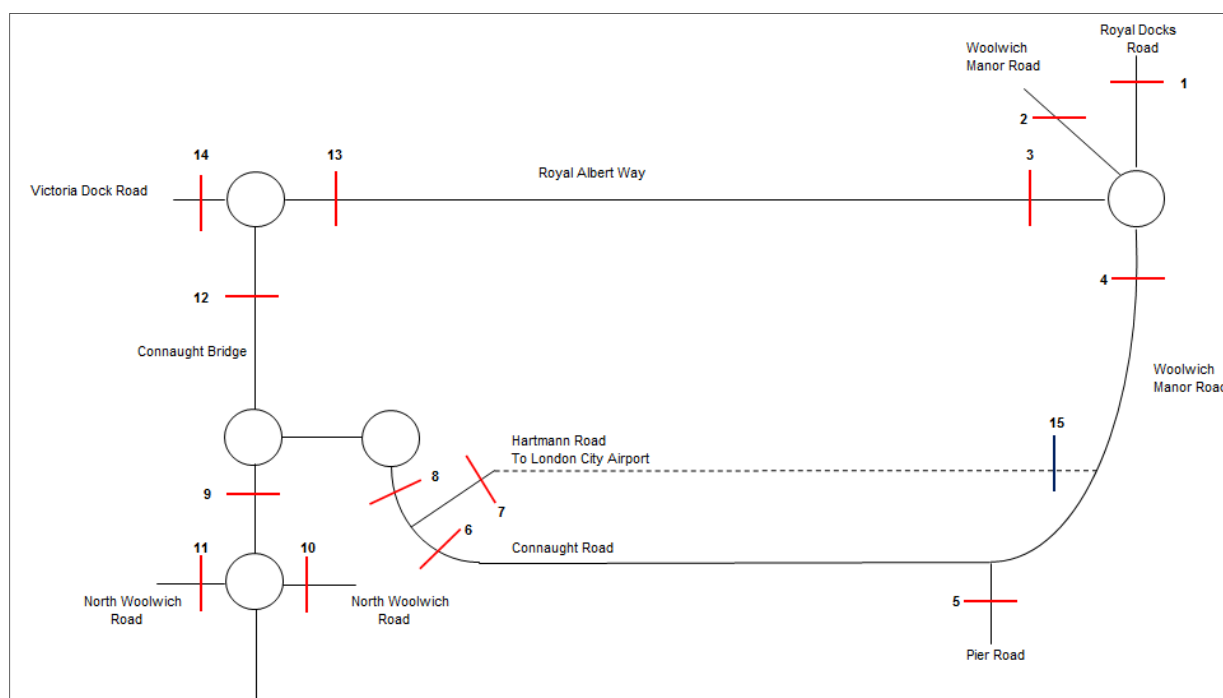
- 11.67 The Annual Average Daily Traffic Flows on the highway network without the effect of the CADP are shown in **Table 11.3**.

**Table 11.3 – Annual Average Daily Traffic Flows: Without Development**

Link	2012	2021	2023
1. Royal Docks Road	19,934	27,848	28,629
2. Woolwich Manor Way (North)	8,300	9,707	10,094
3. Royal Albert Way (East)	15,611	23,457	24,078
4. Woolwich Manor Way South	9,833	11,637	12,055
5. Pier Road	4,023	6,169	6,353
6. Connaught Road (East)	4,804	7,327	7,507
7. Hartmann Road	9,432	12,003	12,140
8. Connaught Road (West)	13,596	18,597	18,971
9. Connaught Bridge (South)	19,481	27,346	28,143
10. North Woolwich Road (East)	5,212	6,228	6,471
11. North Woolwich Road (West)	17,966	24,452	25,178
12. Connaught Bridge (North)	15,748	24,806	25,392
13. Royal Albert Way (West)	17,699	26,125	26,843
14. Victoria Dock Road	9,205	14,432	14,820

- 11.68 The location of the links shown in **Table 11.3** are shown in the study network at **Figure 11.1** below.

**Figure 11.1 - Study Network**



### Car Parking

- 11.69 There are two main car parking areas within the Airport, shared between passengers and staff. The short stay car park is located closest to the terminal building and the main stay car park is adjacent to and to east of the short stay car park.
- 11.70 Staff parking is available within both the short and main stay car parks. Further staff parking is provided at the western and triangle staff car parks which are both located west of the existing terminal building. Staff are required to apply for and display a parking permit. As of December 2012, 832 staff have been issued with parking permits which are free for Airport staff, but charged for third party employees.
- 11.71 The short-stay car park has 148 spaces whilst the main stay car park has 644 spaces. 52 spaces are provided in the western staff car park, whilst 10 spaces are provided in the triangle staff car park.
- 11.72 In addition, 120 parking spaces are allocated to car hire companies. These are located within the forecourt and in an area adjacent to Hartmann Road.

### Personal Injury Accidents

- 11.73 An analysis of Personal Injury Accident (PIA) data has been undertaken for the period between September 2007 and September 2012. The extent of the PIA investigation area is Connaught Bridge, the full length of Hartmann Road, Connaught Road, Albert Road and Woolwich Manor Way (south of Royal Albert Way).
- 11.74 In summary, over a five year period, a total of forty-four accidents occurred within the study area. Forty accidents resulted in slight injuries, four accidents caused serious injuries and there were no fatalities. Ten accidents resulted in injuries to pedestrians including one which resulted in serious injuries.
- 11.75 Given the size of the study area and nature of the local highway network, the number and severity of accidents is not considered to be atypical for this part of London. Hence no physical road safety improvement measures are required.

### DLR

- 11.76 The DLR opened in 1987 to serve the first developments in Docklands, with eleven trains and fifteen stations. Since then, the DLR has progressively been extended to Bank, Beckton, Lewisham, Stratford International and Woolwich Arsenal via the Airport. The DLR Airport extension, opened in December 2005 with the extension onwards to Woolwich Arsenal completed in 2009. The section between Canning Town and the Airport is known as 'the Airport Route.'
- 11.77 The DLR is extensive and currently comprises a 34 km railway with 40 stations and more than 100 trains. According to TfL, DLR carries almost 70 million passengers annually, with this expected to rise to more than 100 million in 2012. DLR is a fully accessible and fully integrated railway - it connects with more than 100 bus routes, 5 mainline railways, 8 Underground lines and coach, taxi and river services.



- 11.78 DLR operates between 05:30 and 00:30 on Monday to Saturdays and between 07:00 and 23:30 on Sundays.
- 11.79 Since January 2012, DLR trains on the Bank to Woolwich Arsenal service have been increased from two to three-carriage trains, to help accommodate increasing DLR passenger numbers using the service from Woolwich Arsenal.

#### Buses

- 11.80 There are three bus stops adjacent to the 'ready' hire car parking area outside the Airport terminal building on Hartmann Road and adjacent to the Jet Centre (used by staff, crew and passengers). All buses that visit the site perform a 'U' turn around the pick-up / drop-off area. Only single stops are required ensuring that passengers do not have to cross Hartmann Road to get to the stops.
- 11.81 The Airport is served by two London bus routes, the 473 and the 474.
- 11.82 The 473 service travels from Stratford – Plaistow – the Airport - North Woolwich, departing approximately every 9-13 minutes from the Airport terminal forecourt in both directions. The service commences from Stratford at 05:04 (06:11 Sunday) with the last bus at 01:14. The first bus from North Woolwich departs at 04:30 (05:39 Sunday) with the last bus at 00:16.
- 11.83 The 474 bus operates between Canning Town – the Airport - North Woolwich –Beckton – East Ham – Manor Park, departing approximately every 10-13 minutes in both directions from the Airport terminal forecourt. The service operates over a 24 hour period, 7 days a week.
- 11.84 Bus usage is greatest amongst staff, with the 2011 staff travel survey indicating that 10% of staff travel to / from the Airport by bus.

#### Taxis

- 11.85 The current arrangement for black taxis is that, on arrival at the Airport with passengers, the taxi will drop passengers at the front of the Airport terminal building within the forecourt. Once the passenger has paid the taxi fare, the vehicle departs from the forecourt and either turns right away from the Airport or turns left and joins the back of the taxi queue that extends eastwards on Hartmann Road towards the Airport car parks. The taxi queue length can accommodate approximately 200 taxis.
- 11.86 Currently the forecourt area has no formal vehicle controls in place, with black taxis, private hire minicabs and private cars sharing drop-off areas.
- 11.87 Taxis perform an important role as a public transport provider by reducing the passenger's reliance on the private car. They are particularly useful for passengers using the Airport from Central London because they are not restricted to a timetable or constrained by fixed routes. Taxis also fulfil a demand that cannot be met by bus, train or underground, especially early in the morning or late at night.

#### Private Hire Minicab

- 11.88 Private hire minicabs use the pick-up / drop-off areas for private vehicles within the Airport forecourt. Should private hire minicabs need to wait for longer periods, they are able to use the short-stay car park.

#### Walking

- 11.89 The Airport is accessible on foot from the surrounding residential and commercial areas. Hartmann Road has a footway on its southern side which connects directly with footways on Connaught Road to the west. There are controlled pedestrian facilities at the traffic signal controlled junction of Connaught Road and Hartmann Road. Pedestrians can also access the Airport from a dedicated pedestrian link between Hartmann Road and Newman Street.
- 11.90 Because of these facilities, local residents and visitors to the area can walk to the Airport in order to access bus services and the DLR.
- 11.91 A number of staff working at the Airport live locally and walk to work. The most recent sample staff survey undertaken in September 2011 showed that 7% of staff walk to work, a significant increase in the 2% of staff who walked to work in 2009.

#### Cycling

- 11.92 There are 30 covered cycle parking spaces located beneath the DLR adjacent to the motorcycle parking area. This is opposite the main entrance to the Airport terminal. There are a further 12 cycle parking spaces located within a secure bike store in the short stay car park. Cycle stands are predominantly used by staff.
- 11.93 Cyclists access the Airport from Hartmann Road.

#### **Future Baseline Conditions**

- 11.94 A fourth arm will be added to the roundabout junction of Connaught Bridge / Connaught Road, in association with the Silvertown Quays development which has planning consent.
- 11.95 Crossrail is being constructed and is anticipated to open by 2019. Whilst the current proposal does not include a Crossrail station at the Airport, DLR forecasts show that some DLR passengers will transfer their journey from DLR to Crossrail. This increases the spare capacity on the Airport Route of the DLR network.
- 11.96 The baseline conditions for all other surface access modes are anticipated to remain constant in the future year assessments.

#### **Assessment of Potential Effects**

- 11.97 This section considers the potential effects of the CADP in the absence of off-site mitigation measures, which are identified and considered later in this chapter where appropriate.

### Demolition and Construction

- 11.98 As set out in Chapter 6: Development Programme and Construction, construction associated with the CADP would consist of deliveries of construction materials and plant, the export of surplus excavated material and other waste disposal off-site, and staff and operatives' transport.
- 11.99 Deliveries during construction are likely to be undertaken by both road and river. The river will be used where possible, in order to minimise the effects on the local road network. For example, it is anticipated that a number of large precast units will be delivered to the site by barge and, for the duration of the deck construction for the stands, apron and taxiways, it is anticipated that 12 flat-top (SPUD) 600 Tonne barge movements will occur per calendar month.
- 11.100 The procedure for managing deliveries undertaken by river will be discussed with the Royal Docks Management Authority (RoDMA) and the Port of London Authority (PLA) in advance of commencement. It is anticipated that river deliveries will accord with the relevant rules and regulations set out by the Port of London.
- 11.101 The daily volume of construction related traffic would depend on the rate of construction and would vary during the overall building programme. As such, whilst based on experience gained on previous works of a similar nature, the predicted construction traffic volumes described below should be considered as broad estimates. More precise figures would only be available on appointment of the main contractor for the CADP.
- 11.102 The peak number of HGV vehicle movements is anticipated to be in the region of 626 two-way trips per month during Year 4 to the middle of Year 7 of the construction programme (see Chapter 6). The peak number of construction staff vehicle movements is anticipated to be 125 two-way trips per day.
- 11.103 Pedestrians and cyclists will continue to be able to access the Airport and surrounding area during the construction works. Where necessary, appropriate diversions will be put in place which will be agreed with the local highway authority.
- 11.104 Bus services will continue to serve the Airport during the construction works, with temporary bus stops provided on Hartmann Road if necessary. Hence, there will be no material effect on the operation of bus services at the Airport.
- 11.105 Without mitigation, the effect of construction activity on surface transport networks surrounding the Airport is considered to be **temporary, Moderate Adverse**.

### Completed Development

- 11.106 The number of additional passengers and staff travel movements by mode is provided in this section, for the With and Without Development Cases.
- 11.107 It is proposed to create a further permanent access and vehicle link to the Airport from the junction with the A117 Woolwich Manor Way / Fishguard Way. This will provide a direct

connection between the eastern end of Hartmann Road and the signalised junction with the A117 Woolwich Manor Way / Fishguard Way.

- 11.108 As described in Chapter 2, the Airport forecourt is being relocated and redesigned to provide sufficient capacity to accommodate the predicted increase in passengers. The forecourt has been relocated eastwards from its current location to enable the construction of the new arrivals building and for a 30m exclusion zone prohibiting vehicular activity near the arrivals building.
- 11.109 It is proposed to replace the main car parking areas with three passenger car parks, a new staff car park and two new car hire areas. Each of the car parks would be accessed from Hartmann Road. This enables passenger and staff parking to be managed and monitored separately.
- 11.110 Passenger Car Park 1 will be a single level car park deck structure. Passenger Car Parks 2 and 3 will be surface level car parks.
- 11.111 Passenger car parking will continue to be chargeable, with differing price structures for each passenger car park. Staff car parking will continue to operate on a permit basis.
- 11.112 It is proposed to increase the parking provision from 974 spaces to 1,251 spaces, i.e. an increase of 278 spaces or a 28% increase. This compares with passenger numbers which will be increasing by 87% and staff numbers which will be increasing by 59%, compared to 2011. The car parking will also serve a Hotel with up to 260 bedroom hotel, proposed in CADP2.
- 11.113 Tables 11.4 and 11.5 compares travel movements by mode between the Existing / Baseline Case (2012) and the With and Without Development Cases (in 2021 and 2023), for a typical weekday.

**Table 11.4 – Peak Hour Travel Movements: Without Development**

Mode	AM Peak			PM Peak		
	2012	2021	2023	2012	2021	2023
Private Car	111	126	123	128	120	118
Dropped off (including by Chauffeur)	136	202	200	169	178	178
Rented Car	4	19	19	5	16	16
Taxi	200	280	278	251	246	246
Private Hire Minicab	232	308	305	289	270	270
DLR	821	1,451	1,438	1,017	1,278	1,276
Bus	26	30	29	28	29	28
Transfer (passengers)	50	54	53	63	47	47
Other	32	72	70	32	68	67
<b>TOTAL</b>	<b>1,611</b>	<b>2,541</b>	<b>2,516</b>	<b>1,970</b>	<b>2,252</b>	<b>2,247</b>

**Table 11.5 – Peak Hour Travel Movements: With Development**

Mode	AM Peak				PM Peak			
	2012	2021	2023	ST	2012	2021	2023	ST
Private Car	111	190	195	199	128	190	196	199
Dropped off (including by Chauffeur)	136	242	251	266	169	214	225	239
Rented Car	4	22	23	25	5	20	21	22
Taxi	200	335	347	369	251	294	310	329
Minicab	232	374	388	411	289	332	349	370
DLR	821	1,771	1,835	1,943	1,017	1,577	1,658	1,754
Bus	26	48	49	49	28	49	50	50
Transfer (passengers)	50	64	67	71	63	56	59	63
Other	32	132	134	136	32	136	139	141
<b>TOTAL</b>	<b>1,611</b>	<b>3,178</b>	<b>3,288</b>	<b>3,468</b>	<b>1,970</b>	<b>2,868</b>	<b>3,007</b>	<b>3,167</b>

### Road Network

11.114 **Table 11.6** shows the overall effect of the CADP traffic flows on the surrounding routes serving the Airport for the future year of 2023, the assumed year of completion and full utilisation which constitutes the ‘worst case’ in terms of differences between the With and Without Development.

**Table 11.6 – 2023 Annual Average Daily Traffic Flows**

	Link	Baseline	With Dev	Change	% Change	Category
1	Royal Docks Road	28,629	30,231	+1,602	+5.6%	Minor Adverse
2	Woolwich Manor Way (North)	10,094	10,094	-	-	-
3	Royal Albert Way (East)	24,078	20,574	- 3,504	- 14.6%	Minor Beneficial
4	Woolwich Manor Way South	12,055	17,161	+5,106	+42.4%	Moderate Adverse
5	Pier Road	6,353	6,397	+44	+0.7%	Negligible
6	Connaught Road (East)	7,507	6,330	-1,177	-15.7%	Minor Beneficial
7	Hartmann Road (West)	12,140	10,214	-1,926	-15.9%	Minor Beneficial
8	Connaught Road (West)	18,971	18,222	-749	-3.9%	Negligible
9	Connaught Bridge (South)	28,143	30,212	+2,069	+7.4%	Minor Adverse
10	North Woolwich Road (East)	6,471	6,471	-	-	-
11	North Woolwich Road (West)	25,178	27,247	+2,069	+8.2%	Minor Adverse
12	Connaught Bridge (North)	25,392	22,574	-2,818	-11.1%	Minor Beneficial
13	Royal Albert Way (West)	26,843	23,339	-3,504	-13.1%	Minor Beneficial
14	Victoria Dock Road	14,820	15,506	+686	+4.6%	Negligible
15	Hartmann Road (East)	-	6,621	+6,621	100.0%	Substantial Adverse

11.115 Table 11.6 demonstrates that there is an increase in traffic on some links and a reduction in traffic on other links. This is because of the creation of an additional vehicle access point to the Airport from Woolwich Manor Way through to Hartmann Road (East). This results in a redistribution of Airport-related traffic and a reduction in traffic on some links in the With Development Case compared to the Without Development Case.



11.116 The greatest proportional reduction in traffic is forecast for Hartmann Road (West) with a -15.9% reduction and **Minor Beneficial** effect, and Connaught Road (east) with a -15.7% reduction and **Minor Beneficial** effect.

11.117 The greatest proportional increase in traffic flows are forecast for Hartmann Road (East) which records a 100% increase in traffic and scores a **Substantial Adverse** effect. It is proposed to provide a new vehicle link to the Airport from Hartmann Road (East), which is currently closed to traffic. This explains why there is a 100% increase in traffic, compared to the Without Development Case. This is followed by Woolwich Manor Way South, which scores a **Moderate Adverse** effect with a +42.4% increase and North Woolwich Road (West) which scored a +8.2% increase, amounting to a **Minor Adverse** effect.

11.118 **Table 11.7** shows the results of the 2023 sensitivity test.

**Table 11.7 – 2023 Annual Average Daily Traffic Flows (Sensitivity Test)**

	Link	Baseline	Sensitivity Test	Change	% Change	Category
1	Royal Docks Road	28,629	30,389	+1,760	+6.1%	Minor Adverse
2	Woolwich Manor Way (North)	10,094	10,094	-	-	-
3	Royal Albert Way (East)	24,078	20,574	-3,504	-14.6%	Minor Beneficial
4	Woolwich Manor Way South	12,055	17,319	+5,264	+43.7%	Moderate Adverse
5	Pier Road	6,353	6,401	+48	+0.8%	Negligible
6	Connaught Road (East)	7,507	6,334	-1,173	-15.6%	Minor Beneficial
7	Hartmann Road (West)	12,140	10,466	-1,674	-13.8%	Minor Beneficial
8	Connaught Road (West)	18,971	18,470	-501	-2.6%	Negligible
9	Connaught Bridge (South)	28,143	30,404	+2,262	+8.0%	Minor Adverse
10	North Woolwich Road (East)	6,471	6,471	-	-	-
11	North Woolwich Road (West)	25,178	27,439	+2,262	+9.0%	Minor Adverse
12	Connaught Bridge (North)	25,392	22,629	-2,763	-10.9%	Minor Beneficial
13	Royal Albert Way (West)	26,843	23,339	-3,504	-13.1%	Minor Beneficial
14	Victoria Dock Road	14,820	15,561	+741	+5.0%	Negligible
15	Hartmann Road (East)	-	6,779	+6,779	100.0%	Substantial Adverse

11.119 Table 11.7 shows that there is not a significant difference in traffic flows for the sensitivity test compared to the With Development traffic flows shown in Table 11.6. There is also no change in the significance category for any of the links.

#### Public Transport Network

11.120 **Table 11.8** shows the annual average weekday Airport-related DLR passengers in the With and Without Development Cases. This includes staff and passengers.

**Table 11.8 – Annual Average Weekday LCY DLR Passengers**

	Without Development			With Development			Change		
	Arr.	Dep.	Total	Arr.	Dep.	Total	Arr.	Dep.	Total
2012	3,265	3,276	6,541	-	-	-	-	-	-
2021	5,175	5,334	10,509	6,173	6,428	12,601	998	1,094	2,092
2023	5,150	5,304	10,454	6,480	6,714	13,194	1,330	1,410	2,740
2023 ST	5,150	5,304	10,454	6,874	7,090	13,963	1,724	1,786	3,510

11.121 **Table 11.9** shows the weekday AM peak hour Airport-related DLR passengers.

**Table 11.9 – AM Peak Hour LCY DLR Passengers**

	Without Development			With Development			Change		
	Arr.	Dep.	Total	Arr.	Dep.	Total	Arr.	Dep.	Total
2012	343	477	821	-	-	-	-	-	-
2021	535	917	1,452	716	1,056	1,772	181	139	320
2023	534	905	1,439	738	1,097	1,835	204	192	396
2023 ST	-	-	-	764	1,179	1,943	-	-	-

11.122 Crowding factors are a measure of the capacity of public transport. For the DLR, it represents a ratio of the number of standing passengers to the available standing space. It should be noted that in their calculations DLR reduce the amount of available standing space on the Airport Route by 15% to take account passengers with luggage. This is included in the assessment in **Tables 11.10** and **11.11**.

**Table 11.10 – DLR Passengers 2023 Weekday AM Peak**

Link	DLR Passengers		Crowding Factor pp sqm		Category	
	Baseline	With Dev	Baseline	With Dev	Baseline	With Dev
Canning Town → West Silvertown	2,116	2,273	0.29	0.43	Low crowding	Low crowding
West Silvertown → Pontoon Dock	1,836	1,993	0.04	0.18	Low crowding	Low crowding
Pontoon Dock → London City Airport	1,288	1,455	0.00	0.00	No crowding	No crowding
London City Airport → King George V	851	865	0.00	0.00	No crowding	No crowding
King George V → Woolwich Arsenal	796	809	0.00	0.00	No crowding	No crowding
Woolwich Arsenal → King George V	916	963	0.00	0.00	No crowding	No crowding
King George V → London City Airport	1,513	1,560	0.00	0.00	No crowding	No crowding
London City Airport → Pontoon Dock	2,076	2,254	0.25	0.41	Low crowding	Low crowding
Pontoon Dock → West Silvertown	4,024	4,203	1.95	2.11	Medium crowding	Heavy crowding
West Silvertown → Canning Town	5,031	5,209	2.83	2.98	Heavy crowding	Heavy crowding

**Table 11.11 – DLR Passengers 2023 Weekday AM Peak Sensitivity Test**

Link	DLR Passengers		Crowding Factor pp sqm		Category	
	Baseline	With Dev	Baseline	With Dev	Baseline	With Dev
Canning Town → West Silvertown	2,116	2,293	0.29	0.44	Slight crowding	Slight crowding
West Silvertown → Pontoon Dock	1,836	2,013	0.04	0.20	Slight crowding	Slight crowding
Pontoon Dock → London City Airport	1,288	1,465	0.00	0.00	No crowding	No crowding
London City Airport → King George V	851	870	0.00	0.00	No crowding	No crowding
King George V → Woolwich Arsenal	796	815	0.00	0.00	No crowding	No crowding
Woolwich Arsenal → King George V	916	969	0.00	0.00	No crowding	No crowding
King George V → London City Airport	1,513	1,566	0.00	0.00	No crowding	No crowding
London City Airport → Pontoon Dock	2,076	2,331	0.25	0.48	Slight crowding	Slight crowding
Pontoon Dock → West Silvertown	4,024	4,279	1.95	2.17	Medium crowding	Heavy crowding
West Silvertown → Canning Town	5,031	5,286	2.83	3.05	Heavy crowding	Severe Crowding

11.123 Table 11.10 shows that for most links the degree of crowding does not change between the With and Without Development Cases. This is because there is a marginal change in the crowding factor as a result of the CADP.

11.124 In Table 11.10 the maximum crowding factor recorded is for the West Silvertown to Canning Town link which scores 2.98 in the With Development Case compared to 2.83 in the Without Development Case. This shows that crowding is anticipated to occur even without the CADP and that the CADP does not exacerbate crowding significantly. Hence, the CADP can be considered to have a **Negligible** effect on crowding.

11.125 In Table 11.11 for the 2023 sensitivity test, 'Severe Crowding' was recorded on the link between West Silvertown and Canning Town. However, the actual change in crowding factor compared with the Without Development Case is just 0.23 pp sqm. Severe crowding is classified as a score of between 3.01 pp sqm – 4.01 pp sqm. The actual score for this link is 3.05 pp sqm which shows that it is at the lower end of the Severe Crowding category and still within the actual capacity of a DLR train which is reached at a score of 4.60 pp sqm. It should be emphasised that this result is for the sensitivity test, which is a worst case scenario, based on an unlikely passenger throughput.

11.126 Overall, taking into account of the increased sustainability and environmental benefits, it is considered that the effects of the CADP on public transport would be **Minor Beneficial**.

## Environmental Effects of Development Traffic

### Severance

- 11.127 Severance is defined as the perceived division that can occur within a community when it becomes separated by a major traffic artery and describes a series of factors that separate people from places and other people. Such division may result from the difficulty of crossing a heavily trafficked road or a physical barrier created by the road itself.
- 11.128 The measurement and prediction of severance is extremely difficult, but relevant factors include road width, traffic flow, speed, presence of crossing facilities and the number of movements across the affected route. The guidelines refer to the Department of Transport's 'Manual of Environmental Appraisal', which suggests that changes in traffic flow of 30%, 60% and 90% would be likely to produce 'slight', 'moderate' and 'substantial' changes respectively. It is advised that these broad indicators should be used with care and regard paid to specific local conditions.
- 11.129 For the majority of links in the vicinity of the Airport, the overall increase in daily traffic flows on existing roads resulting from the CADP is less than 30%. For these links, it is considered that the effect on severance would be **Negligible**. The increase on Woolwich Manor Way (South) is 41.9% and the related effect on severance is therefore **Minor Adverse**. Hartmann Road (East) records a 100% increase in traffic, although because this link is currently closed to traffic, there is no effect on severance compared to the Without Development Case.

### Driver Delay

- 11.130 The guidelines note that driver delay is only likely to be significant when the traffic on the highway network is at or close to the capacity of the system.
- 11.131 Following comprehensive capacity testing as set out in the Transport Assessment, a significant adverse change in traffic conditions on the roads within the immediate vicinity as a result of the CADP would not be expected and on some links there is a reduction in traffic. It is anticipated that the overall changes in traffic as a result of the CADP would have, at worst, a **Minor Adverse** effect on driver delay.

### Pedestrian Delay

- 11.132 It has been demonstrated that, overall, across the road network, there is not a significant difference between the vehicle movements to / from the Airport between the With and Without Development Cases. Consequently, the increased vehicular activity at the Airport should not lead to a net increase in pedestrian delay.
- 11.133 The CADP is accordingly anticipated to have considered a **Negligible** effect on pedestrian delay.

### Pedestrian Amenity

- 11.134 The CADP seeks to improve the surface access arrangements for pedestrians within the reconfigured forecourt area and through the provision of a new dockside path.
- 11.135 Consequently, the CADP is anticipated to have considered a **Minor Beneficial** effect on pedestrian amenity.

### Fear and Intimidation

- 11.136 The guidelines note that a further effect traffic may have on pedestrians is fear and intimidation; the degree of which is dependent on volume of traffic, its composition, proximity to people or a lack of protection caused by such factors as narrow pavements. Since the CADP improves surface access arrangements for pedestrians, there would be a **Minor Beneficial** effect with regard to fear and intimidation.

### Accidents and Safety

- 11.137 Across the study network, the proposals would result in a small net increase in traffic flows on local roads, with a reduction in traffic on some links and an increase in traffic on others. There are no existing issues with regards to road safety. It is therefore considered that the effect on accidents and safety would be **Negligible**.

### **Cumulative and Combined Effects**

- 11.138 A separate chapter on cumulative effects is included within this ES (see Chapter 18). Specifically, with regards to surface access, the cumulative effects of other developments in the vicinity of the Airport have been included in the With and Without Development Cases for the assessment of the effects on the road and public transport networks.

### **Further Mitigation**

#### Demolition and Construction

- 11.139 As described in Chapter 6, a Construction Environmental Management Plan (CEMP) would be prepared to provide a framework for managing the potential environmental effects of construction associated with the CADP, including the movement of plant and materials and other construction traffic. This would define routes for construction traffic, outline restrictions on delivery times and traffic management measures.
- 11.140 A Construction Logistics Plan (CLP) will be prepared and agreed with LBN in order to provide appropriate mitigation measures during the construction phase, so as to minimise the impact on surrounding transport networks. Specifically, the CLP would include the following:
- a) Details of the designated construction traffic routes to / from the Airport
  - b) An estimate of the number and type of construction vehicles
  - c) The access and egress arrangements for all construction vehicles
  - d) The proposed mitigation measures such as wheel washing, road cleansing and dust and noise suppression measures



- e) Details of any local traffic management measures, in discussion with the highway authorities.

#### Completed Development

##### Travel Plan

- 11.141 The Airport has implemented a Travel Plan to reduce single occupancy car journeys to and from the Airport. This contains targets to encourage sustainable travel by car sharing as well as non-car modes. This mitigates the car mode share and the driver delay.
- 11.142 The Travel Plan is being updated and initial discussions have already taken place with LBN and TfL at a meeting on 30<sup>th</sup> April 2013. Initially the updated Travel Plan will concentrate on staff travel. This approach has been agreed with both LBN and TfL. The Travel Plan will in due course be updated to consider passenger travel in conjunction with the development of a new Airport surface access strategy. The new surface access strategy will be developed in consultation with key stakeholders and will reflect the passenger related surface access requirements both in the short term and those associated with the CADP in the longer term.
- 11.143 The Staff Travel Plan will include a series of 'live actions' for key issues regarding how staff access the Airport. Progress against these actions will be reviewed annually. The key issues that will be addressed through the Staff Travel Plan are as follows:
- a) Engagement - the Airport's Travel Co-Ordinator will work with airport companies to share information and encourage airport staff to travel sustainably
  - b) Local staff travel - seek to implement measures that aim to increase the proportion of local staff (within a 3-5 mile radius) who choose to walk or cycle to work. The CADP will provide a new dockside path, creating a new pedestrian link from the east. Additional cycle parking will also be provided to encourage cycling.
  - c) Multi-modal travel - work with partners and transport providers to look to offer better information and ticketing options for staff completing multi modal journeys to and from work
  - d) De-carbonising the car - explore opportunities that reduce the impact of single occupancy car use. To include car sharing, electric vehicles, occasional use of public transport, etc
  - e) Early morning accessibility - explore opportunities for the development of additional early morning transport services to align with airport operational requirements
  - f) Networking - seek to establish a travel plan network with local organisations to identify and address common transport issues
  - g) Monitoring & reporting - report progress against the Staff Travel Plan annually.

##### Taxi Management Plan

- 11.144 A Taxi Management Plan (TMP) will be implemented in conjunction with the OADP which would set out the arrangements for black taxis and private hire minicabs. The TMP will comprise the following elements:
- a) A description of the proposed arrangements for black taxis and private hire minicabs;
  - b) A commitment for the Airport to provide taxi marshals at peak times, to manage the taxi and passenger queues;
  - c) Details of the black taxi feeder park and black taxi call-forward system; and

- d) Management measures to ensure the continued efficiency of the taxi operation at the Airport.

#### Delivery and Servicing Plan

11.145 A Delivery and Servicing Plan (DSP) has been prepared and will be implemented at the Airport in conjunction with the CADP. The purpose of this DSP is to ensure that delivery and servicing activity can take place in a safe, efficient and sustainable manner. The key measures include:

- a) Promoting the DSP to employees and suppliers;
- b) Ensuring that delivery vehicles remain in the service yard for as little time as possible to maximise the efficiency of deliveries;
- c) Seek to reduce the number of deliveries taking place during network peak hours (07:30-09:00 and 16:30-18:00) wherever possible;
- d) Ensuring that refuse and recycling material is transferred to the storage areas in time for collection;
- e) Ensuring that the refuse and recycling stores are kept tidy so that collections can take place efficiently;
- f) Service yard staff who will be trained to assist vehicles manoeuvring to and from the Airport as necessary; and
- g) Undertaking monthly servicing and maintenance checks of the service yard.

#### **Residual Effects**

##### Demolition and Construction

11.146 As a result of the mitigation measures that would be contained within the agreed CEMP and CLP, such as the designation of construction routes, the likely residual effects of construction traffic would be **temporary, Minor Adverse**.

#### **Completed Development**

##### Traffic Flows

11.147 Following completion and full utilisation of the proposed CADP, aside from the road link created on Hartmann Road (East), the change in traffic flows on links surrounding the Airport varies between **Minor Beneficial** and **Moderate Adverse**.

11.148 With the implementation of the Travel Plan, TMP and DSP, overall, the residual effect is **Minor Adverse**.

##### Public Transport

11.149 Since the CADP would generate an increase in the number of journeys by public transport, particularly by DLR, it is considered that it would have a **Minor Beneficial** effect on existing public transport conditions. This is because of the additional revenue that would be generated by the additional passengers.

11.150 It is also worth noting that crowding on the DLR is not significantly exacerbated by the proposed CADP.

11.151 The TMP will manage the arrangements for black taxis and private hire minicabs, minimising the effects on the road network and on Hartmann Road in particular.

#### Driver Delay

11.152 With the continued effect of the Travel Plan in promoting sustainable transport modes, as well as the creation of an additional vehicle access to the Airport, the likely residual effect on driver delay is expected to be **Minor Adverse to Negligible**.

#### Environmental Effects

11.153 With the CADP in place, the likely residual effects on the environmental effects such as Severance, Pedestrian Delay, Pedestrian Amenity and Fear and Intimidation are expected to be **Negligible**.

### **Conclusions and Recommendations**

11.154 The potential effects, mitigation measures and resulting likely residual effects in relation to the CADP are summarised within **Table 11.12**.

**Table 11.12 – Summary of Potential Effects, Mitigation and Residual Effects**

<b>Issue</b>	<b>Potential Effect</b>	<b>Further Mitigation</b>	<b>Residual Effect</b>
Demolition and Construction	Temporary Moderate Adverse	Construction Logistics Plan	Temporary Minor Adverse
Road Network	Moderate Adverse → Minor Beneficial	Travel Plan, Taxi Management Plan, Delivery and Servicing Plan	Minor Adverse
Public Transport Network	Minor Beneficial	Taxi Management Plan	Minor Beneficial
Severance	Minor Adverse → Negligible	-	Negligible
Driver Delay	Minor Adverse	Travel Plan	Minor Adverse → Negligible
Pedestrian Delay	Negligible	-	Negligible
Pedestrian Amenity	Minor Beneficial	-	Minor Beneficial
Fear and Intimidation	Minor Beneficial	-	Minor Beneficial
Accidents and Safety	Negligible	-	Negligible



## 12 Water Resources and Flood Risk

### Introduction

- 12.1 This chapter considers the proposed CADP in terms of its potential impact on the hydrological regimes of the Application Site and its surroundings, in particular the likely significant effects on flood risk and water quality. This assessment provides details of monitoring that has been undertaken within the Royal Docks, including within open and covered water. Where impacts are considered to be significant, mitigation measures are proposed to reduce any detrimental effects to acceptable levels.
- 12.2 A detailed Flood Risk Assessment (FRA) has been produced (see Appendix 12.1), and is referred to within this chapter, together with the CADP Surface Water Drainage Strategy produced by TPS and Atkins, which is provided in Appendix 12.2.

### Planning Policy & Legislative Context

#### European Legislation

##### Water Framework Directive

- 12.3 The European Water Framework Directive (WFD) came into force in December 2000 and became part of UK law in December 2003. The Directive is designed to help protect and enhance the quality of surface water (including lakes, streams and rivers), groundwater, groundwater dependant ecosystems, estuaries and coastal waters out to one mile from low-water.
- 12.4 Over the next few years, the existing statutory targets and legislation relating to water quality will be replaced with a new set of water quality standards under the umbrella of the Water Framework Directive. Under the WFD, all river basins are required to achieve 'good ecological status' by 2015 unless there are grounds for derogation.

#### National Planning Policy

##### National Planning Policy Framework

- 12.5 The National Planning Policy Framework and the related Technical Guidance (NPPF) (DCLG 2012) sets out the Government's national planning policy on development and flood risk. The policy and guidance within the NPPF is based on the former Planning Policy Statement 25. The NPPF classifies Flood Zones, which describe the risk of flooding to an area as follows:
- a) Flood Zone 1: Low probability of flooding (less than 1 in 1000 annual probability of river or sea flooding in any year);
  - b) Flood Zone 2: Medium probability of flooding (between a 1 in 100 and 1 in 1000 annual probability of river flooding and between a 1 in 200 and 1 in 1000 annual probability of sea flooding in any year);
  - c) Flood Zone 3a: High probability (1 in 100 or greater annual probability of river flooding or 1 in 200 or greater annual probability of sea flooding in any year);



- d) Flood Zone 3b: the functional floodplain, where water is stored in times of flood, including water conveyance routes (annual probability of 1 in 20 or greater in any given year or designed to flood in a 1 in 1000 flood).
- 12.6 The NPPF defines the Sequential and Exception Tests that are used to steer development towards areas at lowest probability of flooding. The NPPF specifies that planning applications submitted for developments within Flood Zone 2, Flood Zone 3a or Flood Zone 3b require a Flood Risk Assessment (FRA) to be undertaken in order to assess the potential impacts of all sources of flooding to the site and identify suitable mitigation measures to reduce the risk of flooding to an acceptable level.
- 12.7 As the Application Site is partially within Flood Zones 2 and 3, an FRA has been undertaken in order to assess the potential impacts of all sources of flooding to the Site. The FRA report, included as Appendix 12.1, provides evidence to demonstrate how the proposed CADP passes the Sequential Test. It considers the risk of flooding to the Application Site from all sources and identifies suitable mitigation measures to ensure risk is reduced to an acceptable level. The opportunity to use Sustainable Urban Drainage Systems (SuDS) to provide surface water attenuation has been considered in the FRA and is further detailed in the CADP Surface Water Drainage Strategy (Appendix 12.2).

### **Regional Planning Policy**

- 12.8 The Application Site is within the London Borough of Newham which is covered by The London Plan (2011). The Plan contains various policies pertaining to flood risk and drainage, the relevant aspects of which are reproduced below.

#### *Policy 5.11 Green roofs and development site environs*

- 12.9 This policy promotes the use of green roofs and walls where feasible, to deliver objectives including sustainable urban drainage amongst other wider environmental and sustainability benefits.

#### *Policy 5.12 Flood risk management*

- 12.10 This Policy identifies that the Mayor will work with all relevant agencies including the Environment Agency to address current and future flood issues and minimise risks in a sustainable and cost effective way.
- 12.11 Development proposals must comply with the flood risk assessment and management requirements set out in PPS25 (now the NPPF) over the lifetime of the development and have regard to measures proposed in Thames Estuary 2100 (The Environment Agency, 2012)<sup>(v)</sup> and Catchment Flood Management Plans.
- 12.12 The Policy sets out requirements for developments for which the Exceptions Test is applicable and developments adjacent to flood defences.

#### *Policy 5.13 Sustainable drainage*

*“Development should utilise sustainable urban drainage systems (SUDS) unless there are practical reasons for not doing so, and should aim to achieve Greenfield run-off rates and*

*ensure that surface water run-off is managed as close to its source as possible in line with the following drainage hierarchy:*

- 1. store rainwater for later use*
- 2. use infiltration techniques, such as porous surfaces in non-clay areas*
- 3. attenuate rainwater in ponds or open water features for gradual release*
- 4. attenuate rainwater by storing in tanks or sealed water features for gradual release*
- 5. discharge rainwater direct to a watercourse*
- 6. discharge rainwater to a surface water sewer/drain*
- 7. discharge rainwater to the combined sewer.*

*Drainage should be designed and implemented in ways that deliver other policy objectives of the Plan, including water use efficiency and quality, biodiversity, amenity and recreation”.*

- 12.13 The London Plan is supported by Supplementary Planning Guidance: Sustainable Design and Construction (May 2006). In relation to Water Pollution and Flooding, the guidance states that the Essential Standard is to use SuDS measures, wherever practical and to achieve 50% attenuation of the undeveloped site’s surface water run-off at peak times. The Mayor’s preferred standard is to achieve 100% attenuation of the undeveloped site’s surface water run-off at peak times.

### **Local Planning Policy**

- 12.14 The London Borough of Newham adopted its Core Strategy on 26th January 2012. It has the following policy relating to Flood Risk:

#### *Policy SC3 Flood Risk*

*“The Strategic Flood Risk Assessment will inform spatial planning and development management decisions and flood risk (caused by tidal, fluvial, surface water, sewer and groundwater flooding) will be reduced by the following measures:*

- a) Applying the sequential and exceptions requirements of PPS25 (now NPPF) to avoid development that is not appropriate;*
- b) Developing Flood Risk Assessments in line with PPS25 and advice from, and in conjunction with, the Environment Agency;*
- c) Incorporating Sustainable Urban Drainage Systems in all Major Development in conjunction with Policy SC1, the London Plan drainage hierarchy and PPS25 (now NPPF), and adopting a presumption against hard-standing on domestic gardens and public open space;*

- d) *Working with partners to identify critical drainage areas susceptible to surface water flooding, and develop measures to manage, and where possible, reduce the risk of surface water flooding;*
- e) *Working with partners to maintain existing flood defences, and expecting developments to contribute to their improvement, enhancement or re-naturalisation, and improving the borough's flood resistance by supporting infrastructure improvements set out in Strategic Flood Risk Assessment;*
- f) *Expecting development be set back from the Blue Ribbon Network to create, enhance and improve river corridors and enable access for the maintenance and improvements of flood defences, in conjunction with Policy INF7; and*
- g) *Encouraging the local community in flood risk areas to take up opportunities to improve resilience and resistance of existing homes and buildings."*

#### **Thames Estuary 2100 Plan (TE2100)**

- 12.15 The Royal Docks fall within the TE2100 Plan Policy P4 area which identifies that there is a need to:

*"Take further action to keep up with climate change and land use change so that flood risk does not increase."*

#### **Thames River Basin Management Plan (December 2009)**

- 1.15.1 The Thames River Basin Management Plan (which covers the Medway catchment) focuses on protection, improvement and sustainable use of the water environment. The River Basin Management Plan identifies nine key pressures that need to be dealt with in this river basin district. Six of these key pressures are applicable to the CADP proposals, namely:

- a) Abstraction and flow regulation;
- b) Pesticides;
- c) Phosphates;
- d) Physical modification;
- e) Urban and transport pollution; and
- f) Chemicals.

#### **Environment Agency Designations**

- 12.16 The Environment Agency (EA) helps to protect groundwater by identifying different types of aquifer (underground layers of water-bearing permeable rock or drift deposits from which groundwater can be extracted). The following aquifer designations are used:

- 1 **Principal Aquifers** - These layers of risk or drift deposits that have high inter-granular and/or fracture permeability – meaning they usually provide a high level of water storage. They may support water supply and/or river base flow in a strategic scale.

- 2 **Secondary Aquifers** – These include a wide range of rock layers or drift deposits with an equally wide range of permeability and storage. Secondary Aquifers are subdivided into two types:
- Secondary A – permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers.
  - Secondary B – predominantly lower permeability layers which may store and yield limited amounts of groundwater due to localised features such as fissures, thin permeable horizons and weathering.
  - Secondary Undifferentiated – is assigned in cases where it has not been possible to attribute either category A or B to a rock type.
- 3 **Unproductive Strata** – are rock layers or drift deposits with low permeability that have negligible significance for water supply or river base flow.

12.17 The Environment Agency define groundwater source catchments into three zones:

- a) SPZ 1 – Inner Protection Zone – Defined as the 50 day travel time from any point below the water table to the source. This zone has a minimum radius of 50 m.
- b) SPZ 2 – Outer Protection Zone – Defined by a 400 day travel time from a point below the water table. The previous methodology gave an option to define SPZ 2 as the minimum recharge area required to support 25% of the protected yield.
- c) SPZ 3 – Source Catchment Protection Zone – Defined as the area around a source within which all groundwater is presumed to be discharged at the source. In confined aquifers, the source catchment may be displaced some distance from the source. For heavily exploited aquifers, the final Source Catchment Protection Zone can be defined as the whole aquifer recharge area where the ratio of groundwater abstraction to aquifer recharge (average recharge multiplied by outcrop area) is  $>0.75$ .

## **Assessment Methodology**

### Significance Criteria

- 12.18 The assessment of effects assumes that any corresponding impacts can be apportioned to one of two clearly defined scenarios:
- a) Short-term impacts occurring during the CADP construction phase (construction effects) as described in Chapter 6: Development Programme and Construction; or
  - b) Longer-term impacts occurring after the CADP has been built out, resulting from changes in the nature of the Application Site use or its ongoing operation (operational effects). These are considered for the Principal Assessment Year (2023), as described in Chapter 3: EIA Methodology.
- 12.19 The significance of effects on surface water and flood risk is determined by qualitative assessment based upon the data available. This includes establishing the baseline site condition, an appraisal of the development proposals and operational processes, and the application of professional judgement. Effects on groundwater are considered in Chapter 16.
- 12.20 The assessment of effects has used the significance criteria outlined in Table 12.1:

**Table 12.1 - Significance Criteria**

Significance Criteria	
Major Beneficial	Permanent or major (by extent, duration or magnitude) improvement in surface water quality or flood risk, affecting a receptor of more than local significance.
Moderate Beneficial	Moderate (by extent, duration or magnitude) improvement in surface water quality or flood risk which may be considered significant in the context of the sensitivity of the receptor.
Minor Beneficial	Slight, short-term or highly localised improvement in surface water quality or flood risk.
Negligible	Impact of no significance due to the low magnitude of the impact or the low sensitivity of the receptor.
Minor Adverse	Slight, reversible or short-term negative impacts on local water quality or flood risk.
Moderate Adverse	Moderate (by extent, duration or magnitude) negative impact on surface water quality or flood risk which may be considered significant in the context of the sensitivity of the receptor, or does not conform to applicable guidance or policy.
Major Adverse	Irreversible or major impact (by extent, duration or magnitude) affecting a receptor of more than local significance, or a breach applicable legislation, guidance or policy.

#### Scope of Assessment and Consultations

- 12.21 The key issues identified during the scoping process (see Chapter 3: EIA Methodology) to be addressed within this assessment related to the clarification/ assessment of flood risk issues, the proposed surface water drainage strategy and the potential for site activities to impact the quantity and quality of water run-off.
- 12.22 An initial scoping response letter was received by the Environment Agency (EA) on 20<sup>th</sup> November 2012 (included in Appendix 3.2 of this ES). This raised matters to do with historic contamination, water quality, aquatic ecology, flood risk and drainage. Subsequently, a meeting was held with the EA on 9th January 2013. The key points discussed and agreed at this meeting are summarised below:
- a) A Flood Risk Assessment (FRA) would be required to accompany the proposed CADP planning submission and this should provide an assessment of all potential sources of flooding.
  - b) The surface water drainage strategy for the proposed CADP should take a holistic approach to reducing the surface water discharge from the Application Site, with an ideal aim of achieving greenfield runoff rates in compliance with London Plan policy 5.13.
  - c) The EA acknowledged if this could not practicably be achieved, for instance due to space limitations, aircraft operations or ground conditions, then a 50% reduction in the pre-development discharges to the existing sewer systems would be considered acceptable.
  - d) The EA acknowledged that part of the existing and proposed development is built over an existing dock and therefore the strategy to reduce flow rates, would be different from a typical land based development.
  - e) The surface drainage hierarchy stipulated in London Plan policy 5.13 should be followed, with the use of Sustainable Drainage Systems (SUDS) systems and a preference to infiltrate.
- 12.23 Meetings were also held with Thames Water on 7<sup>th</sup> February and 12<sup>th</sup> April 2013, to discuss the outline drainage proposals for the proposed CADP, and with the Royal Docks Management Authority (RoDMA) on 10<sup>th</sup> December 2012 and 1<sup>st</sup> May 2013 to discuss the potential for



drainage outfall to KGV Dock as well as other matters. The outcome of these meetings is reported more fully in Proposed Surface Water Drainage Strategy (Appendix 12.2).

- 12.24 A qualitative assessment of the likely impacts on local surface water quality has been undertaken and is presented in this chapter. Details of the potential effects of soil contaminants on groundwater quality are dealt with in Chapter 16: Ground Conditions and Contamination, whilst the relationship between aquatic ecology and the limnology/ biochemical quality of KGV Dock is considered within Chapter 13: Ecology and Biodiversity.
- 12.25 The area of study for this assessment comprises the Application Site boundary. However, the wider hydrological setting is also considered where relevant.

### **Technical Assumptions and Methodology**

- 12.26 The assessment methodology involved an initial review of the Application Site's baseline characteristics, followed by an assessment of the likely impacts from the proposed CADP, including direct or indirect, secondary, cumulative short or long-term, permanent or temporary, positive or negative effects. The magnitude of any impact upon the water environment is assessed in relation to baseline conditions and the presence of potentially sensitive receptors. The significance of impacts is assessed using the criteria established in Table 12.1.
- 12.27 Mitigation measures have been identified to ameliorate any potential negative impacts, where appropriate, and to seek to enhance the environment where possible. The assessment subsequently evaluates any residual impacts following the implementation of mitigation.
- 12.28 The baseline assessment has included the review of available historical information relating to the Application Site, a visit to the Site and its surrounds, and review of available data relating to the Application Site, its surroundings and their environmental sensitivity. The baseline assessment is based on data sourced from a number of different organisations / authorities, including:
- a) Environment Agency;
  - b) Ordnance Survey;
  - c) British Geological Survey; and
  - d) Centre for Ecology and Hydrology.
- 12.29 The following technical information has also been referenced within the assessment:
- a) Environment Agency Data, November 2011, Reference: NE29124AC<sup>(i)</sup>;
  - b) Envirocheck Report, dated 12<sup>th</sup> December 2011, Reference 36988474<sup>(ii)</sup>;
  - c) RPS, London City Airport: King George V Dock Limnological Investigations 2010 and 2011, Draft v2, reference JPP2065-R-002d, dated 26th May 2011<sup>(iii and iv)</sup> and update limnology survey report of February 2013
  - d) RPS, Flood Risk Assessment for London City Airport, RCEF17455-002 R Final, dated July 2013 (included as Appendix 12.1).;
  - e) London City Airport Proposed Surface Water Drainage Strategy – City Airport Development Programme, LCY-CADP-ATK-TPS-RPT-0001, Final dated 12<sup>th</sup> July 2013;

- f) Thames Estuary 2100 (TE2100) – Managing flood risk through London and the Thames Estuary, November 2012<sup>(vi)</sup>; and
  - g) The London Borough of Newham Strategic Flood Risk Assessment, Final Report, May 2010<sup>(vi)</sup>.
- 12.30 A detailed Flood Risk Assessment (FRA) has been undertaken for the CADP in accordance with the NPPF, and is located in Appendix 12.1. The key components of the FRA are as follows:
- a) Assessment of key sources of flooding;
  - b) Consideration of existing surface water run-off regime at the Airport; and
  - c) Proposed surface water drainage strategy for the proposed CADP, including the consideration of discharge to the Thames Water sewer and KGV Dock, together with the potential use of SuDS and attenuation measures.
- 12.31 Technical assumptions, where applicable, are discussed within the FRA Report (Appendix 12.1).

## **Baseline Conditions**

### Site Description

- 12.32 The CADP Application Site consists of an operational Airport and extends to an area of 48.5 hectares which is mostly hardstanding except for the grass which surrounds the airfield. The CADP will involve the decking over of approximately 7.5 ha of King George V (KGV) Dock. The existing drainage catchment for the landside aspects are detailed in the Proposed Surface Water Drainage Strategy (Atkins and TPS). This area occupies a total of 7.26 ha. There is likely to be an overall increase in hardstanding in these areas (depending on the final design). Measures are included to reduce flows from the site.
- 12.33 A more detailed description of the Application Site and the CADP is provided in Chapter 2: Site Context and Scheme Description.

### Topography

- 12.34 Reference to topographic levels along the existing taxi-lane (Airsides), along the southern boundary of the taxi-lane and adjacent to the dock edge are between 5.60 m AOD and 5.70 m AOD. The levels rise up slightly from this point and then drop down to the runway, to between 4.80 m AOD and 5.00 m AOD.
- 12.35 Levels along the southern boundary of the dock (Landside) are shown to be typically between 5.40 m AOD and 5.70 m AOD. These levels fall away to Hartmann Road to the south to 4.20 m AOD to 4.40 m AOD in the area of the proposed West Terminal Extension and Forecourt, and between 5.20 m AOD and 5.50 m AOD along the southern boundary of the eastern Dockside area.

### Hydrological Setting

- 12.36 The nearest surface water features to London City Airport are KGV Dock located directly to the south and the Royal Albert Dock located directly to the north. The maximum water level in KGV

Dock is 4.24 m ODN (7.59 CD) and the minimum water level in the dock is 3.44 m ODN (6.79 CD). Therefore, there is a variation in depth of 0.8 m. The water level within the impounded Royal Docks network is maintained within this range by pumping from the River Thames, this being the responsibility of RoDMA.

- 12.37 KGV Dock joins the River Thames at Gallions Reach via a lock system located at the eastern end of the dock.
- 12.38 The Woolwich Reach of the River Thames is located approximately 460 m south of the Application Site. The River Lee is located approximately 2.5 km west of the Application Site, where it outflows into the River Thames. Barking Creek is located approximately 2.25 km east of the Application Site where it also outflows to the River.
- 12.39 Reference to the EA's website identifies that the Airport is not located within an area at risk of reservoir flooding.

#### Geological Setting

- 12.40 Reference to the British Geological Survey online mapping indicates that the Application Site is underlain by Alluvium up to several metres in thickness. The Alluvium is described as silty peaty sandy clay. The Alluvium is shown to be underlain by bedrock comprising the Lambeth Group at the eastern end of the Site, to a depth of up to 30 m. The Lambeth Group is described as clay, silt and sand.
- 12.41 The near surface geology of the Application Site has been confirmed through a number of recent site investigations, as described in Chapter 16: Ground Condition and Contamination.
- 12.42 The Lambeth Group/Alluvium is identified as being underlain by the Thanet Sand Formation at the central and eastern sections of the Application Site. The Upper Chalk Formation is identified as underlying the western end of the site and is in excess of 80 m in thickness.
- 12.43 The Lambeth Group, Thanet Sand strata and Chalk strata are designated as Water Framework Directive (WFD) groundwater bodies. The Directive is designed to give help to protect and enhance the quality of groundwater. Under the WFD, all river basins are required to achieve 'good ecological status' by 2015 unless there are grounds for derogation.

#### Hydrogeological Setting

- 12.44 According to the EA's online Groundwater Vulnerability Mapping, the superficial strata at the surface are classified as a Secondary (undifferentiated) Aquifer. The Lambeth Group and Thanet Sand Formation are described as a Secondary A Aquifer. The Thanet Sand Formation and the deeper Chalk strata are classified as Principal Aquifers.
- 12.45 Reference to the EA's online groundwater Source Protection Zone map indicates that the Application Site is not located within a groundwater Source Protection Zone.
- 12.46 Shallow groundwater flow is likely to be in hydraulic continuity with the River Thames, located approximately 460m south of the site. The River Thames flows in an easterly direction,

therefore groundwater beneath the Application Site is likely to flow in a south-easterly direction. However, as reported in Chapter 16, a recent site investigation (RPS, March 2013), recorded shallow groundwater within the Made Ground, with depths to groundwater during monitoring ranging from 0.80 m below ground level (bgl) in the eastern area of the site to up to 4.22 m bgl in the vicinity of the existing terminal building. Groundwater flow within the Made Ground appeared to be towards the west. This may be on account of that fact that perched groundwater flow in the Made Ground may be influenced by local stratigraphy and can therefore have independent flow direction to that of the deeper groundwater.

- 12.47 There are four records of licensed groundwater abstractions within 2 km of the Airport. These relate to light industry and amenity uses.

#### Flood Risk

- 12.48 Reference to the EA's indicative floodplain maps identifies that the Airport is located within Flood Zone 3 associated with tidal flooding from the River Thames. Based on the presence of the River Thames flood defences (including the Thames Barrier), the risk of flooding associated with the Airport is a residual risk. A 'residual risk' is the remaining risk following application of theoretically possible safety measures (i.e. flood defences in this case).
- 12.49 Modelled flood levels have been provided by the EA for node points along the Gallions Reach and Woolwich Reach of the River Thames. Information provided by the EA is included within the Flood Risk Assessment (Appendix 12.1). The modelled flood levels are shown in Table 11.2 below:

**Table 12.2: River Thames Modelled Flood Levels**

Node and Grid reference	Year	Annual Probability of Occurrence	
		1 in 200 (0.5%)	1 in 1000 (0.1%)
2.49 (TQ 41357 79533)	2005	4.72	4.75
	2055	4.72	4.73
	2107	4.73	4.85
3.01 (TQ 41634 79577)	2005	6.26	6.73
	2055	6.58	7.04
	2107	7.11	7.60
3.04 (TQ 44419 80001)	2005	6.17	6.63
	2055	6.48	6.94
	2107	6.99	7.48

- 12.50 Information provided by the EA records that the Airport has not been affected by flooding at any time. However, two areas within the vicinity of the Airport have been affected by historic flooding events. The map shows that one area, located approximately 500 m south of the Site on the bank of the River Thames, was affected by flooding in 1928. The information provided by the EA does not identify the location of the other historic flood event, which occurred in 1953.
- 12.51 Flood defences along the River Thames in proximity to the Application Site are all raised, man made and privately owned. The EA inspects these defences at least twice a year to ensure that they remain fit for purpose.

- 12.52 The flood defence level (FDL) down river of the Thames Barrier is 7.2 m ODN, and up river the FDL is 5.18 m ODN. The overall condition of the defences in this area is 2 (Good) on a scale of 1 (very good) to 5 (very poor).
- 12.53 Information within the Strategic Flood Risk Assessment (SFRA) (Capita Symonds, 2010)<sup>(v)</sup> identifies that the KGV Gate provides protection to the Royal Docks and low lying land in Newham from extreme tidal events in the River Thames that exceed the water level in the Docks. The KGV Gate forms the defence at the entrance to KGV Dock, lying on the seaward side of the lock gates. The KGV Gate is owned and operated by the EA and is closed according to the Thames Barrier closure rule. It normally sits on the north side of the lock entrance. To close, it rolls out across the lock with a controlled flap dropping into place, blocking the full width and depth of the lock.
- 12.54 The SFRA identifies that the mitre lock gates at the dock entrance (in the landward side of KGV Dock Gate) only hold water in - high water levels in the Thames will push them open. The KGV Gate therefore removes the need to raise the lock gates to the statutory defence level of 7.20 m AOD.

#### Existing Drainage

- 12.55 As reported in the Proposed Surface Water Drainage Strategy (Appendix 12.2), it has been determined that the Airport site is drained via separate foul and surface water gravity collection systems.
- 12.56 Based on Thames Water asset plans, the existing drainage networks within the Application Site are private. This was also confirmed by Thames Water at meetings held on 7<sup>th</sup> February 2013 and 12<sup>th</sup> April 2013.
- 12.57 The airside area is drained by a number of existing surface water drainage sewers, which are described below.

#### ***Existing Airside Drainage***

- 12.58 The airfield is typically drained from the east to the west due to the constraint of KGV Dock present to the Northern, Southern and Eastern boundaries. There are four main drainage runs that travel east to west as follows:
- a) North of the runway (300 to 525mm diameter)
  - b) South of the runway (300 to 525mm diameter). This also picks up the runway hold drainage
  - c) Eastern Stand Drainage (stands 21 to 24) and runway link Delta (225 to 750mm diameter)
  - d) Original Stands Drainage (Stands 1 to 10) (600mm diameter)
- 12.59 These four runs connect into the same drainage system at manholes to the north of the Airport fire station located at the western end of the existing West Pier. An easterly drain run from the western part of the airfield also connects to the system around the same location. The drain then increases to 900mm diameter and passes southeast towards Stand 14, where the drainage from Stands 12 to 14 connect to the system. This 900mm diameter drain further connects to the Thames Water Network and soon increases in size to an 1800mm diameter drain known as the "Royal Docks Surface Water Sewer (Connaught Drain)".

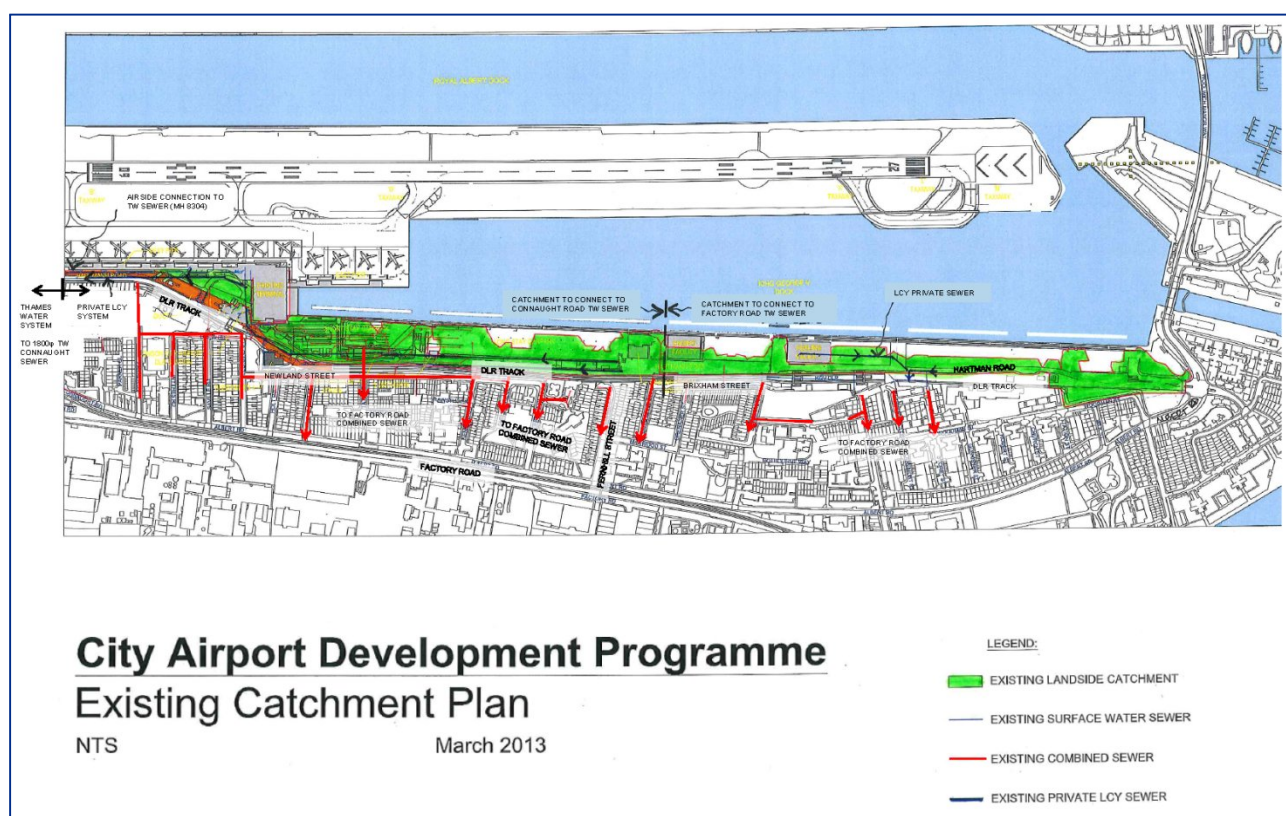


- 12.60 The existing airfield drainage arrangements are further described in Section 4 of the Surface Water Drainage Strategy and illustrated on TPS drawing SK023 in Appendix C of that document (contained in ES Appendix 12.2).

### **Existing Landside Drainage**

- 12.61 The landside area of the Application Site (including the area of the proposed Western Terminal Extension, Forecourt, Eastern Terminal Extension and Dockside) is drained by a number of existing surface water drainage sewers, which are described in the Surface Water Drainage Strategy (ES Appendix 12.2) and illustrated by Figure 12.1 below:

**Figure 12.1 Existing Catchment Plan**



- 12.62 An existing Surface Water sewer crosses the landside site area, flowing from east to west, and ultimately discharging to Thames Water Connaught Surface Water Sewer further west, which then runs north and east and discharges to the River Thames. The pipe sizes vary, starting near the existing Airport KGV Building (opposite Fernhill Street) at 300mm diameter and leaving the landside CADP area through the Western Terminal Extension area at 600mm diameter.
- 12.63 Further east from Fernhill Street (to the south of the DLR), there are a number of combined sewer connections which run north/south perpendicular to the Newland Street/ Brixham Street connecting to an 1200mm Main Line combined sewer to the south in Factory Road.
- 12.64 A recent survey by MSA (LCY Surface Water Drainage Survey, March 2013 – see Appendix 12.2) indicated 13 surface and foul drainage routes from the site (1 to the west and 12 to the south) crossing the DLR line. The connections are believed to be private extensions/stubs to

the boundary of the East Development area (via the adjacent DLR drainage system) which pick up runoff collectors, such as gullies and combined kerb drainage units.

- 12.65 A large proportion of the CADP Dockside area to the east of the Terminal building does not have a positive drainage system. However, it is evident from existing topography and lack of drainage infrastructure that a proportion of the area drains to the sewers in Hartmann Road by overland flow.

#### Surface Water Quality

##### ***Dock Water***

- 12.66 This assessment provides details of monitoring that has been undertaken within KGV Dock, including open and covered water. Effects associated with the observed stratification of the Dock and its associated limnology (reduced oxygenation of dock water) is also presented below, as well as within Chapter 13: Ecology and Biodiversity.
- 12.67 The water quality of KGV Dock is monitored regularly by the RoDMA. A surface water sample is taken from the former waterski club and the water bike area, to the east of the Dock.
- 12.68 Samples are mainly taken for health and safety reasons, but provide an indication of the water chemistry of the Dock including salinity levels, oxygen and nutrient availability. Table 12.3 shows RoDMA data for 13<sup>th</sup> May 2013.

**Table 12.3: RoDMA data 24<sup>th</sup> June 2013 (Source: RoDMA REPORT PO:6700)**

Parameter	Measurement	Parametric Value SI1991, No.1597 or Mandatory Value 76/160/EEC*	Guidance Value 16/160/EEC
<b>On site Observations</b>			
Water Colour	Green/brown	No abnormal change	-
Oil Film	None observed	No visible film	0.3
Lasting Foam / Surfactants	None observed	No lasting foam	0.3
Phenolic Odour / Phenols	None observed	No specific odour	<0.005
Floatables	None observed	-	Absence
<b>On site Measurements</b>			
pH	7.9	6 to 9*	-
Electrical Conductivity (uS/cm, 25 deg C)	4,250	-	-
Water Temperature (deg C)	15.0	-	-
Transparency (Secchi depth (m))	1.5	1*	2
Dissolved Oxygen Saturation (%)	93	-	80 to 120
<b>Laboratory analysis</b>			
Total coliforms per 100 ml	1	10,000	500
E. coli (coliforms) per 100 ml	None detected	**	**
Presumptive enterococci per 100 ml	None detected	**	**

Note - \*\* Bathing Water Regulations – (SI2008 No. 1097) (Annex 1 of 2006/7/EC)

	Excellent	Good	Poor
E.coli	<250	250 to 500	>500
Presumptive Entrococci	<100	100 to 200	>200

- 12.69 The RoDMA report identifies the dock water at this location complies with the Mandatory Value of SI 1991, No. 1597 and 76/160/EEC. In addition both the concentration of total coli forms and the transparency depth were less than the Guideline Value (76/160/EEC).. Based on the concentrations of E.coli (less than 250 per 100 ml) and no presumptive enterococci detected the water is of 'Excellent Quality' for coastal and transitional waters (2006/7/EEC and SI 2008 No.1097).
- 12.70 Surveys of KGV Dock were undertaken by RPS in August 2010, March 2011 and January 2013; the aims of which were to measure certain water quality variables at different depths and locations within KGV Dock and to assess the potential impacts of the proposed CADP on the limnology of the Dock based on these results. This focused on two areas of KGV Dock: the area under the Eastern Apron (stands 21-24), and the open water area which would be covered were the proposed CADP to go ahead.
- 12.71 The basis of the investigations was to use key water quality variables, including: temperature, oxygen, pH and water transparency, with respect to conditions for aquatic life and identifying any gradients in water chemistry; and, conductivity and salinity to understand any influence that the River Thames might have on KGV Dock.

- 12.72 Water samples were taken from profiles in the water column by RPS on three occasions (27<sup>th</sup> August 2010, 2<sup>nd</sup> March 2011 and 16<sup>th</sup> January 2013) from the open area of KGV Dock and under the apron. These dates covered the main seasons of the year, particularly with respect to the persistence of any stratification in the water column.
- 12.73 In total, samples were taken from seven profiles in August 2010 - four from the open area of KGV Dock and three from under the apron (one being from an access point in the apron with entry gained through a manhole cover, and two by divers swimming under the runway). In March 2011, five profiles were taken - four from the open area of KGV Dock and one from under the apron collected through the access point. In January 2013, a total of seven profiles were taken - three from under the apron and four from the open water.
- 12.74 On each sampling occasion, one of the profiles was made through a manhole cover in the apron. This is directly above the old dry dock (below the western stands and runway) which now contains water, having been opened up to the docks during the construction of the Airport. The structure of the old dry dock is described in more detail in Chapter 14: Cultural Heritage.
- 12.75 Additional surface water samples were taken at 24 sampling points within both the open water (21) and covered areas (3) of KGV Dock. Pre-labelled sampling bottles were used to collect samples and these samples were submitted for analysis of a range of variables in August 2010. Furthermore, in March 2011, water samples were tested for concentrations of nitrate, phosphate and chlorophyll-a. In addition to providing a description of the water chemistry for KGV Dock, nitrate and phosphate concentrations provide a good indication of the availability of nutrients for the growth of phytoplankton (microscopic algae suspended in the water) and chlorophyll-a is an indirect measure of the amount of phytoplankton.
- 12.76 The RPS report detailing the findings of the above limnology surveys is included in ES Appendix 13.2. This identified that the open water chemistry of the surface waters is relatively uniform from one sampling point to another.
- 12.77 Stratification was present in the water column between six and seven metres where a notable drop off in oxygen levels and temperature occurred. There was also an increase in the salinity and conductivity below this level. These conditions persist both in the open water and beneath the deck of the Eastern Apron.
- 12.78 The interpretation of this strong pattern of stratification is that the temperature gradient is the dominant feature, although a true thermocline was not observed, i.e. temperature continued to drop below the level of change. This stratification persisted in all three surveys, with no evidence of any turnover or even mixing between water layers.

#### ***Off-site/ River Water Quality***

- 12.79 Reference to the EA website identifies that there is river quality data for the River Lee to the point where it flows into the River Thames. This reach of the River Lee has a chemistry classification grade C (fairly good) which is suitable for potable supply after advanced treatment, good cyprinid fisheries and natural ecosystems. The River Lee Navigation is identified as having a moderate current ecological quality. There is no river quality data for the reach of the River Thames closest to the Application Site.

- 12.80 The current ecological and chemical quality for the reach of the River Thames, including the Gallions Reach and the Woolwich Reach neighbouring the Airport, are not identified for the Water Framework Directive on the EA's website.
- 12.81 The EA River Basin Management Plan for the Thames River Basin District summarises the overall quality of the estuaries and coastal water bodies as per the details in Figure 12.2 below.

**Figure 12.2 - EA Statistics for estuaries and coastal waters close to the Airport**

Table 22 Key statistics for estuaries and coastal waters at a glance				
	Estuaries		Coastal	
	Now	2015	Now	2015
% at good ecological status or potential	0	0	0	0
% assessed at good or high biological status (5 water bodies assessed)	0	50	0	0
% assessed at good chemical status (5 water bodies assessed)	20	40	-	-
% at good status overall (chemical and ecological)	0	0	0	0
% improving for one or more element		27		0

Source: Environment Agency River Basin Management Plan, Thames River Basin District, December 2009

The River Basin Management Plan for the Thames River Basin District (Annex A: Current State of Water) records that the River Lee, Whittings Sewer, Thames, Creekhead, Trinity and Wylees sewers within the vicinity of the Airport had a 'moderate' ecological status in 2009. This rating is dictated by their biological, physico-chemical and hydro-morphological status.

- 12.82 Information on the EA website identifies that there is no bathing water quality information for the area within the vicinity of the Airport. Whilst the Royal Docks are not designated under the Bathing Water Directive, the Royal Albert Dock is frequently used for water sports (from the Regatta Centre) including rowing and occasional swimming. However, KGV Dock (which used to support a waterski centre) is no longer used for regular motorised water sports.

### **Environmentally Sensitive Protected Sites**

- 12.83 As described in Chapter 13: Ecology and Biodiversity, the Airport is not identified as being located within an Environmentally Sensitive/Protected Area, such as Special Area of Conservation (SAC), Special Protection Area (SPA), Nitrate Vulnerable Zone, Local Nature Reserve, Area of Outstanding Natural Beauty (AONB) or Site of Special Scientific Interest (SSSI).
- 12.84 The Royal Docks, of which KGV Dock forms part, is designated as a Site of Borough Importance for Nature Conservation in London. KGV Dock is also part of the Green Corridor Network of Newham due to its association with the River Thames and its tidal creeks, situated about 500 m to the south of the Airport. The river and the creeks are designated as a Site of Metropolitan Importance for Nature Conservation (SMINC).

### **Assessment of Likely Significant Effects**

- 12.85 This section assesses the likely significant effects of the proposed CADP on water resources and flood risk using the significance criteria given in Table 12.1. The impacts are considered for



stages of the project from construction through to the operational phase (2023: the Principal Assessment Year). The assessment includes consideration of mitigation measures, which are proposed as part of the CADP.

12.86 The range of potential environmental effects can be summarised as follows:

- a) Pollution of surface watercourses resulting from contaminants already present (in ground and dock sediments) being disturbed/mobilised during construction activities;
- b) Pollution of surface watercourses by discharge of materials and/or accidental spillage from plant and equipment during the construction phase;
- c) Potential for surface water to be contaminated by accidental spillages resulting in discharge of pollutants into the docks and subsequently to local watercourses (i.e. River Thames) during operational practices following completion of the proposed CADP;
- d) Potential surface water transport of pollutants into the docks and subsequently into local watercourses; and
- e) Potential effects associated with construction and the new CADP footprint (deck and landside development) within the River Thames tidal floodplain.

## **Construction Effects**

### Flood Risk

- 12.87 During construction works there is potential for a tidal flood to occur. Whilst the Airport is located within an area at risk of flooding, the risk is 'residual' based on the presence of the River Thames defences. As such, the risk associated with a breach of the Thames defences on construction activities / workers from tidal and fluvial flooding is considered to be a **minor adverse** temporary effect.
- 12.88 During construction work, before the new drainage system is installed, there is the potential for uncontrolled surface water runoff from the Application Site. As described in Chapter 6: Development Programme and Construction, a phased construction programme is proposed, with the first three new stands to be completed by Year 2-3 and the remaining four stands to be completed by Year 7. Therefore, the future drainage system (as described in Appendix 12.2) will be introduced in a phased manner.
- 12.89 In order to mitigate against surface water flooding during construction activities, the existing surface water drainage gullies will be maintained and used as long as possible during the construction. Whilst construction is ongoing, surface water may flow directly from the concrete platform into KGV Dock until the drainage system is fully operational. If necessary consent to discharge may be required, this would be covered under the environmental permit for the works. Control of surface water flow rates and volumes would not be required during this period as the majority of the development is either over KGV Dock or not positively drained at present. However, effective controls – used effectively during construction of the Eastern Apron in 2007-8) - will be put in place as part of the Construction Environmental Management Plan (CEMP) to ensure that sediment, oils, lubricants and other contaminants will not be released. The residual effect associated with surface water runoff during the construction phase of the proposed CADP is therefore considered to be **negligible**.

## Surface Water Quality

- 12.90 Construction of the proposed CADP will involve a significant amount of work in close proximity to, within and overhanging KGV Dock. This includes floating barges and rigs at the 'working face' of construction within the Dock, as well as fixed platforms and cranes at the Construction Compound located on the eastern part of the Dock frontage (as described in Chapter 6). There is potential for construction materials, fuels, lubricants, debris and sediment entering the water as a result of construction activities, or by accident. However, based on the experience of construction of the Eastern Apron (stands 21-24, in 2007-8), the risk of spillages or release of materials from such activities is likely to be **negligible**, especially where appropriate control measures, prescribed within the CEMP, are in place. Examples of such measures are given below.

### ***Release of sediment and contaminants from Piling***

- 12.91 During CADP construction works, including piling within KGV Dock to form the new deck and taxilane extension, there is potential for mobilisation of contamination trapped within the sediment on the bottom of KGV Dock.
- 12.92 As described in Chapter 6, it is proposed to pile into KGV Dock using continuous flight auger techniques within a cylindrical casing, with arisings brought up to a piling platform above the water via the casing. There is potential for mobilisation of sediment where the pile casing meets the sediment on the base of the Dock. However, the methods of inserting the casing and undertaking the piling have been selected to minimise the disturbance of dock sediment and bed material as far as possible, thus reducing the possibility of adverse effects on water quality. This technique was effectively used during the construction of the Eastern Apron (stands 21-24, in 2007-8).
- 12.93 Where sediment is mobilised laterally it is likely to quickly resettle within KGV Dock due to the strong stratification of the water column.
- 12.94 Taking account of the above, it can be concluded that the residual effect associated with the mobilisation of contaminated sediment from piling within KGV Dock is likely to be **negligible to minor adverse**. A water quality monitoring regime will be established during the piling works to inform the process and any action necessary to ensure that no adverse effects arise.
- 12.95 A Piling Risk Assessment has been undertaken by the project engineers TPS and is presented in Appendix 16.2). The risks to groundwater and the application of associated mitigation measures are discussed within Chapter 16: Ground Conditions and Contamination. In summary Chapter 16 identifies that the piling risk assessment sets out the preferred method of piling as a bored pile with a permanent steel casing. Bored piles are also proposed across the wider CADP. The use of bored piles will significantly reduce the potential for contaminated soil or perched groundwater to be driven down into the deeper, more sensitive aquifers during piling.

### ***Release of contaminants from stockpiling and construction processes***

- 12.96 During construction there is the potential for sediments to be washed off-site within runoff, and cause silting within KGV Dock. The short term effects of this can be effectively mitigated by the utilisation of good construction techniques and practices implemented through the CEMP. These include, amongst others, the following mitigation below:

- a) The prevention of silt-laden run-off and mud entering the site surface water drains, and KGV Dock, by timely site phasing and engineering of surface water drainage systems. Site roads will be regularly maintained and accumulating mud removed; and
- b) Good housekeeping (i.e. appropriate storage of construction materials, fuels/lubricants and waste) will minimise the potential for operational surface water drains to become blocked with debris. Functional drains will be regularly inspected for blockages and cleared as appropriate.

12.97 In view of the above, the residual effects associated with surface water quality during the construction phase are considered to be **negligible**.

## **Operational Effects**

### Flood Risk

#### *Tidal and Fluvial Flood Risk*

- 12.98 As stated previously, the Airport is located within Flood Zone 3, having regard to the tidal flooding from the River Thames. Due to the tidal nature of flooding associated with the London Borough of Newham, including the area in which the CADP is located there will therefore be no loss in fluvial floodplain storage and no alteration of fluvial flood flow routes. Due to the location of the concrete deck being in and above the impounded water level in the dock there will be a loss in volume associated with the deck and piles. The Environment Agency has confirmed that there is no requirement for compensation based on the tidal nature of flooding associated with the site.
- 12.99 The Airport is located within an area at risk of tidal flooding in the event of a breach or overtopping of the River Thames flood defences. The SFRA includes the consideration of a number of breaches of the River Thames defences within the vicinity of the Airport. Based on the presence of the Thames flood defences the risk of flooding is a residual risk. In the event of a breach of the KGV Dock Gate the time for inundation of the docks is identified as less than 2 hours, whilst the time to inundation of the land around the docks is identified as 2 – 13 hours. The proposed CADP will incorporate flood mitigation measures, including access to the first and second floors within the proposed passenger pier and access to the upper floors within the proposed hotel, inclusion of flood resilient construction techniques at ground floor level where possible, (such as painted blockwork rather than plasterboard, and locating electrical equipment and servers as high as possible on the ground floor) and production of a Flood Management Plan as detailed within the Flood Risk Assessment at Appendix 12.1. . Therefore, there will be a **negligible** effect on flood risk to the new East Pier, Eastern and Western Terminal extensions, the hotel and other occupied buildings within the CADP.
- 12.100 The proposed CADP includes the construction of a raised concrete platform above the level of the water impounded into KGV Dock. The flood risk associated with the Airport and surrounding area is tidally influenced by the River Thames and therefore the flood risk to the surrounding areas will not be increased by the displacement of floodwater. This is, therefore considered to have a **negligible** effect to surrounding receptors.
- 12.101 In terms of the TE2100 Plan, the Royal Docks, including KGV Dock, are protected by existing flood defences including the Thames Barrier and KGV dock gates which will not be altered by

the CADP. Therefore, there are considered to be no adverse implications to the policy aims of this Plan, and therefore a **negligible** effect

#### *Surface Water Flood Risk*

##### *Airside*

12.102 As reported in the Proposed Surface Water Strategy (Appendix 12.2) the 1:30 year and 1:100 year +20% storm return periods have been checked by the drainage engineers (Atkins and TPS) using WinDes modelling software. This indicates an increase in surface flooding of the existing and proposed stands, together with land to the north and south sides of the runway.

12.103 The stands have potential flooding of approximately 1000 cubic metres, of which 640 cubic metres could be contained before overflowing would occur at the western end. Surface fall would direct this across the taxiway and into the grassed area south of the runway. The additional flooding adjacent to the runways and taxiways is not excessive in terms of the potential containment within the adjacent low areas. The volumes are summarised as in Table 12.4 below:

**Table 12.4: Predicted Airside Flood Volumes (source: Atkins, April 2013)**

Area	1:30 year (as existing)	1:100 year +20%	Potential Volume
Stands	0 m <sup>3</sup>	1000 m <sup>3</sup>	640 m <sup>3</sup> (Therefore approx 360 m <sup>3</sup> overflow)
North of runway	492 m <sup>3</sup>	830 m <sup>3</sup>	2900 m <sup>3</sup>
South of runway	1330 m <sup>3</sup>	1865 m <sup>3</sup> (+ approx 360 m <sup>3</sup> overflow from stands)	2900 m <sup>3</sup>

12.104 This surface flooding would affect airfield operations but will not pose a risk to buildings or flow out of the Application Site boundary.

12.105 The effects of flooding on the airfield in the event of severe rainfall can therefore be considered **negligible** to **minor adverse**.

##### *Landside Flood Risk*

12.106 The 1:100 year +20% storm return periods have been calculated by Atkins using the WinDes Micro Drainage model in order to assess the extent of surface flooding in the CADP Landside areas.

12.107 The assessment indicates that flooding will occur in extreme events along the southern kerbline of Hartmann Road in 2 locations (contained by local high and low points). The Dockside/ Eastern Development area could also experience minor flooding of all car parks in this extreme event. However, it is estimated that the flooded areas will drain down shortly after an extreme storm event and there will be no flooding to off-site areas.

- 12.108 It is considered that the flooding highlighted above is not excessive to the Airport operation and will only occur for a short time period after an extreme flood event. Accordingly, this represents a **minor adverse** effect.

#### *Landside Drainage*

- 12.109 The proposed drainage strategy for the proposed CADP landside areas is based on the principle of reducing the existing flow rates. Discharge options are summarised below and described in detail for each catchment area in the Section 7 of the Proposed Surface Water Drainage Strategy (see Appendix 12.2).
- 12.110 The surface water from the Landside development, depending on the specific location, is proposed to discharge to either:
- a) The existing LCY private sewer which ultimately discharges into the 1800mm diameter Thames Water Connaught Sewer – the new surface water network will discharge via an attenuation tank with flow control units to the existing 300mm to 600mm diameter private sewers
  - b) The existing combined Thames Water Sewer in Albert Road – either by utilising the existing connections or via a new sewer, with a gravity discharge via an attenuation tank with flow control unit located adjacent to Albert Road.
- 12.111 An alternative option of draining to the King George V Dock, via permeable paving using gravity drainage pipe work and a number of 150 mm outfalls has been considered within the Proposed Surface Water Drainage Strategy (see Appendix 12.2). Such a discharge would be limited to a velocity of 0.5 m/s and a flow rate of less than 5 l/s. Further investigation into this method for disposal of surface water will be undertaken at the detailed design stage.
- 12.112 The proposed design solution for the Dockside area is to reduce the existing flow rate from the redeveloped site, by utilising attenuation systems which will discharge via flow control units at Greenfield run-off rates. The attenuation systems have been minimised as far as possible to limit the disposal of contaminated material, disturbance of heritage assets and to avoid underground existing building foundations.
- 12.113 Further investigation will be undertaken at the detailed design stage to determine the viability of the alternative option of possibly discharging part of the drainage catchments to the King George V Dock. The viability of using infiltration drainage will also be investigated at the detailed design stage.
- 12.114 It is considered that the design solutions and alternative options follow the drainage hierarchy within the London Plan Policy 5.13 (described previously) and provide similar reductions in the existing flow rates discharging to the existing sewer systems. These flows have been limited as far as possible, within the constraints of the site.
- 12.115 The Proposed Surface Water Drainage Strategy identifies that discharge flow rate to the existing sewer network will be reduced in the magnitude of 60% to 65% for the 1 in 30 year plus 20% allowance for climate change event and up to 86% for the 1 in 100 year plus 20% allowance for climate change event. Whilst the airside run-off rate will increase by the nature of



the deck structure, the piped drainage from the landside will be significantly reduced by a combination of SuDS techniques described above and through discharge to KGV Dock.

- 12.116 The impact of the reduction in surface water run-off rates overall (i.e. balanced between airside and landside areas) considered to be a **minor beneficial** effect. Where the alternative solution is used (i.e. disposal of surface water to the King George V Dock or by soakaway) the run-off volumes will be reduced overall and this is considered to be a **moderate beneficial** effect.

#### *Groundwater Flood Risk*

- 12.117 The proposed CADP does not include the creation of basements or significant below ground structures, with the exception of the basement to the West Energy Centre and various attenuation tanks within the landside drainage design. Therefore, it is considered unlikely that there will be any significant changes to the groundwater flow patterns beneath the Application Site or to the risk of groundwater flooding. Such effects can therefore be considered to be **negligible**.

#### *Risk to Water Quality*

- 12.118 The proposed CADP will include an increase of approximately 7.5 ha of hardstanding over an area which is currently open dock water. Therefore, there will be a corresponding increase in surface water run-off. There is potential for a small increase in hardstanding areas as part of the landside development. It is however proposed to include dispose of the surface water through a combination of techniques including disposal to Thames Water sewers, discharge directly to the docks and use of SuDS (i.e. porous paving). Further investigation of the use of soakaways will be undertaken at the detailed design stage.
- 12.119 Part of the area (around 0.5 ha) will support the new East Pier and Arrivals Building. Roof drainage from these structures is intended to discharge directly to KGV Dock, having regard to the clean nature of this discharge.
- 12.120 Based on potential for contaminants to occur within surface water run-off from the remaining new deck area, including the new apron areas, the drainage discharge from these areas will not be permitted to pass to the Dock in an uncontrolled manner. If necessary, it will instead pass to the Thames Water sewer system via attenuation tanks and interceptors to remove any fuels, lubricants or oils contained in the surface water run-off.
- 12.121 The Airport is in advanced discussions with the EA and Thames Water regarding acceptance of the environmental strategy for the existing airfield drainage, it is likely that this will be dealt with under the Airports Environmental Permit. The strategy for the new stands will be in line with this strategy, which includes the following:
- a) Potassium formate based de-icant used for the airfield pavements. This has better environmental characteristics than the de-icants used at most other UK airfields. The Airport source the product from overseas to obtain these environmental improvements;
  - b) Aircraft de-icants need to meet the requirements of international aviation standards. The Airport use mobile glycol recovery units to capture the product when it is applied to the aircraft to minimise any environmental impact;
  - c) Aircraft washing is not permitted at the Airport; and,

- d) The airfield drainage is subject to monitoring of de-icant content and goes to the Thames Water surface water drainage network.
- 12.122 A possible opportunity to outfall some of the airfield surface water drainage to KGV Dock during permitted conditions has been identified by the Airport. Such discharges would occur outside of the winter months and/or only during the winter months when de-icant content is acceptable. This would only be taken forward if acceptable discharge limits and an outfall permit can be agreed with the EA and RoDMA and an associated monitoring system is installed within the runway strip. Outside of the permitted conditions, outfall to Thames Water Surface Water drain would continue.
- 12.123 It is intended that the outfall control to divert to Thames Water would be by a Biological Oxygen Demand (BOD) sensor (and possible other sensors dependent on conditions) and manual override. The manual override will be written into de-icing operational procedures in place at the Airport.
- 12.124 Statutory targets and legislation relating to water quality will be replaced with a new set of water quality standards under the umbrella of the Water Framework Directive (WFD), which was passed into UK law in 2003. Under the WFD, all river basins are required to achieve 'good ecological status' by 2015 unless there are grounds for derogation.
- 12.125 Of those "pressures" identified by the EA within the Thames River Basin and Medway Catchment the following relate specifically to water quality:
- a) Pesticides;
  - b) Phosphates;
  - c) Urban and transport pollution; and
  - d) Chemicals.
- 12.126 All relevant safety standards and regulations regarding the use of the above compounds are adhered to at the Airport, and will continue to be so under the proposed CADP. This includes compliance with the EA's Pollution Prevention Guidelines (especially Pollution Prevention Guidance 3)
- 12.127 There will be no permanent storage of fuel, oil or lubricants on the proposed areas of new apron. Existing fuel storage facilities located to the southwest of the Airport and west of the existing terminal buildings will continue to be used, with aviation fuel transported in mobile tankers onto the apron. Light liquid separators (interceptors) will be included within the surface water drainage system thereby preventing leaks on the apron directly passing to the sewer. As there will be no additional use of herbicides and pesticides as part of the proposed CADP, there will be no change in risk to water quality as referenced in the WFD River Basin Management Plan.
- 12.128 In view of the above, the impact of surface water run-off on water quality once the CADP is built out and operational is considered to be **negligible**.
- 12.129 The recent limnological studies of KGV Dock (described above) have identified that extending the apron out over more of the Dock would be unlikely to alter the stratification in the water column and the upper layer beneath the new apron would remain oxygenated. [We will need to

update this if RoDMA's report of de-oxygenation are verified?] Therefore, there would be no loss in water quality due to de-oxygenation or other biochemical effects. As such, the effect of covering the dock on water quality would be **negligible**.

### **Further Mitigation Options**

- 12.130 Following the completion of the proposed CADP, it is recommended that the Airport is registered with the EA's Flood Warning Service for the River Thames, as detailed within the Flood Risk Assessment (Appendix 12.1). This will help ensure site staff, passengers and other users of the Airport have sufficient time to evacuate the site or seek safe refuge on higher ground, in the unlikely occurrence of an extreme flood event.
- 12.131 A Flood Management Plan will be produced for the Airport, detailing the preparations that would be made on site, along with the response/ evacuation procedures that should be followed in the event of a flood.

### **Cumulative Effects**

- 12.132 In accordance with the NPPF, all new developments must incorporate measures to ensure that the development will not increase flood risk elsewhere. With regard to fluvial/tidal flood risks other developments (including those located adjacent to the Royal Docks) are required to include mitigation measures and are not allowed to make changes to flood flow paths or reduce the volume of storage within a system without compensating for the loss. In addition, with regard to surface water there is a requirement within the London plan to reduce the rate of run-off to 50% of the existing situation or greenfield run-off rates where possible. This should include the use of SuDS techniques, which ultimately should provide an improvement in the quality of surface water quality.
- 12.133 The majority of the cumulative developments within the vicinity of the site are for either residential or office use, or mixed development. There are two cumulative developments within the vicinity of the site (the UNEX site and Peruvian Wharf) which are allocated for business/general industrial/warehousing, however, planning applications have been submitted for residential, office and leisure use. Therefore the impact on water quality associated with these developments is likely to be beneficial in comparison to industrial use. In addition, based on the historic legacy of industrial use within this area, and through the development process, there is potential for an improvement over the past/present situation by reduction in potentially contaminating uses through the removal of sources and potential incorporation of SuDS resulting in an improvement over the existing/historic situation. Accordingly, there are not anticipated to be any significant detrimental flood risk or water quality effects associated with the cumulative developments within proximity to the Application Site.
- 12.134 The cumulative effects of flood risk and water quality will be **negligible** provided that these other developments incorporate appropriate techniques to minimise risks of pollution and that they comply with the same policy and legislative requirements as adopted for the CADP.

## Conclusions

- 12.135 This chapter has assessed the likely nature and magnitude of potential effects to flood risk and surface water quality arising from the construction and operation of the proposed CADP. Appropriate measures to mitigate these effects have been presented and it is concluded that the residual effects will range from **negligible** to **minor adverse** (temporary) during construction phase, to **minor adverse** to **moderate beneficial** in the Principal Assessment Year, once the CADP is built out and fully operational.

## References

- i Environment Agency Data, November 2011, Reference: NE29124AC
- ii Envirocheck Report, dated 12th December 2011, Reference 36988474
- iii & iv RPS, May 2011, London City Airport: King George V Dock, Limnological Investigations 2010 and 2011, Draft v2, Reference JPP2065-R-002d
- v The Environment Agency, Thames Estuary 2100 (TE2100), Managing flood risk through London and the Thames Estuary, November 2012.
- vi Capita Symonds, London Borough of Newham Strategic Flood Risk Assessment, Final Report, May 2010.



## 13 Ecology and Biodiversity

### Introduction

- 13.1 This chapter, prepared by RPS, provides an assessment of the likely significant ecological effects of the proposed CADP, taking into account mitigation and enhancement measures. It assesses:
- a) the potential of the Application Site and its environs to support any important habitats, protected species or otherwise notable species of wildlife;
  - b) the conservation value of habitats and species, both within the Application Site boundary and its environs;
  - c) the likely aquatic and terrestrial ecological effects of the proposed CADP;
  - d) proposed mitigation measures to be taken to avoid, reduce or offset adverse effects, and enhancement measures to be taken to augment any beneficial effects; and
  - e) the predicted residual effects of the proposed CADP.
- 13.2 This impact assessment has been undertaken by RPS following consultation with key ecological stakeholders to secure agreement in relation to ecological resources and impacts that should be considered.

### Legislative Context

- 13.3 The protection of ecological resources is secured by a range of legislation. Those that are relevant to the habitats and species that are considered in this assessment are set out below.

#### European Legislation

##### *Habitats Directive*

- 13.4 In 1992, the European Community (EC) adopted Council Directive 92/43/EEC on the Conservation of Natural Habitats and of Wild Fauna and Flora ('The Habitats Directive'). In the UK this is transposed into national legislation via The Conservation of Habitats and Species Regulations 2010. This regulation consolidates earlier regulations and amendments including The Conservation (Natural Habitats, &c.) Regulations 1994. The Habitats Directive provides protection for specific habitats listed in Annex I and species listed in Annex II of the Directive. This protection is implemented, amongst other means, through a series of protected sites known as Special Areas of Conservation (SACs) and these, along with Special Protection Areas (SPAs) classified under the Birds Directive, contribute to a European network of protected sites known as Natura 2000.
- 13.5 The Habitats Directive sets out decision making procedures for the protection of SACs and SPAs and these are implemented in the UK through The Conservation of Habitats and Species Regulations 2010. As a matter of national policy, terrestrial SACs are also protected as Sites of Special Scientific Interest (SSSI).

### *Birds Directive*

- 13.6 In 1979 the EC adopted Council Directive 79/409/EEC on the Conservation of Wild Birds and with the accession of further countries in to the EU this has been updated and consolidated as Directive 2009/147/EC on the Conservation of Wild Birds. This Directive provides a framework for the conservation and management of wild birds in Europe. The most relevant provisions of the Directive are the identification and classification of Special Protection Areas (SPAs) for rare or vulnerable species listed in Annex I of the Directive and for all regularly occurring migratory species (required by Article 4). It also establishes a general scheme of protection for all wild birds (required by Article 5). The Directive requires national Governments to establish SPAs and to have in place mechanisms to protect and manage them. The SPA protection procedures originally set out in Article 4 of the Birds Directive have been replaced by the Article 6 provisions of the Habitats Directive and implemented in the UK through The Conservation of Habitats and Species Regulations 2010. As a matter of national policy terrestrial SPAs are also protected as Sites of Special Scientific Interest.

### National Legislation

#### *Wildlife and Countryside Act 1981 (as amended)*

- 13.7 The Wildlife and Countryside Act 1981 (as amended) is the principal mechanism for the legislative protection of wildlife in Great Britain. It provides protection for all birds and listed animals and plants and establishes the system of Sites of Special Scientific Interest (SSSI). SSSIs are areas of land that, in the opinion of the statutory nature conservation body, are of special interest by reason of their flora, fauna or geological or physiographical features. That opinion is based on scientific guidelines and the exercise of specialist judgement.
- 13.8 The Act provides, along with The Conservation of Habitats and Species Regulations 2010, the means to implement the Habitats Directive in national law. All terrestrial SPAs and SACs are also notified as SSSIs.
- 13.9 The Act applies a general duty on local authorities to consult Natural England before making a decision likely to damage a SSSI and a general duty to further the conservation of SSSIs as far as is consistent with the proper exercise of their functions.

#### *Countryside Rights of Way Act 2000*

- 13.10 The Countryside and Rights of Way Act 2000 (CRoW Act) contains a series of measures relating to the countryside, with those relevant to ecology, nature conservation and biodiversity being: strengthened protection for SSSIs; extra powers for the prosecution of wildlife crime; strengthened legal protection for specific species; and, new biodiversity duties placed on Government bodies.

#### *Natural Environment and Rural Communities Act 2006*

- 13.11 The Natural Environment and Rural Communities Act 2006 (NERC Act) created Natural England (NE) as the statutory body in England with responsibility for the protection of ecological resources and nature conservation, biodiversity, landscape, access and recreation. It

extended the CRoW Act duty to public bodies and statutory undertakers to ensure they have due regard to the conservation of biodiversity. It applied a general duty on local authorities to have regard to biodiversity, as far as is consistent with the proper exercise of their functions, and establishes a list of species and habitats of principal importance for biodiversity.

## **Planning Policy Context**

### National Planning Policy

#### *National Planning Policy Framework (2012)*

13.12 The National Planning Policy Framework (NPPF) sets out the Government's advice on planning and the natural environment in Policy 11: 'Conserving and enhancing the natural environment'.

13.13 It advises that the planning system should contribute to and enhance the natural and local environment by:

*"Minimising impacts on biodiversity and providing net gains in biodiversity where possible, contributing to the Government's commitment to halt the overall decline in biodiversity, including by establishing coherent ecological networks that are more resilient to current and future pressures".*

13.14 At paragraph 117, the NPPF states that in order to minimise impacts on biodiversity and geodiversity, planning policies should:

- a) "plan for biodiversity at a landscape-scale across local authority boundaries;
- b) identify and map components of the local ecological networks, including the hierarchy of international, national and locally designated sites of importance for biodiversity, wildlife corridors and stepping stones that connect them, and areas identified by local partnerships for habitat restoration or creation; and,
- c) promote the preservation, restoration and re-creation of priority habitats, ecological networks and the protection and recovery of priority species populations, linked to national and local targets, and identify suitable indicators for monitoring biodiversity in the plan".

#### *UK Biodiversity Action Plan (UK BAP)*

13.15 The UK BAP describes the biological diversity resources of the UK and sets out a detailed plan for their conservation. It established national priorities for biodiversity conservation in the UK in 1994 and, following a review between 2005 and 2007, it was substantially updated with a significantly greater list of priority species (1,150) and priority habitats (65). The overall objectives of the UK BAP include conserving and enhancing the populations and natural ranges of native species and the quality and range of wildlife habitats and ecosystems in the UK.

### Regional Planning Policy

#### *The London Plan 2011, Spatial Development Strategy for Greater London*

13.16 The London Plan 2011 Policy 7.19 on Biodiversity and Access to Nature sets out the Mayor's policy on biodiversity and nature conservation. In relation to planning decisions the policy states:

*“Development proposals should:*

- a) wherever possible, make a positive contribution to the protection, enhancement, creation and management of biodiversity
- b) prioritise assisting in achieving targets in biodiversity action plans (BAPs)... and/or improve access to nature in areas deficient in accessible wildlife sites
- c) not adversely affect the integrity of European sites, and be resisted where they have significant adverse impact on European or nationally designated sites or on the population or conservation status of a protected species, or a priority species or habitat identified in a UK, London or appropriate regional BAP or borough BAP.

13.17 On Sites of Importance for Nature Conservation, development proposals should:

- a) give the highest protection to sites with existing or proposed internal designations (SACs, SPAs, Ramsar sites) and national designations (SSSIs, NNRs) in line with the relevant EU and UK guidance and regulations.
- b) give strong protection to sites of metropolitan importance for nature conservation (SMIs). These are sites jointly identified by the Mayor and boroughs as having strategic nature conservation importance.
- c) give sites of borough and local importance for nature conservation the level of protection commensurate with their importance.”

*The Mayor of London's Biodiversity Strategy*

13.18 As required by the Greater London Authority Act, The Mayor of London produced a Biodiversity Strategy in 2002 for the London. The content is very broad, ranging from economic benefits and sustainable development through to nature for its own sake. The two targets set to measure the success were:

- a) no overall loss of wildlife habitat in London; and
- b) more open space is created and made accessible so that all Londoners are within 1 km walking distance of a quality natural space.

13.19 The four main areas given priority through the policies and proposals of the Biodiversity Strategy are:

- a) protection of biodiversity;
- b) positive measures to encourage biodiversity action, promoting the management, enhancement and creation of valuable green space;
- c) incorporating biodiversity into new development; and
- d) access to nature and environmental education.

13.20 The Biodiversity Strategy describes the habitats that are found and their 'London importance'. It requires London Boroughs to assist with the implementation of the Strategy and encourages them to formulate their own biodiversity action plans.

13.21 The delivery of the Strategy relies on close links between a wide range of agencies, which to an extent have been established through the London Biodiversity Partnership. The London Biodiversity Partnership brings together businesses, local planning authorities and statutory bodies (including the EA and Natural England), together with volunteer organisations, with the aim of boosting the capital's greenspaces, including working to increase the understanding of

London's habitats by assessing their condition. It undertakes work on the ground to maintain, enhance and increase the wildlife value of London's habitats and contribute towards the capital's 2015 habitat targets set out in the Biodiversity Strategy.

#### *London Biodiversity Action Plan*

- 13.22 The London Biodiversity Partnership delivers the London Biodiversity Action Plan (BAP) for important habitats and species in the Greater London area. The London BAP provides the overarching framework for identifying priority habitats and species that are of particular importance for biodiversity or under particular threat in London, with the last review being undertaken in 2007. The London BAP has 11 Habitat Action Plans and identifies a total of 214 priority species that are under threat, of which eight have been identified as needing targeted action to secure their future in London and have their own Species Action Plan.

#### Local Planning Policy

##### *Newham 2027: Planning Newham – The Core Strategy (2012)*

- 13.23 The adopted Core Strategy forms the overarching Development Plan in the Local Development Framework and provides the planning framework for biodiversity and nature conservation in the borough.

- 13.24 The policies relating to biodiversity are contained within policy SC4 of the Core Strategy, with the objective being:

*“Protect, enhance and create habitats for biodiversity across Newham, ensuring a net gain in BAP habitats, and secure their positive management; reduce deficiencies in access to nature for Newham's existing and future residents; and undertake awareness-raising to promote appreciation of the Borough's wildlife by all.”*

- 13.25 The policy will protect and enhance biodiversity through ensuring development contributes to a net gain in the quantity and quality of Newham's natural environment by the following measures:

- a) Expecting that all major developments make a contribution to achieving the targets and actions for biodiversity, as set out in the emerging Newham Biodiversity Action Plan, and in conjunction with provision of green infrastructure, as set out in Policy INF7.
- b) Permitting development only where it can be demonstrated that significant adverse impact on species and habitats identified in the Newham biodiversity action plan is avoided.
- c) Sites of Importance to Nature Conservation (SINCs) will be protected, and development should contribute to their qualitative enhancement, including improvements to access.
- d) Enhancing opportunities for biodiversity in the Blue Ribbon Network and waterside environments, meeting the requirements of Policy INF7.”

##### *Newham Biodiversity Action Plan (2010)*

- 13.26 The Newham Biodiversity Action Plan was formally accepted in 2010 and provides the basis for local action to conserve, enhance and protect the biodiversity of the borough. The Newham BAP contains general actions, largely applicable to the Borough Council and local communities,



and actions specific to particular habitats, with a number of key species highlighted for each habitat. The priority habitats identified in the Newham BAP are:

- a) Public open space and green corridors;
- b) Rivers and wetlands;
- c) The built environment; and
- d) Private gardens, grounds and allotments.

### **Assessment Methodology**

- 13.27 This section provides a brief description of the methodology used to assess the baseline conditions and the potential effects of the proposed CADP on the study area, including both the Application Site and its wider ecological context.
- 13.28 In accordance with best practice guidelines, this assessment considers both the habitats and species within the boundary of the Application Site, as well as those within a 2 km radius of the Application Site. This is because the proposed CADP and its associated infrastructure and access routes have the potential to affect, both directly and indirectly, the ecology of land beyond its boundaries.
- 13.29 To inform this assessment, the following technical reports have been produced by RPS describing the results of field surveys and desk studies undertaken in relation to the proposed CADP:
- a) RPS (2007) London City Airport: Ecological Assessment;
  - b) RPS (2011) London City Airport: King George V Dock Limnological Investigations 2010 and 2011;
  - c) RPS (2012) London City Airport: Phase 1 Habitat Survey 2011;
  - d) RPS (2013) London City Airport: King George V Dock Limnological Investigations 2012; and
  - e) RPS (2013) London City Airport: Phase 1 Habitat Survey 2013.
- 13.30 These reports are provided in the Technical Appendices to this ES chapter as follows:
- a) Terrestrial Surveys (London City Airport: Ecological Assessment 2007; London City Airport: Phase 1 Habitat Survey 2011; London City Airport: Phase 1 Habitat Survey 2013) – Appendix 13.1;
  - b) Limnology Surveys (London City Airport: King George V Dock Limnological Investigations 2010 and 2011; and London City Airport: King George V Dock Limnological Investigations 2012) – Appendix 13.2; and
  - c) RPS. 2013. London City Airport, London: Tree Survey (Appendix 13,3).
- 13.31 A general description of the environmental impact assessment methodology that has been applied is provided in ES Chapter 3. Specific elements relevant to the assessment of ecology, nature conservation and biodiversity features of interest and valued receptors are provided below. The impact assessment method follows the established guidelines of the Institute of Ecology and Environmental Management of 2006 (referred to here as the 'IEEM Guidelines').

13.32 The overall process of impact assessment is undertaken in four main stages:

- a) Baseline studies;
- b) Identification of Valued Ecological Receptors (VERs);
- c) Identification and characterisation of potential effects and mitigation; and
- d) Assessment of the significance of effects.

#### Application Site and the 'Zone of Influence'

##### *Data Search*

- 13.33 A desk-based study was undertaken prior to this assessment to identify records of any ecological constraints and opportunities recorded from within the Application Site and in the surrounding area, i.e. within 2 km of the central point of the Application Site. As part of this process, contact was made with Greenspace information for Greater London (GiGL) as the relevant local biodiversity record centre, for information on records of species and Sites of Nature Conservation Interest within 2 km of the Application Site. GiGL utilises the database established by the Greater London Authority (GLA) Habitat Survey, which was adopted by the Mayor in his Biodiversity Strategy in 2002 and was further developed in 2004 to take account of open space information.
- 13.34 A review of existing statutory Sites of Nature Conservation Interest, including Sites of Special Scientific Interest (SSSIs), Special Protection Areas (SPAs), Special Area of Conservation (SACs) and National Nature Reserves (NNRs), and non-statutory sites, such as Sites of Borough Importance for Nature Conservation, was undertaken to identify any existing nature conservation interests within 2 km of the Application Site that could be influenced by development, or pose constraints on the CADP.
- 13.35 The following sources specific to the Application Site were also approached via email correspondence or were consulted regarding any ecological information which they may hold:
- a) The Royal Docks Management Authority (RoDMA);
  - b) The London City Airport Bird Control Unit (BCU);
  - c) The Ecology Consultancy (The Ecology Consultancy, 2012); and
  - d) Nature Conservation in Newham. Ecology Handbook 17. London Ecology Unit.
- 13.36 RoDMA monitors the water quality of the Royal Docks fortnightly at six pre-selected sites. RoDMA is also responsible for the maintenance of the marine infrastructure, impounding and the maintenance of water quality through dredging and the removal of litter, leaves and other floating debris. The observations at each site take into account the colour of the water, the presence or absence of oil film and floatables, and weather conditions. Measurements record the pH, conductivity, ambient temperature, transparency and dissolved oxygen saturation of the water.
- 13.37 Using the information interpreted from these results, RoDMA is able to make recommendations regarding the safety of the water for recreational sports, such as jet skiing. For example, if the

pH level becomes high, it is recommended that showers should be taken following all activities. Changes in pH and dissolved oxygen concentrations may result from temporal and seasonal changes. During the summer months the warm weather encourages the growth of algae, thus depleting the level of carbon dioxide within the water and increasing the acidity and pH levels.

- 13.38 These measurements and laboratory analysis of the water are used to check compliance with mandatory and guideline values set out in the Bathing Water (Classification) Regulations 1991 (Statutory Instrument SI 1991 No. 1597) and European Community Council Directive concerning the quality of bathing water (76/160/EEC).
- 13.39 The Ecology Consultancy undertook an ecological assessment of the Royal Victoria Docks on behalf of Da Vinci Construction (The Ecology Consultancy, 2012). The assessment in the form of a desk study was carried out to provide information on the fish assemblage present in the Royal Docks, to determine the possible impacts on fish from the proposed Crossrail works.
- 13.40 "Nature Conservation in Newham", the Ecology Handbook number 17 published in 1991 by the London Ecology Unit was consulted to check for any relevant background information to the Application site and the surrounding area.

#### *Field Surveys*

- 13.41 The field surveys undertaken by RPS to provide baseline information on the ecological condition of the site are listed in paragraph 13.26 of this chapter. The results of all surveys are provided in Technical Appendix 13.1.

#### *Phase 1 Habitat and protected species scoping surveys*

- 13.42 A walkover inspection of the entire Application Site was carried out on 10th May 2007 and repeated on 16th February 2013 in order to map habitats present and highlight any key constraints. The timing of the first inspection was within the recommended period for such surveys, as most plant species are recognisable and present at this time of year. The 2013 survey was early in the year but survey conditions were good and, as the main habitat type to be assessed was grassland, the dominant plant species were recognisable. The methodology followed that of a standard Phase 1 Habitat survey, as described in the Joint Nature Conservation Committee 'Handbook for Phase 1 Habitat Survey – A Technique for Environmental Audit'<sup>1</sup>.
- 13.43 During the Phase 1 Habitat survey the dominant plant species were recorded and habitats classified according to their vegetation types and presented in the standard Phase 1 Habitat survey format with habitat descriptions and a habitat map. The potential presence of protected and rare species was considered. Due to the types of habitats present, particular attention was paid to identify the presence or potential for bats, reptiles and breeding birds. The presence of any invasive species was also noted.

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<sup>1</sup> JNCC (1990)

### *Limnology surveys*

- 13.44 Limnology is the study of the life and phenomena of fresh water bodies, especially still waters. Surveys at the site were undertaken in August 2010, March 2011 and January 2013, the aims of which were to measure certain water quality variables at different depths and locations within the King George V (KGV) Dock and to assess the potential impacts of the development on the limnology of KGV Dock based on these results. These focused on two areas of KGV Dock: the area under the Eastern Apron with aircraft stands 21-24, and the open water area which would be covered were the proposed CADP to go ahead.
- 13.45 The basis of the investigations was to use key water quality variables to describe any patterns and distributions in the condition of KGV Dock. Those selected were: temperature, oxygen, pH and water transparency, with respect to conditions for aquatic life and identifying any gradients in water chemistry; and, conductivity and salinity to understand any influence that the River Thames might have on KGV Dock.
- 13.46 Water samples were taken from profiles in the water column by RPS on three occasions (27th August 2010, 2nd March 2011 and 16th January 2013) from the open area of KGV Dock and under the Eastern Apron. These dates covered the main seasons of the year, particularly with respect to the persistence of any stratification in the water column. The work was undertaken by three experienced RPS Ecologists working from a boat and snorkelling under the apron.
- 13.47 In total, samples were taken from seven profiles in August 2010 - four from the open area of KGV Dock and three from under the apron (one being from an access point in the apron with entry gained through a manhole cover, and two by divers swimming under the Eastern Apron. In March 2011, five profiles were taken - four from the open area of KGV Dock and one from under the apron collected through the access point. In January 2013, a total of seven profiles were taken - three from under the Eastern Apron and four from the open water.
- 13.48 On each sampling occasion, one of the profiles was made through a manhole cover in the apron. This is directly above the old dry dock, a part of KGV Dock, which now contains water, having been opened up to the main KGV Dock during the original construction of the Airport. The structure of the old dry dock is described in more detail in Chapter 14: Cultural Heritage.
- 13.49 Additional surface water samples were taken at 24 sampling points within both the open water (21) and covered areas (3) of KGV Dock. Pre-labelled sampling bottles were used to collect samples and these samples were submitted for analysis of a range of variables in August 2010. Furthermore, in March 2011, water samples were tested for concentrations of nitrate, phosphate and chlorophyll-a. In addition to providing a description of the water chemistry for KGV Dock, nitrate and phosphate concentrations provide a good indication of the availability of nutrients for the growth of phytoplankton (microscopic algae suspended in the water) and chlorophyll-a is an indirect measure of the amount of phytoplankton.

### *Aquatic Invertebrate Survey*

- 13.50 A survey was undertaken by RPS of the aquatic invertebrates living on the submerged section of KGV Dock wall in order to assess the invertebrate fauna living on this surface. Any

invertebrates found on the wall could have significance for the fish fauna of KGV Dock. Four samples were taken on 16th January 2013 using a Freshwater Biological Association invertebrate sampling net from the surface to 2m from the section of the northern wall of KGV Dock (i.e. the area which will be shaded by the proposed CADP).

- 13.51 The samples were stored in polythene bottles and returning to the laboratory were sieved to remove fine material and the invertebrates were sorted live in white trays. The invertebrates found were identified and counted in order to describe the range of species found and to give an indication of their abundance and biomass.

#### Identification of Potential Effects on Valued Ecological Receptors

- 13.52 It is impractical for an assessment of the likely ecological effects of a development to consider every species and habitat that may be affected. Instead, it should focus on 'Valued Ecological Receptors' (VERs). VERs comprise sites, habitats and species that are valued in a defined way and which could be affected by the project. The evaluation of VERs is carried out with reference to their importance in terms of conservation status and against a geographical scale of reference:

- a) International;
- b) National;
- c) Regional;
- d) County/Metropolitan;
- e) District/Borough; and
- f) Local.

- 13.53 The valuation of sites makes use of established systems of designation. Thus, Special Protection Areas (SPA), Special Areas of Conservation (SAC) and Ramsar Sites are of international importance; Sites of Special Scientific Interest (SSSI) are of national importance; and County Wildlife Sites are of county importance. Professional judgement is required for the valuation of sites of less than county value.

- 13.54 Table 13.1 gives examples of the application of the valuation process (IEEM Guidelines).

**Table 13.1 – Examples of valuation on a geographical scale of reference**

Level of Value	Examples of definitions
International	An internationally important site, e.g. SPA, SAC or Ramsar site or a site identified as meeting those criteria but not yet formally notified (e.g. pSPA and cSAC); a regularly occurring population of an internationally important species e.g. listed on Annex IV of the Habitats Directive
National (UK)	A nationally designated site, e.g. SSSI, or a site considered worthy of such designation; a large and regularly occurring population of a nationally important species, e.g. listed on Schedules 5 and 8 of the Wildlife and Countryside Act (1981); a feature of size, scale and quality identified as of priority in the UK BAP
Regional	Viable areas of key habitat identified in the Regional BAP or smaller areas of such habitat, which are essential to maintain the viability of a larger whole. A regularly occurring regionally significant population of a habitat or species listed as nationally scarce. Sites that exceed the County-level designations but fall short of SSSI selection guidelines, where these occur.
County/Metropolitan	Viable areas of key habitat identified in Local BAPs, or smaller areas of such habitat which are essential to maintain the viability of a larger whole; a site



	designated as a Wildlife Site or Site of Importance for Nature Conservation/Sites of Nature Conservation Importance; a regularly occurring, locally significant number of a nationally important species. Sites of Nature Conservation Interest of Metropolitan Importance.
District/Borough	Viable areas of habitats or species identified in the Newham BAP. Sites of Nature Conservation of Borough Importance. A significant area of habitat or population of a species within the boundaries of a Borough listed as scarce in London.
Parish/local	A good example of a common or widespread habitat in the local area
Neighbourhood	Areas of heavily modified or managed vegetation of low species diversity or low value as habitat to species of nature conservation interest; common and widespread species

- 13.55 The valuation of habitats, plants and animals is based on the status of populations internationally, nationally and in the county according to their distribution, abundance, and whether or not they are in decline. Species that are rare, threatened, declining or important in an international context are included in the UK BAP list.
- 13.56 Some species also receive particular status through legislation - both 'protective' legislation such as the Wildlife and Countryside Act relating to the protection of all birds and their nests, and the requirements to manage certain invasive species to prevent their spread in the wild (see Schedule 9, Wildlife & Countryside Act (as amended)). Particular actions are required for these species in order to ensure legal compliance. Furthermore, these actions should be included in contractual documents (such as a Construction Environmental Management Plan) that define how particular aspects of the proposed development will be carried out.
- 13.57 In order to ensure that legal compliance measures are carried forward through the impact assessment process, some species and habitats are identified as VERs even though the size of the population present might not otherwise warrant this status.

#### Identification and Characterisation of Potential Effects

- 13.58 Potential effects on ecological features are described using a set of parameters from the IEEM Guidelines. These are listed in Table 13.2 below.

**Table 13.2 – Parameters used to describe potential effects**

Parameter	Definition of the parameter
Positive or negative	Whether the impact has a positive or negative effect
Extent	The area of which the impact occurs
Magnitude	The size or amount of an impact
Duration	The time for which the impact is predicted to last prior to recovery or replacement of the resource or feature
Reversibility	Whether the impact is permanent (i.e. irreversible) or temporary (i.e. reversible)
Timing and frequency	How often the impact occurs (e.g. repeated noise from piling work) and when it occurs (e.g. vegetation clearance undertaken outside of the bird breeding season).

- 13.59 Potential effects can be considered to be short, medium or long term, as well as either adverse or beneficial. These factors are brought together to assess the magnitude of the effect on particular VERs and, wherever possible, the magnitude of the effect is quantified.
- 13.60 Professional judgment is then used to assign the effects on the receptors to one of four classes of magnitude, defined in Table 13.3.

**Table 13.3 – Categories of Impact Magnitude**

Magnitude	Definition
High	A permanent or long-term effect on the extent or size or integrity of a site, habitat, species assemblage or community, population or group. If adverse, this is likely to threaten its sustainability; if beneficial, this is likely to enhance its conservation status.
Medium	A permanent or long-term effect on the extent or size or integrity of a site, habitat, species assemblage or community, population or group. If adverse, this is unlikely to threaten its sustainability; if beneficial, this is likely to be sustainable but is unlikely to enhance its conservation status.
Low	A permanent or long-term reversible effect on a site, habitat, species assemblage or community, population or group whose magnitude is detectable but will not threaten its integrity.
Negligible	A short-term but reversible effect on the extent or size or integrity of a site, habitat, species assemblage or community, population or group that is within the normal range.

### Significance Criteria

- 13.61 As part of the ecological impact assessment, it is important to assess whether or not an impact is significant. Within the context of this assessment, an ecologically significant impact is defined using the definition given in the IEEM Guidelines:

*“an impact (negative or positive) on the integrity of a defined site or ecosystem and / or the conservation status of habitat or species within a given geographical area”*

- 13.62 The significance of the predicted effects on VERs arising from the proposed CADP, including designed-in and additional mitigation measures, has been assessed in general accordance with Chapter 3: EIA Methodology.
- 13.63 Table 13.4 below illustrates a matrix that is used for guidance in the assessment of significance. Effects are considered to be of significance ranging from ‘critical’ to ‘minor’.

**Table 13.4 – Assessment of effect significance**

Value of receptor	Magnitude of effect			
	Negligible	Low	Medium	High
International	Minor	Moderate	Substantial	Critical
National	Minor	Moderate	Substantial	Substantial
Regional	Minor	Moderate	Moderate	Substantial
County	Minor	Minor	Moderate	Substantial
District	Minor	Minor	Minor	Moderate
Less than District	Minor	Minor	Minor	Minor

### Baseline Conditions

- 13.64 This section provides a description of the baseline ecological conditions of the Application Site and its surroundings, against which the likely significant environmental effects of the proposed CADP have been assessed. The baseline conditions use the most up to date baseline survey data information available, as described above.

### Designated Sites for Nature Conservation

- 13.65 The Application Site does not lie within 2 km of any internationally or nationally statutory designated sites for nature conservation (RPS (2007) London City Airport: Ecological Assessment). The Application Site does, however, lie within 2 km of a Local Nature Reserve (LNR) and a number of non-statutory sites. Table 13.5 provides a list of these sites.

**Table 13.5 – Summary of statutory and non-statutory sites for nature conservation**

Site name	Borough	Designation
Maryon Wilson Park and Gilbert's Pit	Greenwich	Local Nature Reserve
River Thames and tidal tributaries	Multiple	Site of Importance for Nature Conservation (SINC) (Metropolitan)
Maryon Park, Gilbert's Pit and Maryon Wilson Park	Greenwich	SINC (Borough Grade I)
Beckton District Park and Newham City Farm	Newham	SINC (Borough Grade I)
Royal Docks	Newham	SINC (Borough Grade I)
East Ham Nature Reserve	Newham	SINC (Borough Grade I)
The Greenway and Old Ford Nature Reserve	Newham	SINC (Borough Grade I)
Repository Wood and Charlton Cemetery	Greenwich	SINC (Borough Grade II)
Eastmoor Street Park	Greenwich	SINC (Borough Grade II)
Beckton Alps	Newham	SINC (Borough Grade II)
St. Mary Magdalene Churchyard, Woolwich	Greenwich	SINC (Local)
Pylon Walk	Newham	SINC (Local)

Notes on Table 13.5

SINC = Sites of Importance for Nature Conservation (SINCs)

Sites of Metropolitan Importance (SINC (Metropolitan)) – these sites contain the best examples of London's habitats, rare species or important populations/assemblages, or are of particular significance in heavily built-up areas. They are of the highest priority for protection.

Sites of Borough Importance (SINC (Borough)) – these are sites of importance at a Borough level and are split into two grades depending on their quality.

Sites of Local Importance (SINC (Local)) – these are sites which may be of particular value to the local people nearby.

- 13.66 The proposed CADP will be constructed partly on a concrete deck over KGV Dock which forms part of the Royal Docks Site of Borough Importance for Nature Conservation (SBINC).

### Terrestrial Habitats

- 13.67 The Application Site and surrounding area are highly urbanised, dominated by the Airport infrastructure including the terminal, runway, ancillary buildings and car-parking space. The majority of the Application Site therefore consists predominantly of buildings and hardstanding with very limited vegetation.
- 13.68 A Phase 1 Habitat survey was undertaken in 2007 and repeated in 2013 along with a tree survey (RPS (2013) London City Airport: Tree Survey), included at Appendix 13.3. Figure 13.1 shows the main habitat types identified on the Application Site.
- 13.69 Large linear strips of poor semi-improved grassland dominate the surroundings of the runway. The grassland is frequently mown and receives applications of herbicide for weed control, but during both ecological walkovers surveys the sward was of a reasonable length. Species noted include Perennial Rye-grass *Lolium perenne*, Cock's-foot *Dactylis glomerata*, Ribwort Plantain *Plantago lanceolata*, Vetch species *Vicia species*, Yarrow *Actillea millefolium*, Curled Dock *Rumex crispus*, Herb Robert *Geranium robertianum*, Fescue species *Festuca species*, Black

Medick *Medicago lupulina*, Cow Parsley *Anthriscus sylvestris* and Broad-leaved Dock *Rumex obtusifolius*.

- 13.70 There is a small section or areas of short perennial/ephemeral habitat including:
- g) Land to the south west of the Application Site, left unplanted from the DLR landscape planting scheme. This habitat consists of shallow stony soil with scattered plant species such as Black Medick, Willowherb species *Epilobium* species and Mugwort *Artemisia vulgaris* – all typical of derelict urban sites;
  - h) The margins of the northern side of KGV Dock and runway with stonecrops, mosses and lichens; and
  - i) Moss dominated patches of land along the disused railway section at the southern side of KGV Dock.
- 13.71 Ruderal weeds such as Butterfly-bush *Buddleja davidii* are present along the south eastern corner of the site, around the operational and disused warehouses. Tall ruderals are also present along the car parks situated south of the Fire Station.
- 13.72 There are a few scattered trees on the site including semi-mature London Plane *Platanus x acerifolia* running along the front of the Jet Centre car park. Other tree species, present in the scrub planting to the south of the Jet Centre, included Field Maple *Acer campestre*, Rowan *Sorbus aucuparia* and Ash *Fraxinus excelsior*. Juvenile trees were also present within the amenity hedge planting in the main terminal forecourt area including Cherry *Prunus* species and Sycamore *Acer pseudoplatanus*. Two juvenile Silver Birch *Betula pendula* were also present amongst the shrub planting outside of City Aviation House.
- 13.73 The landscaping within the main terminal forecourt area consists of well maintained Privet and Laurel hedges with the occasion juvenile Sycamore and Cherry.

#### Aquatic Habitats

- 13.74 The Application Site sits within the Royal Docks complex and is surrounded by both the Royal Albert Dock to the north and KGV Dock to the south. As previously stated, the proposed CADP will be constructed on a concrete deck covering an area of approximately 7.54 ha of KGV Dock. The limnological investigations of KGV Dock recorded the conditions in the open water as compared to the water under the Eastern Apron in order to understand the implications of covering over a further part of KGV Dock, approximately 18% of the total existing KGV Dock area. The sampling revealed that the water chemistry at the water surface was uniform across the open and covered areas.
- 13.75 The profiles of oxygen, salinity/conductivity and temperature were also similar in both open water and covered dock areas. In all cases, the profile was stratified at about 6-7m with the upper levels being well oxygenated and relatively low salinity/conductivity (see Technical Appendix 13.2).
- 13.76 At 5-6m, a gradient was present where a notable drop off in oxygen levels and a more gradual fall off in temperature occurred. There was also a significant increase in salinity and conductivity below this depth. This stratification pattern persisted over the autumn, early spring and winter of 2010, 2011 and 2013 respectively (see Technical Appendix 13.2).

- 13.77 Using RoDMA's datasets (included in the RPS Limnological Survey report (2013) - see Technical Appendix 13.2), it is calculated that the water has an average pH of 8.5, typical of such waterbodies. The temperature of the water in the upper water levels fairly closely reflects the ambient air temperature, and generally only exceeds 15°C in the period between mid May to early October.

### Species

#### *Plants*

- 13.78 No plants listed on Schedule 8 of the Wildlife and Countryside Act 1981 (as amended) or otherwise of conservation interest were recorded at the Application Site, nor is it considered that the Site contains habitat suitable to support statutorily protected species or species of conservation interest. No records of plant species of conservation concern were found in consultation with GiGL or any other data sources (e.g. Nature Conservation in Newham. Ecology Handbook 17. London Ecology Unit).
- 13.79 The only invasive plant species listed on Schedule 9 of the Wildlife and Countryside Act 1981 recorded within the Application Site during the course of the site walkovers was Cotoneaster. Japanese Knotweed *Fallopia japonica* was noted on Oriental Road, 300 m from the Application Site boundary. A further invasive species recorded within 1 km of the site, as identified from the GiGL data, was False Acacia *Robinia pseudoacacia*, approximately 700m to the south.
- 13.80 The London Invasive Species Initiative has identified plant and animal species it considers to be of concern within London (<http://www.lbp.org.uk/LISI.html>). In addition to Japanese Knotweed and False Acacia, this includes one species found on the Application Site: Butterfly-bush *Buddleja davidii*.

#### *Invertebrates*

- 13.81 No specific terrestrial invertebrate surveys of the Application Site have been undertaken. It is likely that the fragments of habitat present on site support assemblages of locally common and widespread species typical of such environs in the borough of Newham and the London area. The lack of a varied grassland structure and composition, together with areas of bare and unmanaged ground, mean that many of the species of conservation interest which are typical of the Thames corridor are unlikely to be present on the site.
- 13.82 Records of Stag Beetle *Lucanus cervus* and the rare Streaked Bombardier Beetle *Brachinus sclopetata* were received from GiGL but all relate to records over 1 km from the Application Site.
- 13.83 The January 2013 aquatic survey recorded the abundance of aquatic invertebrates collected from KGV Dock wall based on the main taxonomic families present, as presented in Table 13.6 below.
- 13.84 Table 13.6 - Abundance of invertebrate life taken from samples of KGV Dock wall (individuals per m<sup>2</sup>)



**Table 13.6 - Abundance of invertebrate life taken from samples of KGV Dock wall (individuals per m<sup>2</sup>)**

Species	Sample 1	Sample 2	Sample 3	Sample 4
<b>Crustaceans</b>				
<b>Sphaeromatidae</b>	175	78	100+	100+
<b>Tanaidacea</b>	200+	100+	100+	200+
<b>Shrimp</b>	17	16	14	13
<b>Polychaete tube worms</b>				
<b>Serpulidae</b>	59	98	73	13

- 13.85 Given the number of organisms present in the 1m x 1m areas sampled, KGV Dock walls are likely to support a significant biomass of invertebrates which may form a key part of KGV Dock ecosystem. This abundance of aquatic invertebrates is likely to be an important food source for the Dock's fish populations.

#### *Fish*

- 13.86 The Royal Docks, of which KGV Dock is an integral and connected component part, support a variety of fish species such as Grey Mullet *Chelon labrosus*, Tench *Tinca tinca*, Pike *Esox lucius* and Sea Bass *Dicentrarchus labrax*. This constitutes a relatively unusual mix of both sea and freshwater fish species, arising as a result of the docks location being transitional between sea and freshwater. This is, however, certainly not untypical in the Lower Thames context and does not constitute a particularly sensitive or vulnerable mix of species.
- 13.87 Fishing is generally precluded for safety reasons other than in designated areas of the Royal Docks and is overseen by RoDMA.
- 13.88 The Ecology Consultancy's assessment of the Royal Victoria Docks on behalf of Da Vinci Construction (The Ecology Consultancy, 2012) did not include any data collected from the Royal Docks, the assessment instead relying on data from the River Thames with any inferences being made with respect to the Royal Docks. The only potential effects on fish identified were in relation to the creation of a cofferdam and the pumping of the dock water, activities which will not be used in the construction of the proposed CADP.

#### *Amphibians*

- 13.89 No amphibians were recorded during the course of the Phase 1 Habitat survey walkover surveys. The data search returned records of Common Frog *Rana temporaria* 1.5 km from the Application Site and a record of Common Toad *Bufo bufo* 300m from the site in 2009. The Application Site does not contain any bodies of standing freshwater suitable for amphibians and, given that the majority of the site is built or hardstanding, it unlikely that the Application Site supports any populations of amphibians.

#### *Reptiles*

- 13.90 No reptile species were observed during the Phase 1 walkover surveys. The only record of a reptile near the Application Site comes from GiGL which was for a Grass Snake *Natrix natrix* in 2001, approximately 1.8 km to the north of the Application Site. The well maintained and

isolated grassland habitat and large areas of hardstanding provide unsuitable habitat for reptiles within the Application Site.

#### *Birds*

- 13.91 The Airport operates numerous bird scaring techniques to enable its safe operation and reduce the risk of bird strike, in accordance with CAA requirements. These are implemented by a Bird Control Unit managed by Airport Operations.
- 13.92 A variety of methods and equipment are used to deter birds from the Airport and, particularly, those critical areas such as the runway where birds may endanger arriving and departing aircraft. These methods include simulating distress calls and using shell crackers to disperse any flocks. The airfield is regularly patrolled by vehicle to ensure that birds are not present and measures are rotated to ensure that birds do not become habituated to certain methods. General habitat management is also undertaken to deter flocks of birds from settling and to ensure that habitat, such as areas of grassland and vegetation, occurring on site is as unsuitable as possible for breeding birds. This includes maintenance of grassy areas and the application of herbicide to prevent plants from colonising areas and reducing diversity in the grass sward. The areas where vegetation is present are regularly monitored as well as the area surrounding the Application Site to ensure that habitat is kept in an unfavourable state for roosting and breeding birds.
- 13.93 The Application Site is considered as having limited potential for breeding birds, with most of those species observed during the walk over surveys in 2007 and 2013 being common breeding species. The Application Site, including the open water and edges of KGV Dock, does not support any specially protected species and the buildings within the Site perimeter are unsuitable for breeding or roosting birds.
- 13.94 A few areas were identified as having potential for nesting for common bird species. These include:
- a) Semi-mature to mature trees and areas of dense shrubs as part of the landscaping;
  - b) The grassy runway surrounds which support ground nesting birds: Lapwing *Vanellus vanellus* regularly breed on the grassy runway surrounds, with up to five pairs having been recorded in the past (London Bird Reports). Skylark *Alauda arvensis* and Yellow Wagtail *Motacilla flava*, birds of conservation importance listed on the BoCC Red List, have also been noted as breeding at or near the Application Site in the past (London Ecology Unit 1991<sup>2</sup>) and the GiGL data search returned recent (2010) records of Lapwing at the Application Site during the winter months probably using the grassy surrounds of the runway and could roost on the concrete dolphins in KGV Dock: all three species are uncommon as breeding species in London; and
  - c) The water edges of KGV Dock supports small numbers of breeding waterbirds and Coot *Fulica atra* were observed nesting within KGV Dock basin during the Phase 1 walkover survey. However, the vertical sides of the dock and lack of marginal vegetation means there is little opportunity for nesting birds.
  - d) The area of species poor semi-improved grassland that borders the runway was observed during the Phase 1 Habitat surveys of 2007 and 2013 to support singing Skylark and foraging Starling *Sturnus vulgaris* - both UK Biodiversity Action Plan (BAP) and London

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<sup>2</sup> London Ecology Unit (1991)

BAP species and listed on the Red list of Birds of Conservation Concern (BoCC) (Eaton et al. 20093).

- 13.95 Records were received from GiGL of a number of species recorded within 2 km of the Application Site on Annex 1 of the EU Birds Directive and Schedule One of the Wildlife and Countryside Act 1981. Records of several waterbird species associated with the River Thames were received from during the breeding season. These included Annex I species such as Mediterranean Gull *Larus melanocephalus*, Little Gull *Hydrocoloeus minutus*, Little Tern *Sternula albifrons*, Common Tern *Sterna hirundo*, Arctic Tern *Sterna paradisaea* and Sandwich Tern *Sterna sandvicensis*. Common Tern have been recorded in the Royal Albert Dock but all the other records relate to the River Thames.
- 13.96 Records of Little Ringed Plover *Charadrius dubius*; a species listed on Schedule One of the Wildlife and Countryside Act 1981, were received from GiGL within 2 km of the Application Site with the most recent record being in 2001. No suitable breeding habitat to support Little Ringed Plover is present within the Application Site.
- 13.97 Peregrine *Falco peregrinus*, a species listed on Annex 1 of the EU Birds Directive and Schedule One of the Wildlife and Countryside Act 1981, is known to have bred in the vicinity of the Application Site (London Ecology Unit 19914) and may occasionally forage in the area. Records were received from GiGL of Peregrine in the breeding season within 2 km of the Application Site. No suitable nesting locations exist within the area of the Application Site.
- 13.98 Black Redstart *Phoenicurus ochruros*; a species listed on Schedule One of the Wildlife and Countryside Act 1981, is known to have bred in the vicinity of the Application Site and the London Docklands was previously a breeding stronghold for the species5. Records were also received from GiGL of Black Redstart in the breeding season within 2 km of the Application Site. However, no buildings present within the area of the Application Site are considered suitable for breeding Black Redstart.
- 13.99 Considering the size and location of the Royal Docks, they are not heavily used by waterbird aggregations during the winter. Small numbers of Mallard *Anas platyrhynchos*, Mute Swan *Cygnus olor* and Cormorant *Phalacrocorax carbo* and larger numbers of gulls do occur, as well as sizeable flocks of Great Crested Grebe *Podiceps cristatus* and a few Little Grebe *Tachybaptus ruficollis*6. A factor in this scarcity is likely to be that the depth and sheer sides of the docks means that they support little or no aquatic vegetation which is an important food source to the majority of waterbird species. In the wider area of the Royal Docks several pairs of Common Tern are known to breed on rafts in Pontoon Dock, the southern extension of the Royal Victoria Dock (London Dockland Development Corporation).

#### Mammals

- 13.100 No habitat exists on the Application Site suitable for mammals such as Otter *Lutra lutra*, Water Vole *Aricola terrestris* and Badger *Meles meles* and the data search did not provide any records for these species within the Study Area, extending 2 km from the Site.

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<sup>3</sup> Eaton et al. (2009)

<sup>4</sup> London Ecology Unit (1991)

<sup>5</sup> London Ecology Unit (1991)

<sup>6</sup> London Ecology Unit (1991)

- 13.101 The buildings at the Application Site are all considered unsuitable for roosting bats and no mature trees with the potential to support bats were noted. The Application Site provides little in the way of linear features suitable for foraging bat activity.
- 13.102 The negligible value of the Application Site for bats was confirmed by the data search which revealed that the nearest bat sighting was 1.3 km from the Application Site, with the most recent sightings being in 2008.

### **Identification of Valued Ecological Receptors**

- 13.103 For each ecological receptor identified within or in the vicinity of the Application Site which has the potential to be affected by the proposed CADP, a biodiversity value has been assigned. This value is the result of professional judgement, taking into account the intrinsic value of the receptor type in the UK and the actual area/population (of a habitat or species) within and/or in the vicinity of the Application Site. The rationale for assigning value to each ecological receptor is discussed below.
- 13.104 In addition, some ecological receptors are protected by legislation, such that should they be present on or near the Application Site, they would need to be taken into account when assessing potential effects regardless of the biodiversity value assigned to them.

### Designated Sites for Nature Conservation

- 13.105 The Royal Docks is designated as a Site of Borough Importance for Nature Conservation (SBINC) in London and KGV Dock over which the proposed CADP will be constructed, is part of the SBINC. The Royal Docks SBINC is therefore assessed as being of district importance.
- 13.106 Due to the habitats and species they support and the distances from the Application Site, the Local Nature Reserve at Maryon Wilson Park and Gilbert's Pit and other non-statutory Sites of Nature Conservation Importance within the 2 km Study Area (listed at Table 13.5 above) will not be affected by the proposals and are therefore not considered further in this assessment.
- 13.107 As described in Chapter 12: Water Resources and Flood Risk, the Application Site will not generate any pollutants or other effects that could adversely impact the River Thames and the Thames estuary.

### Habitats

#### *Terrestrial habitats*

- 13.108 No terrestrial habitats of conservation importance at a national or London scale are identified as occurring on the Application Site. The habitats present do not fit the definitions for the UK BAP habitat 'Open mosaic habitat on previously developed land' and the London BAP habitat 'Parks and urban green spaces'. However, the Application Site and wider area of the Royal Docks are identified in the Newham BAP priority habitats 'Public open space and green corridor' and 'Built environment' due to the habitat parcels of interest occurring within this area. These were identified in the Greater London Authority (GLA) habitat survey, namely: the extent of the built environment and the area of semi-improved grassland on the airfield between the runways.

- 13.109 Given the extent of terrestrial habitats present within the Application Site and their interest in the context of the Borough of Newham, it is acknowledged that, whilst being heavily used and rigorously managed, these areas are still identified in the Borough's BAP and therefore assessed as being of district importance.

#### *Aquatic Habitats*

- 13.110 The Royal Docks are included in Newham Borough's Biodiversity Action Plan (BAP) within the Habitat Action Plan for 'Rivers and Wetlands', although no actions specific to the Royal Docks, and hence KGV Dock, are included. The Royal Docks are also part of the Green Corridor Network of Newham due to their association with the 'River Thames and its tidal creeks' situated about 500 m to the south of the Application Site.
- 13.111 Given the importance attached to the large area of open water habitat of the Royal Docks, emphasised by its inclusion in the Newham BAP habitats, the aquatic habitats within and adjoining the Application Site are considered to be of district importance.

#### Species

##### *Plants*

- 13.112 No plants on Schedule 8 of the Wildlife and Countryside Act 1981, or otherwise of conservation concern, were found to be present or have recently occurred within the Application Site or its immediate vicinity. Habitats present within the Application Site are limited and the scope for species of interest occurring is considered low. Plants are therefore not considered further (from a biodiversity viewpoint) in this assessment.
- 13.113 No non-native invasive plant species on Schedule 9 of the Wildlife and Countryside Act 1981 was recorded from the Application Site.
- 13.114 Butterfly-bush *Buddleja davidii*, present in scattered locations across the Application Site, is listed among "Species of high impact or concern which are widespread in London and require concerted, coordinated and extensive action to control/eradicate". Although the list is only advisory, the construction phase will remove the Butterfly-bush, significantly reducing its extent across the site.
- 13.115 Accordingly, non-native invasive plant species are not considered further in this assessment.

##### *Invertebrates*

- 13.116 Given that no habitats of conservation interest or high ecological value exist on site, it is likely that the terrestrial invertebrate assemblages occurring within the Application Site are those typical of the urban environments in London. Consequently, terrestrial invertebrates are not considered further in this assessment.
- 13.117 The aquatic crustacean and polychaete worm fauna found on the northern wall of KGV Dock constitutes a significant biomass and is assessed as important for the maintenance of the Dock's ecology, the fish population in particular. On this basis, it is valued at **district** level.



### *Fish*

- 13.118 KGV Dock provides suitable habitat to support a variety of fish species which are known to occur across the Royal Docks. Although the species present are not of conservation interest nationally or regionally, KGV Dock does provide a large expanse of suitable aquatic habitat that in the context of the Borough of Newham is relatively scarce. The fish populations occurring within KGV Dock, simply owing to its potential size and the relative scarcity of the habitat in the Borough, are likely to be of **district** importance.

### *Amphibians*

- 13.119 No suitable habitat with the potential to support Great Crested Newt or any other amphibians is present within the Application Site and the data search returned no record of Great Crested Newt within 2 km Study Area. Consequently, Great Crested Newt and other amphibians are not considered further in this assessment.

### *Reptiles*

- 13.120 No suitable habitat with the potential to support reptiles was found within the Application Site and the data search returned no records for reptile species within 1.8 km of the Application Site. Consequently, reptiles are not considered further in this assessment.

### *Birds*

#### Breeding Birds

- 13.121 The Application Site contains very limited habitat capable of supporting breeding birds. No suitable habitat is considered to be present to support Black Redstart or any other specially protected species. The limited areas of scattered scrub do have the potential to support small populations of common breeding species, with the area of species poor semi-improved grassland that borders the runway supporting breeding Skylark and, on occasion, Lapwing. Both of these species are UK BAP and listed on the BoCC Red List. In the wider area of KGV Dock and other docks several species of water bird are known to breed.
- 13.122 Given the context within the Borough of Newham, the bird species breeding within the Application Site and the Royal Dock complex (including KGV Dock) are considered to represent a breeding bird assemblage that is of **district** importance.

#### Wintering Birds

- 13.123 As a part of the wider Royal Docks complex, KGV Dock supports a small wintering assemblage of birds consisting of a few species. Active measures are taken by the Airport to discourage these birds because they present a potential hazard to aircraft. However, within the context of the Borough of Newham, where areas of open water are at a premium, the wintering bird assemblage associated with KGV Dock is considered to be of **district** importance.

### *Mammals*

- 13.124 The Application Site including KGV Dock is not considered to support any habitat suitable for breeding or foraging Otter and no records of this species exist within 2 km of the Application Site. As such, Otter is not considered further in this assessment.
- 13.125 No buildings or trees with the potential to support roosting bats were identified within the Application Site and it is considered to be unsuitable for foraging bats. The nearest record of bats returned was 1.3 km from the Application Site. It is therefore considered unlikely that bats occur at the Application Site and consequently they are not considered further in this assessment.
- 13.126 No records of Badger were received within 2 km of the Application Site and the habitats present within the site are not considered suitable for Badgers. Badgers are therefore not considered further in this assessment.

**Table 13.7 - Summary of Valued Ecological Receptors (VERs)**

VER	Biodiversity Value
Royal Docks SBINC	District
Terrestrial habitats	District
Aquatic habitats	District
Aquatic invertebrate fauna	District
Fish	District
Breeding birds	District
Wintering birds	District

### **Incorporated Mitigation**

- 13.127 In recognition of its commitment to support the wider protection, enhancement and understanding of biodiversity, the Airport has produced a Biodiversity Strategy (2012) outlining its approach to achieving these broad aims. The Strategy looks to support the further regeneration of the Royal Docks area, including ecological and other environmental improvements, provided that these are compatible with the continued and safe operation of the Airport. The Strategy is consistent with and supports relevant key objectives of the Newham Biodiversity Plan, which include the following:

*“To reduce deficiencies in access to nature for Newham’s existing and future residents, and undertake awareness-raising to promote appreciation of the Borough’s wildlife by all.”*

- 13.128 Accordingly, the main objective of the Airport Biodiversity Strategy is:

*“To help promote awareness of biodiversity issues by LCY staff, local residents and school children.”*

- 13.129 The Strategy also confirms the commitment by the Airport to explore opportunities to enhance biodiversity at the Airport (or elsewhere in Newham Borough) where such enhancements do not compromise the safety, operational controls or other functions of the Airport. Accordingly, such opportunities have been explored as part of the CADP design evolution and, particularly, the Landscape Strategy, as set out in the Design and Access Statement (DAS) submitted with the

planning application. For the forecourt area in front of the extended terminal, this includes the planting of low growing groundcover comprising shrubs, perennials, bulbs and ornamental grasses, together with Hornbeam trees in planters. This planting meets with the guidance contained within 'Safeguarding aerodromes – advice note 3', which advocates use of species which are least likely to attract large numbers of birds to roost, nest or feed.

- 13.130 The other dockside areas, including the proposed car parks to the east, will incorporate at least 5% of soft landscaping (by area) including hedges and small trees. The species selection for these landscape areas would be defined at the detailed/ reserved matters design stage. However, they are expected to create some additional biodiversity value, whilst complying with the above advice note.

### **Assessment of Potential Effects**

- 13.131 This section identifies and assesses the likely significant effects that are predicted to occur during construction works (the 'construction phase') and on completion of the CADP (the 'operational phase'). The activities and/or elements of the proposed CADP that are likely to give rise to the particular effects on identified VERs are described with reference to other Chapters of this ES, including Chapter 6: Development Programme and Construction,

- 13.132 The assessment and predictions of impact are carried out recognising the avoidance and mitigation measures that have already been built into the planning, design and operation of the CADP and acknowledging that, for the outline elements of the CADP scheme, mitigation measures can only be fully defined at the later detailed design stage. This includes measures that will ensure the following factors will not have any adverse effect on the ecology and limnology of the KGV Dock, nor on the flora and/or fauna:

- a) Noise;
- b) Vibration;
- c) Dust;
- d) Drainage; and
- e) Spills of chemicals.

- 13.133 The potential effects of the proposed CADP that are assessed in detail against each of the ecological VERs are:

- a) Direct loss or damage of habitats within a designated site or of nearby areas used by interest species;
- b) Change in management regimes of habitats within a designated site or of nearby areas used by interest species;
- c) Urbanisation that results in reduction of sight lines or which hinders bird flight paths;
- d) Aerial emissions (construction dust and construction and operational traffic);
- e) Changes in water quality;
- f) Changes to hydrology;
- g) Disturbance (human activity, noise, vibration and lighting); and
- h) Introduction or spread of non-native invasive species.

- 13.134 The initial part of the detailed assessment is to screen the potential effects listed above against the VERs to identify those for which there is a possibility of an impact and to 'screen out' those VER / effect combinations where there is no possibility of an impact, or it is simply not relevant. This screening process is presented in Table 13.8 below.

**Table 13.8 – Screening of VERs against potential effects**

VER	Source of effect	Potential for effect
Protected sites	Direct loss or damage of habitat Change in management regimes of habitats Urbanisation Aerial emissions Changes in water quality Changes to hydrology Disturbance Introduction of non-native invasive species	Yes Yes Yes Yes Yes Yes Yes Yes
Terrestrial habitats	Direct loss or damage of habitat Change in management regimes of habitats Urbanisation Aerial emissions Changes in water quality Changes to hydrology Disturbance Introduction of non-native invasive species	Yes Yes Yes Yes No No No Yes
Aquatic habitats	Direct loss or damage of habitat Change in management regimes of habitats Urbanisation Aerial emissions Changes in water quality Changes to hydrology Disturbance Introduction of non-native invasive species	Yes Yes Yes Yes Yes Yes No Yes
Aquatic invertebrates	Direct loss or damage of habitat Change in management regimes of habitats Urbanisation Aerial emissions Changes in water quality Changes to hydrology Disturbance Introduction of non-native invasive species	Yes Yes Yes No Yes No No Yes
Fish	Direct loss or damage of habitat Change in management regimes of habitats Urbanisation Aerial emissions Changes in water quality Changes to hydrology Disturbance Introduction of non-native invasive species	Yes No No No Yes Yes Yes Yes
Breeding birds	Direct loss or damage of habitat Change in management regimes of habitats Urbanisation Aerial emissions Changes in water quality Changes to hydrology Disturbance Introduction of non-native invasive species	Yes Yes Yes No No No Yes No

VER	Source of effect	Potential for effect
Wintering birds	Direct loss or damage of habitat	Yes
	Change in management regimes of habitats	Yes
	Urbanisation	Yes
	Aerial emissions	No
	Changes in water quality	No
	Changes to hydrology	No
	Disturbance	Yes
	Introduction of non-native invasive species	No

### Construction Phase Effects

- 13.135 The measures implemented to ensure that there are no adverse effects on the ecology and limnology, neither of the KGV Dock nor on the terrestrial flora and/or fauna, will be applied in each of the phases of construction as appropriate.

### *Designated Sites for Nature Conservation*

#### Direct loss or damage of habitat

- 13.136 The proposed CADP will result in the permanent loss of part of the aquatic habitat constituting the Royal Docks Site of Borough Importance for Nature Conservation (SBINC) due to the extent that the additional concrete decking will cause localised shading to the water body, the removal of part of the westernmost dolphin and the breaking out of KGV Dock wall (to create the necessary founding levels for the deck construction). The permanent loss of habitat is considered within the Operational Phase assessment.
- 13.137 There are not anticipated to be any temporary losses of habitat associated with the Royal Docks SBINC during the construction phase of the proposed CADP.
- 13.138 Any damage caused to habitat within the Royal Docks SBINC during the construction works will be minimal, with construction plant and the workforce being restricted in their movements and access due to the operational nature of the Airport.
- 13.139 Mechanisms will be put in place, through a Construction Environmental Management Plan (CEMP), as described in Chapter 6, which will ensure that degradation to the Royal Docks SBINC is avoided.
- 13.140 It is therefore considered that the direct loss of habitat during the construction phase of the development and the associated activities will have **no significant impact** on the Royal Docks SBINC.

#### Changes in management regimes

- 13.141 As described above (see paragraphs 13.65 and 13.85-13.86) the strict management of all habitats in order to maintain the safe operation of the Airport precludes any relaxation or changes to the management regimes currently in place. The construction phase of the proposed CADP will not have any detrimental effect on the management of the habitats associated with the Royal Docks SBINC. Therefore, it is considered that there will be **no significant impact**.



### Urbanisation

- 13.142 Development in close proximity to ecological interest features has the potential to overshadow areas of habitat associated with those features, with imposing structures causing them to become unsuitable to species previously occurring. The potential effects of building permanent structures as part of the development is dealt with in the Operational Phase assessment.
- 13.143 It is not anticipated that the temporary use of plant or structures erected during the construction phase (e.g. cranes and floating rigs) will adversely affect habitats within the Royal Docks SBINC to such an extent as to cause these areas to become unsuitable for the key ecological features or to the long term ecological viability of the habitat. Therefore, it is considered that urbanisation associated with the construction phase will have **no significant impact** on the Royal Docks SBINC.

### Aerial Emissions

- 13.144 There is the potential for dust to be generated during construction as a result of various activities. The precise behaviour of dust, its residence time in the atmosphere and distance travelled before being deposited depends on a number of factors. However, as operational airport environments are very sensitive to fugitive dust emissions, strict controls and regular monitoring will be employed to minimise dust arising from the works. As such, various measures will be implemented to ensure appropriate dust control on site during the construction phase of the CADP, as detailed within Chapter 9: Air Quality.
- 13.145 Furthermore, as set out in Chapter 6, it is anticipated that barges will be employed to deliver precast components and other construction materials which will, in turn, reduce the number of construction related HGV movements and associated emissions.
- 13.146 Given these proposed mitigation measures, habitats associated with the Royal Docks SBINC are not predicted to experience elevated levels of dust or fugitive emissions from construction vehicles, plant or other construction works. Therefore, the effects of construction dust and emissions will have **no significant impact** on the Royal Docks SBINC.

### Changes in water quality

- 13.147 There are two potential risks associated with changes in water quality - one derives from the potential to disturb the stratification of the water column with deoxygenated water being brought into the upper layer of KGV Dock; the other concerns water draining into or otherwise discharging into KGV Dock in an uncontrolled manner.
- 13.148 The disruption to the stratification will be avoided by adopting sensitive engineering techniques. In particular, the piling method (described in Chapter 6) has been selected to minimise the amount of pile driving that is necessary, which will act to minimise the disturbance of sediment and bed material in KGV Dock, thus reducing the possibility of adverse effects on water quality.
- 13.149 Measures will be taken to ensure that the quality of any water discharged into KGV Dock during the construction works is free of contamination and silt. Drainage during construction will form part of the site-wide surface water pollution prevention system which will be developed as part

of the CEMP. A formal water quality monitoring programme will be developed in consultation with the Environment Agency and RoDMA. This will include regular monitoring of pH levels, turbidity, dissolved oxygen and other parameters.

- 13.150 Chapter 6 and Chapter 12: Water Resources and Flood Risk, further outline the measures that will be taken to prevent contamination of KGV Dock during construction.
- 13.151 Implementation of these mitigation measures during the construction phase will limit the risk of a significant pollution incident. Therefore, it is considered that there will be **no significant impact** on the water quality of aquatic habitats associated with the Royal Docks SBINC.

#### Changes to hydrology

- 13.152 The proposed CADP will be constructed on a concrete deck (sat on augur piles) with its base above the water level, as with the existing Eastern Apron (aircraft stands 21-24). The piles will extend through the water column to KGV Dock bed, but these structures will not lead to any changes to the hydrodynamics of the Dock because it is an enclosed water body with negligible current.
- 13.153 The temporary use of plant and machinery and the associated works during the construction phase will not alter the hydrology of KGV Dock system in any way. Therefore, it is considered that the CADP works will have **no significant impact** on the hydrology of the Royal Docks SBINC.

#### Disturbance

- 13.154 Taking into account the security and operational procedures in place at the Airport, disturbance through the movements of the workforce is likely to be contained to the immediate construction site and access will be restricted to all other designated areas within the Application Site.
- 13.155 As set out in Chapter 6 and Chapter 8: Noise and Vibration, the proposed construction works have the potential to generate noise and vibration at different times and locations over a prolonged period. This could in turn have negative effects on species associated with the Royal Docks SBINC. However, given the levels of operational noise, movement and other disturbance that species associated with the Royal Docks SBINC are currently exposed to, it is considered that any additional disturbance during the construction phase will have **no significant impact** on the integrity of the Royal Docks SBINC.

#### Introduction of non-native species

- 13.156 The movement of people and traffic, as well as importation of material and plant to a site, can result in the introduction of non-native species. Therefore, any mechanical plant brought onto site during the construction phase will be specified as clean from weeds and pests, and will be checked as necessary. The Application Site will be monitored for any non-native invasive species during and immediately after construction and such species eradicated if found.
- 13.157 Groundworks can also result in the spread of non-native species present on a site. The potential for this will be controlled through best practice measures.

- 13.158 As a result of the mitigation measures indicated above, the risk of the introduction and spread of non-native species during the construction is considered to be low and is of **no significant impact** on the Royal Docks SBINC.

*Terrestrial habitats*

Direct loss or damage of habitat

- 13.159 The land and airside areas of the Application Site consist primarily of buildings and hardstanding and do not include any terrestrial habitats of ecological interest. There will be no activities associated with the proposed CADP that would damage any on or off-site terrestrial habitats of ecological interest and, with the exception of HGV and barge movements, construction activities will be contained within the curtilage of the development site.
- 13.160 Therefore, the direct loss of habitat during the construction phase of the development will be negligible and have **no significant impact** on terrestrial habitats of ecological interest.

Changes in management

- 13.161 The strict management of terrestrial habitats within the Application Site (in order to maintain aviation safety procedures) precludes any changes in the management regime. Therefore, the construction phase of the proposed CADP will not have any detrimental changes to the management of terrestrial habitats. As such, there will be **no significant impact** on terrestrial habitats of ecological interest as a result of changes in management.

Urbanisation

- 13.162 It is not anticipated that the temporary use of plant and structures erected during the construction phase will affect terrestrial habitats of ecological interest. The urbanisation effect of such structures can therefore be considered to have **no significant impact**.

Aerial emissions

- 13.163 As stated above, various measures will be implemented to ensure appropriate dust control during the construction works, as set out within Chapter 9: Air Quality. Given these proposed mitigation measures, terrestrial habitats of ecological interest are not predicted to experience elevated levels of dust.
- 13.164 The effects of construction dust and emissions from construction traffic will have **no significant impact** on terrestrial habitats of ecological interest.

Introduction of non-native species

- 13.165 As stated above, any plant brought onto site during the construction phase will be specified as clean from weeds and pests and the site will be monitored for any non-native invasive species, both terrestrial and aquatic, during and immediately after construction.
- 13.166 As a result of these measures, the risk of spreading non-native species during the construction phase is of **no significant impact** on terrestrial habitats of ecological interest.

### *Aquatic Habitats, Aquatic Invertebrates and Fish*

#### Direct loss or damage of habitat

- 13.167 The proposed CADP will result in the permanent loss, through shading, of part of the aquatic habitat from KGV Dock. The permanent loss of this habitat is considered within the Operational Phase assessment below.
- 13.168 The risk of damage or permanent loss of aquatic habitats within the Royal Docks SBINC during the construction phase will be minimal, taking into account the proposed mitigation measures such as the adoption of effective pollution control and best practice procedures to be implemented through the CEMP.
- 13.169 It is therefore considered that the direct loss of habitat during the construction phase of the development and associated activities will have **no significant impact** on aquatic habitats, aquatic invertebrates or fish.

#### Changes in water quality

- 13.170 As described above, disruption to the stratification of the water in KGV Dock will be avoided by adopting sensitive engineering techniques and, in particular, the proposed piling technique. This approach was used in the construction of the extension to stand areas over the KGV in May 2008. There were no adverse effects and no indication that the stratification had been disturbed.
- 13.171 This approach also applies to the installation of heat transfer coils in the KGV Dock for the dock source heat exchange (DSHE) system, which forms part of the proposed CADP energy strategy. The heat transfer coils will be supported on stilts at a depth of between 3-6 m below the surface of the Dock water and they will be installed using similar sensitive engineering techniques.
- 13.172 As the DSHE system provides a heat sink for heat rejection from a cooling system in summer and a heat source for a heating system in winter, the surrounding water immediately adjacent to the heat transfer pipework could be very slightly warmer or cooler than the surrounding water. The water temperature increase or decrease locally to the pipework would cause some thermal buoyancy movements within the water.
- 13.173 This depth of installation for the DSHE has been calculated to ensure that the heat transfer coils are below that part of the KGV which receives light (the photic zone) but above the stratification layer. Being below the photic zone will ensure that any warming effect of the water will be dissipated such that any impacts oxygen concentration and algae growth will be minimised. With the coils placed above the stratification layer, the potential to disturb the stratification of the water column and hence the contaminants on the dock bed is removed. It has also been proposed that a deflector plate is installed beneath the heat exchanger to minimise disturbance of these deeper water levels. As the volume of the dock water is relatively large compared to the volume of the closed loop system, it is considered that the overall temperature increase in the body of dock water will be negligible.

- 13.174 Chapter 6 and Chapter 12: Water Resources and Flood Risk, further outline the measures that will be taken to prevent contamination or other impacts to the water quality of KGV Dock during construction.
- 13.175 Implementation of these adopted measures during the construction phase of the proposed CADP will limit the risk of a significant pollution incident occurring. Therefore, it is considered that there will be **no significant impact** on the water quality of aquatic habitats, or to aquatic invertebrates and fish, as a direct result of the construction.

#### Changes in hydrology

- 13.176 For the reasons set out previously, the proposed CADP will not lead to any hydrological changes to the aquatic habitats of KGV Dock. Therefore, it is considered that the construction will have **no significant impact** on the hydrology of aquatic habitats, or directly to aquatic invertebrates and fish.

#### Introduction of non-native species

- 13.177 Again, as a result of the mitigation measures set out above, the risk of spreading non-native species during the construction phase is of **no significant impact** on aquatic habitats of ecological interest or to aquatic invertebrates and fish.

#### Disturbance

- 13.178 Anthropogenic noise and vibration which exceeds natural background levels has the potential to cause disturbance and, in extreme cases, injury or death to fish. The effects of noise depend on the sensitivity and life stage of the fish species, together with the components of the noise itself (e.g. intensity, duration, frequency bandwidth) and the distance to the noise source.
- 13.179 As described in Chapter 6: Development Programme and Construction, the piling method has been selected to minimise the amount of pile driving that is necessary which will, in turn, limit the amount of noise and vibration generated. The piling will comprise: the installation of a steel casing into the bed of KGV Dock by vibration; auguring through the steel casing to create the void for the pile; de-watering the pile casing; placement of reinforcing steel within the casing; placement of pile concrete within the casing; and preparation of the pile top to receive the precast concrete beam. This piling methodology also has the benefit of minimising the disturbance of dock sediment and bed material, thus reducing the possibility of adverse effects on water quality.
- 13.180 Given the intermittent nature of piling operations, any potential effects created by noise and vibration effects will be short term and temporary. If disturbed, fish will naturally swim away from the source of noise and vibration and move to a more sheltered location such as the eastern end of KGV Dock or around to the Royal Albert Dock.
- 13.181 Therefore, the effects of noise and vibration disturbance on fish populations in the study area are predicted to be of minor magnitude, due to the intermittent nature of the disturbance, and **no significant impact** is anticipated.



### *Breeding Birds*

#### *Direct loss or damage of habitat*

- 13.182 The areas within the Application Site boundary that do support limited numbers of breeding birds, namely the grassy surrounds to the runways, landscaped beds and scattered vegetation around the Site perimeter, will largely be unaffected by the development. Where existing soft landscaping is to be removed by the proposed CADP, this will be compensated for by the new landscaping scheme, as outlined previously.
- 13.183 There will be no activities associated with the proposed CADP construction phase that would damage any of the habitats considered to be of interest for breeding birds. Therefore, there will be **no significant impact** on the limited breeding bird assemblages occurring within or in proximity to the Application Site.

#### *Changes in management*

- 13.184 The strict management of terrestrial habitats within the Application Site to maintain aviation safety precludes any changes in the management regime. Therefore, throughout the CADP works, there will be no changes to the management of terrestrial habitats supporting breeding birds and therefore **no significant impact**.

#### *Urbanisation*

- 13.185 Development in close proximity to habitats supporting assemblages of breeding birds has the potential to overshadow such areas by, for example, imposing structures which may cause a visual deterrent or render habitat unsuitable.
- 13.186 However, it anticipated that temporary plant and structures which will be used in the CADP works (e.g. hoardings, cranes, barges and floating rigs) will not be of such an extent or size as to cause these effects. This is partly because the safeguarded surfaces of the Airport prohibit tall structures in proximity to the runway. Therefore, it is considered that urbanisation effects associated with the construction will have **no significant impact** on the breeding bird assemblages occurring within the Application Site.

#### *Disturbance*

- 13.187 Sudden, startling noises can cause animals to stop feeding and flee, whilst continuous background noises can result in less apparent effects. For example, continuous background noises such as traffic or operating machinery (e.g. pumps or generators) can interfere with the ability of animals to communicate by masking their calls, be they territorial, contact or alarm calls. The effect has been studied in detail for birds where the territorial songs or calls may be masked by noise of similar frequencies. This can reduce the distance over which the song or call can be heard. For a song, alarm call or another sound to give rise to a response from an animal, the sound must be detectable against the background noise. The detectability of a sound is determined by the signal-to-noise ratio (SNR) and the detection ability of the animal. Within a given frequency band, signals with a SNR below the detection threshold of the listening animal are 'masked'.

- 13.188 There are no established guidelines for the assessment of noise on bird populations and no publicly approved thresholds (i.e. by a statutory conservation agency) above which birds have been found to be affected. However, based on recent research in the Netherlands (Reijnen *et al* 1995, 1996; Reijnen and Foppen 1997), a threshold has been determined of 55 dB L<sub>Aeq</sub> for the impact of continuous background noise to become significant through causing a masking effect on bird song or calls. Loud noise (which can be defined as greater than 70 dB L<sub>Amax</sub>) and percussive noises have the potential to disturb birds, increasing time spent alert and in flight, reducing the available time to feed.
- 13.189 The proposed CADP construction works have the potential to generate a range of noise sources, as set out in Chapter 8: Noise and Vibration. Also, as described in Chapter 6, some of the works will occur during the night-time and during the weekend period when the Airport is closed. However, noise from construction activities which take place during weekday operational hours would occur in the context of regular background noise from aircraft on the stand and from aircraft landing or taking off from the runway. It is considered that birds which forage at the grassed borders to the airfield regularly (e.g. singing Skylark *Alauda arvensis* and foraging Starling *Sturnus vulgaris*) have become habituated to relatively high levels of noise. Therefore, it is unlikely that such species will be disturbed by the introduction of construction noise during the CADP works. Furthermore, as described previously, bird occurrence within the Royal Docks or close to the airfield is actively discouraged by acoustic scaring and other techniques, due to overriding safety and operational requirements to minimise the risk of bird strike to aircraft.
- 13.190 Activities such as piling in KGV Dock have the greatest potential to cause elevated noise levels. However, as described in Chapter 8, various measures will be implemented to ensure the noise and vibration impacts on sensitive receptors are minimised.
- 13.191 The visual impact from disturbance by the workforce on breeding birds is likely to be minimal. Breeding birds occurring within the Application Site are likely to already be habituated to an extent, and the levels of human disturbance will not increase significantly during the construction phase.
- 13.192 In light of the above factors, it is considered that there will be **no significant** effect on breeding birds as a result of additional disturbance in the construction phase of the CADP.

#### *Wintering Birds*

#### *Direct loss or damage of habitat and Changes in management*

- 13.193 The construction phase of the CADP will not result in any changes to the management of terrestrial habitats supporting breeding birds. It is therefore considered that there will be **no significant impact** on breeding birds as a result of direct loss or damage of habitat or changes in management of habitats within the Application Site.

#### *Urbanisation*

- 13.194 As stated above, it is not anticipated that the use of temporary plant and structures erected during the construction phase will adversely affect any species or the long term viability of the

habitat. Therefore, it is considered that urbanisation associated with the construction works will have **no significant impact** on the wintering bird assemblages occurring within or in proximity to the Application Site.

#### Disturbance

- 13.195 Given the low numbers of waterbirds using KGV Dock, and especially in the area which will be most directly affected by the CADP works, the number of birds exposed to additional elevated noise levels is likely to be minimal. When assessed in conjunction with the current background levels of noise occurring at the Application Site, the impacts on wintering birds using KGV Dock and the wider Royal Docks complex is likely to be negligible.
- 13.196 Little change in road traffic noise is anticipated during the construction phase, with many components being brought in by barge. The use of barges and the associated increase in waterway traffic has the potential to temporarily disturb waterbirds using KGV Dock due to the increased volume of traffic (approximately 12 movements per month), resultant noise and visual movements of people. Barges would enter KGV Dock through the sluice gates at its eastern end. However, given the disturbance already associated with this section of KGV Dock with aircraft frequently taking off and landing over this area of water, the numbers of waterbirds occurring is low. As such, it is anticipated that the temporary increase in boat traffic during the construction phase will have minimal impact on wintering birds.
- 13.197 In view of the above factors, it is considered that there will be **no significant impact** on wintering birds as a result of disturbance during the construction phase of the CADP.

#### Operational Phase Effects

##### *Protected Sites*

##### Direct loss or damage of habitat

- 13.198 The proposed CADP will result in the direct loss of approximately 75,000m<sup>2</sup> of surface water area (approximately 18% of the total existing water area) and approximately 1,800m<sup>2</sup> of Dock wall habitat (i.e. 2 m depth over approximately a 1 km length, 28% of the area of the existing dock wall down to 2 m) from KGV Dock. However, it is considered that the loss of this area of aquatic habitat will not affect the integrity of KGV Dock and the Royal Docks SBINC in terms of its nature conservation interest. The section of aquatic habitat to be lost under the footprint of the development does not support any aquatic species of particular conservation interest, nor is it used by concentrations of waterbirds due to its close proximity to the Airport terminal and runway and being subject to bird scaring actions. Whilst it is acknowledged that there will be a loss of area in aquatic habitat from KGV Dock, the direct loss of habitat will not affect KGV Dock in biodiversity terms.
- 13.199 Therefore, the direct loss of aquatic habitat on KGV Dock resulting from the proposed CADP is considered to have a **negligible permanent adverse impact** on the Royal Docks SBINC that is not considered to be significant.

### Changes in management

- 13.200 The strict management of all habitats within the Airport to maintain safety procedures precludes any changes in the management regimes currently in place. Therefore, the operational phase of the CADP will not have any detrimental changes to the management of the habitats associated with the Royal Docks SBINC and **no significant impact** will occur.

### Urbanisation

- 13.201 Although the footprint of the proposed development, including the terminal extension, new pier and other infrastructure falls within an area of aquatic habitat, these structures are not significantly different to those that currently exist on the site and within the Application Site perimeter. Therefore, **no significant impact** on the Royal Docks SBINC is predicted as result of further urbanisation occurring from the operational CADP.

### Aerial emissions

- 13.202 The Application Site outside of, but adjacent to the Air Quality Management Area that has been declared by the London Borough Newham for exceedances of the annual mean objective for nitrogen dioxide (NO<sub>2</sub>). The Airport has operated an Air Quality Monitoring Programme (AQMP) since October 2006; this currently includes two automatic monitoring stations (measuring nitrogen dioxide and PM10) and a network of nitrogen dioxide diffusion tube samplers. There have been no recorded exceedances of the air quality objectives at any relevant location since monitoring commenced.
- 13.203 As the proposed CADP proposals do not facilitate an increase in aircraft movements above the 120,000 (noise-factored) movements already consented in 2009, there will not be a net increase in aircraft emissions, other than that which would have been associated with the existing permission. In terms of emissions from surface access traffic, there will be some increase in traffic and parking as a result of CADP but this will be less than proportionate to the projected passenger increase and is not considered to be significant (as reported in Chapter 11: Traffic and Transport). Emissions from the two proposed energy centres are also unlikely to be significant, as reported in Chapter 9: Air Quality. Therefore, overall, the proposed CADP will not introduce any significant new source of dust or other emissions which could adversely impact upon ecology.
- 13.204 In view of the above, it can be concluded that the effects of aerial emissions from the operational CADP development will have **no significant impact** on the ecology of the Royal Docks SBINC.

### Changes in water quality

- 13.205 Measures will be taken to ensure that the quality of the water being discharged into KGV Dock meets appropriate discharge limits, such Biological Oxygen Demand (BOD), to be agreed with the Environment Agency and RoDMA. These measures are described in the CADP Surface Water Drainage Strategy (Appendix 12.2) and briefly within Chapter 12: Water Resources and Flood Risk.

- 13.206 Some outfall from the airfield drainage system may occur directly to KGV Dock during permitted conditions, either outside of the winter months or when de-icing chemical is not in use. This would be controlled by a monitoring system, incorporating a Biological Oxygen Demand (BOD) sensor and a manual override that could be installed within the runway strip. Outside of the permitted conditions, discharges would be directed to the existing Thames Water surface water drain, via interceptors.
- 13.207 As described in the CADP Surface Water Drainage Strategy, it may also be possible to discharge the higher dockside parking areas to KGV Dock by utilising porous/permeable paving with a shallow gravity piped outfall. Such porous paving will act to filter out suspended fines and other contaminants. Elsewhere, the landside surface water drainage system will be fitted with oil/ petrol interceptors to capture any spills.
- 13.208 Outfall permit and conditions for the above would be agreed with the Environment Agency and RoDMA to ensure that they do not adversely affect the water quality or ecology of KGV Dock. However, a benefit of draining to the Dock is that it will reduce the amount of 'top-up' water currently required to be pumped from the River Thames to maintain the high water level of the Royal Docks.
- 13.209 Implementation of the above measures and other Sustainable Urban Drainage Systems (SuDS) will limit the risk of a significant pollution incident to KGV Dock. Therefore, it is considered that there will be **no significant impact** on the water quality of aquatic habitats associated with the Royal Docks SBINC.

#### Changes in hydrology

- 13.210 For the reasons set out previously, it is considered that the operational CADP will have **no significant impact** on the hydrology of the Royal Docks SBINC.

#### Disturbance

- 13.211 Disturbance during the operational phase of the proposed CADP has the potential to impact on wildlife associated with the Royal Docks SBINC.
- 13.212 There is little change in road traffic noise anticipated under this development and the primary noise effects are expected to arise as a result of changing the pattern of ground noise produced at the Application Site, as described in Chapter 8: Noise and Vibration. The change will occur because of the introduction of additional aircraft stands and the proposed taxi lane further to the east, along KGV Dock. This will increase ground noise in some directions while reducing it in others because, for instance, aircraft will no longer have to backtrack on the runway.
- 13.213 In terms of noise from aircraft in flight (known as 'air noise'), it is expected that noise levels will not change significantly over those previously predicted, but that some small reduction may result as a consequence of the on-going introduction of a new fleet, such as the Bombardier CS100 aircraft.
- 13.214 As stated above, the number of birds exposed to elevated noise levels is likely to be minimal. Moreover, when assessed in conjunction with the current background levels of noise occurring



at the Airport including bird scaring, the impacts on wintering birds using KGV Dock and the wider Royal Docks complex is likely to be negligible.

- 13.215 In view of these factors, it is considered that potential disturbance created during the operational phase of the proposed development will have **no significant impact** on the Royal Docks SBINC.

*Terrestrial habitats*

Direct loss or damage of habitat

- 13.216 As stated previously, the direct loss of land resulting from the development will have **no significant impact** on terrestrial habitats of ecological interest.

Changes in management

- 13.217 As the completed and operational CADP will not introduce any different or detrimental changes to the management of terrestrial habitats, there will be **no significant impact** on such habitats.

Urbanisation

- 13.218 The buildings and structures of the CADP are not significantly different in nature to those that currently exist at the Application Site and to the limited extent that they will be on existing land rather than new decking over the Dock, the land is previously developed. Therefore, there will be **no significant impact** on terrestrial habitats of ecological interest as a result of the further urbanisation of the Airport brought about by the CADP.

Aerial emissions

- 13.219 For the reasons set out previously, aerial emissions from the operational development will not increase to any significant degree. Therefore, such emissions are expected to have **no significant impact** on the terrestrial habitats of ecological interest.

Introduction of non-native species

- 13.220 The nature of the Airport and security measures in particular, substantially reduces the risk of non-native invasive species being brought into the Application Site. The new landscaping implemented as part of the CADP will use predominantly indigenous plant species obtained from a licensed horticultural supplier. This landscaping will be carefully managed to ensure that the likelihood of any species invading the site and becoming established would be minimised.

*Aquatic Habitat, Aquatic Invertebrates and Fish*

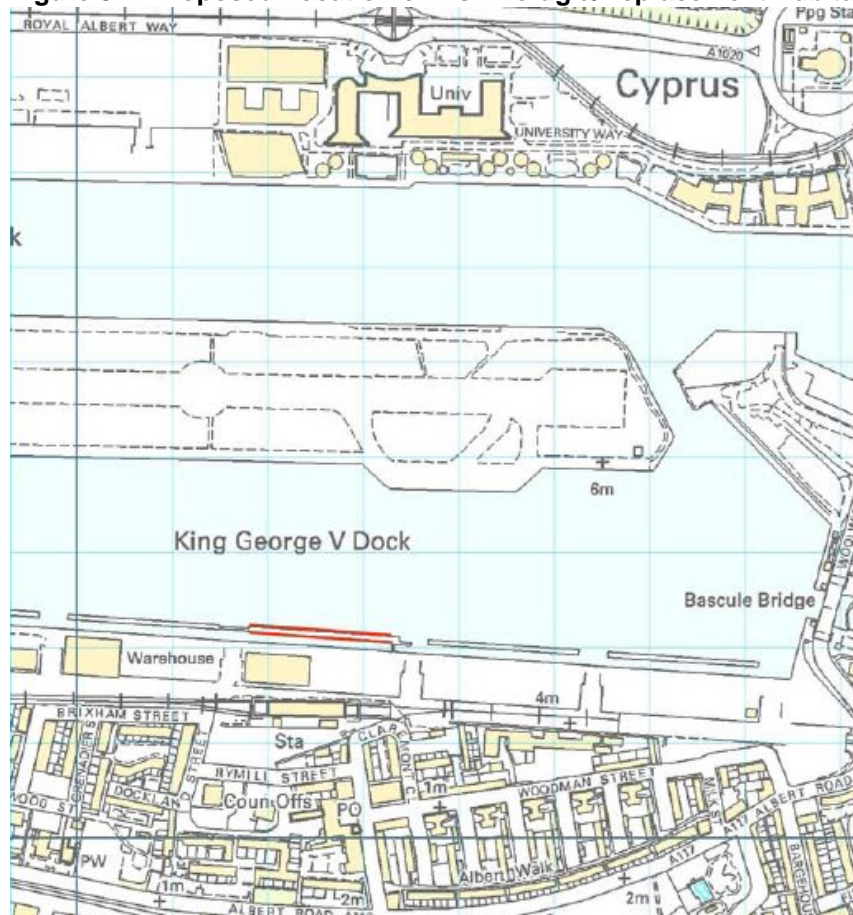
Direct loss or damage of habitat

- 13.221 The proposed CADP will result in the direct loss of approximately 75,000m<sup>2</sup> of surface water area (approximately 18% of the total existing water area in KGV Dock) and approximately 1,800m<sup>2</sup> of dock wall habitat from KGV Dock where the new stands and eastern taxi lane will be constructed. This is approximately 28% of the area of the existing dock wall down to 2 m. This

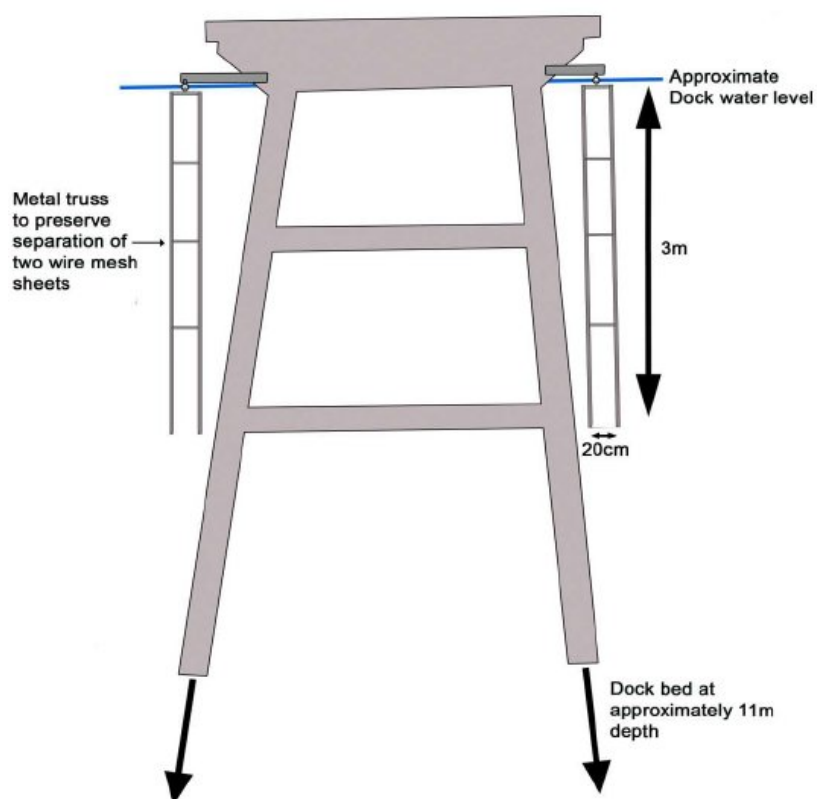
is potentially functional habitat that could be utilised by phytoplankton and zooplankton in the open water and algae and macro-invertebrates on the Dock wall. The Dock wall provides a substrate for a carpet of algae and associated detritus which has been colonised by aquatic invertebrates including crustaceans and polychaete worms. Such habitat is likely to have a functional role in the Dock ecosystem, including providing a food source for fish. However, a substantial amount of similar habitat exists in the remainder of KGV Dock (72% of the dock wall down to 2 m) and within the adjoining Royal Albert Dock that will be unaffected.

- 13.222 The loss of open water habitat for feeding is small relative to the total volume of Royal Docks available to the fish populations. The effect of building over the Dock also has a positive benefit in providing shade and refuge from adverse conditions in the open water due to, for example, extremes of temperature and avoidance of predators. This would be particularly beneficial for fish fry.
- 13.223 To compensate for the loss of this Dock wall habitat, it is proposed to introduce replacement substrate in the form of wire mesh sheeting (artificial fish refugia), suspended at the water surface down to a depth of 3.0 m below the high water level. There would two sheets of mesh fixed parallel to each other 0.25 m apart - one with a mesh size large enough to allow fish fry to pass through it, the other with a smaller mesh to facilitate the colonisation and build up of algae and associated detritus.
- 13.224 The indicative design of these fish refugia features and their location within the KGV Dock are illustrated in Figures 3.1, 3.2 and 3.3 below.

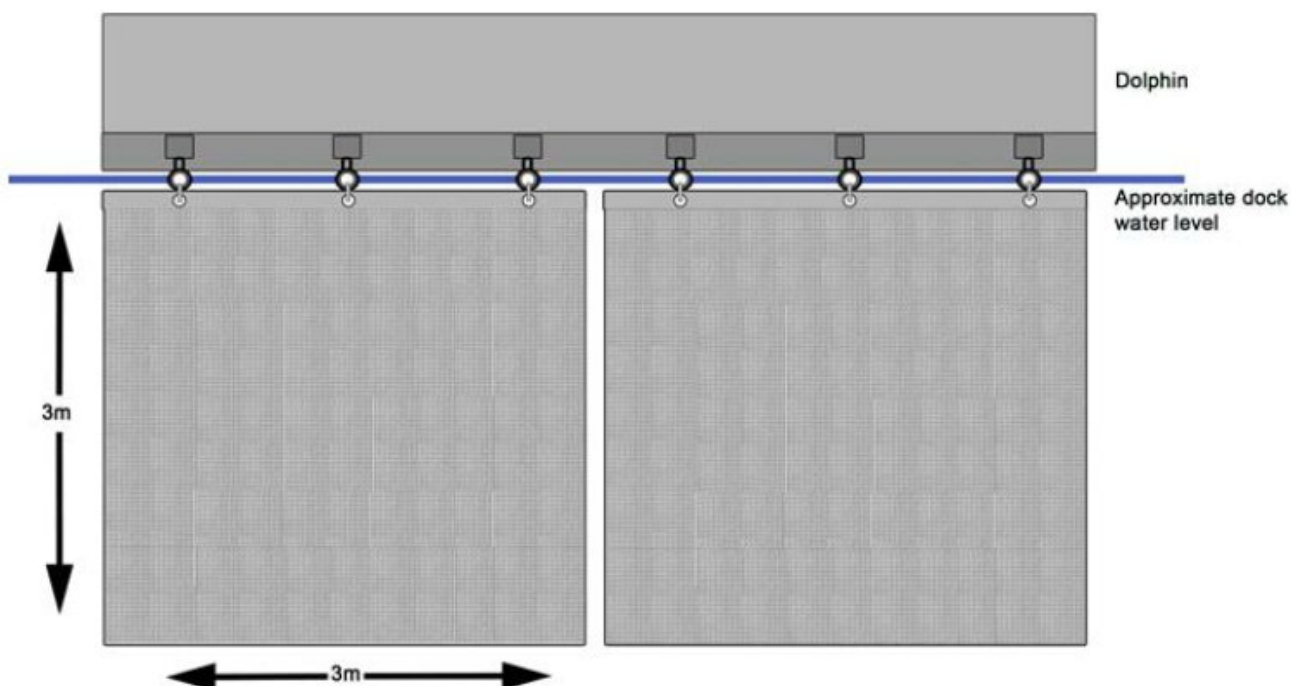
**Figure 3.1: Proposed Location of Fish Refugia/Replacement Habitat**



**Figure 3.2: Cross Section of 'Dolphin' showing proposed Fish Refugia suspended in the KGV Dock**



**Figure 3.3: Illustration of Fish Refugia wire mesh panels suspended in KGV dock**



- 13.225 This replacement habitat will be placed in KGV Dock in a location which is unaffected by the CADP works and will be allowed to colonise with algae and invertebrates over several years prior to the building out over of the existing dock wall. As such, it will directly mitigate for the loss of the dock wall habitat at the point at which it is lost. The wire mesh substrate will provide a secondary benefit of providing shelter to fish fry and thereby introduce a beneficial ecological gain.
- 13.226 Initial discussions with RoDMA (at a meeting on 1<sup>st</sup> May 2013) indicates that this replacement habitat could be located (on a temporary basis) within the Royal Albert Dock or another Royal Dock and then towed into position once the proposed CADP works are complete. The final location and detailed nature of the replacement habitat will also be discussed with the Environment Agency and RoDMA
- 13.227 Given that the final details of this mitigation have not yet been agreed or finalised, an assessment is made of the significance of impact without the mitigation. On this basis, it is considered that the direct loss of Dock wall habitat as a result of the proposed CADP will have **a minor impact** on the aquatic invertebrates and fish fauna.
- 13.228 It is considered that the loss of this open water will not affect the integrity of KGV Dock and wider Royal Docks complex in terms of its ecological interest. The loss of open water habitat for zooplankton is small relative to the total volume of Royal Docks and, given the uniformity of the water bodies comprising the Royal Docks, there would be no loss in biodiversity as a result. Furthermore, the section of aquatic habitat to be lost under the footprint of the development does not support any aquatic species of particular conservation interest.
- 13.229 It can therefore be concluded that whilst there will be a loss of area of aquatic habitat that is exposed to sunlight from KGV Dock, in ecological terms the direct loss of habitat will not affect the functionality or viability of the Royal Docks SBINC. Therefore, the direct loss of habitat resulting from the completed CADP is a **negligible permanent adverse impact** on the aquatic habitat that is not significant.

#### Changes in water quality

- 13.230 As described above, the implementation of the pollution controls and sustainable drainage systems will limit the risk of a significant pollution incident to KGV Dock. Therefore, it is considered that there will be **no significant impact** on the water quality of aquatic habitats.

#### Changes in hydrology

- 13.231 As described above, no hydrological changes to KGV Dock will occur as a result of the completed Eastern Apron deck and other new infrastructure associated with the CADP. Therefore, it is considered that the proposed development will have **no significant impact** on the hydrology of KGV Dock and associated aquatic habitats.

#### Introduction of non-native invasive species

- 13.232 For the reason set out above, it is considered that the proposed development will have **no significant impact** associated with non-native invasive species.

## *Breeding Birds and Wintering Birds*

### Direct loss or damage of habitat

- 13.233 The completed CADP will not provide any habitats to encourage breeding or wintering birds, due to overriding safety concerns and the requirement to minimise the risks of bird strike to aircraft on the ground or in the air. However, the existing areas within the Application Site boundary that support breeding birds, namely the grassy surrounds to the runways, will not be affected by the proposed development.
- 13.234 Therefore, the CADP will have **no significant impact** on the breeding and wintering bird assemblages occurring within or adjoining the Application Site boundary.

### Changes in management

- 13.235 The strict management of terrestrial habitats within the Application Site to maintain aviation safety will continue once the CADP is built out and operational. It is therefore considered that there will be **no significant impact** on breeding and wintering birds as a result of such ongoing management practices.

### Urbanisation

- 13.236 Development in close proximity to habitats supporting assemblages of breeding birds has the potential to overshadow areas, with imposing structures causing a visual deterrent and rendering habitat potentially unsuitable for breeding birds. However, the level of development proposed is not considered likely to result in any adverse effects on breeding or wintering birds through increased urbanisation and therefore **no significant impact** will occur.

### Disturbance

- 13.237 On the basis that noise in the operational phase will not be significantly greater than currently occurring within the Application Site, and is anticipated to be lower for certain individual aircraft such as the forthcoming Bombardier CS100, disturbance of breeding and wintering birds is not expected to increase.
- 13.238 Lighting during the operational phase also has the potential to disturb the birds. The Application Site, particularly the runway and Eastern Apron areas, are already well lit during operational hours (i.e. up to 22.30). The additional lighting introduced for the CADP will not increase light levels significantly, as described in the Lighting Strategy (ES Appendix 10.3).
- 13.239 Therefore, changes to both the noise environment and from additional lighting introduced for the operational CADP will have **no significant impact** on disturbance to breeding and wintering birds.

### **Cumulative and Combined Effects**

- 13.240 The purpose of this section is to assess the cumulative effects of the proposed CADP on ecology both within the proposed CADP and in conjunction with other developments, including any impacts on valued ecological receptors (VERs) identified earlier in this chapter.



- 13.241 Potential combined effects from the different effects arising from CADP development itself such as air quality interacting with noise, have been considered with respect to any potential impacts on ecology. None was identified.
- 13.242 The potential for cumulative effects between the proposed CADP and the other developments is dependent on each resulting in a significant/ residual effect on the same habitats, species or populations. The screening of such effects is however dependant on knowing what are the predicted effects of the these other developments. This is not always possible where a proposal is at an early stage of planning and/or has not been subject to EIA in its own right. In those cases, the screening process has been applied on the basis of professional judgement on the likely type and scale of impacts.
- 13.243 For the purpose of this assessment the following schemes are considered, as set out in Chapter 3: EIA Methodology.
- a) Silvertown Quays: outline planning permission for mixed use development including approximately 2,000 dwellings, B1 business use, hotel and leisure uses, retail and community and tourism uses. This site is located to the west of the Application Site on the southern bank of the Royal Victoria Dock.
  - b) North Side of Royal Albert Dock: Lapsed planning permission for a business park with possible retail and leisure facilities. This site is located directly to the north of the Application Site on the north bank of the Royal Albert Dock.
  - c) The Corniche Floating Village: planning application (with resolution to grant permission) for the construction of a floating village within Royal Victoria Dock. This site is to the west of the proposed CADP.
  - d) ExCel Hotel: Planning permission for hotel complex to the east of ExCel. This site is to the north west of the proposed development.
  - e) Royal Business Parks – Hotel site 2.3: planning application for the erection of a hotel and associated facilities. This site is on the north bank of the Royal Albert Dock to the north of proposed development.
  - f) Royal Business Parks – Hotel site 2.2: planning permission for the erection of a hotel and associated facilities. This site is on the north bank of the Royal Albert Dock to the north of proposed development.
- 13.244 There is the potential for the above schemes to act in combination with the proposed CADP to result in adverse impacts on the Royal Docks SBINC, its associated habitats and species. However, from the information available, the above schemes, all on previously developed land, did not identify any significant effects on ecological features associated with the Royal Docks SBINC. As there are considered to be no effects on ecological features from these other developments then there is no potential for in-combination or cumulative effects with the proposed CADP development.
- 13.245 In summary, no significant cumulative impacts have been identified when the combined impacts of the individual developments and the proposed CADP are considered. As such, no further assessment is considered necessary.

### **Summary of Mitigation**

- 13.246 This section summarises necessary mitigation measures that are not built into the design of the scheme.

13.247 Effects from construction will be minimised in the following ways:

- a) To compensate for the loss of Dock wall habitat, it is proposed to introduce replacement substrate in the form of parallel wire mesh screens, suspended at a depth of 1.5 - 2.0 m below the high water level. The detailed design of this artificial habitat will be discussed and agreed with both the Environment Agency and RoDMA;
- b) Use of a 'soft start' approach to percussive piling. This results in a gradual build-up of vibration and enables fish to move out of the effect zone before vibrations reach the level at which damage might be caused. With this in place, no significant effects on fish are expected;
- c) Measures will be taken to ensure that the quality of all drainage water discharged into KGV Dock meets appropriate discharge limits, such Biological Oxygen Demand (BOD), and does not create any adverse effects to the ecology of KGV Dock. A discharge permit and conditions will be agreed with the Environment Agency and RoDMA;
- d) Where appropriate, existing trees will be checked for nesting birds prior to their removal in accordance with the Wildlife and Countryside Act and if necessary preserved until clear;
- e) Ensuring that all plant brought onto site is cleaned as part of biosecurity measures to minimise the chance of introducing non-native invasive species into the Airport asset;
- f) The species selection for the new CADP landscape areas will be defined at the detailed/reserved matters design stage. This is expected to create some additional biodiversity value, whilst ensuring compliance with the guidance contained within 'Safeguarding of Aerodromes – Advice Note 3'<sup>7</sup> which advocates use of species which are least likely to attract large numbers of birds to roost, nest or feed; and
- g) Use of best practice construction techniques to minimise risk of accidental pollution incidents and to minimise noise and disturbance from construction activities. Measures will be incorporated into the Construction Environment Management Plan (CEMP) setting out operating procedures and remedial measures to be undertaken in the event of pollution and other incidents which may have the potential to adversely affect ecological receptors.

13.248 Considering the effects of the operation of the development, there will be a continuing need to ensure that the quality of all drainage water discharged into KGV Dock meets appropriate discharge limits, such as Biological Oxygen Demand (BOD), and does not create any adverse effects to the ecology of KGV Dock.

### **Conclusions and Recommendations**

13.249 A thorough investigation has been carried out of the biodiversity of the Application Site and its surroundings and of the limnology of KGV Dock basin over the period 2007 to 2013 in order to understand and assess the potential impact of the proposed CADP.

13.250 The potential effects of the proposed CADP that have been assessed in detail against each of the identified Valued Ecological Receptors are:

- a) Direct loss or damage of habitats within a designated site or of nearby areas used by interest species;
- b) Change in management regimes of habitats within a designated site or of nearby areas used by interest species;
- c) Urbanisation that results in reduction of sight lines or which hinders flight paths;
- d) Aerial emissions (construction dust and construction and operational traffic);

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<sup>7</sup> Civil Aviation Authority, Airport Operators Association, and General Aviation Awareness Council, (2003); Safeguarding of Aerodromes Advice Note 3: Potential Bird Hazards from Amenity Landscaping and Building Design. GAAC.

- e) Changes in water quality;
- f) Changes to hydrology;
- g) Disturbance (human activity, noise, vibration and lighting); and
- h) Introduction or spread of non-native invasive species.

- 13.251 Although the Application Site is part of the Royal Docks Site of Nature Conservation Interest of Metropolitan Importance, it has overall low biodiversity value partly due its urbanised nature within a heavily urbanised area and partly as result of the management of the Airport to minimise the risk of bird strikes.
- 13.252 The walls of KGV Dock support a significant biomass of invertebrates and this will be lost when the wall is covered over by the Eastern Apron. The invertebrates are a potential food source for the fish population and it is proposed to create a replacement habitat in the form of screens along the side of the Eastern Apron.
- 13.253 The limnology of the site was found to be uniform in both open and covered water areas presenting a water column stratified with respect to salinity and oxygen. Measures will be implemented as part of the construction process to ensure that the stratification is not disrupted.
- 13.254 The result of the assessment of effects is summarised in Table 13.9. There are no effects of significance predicted to occur as a result of the construction or subsequent operation of the proposed CADP. However, it is recommended that the above mitigation measures are adopted as the detailed design progresses, and during the project implementation and construction stages.

**Table 13.9 – Summary of effects taking account of proposed mitigation**

VER	Potential effect	Identified impact	Significance of impact
Protected sites	Direct loss or damage of habitat	Negligible permanent adverse impact	Not significant
	Change in management regimes of habitats	No permanent adverse impact	Not significant
	Urbanisation	No permanent adverse impact	Not significant
	Aerial emissions	No permanent adverse impact	Not significant
	Changes in water quality	No permanent adverse impact	Not significant
	Changes to hydrology	No permanent adverse impact	Not significant
	Disturbance	No permanent adverse impact	Not significant
	Introduction of non-native invasive species	No permanent adverse impact	Not significant
Terrestrial habitats	Direct loss or damage of habitat	No permanent adverse impact	Not significant
	Change in management regimes of habitats	No permanent adverse impact	Not significant
	Urbanisation	No permanent adverse impact	Not significant
	Aerial emissions	No permanent adverse impact	Not significant
	Disturbance	No permanent adverse impact	Not significant
	Introduction of non-native	No permanent adverse	Not significant

	invasive species	impact	
Aquatic habitats	Direct loss or damage of habitat	Negligible permanent adverse impact	Not significant
	Change in management regimes of habitats	No permanent adverse impact	Not significant
	Urbanisation	No permanent adverse impact	Not significant
	Changes in water quality	No permanent adverse impact	Not significant
	Changes to hydrology	No permanent adverse impact	Not significant
	Disturbance	No permanent adverse impact	Not significant
	Introduction of non-native invasive species	No permanent adverse impact	Not significant
Breeding birds	Direct loss or damage of habitat	No permanent adverse impact	Not significant
	Change in management regimes of habitats	No permanent adverse impact	Not significant
	Urbanisation	No permanent adverse impact	Not significant
	Disturbance	No permanent adverse impact	Not significant
Wintering birds	Direct loss or damage of habitat	No permanent adverse impact	Not significant
	Change in management regimes of habitats	No permanent adverse impact	Not significant
	Urbanisation	No permanent adverse impact	Not significant
	Changes in water quality	No permanent adverse impact	Not significant
	Changes to hydrology	No permanent adverse impact	Not significant
	Disturbance	No permanent adverse impact	Not significant

## 14 Cultural Heritage

### Introduction

- 14.1 This chapter provides an assessment of the potential effects of the CADP on heritage assets within the Application Site and within a one kilometre search area. This includes the potential impact on both buried archaeology and built heritage assets.
- 14.2 The Search Area was discussed and agreed with the Greater London Archaeology Advisory Service at English Heritage (Archaeological Advisers to the London Borough of Newham). The Search Area, for records of heritage assets within the vicinity of the site, was defined as follows;
- a) A search for all heritage assets within a 200m buffer from the red line outline for the CADP;
  - b) A search for all designated heritage assets within an additional 300m buffer outside of the 200m buffer with the additional buffer line to the south of the site located in the Thames so as to avoid picking up heritage assets on the south side of the river.
- 14.3 A full Desk Based Assessment (DBA) has been conducted in order to provide the historical and archaeological context of the Application Site, to define the heritage receptors that might be affected by the CADP and to provide the relevant planning policy and legislative background. For the purposes of data gathering, the Greater London Historic Environment Record (GLHER) was consulted for the Search Area with regard to all recorded heritage assets. Other sources as detailed in the DBA were also consulted to establish the presence of Scheduled Ancient Monuments, Listed Buildings, Conservation Areas and Registered Parks and Gardens within the designated Search Area. The DBA is provided as Technical Appendix 14.1.

### Planning Policy and Legislative Context

- 14.4 This section summarises the legislation and planning policy (national, regional and local) that are relevant to the proposed CADP and the assessment of heritage / buried-archaeology effects. A detailed review of the relevant policies is provided within the DBA.

#### Ancient Monuments and Archaeological Areas Act 1979

- 14.5 The purpose of the Ancient Monuments and Archaeological Areas Act is to make provision for the investigation, preservation and recording of matters of archaeological or historical interest and (in connection therewith) for the regulation of operations or activities affecting such matters.
- 14.6 Monuments deemed to be of such significance that they require this level of statutory protection are placed on the Schedule as defined in section 1 of the Act i.e. they become designated as Scheduled Ancient Monuments (SAMs). All Scheduled Ancient Monuments are of national importance.
- 14.7 For the purposes of the Act, the site of a Scheduled Ancient Monument “includes not only the land in or on which it is situated but also any land comprising or adjoining it which appears to the Secretary of State or the Commission or a local authority.....to be essential for the monument’s support and preservation” (section 61(9) of the Act).



Planning (Listed Buildings and Conservation Areas) Act 1990

- 14.8 Listed buildings and their settings are protected under the provisions of the Planning (Listed Buildings and Conservation Areas) Act 1990. Section 1 of the Act imposes a duty on the Secretary of State to compile and maintain a list of built structures of historic or architectural interest. Listed buildings and their settings need not be preserved unchanged, but development should, in all but exceptional cases, aim to preserve the building's historic or architectural interest.
- 14.9 Conservation Areas (and their settings) are protected under the provisions of Part II of the same Act. Section 69 imposes a duty on local planning authorities to identify and protect areas of special architectural or historic interest worthy of preservation or enhancement.

The National Planning Policy Framework (Conserving and enhancing the historic environment) (March 2012) (NPPF)

- 14.10 The NPPF cultural heritage policies of relevance to the proposed CADP are described in detail in the DBA.
- 14.11 Specifically, section 12 (Conserving and enhancing the historic environment) of the NPPF sets out strategies in relation to heritage assets and states that, in determining planning applications:

*".....local planning authorities should require an applicant to describe the significance of any heritage assets affected, including any contribution made by their setting. The level of detail should be proportionate to the assets' importance and no more than is sufficient to understand the potential impact of the proposal on their significance. As a minimum the relevant historic environment record should have been consulted and the heritage assets assessed using appropriate expertise where necessary." (Paragraph 128)*

- 14.12 Paragraph 135 goes on to state:

*"The effect of an application on the significance of a non-designated heritage asset should be taken into account in determining the application. In weighing applications that affect directly or indirectly non designated heritage assets, a balanced judgement will be required having regard to the scale of any harm or loss and the significance of the heritage asset."*

- 14.13 With regard to setting, paragraph 137 states:

*"Local planning authorities should look for opportunities for new development within Conservation Areas and World Heritage Sites and within the setting of heritage assets to enhance or better reveal their significance. Proposals that preserve those elements of the setting that make a positive contribution to or better reveal the significance of the asset should be treated favourably."*

- 14.14 Practice Guidance on the former Planning Policy Statement (PPS) 5 is provided in the document 'Planning for the Historic Environment Practice Guide'. The Practice Guide is still valid despite the PPS having been replaced by the NPPF.

### The London Plan (2011)

- 14.15 The London Plan Spatial Development Strategy for Greater London was published in July 2011. Chapter 7 of the Plan addresses 'London's Living Places and Spaces', with Policy 7.8 addressing heritage assets and archaeology:

#### *"Strategic*

*A – London's heritage assets and historic environment, including listed buildings, registered historic parks and gardens and other natural and historic landscapes, conservation areas, World Heritage Sites, registered battlefields, scheduled monuments, archaeological remains and memorials should be identified, so that the desirability of sustaining and enhancing their significance and of utilising their positive role in place shaping can be taken into account.*

*B – Development should incorporate measures that identify, record, interpret, protect and, where appropriate, present the site's archaeology.*

#### *Planning Decisions*

*C – Development should identify, value, conserve, restore, re-use and incorporate heritage assets, where appropriate.*

*D – Development affecting heritage assets and their settings should conserve their significance, by being sympathetic to their form, scale, materials and architectural detail.*

*E – New development should make provision for the protection of archaeological resources, landscapes and significant memorials. The physical assets should, where possible, be made available to the public-on-site. Where the archaeological asset or memorial cannot be preserved or managed on-site, provision must be made for the investigation, understanding, recording, dissemination and archiving of that asset."*

- 14.16 Policy 7.9 (Heritage-Led Regeneration) sets out the following approaches:

#### *"Strategic*

*A – Regeneration schemes should identify and make use of heritage assets and reinforce the qualities that make them significant so they can help stimulate environmental, economic and community regeneration. This includes buildings, landscape features, views, Blue Ribbon Network and public realm.*

#### *Planning Decisions*

*B – The significance of heritage assets should be assessed when development is proposed and schemes designed so that the heritage significance is recognised both in their own right and as catalysts for regeneration. Wherever possible heritage assets (including buildings at risk) should be repaired, restored and put to a suitable and viable use that is consistent with their conservation and the establishment and maintenance of sustainable communities and economic vitality."*

- 14.17 Finally, Policy 7.30 addresses 'London's Canals and Other Rivers and Waterspaces' and provides for the following:

*"Planning decisions*

*A - Development proposals along London's canal network and other rivers and waterspace (such as reservoirs, lakes and ponds) should respect their local character and contribute to their accessibility and active water related uses, in particular transport uses, where these are possible.*

*B - Development within or alongside London's docks should protect and promote the vitality, attractiveness and historical interest of London's remaining dock areas by:*

- a) preventing their partial or complete infilling*
- b) promoting their use for mooring visiting cruise ships and other vessels*
- c) encouraging the sensitive use of natural landscaping and materials in and around dock areas*
- d) promoting their use for water recreation*
- e) promoting their use for transport."*

London Borough of Newham (LBN) Policy

- 14.18 LBN adopted its Core Strategy on 26th January 2012. It includes spatial policies and core policies. Spatial Policy S3 (Royal Docks) includes as part of its objective that:

*"The Royal Docks will be developed as a World Class business destination within the knowledge economy, and a focus for investment on a world stage, building on opportunities presented by the Olympics."*

- 14.19 The policy goes on to provide that:

*"Proposals which address, and where appropriate accord with, the following vision-based policies for the wider area will be supported:*

*.....3. The area's key assets, namely the open water and remaining historic buildings and structures of the docks, riverside views and access, and Victorian heritage of North Woolwich around the station and Royal Victoria Gardens, will be re-valued and enhanced, ensuring that they form an integral part of the area's future in line with policies SP5 and INF7....*

*....10. The optimisation of existing capacity at London City Airport, with any proposals for further growth at the airport to be considered in line with Policy INF1."*

- 14.20 Part of the reasoned justification for the policy includes:

*"5.32 The Royal Docks extend from Royal Victoria Dock and West Silvertown at the western end, through King George V Dock and Royal Albert Dock, London City Airport to Albert Basin,*

*Albert Island and North Woolwich to the east, connecting and providing a relationship between areas across several Community Forum Areas. Almost half of the area is water. Much of the area is industrial, particularly south of the docks, with extensive areas of vacant or underused land. However, the Royal Docks also contain a number of key economic drivers within Newham, including the ExCeL conference centre, Tate and Lyle, University of East London, London City Airport, and more recently the London Borough of Newham's offices at Dockside. The Docks have benefited from £500m investment in recent years and the pace of change is becoming rapid".*

- 14.21 Policy SP1 (Borough-wide Place-making) includes the following:

*"High quality development will be expected, which respects, takes advantage of, and enhances the positive elements and distinctive features of the borough, contributing to a well-connected and integrated series of successful and distinctive places, that together help to transform the borough and its attractiveness as somewhere to live, work and stay.*

*To this end, development proposals, including proposals for 'meanwhile' uses, which respond to the following will be supported:*

*1. Topography, landforms, river corridors, green networks, important habitats, waterways, woodlands, other natural features and open spaces;....*

*.....3. Heritage, cultural and infrastructural assets in line with Policy SP5....;"*

- 14.22 Policy SP5 (Heritage and other Successful Place-making Assets) sets out as its objective:

*"6.48 Recognise the value of heritage and other assets (natural, cultural, architectural, and infrastructural) through their protection, conservation, and enhancement."*

- 14.23 With regard to the implementation of Policy SP5, the Core Strategy states:

*"6.53 Developers will be expected to respond to the various aspects of this policy as appropriate in their Design and Access Statements having analysed the context to their development. This should result in incremental change, including resources to support heritage conservation and enhancement, helping to reduce the number of assets identified as Heritage at Risk."*

- 14.24 The map following the reasoned justification for Policy SP5 shows that the land around King George V Dock is located within a designated Archaeology Priority Area. The area occupied by the water of the docks is not included within the Archaeology Priority Area.

- 14.25 Policy INF7 of the Core Strategy is concerned with the Blue Ribbon Network and is thus set within the context of paragraph 7.70 of the London Plan. This refers to the Blue Ribbon Network as London's strategic network of waterspaces which:

*"...covers the River Thames, canals, tributary rivers, lakes, reservoirs and docks alongside smaller waterbodies. The network is of cross cutting and strategic importance for London."*

- 14.26 The Newham Core Policy INF7 sets out as its objective:

*“6.273 The Blue Ribbon Network will be protected and enhanced, contributing to the regeneration of the borough.”*

14.27 The reasoned justification for the objective and subsequent policy is:

*“Additional large water bodies are located in the Royal Docks and other navigable waterways are located within the borough. These assets form the setting for the borough and much of Newham’s regeneration will be located in the areas adjacent to the Blue Ribbon Network.”*  
(Paragraph 6.274)

#### Additional Policy Considerations

14.28 The DBA which informs this ES chapter reviewed and had regard to the following research documents and publications:

- a) Newham Character Study (2010);
- b) Heritage Scoping Study of the Royal Docks Masterplan Area<sup>i</sup>;
- c) Research Framework for London Archaeology<sup>ii</sup>;
- d) Taking to the Water: English Heritage’s Initial Policy for The Management of Maritime Archaeology in England<sup>iii</sup>;
- e) Ports: the impact of development on the maritime historic environment<sup>iv</sup>;
- f) The Heritage at Risk Register;
- g) English Heritage Conservation Bulletin (Issue 67)<sup>v</sup>;
- h) The Thames Gateway Historic Environment Characterisation Project<sup>vi</sup>.

14.29 These documents address the historic significance of docks, ports and harbours and develop, as one of the themes, the neglect that these locations have experienced due to shifting economic pressures and changing modes of transport and communication. The documents are discussed in the DBA.

#### **Assessment Methodology**

##### Pre-application Correspondence and Scoping

14.30 This chapter has been compiled following Scoping Responses received from English Heritage (EH) on 11<sup>th</sup> November 2011 and 20<sup>th</sup> November 2012, and has also taken into account subsequent feedback from the LBN and EH, including:

- a) The DBA being reviewed in draft by EH Greater London Archaeology Advisory Service (Archaeological Advisers to the LBN);
- b) Pre-application letters from LBN; and
- c) A meeting with EH Greater London Archaeology Advisory Service and LBN on 6<sup>th</sup> March 2013.

14.31 Consultation responses (by letter and email) have been issued to LBN and forwarded on to RPS, as agent for LCY, from: the EH Greater London Archaeology Advisory Service (11<sup>th</sup> November 2011), the EH Principal Inspector of Historic Buildings and Areas (20<sup>th</sup> November 2012); LBN (pre-application advice letter of 10<sup>th</sup> January 2013); and from the EH Greater



London Archaeology Advisory Service (20<sup>th</sup> March 2013). This correspondence is included in Annex 4 of the DBA.

- 14.32 The letter from the Principal Inspector of Historic Buildings and Areas indicates that EH do not wish to offer any comment on the CADP and recommend that LBN determines the CADP in accordance with national and local policy guidance and on the basis of their specialist conservation advice.
- 14.33 The letter from the Archaeological Adviser to LBN identifies the King George V (KGV) Dock as a 'heritage asset' which means that consideration of the impacts on it must be addressed. The Dock is not, however, a listed or statutorily designated asset and there are no listed or statutorily designated structures within the Application Site.

### **Assumptions and Limitations**

- 14.34 The DBA has provided the baseline information for the impact assessment. The areas where there is a degree of uncertainty attached to the baseline data sources include:
- a) The Historic Environment Record (HER) can be limited because it depends on opportunities for research, fieldwork and discovery as they arise;
  - b) There is sometimes a lack of dating evidence for sites on the HER;
  - c) Documentary sources are rare before the medieval period and many historic documents are inherently biased. Older primary sources often fail to locate sites accurately and interpretation can be subjective; and
  - d) The extent of truncation caused by previous development impacts and landscaping works cannot be fully ascertained. In some cases, it may be greater than anticipated and in others, less than anticipated.
- 14.35 In undertaking the assessment and compiling this Chapter of the ES, site visits have been undertaken. Access to some of the operational parts of the Airport has not been possible, but this is not considered to affect the integrity of the assessment. The KGV Dock is visible from outside of the air-side parts of the Airport and any early archaeological remains are deeply buried.
- 14.36 Notwithstanding these limitations, the assessment presented within this Chapter and the accompanying technical appendices is considered sufficiently robust to identify the likely significant impacts of the CADP with regard to heritage assets.
- 14.37 No additional archaeological or heritage asset surveys have been undertaken to inform the ES, although additional survey and site investigation reports have been reviewed, including those described in Chapter 16: Ground Contamination.
- 14.38 The following criteria have been used in the assessment of the impact of the proposed CADP on heritage assets:

### Assessment of Effects - Approach and Methodology

- 14.39 No standard EIA methodologies exist for Archaeological and Heritage Assessment. However, assessment methodology can be guided by various published documents including: English Heritage, Conservation Principles, Policy and Guidance<sup>vii</sup>.
- 14.40 In order to reach an understanding of the level of any effect that a proposed development may have on a heritage asset, it is necessary to understand the importance of that asset, the proposed impacts and the asset's significance.
- 14.41 Using a matrix that measures both asset value and impact magnitude produces an assessment of the level of the effect of the proposed scheme on each asset. This approach and the matrices are set out below and in Tables 14.1, 14.2, 14.3 and 14.4.

### Assessment of Asset Significance – Archaeological Remains

- 14.42 There are no government guidelines for evaluating the significance of different types of heritage asset. For archaeological remains, the Department for Culture, Media and Sport (DCMS) has adopted a series of recommended (i.e. non-statutory) criteria for use in the determination of national importance when scheduling ancient monuments. These are expressed in the DCMS document 'Scheduled Monuments'<sup>viii</sup>. The criteria include period, rarity, documentation, group value, survival/condition, fragility/vulnerability, diversity and potential, and can be used as a basis for the assessment of the importance of historic remains and archaeological sites. However, the document also states that these criteria "*should not be regarded as definitive; but as indicators which contribute to a wider judgment based on the individual circumstances of a case*" (Annex 1).

**Table 14.1 - Factors for assessing the significance of archaeological assets**

Significance of Asset	Type of Asset
Very High	World Heritage Sites Assets of acknowledged international significance Assets that can contribute significantly to acknowledged international research objectives
High	Scheduled Monuments Undesignated assets of schedulable quality Assets that can contribute significantly to acknowledged national research objectives
Medium	Designated or undesignated assets that contribute to regional research objectives
Low	Undesignated assets of local significance Assets compromised by poor preservation and/or poor survival of contextual associations Assets of limited importance, but with potential to contribute to local research objectives
Negligible	Assets with very little or no surviving archaeological interest
Unknown	The importance of the asset cannot be ascertained

### Assessment of Asset Importance - Historic Buildings

- 14.43 For historic buildings, the assessment of importance is usually based on the designations used in the listed building process. However, where historic buildings are not listed or where the listing grade may be in need of updating, professional judgement will be required.

**Table 14.2 - Guide for establishing the significance of historic buildings/structures**

Significance of Asset	Type of Asset
Very High	Standing buildings in World Heritage Sites Other buildings of recognised international significance
High	Scheduled Monuments with standing remains Grade I and II* listed buildings Other listed buildings that can be shown to have exceptional qualities in their fabric or historical association not adequately reflected in the listing grade Conservation Areas containing very important buildings Undesignated structures of clear national significance
Medium	Grade II listed buildings Historic (unlisted) buildings that can be shown to have exceptional qualities in their fabric or historical association Conservation Areas containing important buildings Historic Townscape or built-up areas with historic integrity in their buildings, or built settings (e.g. including street furniture and other structures)
Low	'Locally listed' buildings Historic (unlisted) buildings/structures of modest quality in their fabric or historical association Historic Townscape or built-up areas of limited historic integrity in their buildings, or built settings (e.g. including street furniture and other structures)
Negligible	Buildings of no architectural or historic note; buildings of an intrusive character
Unknown	Buildings with some hidden (i.e. inaccessible) potential for historic significance

#### Assessment of Impact Magnitude - Archaeological Remains

- 14.44 The magnitude of impact is assessed without regard to the significance of the archaeological asset. In terms of the judgement of the magnitude of impact, this is based on the principle (established in former PPS5) that preservation of the asset is preferred and that total physical loss of the asset is the least preferred.
- 14.45 Impact scales on archaeological assets are defined thus (positive impacts in brackets):
- Major: Change to most or all key archaeological elements, such that the asset is totally altered and much of its archaeological significance is lost or its significance is increased.
  - Moderate: Changes to many key archaeological elements, such that the asset is clearly modified and there is some loss (or gain) of its significance and/ or integrity of the asset.
  - Minor: Changes to key archaeological elements, such that the asset is slightly altered and there is a slight loss (or gain) of the significance of the asset.
  - Negligible: Very minor changes to key archaeological elements that hardly affect the significance of the asset.
  - No change: No change to key archaeological elements.

#### Assessment of Impact Magnitude - Historic Buildings

- 14.46 The magnitude of impact on historic buildings is assessed without regard to the significance of the asset, so the total destruction of an insignificant building has the same degree of impact magnitude as the total loss of a high significance building. In terms of the judgement of the magnitude of impact, this is based on the principle that preservation of the asset and its setting is preferred, and that total physical loss of the asset and/ or its setting is the least preferred.
- 14.47 Impacts on the setting of historic buildings may include vibration, noise and lighting issues as well as visual impacts, and may be reversible.

14.48 Impact scales are defined thus:

- a) Major: Change to key historic building elements, such that the asset is totally altered and much of its significance is lost. Change within the setting leading to considerable loss of significance of the asset.
- b) Moderate: Change to many key historic building elements, such that the asset is clearly modified and there is some loss of significance. Change within the setting of an historic building leading to some loss of significance of the asset.
- c) Minor: Changes to key historic building elements, such that the asset is slightly altered and there is a slight loss of significance. Change within the setting of an historic building leading to a slight loss of significance of the asset.
- d) Negligible: Slight changes to a historic building's elements or its setting that have no obviously discernible effect on the asset's significance.
- e) No change: No change to the fabric of the asset or its setting.

#### Level of Effects

14.49 The level of effects is a combination of the significance of the heritage asset and the magnitude of the impact on that asset. Effects can be adverse or beneficial. Beneficial effects are those that mitigate existing impacts and help to restore or enhance the significance of heritage assets, therefore allowing for greater understanding and appreciation. The following matrix is used.

**Table 14.3 - Historic Environment: Level of Effects Matrix**

Significance of Asset	Effect				
	Neutral	Minor	Major	Substantial	Very Substantial
<b>Very High</b>	Neutral	Minor	Major	Substantial	Very Substantial
<b>High</b>	Neutral	Minor	Moderate	Major	Substantial
<b>Medium</b>	Neutral	Minor	Minor	Moderate	Moderate
<b>Low</b>	Neutral	Neutral	Minor	Minor	Minor
<b>Negligible</b>	Neutral	Neutral	Neutral	Neutral	Minor
	<b>No Change</b>	<b>Negligible</b>	<b>Minor</b>	<b>Moderate</b>	<b>Major</b>
	<b>MAGNITUDE OF IMPACT</b>				

#### Setting

14.50 Legislation and guidance make reference to the desirability of preserving or not adversely affecting 'settings'. Until recently, there has been no agreed definition of what this term actually means, with interpretations as simple as a visual envelope and more complex ideas based on historic relationships that may no longer be visible in the landscape. The identification of the 'setting' of heritage assets, and the nature and magnitude of impacts and consequently the level of effects on such 'settings', have thus been the subject of debate within the historic environment profession.

14.51 The NPPF now provides, at Annex 2, a definition of the 'setting of a heritage asset':

*“The surroundings in which a heritage asset is experienced. Its extent is not fixed and may change as the asset and its surroundings evolve. Elements of a setting may make a positive or negative contribution to the significance of an asset, may affect the ability to appreciate that significance or may be neutral.”*

14.52 The still valid guide, ‘Planning for the Historic Environment Practice Guide’, addresses the issue of the settings of heritage assets and makes the following points at paragraphs 113 to 124:

- a) All heritage assets have a setting, irrespective of the form in which they survive and whether they are designated or not;
- b) The setting of a heritage asset can enhance its significance whether or not it was designed to do so;
- c) The contribution that setting makes to the significance of the asset does not depend on there being public rights or an ability to access or experience that setting. This will vary over time and according to circumstance. Nevertheless, proper evaluation of the effect of change within the setting of a heritage asset will usually need to consider the implications, if any, for public appreciation of its significance;
- d) For the purposes of spatial planning, any development or change capable of affecting the significance of a heritage asset or people’s experience of it can be considered as falling within its setting; and
- e) A proper assessment of the impact on setting will take into account, and be proportionate to, the significance of the asset and the ability to appreciate it.

14.53 EH guidance on ‘The Setting of Heritage Assets’ (October 2011) <sup>ix</sup> addresses “*managing change within the settings of heritage assets*” and states that setting is separate from the concepts of curtilage, character and context. The guidance indicates that, whereas curtilage is a legal term “....defined by matters including past and present ownership and functional association and interdependency ... the setting of an historic asset will include, but generally be more extensive than, its curtilage (if it has one)”. Section 4 (Setting and Development Management) of the guidance includes the recommendation that any conservation decisions regarding heritage assets are based on the asset’s significance “*and are investigated to a proportionate degree*”.

14.54 The guidance also states that:

*“Development affecting the setting of a heritage asset is a direct environmental effect in terms of EIA definitions and may constitute a significant effect”* (section 6).

14.55 The guidance further sets out five steps to provide a broad approach to the assessment of setting, as follows:

- a) Step 1: identify which heritage assets and their settings are affected. The starting point of the analysis is to identify those heritage assets likely to be affected by the development proposal;
- b) Step 2: assess whether, how and to what degree these settings make a contribution to the significance of the heritage asset(s). The second stage of any analysis is to assess whether the setting of a heritage asset makes a contribution to its significance and the extent of that contribution. EH recommend that this assessment should first address the key attributes of the heritage asset itself and then consider:



- i. the physical surroundings of the asset, including its relationship with other heritage assets;
    - ii. the way the asset is appreciated; and
    - iii. the asset's associations and patterns of use.
  - c) Step 3: assess the effects of the proposed development, whether beneficial or harmful, on that significance. The third stage of any analysis is to identify the range of effects a development may have on setting(s) and evaluate the resultant degree of harm or benefit to the significance of the heritage asset(s). In general, however, the assessment should address the key attributes of the proposed development in terms of its:
    - i. location and siting;
    - ii. form and appearance;
    - iii. additional effects; and
    - iv. permanence.
  - d) Step 4: Maximising enhancement and minimising harm. Options for reducing the harm arising from development may include the relocation of a development or its elements, changes to its design, the creation of effective long-term visual or acoustic screening, or management measures secured by planning conditions or legal agreements. For some developments affecting setting, the design of a development may not be capable of sufficient adjustment to avoid or significantly reduce the harm, for example, where impacts are caused by fundamental issues such as the proximity, location, scale, prominence or noisiness of a development. In other cases, good design may reduce or remove the harm, or provide enhancement, and design quality may be the main consideration in determining the balance of harm and benefit.
  - e) Step 5: make and document the decision and monitor outcomes.
- 14.56 Appraisal of the sensitivity to change of the setting of a heritage asset incorporates a number of factors. These together contribute towards consideration of how certain aspects within the surroundings of a heritage asset contribute towards its significance and/ or people's ability to appreciate that significance.
- 14.57 The levels of sensitivity (to change) of the setting of a heritage asset are identified thus:
- a) **Reduced:** the significance of an asset is not likely to be affected by development within its surroundings - there are already several detracting elements within the setting and few contributory elements.
  - b) **Restricted:** the significance of an asset may be slightly diminished by development within its surroundings - there are some detracting elements within the setting and some contributory elements.
  - c) **Notable:** the significance of an asset may be substantially diminished by development within its surroundings - there are several contributory elements within the setting and few detracting elements.
  - d) **Elevated:** the significance of an asset may be wholly diminished by development within its surroundings - there are a number of contributory elements within the setting and almost no detracting elements.
- 14.58 Impact on the setting of heritage assets is defined as follows (positive impacts in brackets):

- a) **Major:** Substantial change within the setting leading to considerable loss (or increase) of the value/importance and/ or integrity of the asset.
- b) **Moderate:** Change within the setting leading to some loss (or increase) of significance of the asset.
- c) **Minor:** Slight change within the setting leading to a slight loss (or gain) of significance of the asset.
- d) **Negligible:** Very minor changes within the setting that hardly affect the significance of the asset.
- e) **No change:** No change within the setting.

14.59 The judgement of the magnitude of the impact is based on the principle that preservation of the setting is preferred and that total physical loss of the setting is the least preferred.

14.60 Impacts on the setting of heritage assets may include vibration, noise and lighting issues as well as visual impacts, and may be reversible.

14.61 A methodology for the assessment of the effects on the settings of heritage assets has been developed by RPS Planning and Development through use and application within a number of Environmental Impact Assessments and planning submissions in recent years. It is based on existing guidance, consultation within the historic environment profession and published analyses of the concept of 'setting'.

14.62 Clearly, any assessment of effects on heritage assets and their settings needs to take into account a wide variety of factors including the significance of the asset; its location within the physical landscape; its relationship with contemporary and non-contemporary features within that landscape; and the location, size and character of the proposed development in relation to these factors. It is not possible to provide precise equations in this context.

14.63 The effect of the proposed development on the settings of heritage assets is reached by relating the assessment of the magnitude of change within the setting of the heritage asset, with the identified sensitivity (to change) of that setting, as illustrated in Table 14.4 below. This then provides an assessment overall effect of change to the setting of the identified heritage asset(s).

14.64 The table is not designed as an absolute predictive tool, but to make the professional judgements as transparent as possible. The overall effect would be dependent on the value of the asset.

**Table 14.4 - Overall Effect on Settings of Heritage Assets**

Sensitivity (to change) of setting	Effect resulting from change within the setting of a heritage asset				
	No change	Negligible	Negligible	Minor	Moderate
<b>Reduced</b>	No change	Negligible	Negligible	Minor	Moderate
<b>Restricted</b>	No change	Negligible	Negligible	Minor	Moderate
<b>Notable</b>	No change	Negligible	Minor	Moderate	Major
<b>Elevated</b>	No change	Minor	Moderate	Moderate	Major

	None	Negligible	Minor	Moderate	Major
	Change within the setting of a heritage asset				

### Baseline Conditions

- 14.65 The full heritage baseline is presented within the DBA. This section provides a summary of available desk-based information followed by a list of the main identified heritage assets and potential heritage assets that are then considered in the Assessment of Effects section below.

#### Cultural Heritage Planning Background

- 14.66 As already noted, the landside areas of the Application Site are located within a LBN designated Archaeological Priority Area. The defined priority area excludes the area of the water of the Royal Albert Dock and King George V Dock.
- 14.67 There are no Scheduled Ancient Monuments within the identified Search Area. There are however eight listed buildings within the Search Area.
- 14.68 The docks are not listed and are not within a designated Conservation Area. Neither are there any proposals to designate the area of the docks as Conservation Areas.<sup>x</sup>
- 14.69 There are a number of locally listed buildings within the vicinity of the Application Site.
- 14.70 One of these (the abutments to the Sir Steve Redgrave Bridge on Woolwich Manor Way) was recommended for statutory protection as a Grade II Listed building, with the proposal that if it did not make the grade for national listing then it should be locally listed.<sup>xi</sup>

#### Topographic and Geological Background

- 14.71 The Application Site lies in the former Plaistow Levels, an area of marsh next to the River Thames. The Plaistow Levels have historically experienced extensive recurrent flooding - periods of higher sea levels causing the River Thames and other freshwater courses to inundate the low ground. As a result of this inundation, the alluvial landscape that lies along the northern foreshore of the River Thames consists of peat and clay horizons which overlie river terrace gravels.
- 14.72 Geoprobe investigations at Hartmann Road<sup>xii</sup> provided evidence of Made Ground varying in depth from 1.2m to 2.55m. Made Ground is described by the British Geological Survey as;
- man-made deposits such as embankments and spoil heaps on the natural ground surface.*
- 14.73 This material (i.e. deposits that are located above the superficial geology) can be of archaeological interest, dependent upon its context and date.
- 14.74 Beneath the Made Ground, to a depth of circa 3.0m (depth of probe), were deposits of clayey gravels - with borehole WS7 recording 'clay with peat and wood fragments' from 2.55m to 3.0m and WS8 recording 'peaty alluvial clay with decomposed wood' from 2.2m to 3.0m.

- 14.75 The recent RPS Site Investigation<sup>xiii</sup> along the southern side of the site found Made Ground varying in depth from 1.30m to 5.0m, with peaty clay deposits recorded beneath the Made Ground in some instances.

#### Historical Background

- 14.76 Detailed historical background is provided within the DBA, but only that directly related to the docks is included here.
- 14.77 The development of the Newham area was tied up with industry and its docks, with its riverside districts being absorbed into the dock complexes during the 19th and early 20th centuries. The Royal Victoria Dock was constructed in the 1850's and was the first in the country to be connected to the main railway system. The Royal Albert Dock, to the east of the Royal Victoria, opened in 1880 and KGV Dock opened in 1921, parallel to the south of the Royal Albert. This group of docks was the largest in the world and goods were imported and exported here from all over the world.
- 14.78 Competition from the East & West India Docks Company resulted in the construction of Tilbury Docks further down river which led to all the enclosed docks being taken over by the Port of London Authority (PLA) in 1909. The PLA reserved land to the north for a fourth dock which was never built.
- 14.79 The docks were a commercial success, becoming London's principal docks during the first half of the 20<sup>th</sup> century. They specialised particularly in the import and unloading of foodstuffs, with rows of giant granaries and refrigerated warehouses being sited alongside the quays. The docks' great size and provision of numerous finger quays gave them a collective span of over 12 miles (19.3 kilometres) of quaysides, serving hundreds of cargo and passenger ships at a time.
- 14.80 The Royal Albert Dock consisted of a vast linear dock of approximately 2 kilometres in length. Rather than the multi-storey warehouses of London's earlier docks, it had single storey transit sheds lining each wharf, the emphasis being on a fast turnaround of goods.
- 14.81 KGV Dock, which is approximately 1.4 kilometres long, was essentially an extension of the Royal Albert Dock, again with single storey sheds lining the wharf rather than multi-storey warehouses. The two docks are connected to each other at their eastern end with a link to the Thames at Gallions Reach.
- 14.82 The jetties (known as 'Dolphins') along the south side of KGV Dock were instrumental to the fast turnaround of goods, with the design allowing barges to serve either side of the shipping vessels. The Institute of Civil Engineers, in 1923, recorded that the use of jetties in this way was not new in principle, but was novel in their extensive application. There were seven such Dolphins at KGV Dock.
- 14.83 Historic Sources indicate that KGV Dock has the following characteristics;
- a) The dock was just over 1372 metres long and 11.6 metres deep. Its width varied from 152 metres to 213 metres. There was also a small dry dock at the western end.

- b) It had over three miles (5 kilometres) of quays, all furnished with concrete-frame sheds, electric cranes and platform trucks.
- c) The south quay was built as a series of seven long jetties parallel to the wall and 9.8 metres away from it. Barges were intended to lie in-between the jetties and the wall and the goods were unloaded and sorted in transit sheds on the jetties.
- d) There were 5 railway lines available to the 14 warehouses.

14.84 The closure of the docks, due to the changing economic climate and changes in transportation and consumer demand, left this part of Newham “*with great areas of derelict land*”<sup>xiv</sup> which created the momentum for the development of the Airport. The development of the Airport was considered to provide an opportunity for a “*catalyst to other development in this derelict area, and itself provide considerable employment opportunities*”.<sup>xv</sup>

#### Heritage Asset Baseline Summary

14.85 KGV Dock is not included in the GLHER, but it has been identified as a heritage asset in the Scoping Response received from EH (Greater London Archaeology Advisory Service), as referred to above.

14.86 As has already been indicated, the Scoping Response from the Principal Inspector of Historic Buildings and Areas indicated that EH London Office did not wish to offer any comment on the CADP and recommended that LBN determine the application in accordance with national and local policy guidance and on the basis of their specialist conservation advice to be given in due course.

14.87 Eight listed buildings have been identified within the Search Area. These are summarised below, with the listing descriptions provided in the DBA:

- a) Central Buffet at Custom House. A Grade II listed structure comprising a former restaurant, now disused. It was built in 1883 by Vigers and Wagstaffe. The building is currently on the EH “Heritage at Risk Register”.
- b) Central Offices at Custom House. A Grade II listed structure. It was built in 1883 by Vigers and Wagstaffe. The building is currently on the EH ‘Risk Register’.
- c) Entrance to Woolwich Pedestrian Tunnel. A Grade II listed structure (Rotunda) built by the chief engineer for London County Council, Sir Maurice Fitzmaurice.
- d) North Woolwich Station including turntable and platform lamp standards. A Grade II listed structure comprising a railway Station, now converted to railway museum. It was built in 1847 by Sir William Tite.
- e) Former St Mark's Church (Brick Lane Music Hall), North Woolwich Road, Silvertown. A Grade II listed structure built in 1861-2 by S.S. Teulon.
- f) The Woolwich Tunnel. A Grade II listed structure. The existing tunnel was constructed between 1910 and 1912 and was overseen by Sir Maurice Fitzmaurice.
- g) The Connaught Tavern. A Grade II listed structure by Vigers and Wagstaffe.
- h) Gallions Hotel. A Grade II\* listed building by Vigers and Wagstaffe. The building is currently on the EH “Heritage at Risk Register”.

14.88 Eight locally listed buildings have been identified within the Search Area. These are summarised below:



- a) The Royal Standard, Albert Road, E16;
  - b) Police Station, Albert Road, E16;
  - c) Hydraulic Accumulator Tower, Royal Albert Dock, E16;
  - d) Compressor House, Royal Albert Dock, E16;
  - e) Abutments to Sir Steve Redgrave Bridge, Woolwich Manor Way, E16;
  - f) Former Pumping Station, Woolwich Manor Way, E16;
  - g) The Lodge, Woolwich Manor Way, E16; and
  - h) Tate Institute, Wythes Road, E16.
- 14.89 There are no specific archaeological entries for KGV Dock in the GLHER, although there is an entry (MLO25838) which refers to documentary evidence, maps and recent developments indicating the presence of a substantial natural harbour or creek in the area of the Royal Albert and KGV Docks. This appears to be supported by the report on the construction of KGV Dock presented to the Institute of Civil Engineers in 1923.
- 14.90 Specific to the Royal Albert Dock, immediately to the north, the GLHER records the recovery of Palaeolithic flint artefacts (an axe or adze was found at a depth of c 10m below ground surface in gravel) during the Royal Albert Dock extension c 1914. In 1878, a log boat was uncovered in the alluvium during original excavations for the Dock at circa 3.05-3.66m below ground surface. Dendro-chronology has dated the boat to the 3rd century AD while C14 dates ascribe it to the Mid to Late Iron Age<sup>xvi</sup>. Roman pottery, food refuse and tiles on the surface of the peat were found near the boat.
- 14.91 Unspecified works in the dock also revealed a bronze 'rapier' with Mesolithic deposits recorded at Albert Road. Elsewhere in the locality, Neolithic and Bronze Age peat deposits and Bronze Age trackways have been recorded.
- 14.92 During the recent RPS site investigation, soft grey peaty alluvial clay with decomposed wood was recorded in borehole WS8 at the Hartmann Road car park site.

### **Incorporated Mitigation**

- 14.93 Mitigation that has been incorporated into the proposed CADP includes the recognition by the Design Team of the "*unique and fascinating industrial history and opportunity for reinvention*" of the Application Site and the "*key opportunity for the positive expression of both past and future for this part of London*"<sup>xvii</sup>. These principles and how the industrial heritage of the docks is to be expressed in the CADP design are explained more fully in the Design and Access Statement (DAS) accompanying the CADP planning submission. For the outline element of the CADP (the Hotel), the relevant design principles will be taken forward through the Design Code and subsequent reserved matters applications.
- 14.94 Discussions with the Design Team have also sought to address, where possible, minimising the physical effects of the CADP through, for example, careful consideration of the size/location of surface water attenuation tanks.
- 14.95 Where possible, the Design Team has sought to acknowledge the layout of the former dockside warehouses, which were arranged in blocks parallel to the retained Dolphins with breaks in-between to provide access to the transit sheds and dock edge. This is reflected in the outline

arrangement of many of the parking areas, with the accesses aligning with the breaks in the Dolphins. However, the positive impact of this design feature is finite, given the past removal of the structures themselves (i.e. cranes and transit sheds).

- 14.96 The dock edge path also includes remnants of the old rail tracks that were used to guide the railway carts that passed along the dockside behind, and in front of, the storage sheds. These are a key part of the heritage fabric. Therefore, wherever possible, the proposed CADP retains the tracks in-situ, replacing the current paving with new high quality surfaces. Where still in place, the original mooring points will also be retained and a new balustrade, sympathetic in design to the overall character of the dockside, will be introduced to provide the required safety.
- 14.97 As described in the DAS, there will be new interpretation measures installed at both the eastern and western ends of the docks for people to understand more of their history. At the western end, this will take the form of etched panels in the railings and screens; while at the eastern end, this could be through the provision of information panels and models as part of the final overall public realm design. The further development of the details of these railings, screens, panels and models, as well as other elements of the public realm, can be controlled through appropriate planning conditions on any planning permission and through the approval of the reserved matters for the Hotel plot, for which outline permission is sought.
- 14.98 The CADP's proposed Surface Water Drainage Strategy (see Appendix 12.2) has also incorporated historic environment mitigation, by minimising the size of proposed attenuation tanks as far as consistent with sound drainage principles. The primary strategy for discharge of surface water is to the existing sewer network, but the heritage implications of discharging to the Dock via outlets through the southern wall have also been discussed with EH should this alternative be appropriate and feasible. Such outlets would be discreet and widely spaced and of little heritage concern.

### **Assessment of Potential Effects**

- 14.99 Identified potential impacts of the proposed CADP that may affect heritage assets include:
- a) Changes to the setting of KGV Dock (a direct environmental effect in terms of EIA definitions);
  - b) Impacts to the northern wall of KGV Dock;
  - c) Impacts to the western wall of KGV Dock;
  - d) Impact on the Dolphins on the south-side of KGV Dock;
  - e) Impact on buried archaeological deposits;
  - f) Impacts on the setting of statutorily listed buildings; and
  - g) Impacts on the setting of locally listed buildings.
- 14.100 These effects are each assessed in turn under the following individual headings:
- a) Current condition;
  - b) Significance of the asset;
  - c) Sensitivity to change of setting – for buildings/structures;
  - d) Impact of proposals; and
  - e) Assessment of effects.

- 14.101 Assessment of the impacts on the identified heritage assets, along with their importance, has been undertaken in relation to the current baseline situation. The effects of construction are based on completion of the physical works, without interim assessment years.
- 14.102 Following consultation and meetings with both EH and LBN, it was concluded that the 'assessment of potential effects' should initially consider the effect that CADP may have on the setting of the dock, and then the physical effects on the identified individual components.

### **Development Proposals**

- 14.103 The full description of the CADP is provided within Chapter 2: Site Context and Scheme Description.

### **Changes to the setting of KGV Dock**

- 14.104 In addition to the individual assets that make up KGV Dock, consultation with the EH Greater London Archaeology Advisory Service has indicated that the setting<sup>xviii</sup> of the dock is an aspect that will be considered in their response to the CADP. This is in accordance with the policy set out in the London Plan and the LBN Local Plan. In EIA terms, an effect on the setting of a heritage asset is considered a direct environmental effect and may constitute a significant effect.

#### Current condition

- 14.105 KGV Dock is in a dramatically altered condition compared to when it operated as a destination for some of the largest transatlantic cargo ships that entered the River Thames.
- 14.106 Constructed as a linear dock to the south of the Royal Albert Dock, it was regarded as an extension of the Royal Albert's rapid goods transit methodology, with single storey sheds lining the wharf rather than multi-storey warehouses. Photographs of the dock in its heyday show intensive activity.
- 14.107 Following cessation of ship operations at both docks, the former sheds, warehouses and cranes have been removed leaving only the dock structure and the water filled basins.
- 14.108 Along the south-side of the dock, the structural remains of the former maritime industrial landscape that remain visible include the dock walls, seven Dolphins, mooring posts and occasional railways lines. Warehouses and cranes have been replaced by car parking, covered walkways, the runway, aprons and terminal buildings. As such, the former maritime, industrial based landscape has evolved to a modern transport landscape with the DLR to the north and south.
- 14.109 As described in Chapter 10: Townscape and Visual Effects of this ES, from the eastern end of the dock (from the Bascule Bridge) the full length of the water of the dock is visible, along with the runway hold point and extended eastern apron (stands 21-24) at the far end. East of the Bascule Bridge, the locks leading into the KGV Dock are visible, with the water of the River Thames beyond.

- 14.110 Thus, the prime view of KGV Dock (and its relationship with the Royal Albert Dock and the River Thames) is from the eastern end. This view lacks traditional industrial structures, a finding that has been acknowledged by the EH Greater London Archaeology Advisory Service in their review of the draft baseline assessment (e-mail to RPS dated 5th February 2013).
- 14.111 Due to its relationship with the Airport runway and associated transitional surfaces (which impose certain safety and security constraints), it is understood that the water of the KGV Dock is not used for public recreation, except at its far eastern end.
- 14.112 When viewing the dock from its eastern end, the impression of its current setting is one of a large expanse of water, held within dock walls, set within a commercial airport environment.
- 14.113 Information from RoDMA (e-mail dated 2nd March 2012) indicates that the Dolphins were refurbished in circa 2007.
- 14.114 Sainsbury & Butler reported that a *“study of the dock wall stability and structural capacity of the existing quaysides revealed no serious problems. The dock walls are stable provided that the water level is maintained and that there is no quay surcharge of more than 20kN/m<sup>2</sup>”*.<sup>xix</sup>

#### Significance of the asset

- 14.115 In ascribing significance to KGV Dock, in its entirety rather than through its component parts, the matrices set out above (Historic Buildings/Structures – Table 14.2) are referred to.
- 14.116 With reference to the categorisations in Table 14.2, the entirety of KGV Dock can be considered to be of ‘Low Significance’, in that it comprises historic (unlisted) buildings/structures of modest quality in their fabric or historical association with limited historic integrity in buildings, or built settings (e.g. including street furniture and other structures).

#### Sensitivity to Change of Setting

- 14.117 The levels of sensitivity (to change) of the setting of KGV Dock, from its current condition, is considered to vary from ‘Reduced’ to ‘Restricted’.
- 14.118 Reduced sensitivity to change is where the significance of an asset is not likely to be affected by development within its surroundings, as there are already several detracting elements within the setting and few contributory elements.
- 14.119 Restricted sensitivity to change is where the significance of an asset may be slightly diminished by development within its surroundings, but where there are some detracting elements within the setting and some contributory elements.
- 14.120 This assessment of the sensitivity to change of the dock is based upon there being few remains of the former industrial dock structures surviving. In addition, it takes into account the current setting of the dock which includes vibration and noise from the Airport and existing lighting /visual impacts, as described in Chapter 10 (Landscape and Visual Impact) of this ES.

### Impact of the CADP

- 14.121 The development proposals, as described earlier, will have some effect (either temporary or permanent) on the setting of KGV Dock and lead to some loss of significance.
- 14.122 This change in setting is illustrated by visualisations presented in the Design and Access Statement. Figure 14.1 below shows a visualisation, created by architects Pascall & Watson for the Design & Access Statement, of the CADP from the south-west.

**Figure 14.1 – P&W visualization of the CADP from the south-west**



- 14.123 The new aircraft stands, extended taxi lane and the Eastern Terminal Extension will be situated on a 7.56 hectare deck over the KGV Dock. The existing area of the KGV Dock is approximately 30 hectares (taken to the mid point of the cut through to the Royal Albert Dock and up to the bridge carrying the Woolwich Manor Way). The proposed CADP will result in the direct loss of approximately 75,000m<sup>2</sup> of surface water area (approximately 18% of the total existing water area in KGV Dock) and approximately 1,800m<sup>2</sup> of dock wall habitat from KGV Dock where the new stands and eastern taxi lane will be constructed. This is approximately 28% of the area of the existing dock wall down to 2 m.
- 14.124 The proportionate impact is substantially less in the context of the KGV Dock and Royal Albert Dock (area of circa 31.7 hectares) taken together, which are appreciated as an integral waterspace in views from the critical eastern end. In this context, the new decking equates to an impact of circa 14% of the open water of the docks.
- 14.125 A new passenger Forecourt area is proposed to the south and east of the enlarged Terminal. To meet security requirements, there will be a 30m wide landscaped vehicle free zone in front of the enlarged terminal building. The Forecourt will include a black taxi pick-up and drop-off facility, a private vehicle pick-up and drop-off facility and bus stops for London Buses.



- 14.126 The proposed Eastern Terminal Extension (ETE) will be dedicated to passenger arrivals, with the existing terminal reconfigured for departing passengers. This new 'Arrivals' part of the Terminal will be up to 24 metres AOD. The plans show a lower component of the building on its southern side fronting the passenger forecourt (up to approximately 17 m high AOD).
- 14.127 A permanent Noise Barrier (13.5 m AOD) is proposed at the end of the East Pier to mitigate noise impacts principally from aircraft using the end stand.
- 14.128 A temporary noise barrier (3 m high AOD) is proposed along part of the southern boundary of the site to mitigate construction noise impacts for residents to the south of the eastern end of Woodman Street.
- 14.129 The Western Terminal Extension (WTE) will be built in two parts. The first part will comprise new landside and catering uses in an extension at ground floor with a new security area on the first floor (thereby enabling the first floor of the existing terminal to be extensively reconfigured for airside passenger circulation, seating and retail and catering areas). The second floor of the proposed extension will comprise airport related office accommodation. As part of these proposals it is also proposed to build the Western Energy Centre (producing up to 35 kWt) together with a Western Service Yard.
- 14.130 The second part of the WTE will provide additional Airport related office accommodation, which is partly required due to the need to relocate staff from the demolished City Aviation House (CAH) which sits in the location of the proposed Forecourt.
- 14.131 The main existing vehicle access point to the Airport from the western end of Hartmann Road will be maintained and supplemented by a new permanent access from the eastern end of Hartmann Road at its junction with Woolwich Manor Way.
- 14.132 Between Hartmann Road and KGV Dock to the east of the proposed Hotel plot, it is proposed to include decked and surface level car parking (to be used by airport passengers and staff and for car rental).
- 14.133 A Dock Source Heat Exchange (DSHE) system is proposed to serve part of the heating and cooling demand for the Airport. Heat exchanger pipework will be installed within King George V Dock to the south gaterooms in the replacement Eastern Pier (up to 7 in total). It is estimated that each system loop, would extend by up to 25x25m within the dock water. For ease of installation, maintenance and security each loop will be extended into open dock area to the south of the new deck/replacement pier, rather than under the deck. The heat exchange pipework is proposed to be located between 3m to 6m below the dock water surface. Each of the system loops will be installed on a frame with stilts, designed to give at least 2-3m clearance from the dock bottom, to avoid disturbing any contaminants. Although physically substantial, being virtually all submerged, the effect of the DSHE apparatus on the setting of the Dock will be minimal.
- 14.134 The outline application for the erection of a Hotel entails a facility with up to 260 bedrooms.

14.135 Taking account of the above, the condition of the KGV Dock and the quality of the proposed design, it is considered that the magnitude of impact to the setting of the Dock overall will be Moderate.

14.136 As described above, Moderate impacts to setting are when there are changes within the setting leading to some loss of the significance of the asset.

#### Assessment of effects

14.137 The effect of the CADP on the settings of heritage assets is reached by combining the assessment of the magnitude of change/ impact within the setting of the heritage asset with the identified sensitivity (to change) of that setting, as illustrated in **Table 14.4**.

14.138 The magnitude of impact on the setting of KGV Dock has been assessed to be Moderate and the levels of sensitivity (to change) of its setting is considered to vary from Reduced to Restricted. Accordingly, as set out in **Table 14.4**, the corresponding effect can be concluded to be **Minor**.

#### **Impact on the northern wall of KGV Dock**

14.139 As observed earlier, KGV Dock is not included on the GLHER, but has been identified through consultation with EH to constitute a non-designated heritage asset. Detailed information on the construction of the dock indicates that the dock walls are composed of concrete. The walls were excavated in timbered trenches before the main dock excavation and were constructed of concrete, deposited in “*two layers of three feet each*” (Binns, 1923)<sup>xx</sup>. Nineteen three-ton cranes were located along the northern side of the KGV Dock. Binns also records that the northern wall was 51 feet high with a maximum width of 16 feet at its base. At the top, it was 9 feet 7 inches wide with the coping stone sitting within a recess to maintain a flat upper surface. Binns’ section shows that the toe of the wall extended five feet below the excavated depth of the base of the dock.

#### Current Condition

14.140 The current condition of the dock walls was reported in 1993, to reveal no serious problems.<sup>xxi</sup>

#### Significance of the Asset

14.141 With reference to **Table 14.2** (Guide for establishing the significance of historic buildings/structures) and taking into account the huge change in the setting of the dock (i.e. since its closure and the removal of the majority of associated dockside structures), it is considered that the northern dock wall is of Low Significance.

14.142 In terms of the categorisations in **Table 14.2** (see earlier) of historic buildings/structures of low significance, the northern wall of the dock is regarded as being a historic (unlisted) building/structure of modest quality in its fabric / historical association.

### Impact of the CADP

- 14.143 As described in Chapter 6: Development Programme and Construction, the construction of the new stands and taxilane extension requires breaking out of the dock wall on the northern side of KGV Dock. There is a requirement to remove coping stones from the top of the dock wall, with the front face of the wall cut down and levelled with in-situ concrete.
- 14.144 The direct physical impact (removal of coping stone and cutting down of front face) is considered to be Moderate.
- 14.145 Moderate changes to historic buildings/structures are described earlier as “change to many key historic building elements, such that the asset is clearly modified and there is some loss of significance”.

### Assessment of Effect

- 14.146 Assessment of the direct physical effect on the northern dock wall is based on the assessed Low Significance of the asset and the assessed Moderate direct physical impact.
- 14.147 The direct physical effect on the north dock wall is assessed to be **Minor** (Moderate impact on an asset of Low Significance) before mitigation.
- 14.148 Discussions with the Archaeological Adviser to the LBN have indicated that mitigating these impacts could be addressed by the placing of ‘historic building recording’ planning conditions on any planning permission.

### **Impacts to the western wall of KGV Dock**

- 14.149 As described above, information on the construction of the docks indicates that the dock walls are made of concrete. Binns (1923) does not provide any information on the construction of the western wall of KGV Dock, although he does provide a “set-back” section through the dry dock and indicates that this was accessed through “lock gates” set back from the western wall of the dock.

### Current condition

- 14.150 The current condition of the western wall of the dock was reported in 1993, to reveal no serious problems.<sup>xxii</sup>

### Significance of the asset

- 14.151 With reference to **Table 14.2**, and taking into account the huge change in the setting of the dock (as described above), it is considered that the western dock wall is of Low Significance.
- 14.152 In terms of the **Table 14.2** categorisations of historic buildings/structures of Low Significance (see earlier), the western wall of the dock is regarded as being a historic (unlisted) building/structure of modest quality in its fabric / historical association.

### Impact of the CADP

- 14.153 As described in Chapter 6: Development Programme and Construction, the proposed CADP requires the breaking out of the dock wall on the western side of KGV Dock to enable the construction of the deck over which Eastern Terminal Extension, together with associated building foundations and services infrastructure, would be built.
- 14.154 The direct physical impact (removal of coping stones, cutting down of front face) is considered to be Moderate, in accordance with the criteria described previously.

### Assessment of effects

- 14.155 Based upon the assessed Low Significance of the individual heritage asset and Moderate direct physical impact, the effect on the western dock wall is assessed to be **Minor**, before mitigation.
- 14.156 Discussions with the Archaeological Adviser to the LBN have indicated that mitigating these impacts could be addressed by the placing of 'historic building recording' planning conditions on any planning permission.

### **Impact on the 'Dolphins' on the south side of KGV Dock**

- 14.157 Structural remains are visible in the Dock, in the form of fixed jetties known as 'Dolphins'. Seven Dolphins were constructed, each of which survives in a form that has been significantly altered from the original (see Technical Appendix 14.1). They *"allowed lighters to pass freely between ships and the quay, permitting simultaneous loading/unloading over both sides of the ship. The dolphins were connected to the south quay by footbridges"*<sup>xxiii</sup>.
- 14.158 The Dolphins are recorded as each being 520 feet long, 32 feet wide and built 32 feet out from, and parallel to, the quayside. Each one held six, three-ton cranes.
- 14.159 Originally, when constructed, the Dolphins were described by Binns (1923) as follows:
- "The deck of the jetty is of heavy section with special beams for carrying the crane-rails. The jetties are protected by timber fendering and copings; and cast-iron bollards are provided on both sides. A timber gangway which can be lifted by the cranes connects each jetty with the quay".*
- 14.160 The ICE reported<sup>xxiv</sup> that introduction of the jetties along the south wall was largely an experiment to provide better facilities for lighter-borne traffic and that the design in question, which allowed barges to operate on either side of vessels, had been evolved to meet that requirement.
- 14.161 The design also allowed the south wall of the dock to be constructed to a lesser depth, thus saving in building costs.
- 14.162 The structure of the Dolphins is illustrated by Figures in Technical Appendix 14.1 of this ES.

#### Current condition

- 14.163 Information from RoDMA (e-mail dated 2nd March 2012) indicates that the Dolphins were refurbished in circa 2007. It is not clear what form this refurbishment took. However, the cranes, crane-rails, timber fendering / copings, cast-iron bollards on both sides and timber gangways that connected the Dolphins to the quayside are no longer present. A modern footbridge does connect the sixth (from the west) Dolphin to the quayside.

#### Significance of the asset

- 14.164 The Dolphins are not identified as a heritage asset and have been subject to significant change through the loss of cranes and other original features as described above.
- 14.165 In terms of the categorisations in **Table 14.2**, the Dolphins can be considered to be Historic Buildings/Structures of Low Significance.

#### Impact of the CADP

- 14.166 The western-most Dolphin will be partially removed as part of the CADP works, as described in Chapter 6 of this ES. This will entail the cutting, below the water-line, of the piles that support the existing platform deck and the removal of the entire top structure. The lower extent of the piles that support the Dolphin will be left in-situ so as not to disturb the sediments at the bottom of the dock.
- 14.167 The remaining six Dolphins will be left in-situ.
- 14.168 The impact on the western-most Dolphin can be assessed as Major (in both archaeological and historic building terms). However, the impact on the entirety of the seven Dolphins can be assessed as Minor in archaeological terms (changes to key archaeological elements, such that the asset is slightly altered and there is a slight loss of the significance of the asset) and Minor in historic building terms (changes to key historic building elements, such that the asset is slightly altered and there is a slight loss of significance).

#### Assessment of effects

- 14.169 The assessment of the direct physical effect on the western-most Dolphin is based on the assessed Low Significance of the individual heritage asset and the assessed Major direct physical impact. Accordingly, with reference to **Table 14.3**, this is assessed to be **Minor** effect before mitigation.
- 14.170 The assessment of the effect that the impact may have on the entirety of the surviving six Dolphins is assessed to be **Minor** (i.e. Minor impact on an asset of Low Significance).
- 14.171 Discussions with the Archaeological Adviser to LBN have indicated that approaches to mitigating these impacts could be addressed by the placing of 'historic building recording' planning conditions on any planning permission.

#### **Impact on buried archaeological deposits**



- 14.172 As previously noted, the designated Archaeological Priority Area within which the Application Site lies includes large parts of the Borough of Newham, but excludes the area of the water of the Royal Albert Dock and the KGV Dock, over which the new decking would be constructed. The depth of excavation for the dock (it is recorded as being 11.6 metres deep) is likely to have removed all potential archaeological deposits.

#### Current condition

- 14.173 As reported in Chapter 14: Ground Contamination, Site Investigation works have shown between 1.30m and 2.0m of “recent” Made Ground overlying organic alluvial clays, to the south-west of the Airport Fire Station and former Ledger Building, and between 1.30m to 5.0m Made Ground along the southern side of the KGV Dock.

#### Significance of the asset

- 14.174 The significance of any buried archaeological deposits is currently unknown. Database Information presented in the DBA would suggest that archaeological deposits and remains that potentially survive beneath the Made Ground could vary widely in significance from Negligible to High, although other information provided within the DBA would suggest that any archaeological deposits and remains that may be present will vary from Low to Medium significance.

#### Impact of the CADP

- 14.175 Current design information suggests that impacts on buried archaeological deposits and remains may potentially vary from ‘Negligible’ to ‘Major’. These impacts would arise through piling and foundation and drainage infrastructure excavation.

#### Assessment of effects

- 14.176 It is conceivable that archaeological effects may vary from Neutral to Substantial (i.e. potentially Negligible to Major Impacts on assets that could vary in significance from Negligible to High), although information provided within the DBA would suggest that any archaeological deposits and remains, that may be present, will vary from Low to Medium significance leading to an effect that could vary from Neutral to Moderate.
- 14.177 Discussions with the Archaeological Adviser to LBN have suggested that approaches to evaluation and mitigation of these impacts can be addressed through the placing of archaeological planning conditions on any permission. These could establish arrangements for archaeological monitoring of excavations, to secure appropriate measures in the event of unexpected features being uncovered.

#### **Impacts on the setting of statutorily listed buildings**

- 14.178 Six Grade II and two Grade II\* listed building have been identified within the Search Area.

#### Current condition

14.179 The 2012 EH 'Heritage at Risk Register' identifies the Central Buffet at Custom House, Royal Albert Dock E16, Central Offices at Custom House, Royal Albert Dock E16 and the Gallions Hotel as being "at risk".

14.180 The information included in the Risk Register for these buildings is as follows:

- a) Central Buffet: This building is identified as being in good condition with the following text – *"Restaurant, built 1883 to the design of Vigers and Wagstaff in a free classical style. Repaired and 'mothballed' by the London Docklands Development Corporation. Ownership now with London Development Agency and part of the Royals Business Park. Security has been improved. Some emergency repairs have been undertaken. No current plans for the building."*
- b) Central Offices: This building is identified as being in good condition with the following text – *"Offices, built 1883 to the design of Vigers and Wagstaff in the manner of Norman Shaw. Repaired and 'mothballed' by the London Docklands Development Corporation. Now owned by London Development Agency and part of Royals Business Park. Security has been improved. Some emergency repairs have been undertaken. No current plans for the building"*.
- c) Gallions Hotel. *Hotel built 1881-3 to the design of Vigers and Wagstaff. Conversion and restoration works appear to be complete, but building still vacant.*

#### Significance of the asset

14.181 Grade II listed buildings are regarded as being of Medium Significance.

#### Sensitivity to Change of Setting – for buildings/structures

14.182 The levels of sensitivity (to change) of the setting of the identified listed buildings are assessed as Reduced (the significance of an asset is not likely to be affected by development within its surroundings) to Restricted (the significance of an asset may be slightly diminished by development within its surroundings).

#### Impact of the CADP

14.183 Development of the CADP will affect views from the western end of the south of the KGV Dock to the Grade II listed Central Buffet and Central Offices (also known as Dock Manager's Office) at Custom House. This is considered to be a Minor Impact (slight change within the setting leading to a slight loss (or gain) of significance of the asset).

14.184 It is considered that other listed buildings identified will not be impacted by the CADP.

#### Assessment of effects

14.185 Minor Impact on Grade II listed buildings (the Central Buffet and Central Offices at Custom House) is considered to be a **Minor Effect**.

14.186 Minor Impact on the setting of a building of Reduced or Restricted sensitivity is considered to have an overall **Negligible Effect**.

#### **Impacts on the setting of locally listed buildings**

14.187 Eight locally listed building have been identified in the Search Area.

#### Significance of the asset

14.188 Locally listed buildings are of Low Historic Building Significance.

#### Impact of the CADP

14.189 The closest locally listed building is the Abutments to the Sir Stephen Redgrave Bridge. The setting of this locally listed building will not be affected by the CADP.

#### Assessment of effects

14.190 The effect on all locally listed buildings will be **Neutral**.

#### **Cumulative and Combined Effects**

14.191 Chapter 17 of the ES describes the sites that are considered as possibly creating significant cumulative ('in combination') effects with the CADP.

14.192 At the eastern end of the Royal Albert Dock, the Environmental Statement for the Royal Albert Basin / IVAX Quays / Great Eastern Quays site concluded that the *"overall setting of the dock will be improved by the removal of the modern building which currently bridges the Albert Basin and the construction of buildings which respect the alignment of the dock and that there would be no cumulative effect on buried archaeology"*.<sup>xxv</sup>

14.193 As such the Royal Albert Basin / IVAX Quays / Great Eastern Quays site is considered not to have a significant cumulative/combined effect together with the CADP.

#### **Further Mitigation**

14.194 Discussions with the Archaeological Adviser to LBN have indicated that approaches to evaluation and mitigation can be addressed by attaching planning conditions requiring 'historic building recording' and archaeological recording to any planning permission.

#### **Residual Effects**

14.195 Post mitigation, there will be a residual effect on the setting of KGV Dock. The overall effect on the setting of the dock has been assessed in this chapter as **Minor**. This effect will be a residual (remaining) effect after the CADP is built out.

## Conclusions and Recommendations

- 14.196 The Airport and Application Site is located within a LBN designated Archaeological Priority Area. The priority area specifically excludes the area of the water of the Royal Albert Dock and KGV Dock. Much of the development would occur over the latter.
- 14.197 There are no Scheduled Ancient Monuments within the Search Area and eight listed buildings.
- 14.198 There are a number of statutorily and locally listed buildings within the vicinity of the Airport.
- 14.199 The docks are not listed and are not within a designated Conservation Area.
- 14.200 Consultation responses (by letter) have been received from the EH, Greater London Archaeology Advisory Service (Archaeological Advisers to LBN), the EH Principal Inspector of Historic Buildings and Areas, and pre-application advice from the LBN.
- 14.201 The letter from the Archaeological Adviser to the LBN identifies KGV Dock as a heritage asset, which means that consideration of the CADP's impacts on it should be addressed. Accordingly, this ES Chapter assesses the effect that the CADP will have on both the setting of the KGV Dock and individual heritage assets.
- 14.202 It concludes that:
- The Magnitude of Impact on the setting of the dock has been assessed to be Moderate with the overall effect on setting being a Minor effect.
  - The majority of direct effects on the individual structural components of KGV Dock are considered to be Minor, although the effects on buried archaeological remains could vary from Negligible to High. However, information provided within the DBA suggests that any archaeological deposits and remains, that may be present, will vary from Low to Medium significance, leading to an effect that could vary from Neutral to Moderate. Discussions with the Archaeological Adviser to LBN have suggested that approaches to evaluation and mitigation of these impacts can be addressed through the placing of archaeological planning conditions on any permission.
  - Discussions with the Archaeological Adviser to LBN have indicated that such effects could be appropriately addressed by the placing of historic environment planning conditions on any planning permission.

**Table 14.5 - Archaeology and Historic Environment Summary Table**

Issue	Potential Effect	Further Mitigation	Residual Effect
Changes to the setting of KGV Dock	<p>The Magnitude of Impact on the setting of the dock has been assessed to be Moderate</p> <p>The levels of sensitivity (to change) of the setting of the KGV Dock is considered to vary from Reduced to Restricted.</p> <p>Moderate Impact on the setting of a Heritage Asset</p>	<p>Where possible, the Design Team has sought to reflect the spatial arrangement of the old, no longer present, dockside warehouses.</p> <p>The dock edge path also includes remnants of the old tracks that were used to guide the railway</p>	<p>Information as set out in the mitigation column will positively affect the way the asset is appreciated (EH Setting Guidance, Step 2).</p>

	<p>considered to vary from Reduced to Restricted levels of sensitivity (to change) is set out in <b>Table 14.4</b> as causing a Minor effect.</p>	<p>carts that used to pass along the dockside behind and in front of the storage sheds. These are a key part of the heritage fabric, to be retained in-situ wherever possible.</p> <p>There will be new interpretation measures installed at both the eastern and western ends of the docks for people to understand more of their history.</p> <p>The southern building line of the historic structures will be restored through the CADP, commencing with the hotel block and proceeding westwards with the alignment of the edges of the car park areas.</p>	
Impact on the northern wall of KGV Dock	<p>Assessment of the direct physical effect on the northern dock wall is based on the assessed Low Significance of the asset and the assessed Moderate direct physical impact.</p> <p>The direct physical effect on the north dock wall is assessed to be Minor (Moderate impact on an asset of Low Significance) before mitigation.</p>	<p>Discussions with the Archaeological Adviser to the LBN have indicated that approaches to mitigating these impacts could be addressed by the placing of "historic building recording" planning conditions on any planning permission.</p>	<p>Publication of the results of "historic building recording" will enhance knowledge of the recently identified heritage asset.</p>
Impacts to the western wall of KGV Dock	<p>Assessment of the direct physical effect on the western dock wall is based on the assessed Low Significance of the individual heritage asset and the assessed Moderate direct physical impact.</p> <p>The direct physical effect on the western dock wall is assessed to be Minor (Moderate impact on an asset of Low Significance) before mitigation.</p>	<p>Discussions with the Archaeological Adviser to the LBN have indicated that approaches to mitigating these impacts could be addressed by the placing of "historic building recording" planning conditions on any planning permission.</p>	<p>Publication of the results of "historic building recording" will enhance knowledge of the recently identified heritage asset.</p>
Impact on the "Dolphins" on the south-side of KGV Dock	<p>The assessment of the direct physical effect on the western-most Dolphin is based on the assessed Low Significance of the individual heritage asset</p>	<p>Discussions with the Archaeological Adviser to the LBN have indicated that approaches to mitigating these</p>	<p>Publication of the results of "historic building recording" will enhance knowledge of the recently identified</p>



	<p>and the assessed Major direct physical impact.</p> <p>As a result of this, the direct effect on the western-most Dolphins is assessed to be Minor (Major impact on an asset of Low Significance) before mitigation.</p> <p>The assessment of effect that the impact may have on the entirety of the surviving Dolphins is assessed to be Minor (Minor impact on asset of Low Significance).</p>	<p>impacts could be addressed by the placing of "historic building recording" planning conditions on any planning permission.</p>	<p>heritage asset.</p>
Impact on buried archaeological deposits through piling and excavation for foundations and drainage infrastructure.	<p>It is conceivable that the effects may vary from Neutral to Substantial (potentially Negligible to Major Impacts on assets that could vary in significance from Negligible to High) although information provided within the DBA would suggest that any archaeological deposits and remains, that may be present, will vary from Low to Medium significance leading to an effect that could vary from Neutral to Moderate.</p>	<p>The Archaeological Adviser to the LBN has indicated that approaches to evaluation and mitigation of these impacts can be secured by planning condition(s) on any permission.</p>	<p>Publication of the results of archaeological works will enhance knowledge of the local planning authority's Archaeological Priority Area.</p>
Impacts on the setting of statutorily listed buildings	<p>Minor Impact on a Grade II listed building (the Central Buffet and Central Offices at Custom House) is considered to be a Minor Effect.</p> <p>Minor Impact on the setting of a building of Reduced or Restricted sensitivity is considered to have an overall Negligible effect.</p>	<p>None proposed.</p>	
Impacts on the setting of locally listed buildings	<p>The effect on all locally listed buildings will be Neutral.</p>	<p>None proposed.</p>	

## References

<sup>i</sup> Bird, E, 2010, Heritage Scoping Study of the Royal Docks Masterplan Area. London Development Agency/ Design for London/Mayor of London

<sup>ii</sup> Museum of London/English Heritage, 2002, A Research Framework for London Archaeology

<sup>iii</sup> English Heritage 2002, Taking to the Water: English Heritage's Initial Policy for The Management of Maritime Archaeology in England

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- <sup>iv</sup> English Heritage 2006, Ports: the impact of development on the maritime historic environment
- <sup>v</sup> English Heritage 2011d, Conservation Bulletin Issue 67: Autumn 2011. Saving the Age of Industry
- <sup>vi</sup> English Heritage, 2005, The Thames Gateway Historic Environment Characterisation Project: final report
- <sup>vii</sup> English Heritage, 2008, Conservation Principles. Policies and Guidance for the Sustainable Management of the Historic Environment
- <sup>viii</sup> 'Scheduled Monuments - Identifying, protecting, conserving and investigating nationally important archaeological sites under the Ancient Monuments and Archaeological Areas Act 1979'
- <sup>ix</sup> English Heritage, 2011, The Setting of Heritage Assets
- <sup>x</sup> Bird, E, 2010, op cit
- <sup>xi</sup> Bird, 2010, op cit, 185 & 198-199
- <sup>xii</sup> Keltbray Environmental 2011, London City Airport Ledger Building, Site Investigation
- <sup>xiii</sup> RPS, 2013, London City Airport. Project HLEI 24974
- <sup>xiv</sup> Sainsbury, R.N & Butler D.J.R., 1993, London City Airport. Proceedings of the Institute of Civil Engineers Transp, 100, 1-20
- <sup>xv</sup> Sainsbury, R.N & Butler D.J.R., 1993, London City Airport. Proceedings of the Institute of Civil Engineers Transp, 100, 1-20
- <sup>xvi</sup> C14 dating measures the decayed "half –life" of the carbon isotope C14, which start to decline as soon as living matter dies
- <sup>xvii</sup> City Airport Development Programme (CADP), June 2013, Design And Access Statement
- <sup>xviii</sup> English Heritage, 2011, The Setting of Heritage Assets
- <sup>xix</sup> Sainsbury, R.N & Butler D.J.R. op.cit, p6
- <sup>xx</sup> Binns, A, 1923, The King George V Dock, London, in Minutes of Proceedings of the ICE (Paper 4410) 327-398
- <sup>xxi</sup> Sainsbury, R.N & Butler D.J.R., 1993, London City Airport. Proceedings of the Institute of Civil Engineers Transp, 100, 1-20
- <sup>xxii</sup> Sainsbury, R.N & Butler D.J.R. op.cit.
- <sup>xxiii</sup> <http://www.royaldockstrust.org.uk/popup.htm>
- <sup>xxiv</sup> ICE, 1923, Discussion of the King George V Dock, Minutes of the Proceedings, Vol 216, 399-408
- <sup>xxv</sup> Great Eastern Homes LLP Albert Basin Royal Docks, Ivax Quays, Gallions Road ES Chapter 15



# 15 Waste Management

## Introduction

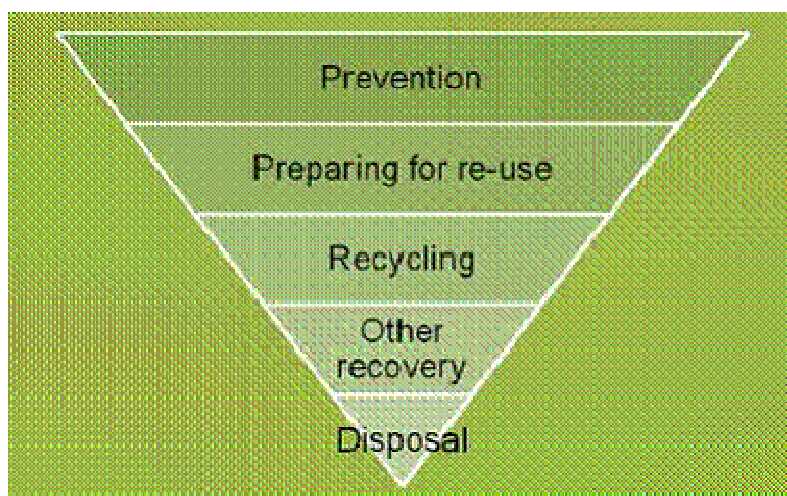
- 15.1 This chapter reports on the assessment of the likely significant environmental effects of waste generation associated with the proposed CADP. This includes the effects of waste produced as a result of demolition and construction activities and the potential additional waste to be generated during operation of the new development due to the predicted increase in passenger numbers. A summary of relevant legislation and planning policy is given together with a summary of the Airport's waste policy.
- 15.2 A baseline assessment has been carried out, which draws upon current and predicted waste data for London and existing and planned waste infrastructure. Data for waste generation for the current operation of the Airport have also been assessed. Potential effects, mitigation and resulting residual effects are considered during both the construction works and once the proposed CADP is completed and operational.
- 15.3 The key waste-generating activities of the proposed CADP are listed below, together with some examples of the waste types that are likely to be produced:
- a) **Site preparation:** this waste will include demolition rubble such as concrete and reinforcement bars;
  - b) **Piling and earthworks:** this waste will include pile arisings and excavated soils;
  - c) **Construction:** this waste will include aggregate, cement, concrete, reinforcing steel, sand, pipe work and structural steelwork; and
  - d) **Operational:** this waste will include aircraft maintenance waste, catering waste and general waste from the hotel, the passengers and staff.

## **Planning Policy & Legislative Context**

### European Legislation

- 15.4 The **EU Waste Framework Directive (2008/98/EC)** provides the overarching legislative framework for the collection, transport, recovery and disposal of waste, and includes a common definition of waste. It encourages the prevention and reduction of harmful waste by requiring that Member States have control regimes in place. This Directive repealed Directive 2006/12/EC of the European Parliament and of the Council of 5 April 2006 on waste (the codified version of Directive 75/442/EEC as amended), the Hazardous Waste Directive 91/689/EEC, and the Waste Oils Directive 75/439/EEC.
- 15.5 Waste is defined under the Article 3.1 of the Directive as any substance or object which the holder discards intends to discard or is required to discard.
- 15.6 The Waste Framework Directive introduced the "waste hierarchy" (Figure 15.1), which sets out five steps for dealing with waste, ranked according to environmental impact. The hierarchy requires prevention of waste generation in the first instance and reducing, as far as possible, the volume requiring disposal once the waste has been produced.

15.7 **Figure 15.1 - The Waste Hierarchy** (EU Waste Framework Directive 2008/98/EC)



15.8 The **EC Landfill Directive (1999/31/EC)** aims to prevent, or reduce as far as possible, negative effects on the environment from the landfilling of waste. Under this legislation, waste is generally subdivided into four broad categories – municipal, inert, non-hazardous and hazardous, as described below:

- a) **Municipal waste** means waste from households, as well as other waste which, because of its nature or composition, is similar to waste from households.
- b) **Inert waste** does not undergo any significant physical, chemical or biological transformations (e.g. brick, concrete and glass). Demolition, piling, earthworks and construction waste produced by the proposed CADP will be predominantly inert in nature.
- c) **Hazardous waste** means any waste which is covered by Article 1(4) of Council Directive 91/689/EEC of 12 December 1991 on hazardous waste (replaced by 2008/98/EC) and has properties which are considered harmful to human health and/ or the environment (e.g. some remedial waste, asbestos, batteries and fluorescent tubes). Hazardous waste will comprise the smallest proportion of waste produced from the proposed CADP.
- d) **Non-hazardous waste** is any waste not covered by c). It may be reactive but is not considered harmful to human health and/ or the environment (e.g. organic matter in general waste).

15.9 The Directive sets out three different types of landfills, those for hazardous waste, non-hazardous waste and inert waste. Hazardous waste must be deposited only in a hazardous waste landfill, inert waste landfills may only accept inert waste and the Directive states that a non-hazardous waste landfill must be used for municipal and non-hazardous waste.

15.10 The **EC Directive on the Incineration of Waste (2000/76/EC)** aims to limit the risks that waste incineration poses to the environment and human health. The Waste Incineration Directive is implemented through **Environmental Permitting Regulations** in England and Wales (2010); further details of these are given below.

15.11 The **EC Directive on Integrated Pollution Prevention Control (2008/1/EC)** encourages minimisation of pollution from various industrial sources throughout the EU. Operators of



industrial installations undertaking activities covered by Annex I of the IPPC Directive are required to obtain an environmental permit from the authorities in EU countries.

### ***National Legislation***

- 15.12 The **Waste (England and Wales) (Amendment) Regulations (2012)** classifies waste as industrial, commercial or household waste and also provides information for local authorities on whether they can charge for the collection and disposal of individual waste types.
- 15.13 The **Environmental Protection Act (EPA) (1990)** addresses areas of significant environmental concern including waste disposal. Waste management issues are considered under Part II of the EPA. Controlled waste includes commercial, industrial (including agricultural waste from 2006) and household waste. Under the EPA, the deposition of waste to land without a licence or breaching licence conditions is an offence. The EPA is also designed to prevent environmental pollution or harm to human health by prohibiting treatment, storage and disposal of controlled wastes without a licence or in breach of a licence.
- 15.14 The **Waste and Emissions Trading Act (2003)** implements a commitment to introduce tradable allowances for Local Authorities to restrict the amount of biodegradable municipal waste sent to landfill and would be relevant during the operational phase of the proposed CADP.
- 15.15 The **Environmental Permitting (England and Wales) Regulations (2010)** introduced a new streamlined system of environmental permitting in England and Wales for certain installations, waste operations and mobile plant. Activities under these regimes are covered by a single form of Environmental Permit governed by one set of regulations. This provides a system for environmental permits and exemptions for industrial activities, mobile plant, waste operations, mining waste operations, water discharge activities, groundwater activities and radioactive substances. It also sets out the powers, functions and duties of the regulators. Notably, the requirements of the Landfill Directive and Waste Management Licensing are applied under these regulations. These regulations would be relevant during the construction and operational phases of the proposed CADP.
- 15.16 The **Controlled Waste (Registration of Carriers and Seizure of Vehicles) Regulations 1991 (as amended 1998)** introduced a registration system for carriers of controlled waste, whereby all waste to be transported off-site must be disposed of by registered waste carriers, using vehicles licensed for the transport of waste, and taken to an appropriately licensed waste management facility. Furthermore, the **Control of Pollution (Amendment) Act (1989)** requires carriers of controlled waste to register with the Environment Agency (EA) and outlines the penalties (including seizure and disposal) for vehicles shown to have been used for illegal waste disposal. The **Controlled Waste (England & Wales) Regulations (2012)** define household, industrial and commercial waste for the purposes of Part 2 of the EPA.
- 15.17 The above policies and statutes link closely with the **Environmental Protection (Duty of Care) Regulations (1991)**, which require any organisation disposing of waste to be able to account for all of its waste and demonstrate that disposal was carried out legally.

- 15.18 The **Site Waste Management Plans Regulations (2008)** aim to make the construction industry more sustainable by ensuring that those responsible for development projects are aware of the waste being produced so that it can be reduced. These regulations make it an offence to fail to prepare and implement a Site Waste Management Plan (SWMP) for certain construction projects that have an estimated cost of more than £300,000 (excluding VAT). Additional requirements are described in the schedule for projects over £500,000. The proposed CADP will require a SWMP.
- 15.19 The **Landfill (England and Wales) Regulations (2002)** require a reduction of biodegradable waste sent to landfill. These regulations implement the **EC Landfill Directive**, detailed above, which aims to prevent, or reduce as far as possible, negative effects on the environment from the landfilling of waste by introducing stringent technical requirements for waste and landfills.
- 15.20 New definitions for hazardous waste and non-hazardous waste are given by the **Hazardous Waste (England and Wales) Regulations (Amended 2009)**. These regulations aim to track and control hazardous waste movements. Under these regulations, a consignment note is required prior to the removal of any waste and a waste producer who produces over 500kg of hazardous waste a year must notify the EA.
- 15.21 The **Contaminated Land (England) Regulations (2012)** set out provisions relating to the identification and remediation of contaminated land. These regulations also determine sites which require regulation as 'special sites' and include land contaminated by radioactive substances in this classification.
- 15.22 The **Environment Act (Waste and Producer Responsibility) (1995)** requires provision of appropriate waste disposal technologies and the prevention or reduction of waste through reuse, recycling and the use of waste as an energy source.
- 15.23 The **Producer Responsibility Obligations (Packaging Waste) Regulations (amended 2012)** apply to businesses that handle more than 50 tonnes of packaging or packaging materials a year. A producer may demonstrate their compliance with the regulations by obtaining Packaging Waste Recovery Notes (PRN's) and/ or Packaging Waste Export Recovery Notes.
- 15.24 The **Waste Electrical and Electronic Equipment (WEEE) Regulations (2006)** aim to reduce the volume of WEEE waste being taken to landfill sites by allowing separate collection, recovery, treatment, recycling and safe disposal of the waste. Producers of electrical and electronic equipment (EEE) are required to join schemes responsible for financing and ensuring WEEE is treated at an authorised facility. The producers and distributors of EEE are also required to make sure household WEEE products can be returned free of charge and treated in an appropriate way.
- 15.25 The **Waste Batteries and Accumulators Regulations (2009)** set out requirements for waste battery collection, treatment, recycling and disposal for all battery types.

### ***National Planning Policy***

- 15.26 The **National Planning Policy Framework (NPPF, 2012)** sets out the Government's planning policies for England and how these will be applied. The framework does not contain specific waste policies, as these are proposed to be included as part of the National Waste Management Plan for England (expected to be published in December 2013). Until this policy is published Planning Policy Statement 10 remains the most current relevant national waste planning policy.
- 15.27 **Planning Policy Statement 10 (PPS10)**: Planning for Sustainable Waste Management (revised March 2011) forms part of the national waste management plan for the UK and replaces Planning Policy Guidance Note 10, Planning and Waste Management, published in 1999. The main objective of Government policy on sustainable waste management is to protect human health and the environment by producing less waste and by using waste as a resource wherever possible. This means a step-change in the way waste is handled and significant new investment in waste management facilities. The planning system is pivotal to the adequate and timely provision of the new facilities that will be needed. PPS10 sets out the key planning objectives for waste planning authorities.
- 15.28 Where there is residual waste, this should be managed in line with the principles of the waste hierarchy, and be disposed of in one of the nearest appropriate installations to minimise environmental impacts and actively contribute to the social and economic goals of sustainable development. The disposal of waste in one of the nearest appropriate installations encourages the management of waste close to its place of generation, thus reducing the impacts of transporting waste over long distances and promoting management of the waste within its region of origin. It is also recognised that the movement of waste across regional boundaries is an option where this meets other objectives (e.g. movement of waste up the hierarchy) or is otherwise considered appropriate in planning terms.
- 15.29 PPS10 requires the Mayor, through the London Plan, to:
- a) Identify the tonnages of municipal and commercial/ industrial waste requiring management and to apportion them by waste planning authority area;
  - b) Evaluate the adequacy of existing strategically important waste management and disposal facilities to meet London's future needs, both for municipal and other waste streams;
  - c) Identify the number and type of new or enhanced facilities required to meet those needs; and
  - d) Identify opportunities for the location of such facilities and, where appropriate, criteria for the selection of sites.
- 15.30 The **Waste Strategy for England (2007)** built upon the Waste Strategy 2000 (WS2000) by identifying additional steps to overcome challenges that had been encountered since its implementation. The key elements of the 2007 strategy were to:
- a) increase waste reduction, recycling and reuse through incentivisation;
  - b) reduce and divert waste going to landfill through regulation reform and cut costs for compliant regulators and businesses;
  - c) boost investment in infrastructure for waste collection, recovery and recycling whilst maximising the value of energy and materials recovered by stimulating markets

- d) prioritise action on sectors, materials and products which were most likely to improve environmental and economic outcomes; and
  - e) develop a performance and institutional framework to improve the coordination of local, regional and national governance and the services they provide.
- 15.31 The **Government Review of Waste Policy in England (2011)** provides a review of the Waste Strategy for England (2007) in which commitments were made to set new national targets for the reduction of household waste through recycling and composting by at least 40% by 2010, 45% by 2015 and 50% by 2020, in comparison to 2000 levels. The principal challenges are as follows:
- a) Preventing waste wherever it occurs;
  - b) Continuing to increase the recycling of waste collected from both households and businesses, including meeting the revised Waste Framework Directive target to recycle 50% of waste from households by 2020;
  - c) Establishing the right interface between energy from waste policies, renewable energy targets and delivering on climate and broader environmental needs;
  - d) Ensuring the UK meets the EU Landfill Directive targets for diverting biodegradable municipal waste from landfill in 2013 and 2020.
  - e) Decoupling waste growth from economic growth with more emphasis on waste prevention and reuse;
  - f) Meeting and exceeding the Landfill Directive diversion targets for biodegradable municipal waste;
  - g) Increasing diversion from landfill and securing better integration of treatment for municipal and non-municipal waste;
  - h) Securing the investment in infrastructure needed to divert waste from landfill and for the management of hazardous waste; and
  - i) Getting the most environmental benefit from that investment, through increased recycling of resources and recovery of energy from residential waste using a mix of technologies.
- 15.32 The **UK Sustainable Development Strategy (March 2005)** builds upon the 1999 strategy with a more explicit focus on environmental limits and contained four agreed priorities including sustainable consumption and production, climate change, natural resource protection and sustainable communities. Part of the strategy involved undertaking a review of the waste strategy, with increased emphasis on reducing waste at source and making use of it as a resource.
- 15.33 The **Strategy for Sustainable Construction (2008)** aimed to deliver the policies set out in the UK's Sustainable Development Strategy. It is a joint industry and government initiative and is intended to promote leadership and behavioural change, as well as delivering benefits to both the construction industry and the wider economy. The strategy aimed to reduce construction, demolition and excavation waste to landfill by 50% by 2012, compared to 2008 levels.

#### **Regional Planning Policy**

- 15.34 The **London Plan** was introduced by the Mayor and the Greater London Authority in 2004 (amended in 2011) and is a strategic plan setting out an integrated social, economic and environmental framework for the future development of London. The London Plan states that the Mayor is committed to a policy framework for waste management which starts from the position that the best approach is to reduce the amount of waste that arises in the first place.

Where this is not possible, he supports an approach based on the waste hierarchy. The Mayor believes that making better use of waste has a major role to play in tackling climate change and that London's waste is potentially a valuable resource that can be exploited for London's benefit and not solely a disposal problem. London should manage as much of the capital's waste within its own boundaries as practicable, enabling London and Londoners to receive environmental and economic benefits from its management.

- 15.35 The plan states that increasing London's waste processing capacity is a major mayoral priority. The Mayor will work with all parties to achieve this. Through the London Waste and Recycling Board (LWaRB), he will collaborate with boroughs and other partners to make the capital a global beacon of best practice in waste management.
- 15.36 A number of specific policies within the plan relate to waste and these are summarised below:
- 15.37 Policy 5.16 (Waste Self-Sufficiency) of the plan states that the Mayor will work with London boroughs and waste authorities, the LWaRB, the Environment Agency, the private sector, voluntary and community sector groups, and neighbouring regions and authorities to: manage as much of London's waste within London as practicable, working towards the equivalent of 100 per cent of London's waste within London by 2031; create positive environmental impacts from waste processing and work towards zero biodegradable or recyclable waste to landfill by 2031.
- 15.38 The London Plan sets out a number of strategies for achieving the targets of Policy 5.16, including:
- a) Minimising waste;
  - b) Encouraging the reuse of and reduction in the use of materials;
  - c) Exceeding recycling/ composting levels in municipal solid waste (MSW);
  - d) Exceeding recycling/ compositing levels in commercial and industrial (C&I) waste of 70% by 2020;
  - e) Improving London's net self-sufficiency through reducing the proportion of waste exported from the capital over time; and
  - f) Working with neighbouring regional and district authorities to coordinate strategic waste management across the greater south-east of England.
- 15.39 Policy 5.17 (Waste Capacity) states that the Mayor supports the need to increase waste processing capacity in London. He will work with London boroughs and waste authorities to identify new opportunities for introducing new waste capacity, including strategically important sites for waste management and treatment, and resource recovery parks/ consolidation centres, where recycling, recovery and manufacturing activities can co-locate.
- 15.40 The London Plan sets out planning policy for achieving the increase in waste capacity and states that the following will be supported:
- a) Developments that include a range of complementary waste facilities on a single site;
  - b) Developments for manufacturing related to recycled waste;
  - c) Developments that contribute towards renewable energy generation; and
  - d) Developments for producing renewable energy from organic/ biomass waste.



15.41 Policy for preparation of Local Development Frameworks (LDFs) is also included within Policy 5.17. This states that boroughs must allocate sufficient land and identify waste management facilities to manage the tonnages of waste apportioned to them in the Plan. Boroughs may achieve this in collaboration by pooling their apportionment requirements. Land to manage borough waste apportionments should be brought forward through:

- a) Protecting and facilitating the maximum use of existing waste sites;
- b) Identifying sites in strategic industrial locations;
- c) Identifying sites in locally significant employment areas;
- d) Safeguarding wharves with an existing or future potential for waste management.

If, for any reason, an existing waste management site is lost to non-waste use, an additional compensatory site provision will be required that normally meets the maximum throughput that the site could have achieved.

15.42 Policy 5.18 (Construction, Excavation and Demolition Waste) relates specifically to construction, excavation and demolition (CE&D) waste and states that new CE&D waste management facilities should be encouraged at existing waste sites, including safeguarded wharves, and supported by:

- a) Using mineral extraction sites for CE&D recycling and
- b) Ensuring that major development sites are required to recycle CE&D waste on-site, wherever practicable, supported by planning conditions;

Waste should be removed from construction sites, and materials brought to the site, by water or rail transport wherever practicable.

15.43 Policy 5.18 also states that LDFs should require developers to produce site waste management plans to arrange for the efficient handling of CE&D waste and materials.

15.44 With regard to CE&D waste and materials, the London Plan states that a combination of on-site mobile facilities on construction sites, effective use of existing waste processing sites and, where appropriate, safeguarded wharves, and the provision of recycling facilities at aggregate extraction sites, should be capable of meeting the anticipated requirement within London to achieve a more beneficial re-use of this material.

15.45 Policy 5.19 (Hazardous Waste) states that the Mayor will prepare a Hazardous Waste Strategy for London and will work in partnership with the boroughs, the Environment Agency, industry and neighbouring authorities to identify the capacity gap for dealing with hazardous waste and to provide and maintain direction on the need for hazardous waste management capability.

15.46 The policy states that LDFs should:

- a) Make provision for hazardous waste treatment plants to achieve, at regional level, the necessary waste management requirements;
- b) Identify suitable sites for the storage, treatment and reprocessing of relevant or a range of hazardous waste streams; and
- c) Identify sites for the temporary storage, treatment and remediation of contaminated soils and demolition waste during major developments.

- 15.47 Policy 5.20 (Aggregates) states that the Mayor will work with all relevant partners to ensure an adequate supply of aggregates to support construction in London. This directly relates to the policies on waste, set out above, since the Mayor plans to achieve this in part by encouraging reuse and recycling of CD&E waste within London and to use 80% of this recycled material as aggregates by 2020.
- 15.48 The **London Plan Implementation Plan (January 2013)** provides further detail on how the targets set out in the London Plan will be achieved. Relating to waste, the London Plan Implementation Plan recognises the need for significant investment in infrastructure and sets out a number of potential options for funding the future expansion of waste management capacity in London.
- 15.49 The **Business Waste Strategy (2011)** was produced by the Mayor of London and aims to encourage the reduction of waste and promote better reuse and recycling. Whilst the Mayor's statutory powers only extend to municipal waste, business waste accounts for approximately 75% of the total produced by London. Given the significance of this waste stream, and in the context of the London Plan, the Mayor has introduced a strategic framework. The strategy details four key policy areas. These are outlined as follows:
- a) The Mayor will promote the potential commercial value of businesses that are resource-efficient (Policy 1);
  - b) The Mayor will work with the industrial and commercial sectors to boost recycling, reuse and composting participation (Policy 2);
  - c) The Mayor will work to support the growth and delivery of the waste infrastructure market in order to provide for waste producing businesses (Policy 3);
  - d) The Mayor will work to drive the construction and demolition sectors to improve resource efficiency whilst maintaining recycling and reuse performance (Policy 4).
- 15.50 LBN has prepared a **Core Strategy (2012)** to form the overarching development plan in the Local Development Framework (LDF). The strategy sets out long-term spatial vision and policies for the borough. Notably, policy SC1 (climate change) lists measures to mitigate and adapt for climate change, which include *"reusing and recycling waste arising from demolition and construction, and utilising materials produced and/or sourced locally"*.
- 15.51 Policy INF3 (Waste and Recycling) of the Core Strategy sets out the objective to manage Newham's waste in accordance with the waste apportionment set out in the London Plan (2011) and the aim of moving from landfill to waste minimisation by moving up the waste hierarchy.
- 15.52 LBN is producing a Local Plan (formerly called the Local Development Framework) for Newham that will include the Core Strategy and eventually replace the Unitary Development Plan (UDP). A number of policies from the UDP have been saved and are currently used to inform planning decisions. This includes the objective to promote clean, efficient and effective waste management, including waste minimisation and the recycling of materials in new development.
- 15.53 In accordance with Policy 5.17 of the London Plan, the East London Waste Authority (ELWA), boroughs of Barking and Dagenham, Havering, Newham and Redbridge, have produced a **Joint Waste Development Plan Document (JWDPD)** for these boroughs. The purpose of the document is to set out a planning strategy to 2020 for sustainable waste management, which

enables the adequate provision of waste management facilities (including disposal) in appropriate locations for municipal and commercial and industrial waste, having regard to the London Plan Borough level apportionment. Construction, excavation and demolition and hazardous wastes are also covered by the JWDPD. The JWDPD forms part of the LDF for each borough and helps deliver the relevant elements of the Sustainable Community Strategy for each borough. The JWDPD was adopted by the London Borough of Newham in February 2012.

### **Guidance**

- 15.54 The Waste & Resources Action Programme (WRAP) assists the UK Government to meet national and international commitments and to support resource efficiency in the UK. This is achieved by helping businesses and individuals within the UK to benefit from reducing waste, develop sustainable products and use resources in an efficient way. WRAP provides guidance to the construction industry on the use of Site Waste Management Plans, use of materials, and resource efficient construction.
- 15.55 Contaminated Land: Applications in Real Environments (CL:AIRE) is an independent, non-profit organisation that aims to encourage the sustainable remediation of contaminated land and groundwater throughout the UK for effective social and economic use. This is achieved by increasing awareness and confidence in practical, sustainable remedial solutions.
- 15.56 CL:AIRE introduced The Definition of Waste: Development Industry Code of Practice (DoWCoP), an initiative to improve the sustainable and cost effective development of land. The DoWCoP provides a clear, consistent and streamlined process which enables the legitimate reuse of excavated materials on-site or their movement between sites with a significantly reduced regulatory burden. In many instances the DoWCoP can provide an alternative to Environmental Permits or Waste Exemptions when seeking to reuse excavated materials.
- 15.57 The DoWCoP enables the direct transfer and reuse of clean naturally occurring soil materials between sites. It creates the conditions to support the establishment and operation of fixed soil treatment facilities, which have a key role to play in the future of sustainable materials management. It allows the reuse of both contaminated and uncontaminated materials on the site of production and between sites within defined Cluster projects.
- 15.58 The DoWCoP requires a staged approach which includes the production of a Materials Management Plan for the reuse or movement of material. This must be signed off by a "Qualified Person" as set out in the Code. The DoWCoP has allowed the Environment Agency to step back from the detailed auditing and quality assurance of many earthworks projects which pose little or no risk to the environment. In establishing a role for a "Qualified Person" the Environment Agency has enabled the private sector to step up and take responsibility for implementing good practice and promoting sustainable materials management.
- 15.59 CL:AIRE is keeping a register of materials and services which fall within the DoWCoP. This aims to link material holders with service providers or organisations requiring materials in order to make the process of finding project partners more efficient.

- 15.60 The Building Research Establishment (BRE) is a provider of expert, impartial research, knowledge and advice for the built environment sector and beyond. It provides guidance on reducing and managing construction waste.

### ***London City Airport Waste Policy***

- 15.61 The Airport's Sustainability Strategy and Sustainability Action Plan (2012) (the "Airport Sustainability Strategy") establishes a series of objectives and targets for managing the Airport's key sustainability priorities, which include waste production. The Airport Sustainability Strategy sets out the Airport's objective for waste management, which is to "promote the waste hierarchy and reduce waste to landfill".
- 15.62 The Airport ensures that suppliers comply with its sustainability objectives through contractual mechanisms and has developed a system for monitoring and checking performance, with an aim of annual improvement. The practical implementation of these objectives with regard to waste for the Airport as a whole, as presented in the Airport Sustainability Strategy, includes:
- a) **Prevention** - The careful design of enabling and earthworks activities to achieve (where possible) a neutral cut and fill balance, thereby reducing the potential to generate excess spoil requiring removal from site during construction works. Construction activities and the ordering of materials will be planned to minimise waste including packaging. Adoption of best practice construction methods and consultation with the Waste and Resources Action Programme (WRAP) will ensure waste minimisation.
  - b) **Preparation for Re-use** - Efforts will be made to reuse materials during all developments at the Airport. The reuse of material through a waste inventory will be encouraged; for example, whole units, materials, fabrics and components could potentially be reused elsewhere at the Airport, or sold locally.
  - c) **Recycling** - Waste from demolition, construction and operational activities which is not suitable for reuse will be sent to an appropriate Material Recycling Facility (MRF). All workers will be actively encouraged to recycle and this will be monitored accordingly.
  - d) **Other Recovery** - Food waste will be sent to a composting facility or anaerobic digestion plant, where available. Waste remaining after being sent for recycling, composting and to anaerobic digestion plants (i.e. residual waste) could also be sent to an Energy from Waste (EfW) facility for energy recovery.
  - e) **Disposal** - Only in the last instance will material be sent to landfill (e.g. non-treatable hazardous wastes).
- 15.63 The following waste management initiatives were adopted from 2009 through to 2012 to assist in the development of the Airport Sustainability Strategy:
- a) In 2009, all waste management procedures were contracted to one specialist waste contractor, as opposed to using a number of different waste contractors and the Airport works closely with the waste contractor to ensure that targets for waste management can be delivered; and
  - b) Reviews were undertaken of existing waste management procedures at the airport, including how tenants and retail concessions are able to implement their own waste management initiatives through the facilities provided.
- 15.64 The following targets and actions have been set as part of the 2012 Airport Sustainability Action Plan, included in Annex 1 of the Airport Sustainability Strategy:
- a) 75% of waste collections to be on weigh scale vehicles by December 2013;
  - b) Introduction of a new waste storage hub to promote waste segregation by December 2012;

- c) Increasing of waste recycling rates to 20% by summer 2011;
  - d) Implementation of a training programme to ensure that 100% of London City Airport staff have been trained in waste management; and
  - e) Conducting a feasibility study to explore opportunities for Energy from Waste and or Anaerobic Digestion by December 2012.
- 15.65 As detailed in London City Airport's Community and Environment Review (2012), the Airport works hard to reduce the amount of waste resulting from activities on-site, whilst increasing the amount of waste which is recycled. The Airport employs a special waste contractor to manage all waste streams generated on site. The Airport is pursuing new ways to improve its Waste Management Programme, investing in a new on-site recycling facility where a waste operative will manage the waste streams by actively identifying materials to be recycled.
- 15.66 The Airport has procedures in place to deal with waste in a sustainable way and has made particular headway over the last five years to increase its waste recycling rate and divert waste from landfill. Operational waste on a day-to-day basis is therefore well managed, and it is expected that these practices will continue in future operations.

### **Assessment Methodology**

- 15.67 The methodology for assessing the significance of effects associated with the generation of waste is based upon an assessment of the quantity and types of waste that are likely to be produced during the site construction and operation of the proposed CADP, how this deviates from baseline conditions and the impact that any additional waste will have upon the existing and proposed waste management infrastructure.

### **Baseline Conditions**

- 15.68 Baseline conditions for current and predicted waste generation in Greater London and east London have been established from publicly available sources. Available data for current waste management facilities have been reviewed and an assessment of proposed new waste infrastructure has been made.
- 15.69 Baseline conditions have also been established for the types and volumes of waste currently produced at London City Airport. Data for January to July 2012 were available and were obtained from the Facilities Management department of the Airport. For the purpose of this assessment, these figures have been increased on a pro rata basis to provide an estimate of the total waste generated during the entire year.

### **Significance Criteria**

- 15.70 The predicted volumes of waste to be produced during the demolition, piling and earthworks, construction and operation of the CADP have been compared against the current baseline conditions derived for the site, along with the types and total volumes of waste managed and produced in London each year. From this assessment, the significance of the environmental effect has been determined in accordance with the following criteria:
- a) **Major adverse:** Substantial increase in waste generation (including hazardous or otherwise difficult to treat waste) with no reuse, recycling or other recovery undertaken;



volumes are likely to be above those considered to be within the capacity of receiving waste management facilities.

- b) **Moderate adverse:** An increase in waste generation with some potential for reuse, recycling or other recovery; volumes are likely to be above those considered to be within the capacity of receiving waste management facilities.
- c) **Minor adverse:** Increase in waste generation with moderate potential for reuse, recycling or other recovery; volumes are likely to be within the capacity of receiving waste management facilities.
- d) **Negligible:** No discernable overall change in waste generation.
- e) **Minor beneficial:** A net reduction in waste generation from site operations; volumes are likely to be within the capacity of receiving waste management facilities.
- f) **Moderate beneficial:** A net reduction in waste generation from site operations with a moderate potential for reuse, recycling or other recovery; volumes are well within the capacity of receiving waste management facilities.
- g) **Major beneficial:** A complete elimination of all waste from the site.

## Baseline Conditions

### Regional Waste Production

- 15.71 According to the London Plan (2012), London produced 22 million tonnes of waste in 2008. Of this, approximately 4.2 million tonnes (19%) comprised municipal household waste (or municipal solid waste, MSW), approximately 7.5 million tonnes (24%) comprised commercial and industrial waste (C&I) and approximately 10.4 million tonnes (47%) comprised construction, excavation and demolition waste (CE&D). It was estimated that 82% of CE&D waste was reused or recycled in 2008. The London Plan states that London currently manages an estimated 53% of its own waste.
- 15.72 The London Plan forecasts that London's waste arisings will rise to approximately 34 million tonnes per year by 2031. In addition, it is proposed that the equivalent of 100% of London's waste will be managed within London by this time.
- 15.73 The JWDPD for east London provides an indication of the tonnages of each waste stream managed by the ELWA boroughs in 2010 and includes predictions of the tonnages of each waste stream that will need to be jointly managed by these boroughs to 2021. A summary of these volumes is presented in Table 15.1, below:

**Table 15.1: Predicted waste quantities to be managed by ELWA boroughs (JWDPD, 2011)**

Waste Stream	Predicted Quantity (tonnes per year)	
	2010	2021
MSW and C&I	1.39 million	1.573 million
CE&D	0.99 million	1.267 million
Hazardous	0.098 million	0.095 million

### Regional Waste Infrastructure

- 15.74 Data provided by the Environment Agency indicates that approximately 15 million tonnes of waste was managed by licensed facilities in London during 2011. This figure is higher than would be expected based on the data provided by the London Plan for 2008, and may reflect an increase in waste generation since 2008 and/ or an increase in the percentage of London's waste being managed within London. Of this 15 million tonnes, the majority was reused, recycled or recovered, with less than 2.5 million tonnes (approximately 16%) deposited to landfill in London.
- 15.75 In order to achieve the targets set out in the London Plan, London's waste infrastructure will need to manage more than double the tonnage of waste processed in 2011 by 2031, with significant financial and logistical implications. This is recognised by Policy 5.17 of the London Plan, which states that the Mayor supports the need to increase waste capacity in London and that individual boroughs (or collaborations of boroughs) must provide capacity to manage the apportionment of waste allocated to them in the plan. The apportionment for LBN is presented in Table 15.2, below.

**Table 15.2: Total MSW and C&I waste (tonnes per year) apportioned to be managed by the London Borough of Newham (London Plan, 2011)**

% Share of London's Waste	2011	2016	2021	2026	2031
4.9	356,000	405,000	458,000	514,000	572,000

- 15.76 In line with the suggested approach presented in the London Plan, the ELWA have pooled their waste apportionments and a strategy for providing sustainable waste management within the four boroughs is presented in the JWDPD.
- 15.77 A summary of the existing waste infrastructure in the ELWA area is presented in the JWDPD and in Table 15.3, below. As there is some uncertainty surrounding actual throughput and the available data, the actual capacity has been estimated as 75% of maximum available capacity, which is consistent with the approach used in the London Plan.

**Table 15.3: Existing waste management capacity in the ELWA area (JWDPD, 2011)**

Facility Type	Number of Facilities	Annual Permitted Tonnage	Estimated Actual Capacity (75%)
A13 – Household Amenity Sites (Reuse and Recycling Centres)	4	167,050	125,288
A15 – Material Recycling Treatment Facility	10	950,500	712,875
A20 – Metal Recycling Sites	5	488,080	366,060
A22 – Composting Facility	2	202,000	151,500
A16 – Physical Treatment Facility	3	174,000	130,500
A17 – Physico-Chemical Treatment Facility	1	90,000	67,500
A23 – Biological Treatment Facility	2	193,080	145,080
A11 – Household, Commercial and Industrial Waste Transfer Station	23	3,252,833	2,439,625
A18 – Incineration (Clinical Waste)	1	7,000	5,250
A09 – Special Waste Transfer	6	470,627	352,970

Station			
A12 – Clinical Waste Transfer Station	3	6,040	4,250
A14 – Transfer Station taking Non-Biodegradable Wastes	2	280,800	210,600
A05 – Landfill taking Non-Biodegradable Wastes	6	866,000	649,000

- 15.78 Targets for waste management, as set out in the Waste Strategy for England (2007) and endorsed by the London Plan, are adopted in the JWDPD, and are presented in Table 15.4, below:

**Table 15.4: Target MSW, C&I and CE&D recovery, composting and recycling to 2020**

Waste Stream	Management Route	Target		
		2010	2015	2020
MSW	Recycling	27%	30%	33.5%
	Composting	13%	15%	16.5%
	Recycling and Composting	40%	45%	50%
	Other Recovery	13%	22%	25%
	Total Recovery	53%	67%	75%
C&I	Recycling	38%	43%	47%
	Composting	18%	21%	23%
	Recycling and Composting	56%	64%	70%
CE&D	Recycling and Reuse			95%

#### *Commercial and Industrial Waste*

- 15.79 In addition to the targets set out in the Waste Strategy and the London Plan, the ELWA boroughs have planned on the basis of that waste which is not recycled or composted being recovered with a target of no waste going to landfill. Using this approach, a summary of the waste capacities required for these boroughs to meet the apportionment set out in the London Plan is presented in the JWDPD and summarised in Table 15.5.

**Table 15.5: Summary of average capacity surplus/ deficit within the ELWA boroughs required to meet the London Plan apportionment for MSW and C&I waste**

Waste Management Route	Capacity Required (tonnes per year)		
	2011	2016	2021
Recycling (MSW and C&I)	786,203	674,313	415,428
Composting (MSW and C&I)	-47,440	-109,170	-320,255
Recovery (all facilities)	-262,710	-256,090	-269,370

Note: Negative numbers indicate a deficit or future capacity requirement. Positive numbers indicate a surplus capacity.

#### *Construction, Excavation and Demolition Waste*

- 15.80 With regard to CE&D waste, the JWDPD states that it is estimated that a large portion of this waste is currently recycled or reused on site rather than in designated licensed facilities, or is transferred out of London through inert transfer stations. It is therefore considered that additional permanent new CE&D recycling facilities are not required.
- 15.81 As an alternative to allocating sites for CE&D recycling facilities, the JWDPD (Policy W1) encourages the reuse of CE&D waste at or near construction sites with on-site recycling wherever possible and highlights the increased opportunity for use of recycled aggregates sourced from a variety of construction, excavation and demolition wastes.

#### *Hazardous Waste*

- 15.82 Policy 5.19 of the London Plan states that Development Plan Documents should make provision for hazardous waste treatment plants to achieve, at regional level, the necessary waste management requirements. However, a study carried out by ERM in 2005, *The Study of Arisings and Management of Non-Municipal Wastes in the ELWA Area* considered that it would not be appropriate for the ELWA boroughs to aim for self-sufficiency or to allocate specific sites for hazardous waste management due to the variety and nature of hazardous wastes and the specialist management techniques and facilities required.
- 15.83 The London Plan indicates that 300,000 tonnes of hazardous waste was produced in London in 2007. Of this, 35% was produced from CD&E waste (including contaminated soil), 21% was produced from oil and oil/water mix waste and 44% was produced from chemical and other industrial processes. However, no data are currently available for the quantity of hazardous waste produced by each borough.
- 15.84 As detailed in Table 15.3, the ELWA boroughs currently have capacity to deal with 483,000 tonnes of hazardous waste per year. It is noted that on-site soil treatment facilities, including temporary facilities, provide additional capacity. Furthermore, although not classified as “treatment”, special waste transfer facilities provide an important role in storage and reprocessing of hazardous waste.
- 15.85 Some WEEE also falls within the definition of hazardous waste. All four of ELWA’s Reuse and Recovery Centres are Designated Collection Facilities for WEEE, which separate and recycle used electronic equipment with a current recycling rate of in excess of 90%.

#### *Safeguarded and Proposed Infrastructure*

- 15.86 In order to achieve the proposed targets, JWDPD Policy W2 states that the ELWA boroughs will safeguard the capacity of the existing waste management facilities listed in Schedule 1 of the document. There are 18 recycling facilities (of which three are located in Newham), two composting facilities and six recovery facilities (of which one is located in Newham) listed in Schedule 1.
- 15.87 Policy W2 of the JWDPD also states that the ELWA boroughs will approve strategic waste management facilities where it will contribute to the ELWA boroughs meeting the London Plan apportionment on sites within the locations listed in Schedule 2 of the document.

- 15.88 Schedule 2 identifies a number of areas within which potentially available and suitable sites for waste management facilities can be located. There are five sites listed on Schedule 2, including one 7ha site in Newham that has been identified as suitable for a medium to large facility. The JWDPD states that the sites listed in Schedule 2 will provide sufficient additional capacity to manage the tonnage of waste required to meet the apportionment set out in the London Plan.

#### *Investment*

- 15.89 The London Plan Implementation Plan indicates that an investment in infrastructure of approximately £2bn across London would be required in order to achieve the proposed target of managing 100% of London's waste within the capital by 2031. A number of potential sources for this funding are considered in the Implementation Plan, although it was recognised that the majority of investment would be met by commercial funds. Other potential sources of funding include the LWaRB, which had already committed £18.3 million at the time of production of the Implementation Plan (January 2013), the UK Green Investment Bank and the London Green Fund (£186 million). It was also estimated that contributions of £250 million could be made through savings from better management of Local Authority Controlled Waste, generation of green collar jobs and generation of energy from waste.
- 15.90 The LWaRB has published a business plan for 2013 to 2015, which launches a £19 million "Tailored Investment Fund". Under this fund, LWaRB will explore a range of financial support mechanisms that are tailored to individual projects. LWaRB will work with project sponsors and potential funders to create a suitable finance structure that will help ensure that a potential infrastructure project is not put in jeopardy through lack of finance.
- 15.91 The London Development Agency and LWaRB have recently launched the £100 million Joint European Support for Sustainable Investment in City Areas (JESSICA) in partnership with the European Investment Bank, with match-funding from the European Regional Development Fund. JESSICA will make loan and equity investments in decentralised energy and waste management infrastructure, and support local businesses. The LWaRB will also work with the LDA, London boroughs, businesses and householders to divert waste from going to landfill by investing in processing, reprocessing and advanced thermal technology waste to energy plants, to improve waste management and generate power locally.

#### Current Airport Waste Production

- 15.92 The majority of Airport waste is currently produced by airlines, tenants and retail concessions. This includes in-flight waste, terminal waste, aircraft maintenance waste, catering waste and general waste from passengers. Furthermore, waste is produced by Airport staff, tenants (office waste) and retail concessions.
- 15.93 An estimated total of 946 tonnes of waste arose at the Airport during 2012. Of this total, 459 tonnes (48%) comprised general waste, 487 tonnes (51%) was recycled and 0.9 tonnes (0.1%) was classified as hazardous. The waste was managed by the specialist waste contractor. A total of 3.03 million passengers passed through the Airport during 2012, which equates to approximately 312 grams of waste was produced per passenger. It is not permitted for



international airline waste (Cat 1 ICW) to be deposited at UK airports and therefore this is not included within this calculation.

- 15.94 The Airport currently recycles a range of waste materials as part of its Dry Mixed Recyclable (DMR) collections. This primarily comprises paper, cardboard, cans, and plastic packaging. DMR is segregated on site at a central storage area ('the waste hub') and removed by the waste contractor on a daily basis. During 2012, the recycling rate for the Airport was recorded estimated to be 51%, which exceeds the 2015 recycling target of 45% as set out in the London Plan (2011) and the Airport's own target to increase waste recycling rates to 20% by summer 2011 and then to reach 45% over the following three years.
- 15.95 Various initiatives to increase recycling rates have recently been implemented at the Airport, including the transfer of waste using clear bags to assist in the identification of waste types. Furthermore, a number of workshops have been run to increase waste recycling awareness amongst staff, concessions and the waste contractor.
- 15.96 According to the Airport Sustainability Strategy, none of the waste generated at the Airport is sent to EfW or anaerobic digestion (AD) facilities.

#### **Assessment of Likely Significant Effects**

- 15.97 This section compares the predicted volumes of waste to be generated during the demolition, piling and earthworks, construction and operational phases of the development against the current (2012) baseline conditions. From this, the significance of impact upon current waste management infrastructure in London has been determined. The majority of construction and demolition waste, in addition to pile arisings and soil to be removed from site following earthworks is likely to be suitable for re-use, recycling or recovery, with only limited volumes requiring disposal to landfill.
- 15.98 The following sources of information have been used to calculate the anticipated waste volumes for the demolition, piling and earthworks, construction and operational phases of the CADP:
- a) **Site preparation (demolition)** waste volumes were calculated from the mass and volume of structures to be removed.
  - b) **Piling and earthworks** waste volumes were based on information provided by the project engineers (TPS and Atkins) and through the application of BRE Waste Benchmark Data, published by Smartwaste and the BRE in June 2012<sup>i</sup>.
  - c) **Construction** waste volumes were based on information provided by the project engineers (TPS)..
  - d) **Operational** waste volumes were based upon 2012 baseline data for the Airport and scenarios for increased passenger numbers, based on predictions made by York Aviation (as summarised in the Need Statement which accompanies the CADP planning submission). In the absence of specific construction details for the hotel, published data sourced by WRAP<sup>ii</sup> for an average hotel has been used.

#### Limitations, Constraints and Assumptions

- 15.99 The key limitations, constraints and assumptions to this assessment include the following:

- a) The predicted waste volumes are based on conservative estimates, as detailed above.
- b) It is assumed that, in the event that it is not possible to re-use materials from the site clearance, piling/ earthworks and construction phases, suitable clean arisings could be reused on other sites within Greater London. For example, the use of the CL:AIRE database, waste brokers or the National Industrial Symbiosis Programme (NISP) could assist in the identification of companies or sites that may require large quantities of construction and demolition-type material.

#### Demolition, Earthworks and Construction Waste Effects

##### **Demolition Waste**

- 15.100 The existing City Aviation House, OBB tent, East Pier, part of the immigration area and one of the dolphin structures will be demolished as part of the proposed CADP (as described in Chapter 6: Development Programme and Construction). This is predicted to result in approximately 750 tonnes of steel and 800 tonnes of general waste requiring removal from the site. At present, the reuse of this material on-site is not anticipated to be feasible, as material reprocessing (e.g. on-site crushers) would be constrained due to the proximity of local residents, approximately 35m away from the area of the proposed CADP. However, the feasibility of this will be further assessed by the Principal Contractor. However, it is anticipated that the majority of this material could be processed for reuse on other development projects and the JWDPD sets a target for reuse and recycling of 95% of CE&D waste by 2020.
- 15.101 This one-off volume of demolition waste will exceed the current baseline waste volume (946 tonnes in 2012) for the Airport. However, the ELWA predicted that they would be managing 0.99 million tonnes of CE&D waste in 2010, rising to 1.267 million tonnes by 2020. The waste produced during demolition of structures as part of the proposed CADP is therefore unlikely to significantly impact the existing and proposed waste management infrastructure. The site clearance/ demolition phase will therefore result in a **Negligible to Minor Adverse** effect.

##### **Earthworks, Piling and Foundation Spoil**

- 15.102 It is predicted that approximately 65,000m<sup>3</sup> of spoil will arise from site excavations, piling and foundations associated with 'landside' elements of the proposed CADP. This comprises approximately 4,520m<sup>3</sup> of excavation in the location of the new landside buildings (i.e. the Western terminal Extension, the West Energy Centre, East Energy Centre, sub-stations and ancillary buildings); 30,020m<sup>3</sup> from site surface preparation (including a 'cut and fill' balance at the new forecourt area); and, 30,400m<sup>3</sup> for site services excavation, allowing for reuse of site won material as backfill where possible (drainage pipes, attenuation tanks and interceptors; gas, electricity, telecoms and other services). In addition, the 'airside' excavation (including pile arisings, excavations for drainage runs, oil separators and AGL ducting and pits) is likely to generate in the region of 30,000m<sup>3</sup> of waste spoil.
- 15.103 As some CADP buildings (e.g. Eastern Terminal Extension and the hotel) are only at an outline stage of design, the foundations of such buildings and the associated volumes of spoil cannot be calculated at this time. However, taking account of these additional sources, which are unlikely to generate more than 45,000m<sup>3</sup> of excavated soil, it is estimated that the total volume of spoil from the CADP works over the duration of the construction phase is unlikely to exceed

110,000m<sup>3</sup>. Based on a conservative estimated density for the spoil of 1.8 tonnes per m<sup>3</sup>, the total earthworks, piling and foundation spoil is unlikely to exceed approximately 200,000 tonnes.

- 15.104 These figures take into account the reuse of material on site where possible. In addition, the project engineers (Atkins) have identified that approximately 18% of the earthworks, excavation and piling spoil could be re-useable as engineering fill off site. Based on the JWDPD target of reuse and recycling of 95% of CE&D material by 2020, it is likely that the majority of the remainder of the material could also be processed for reuse in other local developments.
- 15.105 Based on the information available from intrusive site investigations, it is not considered likely that significant remediation works relating to contaminated land will be required during redevelopment. Therefore it is not likely that remedial waste, comprising significantly impacted soils requiring disposal off-site would arise from the development. Further information regarding soil quality is presented in Chapter 16: Ground Contamination.
- 15.106 The earthworks, piling and foundation spoil will exceed the current baseline waste volume (946 tonnes in 2012) for the Airport. However, the earthworks, piling and foundation excavations will take place over a number of years. It is estimated that by 2020 1.267 million tonnes of CE&D waste will be managed in the ELWA boroughs per year and the volume of waste produced by the proposed CADP each year is therefore unlikely to significantly impact the existing and proposed waste management infrastructure. Furthermore, waste management infrastructure for CE&D waste can be flexible and the JWDPD encourages the use of temporary recycling facilities. The earthworks, piling and foundation phase will therefore result in a **Negligible to Minor Adverse** effect.

#### **Other Construction Waste**

- 15.107 It is estimated that approximately 8,362 tonnes of other construction waste material will arise from the proposed CADP. The majority of this other construction waste will be generated from off-cuts of fitting materials, spent materials and packaging and will typically comprise materials such as concrete, metal and plastics. Further details on the management of construction waste are provided in Chapter 6: Development Programme and Construction. During construction, over 90% of waste material is to be targeted to be re-cycled, re-used or otherwise diverted away from landfill.
- 15.108 This estimation is considered to be conservative. In practice, waste management measures including careful procurement, segregation and adequate storage for unused materials in line with the WRAP protocol will reduce the volume of waste generated. Furthermore, during the construction phase, the CADP will be subject to a Site Waste Management Plan (SWMP) which will encourage better waste management practices and improve environmental performance.
- 15.109 Notwithstanding the above, the waste produced during construction will exceed the current annual baseline volume of waste produced at the Airport. However, the volume of CE&D waste managed within the ELWA boroughs per year is expected to increase to 1.267 million tonnes by 2020 and the volume of other construction waste produced by the proposed CADP is not significant in this context. In addition, the generation of construction waste will likely be spread

over a period of 6-7 years (as described in Chapter 6), further reducing the potential impact on existing waste management facilities.

- 15.110 Overall, environmental effects from waste produced during the construction phase would be **Negligible to Minor Adverse**.

#### Completed Development

- 15.111 Waste will continue to be produced during the transitional and operational phase of the proposed CADP, by passengers, Airport staff, concessions, airlines and tenants. During 2012, the estimated volume of waste produced per passenger was approximately 312 grams. Based upon this baseline figure, the following waste predictions have been calculated for the proposed CADP:

- a) 2019 (Transitional Assessment Year): approximately 4.9 million passengers, equating to 1,521 tonnes of waste being produced.
- b) 2021 (Design Year – CADP completed): approximately 5.5 million passengers, equating to 1,721 tonnes of waste being produced.
- c) 2023 (Principal Assessment Year): approximately 5.9 million passengers, equating to 1,834 tonnes of waste being produced.

- 15.112 By comparison to these With Development calculations it is predicted that without the proposed CADP, 4.4 million passengers would pass through the Airport during 2021, equating to approximately 1,371 tonnes of waste being produced during that year. In 2023, 4.4 million passengers would pass through the Airport generating approximately 1,385 tonnes of waste that year.

- 15.113 The above calculations do not take into consideration of any potential reductions in waste generation as a result of waste management initiatives which will continue to be promoted by the Airport in accordance with the objectives set out in the Airport Sustainability Strategy (as described above). As such, it is likely that per-passenger waste generation rate would decrease somewhat, in both the With and Without Development cases.

- 15.114 As a per passenger measure, operational phase waste production from Airport facilities (e.g. catering, retail and other passenger facilities) would not increase significantly above the current levels because the expansion of such facilities is proportionate to the predicted increase in passenger numbers. In other words, such waste is derived in proportion to the number of passengers passing through the Airport and is therefore captured by the 'waste per-passenger' calculations.

- 15.115 The only 'new' land uses at the Airport are the proposed East and West Energy Centres and a hotel of approximately 260 bedrooms which will be located east of the Terminal Forecourt. As the energy centres will be fuelled by natural gas rather than solid fuel, it is expected that these facilities will generate minimal waste. With regard to the hotel, its design and associated facilities (e.g. type of restaurant and catering facilities) have not been established at this stage. However, according to data sourced by WRAP (The Composition of Waste Disposed of by the UK Hospitality Industry, 2011)<sup>ii</sup>, the median annual volume of waste produced by hotels in the UK was recorded as 66 tonnes during 2009 / 2010. Therefore, this figure can be used as a broad estimate for the quantity of waste likely to be produced by the proposed hotel.

- 15.116 In summary, waste production at the Airport will increase under the CADP due to the increase in the number of arriving and departing passengers, and the associated enlargement of passenger facilities within the terminal buildings. Assuming maximum passenger numbers of 5.9 million during the Principal Assessment Year (2023), the volume of operational waste that will be produced at the Airport is predicted to reach 1,834 tonnes per year. This will exceed the current (2012) baseline volume of waste of approximately 946 tonnes, and generate 449 tonnes of additional waste in 2023 compared to the Without Development scenario. In addition, the hotel to be constructed as part of the CADP will result in the order of 66 tonnes of additional waste per annum. These predicted volumes do not take into consideration potential reductions in waste production at source, as a consequence of the targeted improvements in waste management at the Airport which are set out in the Airport Sustainability Strategy.
- 15.117 Within the ELWA boroughs there are currently 23 household, commercial and industrial waste transfer stations with an estimated annual capacity of 2,439,625 tonnes. The JWDPD predicts that the ELWA will be managing 1,573,000 tonnes of MSW and C&I waste by 2020. The additional waste generated by the operation of the airport is therefore unlikely to significantly impact existing or proposed infrastructure. In addition, the range of waste processing and management sites that could accommodate the type of waste generated by the Airport is not expected to diminish significantly over the next 10 years.
- 15.118 In view of the above, environmental effects from waste produced during the operational phase of the CADP would be **Negligible to Minor Adverse**.

### **Mitigation Options**

- 15.119 Waste will be managed in a responsible manner throughout the site preparation, piling and earthworks, construction and operational phases of CADP development, with a clear intention to prevent and reduce waste streams in accordance with the waste hierarchy and the Airport's own corporate objectives set out in the Airport Sustainability Strategy. Where practicable, waste production would be prevented at source through the careful design and management of materials during both the construction and operational phases. Furthermore, subject to commercial considerations, waste will be sent to one of the closest suitable facilities.
- 15.120 During the construction phase, waste will be segregated and stored on-site within a dedicated compound pending its onward transfer. As set out in Chapter 6: Development Programme and Construction, over 90% of waste material is to be targeted to be re-cycled, re-used or otherwise diverted away from landfill.
- 15.121 Inert demolition waste and materials such as broken-out concrete and tarmac will be stockpiled for as short a period of time as possible (i.e. one or two days) before removal for re-use and recycling elsewhere. Excess spoil from pile arisings and other excavations (i.e. which are not suitable for backfill or other uses) are expected to be removed from the site by barge. Preferably, such an operation would be 'two-way', whereupon barges employed to deliver construction materials to the Airport would then be used to transport waste away. However, the practical and commercial implications of this option would need to be considered upon instruction of the Principal Contractor.



15.122 All relevant contractors will be required to investigate opportunities to minimise and reduce waste generation, such as:

- a) Agreements with material suppliers to reduce the amount of packaging or to participate in a packaging take-back scheme;
- b) Implementation of a 'just-in-time' material delivery system to avoid materials being stockpiled, which increases the risk of their damage and disposal as waste;
- c) Attention to material quantity requirements to avoid over-ordering and generation of waste materials;
- d) Segregation of waste at source where practical; and
- e) Reuse and recycling of materials off-site where re-use onsite is not practical (e.g. through use of an off-site waste segregation facility and re-sale for direct reuse or reprocessing).

15.123 A Site Waste Management Plan (SWMP) will form a component part of the Construction Environmental Management Plan (CEMP). As described in Chapter 6, the CEMP will contain procedures for the management of waste and related pollution control measures. The appointed contractors for the site preparation, piling and earthworks and construction phases of the works will be contractually obliged to follow the CEMP and all relevant waste legislation, as summarised at the beginning of this chapter.

15.124 It has been estimated by the project engineers (Atkins) that it may be possible to reuse approximately 35% of clean excavated materials as engineering backfill, with 17% likely to be suitable for use on-site during the CADP works. This would be coordinated as part of a Materials Management Plan (MMP) under the CL:AIRE Code of Practice. Furthermore, there may be opportunities to reuse clean excavated materials and demolition waste on other off-site developments, although this would require an Environmental Permit or MMP.

15.125 Within the Airport's Sustainability Strategy, the Airport propose to minimise operational waste production and promote sustainability in the following ways:

- a) Monitor waste leaving the Airport more closely, including making use of more advanced vehicles including weighing scales;
- b) Develop better ways to monitor how and where waste is generated at the Airport;
- c) Develop a programme of awareness raising through staff training;
- d) Review the Airport's procurement procedures, including efforts to reduce packaging and other inherent wastage;
- e) Review procurement and delivery procedures of concessions at airport forums; and
- f) If necessary, adapt tenant lease conditions to ensure that the longer term targets of the Sustainability Strategy can be achieved.

15.126 Furthermore, in order to increase recycling rates to 45% by 2015, the Airport proposes to do the following:

- a) Recycle a wider range of materials;
- b) Examine the potential for composting biodegradable materials; and
- c) Work closely with retail concessions, the Airport's cleaning contractors and airlines to increase the recycling rate.

- 15.127 Such measures will be taken forward as part of the management and operation of the proposed CADP.

### **Residual Effects**

- 15.128 Any major development project is likely to result in the generation of waste above baseline/ normal operational conditions. During the demolition, earthworks and construction phases of the CADP (spanning 6-7 years) it is likely that there will be short-term generation of additional waste that cannot be reused at the Airport. In addition, due to the predicted increase in passenger numbers to 5.9 mppa and associated passenger facilities in the terminal buildings by 2023, together with the construction of the new hotel, it is inevitable that waste generation will increase following completion of CADP. However, on a per passenger measure, waste is unlikely to increase.
- 15.129 Within Greater London, there is significant commitment to improving the existing waste management infrastructure in order to deal with increasing waste generation across the capital and achieve the targets set by the London Plan. Considerable investment has already been allocated to waste management improvement. The JWDPD sets out a strategy for meeting the apportionment requirements of the London Plan within the ELWA boroughs.
- 15.130 The volumes of waste generated as a result of the CADP are relatively small when compared to the predicted figures for waste generation and proposed waste management capacity within the ELWA boroughs. The additional waste is therefore not likely to adversely impact upon this existing and proposed infrastructure. Furthermore, the proposed mitigation measures outlined above, combined with the long-term commitment and initiatives adopted by the airport to reduce waste generation, are likely to result in residual effects being less significant than predicted.
- 15.131 Overall, the residual effects resulting from waste generation from the proposed CADP are considered to be of **Negligible to Minor Adverse** significance at worst, both during and following completion of the development.

### **Cumulative Effects**

- 15.132 The regeneration of east London has resulted in large scale redevelopment in recent years. Further developments in east London and in close proximity to the Airport are planned for the near future, as described in Chapter 3: EIA Methodology. The London Plan predicts a significant increase in the quantity of waste, including CE&D and C&I waste, within London that will be produced to 2031, and this is taken into account in the proposed investment in infrastructure. Any new developments in the ELWA boroughs are anticipated to follow the recommendations of the JWDPD and the London Plan. Therefore, collectively, these developments in combination with the CADP are unlikely to significantly deplete the existing and planned waste capacity of east or Greater London.
- 15.133 There may be opportunities to directly reuse some of the materials derived from the proposed CADP at other development sites within the vicinity of the Airport. This would be dependent upon factors such as timings and the suitability of the material, but this could be assisted through the use of the CL:AIRE database, waste brokers or the National Industrial Symbiosis

Programme (NISP). Reuse of materials is likely to require an Environmental Permit or Materials Management Plan under the CL:AIRE Code of Practice.

- 15.134 Overall, the cumulative effects from neighbouring developments are considered to be of **Negligible** significance.

## Conclusions

- 15.135 This assessment has demonstrated that impacts from the production of waste during the demolition, piling and earthworks, construction and operational phases of the proposed CADP would be **Negligible or Minor Adverse** (at worst). The proposed mitigation measures will ensure that the waste hierarchy (prevention, preparation for reuse, recycling, other recovery and disposal) and disposal to one of the nearest appropriate installations are observed wherever practical and commercially viable. In accordance with its own corporate policies, London City Airport is committed to prevent or reduce waste at source wherever possible through careful management, design and, procurement. It can therefore be concluded that the proposed CADP would comply with, or exceed, all relevant waste policy and legislation.
- 15.136 Measures have been set out above which would act to reduce the volumes of waste associated with the CADP and which would enhance the options for on-site reuse of materials, which might otherwise become waste. The greatest volumes of potential waste (approximately 110,000m<sup>3</sup>) are predicted to arise during the earthworks and piling phases of the development. However, it is estimated in the JWDPD that by 2020 1.267 million tonnes of CE&D waste will be managed in the ELWA boroughs per year and the volume of waste produced by the proposed CADP each year is therefore unlikely to significantly impact the existing and proposed waste management infrastructure.
- 15.137 The current baseline operational waste volumes derived from the Airport will increase due to the CADP, which can be expected in view of the increase in passenger numbers as a result of the provision for larger aircraft and associated passenger facilities within the terminal. The JWDPD predicts that the ELWA will be managing 1,573,000 tonnes of MSW and C&I waste by 2020. The additional waste generated by the operation of the airport is therefore unlikely to significantly impact existing or proposed infrastructure. In addition, the proactive approach of London City Airport to waste management, including setting targets for increasing the amount of waste being recycled to 45% by 2015 and working closely with tenants and the waste management contractor, is likely to result in an overall reduction in the percentage of waste generation in the future.

## References

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<sup>i</sup> Waste Benchmark Data. Published by Smartwaste and BRE, 26<sup>th</sup> June 2012.

<sup>ii</sup> The composition of Waste Disposed of by the UK Hospitality Industry, Published by WRAP, July 2011. Project Code: RES093-001.

## 16 Ground Conditions and Contamination

### Introduction

- 16.1 This chapter reports on the assessment of the effects of the proposed CADP relating to ground conditions and contamination. A summary of relevant legislative and planning policy is given, together with a description of the assessment methods employed. A baseline assessment has been completed which draws upon and summarises the results of a Phase 1 Environmental Risk Assessment and an intrusive ground investigation carried out in March 2013 - these reports are presented in ES Appendix 16.1. The assessment also draws upon a number of previous site investigations relating to the Application Site, the reports of which are reproduced at Appendix 16.3.
- 16.2 Likely significant effects, mitigation and resulting residual effects are considered during both the construction works and once the proposed CADP is completed and operational.
- 16.3 This chapter should be read in conjunction with other technical chapters relating to proposed works involving the disturbance of ground, including Chapter 6: Development Programme and Construction and Chapter 15: Waste. It is also supported by a separate Piling Risk Assessment prepared by the project engineers TPS which is included at Appendix 16.2.
- 16.4 This chapter has been prepared by RPS on behalf of London City Airport (LCY).

### Planning Policy & Legislative Context

- 16.5 This section outlines the key international, national, regional and local environmental legislation, policies and guidance which relate to ground conditions and contaminated land.

#### European Legislation

- 16.6 The Water Framework Directive (2000/60/EC) aims to protect and enhance the quality of:
- a) Surface freshwater (including lakes, streams and rivers);
  - b) Groundwater bodies;
  - c) Groundwater dependent ecosystems;
  - d) Estuaries; and
  - e) Coastal waters to one mile from low-water.
- 16.7 The Groundwater Daughter Directive (2006/118/EC) expands upon Article 17 of the European Water Framework Directive. The Directive includes provisions for assessing groundwater chemical status and criteria for groundwater pollution trend identification.
- 16.8 The Environmental Liability Directive (2004/35/EC) establishes a framework on environmental liability with regard to the prevention and remedying of environmental damage based on the 'polluter pays principle', according to which the polluter pays for the prevention and remediation of environmental damage. The Directive's objective is to prevent and remedy 'environmental

damage' which is damage to protected species and habitats (nature), damage to water and damage to soil.

- 16.9 The Landfill Directive (1999/31/EC) was ratified in July 1999. The Directive's overall aim is to prevent or reduce as far as possible negative effects on the environment, in particular the pollution of surface water, groundwater, soil and air, and on the global environment, including the greenhouse effect, as well as any resulting risk to human health, from the landfilling of waste, during the whole life-cycle of the landfill. It set out new operational, regulatory and technical requirements for the landfilling of waste. The associated Council Decision 2003/33/EC sets out criteria and testing procedures to be adopted and the Waste Acceptance Criteria (WAC) for landfills. The legislation is applicable to the removal of contaminated materials originating from a site for disposal to landfill.

#### National Legislation

- 16.10 The Environmental Protection Act (1990) includes contaminated land legislation, which is principally contained within Part IIA of the Act. This sets out a scheme for the identification of contaminated land and for the enforcement of remediation.
- 16.11 The Environment Act 1995 (Section 57) amends the Environmental Protection Act (1990) and makes provisions for a risk based framework for the identification, assessment and management of contaminated land within the UK. The provisions of the Act came into effect in April 2000 and are aimed at ensuring that actions taken with respect to contaminated land are directed by a technically well-founded assessment of risk that considers the 'source-pathway-receptor' (pollutant linkage) scenario. Under the legislation, contaminated land is defined as:

*"...any land which appears to the Local Authority in whose area it is situated to be in such a condition that:*

- a) 'Significant harm' is being caused or there is a significant possibility of such harm being caused; or*
- b) Pollution of controlled waters is being, or is likely to be, caused."*

- 16.12 'Significant harm' is defined in the guidance according to risk-based criteria and must be the result of 'pollutant linkages'. Such pollutant linkages can be assessed using a qualitative risk assessment that addresses the following:

- a) Potential sources of contamination;
- b) Sensitive receptors; and
- c) Migration pathways linking the potential sources to the sensitive receptors.

- 16.13 All three of the above factors must be present for an environmental risk to exist. The presence of contamination alone does not necessarily indicate a need for remedial action and a site can only be considered 'contaminated' when a risk to the environment or human health exists due to the presence of a full 'source-receptor-pathway' linkage. In such circumstances, and where there is a significant risk posed to human health and / or the environment, the above Acts state



that Local Planning Authorities (LPAs) must adopt a 'suitable for use' approach. This means that the degree of remediation is dictated by the site's proposed end use.

- 16.14 The Contaminated Land (England) Regulations (amended 2012) set out provisions relating to the identification and remediation of contaminated land. These regulations also determine sites which require regulation as 'special sites' and add land contaminated by radioactive substances to this classification.
- 16.15 The Water Resources Act 1991 (Amendment) (England and Wales) Regulations (2009) introduced the definition of controlled waters and outlined measures that should be undertaken to protect water resources. The Act also details the responsibilities of the Environment Agency (EA) in relation to water pollution, resource management and flood defence.
- 16.16 The Groundwater (England and Wales) Regulations (2009) implement Article 6 of Directive 2006/118/EC on the protection of groundwater against pollution and deterioration. They create an offence of discharge of a hazardous substance or non-hazardous pollutant without a permit and give the Environment Agency powers to require information and to serve notices prohibiting activities.
- 16.17 The Water Environment (Water Framework Directive) (England and Wales) Regulations (2003) implement the European Water Framework Directive. The Regulations require a new strategic planning process to be established for the purposes of managing, protecting and improving the quality of water resources and apply to river basins in England and Wales.
- 16.18 Other relevant legislation, which has implications for the consideration of pollution risks and contamination, include: The Environmental Protection (Duty of Care) Regulations (1991), which ensure that waste is disposed of legally and in an appropriate manner. Under these regulations, any organisation disposing of waste should be able to account for all of the waste and demonstrate that disposal was carried out legally.
- 16.19 New definitions for hazardous waste and non-hazardous waste are given by the Hazardous Waste (England and Wales) Regulations 2005 (SI 2005 894). Overall, the regulations aim to track and control hazardous waste movements, including the requirement for a consignment note prior to the removal of any waste.
- 16.20 The Landfill (England and Wales) Regulations (2002) implement the regulatory and technical aspects of the EU Landfill Directive in England and Wales.
- 16.21 The Control of Asbestos Regulations 2006 prohibit the importation, supply and use of all forms of asbestos and include regulations regarding the duty to manage asbestos and the removal of asbestos.

### **National Planning Policy**

- 16.22 The National Planning Policy Framework (2012) sets out the government's national planning policy regarding land that may be affected by contamination. This policy is risk-based and follows former guidance presented in Planning Policy Statement Number 23 (PPS23) which was formally withdrawn on the 27th March 2012. The risk assessment methods adopted by

PPS23 reflected those contained in Part IIA of the Environmental Protection Act (1990), as detailed above.

#### Regional Policy

- 16.23 The London Plan (2011) was issued by the Mayor of London and the Greater London Authority (GLA) and is a strategic plan setting out an integrated social, economic and environmental framework for the future development of London. Policy 5.21 (Contaminated Land) states that the Mayor supports the remediation of contaminated sites and will work with strategic partners to ensure that the development of brownfield land does not result in significant harm to human health or the environment, and to bring contaminated land back into beneficial use. The policy recommends that appropriate measures be taken to ensure that development on previously contaminated land does not activate or spread contamination. Furthermore, Policy 5.21 states that Local Development Frameworks (LDFs) should encourage the remediation of contaminated sites and sets out policy to deal with contamination.

#### Local Policy

- 16.24 Newham 2027 - Planning Newham: The Core Strategy (2012) was adopted on 26th January 2012 and replaced the Unitary Development Plan (UDP). It seeks to ensure that new development will achieve the London Borough of Newham's (LBN) objective to make Newham a place where people will choose to live, work and stay. It is noted under Section 3.19 of The Core Strategy that Newham is able to provide London with a large supply of brownfield development land over the plan period to 2027, to help meet its targets for new housing and economic growth.
- 16.25 The London Borough of Newham UDP – Contaminated Land: Assessment, Remediation and Monitoring (Policy EQ49) has been saved and adopted within The Core Strategy 2012 until further LDF work is complete. Essentially, the UDP requires that planning applications for the development of a site known or reasonably suspected of being contaminated, or containing landfill gas, are accompanied by an assessment of the type and extent of contamination and proposals for any necessary remedial measures. In other cases, where the Council suspects that there may only be slight contamination, planning permission may be granted but conditions would be attached to make it clear that development would not be permitted to start until a site investigation has been carried out. As the developers are liable for the integrity of any remediation scheme required for the lifetime of the development the Council would, where deemed appropriate, require the developer to undertake a monitoring strategy to prove the effectiveness of the remediation scheme.

#### Guidance

- 16.26 DEFRA Environmental Protection Act 1990: Part 2A - Contaminated Land Statutory Guidance (2012) replaces previous statutory guidance, which was published as Annex 3 of DEFRA Circular 01/2006. The guidance details the responsibilities of the Local Authority in prioritising the inspection of sites under Part 2A of the Environmental Protection Act and sets out a revised framework for assessing risk associated with land contamination. Guidance on remediation is

also presented and the document introduces the necessity for cost-benefit analysis when assessing appropriate remedial techniques.

- 16.27 British Standard BS 10175 (2011) 'Investigation of Potentially Contaminated Sites' forms the basis for assessing the necessary extent of site investigations.
- 16.28 Model procedures for the management of land contamination have been developed by the Environment Agency and are presented in Contaminated Land Report 11 (CLR 11, 2004). These provide the technical framework for applying a risk management process when dealing with land affected by contamination. The framework presented in CLR 11 forms the basis of the risk assessment approach adopted in this ES Chapter.
- 16.29 Groundwater Protection: Principles and Practice (GP3, 2012) is a document published by the Environment Agency that sets out the Agency's approach to the management and protection of groundwater. The document includes details of the risk-based approach used for permitted activities and land contamination issues.
- 16.30 Contaminated Land: Applications in Real Environments (CL:AIRE) is an independent, non-profit organisation that aims to encourage the sustainable remediation of contaminated land and groundwater throughout the UK for effective social and economic use. This is achieved by increasing awareness and confidence in practical, sustainable remedial solutions.
- 16.31 The Health and Safety Executive (HSE) guideline 'Protection of workers and the general public during the development of contaminated land' (1991) provides guidance on the protection of human health during implementation of remediation.

## **Assessment Methodology**

### Baseline Conditions

- 16.32 The methodology for the assessment of baseline ground conditions and contamination at the Application Site follows the phased approach recommended by Environment Agency guidance presented in CLR 11 (2004). This methodology was endorsed through LBN's Scoping Opinion of 4<sup>th</sup> December (as described in Chapter 3: EIA Methodology). The assessment of baseline conditions was informed by the following:

#### *Phase 1 Site Assessment*

- a) An assessment of published geology, hydrogeology, hydrology and overall environmental sensitivity;
- b) A review of the potential for historical contamination to exist based on published Ordnance Survey (OS) maps;
- c) A review of the potential for current sources of contamination to exist based on a site walkover;
- d) A review of historical site investigation reports; and
- e) The development of a Preliminary Conceptual Site Model, looking at potential source–pathway–receptor pollutant linkages.

### *Phase 2 Intrusive Investigation*

- a) Intrusive site investigation, including soil and groundwater analysis; and
- b) Environmental risk assessment.

### Significance Criteria

- 16.33 The process and objective of this EIA is to focus on those aspects of the proposed CADP that are likely to give rise to likely 'significant' effects on the environment relative to the baseline conditions. With respect to contaminated land, a 'significant' effect is determined in accordance with Part IIA of the Environmental Protection Act 1990, introduced by Section 57 of the Environmental Act 1995, and is based on the presence of a significant 'source-pathway-receptor' pollutant linkage.
- 16.34 For the purposes of this Chapter, the effects have been assessed in accordance with the following risk-based terminology:
- a) **Substantial adverse:** High risk to human health, controlled waters and / or other ecological receptors, including: the potential for significant harm to human health to be caused; the potential to result in a permanent or severe temporary reduction in the quality of a Principal Aquifer, potable groundwater or a surface water resource of local, regional or national importance; the potential for permanent or severe temporary harmful effect upon animal or plant populations.
  - b) **Moderate adverse:** Moderate risk to human health, controlled waters, and / or other ecological receptors, including: the potential to result in a moderate temporary or minor chronic risk to human health; the potential to result in a severe temporary or localised permanent reduction in the quality of any classified groundwater or surface water body; the potential for a moderate temporary detrimental effect upon animal or plant populations.
  - c) **Minor adverse:** Minor risk to human health, controlled waters and / or other ecological receptors, including: temporary minor risk to human health; the potential to result in moderate, localised reduction in the quality of any classified groundwater or surface water body which would be fully reversible with time or widespread reversible reduction in the quality of groundwater or surface water resources used only for commercial or industrial abstractions; the potential for a minor, localised and reversible detrimental effect on animal or plant populations.
  - d) **Negligible:** No appreciable risk to human health, controlled waters and / or other ecological receptors. Any effects would be minor, localised, temporary and fully reversible.
  - e) **Minor beneficial:** Minor reduction in risk to human health, controlled waters and / or other ecological receptors, including: minor improvement in potential effects on human health; minor local scale improvement in the quality of any classified groundwater or surface water body and / or a moderate to significant improvement in the quality of groundwater or surface water resources used only for commercial or industrial abstraction; minor improvement in potential effects upon animal and plant populations.
  - f) **Moderate beneficial:** Moderate reduction in risk to human health, controlled waters and / or other ecological receptors, including: moderate improvement in potential effects on human health; significant local scale or moderate regional scale improvement in the quality of any classified groundwater or surface water body; moderate improvement in potential effects upon animal and plant populations.
  - g) **Substantial beneficial:** Major reduction in risk to human health, controlled waters and / or other ecological receptors, including: major improvement in potential effects on human health; significant local or regional scale improvement in the quality of potable groundwater

or a surface water resource of local, regional or national importance; major improvement in potential effects upon animal and plant populations.

## Baseline Conditions

### Phase 1 Site Assessment

- 16.35 A Phase 1 Environmental Risk Assessment was carried out by RPS in March 2013, the findings of which are presented in Technical Appendix 16.1 and summarised below:

#### *Geology*

- 16.36 Based on the British Geological Survey (BGS) mapping (1:50,000 scale) and previous intrusive site investigation reports carried out between 2001 and 2013, the stratigraphic sequence beneath the Application Site comprises:

**Table 16.1 - Geology of the Application Site**

Strata	Location	Age	Thickness (m)
Made Ground	Whole Application Site	Recent	Several metres
Alluvium	Whole Application Site	Pleistocene	Several metres
River Terrace Deposits	Whole Application Site	Quaternary	Several metres
Lambeth Group	Western area of Application Site	Palaeogene	Up to 30m, thinning towards the east
Thanet Sand Formation	Western and central areas of Application Site.	Palaeogene	Up to 15m, thinning towards the east
Upper Chalk	Whole site	Cretaceous	> 80m

- 16.37 There are no recommended or potential Regionally Important Geological Sites (RIGS) or Locally Important Geological Sites (LIGS) within the London Borough of Newham, as set out by the London Plan (2011)<sup>1</sup> and supplementary guidance presented in the London Plan Implementation Framework document Green Infrastructure and Open Environments: London's Foundations: Protecting the Geodiversity of the Capital, Supplementary Planning Guidance (2012)<sup>2</sup>.

#### *Hydrogeology*

- 16.38 Environment Agency Groundwater Vulnerability Digital Mapping indicates that Application Site overlies a Secondary Undifferentiated Aquifer relating to the Alluvium. Secondary Undifferentiated Aquifers are formations which have a low permeability and have negligible significance for water supply or base flow. The River Terrace Deposits are classified as a Secondary A Aquifer, which is considered to be a moderately sensitive receptor to any contamination. Secondary A Aquifers are formed of permeable layers capable of supporting water supplies at a local scale and in some cases forming an important source of base flow to rivers. Shallow groundwater within this deposit beneath the Site may be in hydraulic continuity with the River Thames, located approximately 460m to the south of the site.
- 16.39 The Lambeth Group and the Thanet Sand Formation are also classified as Secondary A Aquifers. The Upper Chalk is classified as a Principal Aquifer; these formations provide a high level of water storage and may support water supply and / or river base flow on a strategic



scale. Notably, the overlying, variably permeable Alluvium will likely afford a degree of protection to these more sensitive groundwater bodies from contamination sourced within shallow soils and perched groundwater (if present).

- 16.40 The Lambeth Group, Thanet Sand and Upper Chalk strata are designated as Water Framework Directive groundwater bodies. Under the Water Framework Directive, measures will be put in place to improve the quality of groundwater within these bodies.
- 16.41 There are no records of licensed groundwater abstractions within 1km of the Application Site. The Site is not located within an Environment Agency defined groundwater Source Protection Zone (SPZ).
- 16.42 Further information regarding the hydrogeological setting of the Airport is given in Chapter 12: Water Resources and Flood Risk.

#### *Hydrology*

- 16.43 King George V (KGV) Dock is situated to the east of the terminal and the Royal Albert Dock is situated adjacent to the north of the runway. The Royal Victoria Dock is located approximately 70m to the west of the Application Site. The River Thames is located approximately 460m to the south and flows in an easterly direction.
- 16.44 According to Environment Agency data, there are two watercourses recorded within 1km of the Application Site classified within a River Basin Management Plan published by the Environment Agency under the European Water Framework Directive (2000). These are listed in Table 16.2, below:

**Table 16.2 – Watercourses classified within a River Basin Management Plan within 1km of the Application Site**

Watercourse / body	Current Chemical Quality Classification	Approx. Distance and Direction from Site
Thames, Creekhead, Trinity, Wylees Sewers	Does not require assessment	50m North
River Thames	Fail	460m South

- 16.45 There are records of two licenced surface water abstractions within 1km of the site. These both relate to abstractions from the River Thames by Tate and Lyle Sugars Ltd and the abstractions are recorded as being located approximately 375m and 480m south of the Application Site.
- 16.46 Further information regarding the hydrological setting of the Airport is given in Chapter 12: Water Resources and Flood Risk.

#### *Ecological Receptors*

- 16.47 DEFRA Environmental Protection Act 1990: Part 2A - Contaminated Land Statutory Guidance (2012) sets out relevant types of ecological receptor that should be considered when assessing sites under Part 2A of the Environmental Protection Act (1990). These include Sites of Special Scientific Interest, National Nature Reserves, Marine Nature Reserves, Special Areas of Conservation, Special Protection Areas, Ramsar Sites and any nature reserve established

under section 21 of the National Parks and Access to the Countryside Act (1949). There are no records of Sites of Special Scientific Interest, Special Protection Areas, Special Areas of Conservation, RAMSAR sites, Marine, Local or National Nature Reserves within 500m of the Airport.

- 16.48 The Royal Docks are included in Newham Borough's Biodiversity Action Plan (BAP) within the Habitat Action Plan for 'Rivers and Wetlands', although no actions specific to the Royal Docks, and hence KGV Dock, are included. The Royal Docks are also part of the Green Corridor Network of Newham due to their association with the 'River Thames and its tidal creeks' situated about 500 m to the south of the Application Site.
- 16.49 The Application Site and wider area of the Royal Docks are identified in the Newham BAP priority habitats 'Public open space and green corridor' and 'Built environment' due to the habitat parcels of interest occurring within this area. These were identified in a habitat survey carried out by the Greater London Authority (GLA), and relate to the extent of the built environment and the area of semi-improved grassland on the airfield between the runways.
- 16.50 Further information regarding potential ecological receptors in the vicinity of the site is presented in Chapter 13: Ecology.

#### *Potential Historical Sources of Contamination*

- 16.51 The following summary of the Application Site history has been compiled from Ordnance Survey (OS) map extracts and a review of a report detailing the construction of the King George V Dock by the Institute of Civil Engineers, dated 1923<sup>3</sup>. A full review of the mapping is provided within the Phase 1 Preliminary Risk Assessment (included in Technical Appendix 16.1) and further information regarding the history of the Airport site and surrounding area is given in Chapter 15: Cultural Heritage. Selected extracts from the historical maps are included as Figures 16.1, 16.2 and 16.3 at the end of this Chapter.
- 16.52 The OS maps show that prior to 1869 the Application Site comprised predominantly marsh land. Woolwich Manor Way and an unnamed structure were shown to be present in the southeastern corner of the site and the Great Eastern Railway intersected the western end of the site. The Woolwich Reach inlet was shown to intersect the south of the site.
- 16.53 By c. 1898 (see Figure 16.1), the Royal Albert Dock had been constructed to the north of the Site. A wharf with a number of warehouses had been constructed adjacent to the dock in the northern area of the Site and two associated dry docks had been constructed to the west. A 'composition works' was labelled in the south-western area of the Site and an engine works was located in the north-western corner of the site. Residential properties extended across the southern site boundary. The Woolwich Reach inlet appeared to have been infilled by this time.
- 16.54 According to the report from the Institute of Civil Engineers - Discussion of the King George V Dock, Minutes of the Proceedings, Vol 216, 399-408 (1923), the construction of KGV Dock with associated warehouses started in 1912 and was formally completed in 1921. A wharf had been constructed to the south of KGV Dock and was reportedly raised by around 5m with ballast obtained from the dredging of the dock. An associated dry dock was constructed to the west of KGV Dock. Seven single storey transit sheds were constructed on the new wharf, with two

associated railway lines. Additional residential properties are shown in the south-western area of the site on an OS map dated 1920.

- 16.55 By 1938 (see Figure 16.2) the engine works appeared to have been demolished. Additional warehouse buildings were shown in the northern area of the Application Site by 1940 and by 1966 office buildings were shown in the north-western corner and at the western extent of the site. Works were indicated in the location of the former 'composition works' (labelled as a Paint Works in 1959) and to the south of warehouses in the north of the Site. The majority of residential properties in the south-western area of the Site were no longer shown and a new road had been constructed in this area. By 1984, the former office building in the north-western corner of the Site was labelled as a works and an additional works had replaced one of the warehouses adjacent to KGV Dock. This layout remained relatively unchanged until the Airport was constructed in 1987.
- 16.56 Maps dating from 1991 (see Figure 16.3) show the Airport to occupy the majority of the Application Site. The runway was located on the northern area of the Site, to the north of KGV Dock. Terminal buildings were present to the southwest of the runway and two of the former warehouses to the south of KGV Dock (located at the western end of the dock) were no longer shown. The four remaining original warehouses were still indicated on OS mapping to be at the eastern extent of the dock. Reportedly, at the time of the Airport construction, the dry dock was drained and covered with concrete columns. In addition, aircraft stands 1-10 in the east (formerly 12-24) were built upon a concrete apron piled into KGV Dock.
- 16.57 A number of railway lines and sidings have been present historically in the vicinity of the site. From at least 1869, the Great Eastern Railway, which intersected the western extent of the site, ran approximately 100m to the south of the site leading to North Woolwich Station. From 1896, a second branch of this railway had been constructed and ran to the north of the Royal Albert Dock. At this time, sidings were also constructed on the Site. By 1938 two lines were shown at the western extent of the Site, one of which ran through a tunnel. By 1974 the lines and sidings to the north of Royal Albert Dock and the sidings on site appear to have been partially deconstructed and these are no longer shown by 1982. At this time, the above ground line at the western extent of the Site was no longer shown, although the tunnel was still indicated to be present. The Docklands Light Railway (DLR) is also shown to have been constructed prior to 2006, with lines running adjacent to, and intersecting, the southern Site boundary and to the north of the Royal Albert Dock.
- 16.58 Numerous former industrial land uses have been present approximately 100m to the south of the Application Site, between the railway line and the River Thames. A former gas works was located approximately 100m to the south of the site from at least 1873, and to the east of this a sewage works and chemical factory were shown from 1896. By 1920, the former sewage works was labelled as Cairn Oil Mills and the former chemical works was labelled as a wharf, with an electrical cable works shown to the east. By 1966 this area had been redeveloped and was shown as a number of works, industrial buildings and a factory. The gas works was no longer shown on the OS map at this time. By 1974, the former gas works site was labelled as a sugar refinery and a number of tanks were indicated to be present. By 1984 the area had been partially redeveloped again and the sugar refinery was no longer shown. The western section of the industrial area was labelled as Thameside Industrial Estate. By 2006 further redevelopment

had occurred to the east of Thameside Industrial Estate, and this area was labelled as Standard Industrial Estate.

- 16.59 Former industrial land uses were also located from approximately 50m to the west of the Application Site, associated with Royal Victoria Dock, and from approximately 150m to the north of the site, to the north of Royal Albert Dock. These included, at various times, a number of unspecified works, mills, depots, wharves and cranes.
- 16.60 EA Data, included with a Landmark Envirocheck Report obtained by RPS (included in Appendix 16.1) indicates that a licensed landfill site was operational from 1986 - 1989, approximately 550m to the west of KGV Dock. This landfill is reported to have accepted up to 250,000 tonnes of crushed brick, concrete, stone, clinker and inert excavated natural materials per annum. There were a number of restrictions on the types of waste that were permitted to be deposited and it is unlikely that the landfill represents a significant potential source of contamination. Further information regarding this landfill is not available, however, it is considered likely that it was related to the construction of the Airport.

#### *Summary*

- 16.61 In summary, due to the industrial history of the area, a number of potentially contaminative land uses have occupied both the Application Site and the immediately surrounding area. Within the Site itself, potentially contaminative historical land uses include a former 'composition works' and later paint works, railway sidings and a fuel storage area. A number of other industrial facilities, including an engine works, warehouses and railway sidings have historically occupied the adjoining areas. In addition, due to previous development of the land, infilling of the Woolwich Reach inlet, the former landfill and the raising of levels during the construction of KGV Dock, Made Ground is likely to be present across the entire Application Site.

#### **Potential Sources of Contamination associated with Current Site Use**

- 16.62 The following section is based on observations made during site walkover inspections of the Airport and Application Site conducted by RPS on the 21st December 2011 and 11th February 2013. The key observations recorded during the walkovers are detailed below.
- 16.63 The walkover surveys recorded the principal features of the Airport with regards to contamination risk, including bulk fuel storage, refuelling areas, car parks, the fire training ground and airside fire station. A full description of the Application Site is provided in Chapter 2 of this ES.
- 16.64 The Application Site predominantly comprises hardstanding and building cover, and is generally surfaced with concrete, asphalt and brick-block paving. Some limited soft-standing / unmade ground exists to the north-west of the Site, in the vicinity of the fire training ground.
- 16.65 A tank farm, operated by BP, is located within a fenced enclosure in the south-western area of the Airport, behind the western end of the West Pier. This area is surfaced with brick-block paving and the fuel storage containers are located within an approximately 1m high concrete bund. These storage containers comprise three above-ground storage tanks (ASTs) each of 70,000L capacity and a fourth AST of 500,000L capacity. These AST are understood to store

aviation fuel (Jet A-1 kerosene). Approximately 152,000L (four 38,000L loads) of aviation fuel is pumped into the ASTs each day via delivery tankers with the fuel transferred to the refuelling area via underground pipework. Some general hazardous waste storage, including waste oils and 'jet slops', were observed to be stored on drip trays on hardstanding within this part of the site. Several groundwater or ground gas monitoring boreholes were observed around the tank bund area.

- 16.66 A refuelling area is located to the west of the existing Terminal. The Airport advise that, on average, three 30,000L and two 20,000L capacity aircraft fuelling tankers fill up from the pumps each day. An underground storage tank (UST) of 6000L capacity was recorded in the refuelling area, containing red diesel. Spill kits were observed in this area. The Airport advised that an intrusive investigation had recently been undertaken in the refuelling area, although none of the boreholes were installed for monitoring purposes.
- 16.67 A small-scale hazardous waste storage area is located adjoining the eastern end of the refuelling area. Several 200L barrels of waste engineering oil, contaminated filters / rags and 'jet slops' were observed on drip trays and stored directly onto hardstanding.
- 16.68 A fuel transfer facility is present to the southeast of the Terminal building, operated by Shell Aviation. It is understood that aviation fuel arrives at this facility in large tankers and is subsequently transferred to smaller aircraft fuelling tankers, which directly fuel aircraft on the stands.
- 16.69 Refuelling and de-icing of aircraft takes place at the aircraft stands. Surface water run-off, which may contain residues of these fuels and chemicals, washes into dedicated oil:water interceptors and then discharges to the surface water drain. Drainage water mixes with surface water drainage from surrounding areas, prior to being discharged into the River Thames to the south via the Thames Water network.
- 16.70 The existing and proposed drainage arrangements at the Airport are described in the CADP Proposed Surface Water Drainage Strategy document prepared by TPS and Atkins (contained in Appendix 12.2 of this ES)
- 16.71 The Airport fire training ground and a general storage area is present in the north-west of the Application Site (situated to the north-west of the runway, extending to the edge of the Royal Albert Dock). The following observations were made in this area:
  - a) A rig used for fire training purposes was observed upon hardstanding within a concrete lipped bund, approximately 20m x 20m in area. It is understood that the rig is set alight using either oil, propane or wood once to twice a week. Fires started using hydrocarbons are extinguished using a biodegradable fire fighting foam concentrate, known as Petroseal 6%;
  - b) A 500L capacity, steel double-skinned AST containing oil was observed upon hardstanding. The oil is used to fill jerry cans to light the fire training rig;
  - c) A large propane tank (capacity unconfirmed) was observed upon hardstanding;
  - d) 19 intermediate bulk containers (ICBs), each of 1,000L capacity, were observed to contain runway de-icer - 51 ICBs contained Type 2 de-icer and nine contained Type 1 de-icer;



- e) A large, bunded AST containing roadway de-icer was recorded adjacent to a large bunded AST storing anti-freeze de-icer fluid. The capacities of these tanks was unknown, although they are likely to be in the region of 40,000L;
  - f) It is understood that perfluorooctane sulfonate acid (PFOS), a persistent organic pollutant, is not stored on site for fire-fighting purposes.
- 16.72 General waste and recyclable materials is collected in numerous bins and skips positioned around the Airport site (see Chapter 15: Waste for further information). No housekeeping issues relating to the management of waste were noted during the site visit.
- 16.73 There are no records of any major historical spills or leakages from bulk fuel storage at the Application Site.
- 16.74 An electricity sub-station is situated within the bulk fuel storage area, in the south-west of the Site. No evidence of staining associated with the sub-station was observed during the walkover.
- 16.75 A steel yard (leased by AST Metals) is present in the far southeast of the Application Site, with derelict land present to the east of this area.
- 16.76 A slight hydrocarbon sheen was observed upon surface water run-off within the refuelling area. Surface water in the refuelling area drains into an oil:water interceptor, where any free-phase hydrocarbons would be separated from the surface water run-off and contained within a dedicated chamber. The interceptor is well maintained and cleaned regularly and therefore the slight sheen observed is unlikely to represent a significant source of ground or groundwater contamination. No other visual or olfactory evidence of significant contamination was observed during the walkover inspections.

### *Summary*

- 16.77 In summary, a number of potential sources of contamination were observed relating to the current operation of the Airport. These predominantly relate to bulk fuel storage and aircraft maintenance, including refuelling and de-icing. In addition, a fire training ground is located in the north western area of the Airport. The areas of fuel storage, aircraft maintenance and fire training ground were well maintained and managed with surface run-off draining to dedicated interceptors. At the time of the walkovers the area of the proposed CADP comprised (from west to east) a staff car park, a service area adjacent to the main terminal, the terminal forecourt, the short and long stay car parking areas, a disused shed / warehouse, a fuel depot, a steel yard and an area of derelict land.

## **Previous Intrusive Site Investigations**

### Introduction

- 16.78 The reports described below were reviewed in relation to ground conditions at the Application Site and a selection of these are provided in full in ES Appendix 16.3. These intrusive investigations were not carried out to inform the proposed CADP, but are considered relevant in assessing general ground conditions and the potential for contamination at the wider site, including those areas which will be unaffected by the proposed CADP works.

16.79 Composite plans showing the locations of boreholes and trial pits excavated during previous investigations of the Airport (2001 to 2013) are denoted on Figures 16.4.A (west) and 16.4.B (east), provided at the end of this Chapter.

16.80 The previous site investigations and their relevant findings are summarised below in chronological order:

Factual Report on Ground Investigation, London City Airport – Phase I Airside Improvement Programme<sup>4</sup> by Soil Mechanics Limited, dated January 2001:

16.81 Soil Mechanics were commissioned to carry out an intrusive ground investigation between June and August 2000 across four areas around and on the existing runway facilities of London City Airport and KGV Dock for the Airside Improvement Programme. The purpose of the investigation was to determine subsurface conditions in order to aid the design and construction phases of the proposed works. The areas of investigation were as follows (Note: Area 1 was investigated during a later phase, detailed below):

- a) Area 2: Eastern areas of the runway and KGV Dock; 25 trial pits were excavated through the eastern area of the runway
- b) Area 3: Approximately 10m north of the western edge of the KGV Dock; 24 trial pits were excavated in this area
- c) Area 4: Western area of London City Airport; 20 trial pits were excavated and one borehole was drilled in this area
- d) Area 5: Approximately 5m north of the western edge of the existing runway; five trial pits were excavated in this area

16.82 The investigation comprised a total of 74 trial pits and one borehole. Trial pit and borehole locations are shown on Figure 16.4. Made Ground encountered in the trial pits typically comprised silty gravelly sand in Area 2 and Area 3, and variable sand, clay and silt in Area 4 and Area 5. The borehole, drilled to a maximum depth of 13.10m in Area 4, encountered Made Ground of red brown clayey gravel and blue grey sandy organic clay underlain by firm grey brown mottled dark grey fissured clay (interpreted as Alluvium), further underlain by grey brown very sandy flint gravel, likely to represent River Terrace Deposits. Groundwater was struck at a depth of 5.80m below ground level, rising to 5.10m after a 20 minute interval.

16.83 Geotechnical testing was carried out on representative soil samples along with testing for a suite of metals and metalloids, asbestos, chloride, pH, semi-volatile organic compounds (SVOC), TPH (total mineral oil) and glycol. No interpretation of the data was presented in the report. However, the results do not indicate that significant contamination was encountered within the Made Ground in any areas of the site which were investigated. Localised elevated concentrations of metals were detected but metal contamination does not appear to have been widespread. Total TPH was detected within the majority of samples, although no speciated analysis was undertaken. Also, with the exception of occasional occurrences of Polycyclic Aromatic Hydrocarbons (PAH) compounds, the SVOC concentrations were generally below or close to the laboratory limits of detection.

Factual Report on Ground Investigation, London City Airport – Phase 2 Airside Improvement Programme<sup>5</sup> by Soil Mechanics Limited, dated October 2001:

- 16.84 Soil Mechanics undertook an additional intrusive ground investigation for the Airside Improvement Programme on behalf of London City Airport Limited between 5<sup>th</sup> March and 4<sup>th</sup> May 2001. The investigation comprised the drilling of 17 boreholes through the base of KGV Dock, in areas known as Area 1 (western half of the dock) and Area 2 (eastern half of the dock). Boreholes were drilled to a maximum depth of 25.80m below the base of the dock. The locations of the boreholes are shown on Figures 16.4 A and 16.4 B.
- 16.85 Ground conditions comprised dark grey silt (Alluvium) underlain by sandy gravel (River Terrace Deposits). Thanet Sand was encountered beneath the River Terrace Deposits in Area 1, but this stratum was absent beneath the eastern area of the dock. Chalk was encountered beneath the Thanet Sand in the western area of KGV Dock at depths ranging between approximately 15m and 20m below the base of the Dock. The Chalk was encountered beneath the River Terrace Deposits at much shallower depth in the eastern area of the Dock, at depths ranging between 2m and 3m below its base.
- 16.86 Depths to groundwater ranged from 9.20m to 12.40m in Area 1 and 10.70m and 11.60m in Area 2, indicating a relatively consistent groundwater body within the Thanet Sand and Chalk.
- 16.87 As part of this 2001 investigation, geotechnical testing was undertaken on a number of samples. However, no laboratory testing for potential contaminants of concern was undertaken.

Contaminated Land Survey at London City Airport – Interpretive Report<sup>6</sup>, by FUGRO Engineering Services Ltd, dated February 2006:

- 16.88 FUGRO Engineering Services Ltd was commissioned in February 2006 to carry out an intrusive ground investigation at the Airport. The objective of this investigation was to provide information on potential issues associated with land contamination that could impact the proposed development of a taxiway and parking apron in the far western area of the Airport.
- 16.89 A total of eight trial pits (see Figure 16.4 B) were excavated and chemical analysis, waste acceptance criteria and leachate testing was undertaken on selected soil samples. A degree of hydrocarbon and metal contamination was identified within shallow soils. Groundwater analysis was not undertaken; however, the leachate test results indicated the presence of potentially mobile soil contaminants, including metals and hydrocarbons. It was concluded that the proposed development at that time, which would have comprised the excavation of Made Ground to a depth of 2m bgl and replacement with a concrete apron, would provide a suitable form of remediation. However, a further site investigation was recommended in order to delineate the extent of ground contamination.

London City Airport Aircraft Stands and Car Park – Phase 2 Site Investigation Report<sup>7</sup> by RPS Health Safety and Environment, Ref: HLEC3237/004R, dated May 2008:

- 16.90 An intrusive ground investigation was carried out by RPS Health Safety and Environment during May 2008 at the Hartmann Road staff car park in the southwest of the Airport and of land to the east of this car park, which comprised a slope with an electricity sub-station. The investigation was undertaken in relation to proposals to redevelop this part of the site into aircraft stands and an underground car park (Note: these proposals were not subsequently pursued by the Airport). Several potentially contaminative land uses previously occupied this

area of the Application Site, including the composition works and a paint works, referred to above.

- 16.91 The investigation comprised: the drilling of seven window sampler boreholes, advanced to a maximum depth of 5m bgl; three cable percussive boreholes, advanced to a maximum depth of 30m bgl; seven trial pits, excavated to a maximum depth of 3.8m bgl; and, the installation of ten groundwater / ground gas monitoring wells. Three rounds of groundwater and ground gas monitoring were also undertaken.
- 16.92 Encountered ground conditions comprised concrete underlain by Made Ground constituting ashy clay, sand and gravel with varying amounts of brick, metal, clinker, pottery and wood to depths of between 1.2m and 3.6m bgl. Alluvium was recorded beneath the Made Ground, underlain by the River Terrace Deposits and Thanet Sand Formation. Some visual and olfactory evidence of hydrocarbon contamination was recorded within the Made Ground and Alluvium.
- 16.93 A degree of ground contamination (hydrocarbons and metals) was identified within the Made Ground and shallow natural Alluvium. However, due to the commercial nature of the site, and the extensive hardstanding and building cover, the contamination was not considered to pose a significant risk to future site users due to the absence of an active exposure pathway. No elevated concentrations of contaminants were recorded within groundwater sampled from the Alluvium, River Terrace Deposits or Thanet Sand. This indicated that the contamination had not impacted shallow groundwater and was unlikely to migrate from this area of the site via the groundwater migration pathway.
- 16.94 Ground gas monitoring data was indicative of CIRIA Characteristic Situation 2, whereby basic gas protection measures would need to be installed into future site buildings.

Environmental Investigation Report – BP Air Fuel Storage Area, London City Airport, Royal Dock, London<sup>8</sup> by Subadra, dated January 2011:

- 16.95 Subadra was commissioned to carry out an intrusive site investigation during November and December 2011 at the BP Fuel Storage Area in the west of the Airport, approximately 5m north of Camel Road and the DLR viaduct. As described above, this site comprises a tanker off-loading facility and a central bund structure containing four fuel storage tanks. The purpose of the investigation was to determine whether past or current land uses in this area had led to contamination of underlying groundwater and soils.
- 16.96 The Subdara report (included in ES Appendix 16.3) includes a review of two previous reports relating to this area, as follows:
- a) Assessment of Environmental Impact at UK Aviation Terminals, September 1993, completed by Land Restoration Systems on behalf of BP; this report included a summary of the history of this area, which was formerly a “composition works” and later a works. The report included anecdotal evidence that remedial works may have been undertaken at the site, required as a result of historical contamination. The remedial works reportedly comprised excavation of soils to a depth of 1m below ground level and placement of an impermeable membrane prior to development of the fuel depot.

- b) London City Airport Environmental Compliance Audit, September 2007, completed by Wardell Armstrong LLP on behalf of BP Air; this report detailed the results of an environmental compliance audit completed at the BP Air fuel storage depot and associated air-side fuelling station. No intrusive works were completed as part of the investigation. The report mentions that remedial works may have been undertaken in the past.
- 16.97 Subadra carried out some additional research into the possibility that remedial works may have been carried out at the site. The construction engineers confirmed that remedial works were carried out for geotechnical ground improvement purposes in order to provide a suitable founding layer for the fuel tanks. Clay soils from this area were excavated and a geotextile membrane was placed prior to backfilling of the excavation with compacted granular material.
- 16.98 Five direct-push boreholes were drilled to a maximum depth of 5m below ground level and two hand-pits were excavated to a maximum depth of 1.2m below ground level. The locations of the boreholes and hand pits are shown on Figure 16.4. Soil and groundwater samples were collected and analysed for a range of contaminants. Ground conditions comprised hardstanding underlain by Made Ground of gravel, concrete and brick fragments, underlain by a layer of Made Ground of soft slightly sandy clay. Beneath the Made Ground, natural clay and peat were encountered (Alluvium). Hydrocarbon odours were noted in soil samples collected from one borehole, with a sheen noted on groundwater at this location. Hydrocarbon odours were also noted in one hand pit. Free phase hydrocarbons were encountered in a second borehole product.
- 16.99 Soil and groundwater analysis indicated that kerosene range hydrocarbons were present in shallow soils and groundwater underlying the north-east of the site. However, as this contamination was found beneath a thick layer of concrete and block paving, the risk to human receptors was considered to be negligible.
- 16.100 Due to the low permeability of the Alluvium, it was considered unlikely that contamination within perched groundwater would migrate to other parts of the Airport site.

Environmental Investigation Report - BP Air Airside Fuel Loading Area, London City Airport, Royal Dock, London<sup>9</sup> by Subadra, dated January 2011

- 16.101 On 26th November 2011, Subadra carried out an 'airside' intrusive site investigation, approximately 5m to the north of Connaught Road in the western end of the Airport. The area of investigation comprised a fuelling island and fuel loading area for aviation fuelling tankers with an underground tank, wasted drum storage and an oil/water interceptor. The investigation was undertaken to establish whether there was any existing diesel contamination in the underlying soils or groundwater, prior to the fuelling facilities being taken over by London City Airport.
- 16.102 The investigation comprised the drilling of three direct-push geoprobe boreholes advanced to a maximum depth of 4.8m. The locations of the boreholes are shown on Figure 16.4. One borehole was located on the airside pavement and two were located within the loading bay. Ground conditions comprised hardstanding (block paving underlain by a sand layer and concrete) and Made Ground of compacted concrete and brick in-fill. The Made Ground was underlain by natural soils comprising soft Alluvium with interbedded peat layers. No olfactory or visual signs of contamination were observed.



- 16.103 Soil samples from all three boreholes were analysed for a range of contaminants including Total Petroleum Hydrocarbons (TPH), Polycyclic Aromatic Hydrocarbons (PAH) and Volatile Organic Compounds (VOCs). Hydrocarbons were only detected within one sample; this was taken from the sand layer between the block paving and concrete hardstanding. Hydrocarbons within this sample were thought to relate to surface diesel spillage that did not appear to have impacted soils beneath the concrete layer.
- 16.104 Groundwater samples were only collected from two of the three boreholes as one monitoring well was dry. The samples were analysed for TPH and VOCs and 1,2,4-trimethylbenzene was detected within one sample; none of the other hydrocarbon contaminants of concern were detected within the water samples.
- 16.105 Overall, it was considered that there was no evidence of significant hydrocarbon contamination within soil or groundwater in this area of the site. Furthermore, the low permeability of the underlying Alluvium was considered likely to restrict migration of any contamination from this area.

London City Airport Ledger Building Site Investigation<sup>10</sup> by Keltbray Environmental, dated June 2011:

- 16.106 Keltbray Environmental undertook an intrusive ground investigation during June 2011 in the southwest of the Airport across the Hartmann Road staff car park. This included land adjacent to the east of the tank farm and to the southwest of the Ledger Building. The investigation was undertaken to assess the potential for contamination to exist in soils in this area in relation to proposals to construct additional office space to replace the former Ledger Building (now demolished).
- 16.107 A total of eight probeholes were drilled to a maximum depth of 3m below ground level (bgl) using a hand held geoprobe. The locations of the boreholes are shown on Figure 16.4 B. Beneath a concrete slab, ground conditions were described as sandy, ashy, slightly clayey, gravelly fill with man-made fragments including brick to approximately 1.3m bgl. This Made Ground was underlain by soft to firm, grey clay with occasional black mottling and a slight hydrocarbon odour, interpreted as Alluvium.
- 16.108 A total of 31 soil samples were collected and analysed for a range of contaminants including total petroleum hydrocarbons (TPH), Polycyclic Aromatic Hydrocarbons (PAH), metals, inorganics and asbestos. However, an assessment of the analytical results was not included within the report.

Environmental Site Assessment Report – BP Northair Fuel Storage and Distribution Areas, London City Airport, Royal Docks, London E16 2PB, ref 807880106<sup>11</sup>, by ARCADIS (UK Ltd), dated February 2013:

- 16.109 ARCADIS (UK) Ltd was commissioned by Air BP Limited and London City Airport to carry out a desk study and intrusive site investigation for the Landside Jet A1 Fuel Storage Area (Landside Site) and the Airside Fuel Distribution and Storage Area (Airside Site). The objective of the investigation was to assess whether hydrocarbon contaminants of concern may be present in soil or groundwater beneath the site and to undertake a risk based evaluation of the findings.

The report makes reference to the investigations carried out by Subadra, as summarised above.

- 16.110 The intrusive investigation included the drilling of four boreholes to a maximum depth of 6m at each of the Landside and Airside sites. Ground conditions comprised Made Ground to a depth of 2.4m bgl, underlain by silty clayey sand (Alluvium). Analysis for potential hydrocarbon contaminants was completed on soil and groundwater samples and the results were screened against generic assessment criteria derived by ARCADIS for the protection of human health and controlled waters.
- 16.111 None of the measured concentrations exceeded the generic assessment criteria for the protection of human health. However, a number of the measured concentrations exceeded the generic assessment criteria for the protection of controlled waters. It was concluded that further assessment of the risks to controlled waters was required, and this was subsequently carried out by ARCADIS with the findings detailed in the report summarised below.

Detailed Quantitative Risk Assessment – London City Airport<sup>12</sup> by ARCADIS, dated March 2013:

- 16.112 ARCADIS (UK) Ltd was commissioned by Air BP Limited and London City Airport to carry out a Detailed Quantitative Risk Assessment (DQRA) for the Landside Jet A1 Fuel Storage Area (Landside Site) and the Airside Fuel Distribution and Storage Area (Airside Site) between December 2012 and February 2013. The assessment was carried out to further characterise and evaluate the risks associated with petroleum hydrocarbon-related impacts on the site.
- 16.113 The DQRA was undertaken using CLEA v.1.06, RBCA v. 2.5<sup>13</sup> and RTW 3.1<sup>14</sup> in order to provide risk-based assessment criteria to determine whether the measured concentrations of contaminants would pose a risk to watercourses or off-site human health receptors. Following comparison of the data to the Site Specific Assessment Criteria, none of the measured concentrations exceeded the criteria for the protection of human health. Although some concentrations measured were in exceedance of the screening criteria for the protection of controlled waters, it was considered that these did not pose an unacceptable risk to water resource receptors.

Summary of Previous Ground Investigations:

- 16.114 In summary, a number of intrusive ground investigations have been carried out at the Airport over the past 12 years covering most of the Application Site, with the exception of landside areas to the east. These investigations encountered localised areas of hydrocarbon and metal contamination within shallow soils. However, widespread contamination has not been detected and the investigations carried out to date have not revealed contamination that is likely to significantly impact on the wider environment or the proposed CADP.

#### **Preliminary Conceptual Site Model**

- 16.115 The Phase 1 Environmental Risk Assessment carried out by RPS in March 2013 (ES Appendix 16.1) identified potential historical sources of contamination within the Application Site, including the former 'composition works' and paint works at the western part of the Site, and

further works located to the south of KGV Dock. In addition, the fill material used to raise the wharf area during the construction of KGV Dock was identified as a potential source of contamination.

- 16.116 Currently, a number of potentially contaminative land uses and activities take place at the Airport (e.g. bulk fuel / chemical storage and use) and in the surrounding area (e.g. light industrial uses).
- 16.117 The various intrusive investigations undertaken at the Application Site have confirmed the presence of localised hydrocarbons and heavy metal contaminants within shallow soils, although no extensive contamination has been found.
- 16.118 Anecdotal evidence exists to suggest that some form of remediation was undertaken at the BP fuel storage site at the time of construction of the Airport. This is believed have comprised the removal of 1m of made ground from the footprint of the buildings. A membrane was emplaced prior to the backfill of inert material being deposited.
- 16.119 Sensitive receptors in the vicinity of the Application Site include employees, passengers and other visitors to the Airport, neighbouring site users and residents, groundwater and surface water (the Royal Docks and the River Thames).
- 16.120 No sensitive ecological receptors, as set out in the DEFRA Environmental Protection Act 1990: Part 2A - Contaminated Land Statutory Guidance (2012), are located within 500m of the Application Site. However, terrestrial and aquatic habitats associated with the Royal Docks are included in Newham Borough's BAP. Further information regarding potential ecological receptors in the vicinity of the Airport is presented in Chapter 13: Ecology.
- 16.121 The Preliminary Conceptual Site Model concludes that, given the presence of almost complete building and hardstanding cover, the potential for site users to be exposed to any ground contamination (if present) through direct contact or ingestion is low. Previous intrusive investigations carried out across the Airport have not identified significant concentrations of volatile contaminants in shallow soils. However, if volatile contaminants are present locally, current site users could be at risk via the vapour inhalation pathway if such ground was uncovered. Made Ground and permeable natural strata underlying the site may allow vertical migration of contamination through the unsaturated zone towards groundwater. However, the sensitive aquifers beneath the site would be afforded a degree of protection by the overlying variably permeable Alluvium, which previous site investigations have indicated to range up to 5m in thickness beneath the Airport. Lateral migration of contamination could occur via migration of perched or deeper groundwater towards off-site receptors, including surface waters. The nearest surface water features to the site are the Royal Docks and the River Thames. The neighbouring KGV, Victoria and Albert docks are known to be lined and therefore shallow groundwater is unlikely to be in hydraulic continuity with these receptors. The River Thames is located approximately 460m to the south of the site. The risk to this receptor would be reduced by likely dispersion and attenuation of any contamination within shallow groundwater over this distance. In addition the Thames offers significant dilution potential, which further reduces the risk from any contamination sourced from the Airport. The hardstanding and building cover across the Application Site would also limit the potential for

generation of contaminated dust. Therefore, this potential off-site migration pathway is not considered to be active.

- 16.122 Contamination originating from the wider Airport or off-site sources could migrate on to the area of the proposed CADP via lateral movement of perched and deeper groundwater. Due to the predominant hardstanding and building cover across the occupied area, the only viable exposure pathway to site users would be inhalation of volatile contaminants (if present). Furthermore, a number of intrusive investigations carried out across the Airport have not indicated the presence of significant widespread contamination beneath the site and so the risk to on-site users from contamination sourced from the wider Airport is considered to be low.

#### Phase 2 Intrusive Investigation

- 16.123 RPS undertook an intrusive investigation of the Application Site during February 2013. The investigation covered the land-side area only, with no intrusive investigation carried out within KGV Dock or in any areas outside of the Application Site boundary. The purpose of this investigation was to determine the contamination status of soil and shallow groundwater to refine the Preliminary Conceptual Site Model and to enable a robust environmental risk assessment to be carried out. In addition, an assessment of the permeability of shallow soils was undertaken to assist the outline design of the surface water drainage as part of the proposed CADP in relation to the siting of soakaways.

- 16.124 The findings of the Phase 2 Intrusive Investigation are summarised below and presented in full in ES Appendix 16.1.

#### City Airport Development Programme, London City Airport, Phase 2 Environmental Site Investigation, report reference HLEI 24974 001R, March 2013:

- 16.125 Twenty one window sample boreholes were advanced to depths between 0.5m and 5.0m below ground level (bgl) and seven hand dug trial pits were excavated. A plan showing the location of the boreholes and trial pits excavated as part of this investigation is included as Figure 16.5, presented at the end of this Chapter.
- 16.126 Thirteen groundwater/ ground gas monitoring wells were installed and three rounds of follow-up groundwater and ground gas monitoring were subsequently undertaken.

#### Ground and Groundwater Conditions

- 16.127 Made Ground was encountered in all of the boreholes to depths of between 4.7 and >5.0m bgl. The Made Ground typically consisted of reworked natural materials (Alluvium and River Terrace Deposits) with localised fragments of anthropogenic material including brick, concrete, ash and clinker. Made Ground was predominantly granular in nature, although localised pockets of sandy clay (reworked Alluvium) were encountered.
- 16.128 Alluvium was encountered beneath the Made Ground in six of the boreholes at depths of at least 4.5m bgl, extending to the base of these boreholes.

- 16.129 A slight hydrocarbon odour was noted within Made Ground at a depth of 1.0m bgl in one borehole (WS4) in the western area of the site. No other visual or olfactory evidence of significant contamination was observed during the intrusive investigation. A portable photoionisation detector (PID) was used to screen soil samples for the presence of ionisable volatile organic compounds. Although no screening criteria are available for total volatile organic compounds, readings were generally considered as low and well within the limits generally considered to represent significant contamination, with a maximum recorded concentration of 25 parts per million (ppm).
- 16.130 Shallow groundwater was encountered within the Made Ground, with depths to groundwater during monitoring ranging from 1.96m bgl in the eastern area of the site to up to 4.22m bgl in the vicinity of the existing Terminal building. Groundwater flow within the Made Ground was towards the west. Based on desk study information, it was anticipated that groundwater flow was likely to be towards the River Thames. However, groundwater within the Made Ground may be influenced by local controls, such as the interface with the underlying lower permeability Alluvium and the presence of the Royal Docks in this area, which are likely to be concrete lined to depth.

#### **Results of Soil Analyses**

- 16.131 A total of thirty soil samples were collected and analysed for a broad range of contaminants. The results were screened against assessment criteria derived by RPS using CLEA v.1.06 software for the protection of commercial workers.
- 16.132 None of the determinants tested for were recorded at concentrations in excess of the derived assessment criteria for the protection of current and future site users.
- 16.133 Total Petroleum Hydrocarbons (TPH) compounds, predominantly in the range C12-C35, were detected in a sample taken from borehole WS4 where a hydrocarbon odour was detected during drilling. However, the contamination identified in this borehole appeared to be localised and a sample taken from deeper within the borehole did not record TPH above the limit of detection, indicating that the minor contamination was not migrating to deeper soils. Trace concentrations of hydrocarbons were also detected in a number of other samples of Made Ground across the site. However, these were typically the longer chain, less mobile TPH compounds that at the measured concentrations are considered unlikely to pose a significant risk of migration to water resource receptors. The concentrations of other contaminants of concern (e.g. Poly-aromatic Hydrocarbons – PAH, and metals) were typically low, consistent with the Made Ground comprising predominantly reworked natural material.

#### **Results of Groundwater Analyses**

- 16.134 Nine groundwater samples were collected from the monitoring wells and submitted for chemical analysis. Concentrations of contaminants in groundwater samples were compared to Environmental Quality Standards (EQS) for freshwater. These screening criteria are protective of surface water receptors. As the site is not located in a groundwater source protection zone and no licensed groundwater abstraction wells are located in the vicinity of the site, the more



conservative UK Drinking Water Standards (DWS) were only adopted as screening criteria where no EQS are available.

- 16.135 Concentrations of arsenic in groundwater sampled from one borehole, WS7 (see Figure 2 of the intrusive site investigation report, included as Technical Appendix 16.1), were significantly higher than the EQS, with a measured concentration of 1300µg/l compared to a screening value of 50µg/l. Marginally elevated concentrations of arsenic (90µg/l) were also detected in groundwater sampled from WS11. Groundwater flow within the Made Ground was generally towards the west. Arsenic concentrations were low within groundwater across the remainder of the site and within water samples collected down gradient of these boreholes, suggesting this reflects localised contamination. Arsenic is a contaminant often associated with engineering works and the burning of fossil fuels and localised arsenic contamination is not uncommon associated with industrial land uses. No significant soil source of arsenic was identified during the investigation.
- 16.136 Copper was detected locally within groundwater samples at concentrations marginally in excess of the EQS.
- 16.137 Sulphate was also detected at concentrations above the screening criteria; it is considered that this is likely to be naturally occurring, sourced from the underlying sulphate-rich Alluvium.
- 16.138 None of the other analysed contaminants were detected within groundwater sampled from beneath the site at concentrations above the screening criteria. Furthermore, concentrations of hydrocarbon contaminants were typically low.

### **Ground Gas Regime**

- 16.139 Ground gas monitoring was undertaken on three occasions with thirteen wells monitored for concentrations of methane, carbon dioxide and oxygen. In addition, barometric pressure and flow rates were recorded. A Photo-ionising Detector (PID) was used test for the presence of ionisable volatile organic compounds in each of the monitoring wells.
- 16.140 Methane was recorded at a maximum concentration of 8.8% v/v within borehole WS11. Methane was not recorded in any other borehole during the monitoring period. Carbon dioxide was recorded at a maximum concentration of 9.5% v/v also within borehole WS11 and the lowest recorded oxygen concentration was 0.8% v/v within the same borehole.
- 16.141 The maximum recorded flow rate was 0.1L/ hour. Atmospheric pressure ranged from 1011mb to 1035mb during the monitoring period.
- 16.142 PID readings were generally low, with a maximum recorded concentration of ionisable volatile organic compounds of 1ppm.
- 16.143 The CIRIA Report C665 "Assessing the risks posed by hazardous ground gases to buildings"<sup>15</sup> outlines indicative guideline concentrations for carbon dioxide and methane, in association with gas flow rates, for which gas protection measures may be required in new residential or commercial developments. The methodology is based on a modified Wilson and Card approach that characterises the gas regime into a series of Characteristic Situations (1 to 5),

with corresponding recommended gas protection measures. Using this methodology, the ground gas regime at the site corresponds to Characteristic Situation 1 (very low risk) whereby no gas protection measures are required. However, where carbon dioxide concentrations exceed 5% and methane concentrations exceed 1%, CIRIA C665 recommends that consideration should be given to raising this categorisation to Characteristic Situation 2 (low risk) where basic specific gas protection measures would be required for new buildings. This would be the case in the vicinity of borehole WS11 (see Figure 16.2). However, as this borehole is in the location of the proposed new forecourt area, it would not contain any buildings and thus gas protection measures are not necessary.

#### Environmental Risk Assessment

- 16.144 Based on the information detailed above, a Conceptual Site Model (CSM) has been developed for the proposed CADP. The CSM is used to identify potential sources, pathways and receptors (i.e. potential pollutant linkages) on site. A summary table is provided as Table 16.3 at the end of this section.

#### *Human health*

- 16.145 The intrusive investigation carried out in the landside areas of the proposed CADP did not identify contamination within shallow soils at concentrations in excess of the screening criteria for site users (commercial workers). No significant volatile contamination was detected within groundwater samples.
- 16.146 Pathways to off-site human health receptors are limited to inhalation of volatile contamination from soil or groundwater. No significant volatile contamination was detected within soil or shallow groundwater.
- 16.147 Risks to on-site and off-site human health receptors from contamination within the proposed CADP area are therefore considered to be low.

#### *Groundwater*

- 16.148 Minor hydrocarbon contamination was identified in shallow Made Ground sampled from one borehole. However, TPH concentrations were below the limit of detection from a deeper sample taken from the same location suggesting that TPH contamination is localised within shallow soils and is not posing a significant risk to groundwater. TPH concentrations were below the limit of detection in all groundwater samples analysed during the RPS investigation, indicating that concentrations within soil are not adversely impacting groundwater.
- 16.149 Localised hydrocarbon contamination was detected in the BP fuel storage area during previous investigations. However, a DQRA carried out by ARCADIS indicated that this contamination was not posing a significant risk to wider groundwater.
- 16.150 Sulphate was detected within a number of groundwater samples at concentrations in excess of the UK DWS guideline value. However, it is likely that this is due to natural conditions and concentrations are not considered to be a significant risk to controlled water receptors.

- 16.151 Localised arsenic contamination was detected within groundwater. Arsenic concentrations were low in water sampled from down gradient boreholes, indicating that this contamination is not adversely affecting the wider groundwater environment. No significant soil source of arsenic was detected during the investigation. Copper, a phytotoxic metal (toxic to plants) was detected locally at concentrations marginally in excess of the EQS within a number of groundwater samples collected from the site. The measured concentrations of copper within these boreholes are unlikely to pose a significant risk to the wider groundwater environment.
- 16.152 With the exception of a localised area of arsenic contamination, which does not appear to be impacting wider groundwater, no significant contamination was detected within groundwater sampled from beneath the site. Risks to groundwater from contamination sourced from the proposed area of the CADP are therefore considered to be low.

#### *Surface Water*

- 16.153 The groundwater across the majority of the site appears to be at significantly lower depth than the upper water level of the adjacent KGV Dock and is therefore not considered to be in hydraulic continuity with this receptor. Information on the construction of the KGV Dock (Binns, 1923) indicates that this dock is lined with concrete. In order to maintain water levels, it is likely that the Royal Albert and Royal Victoria Docks are also lined. The concrete lining would serve as a barrier which would prevent the migration of any contaminated groundwater to these receptors. In addition, the docks leak and are regularly topped up by RoDMA, further indicating that hydrostatic head pushes water out of the docks and that groundwater ingress is unlikely.
- 16.154 No significant soil source of contamination was identified during the investigation. Elevated concentrations of arsenic were detected with groundwater sampled from one borehole. However, this appears to be a localised area of contamination and arsenic was not detected at significant concentrations in the down gradient boreholes. The site investigation data show that shallow groundwater flow is towards the west beneath the site and this localised contamination is therefore not considered to pose a risk to the River Thames, located approximately 460m to the south of the Airport.
- 16.155 Localised hydrocarbon contamination was detected in the BP fuel storage area during previous investigations. However, a DQRA carried out by ARCADIS indicated that this contamination was not posing a significant risk to surface water receptors.
- 16.156 Risks to surface water receptors from contamination within the development area of the Proposed CADP are therefore considered to be low.

#### *Ecological Receptors*

- 16.157 Terrestrial and aquatic habitats associated with the Royal Docks are included in Newham Borough's BAP. Widespread significant contamination was not detected within soil or shallow groundwater during intrusive investigations. Due to the substantial building and hardstanding cover across the developed area of the proposed CADP, it is not considered that migration of localised contamination via airborne soil or dust particles would occur. As discussed above, no viable migration pathways to the neighbouring surface water bodies within docks are considered to be active. The risks posed to terrestrial and aquatic habitats from contamination

sourced within the development area of the proposed CADP are therefore considered to be low.

16.158 As part of the proposed CADP, limited areas of soft landscaping are proposed around the forecourt and parking areas. Significant widespread contamination that would be likely to adversely impact upon the proposed landscaping was not detected in shallow soils. Furthermore, in order to provide a suitable growing medium an appropriate thickness of topsoil would be imported into these areas. This topsoil will be sourced from a responsible supplier and chemical testing will be carried out to ensure it is of the required quality. The imported topsoil will provide further mitigation to proposed planting from any localised contamination (if present) within shallow Made Ground.

16.159 Groundwater was encountered within the Made Ground at depths typically in excess of 2m below ground level. Significant contamination was not detected in this water body beneath the site. In addition, the groundwater is at a significant depth below the proposed planting and therefore the risk associated with localised hydrocarbon, metal and metalloid contamination is unlikely to adversely impact these landscaped areas.

**Table 16.3 – Summary of Potential Pollutant Linkages**

Potential Source	Identified Source	Potential Pathways	Pathway Active	Receptors	Risk
Human Health Receptors					
Contamination within shallow soils at concentrations that may pose a risk to human health	Not detected during site investigations	Direct contact	x x	Current site users Future site users	Low Low
		Inhalation/ ingestion of soil or dust	x x	Current site users Future site users	Low Low
		Migration of soil or dust to off site receptors	x	Off site receptors	Low
		Inhalation of vapour	✓ ✓	Current site users Future site users	Low Low
		Off-site migration and inhalation of vapour	✓	Off site receptors	Low
Contamination within shallow groundwater at concentrations that may pose a risk to human health	Not detected during site investigations	Direct contact	x x	Current site users Future site users	Low Low
		Ingestion	x x	Current site users Future site users	Low Low
		Inhalation of vapour	✓ ✓	Current site users Future site users	Low Low
		Off-site migration and: Direct contact Ingestion Inhalation of vapour	x x ✓	Off site receptors	Low
Controlled Waters Receptors					
Contamination within shallow soils at concentrations that may pose a risk to controlled waters	Not detected during site investigations	Leaching of mobile contaminants	✓ ✓	Secondary A and Principal Aquifers	Low Low
		Vertical and lateral migration in permeable strata	✓ x ✓	Secondary A and Principal Aquifers Royal Docks River Thames	Low Low Low
Contamination within shallow groundwater that may pose a risk to	Localised arsenic and minor copper contamination detected	Vertical and lateral migration in permeable strata	✓ ✓ ✓	Secondary A and Principal Aquifers Royal Docks River Thames	Low Low Low

controlled waters	during SI. Localised hydrocarbon contamination detected during previous SIs.				
<b>Ecological Receptors</b>					
Contamination within shallow soils or groundwater that may pose a risk to ecological receptors	Significant contamination of shallow soils not detected. Contamination within groundwater is localised or minor.	Direct contact with soils	× × ×	Proposed landscaping Terrestrial habitats within Royal Docks Aquatic habitats within Royal Docks	Low
		Direct contact with groundwater	× × ×	Proposed landscaping Terrestrial habitats within Royal Docks Aquatic habitats within Royal Docks	Low
		Migration of groundwater to surface waters	×	Aquatic habitats within Royal Docks	Low

### Assessment of Potential Effects

- 16.160 The following assessment considers the potential environmental effects of the site preparation and construction, and the operation of the completed proposed CADP and the associated risks. Measures to mitigate these risks are discussed in the following section.

#### Site Clearance, Earthworks and Construction

##### *Limitations*

- 16.161 The site investigation data is limited to the locations of the boreholes and trial pits. During demolition and construction, on removal of hardstanding, and in excavations for foundations and service trenches there is the potential that additional soil contamination may be revealed in areas between the sampling locations. However, as described in Chapter 6: Development Programme and Construction, the Construction Environmental Management Plan (CEMP) for the works would include the requirement that, if evidence of previously unidentified contamination is encountered during groundworks, the nature and extent of the contamination will be fully investigated by a suitable professional, a risk assessment will be carried out to identify any potential risks to sensitive receptors during and following construction and, if necessary, these risks will be mitigated to the satisfaction of the Local Authority and the Environment Agency.

##### *Construction Workers*

- 16.162 The CLEA v1.06 software, used to derive screening criteria for the protection of human health, cannot be used to assess risks associated with acute exposure e.g. during construction. No significant soil source of contamination was identified within the area of the proposed CADP during the intrusive investigation, although the potential remains for localised contamination to exist within soils between borehole and trial pit locations.



- 16.163 Without mitigation there is the potential for a temporary effect of minor adverse significance on construction workers.

*Off-Site Human Health Receptors*

- 16.164 Following removal of the hardstanding across the Application Site, there is the potential for contamination to migrate off-site via wind-blown dust and soil particles. No significant soil source of contamination was identified within the area of the proposed CADP during the intrusive investigation, although the potential remains for localised contamination to exist within soils between sampling locations.
- 16.165 Arisings generated during land-side piling activities could present an environmental risk if not stored and disposed of in a responsible manner, due to the potential for migration of contamination via wind entrainment of soil and dust particles.
- 16.166 Without mitigation there is the potential for a temporary effect of minor adverse significance on off-site human health receptors.

*Groundwater*

- 16.167 The piling process has the potential to generate preferential pathways for the vertical migration of contaminants within shallow soils, the dock sediments or perched groundwater into the underlying River Terrace Gravel, Lambeth Group, Thanet Sand and Chalk Aquifers.
- 16.168 Widespread, significant contamination was not detected within soils or perched groundwater during the site investigations, although localised contamination of perched water was encountered. The potential remains for previously undetected areas of localised contamination to exist beneath the site.
- 16.169 Without mitigation, there is therefore the potential for a temporary effect of minor adverse significance on groundwater receptors.

*Surface Water*

- 16.170 The piling process has the potential to disturb dock sediment, which may contain previously unidentified contamination that could be mobilised into the water column. However, no such issues were experienced in the construction of the Eastern Apron (2007 - 2008). In addition, previously unidentified contamination within soils beneath the KGV Dock could be mobilised into the dock water.
- 16.171 The piling process across the wider land-side areas of the proposed CADP area has the potential to generate preferential vertical migration pathways for previously unidentified contamination into groundwater. However, since the docks are likely to be lined, which will prevent migration of contamination from the wider land-side areas of the proposed CADP to these receptors, no significant impact on surface water bodies via migration of additional contamination within groundwater is anticipated.

16.172 Without mitigation, there is the potential for a temporary effect of minor adverse significance on surface water receptors.

#### *Ecological Receptors*

16.173 Terrestrial and aquatic habitats within the Royal Docks have been identified within Newham Borough's BAP. No significant widespread contamination of soil or perched groundwater was detected during the site investigations. However, there is the potential for localised previously unidentified contamination to be present beneath the area of the proposed CADP.

16.174 During site clearance and earthworks, there is the potential for generation of contaminated dust and for soil particles to become airborne. However, any contamination within soils would be limited to localised areas and it is not considered likely that migration of contamination within dust or soil particles would pose a significant risk to terrestrial or aquatic habitats.

16.175 As discussed in 16.169 and 16.170, there is limited potential for contamination sourced from the area of the proposed CADP to impact surface waters during the site clearance, earthworks and construction phases. Other potential impacts to Ecological Receptors are discussed further in Chapter 13: Ecology.

16.176 The potential effects on Ecological Receptors from contamination within the area of the proposed CADP are therefore considered to be negligible during the site clearance, earthworks and construction phases.

#### *Site Infrastructure*

16.177 Hydrocarbons were detected locally within shallow soils at concentrations that may permeate polymeric utility pipes.

16.178 Ground gas concentrations recorded during the site investigation were generally in accordance with Characteristic Situation 1, whereby no specific gas protection measures are required for new developments. In the vicinity of WS11 (see Figure 16.1), concentrations of methane and carbon dioxide were such that consideration should be given to including basic gas protection measures for any buildings located in this area. However, as described in Chapter 2: Site Context and Scheme Description, this part of the proposed CADP comprises the new forecourt (surface level vehicular circulation space and landscaping) and such uses do not necessitate gas protection measures, particularly as no buildings or enclosed spaces will be included in this area.

16.179 Risks of ground gas ingress or permeation of hydrocarbons into underground services on the CADP apron deck would not exist where construction is above the existing dock, due to the absence of underlying soils.

16.180 Without mitigation, there is therefore the potential for a permanent effect of minor adverse significance on site infrastructure.

16.181 A summary of the potential effects of the proposed CADP during site clearance, earthworks and construction is presented in Table 16.4.

**Table 16.4 – Summary of Potential Contamination Effects during Site Clearance, Earthworks and Construction**

<b>Issue</b>	<b>Potential Effect (without mitigation)</b>
<b><u>Human Health Receptors</u></b>	
Exposure of construction workers to previously unidentified contamination within shallow soils and dust during earthworks	Temporary local effect of minor adverse significance
Potential for off-site migration of contaminated soils and dust by wind entrainment to impact human health receptors, following removal of hardstanding and during stockpiling of arisings.	Temporary local effect of minor adverse significance.
<b><u>Controlled Waters</u></b>	
Piling works resulting in the potential for vertical migration of contaminants to the underlying aquifers.	Temporary local effect of minor adverse significance
Lateral migration of contamination mobilised into groundwater during piling resulting in the potential to impact surface waters	Negligible
Piling works into the King George V Dock leading to disturbance of contaminated sediment into the water column.	Temporary local effect of minor adverse significance
Piling works into the King George Dock leading to exposure of surface water to contaminated pile arisings	Temporary local effect of minor adverse significance
<b><u>Ecological Receptors</u></b>	
Potential for previously unidentified contamination within airborne soil and dust to impact terrestrial habitats following removal of hardstanding	Negligible
Potential for previously unidentified contamination to become mobilised during earthworks or piling and impact aquatic habitats	Negligible
<b><u>Infrastructure</u></b>	
Potential impact on infrastructure from hydrocarbon permeation into utility pipes and ground gas ingress into new buildings.	Permanent local effect of minor adverse significance

#### Completed Development

##### *Future Site Users*

- 16.182 The intrusive site investigation did not identify contamination within shallow soils at concentrations above the screening criteria for commercial end use. However, the potential remains for localised previously unidentified contamination to be present beneath areas of the proposed CADP.
- 16.183 Following completion of the proposed CADP, the site will be surfaced with hardstanding or building cover with minimal soft landscaping, breaking potential exposure pathways via dermal contact, ingestion or inhalation of dust. In areas of soft landscaping, an appropriate thickness of clean topsoil will be required in order to provide a suitable growing medium for planting; this will also break exposure pathways to future site users from any localised shallow contamination within Made Ground in these areas.
- 16.184 No significant volatile contamination, which may pose a risk via vapour migration and inhalation pathways, was identified within soil or groundwater.

- 16.185 The effect of development of the CADP on future site users is considered to be minor beneficial.

#### *Future Off-Site Human Health Receptors*

- 16.186 As described above, no significant soil or groundwater contamination was identified during the intrusive site investigation of the land-side areas of the proposed CADP. Following development, the site will be surfaced with buildings or hardstanding with minimal soft landscaping. There is therefore limited potential for off-site migration pathways via wind entrainment of dust or soil particles to be active. Due to the depth to groundwater, pathways of dermal contact or accidental ingestion of groundwater are considered highly unlikely. Furthermore, no significant volatile contamination, which may pose a risk via vapour migration and inhalation pathways, was identified within soil or groundwater beneath the proposed development area.

- 16.187 The effect on future off-site human health receptors is therefore considered to be **negligible**.

#### *Groundwater*

- 16.188 As in the existing situation, during the operation of the proposed CADP a number of materials and substances will be stored, including aviation fuel, de-icing fluid and waste materials (e.g. waste oil and jet slops) which could potentially impact the quality of water resources. However, no increased risk of such occurrence is anticipated and it is noted that the Airport has never experienced a major pollution incident since it first opened on the late 1980s.
- 16.189 Consideration is being given to the use of infiltration drainage in the landside areas of the Proposed CADP, as set out in the CADP Drainage Strategy (Appendix 12.2). No significant soil source of contamination was identified during the intrusive investigation and risks to groundwater through increased infiltration are not considered to be significant. However, as a precaution, soakaways will not be located in the area of the localised arsenic contamination (WS7, shown on Figure 16.1). Under the CADP proposals, this area will comprise an external yard adjoining the proposed West Terminal Extension.
- 16.190 The detailed drainage design for the landside areas can only be confirmed at the reserved matters planning stage, once the exact layout of the outline elements of the proposed CADP are confirmed. Consideration is currently being given to a number of potential options including discharge to existing sewers, discharge to the KGV Dock, and the use of soakaway drainage and permeable paving.
- 16.191 Without mitigation, following construction of the proposed CADP, there is the potential for a temporary local effect of minor adverse significance.

#### *Surface Water*

- 16.192 As discussed in 16.188, above, the operation of the completed CADP will include the bulk storage of a number of potentially contaminative substances. However, no increased risk associated with this storage is anticipated. The KGV Dock is concrete lined and, in order to maintain water levels it is likely that this is also the case for the Victoria and Albert Docks.

There is therefore considered to be no increased risk to these receptors from the migration of contamination from the proposed CADP area.

- 16.193 Following construction of the proposed CADP, the potential effects on surface waters are considered to be **negligible**.

#### *Ecological Receptors*

- 16.194 Terrestrial and aquatic habitats within the Royal Docks have been identified within Newham Borough's BAP. In addition, limited soft landscaped areas are proposed as part of the development.
- 16.195 Following development, the area of the CADP will predominantly be surfaced with building and hardstanding cover. There is therefore limited potential for off-site migration of contamination within airborne soil particles or dust to ecological receptors.
- 16.196 As discussed above, the completed development is likely to have a negligible effect on the quality of surface water receptors and therefore is unlikely to impact aquatic habitats.
- 16.197 No significant widespread contamination of soil was encountered during the site investigations. However, there is the potential for localised previously unidentified contamination of shallow soils to be present beneath the area of the proposed CADP. Significant contamination (if present) within proposed landscaped areas could impact proposed planting. However, in order to provide a suitable growing medium, an appropriate thickness of clean topsoil would be required and this would mitigate any risks to this receptor.
- 16.198 The potential effects on ecological receptors from contamination within the area of the proposed CADP are therefore considered to be **negligible**.
- 16.199 A summary of the potential effects of the completed CADP is presented in Table 16.5.

**Table 16.5 – Summary of Potential Contamination Effects of the Completed CADP (without mitigation)**

<b>Issue</b>	<b>Potential Effect (without mitigation)</b>
<b>Human Health</b>	
Exposure of future site users to contamination within shallow soil or groundwater	Minor beneficial
Exposure of off-site human health receptors to contamination sourced from the proposed CADP	Negligible
<b>Controlled Waters</b>	
Vertical migration of contamination associated with spillages from bulk fuel or chemical storage impacting underlying aquifers	Temporary local risk of minor adverse significance
Lateral migration of contamination sourced from the proposed CADP impacting neighbouring docks	Negligible
<b>Ecological Receptors</b>	
Impacts to terrestrial and aquatic habitats from contamination sourced from the proposed CADP	Negligible
Impacts to proposed landscaping from contamination in shallow soils	Negligible

## **Proposed Mitigation**

- 16.200 Whilst no significant environmental effects are predicted in regard to contamination, the best practice measures presented summarised below are proposed in order to mitigate any risks associated with the CADP construction and future operation.
- 16.201 As part of the CEMP, a detailed Method Statement will also be prepared before the works commence, outlining measures to deal with unforeseen contamination and pollution risks. This will be submitted to London Borough of Newham (LBN) for approval.

### Site Clearance, Earthworks and Construction

- 16.202 Full details of the construction scope and environmental mitigation measures to be implemented in response to relevant planning conditions, environmental legislation and standards will be included in a Construction Environmental Management Plan (CEMP), as described in Chapter 6. Should any significant ground contamination be encountered during redevelopment, including during piling, then the activity would cease and the advice of a suitably qualified environmental professional will be sought.
- 16.203 A Materials Management Plan (MMP) is likely to be required under the CL:AIRE Code of Practice to detail the management of materials that will be generated as a result of the site preparation activities, with the emphasis being on the assessment, definition of appropriate classification and end uses for materials arising. Further details on the reuse of material during construction are included in Chapter 15: Waste and Chapter 6: Construction.
- 16.204 All waste soils arising from the site, including pile arisings, will be disposed of in accordance with the relevant statutes and Duty of Care Regulations. A Site Waste Management Plan (SWMP) will be drawn up and adopted by the Principal Contractor. This plan will include details on the effective management of construction materials and wastes and the safe storage of fuels and other potentially contaminative substances used on site. Further details of the management of waste during construction are provided in Chapter 15: Waste.

### *Construction Workers*

- 16.205 Adherence to the CEMP and relevant legislative requirements will significantly reduce any risks posed to construction site workers by minimising the risk of inhalation, ingestion or contact with contaminated soil, sediment, dust, groundwater or contaminated surface water run-off.
- 16.206 Ground workers will be provided with appropriate risks assessments, which address the potential for contaminated soil to be encountered. Appropriate Personal Protective Equipment (PPE) will be provided to protect the ground workers in the event that contaminated soils or groundwater are encountered.
- 16.207 In particular, the control measures described in Chapter 9: Air Quality would minimise the potential for exposure of construction workers to contaminants associated with dust. The control measures include implementation of a dust management plan and the following mitigation:



- a) Removal of materials that have a potential to produce dust from site as soon as possible.
- b) Ensuring an adequate water supply on the site for effective dust/particulate matter suppression/mitigation, using non-potable water where possible;
- c) Use of enclosed chutes, conveyors and covered skips, where practicable;
- d) Minimising drop heights from conveyors, loading shovels, hoppers and other loading or handling equipment and use of fine water sprays on such equipment wherever appropriate;
- e) Re-vegetation or covering of earthworks and exposed areas/soil stockpiles as soon as practicable;
- f) Avoiding dry sweeping of large areas; and
- g) Installation of hard surfaced haul routes, which are regularly damped down with fixed or mobile sprinkler systems, or mobile water bowsers and regularly cleaned.

16.208 With mitigation, the effects on construction site workers would be **negligible**.

#### *Off-Site Human Health Receptors*

16.209 It is not anticipated that wind-blown dust and soil particles will cause significant off-site migration of contamination during construction. However, if significant dust generation is observed during construction, dust suppression, including the measures set out in 16.207, above, will be employed via the implementation of the CEMP, as described in Chapters 6 and 9 of this ES.

16.210 With respect to public safety, the construction compound areas would be fenced-off and secured.

16.211 With mitigation, the effects on off-site human health receptors during all phases of site clearance, earthworks and construction would be **negligible**.

#### *Groundwater*

16.212 A Piling Risk Assessment for piling through the KGV Dock has been carried out by TPS and is included in Appendix 16.2 of this ES.

16.213 The piling risk assessment set out the preferred method of piling as a bored pile with a permanent steel casing. Bored piles are also proposed across the wider CADP. The use of bored piles will significantly reduce the potential for contaminated soil or perched groundwater to be driven down into the deeper, more sensitive aquifers during piling.

16.214 With mitigation, effects on groundwater during development are considered to be **negligible**.

#### *Surface Waters*

16.215 As described in Chapter 6, the piling method in KGV Dock has been selected to minimise the amount of pile driving that is necessary. This will in turn minimise the disturbance of dock sediment and bed material and thereby reduce the possibility of adverse effects on water

quality. It is proposed to pile into the dock using bored concrete piles with steel casings founded in the Thanet Sand beneath the dock bed. The steel casings will be installed into the dock bed by vibration and material within the casings will then be brought up to the piling platform above the water using auguring techniques. Any contaminated sediment arising from this piling will be loaded onto barges and/ or lorries and thereafter disposed of at a licensed landfill facility. The risks associated with piling through KGV Dock have been assessed in the Piling Risk Assessment (Appendix 16.2). This indicates that the use of steel casings will prevent any potentially contaminated soil arising from coming into contact with the dock water.

16.216 With mitigation, effects on surface waters during development are considered to be **negligible**.

#### *Site Infrastructure*

16.217 Hydrocarbons were detected locally within shallow soils at concentrations that may permeate polymeric utility pipes. Following consultation with the utility providers, risks to services will be prevented by the use of upgraded utility pipes or over-excavated service corridors where required.

16.218 Consideration will be given to the use of gas protection measures for any new buildings constructed in the vicinity of borehole WS11, as shown on Figure 16.1. However, as this is the location of the proposed CADP Forecourt no such buildings are envisaged.

16.219 With mitigation, the effects on site infrastructure will be **negligible**.

#### Completed Development

16.220 New areas for the storage bulk materials including oils, fuel and chemicals will be designed and managed according to current best practice and in compliance with prevailing legislation and EA guidance. The new site drainage system will be fitted with oil interceptors and other pollution controls which will be regularly monitored, cleaned and maintained.

16.221 As described in the CADP Proposed Surface Water Drainage Strategy (Appendix 12.2), installed drainage on the new airside and landside operational areas will be fitted with oil interceptors, an automatic monitoring system (incorporating a BOD sensor) and a manual override that could be installed within the runway strip. This system will reduce the risk of pollution of groundwater.

16.222 All existing procedures for pollution prevention and emergency response at the Airport will be maintained and, where necessary, updated as part of the future management of the Airport once the proposed CADP has been built-out.

#### **Residual Effects**

16.223 [In the case of all brownfield development projects, there are potential risks to sensitive receptors, such as construction workers, end users and controlled waters, from the disturbance and mobilisation of ground contamination. However, these can be appropriately mitigated through the implementation of environmental management practices and procedures during the construction works, as discussed above.

- 16.224 Assuming the proposed mitigation measures are adopted, residual effects arising from ground conditions at the site are considered to be of **negligible** or **minor beneficial** significance, both during and following the CADP development.]

### **Cumulative Effects**

- 16.225 Effects relating to soil and ground conditions are site-specific and planned developments in proximity to the Airport (as set out in Chapter 3: EIA Methodology) are unlikely to adversely impact shallow soils beneath the Application Site.
- 16.226 With regard to groundwater and surface water receptors, it is assumed that any development schemes in the surrounding area would have sufficient mitigation measures in place during ground works to prevent adverse effects. As a result, it is considered that there will be an overall negligible cumulative effect in terms of risk to groundwater and surface waters. Furthermore, the negligible significance of all effects during and following the CADP means that accumulation of impacts is unlikely.

### *Conclusions*

- 16.227 A number of potentially contaminative current and historical land uses have been identified both within the Application Site and on sites in proximity to the Airport. Within the landside development areas, the principal historical sources of contamination include the former composition and paint works in the west, a former works in the central area and the fill used to create the new wharf during construction of KGV Dock. Current sources of contamination include fuel storage areas and a steel yard.
- 16.228 The recent and extensive investigation carried out by RPS across the Application Site, supporting previous site investigation episodes, did not encounter significant contamination of soil or shallow groundwater at concentrations likely to pose a risk to the identified receptors. This reaffirms the conclusions of the various other site investigations completed between 2001 and 2013. In particular, concentrations of contaminants within soils do not exceed screening criteria derived for the protection of current and future site users. No significant volatile contamination was detected within soil or groundwater and risks to current and future site users and off-site human health receptors are considered to be **low**.
- 16.229 With the exception of localised arsenic contamination within groundwater, which did not appear to have migrated to down-gradient locations, and localised hydrocarbon contamination detected during previous investigations in the BP storage areas, no significant contamination of groundwater was identified that could pose a risk to the wider environment. The risk to groundwater is therefore considered to be **low**. The risks to surface water receptors are also considered to be **low** due to the absence of significant contamination within the development area and because the neighbouring docks are lined, preventing migration of contamination into these water bodies.
- 16.230 During construction, best practice mitigation measures (outlined above) will ensure that potential effects associated with contamination will be **negligible**.

- 16.231 A watching brief will be carried out during construction for previously unidentified contamination. Any contamination encountered during the works will be investigated and dealt with appropriately through disposal or containment, which will result in a **minor beneficial effect**.
- 16.232 No on-going issues are anticipated following redevelopment of the site and the existing management procedures in place at the Airport will ensure that the operation of the built-out CADP will not result in future adverse effects.
- 16.233 A summary of the potential effects of the proposed CADP and appropriate mitigation measures is presented in Table 16.6 below.

**Table 16.6 - Summary of Potential and Residual Ground Conditions and Contamination Effects**

Issue	Potential Effect	Mitigation	Residual Effect
<b>Site Clearance, Earthworks and Construction</b>			
<b>Human Health Receptors</b>			
Exposure of construction workers to previously unidentified contamination within shallow soils and dust during earthworks.	Temporary local effect of minor adverse significance	Construction workers to be provided with appropriate PPE and risk assessments. Construction to be carried out in accordance with the CEMP, with dust suppression measures employed as appropriate.	Negligible
Potential for off-site migration of contaminated soils and dust by wind entrainment to impact human health receptors, following removal of hardstanding and during stockpiling of arisings.	Temporary local effect of minor adverse significance.	Site works to be carried out in accordance with the CEMP, with damping down and sheeting of dry soils if required.	Negligible
<b>Controlled Waters</b>			
Piling works resulting in the potential for vertical migration of contaminants to the underlying aquifers.	Temporary local effect of minor adverse significance	Bored concrete piles with steel casing are proposed, which will limit the downward migration of contaminated soil and shallow groundwater and limit the potential for generation of preferential pathways.	Negligible
Lateral migration of contamination mobilised into groundwater during piling resulting in the potential to impact surface waters	Negligible		Negligible
Piling works into KGV Dock leading to disturbance of contaminated sediment.	Temporary local effect of minor adverse significance	A piling risk assessment has been carried out and a watching brief will be undertaken during construction. Any contaminated sediment arising from this piling will be loaded onto barges and/ or lorries and thereafter disposed of at a licensed landfill facility.	Negligible
Piling works into KGV Dock leading to exposure of surface water to contaminated	Temporary local effect of minor adverse significance	A piling risk assessment has been carried out. The piles will be constructed through a permanent steel casing;	Negligible

pile arisings.		therefore arisings will not come into contact with dock water.	
Potential impact on infrastructure from hydrocarbon permeation into utility pipes and ground gas ingress into new buildings.	Permanent local effect of minor adverse significance	Utility providers to be contacted with regard to the use of upgraded utility pipes if required. Consideration to be given to the use of gas protection measures in any buildings constructed in the vicinity of WS11 (none expected).	Negligible
<b>Completed Development</b>			
<b><u>Human Health</u></b>			
Exposure of future site users to contamination within shallow soil or groundwater	Minor beneficial		Minor beneficial
Exposure of off-site human health receptors to contamination sourced from the proposed CADP	Negligible		Negligible
<b><u>Controlled Waters</u></b>			
Vertical migration of contamination associated with spillages from bulk fuel or chemical storage impacting underlying aquifers	Temporary local risk of minor adverse significance	The new site drainage system will be fitted with oil interceptors and other pollution controls which will be regularly monitored, cleaned and maintained. All existing procedures for pollution prevention and emergency response at the Airport will be maintained and, where necessary, updated. Fuels and chemicals will be stored according to current best practice with provision of appropriate secondary containment where appropriate	Negligible
Lateral migration of contamination sourced from the proposed CADP impacting neighbouring docks	Negligible		Negligible
<b><u>Ecological Receptors</u></b>			
Impacts to terrestrial and aquatic habitats from contamination sourced from the proposed CADP	Negligible		Negligible
Impacts to proposed landscaping from contamination in shallow soils	Negligible		Negligible

- 
- <sup>1</sup> Greater London Authority, July 2011, The London Plan – Spatial Development Strategy for Greater London.
- <sup>2</sup> Greater London Authority, 2012, London Plan Implementation Framework document Green Infrastructure and Open Environments: London's Foundations: Protecting the Geodiversity of the Capital, Supplementary Planning Guidance.
- <sup>3</sup> ICE, 1923, Discussion of the King George V Dock, Minutes of the Proceedings, Vol 216, 399-408.
- <sup>4</sup> <sup>4</sup> Soil Mechanics Ltd, 2001, London City Airport – Phase 1, Airside Improvement Programme, Factual Report on Ground Investigation.
- <sup>5</sup> Soil Mechanics Ltd, 2001, London City Airport – Phase 2, Airside Improvement Programme, Factual Report on Ground Investigation.
- <sup>6</sup> Fugro Engineering Services Limited, 2006, Contaminated Land Survey at London City Airport – Interpretive Report.
- <sup>7</sup> RPS Health Safety and Environment, 2008, London City Airport, Aircraft Stands and Car Park - Phase 2 Environmental Site Investigation Report For London City Airport.
- <sup>8</sup> Subadra, 2012, Environmental Investigation Report – BP Air Fuel Storage Area, London City Airport, Royal Dock, London.
- <sup>9</sup> Subadra, 2012, Environmental Investigation Report – BP Air Airside Fuel (JetA1 and Diesel) Loading Area, London City Airport, Royal Dock, London.
- <sup>10</sup> Keltbray Environmental, 2011, London City Airport Ledger Building Site Investigation.
- <sup>11</sup> ARCADIS (UK) Ltd, 2013, Environmental Site Assessment Report, BP Northair Fuel Storage and Distribution Areas - London City Airport.
- <sup>12</sup> ARCADIS (UK) Ltd, 2013, Detailed Quantitative Risk Assessment, BP Northair Fuel Storage and Distribution Areas – London City Airport.
- <sup>13</sup> Risk Based Corrective Action Toolkit for Chemical Releases (RBCA – version 2.5).
- <sup>14</sup> Environment Agency, Remedial Targets Worksheet (RTW), version 3.1.
- <sup>15</sup> CIRIA, 2007, CIRIA Report C665 “Assessing risks posed by hazardous ground gases to buildings”.







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T 020 7280 3200 F 020 7283 9248 W www.rpsgroup.com

Client: London City Airport  
Project: City Airport Development Programme (CADP)  
Title: Historical Map Extract dated 1896

Date: May 2013 Scale: NTS  
Figure: 16.1 Rev: 00

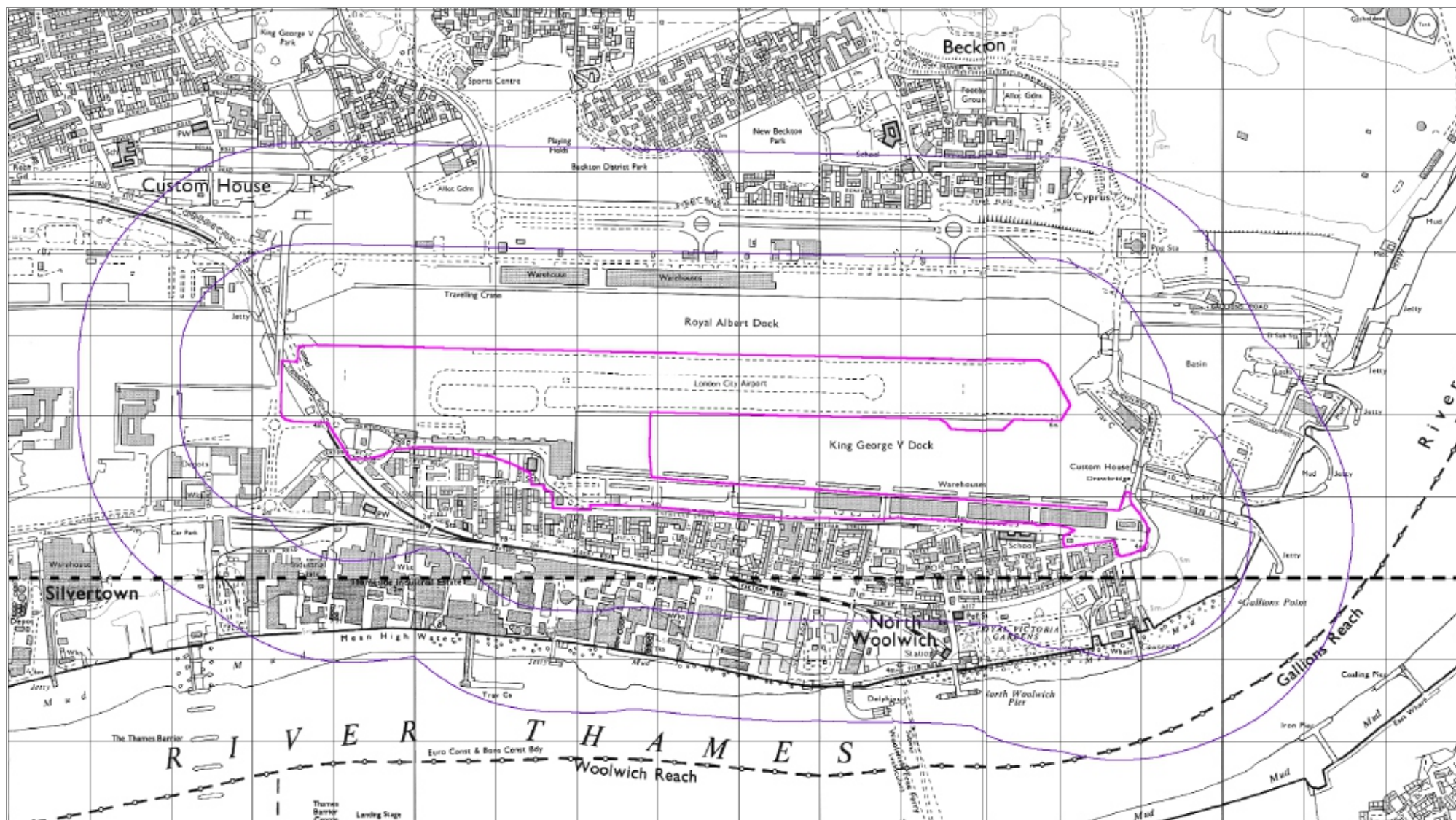




Client: London City Airport  
Project: City Airport Development Programme (CADP)  
Title: Historical Map Extract dated 1938

Date: May 2013	Scale: NTS
Figure: 16.2	Rev: 00

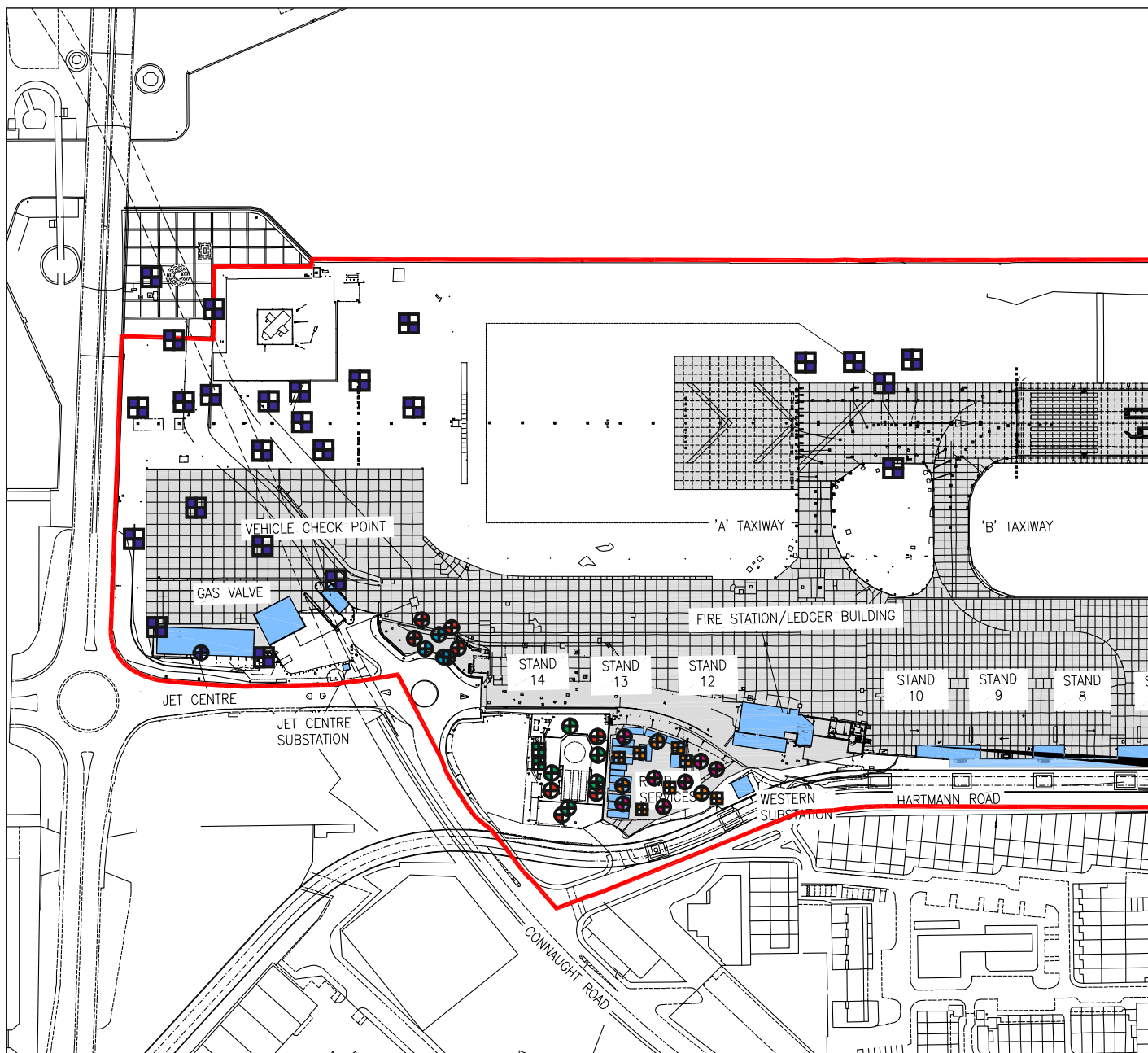




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Project: City Airport Development Programme (CADP)  
Title: Historical Map Extract dated 1991 - 1996

Date: May 2013 Scale: NTS  
Figure: 16.3 Rev: 00



- Key:
-  Borehole Location - Arcadis, March 2013
  -  Borehole Location - Subadra, January 2012
  -  Borehole Location - Subadra, January 2012
  -  Hand Pit Location - Subadra, January 2012
  -  Borehole Location - RPS, May 2008
  -  Window Sample Location - RPS, May 2008
  -  Trial Pit Location - RPS, May 2008
  -  Trial Pit Location - Soil Mechanics, January 2001
  -  Borehole Location - Soil Mechanics, January 2001



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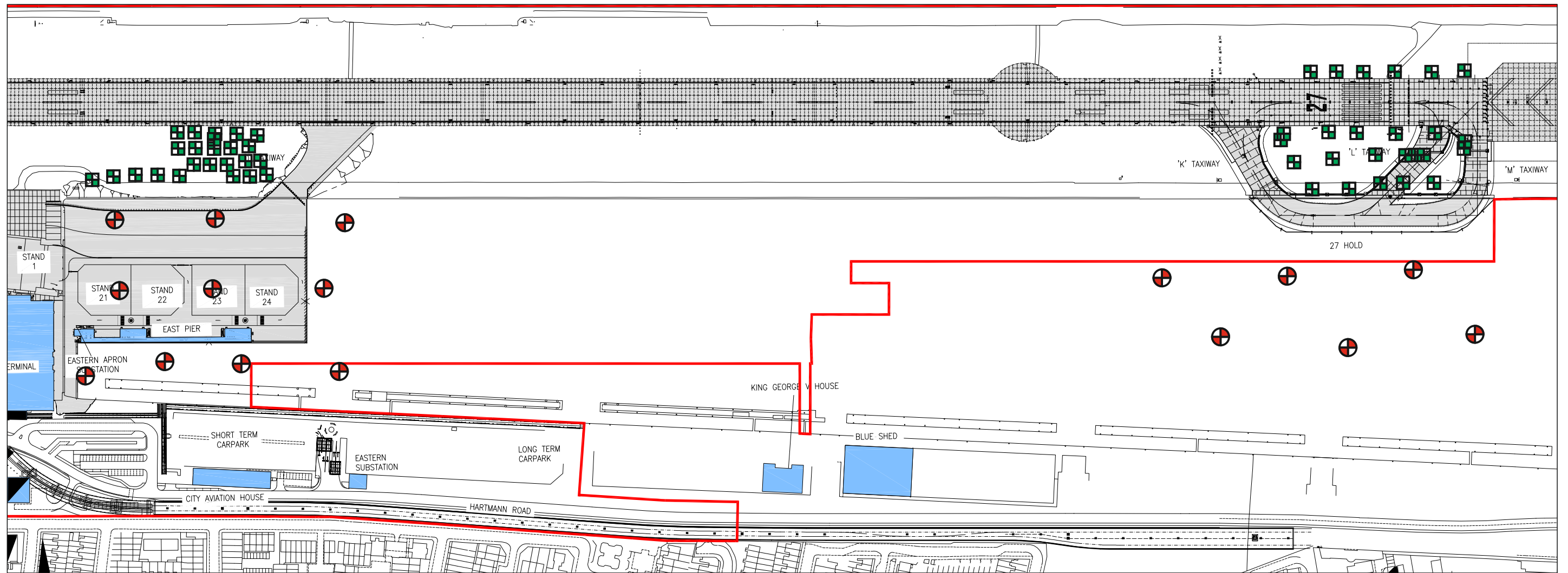
Title: Composite plan showing previous site investigation locations

Date: May 2013

Scale: NTS

Figure: 16.4A

Rev: 00



Key: Borehole Location - Soil Mechanics, October 2001

Trial Pit Location - Soil Mechanics, January 2001



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Client: London City Airport

Project: City Airport Development Programme (CADP)

Title: Composite plan showing previous site investigation locations

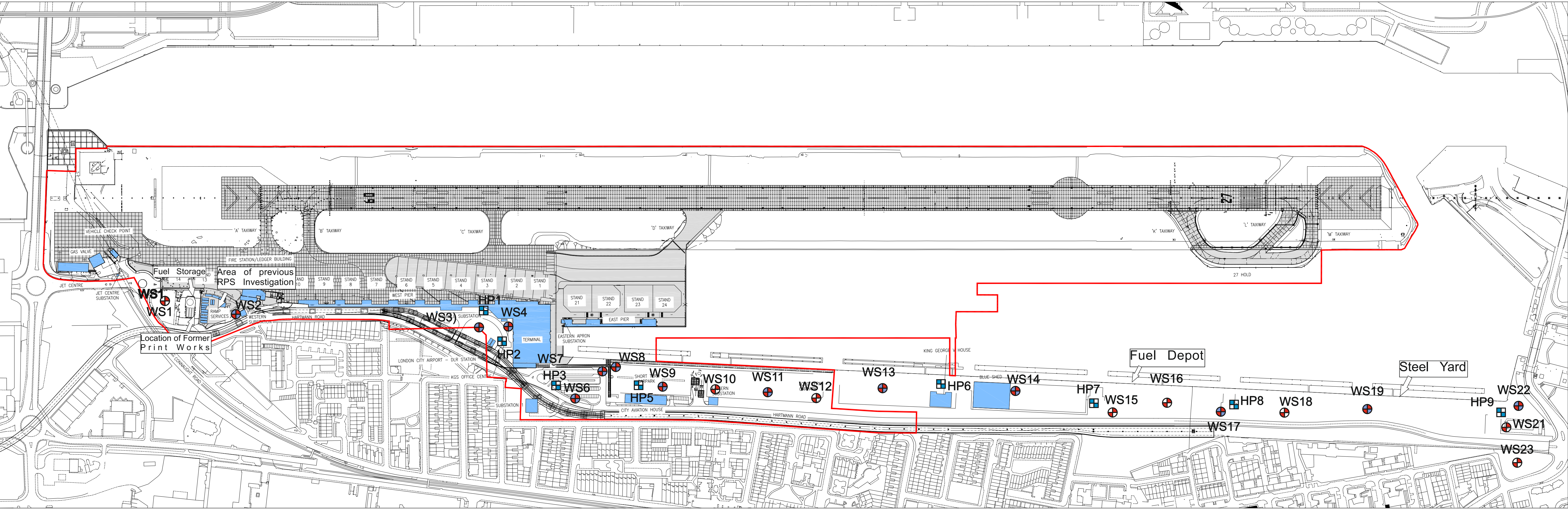
Date: May 2013




Scale: NTS

Figure: 16.4B

Rev: 00





- Key
-  Borehole Location
  -  Borehole with Monitoring Well Installed
  -  Hand Pit Location

# 17 Climate Change

## Introduction

- 17.1 This chapter presents a carbon footprint calculation for the Airport's baseline (present-day operations) and future year (2023) with and without the proposed CADP. It has been prepared to address the request by the London Borough of Newham (LBN) in its Scoping Opinion on 4th December 2012 that the ES considers energy and other sustainability impacts. It draws on information presented in:
- a) Chapter 9: Air Quality of this ES;
  - b) The 2012 Airport Carbon Accreditation report (included at Technical Appendix 17.1 of this ES);
  - c) The Energy and Low Carbon Strategy which accompanies the CADP planning submission; and
  - d) The Need Statement that also accompanies the CADP planning submission.
- 17.2 The proposed CADP will lead to changes in greenhouse gas (GHG) emissions that arise due to the Airport's operations. Affected emissions sources will include energy consumed in the Airport's buildings, and emissions from aircraft in the landing and takeoff (LTO) cycle, which will be influenced by the proposed CADP.
- 17.3 The potential impacts of climate change upon the proposed CADP are not considered within this ES chapter. The effect of climate change on surface drainage and flood risk is assessed in Chapter 12: Water Resources and Flood Risk, and the accompanying Flood Risk Assessment.
- 17.4 Relevant planning policy and the legislative context, together with industry and planning drivers for controlling and reducing the climate change impacts of aviation, are discussed first in this chapter. The assessment methodology is then detailed and subsequent sections present the results of the carbon footprint calculation, mitigation, and significance. A conclusion regarding the climate change impacts of the development is then made.

## Planning Policy & Legislative Context

- 17.5 Globally, the aviation sector is responsible for about one to two percent of greenhouse gas (GHG) emissions<sup>1</sup>. Domestic and international aviation emissions amount to about six percent of the UK's GHG emissions. Furthermore, as other economic sectors decarbonise over the coming decades, aviation is likely to make up an increasingly large proportion of the UK's total emissions. The UK Government is therefore determined to improve the sustainability of the sector and make aviation a core part of its vision for a greener transport system.
- 17.6 The aviation industry has an important role to play in this challenge. The general acceptance that the predicted growth in aviation will result in increased emissions has meant that airport operators and other industry stakeholders are now taking on increased levels of responsibility to help reduce the overall environmental impact of the industry and operate in a more sustainable manner.

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<sup>1</sup> Reducing Transport Greenhouse Gas Emissions: Trends and Data, International Transport Forum, 2010  
<http://www.internationaltransportforum.org/Pub/pdf/10GHGTrends.pdf>



- 17.7 A chronological history of the political, legislative and industry drivers of sustainable development is therefore given below in order to demonstrate the ever-increasing importance that is being attached towards achieving more sustainable aviation.

### **Political Drivers**

- 17.8 Under the Climate Change Act 2008, the UK has established legally binding targets to reduce CO2 emissions by 80% below the 1990 baseline by 2050. To achieve these targets, rapid decarbonisation is required in a range of sectors. A key strategic consideration, therefore, is the role that aviation should play relative to other sectors in the economy in reducing emissions in the medium and longer term. This political context provides an important backdrop to driving sustainability forward in the UK aviation industry.

#### *The White Paper 'The Future of Air Transport'*

- 17.9 The Air Transport White Paper (ATWP) published in 2003 by the Department for Transport set out a strategic framework for the development of airport capacity in the UK over the next 30 years, against the wider context of the air transport sector. The ATWP considered the effect of increasing airport capacity and climate change and concludes that emissions trading would be the best way of tackling the aviation industry's GHG emissions.
- 17.10 Whilst now formally replaced by the Government's Aviation Policy Framework (APF, March 2013) (see below), the 2003 ATWP remains relevant to the consideration of sustainability as the Government's full position on aviation, particularly in the South East, will not be known for a number of years
- 17.11 Included in the ATWP is the commitment to press for the emissions trading approach both in the EU and globally and to do more to reduce the environmental effects of aviation. ATWP Paper committed the UK to take actions internationally and domestically, as well as to meeting air quality and other environmental standards and minimising environmental damage.

#### *Air Transport White Paper Progress Report 2006*

- 17.12 The findings of the ATWP were reviewed and reaffirmed by the ATWP Progress Report of 2006. At Paragraph 2.10 the Progress Report stated:

**"The Government continues to believe that this can be done by emissions trading. This mechanism – which already operates across the EU in other sectors – should be extended to the aviation sector at the earliest opportunity. Inclusion of aviation in the emissions trading scheme is the most efficient and cost-effective way to ensure that the sector plays its part in tackling climate change. This approach was endorsed by Sir Nicholas Stern's recent report on the economics of climate change, which strongly supports carbon pricing to ensure that economic decisions fully reflect social and environmental costs."**

- 17.13 The ATWP and Progress Report set out clearly the previous Government's policy for addressing climate change with regard to aviation. It considered that given the supra-national economic and environmental implications of air travel, the most efficient and cost-effective way

for aviation to tackle climate change is through the European system of emissions trading - a stance which the current Coalition Government continues to pursue (see below).

*Towards a Sustainable Transport System 2007*

- 17.14 In 2007, the Department for Transport published a document considering the future UK transport system and how it will play its part in delivering the overall level of reductions in carbon emissions recommended by the Stern Review of the Economics of Climate Change (December 2006). The Stern Review recommended pricing incentives for industry, including the aviation industry, to reduce climate change emissions. The Review supported the principle that carbon is priced in a way that reflects its cost to society and the environment.
- 17.15 The Eddington Transport Study (December 2006), which fed into the DfT 'Towards a Sustainable Transport System' report, advised of the transport sector's importance to economic growth, but that sustainable growth requires recognition of environmental responsibility. The report stipulated that the transport sector (including aviation) should improve the capacity and performance of travel infrastructure, whilst playing an important role in the response to climate change by meeting environmental costs in full.
- 17.16 The challenges in achieving a sustainable transport system were identified as:
1. Maximising the competitiveness and productivity of the economy;
  2. Addressing climate change;
  3. Protecting safety, security and health;
  4. Improving quality of life; and
  5. Promoting greater equality of opportunity.
- 17.17 The Government reiterated its support for work to improve and identify further technological solutions to reducing the environmental impacts of aviation and stated that the reflection of the costs of carbon from aviation in ticket pricing and through emissions trading would be particularly important in driving behavioural and technological change in the future.

*The Aviation Policy Framework 2012*

- 17.18 The Government produced its draft Sustainable Framework for UK Aviation (Scoping Report) in July 2012, with consultation on this document continuing to 31st October 2012. The final Aviation Policy Framework (APF) was published in March 2013 and now supersedes the ATWP.
- 17.19 The APF sets out the Government's policy to allow the aviation sector to continue to make a significant contribution to economic growth across the country. It does not contain any site specific policies or recommendations for development at individual airports but sets out the policies which apply to the sector as a whole in order "to guide plans and decisions at the local and regional level". It also sets out the Government's objectives on the issues which will challenge and support the development of aviation across the UK.

17.20 When considering the management of aviation's environmental impacts, the APF outlines three main objectives to address impacts that are both global, such as climate change, and local – primarily noise, as well as air pollution and surface access traffic congestion. These are:

1. **Climate change impacts:** to ensure that the aviation sector makes a significant and cost-effective contribution towards reducing global emissions. [Note: the Government has supported the inclusion of aviation in the EU Emission Trading System (EU ETS) from January 2012. However, non-EU flights are currently suspended from the EU ETS pending decisions on global policy expected by end 2013 - see [http://tools.decc.gov.uk/en/content/cms/emissions/eu\\_ets/aviation/aviation](http://tools.decc.gov.uk/en/content/cms/emissions/eu_ets/aviation/aviation))]
2. **Noise impact:** to limit and where possible reduce the number of people in the UK significantly affected by aircraft noise;
3. **Other local environmental impacts, e.g. air pollution:** to ensure appropriate health protection by focusing on meeting relevant legal obligations; and
4. **Community impacts:** to encourage the aviation industry and local stakeholders to strengthen and streamline the way in which they work together.

17.21 The Government's intention is that the APF should support sustainable development and be delivered in a way which is consistent with its principles.

#### *The Airports Commission*

17.22 The Airports Commission (AC) was established in November 2012 with the principal remit of identifying short, medium and long term solutions to meeting the UK's aviation capacity and connectivity needs. The AC will produce an Interim Report by the end of 2013 and a final report with recommendations to the Government by summer 2015. These recommendations are then intended to be encompassed in a National Policy Statement for aviation, to accelerate the resolution of any future planning applications to provide such capacity.

17.23 The AC was formed to act on the following policy:

**“Making sure UK airports and airlines are safe, secure and competitive while reducing their impacts on the environment and communities.”**

17.24 In its Guidance Document 01: Submitting Evidence and Proposals (February 2013), the Commission identifies six broad categories of factors which should be considered in the development of proposals to increase airport capacity (Paragraph 3.12):

- a) Economic factors;
- b) Social factors;
- c) Climate change impacts;
- d) Local environmental factors;
- e) Accessibility; and,

f) Feasibility considerations.

17.25 With regard to climate change impacts, the AC will look first at the overall compatibility of growth in air travel with the national and global climate change targets, taking into account both existing evidence and new evidence as it emerges. The second is the relative climate change impacts of different options for providing additional airport capacity – resulting, for example, from the scale of construction required or the operational efficiencies that might be generated. Paragraph 3.16 of Guidance Document 01, states that relevant areas could include:

- a) Impacts upon the efficient use of airspace, such as the reduction of “stacking”;
- b) Greenhouse gas emissions resulting from construction works associated with proposals;
- c) Emissions from airport buildings;
- d) Emissions associated with ground operations, or take-off and landing procedures, at the airport;
- e) Emissions relating to surface access options for the proposed scheme; and
- f) Any climate change adaptation measures that might be necessary to ensure the long term resilience of the proposal.

17.26 The Airports Commission published its 'Discussion Paper 03 Aviation and climate change' in April 2013, the third in a series of discussion papers to build the evidence base to inform its assessment of the UK's airport capacity needs.

17.27 The paper explores the science and policy around aviation and climate change that the Commission will need to consider when making its assessment of the nature, scale and timing of the UK's aviation capacity and connectivity needs. It discusses approaches to forecasting aviation emissions and the potential carbon implications of airport capacity constraints, as well as the climate change adaptation issues that the Commission will need to consider when making recommendations on future airport capacity:

**“In the UK, aviation emissions account for about 6% of greenhouse gas (GHG) emissions or about 22% of the transport sector's GHG. 40% of transport emissions are attributable to cars, 14% to heavy goods vehicles and 8% to shipping” (paragraph 2.7)**

**“However, if demand for air travel grows in line with current projections, and other sectors begin to decarbonise relatively more quickly, aviation emissions are likely to make up a growing proportion of global and UK totals. One reason that aviation is expected to take longer to decarbonise than other sectors is the lack of an obvious low-carbon alternative to aviation fuel (kerosene). In addition, the long service life of aircraft compared to most other vehicles means that it takes longer for new technologies to penetrate the aircraft fleet than, for example, the car fleet” (Paragraph 2.8)**



### *The Committee on Climate Change*

- 17.28 The Committee on Climate Change (the CCC) is an independent, statutory body established under the Climate Change Act 2008 whose purpose is to advise the UK Government on emissions targets and report to Parliament on progress made in reducing greenhouse gas emissions and preparing for climate change.
- 17.29 The CCC has produced three reports of relevance to the aviation sector and the CADP application:
1. **Meeting the UK Aviation target – options for reducing emissions to 2050:** in January 2009 the Government adopted a target to reduce UK aviation emissions back to 2005 levels in 2050 alongside its decision to support expansion of Heathrow airport. The CCC was requested by Government “to assess scope for [emissions] reductions, including from improvements in technology and the effect of appropriate policy levers; and the implications of further aviation expansion beyond 2020”. This report (December, 2009) sets out the Committee’s assessment of options for reducing UK aviation emissions up to 2050.
  2. **International Aviation and Shipping Review:** this review (November, 2011) provides the first detailed assessment of the UK’s share of current international shipping emissions, projects emissions out to 2050 and estimates the abatement potential from shipping. It recommends that the Government should work with the EC to gain access to fuel use data from ship operators in order to resolve uncertainties over current emissions, and that the Government should support market based approaches to reducing shipping and aviation emissions, ideally global but if not at the EU level.
  3. **Meeting Carbon Budgets – 2012 Progress Report to Parliament** – the CCC’s 2012 Progress Report (June, 2012) looks at emissions trends over the past year and evaluates underlying progress in implementing carbon-reduction measures and policies in the UK. It assesses performance of government policies in driving down emissions – including in areas such as aviation, the Green Deal and Carbon Capture & Storage.

### **Industry Drivers**

- 17.30 Aside from the obvious global challenge of climate change, the aviation industry also has the potential to affect a number of other environmental and sustainability issues on both a local, regional and national scale.

### *EU Emissions Trading Scheme*

- 17.31 Since 2012, emissions from international aviation are included in the EU Emissions Trading System (EU ETS). Like industrial installations covered by the EU ETS, airlines receive tradeable allowances covering a certain level of CO<sub>2</sub> emissions from their flights per year. The legislation, adopted under the Aviation Greenhouse Gas Emissions Trading Scheme Regulations (2009), applies to EU and non-EU airlines alike<sup>2</sup>. Emissions from flights to and

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<sup>2</sup> Although Incoming flights can be exempted from the EU ETS if the EU recognises that the country of origin is taking measures to limit aviation emissions from departing flights ( see: [http://ec.europa.eu/clima/policies/transport/aviation/index\\_en.htm](http://ec.europa.eu/clima/policies/transport/aviation/index_en.htm))

from Iceland, Liechtenstein and Norway are also covered. Croatia will become a full member of the EU ETS on 1 January 2014.

- 17.32 However, on 20 November 2012, the European Commission submitted its formal proposal to 'stop the clock' and defer EU ETS international aviation compliance for flights outside the EU by one year. The EU has been seeking a global agreement to tackle aviation emissions through the International Civil Aviation Organisation (ICAO) for more than 15 years. The decision to exempt from enforcement flights into and out of Europe operated in 2010, 2011, and 2012 was made to provide negotiation time for the ICAO General Assembly in autumn 2013. The legislation will continue to apply to all flights within and between the 30 European countries in the EU ETS.
- 17.33 The Commission believes a global solution is within reach at the 2013 ICAO General Assembly. In its statement the Commission made clear that, should this meeting fail to make the necessary progress, the EU ETS legislation would be applied in full again to all flights to and from European airports.

#### *Sustainable Aviation*

- 17.34 Sustainable Aviation (SA) was launched in 2005 to bring together the main players from UK airlines, airports, engine and airframe manufacturers and air navigation service providers. It is unique in the UK transport sector in representing a proactive coalition of the aviation industry, established specifically to address sustainability issues. The Airport is a signatory of Sustainable Aviation.
- 17.35 Sustainable Aviation developed a long term strategy in 2005, 'A Strategy Towards Sustainable Development of UK Aviation', which sets out the collective approach of UK aviation to tackling the challenge of ensuring a sustainable future for the industry.
- 17.36 The Sustainable Aviation 2005 Strategy established a set of Goals and Commitments focused on improving environmental performance and ensuring sustainable growth. These are:
1. **Social and Economic:** A competitive aviation industry making a positive contribution to the UK economy and meeting the needs of society for air transport, whilst maintaining constructive relationships with stakeholders;
  2. **Climate Change:** Aviation incorporated into a robust global policy framework that achieves stabilisation of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous man-made interference with the climate system;
  3. **Noise:** Limit and, where possible, reduce the impact of aircraft noise. SA has recently published a Noise Road Map<sup>3</sup> which provides a toolkit for working towards this goal. The Airport is a signatory to this Noise Road Map;
  4. **Local Air Quality:** Industry to play its full part in improving air quality around airports;

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<sup>3</sup> Sustainable Aviation (2013), Noise Road-Map, A Blueprint for Managing Noise from Aviation Sources to 2050

5. **Surface Access:** Industry to play its full part in an efficient, sustainable multi-modal UK transport system;
  6. **Natural Resources:** Environmental footprint of UK aviation's ground-based, non-aircraft activities to be contained through effective engagement and reduction measures; and,
  7. **Implementation:** Full industry commitment to sustainable development and communicating fully the role of aviation in society, in order to support a better understanding of its contributions.
- 17.37 The Strategy also sets out 34 commitments covering the environmental, economic and social impacts of aviation.
- 17.38 Reports reviewing progress against the 7 goals outlined above are prepared on a two-yearly basis. Three Progress Reports on the Strategy have been published to date; the third and most recent Progress Report, spanning the years 2009 and 2010, was published in March 2011<sup>4</sup>. This identified the following specific areas that would be a focus for SA for the 2011 to 2012 period:
1. Climate Change Roadmap – reviewing the contributions to medium and long term reductions in CO2 emissions from UK aviation;
  2. Non-CO2 impacts of aviation – establishing agreement on current gaps in understanding, priorities on how to address these, and a broad framework for progression; and
  3. Operational Improvements – promoting and building understanding on identified opportunities for improvement to other airlines, airports and neighbouring air traffic authorities.

*London City Airport Sustainability Strategy and Sustainability Action Plan*

- 17.39 The Airport has developed its own Sustainability Strategy and Airport Sustainability Action Plan (June 2012), which sets out proposals for managing sustainability at the Airport, based on its adopted Sustainability Vision:
- 17.40 'To be a responsible airport operator by minimising our impact on the environment and surrounding communities, whilst supporting economic growth for London and the South East. We will strive for an honest and transparent approach to sustainability reporting developing actions to deliver genuine and long-term environmental improvements. We will lead by example; we wish to become a key partner for delivering sustainability in London's Docklands.'
- 17.41 The Airport Sustainability Strategy and Action Plan was developed in accordance with the 2009 Section 106 Agreement with LBN, forming part of the existing planning permission. The Strategy set out various objectives and targets for managing sustainability at the Airport now and in the future and focuses on the aspects of the Airport's operations which could lead to greatest environmental, social and economic impacts; identifying how these aspects are currently being managed and how the Airport proposes to manage them going forward.

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<sup>4</sup> Sustainable Aviation, (2011); Progress Report 2011. SA

17.42 Regarding climate change, the Strategy includes a section on 'Energy and Emissions', which establishes two main objectives for the airport:

1. To reduce energy consumption through targeted energy efficiency measures;
2. To stabilise the emissions associated with the ground operations at the Airport, with the goal to reduce the total amount of these emissions over the longer term.

### **Planning Policy Drivers**

17.43 The challenge of climate change and the need to stabilise GHG levels in the atmosphere while enabling sufficient growth to support the UK's growing population has intensified. There is now a comprehensive range of legislation and policy at various levels which supports the design and implementation of measures and approaches to ensure new development is sustainable and 'low carbon'.

#### National Planning Policy

17.44 The UK Government has made commitments on a wide range of social, economic and environmental targets through its implementation of national planning policy, which is set out in the National Planning Policy Framework (NPPF)<sup>5</sup>.

17.45 The NPPF states that "the purpose of the planning system is to contribute to the achievement of sustainable development" and identifies the need for the planning system to perform the following roles (paragraph 7):

- a) "An economic role – contributing to building a strong, responsive and competitive economy, by ensuring that sufficient land of the right type is available in the right places and at the right time to support growth and innovation; and by identifying and coordinating development requirements, including the provision of infrastructure;
- b) A social role – supporting strong, vibrant and healthy communities, by providing the supply of housing required to meet the needs of present and future generations; and by creating a high quality built environment, with accessible local services that reflect the community's needs and support its health, social and cultural wellbeing; and
- c) An environmental role – contributing to protecting and enhancing our natural, built and historic environment; and, as part of this, helping to improve biodiversity, use natural resources prudently, minimise waste and pollution, and mitigate and adapt to climate change including moving to a low carbon economy."

#### Regional Planning Policy – Greater London Authority Policies

17.46 The Mayor of London has a vision for the city to become an exemplary sustainable world city, based on the three integrated principles of:

- a) Strong and diverse economic growth;
- b) Social inclusivity to allow all Londoners to share in London's future success; and
- c) Fundamental improvements in environmental management and use of resources.

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<sup>5</sup> DCLG, (2012); National Planning Policy Framework. DCLG.

17.47 In achieving sustainable development, the Mayor has published a series of strategy documents setting out the policies for London. The following are relevant to this chapter:

- a) The London Plan – Spatial Development Strategy (2011);
- b) Mayor's Energy Strategy (2004);
- c) Mayor's Air Quality Strategy (2002); and
- d) Mayor's Sustainable Design and Construction Supplementary Planning Guidance (2006).

17.48 Relevant regional planning policy principles established by the Mayor and the London Plan are as follows:

*London Plan Policy 5.2: Minimising Carbon Dioxide Emissions*

17.49 This states that development proposals should make the fullest contribution to minimising carbon dioxide emissions in accordance with the following energy hierarchy, as set out in the Mayor's Energy Strategy (2004):

- 1. Be lean: use less energy;
- 2. Be clean: supply energy efficiently;
- 3. Be green: use renewable energy.

17.50 In addition, Policy 5.2 requires minimum improvements on Building Regulations 2010 – all major development proposals should meet the targets shown for carbon dioxide emissions reduction in buildings. The targets are expressed as minimum improvements over the 2010 Building Regulations as shown below:

Year	Improvement on 2010 Building Regulations
2010 – 2013	25 per cent
2013 – 2016	40 per cent
2016 – 2019	As per building regulations requirements
2019 – 2031	Zero carbon

*London Plan Policy 5.6: Decentralised Energy Networks*

17.51 A significant focus of the London Plan 2011 is the implementation of decentralised energy networks. A hierarchy is proposed for the implementation of decentralised energy within the policy. Major development proposals should select energy systems in accordance with the following hierarchy:

- 1. Connection to existing heating or cooling networks;
- 2. Site wide CHP network;
- 3. Communal heating and cooling.



### *London Plan Policy 5.7: Renewable Energy*

- 17.52 As a final stage in the hierarchy, developments are encouraged to utilise on-site renewable energy. No specific target is given, although the overall 'headline' targets in Policy 5.2 are provided in place of a more prescriptive approach to CO<sub>2</sub> reduction.

### *London Plan Policy 6.6 Aviation*

- 17.53 This Policy states that development proposals affecting airport operators should give a high priority to sustainability and take full account of environmental impacts (particularly noise and air quality). It also stresses that the aviation industry should meet its full environmental and external costs.

### Local Planning Policy

#### *LB Newham Core Strategy*

- 17.54 The LB Newham Core Strategy was adopted in January 2012 and forms the lower part of the development plan for the borough (after the London Plan). The Core Strategy covers a 15 year period from 2012 to 2027, helping the Council to assess all future planning applications.
- 17.55 Within the Core Strategy, the following policies are particularly relevant with respect to climate change:
- a) SC1 Climate Change: to mitigate and adapt to climate change by transforming the Borough into a more sustainable place; and
  - b) SC2 Energy: to transform Newham into a low carbon borough by minimising the demand for energy in the built environment and by switching to renewable and low carbon sources.

### **Assessment Methodology**

#### Overview

- 17.56 The assessment seeks to establish the Airport's present carbon footprint (annual GHG emissions arising due to its operation), and predict how it is likely to change as a result of the proposed CADP.

#### Emissions scopes

- 17.57 GHG emissions can be released directly (for example, by burning fuel) at the Airport, but can also be caused indirectly by the Airport's operations – for example, in the refining and transportation of fuel purchased, or in generating electricity consumed by the Airport.
- 17.58 Within the field of carbon footprint assessment, the terms 'scope one, two and three' (coined in 'The Greenhouse Gas Protocol'<sup>6</sup>) have become widely used to denote specific subsets of direct and indirect emissions. These terms may be defined as follows:

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<sup>6</sup> WRI and WBCSD, (2004); The Greenhouse Gas Protocol: A Corporate Accounting and Reporting Standard. Revised edition

- a) Scope One – direct emissions from sources or sites controlled by the company or project assessed.
  - b) Scope Two – indirect emissions associated with the generation of electricity directly consumed or displaced by the company or project assessed (excluding transmission and distribution losses).
  - c) Scope Three – all other indirect emissions that arise as a consequence of the project or company's activities. These include supply chain emissions and other indirect effects.
- 17.59 Scope three emissions have been included within the assessment where possible. Similarly, in order to form the most comprehensive assessment, where available the emissions factors used include the 'Kyoto basket'<sup>7</sup> of GHGs, converted to CO<sub>2</sub>-equivalent 100-year global warming potential (GWP). This is denoted by CO<sub>2</sub>e units in emissions factors and calculation results.
- 17.60 Carbon footprint results are shown disaggregated by scope where possible, as in general this provides a guide to the proportion of total emissions that occur directly at the Airport from its activities, compared to those that arise indirectly elsewhere due to ramifications of the Airport's activities.

#### Assessment Boundary

- 17.61 Elements included within the assessment boundary comprise direct emissions within the environs of the Airport, indirect emissions arising from electricity and water consumption, indirect emissions from the fuel supply chain; and emissions during the LTO cycle (defined in Chapter 9: Air Quality) from aircraft using the Airport.
- 17.62 Emissions have been estimated for three scenarios – the present-day baseline (using data from 2011-13) and a future year (2023) with and without development.

#### *Baseline scenario*

- a) Existing Airport building energy and water consumption, and waste disposal;
- b) Airside ground operations (fuel use); and
- c) LTO cycle of aircraft using the Airport.

#### *Future scenario – without development*

- a) Airport building energy and water consumption, and waste disposal, with greater passenger numbers;
- b) Airside ground operations (fuel and electricity use) with a greater number of aircraft movements; and
- c) LTO cycle of aircraft using the Airport with a greater number of aircraft movements.

#### *Future scenario – with proposed development*

- a) Existing and proposed Airport building energy and water consumption, and waste disposal with greater passenger numbers;
- b) Airside ground operations (fuel and electricity use) with a greater number of aircraft movements; and
- c) LTO cycle of aircraft using the Airport, including new-generation aircraft.

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<sup>7</sup> Methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons and sulphur hexafluoride

- 17.63 Although both future scenarios (with and without development) include a greater number of passengers and aircraft movements, in the without development scenario the number of movements and the size of aircraft are constrained by the existing infrastructure (as explained in the Need Statement accompanying the CADP planning submission). The number of passengers and number of aircraft movements in the with development scenario are greater.

#### Exclusions from the Assessment Boundary

- 17.64 The possible hotel development included in the outline part of the planning application is excluded from the assessment, as no details are available at this early, outline planning stage.
- 17.65 Emissions associated with passenger surface transport access to the Airport are excluded from the assessment boundary as they are not directly controlled by the Airport. However, the Airport Travel Plan aims to encourage the decarbonisation of staff and passenger travel patterns through exploring opportunities for carsharing, electric vehicles, and use of public transport (see Chapter 11: Traffic and Transport for further details). In addition to this, the Airport's central London location and good access to and use of public transport mean it is considered likely that equivalent or greater emissions would arise due to passenger surface transport if the Airport's passengers used an alternative airport.
- 17.66 Construction-phase transport (for workers and materials) is also excluded from the assessment boundary. Although some aspects can be influenced by the Airport (such as enabling water-borne deliveries where feasible), a detailed inventory of materials sources and transport distances are not known at this stage, leading to high uncertainty in any estimations. Similarly, at this stage the design of the development has not progressed to a point at which details of the precise amounts of construction materials can be estimated, and their embodied carbon is hence also excluded from the assessment. However, it is likely that construction-phase embodied carbon and transport emissions would be of relatively low significance compared to the Airport's cumulative emissions over ongoing years of operation, with or without the development.
- 17.67 Emissions from airlines are excluded from the assessment boundary, save in respect of their use of the Airport's facilities (i.e. the Terminal and airspace during the LTO cycle). Emissions during the LTO cycle can be directly and indirectly influenced by the Airport, and are therefore included in the assessment even though under an operational or financial control boundary they would be regarded as the responsibility of the airlines concerned.
- 17.68 In this regard, it is also important to note that the proposed CADP will enable the use of more fuel-efficient aircraft models by the Airport's client airlines, potentially offering significant GHG emissions reductions over the whole course of a flight. This potential has been explored further below, taking the example of the new generation Bombardier C100 aircraft (see paragraph 17.96). However, for the purposes of the estimating emissions associated with the CADP submission, the assessment boundary has been limited solely to the LTO cycle. This is on the basis that including potential further emissions savings from aircraft would require an assessment of the carbon footprint of several airlines, estimation of GHG emissions at alternative airports, and investigating of passenger origins and destinations, rather than

focusing purely on the emissions associated with the Airport and the CADP submission as is the requirement for this ES chapter.

#### Significance criteria

- 17.69 The nature of the global climate system means that GHG emissions are regarded as contributing to global impacts, rather than causing a direct effect on the climate of the local area. As such, categorisations of local receptor sensitivity and significance of effects that form the general EIA methodology are not applicable to this assessment.
- 17.70 As detailed in the planning policy and legislative context section, total GHG emissions are regulated at a global, European and national level, although voluntary emissions targets or management strategies have also been applied within the aviation industry. Any individual development's contribution to national emissions will necessarily be minor, while national and international trajectories for GHG emissions reduction are planned allowing for the varying growth prospects and ease or cost of emissions reduction in different industries.
- 17.71 It is therefore not meaningful to define significance of emissions change due to the development at London City Airport in terms of contribution to national or sectoral totals. Nevertheless, a contribution to controlling the growth of aviation emissions, making reductions where possible, is important for all actors in the sector.
- 17.72 For the reasons outline above, the significance of GHG emissions is therefore considered to be best shown by the magnitude of change in the Airport's carbon footprint, in proportion to the baseline and to the future without-development scenario, as a result of the proposed CADP.

#### Emissions intensity

- 17.73 The carbon footprint results are presented firstly as total emissions for the baseline year (2012) and future year (2023). Secondly, an emissions intensity ratio (per passenger using the Airport) has been calculated. Intensity ratios can be useful when comparing different businesses or normalising emissions trends over time to remove the influence of changes in activity levels. From the perspective of quantifying GHG emissions attributable to the Airport for the purpose of the planning application, the simple per-passenger intensity ratio that has been calculated provides useful context to the total GHG emissions.
- 17.74 In the context of the carbon footprint prepared for this planning submission, increased demand for air travel and consequent growth in passenger numbers at the Airport is taken as the starting point for the assessment (detailed in the projections presented in the CADP Need Statement). Managing passenger growth while stabilising or (where feasible) decreasing total GHG emissions is a target of the Airport's Sustainability Strategy and Airport Sustainability Action Plan (2012), as agreed with LBN.
- 17.75 It should also be noted that passenger numbers are expected to be limited primarily by capacity rather than demand (even with the proposed CADP having been implemented) and therefore in general, the Airport's increased capacity is unlikely to be creating additional demand and hence additional GHG emissions; rather, it is likely to be increasing the Airport's market capture and in effect merely shifting passenger air travel and the associated GHG emissions from other

airports to the Airport. Further detail is given in the proposed CADP Need Statement, which accompanies the planning submission.

- 17.76 Finally, it is important to remember that the CADP proposal is for additional airfield infrastructure and passenger Terminal facilities that are required to facilitate the consented number of aircraft movements operated by the Airport (120,000, noise factored), as allowed for within the terms of the July 2009 planning permission. The future aircraft LTO emissions being assessed are therefore generated from movements that are already permitted (and that have been the subject of previous EIA).

#### Approach to estimating emissions

- 17.77 The approach to estimating GHG emissions is based on use of published metrics (emissions factors) to convert data regarding activity, energy and resource consumption at the Airport into GHG emissions. The principal source of emissions factors used is the Department for Environment Food and Rural Affairs (Defra) / Department for Energy and Climate Change (DECC) GHG Conversion Factors for Company Reporting<sup>8</sup>, which brings together information from a number of published studies and national statistics.
- 17.78 GHG emissions arising from electricity consumption in the future year (2023) have been estimated using DECC's Interdepartmental Analysts' Group's projections of the carbon intensity of future electricity generation. The factor includes scope 3 emissions for typical transmission and distribution losses to a commercial consumer. The projected scenario assumes rapid decarbonisation of average grid electricity generation, with a 65% reduction between 2013 and 2023. The DECC projections may be viewed as reflecting the political aspiration to reduce the carbon intensity of electricity generation, and have recently (December 2012) been revised to be significantly more ambitious in the rate of decarbonisation envisaged
- 17.79 For the baseline year, information on activity at the Airport (electricity, gas, propane, water and red diesel consumption) has been taken from the verified Airport Carbon Accreditation (ACA) report for the financial year 2011-12 (propane, water), and the draft unverified records for financial year 2012-13 (electricity, gas, red diesel). As discussed in paragraph 17.59, the emissions from these activities have been calculated using emissions factors including scope three supply chain emissions. This is a wider scope of emissions than included in the ACA methodology, and the emissions total calculated for this assessment is consequently greater.
- 17.80 Electricity and gas consumption at the aircraft Terminal buildings in the future year has been estimated using Integrated Environmental Solutions (IES) 2012 software (which uses the SBEM calculation methodology). Full details of the calculation approach and proposed energy measures are given in the CADP Energy and Low Carbon Strategy Report (the Energy Strategy), which accompanies the CADP planning submission. In the with development scenario, electricity and gas consumption have been estimated for the Western Terminal Extension, Eastern Stand development, and Coach House. Electricity consumption at fixed electrical ground power (FEGP) connections for aircraft at the Eastern Stand has also been estimated for the Energy Strategy.

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<sup>8</sup> AEA, (2013); GHG Conversion Factors for Company Reporting. Defra / DECC, London.



- 17.81 The Energy Strategy proposes three low-carbon options for electricity generation, heating and cooling on site: two gas-fired combined cooling, heating and power (CCHP) facilities, supplying the Western Terminal and Eastern Stand; an array of photovoltaic (PV) panels; and a dock-source heat pump. The capacity of the possible PV and dock-source heat pump systems is not specified in the Energy Strategy, and so they are not considered further in this assessment. However, both are low-carbon technologies and would contribute to reducing the Airport's future carbon footprint. The two CCHP facilities are specified as having up to 35 kW and 230 kW thermal inputs, for the Western Terminal and Eastern Stand, respectively. The Energy Strategy suggests that they would have a 35% net electrical generation efficiency.
- 17.82 Water consumption has been assumed to scale up linearly with passenger numbers for the future year. Red diesel consumption for mobile ground power units (MGPU) is assumed to be reduced by 50% of the baseline level in the future year with and without the proposed CADP, due to the Airport's commitment to replace use of MGPU with FEGP where possible. Red diesel consumption by airside vehicles has been assumed to scale up linearly with passenger numbers. GHG emissions associated with water consumption use the conservative assumption that all water is discharged to water treatment facilities via the foul sewer.
- 17.83 Waste generation and the recycling and disposal routes in the baseline year, along with predictions of waste generation by the Airport in the future year, are set out in Chapter 15: Waste Management. In the baseline year (2011, as 2012 data are not available), the Airport generated around 901 tonnes of waste, of which around 47% was recycled, 52% disposed to landfill, and under 1% was hazardous. It is assumed that, following separation of metals, paper/card and plastic packaging for recycling, the residual waste has a composition similar to typical municipal solid waste (MSW). As a conservative assumption, the proportion of waste disposed to landfill is assumed to remain the same in the future year (no increase in recycling or diversion to energy recovery). Under Defra's guidelines for GHG reporting, emissions savings due to recycling are assigned to the recycler rather than waste generator, and hence only a standard factor for recyclate transport is included in this assessment. Hazardous waste disposal is not considered, as the amount is very small (<10 tpa) and the nature of the waste is not known.
- 17.84 Aircraft LTO emissions have been estimated using assumed thrust setting and time in mode for each stage of the LTO cycle in calendar year 2012, based on recorded aircraft movements and operational experience at the Airport. Fuel consumption at each thrust setting was provided by the US Federal Aviation Administration's Emissions and Dispersion Modelling System (EDMS) database and (for one as-yet uncertified aircraft) manufacturer's data. Full detail of the methodology and data sources for estimating aircraft fuel use is provided in Chapter 9: Air Quality and its appendices. The number of aircraft movements and fleet composition for future years is as set out in the CADP Need Statement which accompanies the planning submission.

### **Baseline Conditions**

- 17.85 The Airport's baseline GHG emissions are summarised in Table 17.1. Aircraft fuel combustion in the LTO cycle comprises by far the largest proportion of the carbon footprint (87%). Within the scope of energy and fuel use by the Airport itself, electricity consumption is the most significant emissions source, followed by use of red diesel.

**Table 17.1: Baseline (2011-2013) GHG emissions**

Emissions Source	Scope 1 emissions	Scope 2 emissions	Scope 3 emissions	Total emissions
Terminal energy, water and fuel consumption and waste (tCO <sub>2</sub> e)	1,429	4,172	1,496	7,097
Aircraft LTO emissions (tCO <sub>2</sub> e)	39,942	-	8,237	48,179
TOTAL (tCO <sub>2</sub> e)	41,370	4,172	9,733	52,276

### **Incorporated Mitigation**

- 17.86 A suite of measures to mitigate the energy consumption, and hence GHG emissions, of the proposed new and refurbished Terminal buildings is described in the CADP Energy and Low Carbon Strategy Report that accompanies the CADP planning submission. In summary, the following measures will be incorporated as part of the CADP:

#### *Passive energy efficiency measures*

- a) Efficient thermal envelope to reduce heat losses;
- b) Solar shading to reduce heat gains;
- c) Enhanced use of natural daylighting to reduce lighting energy requirements; and
- d) Enhanced air tightness to reduce heat gains and losses from air infiltration.

#### *Active energy efficiency measures*

- a) Low energy systems, e.g. using heat reclaim, low energy heating, ventilation and air conditioning (HVAC) systems, appropriate controls, occupancy sensing;
- b) High efficiency plant and equipment;
- c) High efficiency lighting, e.g. use of LED lighting ; and
- d) Energy sub-metering.

#### *Supplying energy efficiently*

- a) Small scale localised combined cooling, heat and power systems; and
- b) Space provisions (and valved connections to main heating headers) for potential connectivity to a future district heating system when it becomes available in the area.

#### *Use of renewable energy systems*

- a) Photovoltaic arrays on the roofs of the Terminal buildings; and
- b) A closed loop dock source heat exchange system.

- 17.87 As detailed in the Energy Strategy, the energy saving proposals will be capable of meeting and exceeding the 25% reduction in carbon dioxide emissions required by LBN and the Greater London Authority. The strategy acknowledges that Part L of the Building Regulations and London Plan policy may seek a higher target from October 2013, of a 40% reduction in CO<sub>2</sub> emissions compared to 2010. In this respect space has been safeguarded for further PV arrays which, together with further optimisation measures as the design develops (as energy efficiencies of the latest products and systems improve further e.g. lighting), would ensure that the scheme can respond to and meet this more challenging target.

- 17.88 The Terminal development includes increased provision of FEGP, which will mitigate direct emissions from MGPU usage. Indirect emissions will occur through greater electricity consumption, but there is still likely to be a net saving on a per kWh basis due to use of FEGP instead of MGPU.
- 17.89 The proposed CADP is designed to enable use of new aircraft models by the Airport's client airlines, which are likely to offer GHG emissions reductions as a result of enhanced airframe efficiencies. For example, the Bombardier C100 (presently under development) is predicted to contribute 14,416 aircraft movements with development in 2023, compared to 8,871 without development (and none in the baseline year). Commercially confidential information supplied by the manufacturer indicates that the C100 is being designed to offer direct CO<sub>2</sub> emissions reductions compared to existing similarly-sized aircraft in use at the Airport, over the course of a typical flight.
- 17.90 Although emissions outside the LTO cycle are not included within the assessment boundary, this trend towards phasing out less efficient and more polluting aircraft, with the associated mitigation of GHG emissions, is still important to note, and is discussed further in Section 17.6.

#### Assessment of Potential Effects

- 17.91 Tables 17.2 and 17.3 summarise the operational GHG emissions in the future year, 2023, without and with development. Although the Airport's growth, driven by increasing passenger demand, leads to greater total GHG emissions than in the baseline year, this is the case with or without the proposed CADP. However, with development, total emissions per passenger (shown in Table 17.4) are predicted to be marginally lower in the future year, compared to the baseline year and to the future year without development.

**Table 17.2: Future year GHG emissions without development**

Emissions Source	Scope 1 emissions	Scope 2 emissions	Scope 3 emissions	Total emissions
Terminal energy, water and fuel consumption and waste (tCO <sub>2</sub> e)	1,102	1,225	526	2,853
Aircraft LTO emissions (tCO <sub>2</sub> e)	59,932	-	12,360	72,292
TOTAL (tCO <sub>2</sub> e)	61,033	1,225	12,886	75,144

**Table 17.3: Future year GHG emissions with development**

Emissions Source	Scope 1 emissions	Scope 2 emissions	Scope 3 emissions	Total emissions
Terminal energy, water and fuel consumption and waste (tCO <sub>2</sub> e)	1,398	4,998	932	7,329
Aircraft LTO emissions (tCO <sub>2</sub> e)	78,423	-	16,174	94,597
TOTAL (tCO <sub>2</sub> e)	79,821	4,998	17,106	101,926

**Table 17.4: Future year GHG emissions per passenger**

Emissions Source	Baseline	Without development	With development	Change from baseline		Change from without development	
Terminal energy, water and fuel consumption (kgCO <sub>2</sub> e)	2.34	0.64	1.25	-1.09	-46.7%	0.60	94.0%
Aircraft LTO emissions (kgCO <sub>2</sub> e)	15.90	16.30	16.10	0.20	1.3%	-0.20	-1.2%
TOTAL (kgCO <sub>2</sub> e)	18.24	16.94	17.35	-0.89	-4.9%	0.41	2.4%
Passengers (no.)	3,030,000	4,435,000	5,874,000	2,844,000	93.9%	1,439,000	32.4%

- 17.92 Excluding aircraft emissions (looking just at the Terminal operations), emissions per passenger decrease by 47% in the future year compared to the baseline, due primarily to the much lower assumed electricity emissions factor in the future year, although potentially also influenced by differences in scope and notional building energy consumption (compared to recorded consumption for the baseline). However, emissions per passenger from the Airport (excluding aircraft emissions) in the future year with the CADP development are estimated to be 94% greater than accommodating increased passenger flows in the future year without development. This is due to the increased energy consumption predicted for the new buildings, in particular the Eastern Terminal Extension.
- 17.93 The composition of the fleet of aircraft using the Airport is predicted to change in the future years, with and without development. The predicted compositions are detailed in Chapter 9: Air Quality. Changes are expected to include a greater prevalence of larger aircraft, which can have less LTO GHG emissions per passenger carried. Nevertheless, the expected changes in fleet composition in the future year are estimated to lead to a small increase in LTO GHG emissions per passenger, compared to the baseline year.
- 17.94 The difference in LTO emissions between the with and without development scenarios in the future year is estimated to be minor, as the fleet penetration of the newest (and most efficient) aircraft by that point (the first year of completed development) would be limited. However, a small decrease in LTO emissions per passenger in the future year with development, compared to without development, is predicted. It should also be recognised that new aircraft models could offer significant GHG emissions reductions over the whole course of a typical flight. This possibility is not fully reflected in the emissions calculation for the proposed CADP (which only considers the LTO cycle), but is explored further below taking the example of the Bombardier C100 model.
- 17.95 Overall, it is predicted that the proposed CADP will enable the Airport to accommodate the predicted 32% increase in passenger numbers with only a minor increase (around 2.4%) in GHG emissions per passenger, compared to if the development did not proceed. This minor change is likely to be within the uncertainties of the assessment. On a per-passenger basis, a minor decrease (-4.9%) in emissions with development in the future year, compared to the baseline year, is predicted.

### *Cleaner Aircraft Fleet – the Bombardier C100 example*

- 17.96 Commercially confidential information regarding the expected CO<sub>2</sub> emissions performance has been provided by Bombardier for its future C-series aircraft (C100 model), which are presently in development. The C100 is predicted to contribute 14,416 aircraft movements with development in 2023, compared to 8,871 without development (and none in the baseline year). It is expected that greater use of the new C100 model would replace some movements by similarly-sized existing aircraft models such as the Embraer 190.
- 17.97 Bombardier's information suggests that during a typical flight from the Airport to Zurich (760 km), a C100 may directly emit (excluding any additional radiative forcing multiplier) around 13% less CO<sub>2</sub> than an E190, which is a 22% reduction per passenger (as the C100 can also carry a greater number of passengers).

### **Cumulative and Combined Effects**

- 17.98 GHG emissions arise from most industrial activities and the Airport's baseline operation and proposed CADP are therefore necessarily linked to cumulative impacts that are not limited to the local scale but which are transboundary in nature. Where scope three lifecycle emissions factors have been employed, some of these cumulative impacts have been captured within the assessment. However, in general, national and international GHG emissions are managed through regulatory and market-based measures (for example the EU ETS) and it is therefore not meaningful to assign impacts from such wider cumulative GHG impacts to the Airport for the purposes of this ES.

### **Further Mitigation**

- 17.99 No further mitigation is recommended, as the CADP will allow the Airport to meet increased passenger demand with only a small increase in emissions per passenger.
- 17.100 Although construction phase impacts have not been assessed, since due to their temporary nature they are assumed to be minor compared to ongoing operational impacts, scope for mitigation of construction phase GHG emissions exists in the form of efficient materials use (including recycled materials), use of efficient delivery options, and use of well-maintained, fuel-efficient construction plant. Proposed construction efficiency measures are detailed in Chapter 15: Waste, and the Draft CADP Construction Environment Management Plan (CEMP) located at Appendix 6.1.

### **Residual Effects**

- 17.101 The residual GHG emissions, following mitigation, are detailed in Section 17.6. In the future year (2023), the Airport's GHG emissions with the CADP are estimated to be around 27,000 tCO<sub>2</sub>e/annum greater than if the development did not proceed, and around 47,000 tCO<sub>2</sub>e/annum greater than in the baseline year. However, the CADP will allow the Airport to accommodate greater passenger numbers and aircraft movements, as consented by the 2009 planning permissions, than if the development did not proceed and will also allow greater use of new, more efficient aircraft models. GHG emissions on a per-passenger basis, therefore, are

predicted to be only slightly greater (2.4%) in the future year (within the uncertainties of the assessment), compared to the future year without development.

- 17.102 It should also be noted that passenger numbers are expected to be limited primarily by capacity rather than demand (including with the proposed CADP) and therefore in general, that the Airport's increased capacity is unlikely to be creating additional demand and hence additional GHG emissions; rather, it is likely to be increasing the Airport's market capture and in effect merely shifting passenger air travel and the associated GHG emissions from other airports to London City Airport. Further detail is given in the Need Statement, which accompanies the CADP planning submission.

## **Conclusion**

- 17.103 Greenhouse gas (GHG) emissions that would arise due to operation of the Airport in 2023 with and without the proposed CADP have been estimated and compared to an estimate of GHG emissions from the present-day baseline (using data from 2011-2013). The assessment boundary comprises electricity, fuel, gas and water use, and waste disposal, by the Airport, GHG emissions released during the landing and takeoff (LTO) cycle by the Airport's client airlines, and a limited set of lifecycle GHG emissions released outside the Airport's operational boundary.
- 17.104 Emissions for the baseline have been estimated based on records of operational activity held by the Airport, and standard emissions factors published by Defra/DECC. Emissions for 2023, with and without development, have been estimated using projected aircraft movements and passenger numbers, and SBEM energy modelling for the proposed new and refurbished CADP buildings. GHG emissions estimates for the 'with development' scenario include designed-in mitigation.
- 17.105 The results demonstrate that although the Airport's growth, driven by increasing passenger demand, leads to greater total GHG emissions than in the baseline year, this would be the case with or without the proposed CADP due to the forecast additional demand.
- 17.106 Importantly however, with development, total emissions on a per-passenger basis are predicted to be only slightly greater (2.4%) in the future year with the CADP, compared to the future year without development, and they would be slightly less (-4.9%) when compared with the baseline GHG emissions per passenger.
- 17.107 This is due to the fact that the CADP will allow the Airport to accommodate greater passenger numbers in energy-efficient new Terminal buildings, and the fact that in the future year, the composition of the fleet of aircraft using the Airport (with development) is predicted to include an increased number of larger and more efficient models, which have less LTO GHG emissions per passenger.
- 17.108 Overall, it is predicted that the proposed CADP will enable the Airport to accommodate the predicted 32% increase in passenger numbers with only a small increase in GHG emissions per passenger (within the assumptions of the assessment outline above), compared to if the development did not proceed.





## 18. Cumulative Effects

- 18.1 This Chapter has been prepared by RPS and Quod (Planning Consultants) and assesses the potential for cumulative environmental effects to arise from the proposed CADP, in combination with other major developments in the area.
- 18.2 Generally, cumulative effects are considered in two ways, defined as follows:
- a) Type 1 - The combined effects of individual residual impacts of the proposed development on a particular sensitive receptor, for example, the consequence of increased traffic flows on air quality and noise, and the effects of increased employment on travel patterns; and
  - b) Type 2 - The combined effects from several developments in the area which individually might be insignificant, but when considered together, could result in a significant cumulative effect.
- 18.3 The chapter describes the methods used to assess the residual impacts, the scope of the cumulative assessment in terms of the other activities under review, and the potential for cumulative effects to arise from the interaction of the proposed development with other projects within the area. Unless stated otherwise, the impacts described in the cumulative assessment are the residual effects arising following mitigation.
- 18.4 The zones of influence appropriate to the impact under assessment have been identified within the technical chapters. For example, visual impacts are likely to have a greater zone of influence compared to noise and vibration impacts; this has been taken into account when assessing the cumulative effects within this chapter.

### Legal Requirements

- 18.5 Relevant legislation and guidance applicable to the assessment of cumulative effects are set out below.

#### EC Directive

- 18.6 Council Directive 2011/92/EU, which codified Council Directive No. 85/337/EEC 1998 (as amended by Council Directive 97/11/EC 1999) requires assessment of '*the direct effects and any indirect, secondary, cumulative, short, medium and long-term permanent or temporary, positive and negative effects of the project.*'
- 18.7 Council Directive 2011/92/EU selection criteria for projects to be assessed include: '*The cumulation with other projects*' and the '*existing land use*'.

#### The EIA Regulations

- 18.8 Schedule 3 paragraph 1 of the EIA Regulations 2011 requires that 'the characteristics of development must be considered having regard, in particular to...(b) the cumulation with other development'.
- 18.9 Schedule 3 paragraph 2 requires environmental sensitivity to be assessed having regard to '*the existing land use*'.

- 18.10 Schedule 4 Part 1, paragraph 4 requires a 'description of the development of the likely significant effects of the development on the environment, which should cover...any indirect, secondary, cumulative...effects'.
- 18.11 Within the EIA Regulations, no additional information is provided on cumulative effects and how they are to be assessed and there is no formal guidance in this respect.

### **Assessment Methodology and Criteria**

- 18.12 The assessment of cumulative effects has been undertaken in the following stages:
- c) Identification of other permitted developments or those for which there is a resolution to grant planning permission or applications which are the subject of an appeal (collectively referred to as committed developments) within the defined study area;
  - d) Identification of sensitive receptors (e.g. schools or residential dwellings);
  - e) Consideration of committed developments against a set of screening criteria to identify those that should be considered within the cumulative effects assessment;
  - f) Review of the available and relevant planning application documents for the committed developments, to identify any potentially significant cumulative effects;
  - g) Identification and assessment of cumulative effects from both construction and operation stages that may result from the proposed CADP in combination with the other committed developments; and
  - h) Identification of appropriate mitigation and management of the identified effects, as required.
- 18.13 The same significance criteria have been adopted for the cumulative assessment as for the overall assessment as defined in Chapter 3: EIA Scope and Methodology and the individual technical chapters. The definition of significance as outlined in Chapter 3 has been reproduced below in Table 18.1.

**Table 18.1: Definitions of Significance**

Level of Significance	Description
Substantial	Very large or large change in environmental or socio-economic conditions. Effects, both adverse and beneficial, which are likely to be important considerations at a regional or district level because they contribute to achieving regional or local objectives or, could result in exceedance of statutory objectives and/or breaches of legislation.
Moderate	Intermediate change in environmental or socio-economic conditions. Effects which are likely to be important considerations at a local level.
Minor	Small change in environmental or socio-economic conditions. These effects may be raised as local issues but are unlikely to be of overriding importance in the decision making process.
Negligible	No discernible change in environmental or socio-economic conditions. An effect that is likely to have a negligible or neutral influence, irrespective of other effects, often not discernable above the natural levels of variation.

## **Assumptions**

- 18.14 The level of information available for each of the committed developments is highly variable and, as a consequence, the rigour to which any assessment of the potential effects can be accurately applied differs. Where possible, a quantitative assessment of the individual environmental effects from the proposed development in cumulation with other developments has been undertaken and the outcome discussed in each technical chapter of this ES.
- 18.15 However, in view of the inherent uncertainty with the timing and quantifiable effects associated with other developments, as well as the length of the phasing for construction associated with the proposed development, it can sometimes be difficult to accurately determine the significance of cumulative effects. When a quantitative assessment has not been possible, a qualitative assessment of the reasonable likely cumulative effects has been undertaken using professional judgement, based upon a realistic worst-case scenario.
- 18.16 The methodology adopted for the Transport Assessment takes account of planned and committed development in the vicinity of the Airport by considering the predicted trip generation developments in the vicinity of the Airport which have been granted planning permission and which are likely to have a traffic impact in the study area. The traffic forecasts therefore incorporate emerging developments, which furthermore feeds into other technical assessments, including air quality and noise.
- 18.17 In addition, the assessment has assumed that each of the cumulative developments identified have or will be sufficiently conditioned to mitigate any potential adverse effects arising from their construction activities as part of the relevant planning permission, for example by the imposition of a Construction Environmental Management Plan (CEMP), to control emissions or other pollution during this phase, as is also the case with the proposed development.

## **Identification of Sensitive Receptors**

- 18.18 This assessment considers the likely combined effects of the proposed development with other permitted or allocated schemes on identified sensitive receptors located within the vicinity of the Airport. The key objective of the assessment is to determine whether a particular receptor can accommodate additional change, or an adverse effect would be likely to occur. potential sensitive receptors, which the identified technical issues may impact upon during both the construction and operational stages of the proposed development, have been identified as follows:
- i) Construction workers on-site and locally;
  - j) Existing local residents or visitors near the site;
  - k) Future local residents or visitors near to or on the site, including those using local public transport and the Airport itself;
  - l) Nearby ecological receptors, including the KGV Dock, which forms part of the Royal Docks Site of Nature Conservation Interest of Metropolitan Importance;
  - m) Local community assets on or near to the Site;
  - n) Employees of the Airport and other local employees.

## Schemes to be considered for Cumulative Assessment

- 18.19 Various criteria have been adopted for establishing the scope of the cumulative assessment. The scope of the assessment has been guided using the following screening criteria, which other developments must meet in order to be included within the cumulative assessment:
- o) Developments that are within 1km of the boundary of the Airport runway;
  - p) Comprise more than 10,000 sqm of development and/ or 100 or more residential units and/ or are of a particularly sensitive nature (e.g. new schools or hospitals);
  - q) Expected to be built-out at the same time as the proposal and with a defined phasing and construction programme;
  - r) Developments which are considered likely to result in significant environmental effects of some nature, often signified by being subject to EIA; and,
  - s) Developments that have planning permission or a 'resolution to grant' planning permission, or sites that have been allocated in the Local Plan.
- 18.20 The developments which have been considered for the cumulative assessment, based on the 'screening criteria' outlined above and discussions with LBN, are identified in Table 18.2 below. The locations of these developments in relation to the Development site are shown in Figure 18.1 at the end of this chapter.

**Table 18.2 - Developments Considered within the Cumulative Assessment**

No.	Scheme	Application No.	Application Description	Status
1	Silvertown Quays	03/2006 issued on 27 April 2007 And 10/00860/ RENEW) And 12/01234/FUL	<p>Outline planning permission for a mixed use development including:</p> <ul style="list-style-type: none"> <li>• Residential (C2/C3) 437,220 sqm/ 4930 units;</li> <li>• Employment (B1) 7,800 sqm;</li> <li>• Retail (A1/A2) 4,320 sqm;</li> <li>• Restaurant/Bar (Class A3/A4) 5,570 sqm;</li> <li>• Flexible commercial space 7,600 sqm;</li> <li>• Community (including school) (D1) 8,000 sqm;</li> <li>• Leisure (including Aquarium) (D2) 18,925 sqm;</li> <li>• Hotel (C1) 8,000 sqm.</li> </ul> <p>Several reserved matters applications subsequently approved.</p> <p>Application (ref. 10/00860/ RENEW) submitted to extend the timeframe for implementing the outline planning permission which expired on 27/04/2010. On 13 December 2010, LBN's Strategic Development Committee resolved to grant planning permission subject to conditions and resolution of the s106 legal agreement. It is understood that the s106 remains unresolved.</p> <p>Application submitted for western part of site (12/01234/FUL) for 160 bed container hotel, restaurant &amp; bar.</p>	10/00860/ - Pending Decision And 12/01234/FUL - Pending Consideration

2	North Side of Royal Albert Dock	N/97/0134 issued in 1998	Royal Docks Business Park Masterplan –planning permission for a business park of up to 150,000 sqm comprising B1 uses and up to 9,290 sqm of supporting A1, A2, A3 and leisure uses.	Application Permitted
3	Royal Albert Basin / IVAX Quays / Great Eastern Quays	12/01881/OUT submitted 11/10/12	<p>Planning permission for mixed use development to provide:</p> <p>Outline, up to:</p> <ul style="list-style-type: none"> <li>• 837 residential units</li> <li>• 3,617sqm Office (B1)</li> <li>• 1,353sqm Retail (A1-A4)</li> <li>• 703sqm Community (D1)</li> <li>• 417sqm Leisure (D2)</li> </ul> <p>Detailed:</p> <ul style="list-style-type: none"> <li>• 350 residential units</li> <li>• 1,893sqm Office (B1)</li> <li>• 789sqm Retail (A1-A4)</li> <li>• 417sqm Community/Leisure (D1/D2)</li> </ul>	Pending Decision
4	Barrier Park East	08/01042/OUT issued on 14 December 2009	<p>Planning permission for a mixed use development comprising:</p> <ul style="list-style-type: none"> <li>• Between 750 and 780 residential dwellings</li> <li>• Retail/ commercial (A1-A5 and B1) up to maximum of 1,014 sqm</li> <li>• Community (D1) up to a maximum of 144 sqm</li> <li>• Assembly and leisure (D2) uses up to maximum of 124 sqm</li> <li>• Ancillary uses</li> <li>• Landscaping open space</li> <li>• Car parking</li> </ul> <p>Subsequent reserved matters approved refs: 12/00189/REM, 11/00379/REM, 11/00030/REM, 10/01015/REM, 09/02087/REM</p>	Approved
5	Minoco Wharf	<p>07/01143/OUT issued on 28 November 2008 by LBN and the LTGDC-07-138-OUT</p> <p>And 11/00856/OUT</p> <p>And</p> <p>11/00856/OUT</p>	<p>Planning permission issued by LBN (ref: 07/01143/OUT) and the LTGDC (ref: LTGDC-07-138-OUT) for:</p> <ul style="list-style-type: none"> <li>• Residential (C3) maximum of 222,055 sqm or 2,598 units</li> <li>• Employment (B1) 15,000 sqm</li> <li>• Retail (A1) 2,000 sqm</li> <li>• Professional services, food and drink (A2-A5) 3,000 sqm</li> <li>• Community, health, education, cultural and assembly (D1) 4,000 sqm</li> <li>• Recreation and leisure (D2) 2,000 sqm</li> <li>• Car parking (maximum 0.5 spaces per dwelling and 1 space per 1,000 sqm for commercial)</li> </ul> <p>Application for Outline planning permission for:</p> <ul style="list-style-type: none"> <li>• Residential (up to 3,385 new homes)</li> <li>• 15,000 sqm B1 employment</li> <li>• 5,500 sqm of 'A' class uses</li> <li>• 9,600 sqm of D1 community floorspace including a new</li> </ul>	Approved



			<p>primary school and</p> <ul style="list-style-type: none"> <li>• community facilities</li> <li>• 3,000 sqm of D2 leisure floorspace</li> <li>• A range of open spaces including a new Riverside Park.</li> </ul> <p>The latest scheme includes additional land acquired by the developer (Ballymore) to the west of Minoco Wharf.</p>	
6	Peruvian Wharf	-	<p>In April 2010, the applicants (Colpy Limited and Haworth Limited) sought to renew planning permission for eight previously approved schemes. The original permissions were granted in 2005 for:</p> <ul style="list-style-type: none"> <li>• Full application for four-storey office B1(a)/ A1/A2/A3 building (3330 sqm)</li> <li>• Full application for seven storey 180 bed hotel (9560 sqm)</li> <li>• Outline application for six storey B1(a) business use (14,000 sqm)</li> <li>• Outline application for six storey B1(a) business use (23,220 sqm)</li> <li>• Outline application for two storey B1(a)/A1 business/shop use (1080 sqm)</li> <li>• Outline application for four-storey B1(a) business use</li> <li>• Outline application for a four-storey B1 business use (8360 sqm)</li> </ul> <p>Full application for a new road junction to North Woolwich Road and access road through the site</p>	Understood that Mayor of London advised that the applications are non-compliant with the London Plan and have requested further information/ scheme changes
7.1	Thames Wharf	<p>Olympic relocations – 06/01657/LTGDC issued January 2007</p> <p>Asbestos storage – 08/02366/COU issued in March 2009</p> <p>Concrete batching – Planning permission (ref: 08/02289/FUL) Wharf – 08/01523/LTGDC</p>	<p>Olympic relocations – Temporary planning permission for Thames Wharf Olympic business relocations until 31 January 2014 (waste recycling and transfer businesses).</p> <p>Asbestos storage – Temporary planning permission for change of use (until 31 July 2014) of existing demolition company premises for the receipt, transfer and secure temporary storage of asbestos waste in two sealed containers, pending removal to a licensed waste facility.</p> <p>Concrete batching – Planning permission for change of use to concrete batching plant and premises and associated works – No details available.</p> <p>Wharf – Planning permission issued by LTGDC for temporary change of use from wharf for stocking and export of scrap metal to waste to ship load facility (excavation waste) including erection of associated storage buildings expiring on 31 July 2014. Planning permission subsequently varied (ref: LTGDC-10-015-PP; 10/00323/LTGDC) to include</p>	Approved

			storage of building and construction materials.	
8	UNEX	10/01538/OUT submitted on 13 July 2011	Outline planning permission for: <ul style="list-style-type: none"> <li>• Residential (1,634 units)</li> <li>• Employment (B1) (16,916 sqm)</li> <li>• A2/A3/A5 A2 (1,500 sqm)</li> <li>• D1 – (2,000 sqm)</li> <li>• D2 – (500 sqm)</li> <li>• Energy centre (5,256 sqm)</li> </ul>	Application Withdrawn (therefore not assessed further)
9	The Corniche Floating Village	11/00923/FUL submitted on 7 July 2011	Planning application for the construction of floating village within Royal Victoria Dock, comprising 5no. restaurants, boat bar, boat café, swimming pool, wakeboard centre, boardwalk and garden and ancillary plant. Mayor of London announced plans in March 2013 for floating village in Docks.	Pending Consideration
10	Gallions Reach (LB Greenwich)	Several applications (e.g. refs: 10/0175/SD and 09/2431/SD)	Several applications (e.g. refs: 10/0175/SD and 09/2431/SD) for submission of details in respect of planning permission ref: 97/0044/O (dated 18 September 1998).	Decided
11	Tripcock Point (LB Greenwich)	03/2618/O issued in June 2006	Outline planning permission for mixed use development including 2000 residential dwellings.	Decided
12	Pumping Station Site, Tidal Basin	10/00369/FUL	Planning application granted 19/03/12 for construction of: 1) a 24 storey tower containing B1/A1/A3 (at ground floor level) and 161 residential units; and, 2) three-storey block, providing energy centre plus B1 commercial space.	Application approved
13	Royals Business Park – Hotel Site 2.3	11/01362/FUL	Planning application for erection of a 204 bed hotel in two linked buildings over 4 floors with associated facilities and 60sqm commercial (A1-A3).	Application approved
14	Royals Business Park – Hotel Site 2.2	11/00088/FUL	Planning permission for a five storey 131 bedroom hotel (Use Class C1) with a gross internal area of 3,914 sqm.	Application approved
	Royal Business Park – Hotel Site 2.3	12/01910/FUL	Application for the erection of three buildings (varying in height of five to ten storeys) comprising in total 17,624sqm (GEA) of new hotel (use class C1) floorspace (364 new hotel rooms and 38 suites), 161sqm (GEA) of use class A3 floorspace and 813sqm of use class B1 floorspace with associated access and landscaping.	Application approved
15	Tidal Basin	09/02013/FUL	Application for 25 storey residential building and 17 storey hotel building, comprising 170 residential units, 250 hotel rooms and serviced apartments, retail floor space, health club, community use, indoor children's day centre space etc.	Application approved
16	Canning Town Areas 7 and 1C, E16	11/00662/LTGDC	Application for: In outline: mixed use scheme comprising 191,530sqm floorspace, including retail (A1-A5), residential, leisure, health, office, live/work,	Application approved

			research & development, hotel, student accommodation, energy centre. Detailed approval for Phase 1, to include 8,200sqm GEA foodstore, 425sqm retail unit, 179 residential dwellings, energy centre, car parking and associated works.	
17	Rathbone Market, Barking Road, E16	08/02263/LTGDC	Application for: In outline: up to 60,600sqm retail (A1-A5), offices (B1), residential (C3) and market. In detail: 25,907sqm comprising retail (A1-A5), residential (C3), parking and public realm.	Application approved
18	Leamouth Peninsula North, Orchard Place (LB Tower Hamlets)	PA/10/01864	Application for a residential led mixed use scheme providing up to 1,706 residential units, 7,848sqm of business uses, 1,852sqm of retail, financial and professional services, food and drink (A1 to A5), 1,801sqm of leisure (D1 & D2), 2,049sqm of arts and business (D1), 4,800 sqm of education and 1,296sqm of community uses (D1), as well as an energy centre, storage and car and cycle parking.	Application approved
19	Aberfeldy Estate, Abbot Road (LB Tower Hamlets)	PA/11/02716 and PA/12/03548	Application for creation of a new residential-led mixed use scheme comprising 1176 new homes, providing affordable homes as well as a mix of rented and privately owned accommodation. Application PA/12/03548 currently under consideration for 3 blocks of 4-10 storeys comprising 342 residential units, 352sqm retail floorspace and a marketing suite of 407sqm.	Pending Consideration
20	Blackwall Reach Regeneration (LB Tower Hamlets)	PA/12/00001	Outline application) for up to 1,575 residential units, 1,710sqm retail (A1-A5), 900sqm Office (B1), 500sqm Community (D1), 4,500sqm School (D1), 750sqm Energy Centre and 1,200 Faith Building (D1).	Application approved
21	Wood Wharf (LB Tower Hamlets)	PA/11/02174	Extension of time approved 29/03/12 for: Outline: up to 1,668 residential units, Hotel, Commercial (B1), Retail (A1-A5) Community and Leisure. Detailed: creation of canal and other engineering infrastructure.	Approved.
22	New Union Wharf (LB Tower Hamlets)	PA/12/00360	Application comprising 399 residential units and 103sqm Community Facility (D1)	Pending Consideration
23	New Providence Wharf (LB Tower Hamlets)	PA/06/02101	Planning Permissions for mixed use development comprising a part 12, part 44 storey building to include residential, retail and a health club. Subsequent discharge of conditions approved (PA/11/00427, PA/11/00429, PA/11/00431 & PA/11/03196)	Application approved

## Assessment of Effects

- 18.21 The cumulative assessment provides an opportunity to identify and, where possible, mitigate the anticipated impacts of the proposed development in order to avoid negative cumulative residual impacts with other developments within the area.

### Consideration of Potential Future Work at the Airport

- 18.22 On 8th January 2013, the Airport wrote to LBN with regard to proposed alterations and improvements on the existing passenger pier to the west of the main terminal building (the 'West Pier') which the Airport can undertake using its permitted development (PD) rights. These works would be undertaken in order to upgrade the West Pier facility to comply with modern building standards and to meet passenger and client expectations in terms of comfort, space and convenience of use.
- 18.23 Whilst the exact detail and timetable of these works is not currently known, there is potential for them to be brought forward during the construction of the proposed CADP, therefore consideration is given here to potential environmental effects associated with the West Pier PD works in order to assess whether these effects could combine into significant impacts in combination with the CADP.
- 18.24 It should be noted that the construction programme of the West Pier works is unlikely to be extensive and will not be of a scale that could contribute to significant cumulative impacts upon areas beyond the immediate vicinity of the Airport site; therefore it is not considered necessary to assess cumulative effects with other permitted developments in the area.
- 18.25 It should be noted that the proposed alterations to the West Pier do not involve any changes to the operation of the Airport, to the adjoining stands or to the maximum width and height of the existing West Pier structure. The proposal is that a new first floor structure would simply 'infill' the gaps between the existing separate roof structures above the ground floor gate rooms.
- 18.26 An EIA Screening Letter was sent to LBN on 8th January 2013, which demonstrated that the environmental effects arising from the proposed West Pier works are not considered to be complex and are unlikely to have significant implications for the wider area. As a result, the Screening Opinion issued by LBN (6th March 2013) concluded that the proposal was not deemed to require an EIA.
- 18.27 Consideration of the West Pier works in combination with the proposed CADP results in the potential for cumulative effects to arise during the construction stage if this were to coincide with the CADP construction programme. Likely construction related effects from dust, traffic, noise and visual impacts may result in minor adverse effects to residents and end users. However, together with existing environmental and planning controls currently in place at the Airport and the incorporated mitigation embedded in the CADP proposals, it is considered unlikely that the scale and nature of the West Pier works will result in any further combined adverse affects. Therefore, cumulative effects during construction are considered to be **negligible**.
- 18.28 There would be **negligible** operational effects from the West Pier Alteration proposal to the CADP and other proposed development schemes within the local area. The CADP and the West Pier Alteration scheme would be mutually supportive once operational, resulting in beneficial effects to

users of the Airport, for example the design of the alterations to the west pier will provide an improvement in the acoustic insulation properties of the Pier structure.

### **Effect of Cumulative Schemes**

- 18.29 The authors of each of the ES Chapters have reviewed the available information for the known, committed schemes, to determine the potential cumulative effects when combined with the proposed CADP.
- 18.30 Not all of the developments listed in Table 18.2 have been considered for each EIA topic, as their vicinity to the Airport may mean they are irrelevant. For example, the noise assessment has considered the schemes that fall into the modelled noise contours, whereas the Townscape and Visual Impact Assessment will only consider those which fall within the specified viewpoints.
- 18.31 The assessment of potential cumulative effects that are considered to result from other developments taking place within the area, in combination with the residual effects from the proposed CADP, are considered for each environmental topic below:

#### *Socio Economics*

- 18.32 The effects of the proposed CADP and other proposed developments in the vicinity of the Airport are likely to be mutually supportive and **moderately beneficial**. This is in the sense that the proposed CADP will support positive socio-economic impacts in the wider local economy with the potential to provide employment opportunities to future residents. The growth of air services at the Airport from the proposed CADP may also be a positive factor by acting as a pull factor for other businesses considering locating to one of the other proposed development sites.
- 18.33 The exception to this is the **adverse effects** of the enlarged Public Safety Zone (PSZ), this affects the 'with' and the 'without' development scenarios. The Corniche Floating Village development is proposed to be located at the most western end of the PSZ and the Royal Albert Basin is proposed to be developed at the most eastern end of the PSZ; the latter proposing a considerable number of residential units. The basic policy of the PSZ is to control the number of people on the ground at risk to aircraft accidents. However it should be noted that the adverse effects are greater in the 'without development' scenario.

#### *Noise*

- 18.34 The Crossrail development is estimated to be complete by June 2015. This is before the anticipated start of the CADP works and therefore no cumulative impact is expected.
- 18.35 It is not known when other major developments, such as Royal Albert Basin, Ivax Quays and Great Eastern Quays sites, will be constructed. However, if construction takes place at the same time as the proposed CADP construction phase, this could increase temporary construction noise levels for the closest noise sensitive receptors. The construction noise levels predicted from the CADP works at these receptors are low, generally less than 55 dB L<sub>Aeq</sub>. The CADP construction noise levels will therefore **not significantly** contribute to any noise impact from these major developments. The

impact of construction noise from these developments will also need to be mitigated to meet local requirements and this will likely form part of any associated planning conditions.

- 18.36 Developments such as the Royal Albert Basin have been conditioned to mitigate air noise from the Airport, requiring acoustic protection to be installed to meet acceptable internal noise levels during the operational stage. It is considered that LBN, as part of future outline and reserved matters applications, can impose conditions to ensure there is a commensurate level of protection against air noise effects during the operation of the cumulative schemes considered.
- 18.37 The 'land to the north side of Albert Dock' development may result in a beneficial impact in terms of noise; if this site is developed prior to the construction and/or operational phase of the CADP development the buildings would be likely to act as local noise barriers. This will reduce construction and/or operational ground noise from the airport for those residential buildings in Beckton.

#### *Air Quality*

- 18.38 Traffic generated by the proposed developments listed in Table 18.2 has been included in the future baseline and Without Development scenarios and, as such, the Air Quality assessment incorporates and explicitly considers emerging cumulative developments. In addition, sensitive receptors at these consented or proposed schemes have been included in the assessment.
- 18.39 There is a residual risk of slight adverse dust effects during both demolition and construction works of the proposed CADP, therefore it is nearby cumulative developments where construction phases occur at the same time. Whilst it is not known exactly when construction is likely to occur on major developments such as Royal Albert Basin, Ivax Quays and Great Eastern Quays, these effects are anticipated to be **negligible to minor adverse** and on a temporary basis only, given that construction will occur in combination only over the shorter term.
- 18.40 The Silvertown Quays site is currently partly encompassed by LBN's AQMA (Connaught Bridge and North Woolwich Road). The combined air quality effects on the AQMA from increased concentrations of NOx from the increase in traffic flows on the local road network are considered to be **negligible** or **minor adverse** (at worst).

#### *Townscape and Visual*

- 18.41 Combined views of the developments considered (refer to Table 18.2) and the proposed CADP could cumulatively improve views experienced by residents within the area. The proposed business park on North side of Albert Dock and hotels at Royals Business Park will be located on vacant land between the existing UEL complex and Connaught Road and would result in further visual enclosure of Royal Albert Dock, with less potential for the proposed CADP to be seen from Royal Albert Way. Overall, it is anticipated that these schemes would enhance the views experienced within the area and would enhance the townscape character of the Royal Docks CA. The Silvertown Quays development would be located on existing goods yards and vacant land. It is anticipated that any development proposed here would improve views and would enhance the townscape character of the Royal Docks CA. This development would largely be screened from the proposed CADP by intervening buildings, Connaught Bridge and the elevated DLR.



- 18.42 The Royal Albert Basin development once completed would, on balance, enhance areas which currently comprise vacant land, goods yards or land in industrial/warehouse uses. Some existing views across vacant land to the Airport are also likely to be screened by new structures within the Royal Albert Basin development.
- 18.43 If the construction phases of these schemes coincide with construction of CADP there is the potential for cumulative adverse effects on views and townscape character. However, this would be of a temporary nature. New structures will help screen views of the proposed CADP; therefore cumulative visual effects from publicly accessible locations are likely to be less than with the proposed CADP on its own during the operational phase. The **minor beneficial** effects arising from the proposed developments would partially offset adverse visual and townscape effects arising from the proposed CADP.

#### *Traffic and Transportation*

- 18.44 A link flow and junction capacity assessment has been undertaken in order to assess the impact on the highway network, which has taken account of the planned and committed development in the vicinity of the Airport.
- 18.45 The junction capacity assessment predicts traffic flows at junctions within the study area under future built out development scenarios. The assessment concluded that there is sufficient capacity at the junctions assessed to adequately deal with the Airport and future developments. It is considered that the traffic impact assessment is robust and the impact of the development traffic on the local highway network in the context of future cumulative development in the area is **acceptable**.
- 18.46 The East London River Crossings may have an impact on traffic patterns within the local area, should these become committed schemes in the future. However, since the river crossings are still undergoing a consultation process and are not yet committed, these have not be included within the assessment.

#### *Water Resources and Flood Risk*

- 18.47 In accordance with the NPPF, all new developments must incorporate measures to ensure that the development will not increase flood risk elsewhere. With regard to fluvial/tidal flood risks other developments (including those located adjacent to the Royal Docks) are required to include mitigation measures and are not allowed to make changes to flood flow paths or reduce the volume of storage within a system without compensating for the loss. In addition, with regard to surface water there is a requirement within the London plan to reduce the rate of run-off to 50% of the existing situation or greenfield run-off rates where possible. This should include the use of SuDS techniques, which ultimately should provide an improvement in the quality of surface water quality.
- 18.48 The majority of the cumulative developments within the vicinity of the site are for either residential or office use, or mixed development. There are two cumulative developments within the vicinity of the site (the UNEX site and Peruvian Wharf) which are allocated for business/general industrial/warehousing, however, planning applications have been submitted for residential, office and leisure use. Therefore the impact on water quality associated with these developments is likely to be beneficial in comparison to industrial use. In addition, based on the historic legacy of industrial

use within this area, and through the development process, there is potential for an improvement over the past/present situation by reduction in potentially contaminating uses through the removal of sources and potential incorporation of SuDS resulting in an improvement over the existing/historic situation. Accordingly, there are not anticipated to be any significant detrimental flood risk or water quality effects associated with the cumulative developments within proximity to the Application Site.

- 18.49 The cumulative effects of flood risk and water quality will be **negligible** provided that these other developments incorporate appropriate techniques to minimise risks of pollution and that they comply with the same policy and legislative requirements as adopted for the CADP..

#### *Ecology and Biodiversity*

- 18.50 The cumulative assessment of the above proposed schemes together with the proposed CADP did not identify any significant effects on ecological features associated with the Royal Docks SBINC. As there are considered to be no effects on ecological features from these other developments then there is no potential for in-combination or cumulative effects with the proposed CADP development. Therefore, **no significant cumulative impact** has been identified when the combined impacts of the individual developments and the proposed CADP are considered.

#### *Cultural Heritage*

- 18.51 The proposed Royal Albert Basin / IVAX Quays / Great Eastern Quays sites, if built-out, would improve the overall setting of the site by the removal of the modern building which currently bridges the Albert Basin and the construction of buildings which respect the alignment of the dock. There would be no cumulative effect on buried archaeology. Therefore, **no significant cumulative impact** has been identified when the combined impacts of the individual developments and the proposed CADP are considered.

#### *Waste*

- 18.52 All of the cumulative schemes considered will incorporate appropriate construction waste management techniques to minimise the amount of waste generated for landfill disposal. However, inevitably waste production will increase across the area as a result of the combined development projects.
- 18.53 There may be opportunities to directly reuse some of the materials derived from the proposed CADP at other development sites within the vicinity of the Airport. This would be dependent upon factors such as timings and the suitability of the material, but this could be assisted through the use of the CL:AIRE database, waste brokers or the National Industrial Symbiosis Programme (NISP). Reuse of materials is likely to require an Environmental Permit or Materials Management Plan under the CL:AIRE Code of Practice.
- 18.54 Overall, the cumulative effects on waste from neighbouring developments are considered to be of **negligible** significance.

#### *Ground Contamination*

- 18.55 All of the cumulative schemes considered will incorporate appropriate good practice construction techniques in order to mitigate against potential ground pollution from construction activities. Any remediation that is required to reduce potential land contamination will be carried out during the construction stage.
- 18.56 Overall cumulative effects in relation to ground conditions and contamination during the construction stage are therefore considered to be **negligible**.

### Conclusions

- 18.57 The combined effects of different types of effects, or “effect interactions”, from the proposed development on particular receptors, has been considered during the assessment of the demolition and construction works and set out in subsequent chapters of the ES.
- 18.58 Table 18.3 below summarises the potential for cumulative effects from the proposed development and other projects within the zone of influence.

**Table 18.3 Summary of potential cumulative effects**

Potential Impact Areas	Overall Cumulative Impact
Socio Economics	Moderate Beneficial (except for potential adverse effect of enlarged PSZ)
Noise	Negligible
Air Quality	Negligible to Minor Adverse
Townscape and Visual	Minor Beneficial
Traffic and Transportation	Negligible
Water Resources and Flood Risk	Negligible
Ecology and Biodiversity	Negligible
Cultural Heritage	Negligible
Waste	Negligible
Ground Contamination	Negligible

- 18.59 A positive outcome if the proposed developments listed in Table 18.2 were to be built would be the screening affect that some of the buildings would provide to the current residents in the vicinity of the Airport. In addition, the cumulative socio-economic effect of a large number of construction projects and new development is considered to be beneficial to the local community through potential employment and income generation.
- 18.60 It is acknowledged that the construction works are the greatest potential cause of effect interactions, particularly for a site of this nature within an urban context and close to a number of sensitive receptors. However, it can be assumed that each of those developments identified above have or will be sufficiently conditioned to mitigate any adverse effects from their construction and operation activities as part of the relevant planning permission, for example, by the imposition of a

Construction Environmental Management Plan (CEMP) to control emissions or other pollution during this phase.

- 18.61 There would be no significant adverse cumulative impacts as a result of the proposed developments combined impacts and together with the proposed development in the area.



## **19 Summary of Mitigation and Residual Effects**

- 19.1 This chapter summarises the residual (remaining) environmental effects of the proposed CADP following implementation of the proposed mitigation measures outlined in the preceding chapters of this ES.
- 19.2 A thorough and complete Environmental Impact assessment (EIA) has been undertaken of the proposed CADP - both for the full infrastructure and terminal works, comprising CADP1, and for the outline application for the proposed Hotel, comprising CADP2. This process of EIA has been thorough and iterative and this has helped inform the final development scheme for which planning permissions are sought.
- 19.3 The ES presents the “likely significant environmental effects” of the proposed CADP as required by the EIA Regulations 2011, using established assessment methodologies, standards and guidelines. It also addresses all matters contained in the formal Scoping Opinion from LBN (dated 4<sup>th</sup> December) and has responded to other relevant issues raised by LBN, the GLA, adjoining Boroughs, and statutory bodies such as the Environment Agency (EA), English Heritage and RoDMA through written correspondence and meetings.
- 19.4 The development of mitigation measures to avoid, reduce or off-set predicted significant adverse effects and, equally, to enhance the potential of significant beneficial effects from the proposed CADP has been considered throughout the EIA and design evolution. These mitigation measures are summarised in this chapter, including those measures already factored into the design of the proposed CADP (i.e. Design Mitigation) as well as the environmental controls which would be implemented at the construction stage and/ or discharged through planning conditions set by LBN.
- 19.5 Residual effects have been determined based on the assumption that the proposed mitigation measures outlined in Chapters 7 to 17 are implemented. A composite summary of the recommended mitigation and the main residual effects of the proposed CADP is presented in Table 19.1 below.



**Table 19.1 – Summary of Mitigation and Residual Effects**

Topic		Summary of Impacts	Proposed Mitigation	Residual Effects
Chapter 7 Socio Economics, Recreation and Community	Construction	There is an opportunity for 344 full time equivalent (FTE) direct onsite construction jobs over the life of the construction phase, with a further 103 indirect and induced FTE jobs, making a total of 448 FTE jobs. This equates to around £234m of direct Gross Value Added (GVA) and £70m of indirect and induced GVA, making a total of £304m.	No mitigation required.	The proposed CADP would bring about additional demolition and construction jobs; which is likely to have a <b>substantial beneficial</b> residual effect.
	Completed Development	<p>Overall, taking all types of employment into account, the CADP proposals would generate an increase in local employment of approximately 1,500 compared to 2012, when the full impact of the hotel is taken into account. This is made up of 1,250 jobs as a result of the increase in operational activity at the Airport and around 200 jobs in total related to the hotel and other elements of CADP2.</p> <p>In the context of the overall demand for jobs in the Study Area, there is unlikely to be any significant displacement. The impact of additional retail development at the Airport on retail businesses in Woolwich is also judged not to be significant. There will be continuing growth in the wider economy supported or facilitated by the proposed CADP.</p> <p>The risk to community health is not of a level to quantify any meaningful adverse health outcome and would be further managed through bespoke mitigation. The income and employment benefits would also bring health benefits.</p> <p>The effect of the potential expansion of the</p>	No mitigation required.	The likely net socio-economic effects of the proposed CADP would be <b>substantial beneficial</b> .

Topic		Summary of Impacts	Proposed Mitigation	Residual Effects
		Public Safety Zones (PSZs) at either end of the runway as a result of the increase in aircraft movements and the change to the fleet mix has been considered. Whilst smaller than the projected 'Without development' PSZs, some development sites in the area could be partially infringed by the projected 'With Development' PSZ. This would reduce the net number of additional FTEs at 2023 by 160 and the GVA by £7.1m. However, the enlarged PSZ would be greater 'Without Development', reducing the number of additional FTEs at 2023 by 300 and the GVA by £13.3m, hence the impact would be more adverse in this scenario.		It is considered that the potential effect of the enlarged PSZ on employment and GVA in the 'with development' scenario would constitute a moderate beneficial effect.
Chapter 8- Noise and Vibration	Construction	<p>No significant adverse noise impacts are predicted for daytime working hours. Minor adverse noise impacts are predicted for the evening/night time/weekend works.</p> <p>Landside infrastructure (concrete and general works) have the potential to cause short term significant adverse noise impacts when works are carried out close to the nearby dwellings during evening/weekend/night periods when more stringent noise limits apply.</p> <p>Piling will take place during the construction of the new apron. Auger piling is to be used as levels of vibration associated with this method are low. Vibration levels are predicted to be well below those likely to cause any damage to buildings. Occupants of buildings located approximately 10m away would experience some slight impacts; however, ground-borne vibration</p>	<p>In view of the location of the site compound and haul road in the vicinity of the eastern end of Woodman Street a temporary construction noise barrier is proposed. This will mitigate the potentially significant impact of these works.</p> <p>The Principal Contractor will develop and implement a site specific Construction Environmental Management Plan (CEMP) covering demolition and new construction. This will ensure that best practicable means are used to mitigate construction noise impacts.</p>	<p>The residual construction noise impact has been assessed as <b>negligible adverse</b> for the daytime and <b>minor to significant adverse</b> for evening/night time/weekend works.</p> <p><b>No significant adverse impacts</b> are predicted from construction vibration.</p>

Topic		Summary of Impacts	Proposed Mitigation	Residual Effects
		levels can be expected to decrease with distance.		
	Completed Development	<p>Comparing the 'With' and 'Without' development cases in 2023, there is only a slight increase in noise level resulting from the proposed CADP, generally in the range of 0.5 to 1.0 dB, giving rise to a negligible impact when comparing the two scenarios directly and considering the change in impact. A negligible change of this magnitude has no significance.</p> <p>More people will become affected by aircraft noise as a result of increasing activity at the Airport (which is in line with current permitted aircraft movement limits) and due to envisaged continuing development around the area. An estimate of the increase in the number of people likely to be "highly annoyed" as a result of air noise in 2023, should the proposed CADP proceed, is 2% when compared to the population within the noise contours for the Without Development case in 2023. Beyond 2023, as a result of the introduction of modern aircraft that will be quieter in operation, there will be an estimated increase of 0.3 % in the number of people "highly annoyed" with the proposed CADP in place, despite the annual number of aircraft movements being around 15% greater. The proposed CADP would result in a reduction in the number of people highly annoyed by aircraft noise of around 0.7% when compared with those that would be highly annoyed post 2023 in the without CADP scenario.</p>	<p>For those people close to the Airport, and thus most affected by noise, protection has for most properties already been provided as a result of the Sound Insulation Scheme provided for many years by the Airport. The Airport will continue to operate the Sound Insulation Scheme and will improve the scheme by offering those people most affected by noise improved secondary glazing or a 100% monetary contribution towards high acoustic performance thermal double glazing, together with acoustic ventilation. This will ensure that all of those most affected by noise are afforded the maximum noise protection opportunity.</p> <p>Properties west of Woodman Street will benefit from the purpose built noise barrier created for the Docklands Light Railway (DLR).</p> <p>The height (16m) of the terminal extension and the new infrastructure will act as a noise barrier and provide a substantial reduction in ground noise, protecting dwellings close by. Ground thrust during landing will be encouraged to be reduced, as will the use of Auxiliary Power Units (APUs), to no more than 10 minutes</p>	<p>More people will become affected by air noise as the Airport continues to grow within its permitted limits, irrespective of whether the proposed CADP is built or not. This will give rise to a moderate adverse impact with or without the proposed CADP. The introduction of the proposed CADP, as compared to without it, will give rise to a negligible change in noise level with a corresponding negligible impact. Taken as a whole, it is envisaged that the air noise impacts associated with the proposed CADP will be of a <b>minor adverse</b> nature.</p> <p>The small number of dwellings exposed to significant adverse impacts due to an increase in ground noise will have been provided with sound proofing either from the Airport or as required by planning condition. Therefore the residual ground noise impact is assessed as <b>negligible to minor adverse</b>.</p> <p>With the exception of the properties at the eastern end of Woodman Street, <b>no significant adverse</b> noise impacts are predicted. Properties in Woodman Street will only be exposed to minor absolute levels of road traffic noise and will have qualified for noise protection</p>

Topic		Summary of Impacts	Proposed Mitigation	Residual Effects
		<p>Some dwellings in Newland Street will be exposed to a significant reduction in ground noise, due to increased noise screening provided by the development. Brixham Street will be exposed to a significant increase in ground noise, due to the closer proximity of this site to the new aircraft stands.</p> <p>Some areas will see a reduction in traffic noise as a result of the easterly access road being opened up taking traffic away from roads to the west. Although properties located on Woodman Street (the closest residential area to the new access road) will be exposed to a new traffic source.</p>	<p>prior to departure and landing.</p> <p>In addition, the Airport will continue to operate and, where appropriate, seek to improve the various noise mitigation measures in place at the Airport that have successfully ensured that noise effects to the local community have been, and will continue to be, controlled to acceptable levels.</p> <p>All aircraft operating at the Airport must lie within one of the categories or noise limits set out in the Aircraft Categorisation System as agreed with the LBN.</p>	<p>treatment under the Airport's Sound Insulation Scheme. The residual road traffic noise impacts have been assessed as <b>negligible adverse</b>.</p>
Chapter 9- Air Quality	Construction	Dust from construction related activities such as the demolition, earthworks, construction and track-out activities are likely to occur. The dust emission class for the construction related works is judged to be large.	During demolition and construction it will be necessary to apply a package of measures to minimise dust emissions, as part of the CADP Construction Environmental Management Plan (CEMP). The IAQM guidance on monitoring during demolition and construction is used to set out mitigation measures. For dust, a Dust Management Plan which is approved by LBN will be implemented which is to include monitoring of dust through daily on-site and off site inspections and recording dust and complaints.	There is still a risk of slight adverse dust effects during both demolition and construction works even with mitigation. However, the effects are likely to be short lived and only occur during dry and windy periods, therefore the residual effects are assessed as <b>slight adverse</b> .
	Completed	During operation, the predicted concentrations of nitrogen dioxide, PM10	The Airport has already instigated a programme of measures within its	The mitigation measures embedded in the existing Action Plan or within

Topic		Summary of Impacts	Proposed Mitigation	Residual Effects
	Development	<p>and PM2.5 are all below the objectives and limit values, whether the proposed CADP proceeds or not. A large number of properties would experience imperceptible increases to pollutant concentrations; however, with the introduction of the new eastern access to Hartmann road, those properties at the western access point (close to Camel Road) would experience a reduction in concentrations.</p> <p>The overall air quality impact of the proposed CADP is judged to be insignificant.</p>	<p>Air Quality Action Plan which will further minimise any impacts in future years. In addition, a number of measures to reduce pollutant emissions have been embedded in the CADP proposals. These include the provision of FEGP to all new stands; the introduction of measures to prohibit idling by stationary taxis; the reduction of traffic flows along the western part of Hartmann Road by provision of the eastern access point; the provision of new Energy Centres with a high level of NOx abatement; and the development of an updated Airport Travel Plan.</p>	<p>the CADP proposals have been taken into account in the air quality assessment. With regard to the London Councils guidance, it is judged that residual effects on air quality are <b>insignificant</b>.</p>
Chapter 10- Townscape and Visual	Construction	<p>Construction phase visual effects will be of a temporary nature (7 year construction period). On-going disturbance to landscape features and indirect visual effects arising from the demolition and construction activities and views of stored materials and plant, such as cranes.</p> <p>During the construction phase, the significance of effects was found to be the same as for the completed CADP at 8 of the 12 representative viewpoints. Some slightly more adverse effects were identified for receptors in the vicinity of the other four representative viewpoints. However, these additional effects would only be of a temporary, short term nature.</p> <p>Many views of the construction works will be experienced from upper floor windows of apartment buildings and from elevated</p>	<p>During the construction phase it is recommended that additional screen fencing is provided on the southern site boundary in the Newland Street / Leonard Street area of Silvertown. This will act to screen construction works to the Terminal building and Forecourt area from adjacent residential areas.</p>	<p>The screening is unlikely to be sufficient to alter the magnitude of visual effects completely; therefore <b>likely significant visual effects</b> remain for a small portion of dwellings located in Silvertown.</p>

Topic		Summary of Impacts	Proposed Mitigation	Residual Effects
		locations such as the deck of Sir Steve Redgrave Bridge. As such, it will not be possible to provide an effective visual screen from such locations.		
	Completed Development	<p>Within 500m of the Application Site, likely significant visual effects from the proposed CADP have been identified from publicly accessible locations on the north side of Royal Albert Dock. Also, a small number of apartments, within 100m of the Application Site, with north facing 2nd or 3rd floor windows, in Silvertown to the south of the Airport, would experience likely significant adverse effects. However, these receptors represent a very small proportion of the total number of dwellings in Silvertown, the majority of which would experience effects ranging between Negligible and Minor to Moderate Adverse and no dwellings in any other part of the study area would experience any likely significant adverse effect.</p> <p>No significant visual effects have been identified beyond 500m of the Application Site and no significant visual effects were identified on the long distance east to west, open views experienced down the Docks from publicly accessible locations in the vicinity of Woolwich Manor Way and Connaught Bridge.</p> <p>Ten townscape Character Areas (CAs) have been identified within the area covered by the ZTV of which only one (the Royal Docks CA) would be directly affected by the proposed CADP.</p>	<p>The Eastern Pier, extended Terminal and Hotel will be the most visually intrusive parts of the proposed CADP and will obstruct existing open views from a few locations to the south. These buildings will also be clearly visible from dockside areas and from residential areas including areas in relative close proximity at Silvertown to the south. The appearance of these buildings will therefore be of importance to the townscape character of the Docks area and in views experienced from locations around the Docks. A high quality of design is therefore proposed, as described in the DAS prepared by the architects.</p> <p>The planting strategy for the proposed CADP includes a minimum of 5% planting in the parking layouts with shrubs and low hedges and small areas of planting at the end of parking rows. Some cube-headed Hornbeam trees will also be planted to the south of the Terminal and within the proposed Forecourt. Planting will provide the benefit of some localised screening of the parking areas and other structures. Larger specimen trees,</p>	<p>The proposed landscaping is unlikely to fully mitigate or reduce adverse townscape or visual effects due to the operational constraints of the airfield. The small number of dwellings that would experience significant views during construction would have slightly more attractive <b>moderate to substantial adverse</b> views during the operational phase due to the completed buildings.</p> <p>No significant visual effects have been identified beyond 500m.</p> <p>None of the effects on townscape character including those on the Royal Docks CA, are regarded as significant.</p>



Topic		Summary of Impacts	Proposed Mitigation	Residual Effects
			whilst offering the potential benefit of better visual screening, could attract nesting birds and, moreover, are considered an alien feature in the historic dockside environment.	
Chapter 11 Traffic and Transport	Construction	<p>Additional traffic on the local highways network from the deliveries of construction related material. Where possible, material will be transported by river, in order to minimise impact on the local roads.</p> <p>The peak number of HGV vehicle movements is anticipated to be in the region of 626 two-way trips per month during Year 4 to the middle of Year 7 of the construction programme. The peak number of construction staff vehicle movements is anticipated to be 125 two-way trips per day.</p>	A Construction Logistics Plan (CLP) will be prepared and agreed with LBN in order to provide appropriate mitigation measures, this will specify designated construction traffic routes to / from the Airport and proposed dust and noise suppression measures.	With the implemented mitigation measures set out in the CLP some residual effects are likely to remain for traffic and transport, therefore there is likely to be <b>temporary, minor adverse effects</b> .
	Completed Development	<p>The transport assessment demonstrates will be an increase in traffic on some links and a reduction in traffic on other links. This is because of the creation of an additional vehicle access point to the Airport from Woolwich Manor Way through to Hartmann Road (East), which results in a redistribution of Airport-related traffic and a reduction in traffic on some links.</p> <p>There would not be a significant change in driver delays across the road networks. Consequently, the increased vehicular activity at the Airport should not lead to a net increase in pedestrian delay.</p> <p>The proposed CADP will provide a new dockside path, creating a new pedestrian link from the east and additional cycle parking will also be provided to encourage</p>	<p>The Airport has implemented a Travel Plan to reduce single occupancy car journeys to and from the Airport. This contains targets to encourage sustainable travel by car sharing as well as non-car modes.</p> <p>The Staff Travel Plan will also look to encourage staff to travel to work sustainably.</p> <p>A Taxi Management Plan (TMP) will be implemented to manage the arrangements for black taxis and private hire minicabs, minimising the effects on the road network and on Hartmann Road in particular.</p> <p>A Delivery and Servicing Plan (DSP) will also be prepared and will</p>	<p>With the implementation of the Travel Plan, TMP and DSP, overall, the residual effect from the change in traffic flows is <b>Minor Adverse</b>.</p> <p>The proposed CADP would generate an increase in number of journeys by public transport, and bring about a <b>minor beneficial</b> impact in the form of increased revenue to the public transportation networks.</p> <p>With the continued effect of the Travel Plan in promoting sustainable transport modes, as well as the creation of an additional vehicle access to the Airport, the likely residual effects on the environmental effects such as</p>

Topic		Summary of Impacts	Proposed Mitigation	Residual Effects
		<p>cycling.</p> <p>Crowding on the DLR will not be significantly exacerbated by the proposed CADP</p>	<p>be implemented to ensure that delivery and servicing activity can take place in a safe, efficient and sustainable manner.</p>	<p>Severance, Pedestrian Delay, Pedestrian Amenity and Fear and Intimidation are expected to be <b>negligible</b>.</p>
Chapter 12- Water Resources and Flood Risk	Construction	<p>During construction works there is potential for a tidal flood to occur and, uncontrolled surface water runoff from the Application Site.</p> <p>There is potential for construction materials, fuels, lubricants, debris and sediment entering the water as a result of construction activities, or by accident. There is also the potential for sediments to be washed off-site within runoff, and cause silting within KGV Dock.</p> <p>Piling may pose the risk of the release of contaminated sediment. As well as contaminates entering KGV Dock from washed away stockpiling and cause silting within the dock, which could consequently threaten the aquatic habitat.</p>	<p>The existing surface water drainage gullies will be maintained and used as long as possible during construction.</p> <p>The majority of the development is either over KGV Dock or not positively drained at present. However, an effective CEMP will help to ensure that sediment, oils, lubricants and other contaminants will not be released.</p> <p>A water quality monitoring regime will be established during the piling works to inform the process and any action necessary to ensure that no adverse effects arise, this will involve: The prevention of silt-laden run-off and mud entering the site surface water drains, and KGV Dock and, good housekeeping (i.e. appropriate storage of construction materials, fuels/lubricants and waste).</p>	<p>The residual effects associated with surface water runoff and water quality is considered to be <b>negligible</b>.</p>
	Completed Development	<p>Whilst the Airport is located within an area at risk of flooding, the risk is 'residual' based on the presence of the River Thames defences. There will be no loss in floodplain storage and no alteration of flood flow routes as a result of the proposed</p>	<p>The proposed CADP will incorporate flood mitigation measures and a Flood Management Plan as detailed within the Flood Risk Assessment</p> <p>The Airport is registered with the</p>	<p>There will be a <b>negligible</b> effect on flood risk to the new East Pier, Eastern and Western Terminal extensions, the hotel and other occupied buildings within the Airport.</p>

Topic		Summary of Impacts	Proposed Mitigation	Residual Effects
		<p>CADP.</p> <p>Modeling indicates potential for an increase in surface flooding of the airfield and some landside areas during extreme storm events. However this increase is not considered to be excessive to the Airport operation and will only occur for a short time period after an extreme flood event.</p> <p>A number of options for drainage of the CADP site have been explored and the drainage strategy consists of a range of suitable Sustainable Drainage Systems (SUDS), which will aim to limit flows to the existing sewers as far as possible. The strategy centres on the use of attenuation tanks with oil separators across the site, appropriately sized to reduce the existing flow to greenfield runoff rates. The new East Passenger Pier and the Arrivals Building roof drainage is intended to discharge directly to the dock due to the clean nature of this discharge. A rainwater harvesting system is also proposed, which stores rainwater collected from the new Terminal roof and provides water to irrigate the landscaping in the forecourt area.</p> <p>The Proposed Surface Water Drainage Strategy identifies that discharge flow rate to the existing sewer network will be reduced in the magnitude of 60% to 65% for the 1 in 30 year plus 20% allowance for climate change event and up to 86% for the 1 in 100 year plus 20% allowance for climate change event.</p>	<p>EA's Flood Warning Service for the River Thames, as detailed within the Flood Risk Assessment. This ensures there is sufficient time to evacuate in the unlikely occurrence of an extreme flood event.</p> <p>The Proposed Surface Water Drainage Strategy will reduce discharge flow rates and utilise SUDS techniques.</p> <p>The Airport is in advanced discussions with the EA and Thames Water regarding acceptance of the environmental strategy for the existing airfield drainage, it is likely that this will be dealt with under the Airports Environmental Permit.</p>	<p>The Proposed Surface Water Drainage Strategy identifies that discharge flow rates to the existing sewer network will be reduced. This reduction is considered to be a <b>moderate beneficial</b> effect.</p>

Topic		Summary of Impacts	Proposed Mitigation	Residual Effects
Chapter 13- Ecology and Biodiversity	Construction	<p>Although the Application Site is part of the Royal Docks Site of Nature Conservation Interest of Metropolitan Importance, it has overall low biodiversity value, partly due its urbanised nature within a heavily urbanised area and partly as result of the management of the Airport to minimise the risk of bird strikes.</p> <p>The walls of KGV Dock support a significant biomass of invertebrates and this will be lost when the wall is covered over by the Eastern Apron. The invertebrates are a potential food source for the fish population and it is proposed to create a replacement habitat in the form of screens along the side of the Eastern Apron.</p> <p>The limnology of the site was found to be uniform in both open and covered water areas presenting a water column stratified with respect to salinity and oxygen. Measures will be implemented as part of the construction process to ensure that the stratification is not disrupted</p> <p>There will be no activities associated with the proposed CADP construction phase that would damage any of the habitats considered to be of interest for breeding birds.</p>	<p>To compensate for the loss of Dock wall habitat, the CADP proposes to introduce replacement substrate in the form of parallel wire mesh screens, suspended at the water surface down to a depth of 3.0 m below the high water level. The detailed design of this artificial habitat will be discussed and agreed with both the Environment Agency and the Royal Docks Management Authority (RoDMA). The construction for this is likely to occur prior to the demolition/ construction of the new apron to allow enough time for the habitat to grow.</p> <p>Where appropriate, existing trees will be checked for nesting birds prior to their removal in accordance with the Wildlife and Countryside Act.</p>	<p>The introduction of the wire mesh screen will provide refugia for fish fry. However given that the final details of this mitigation have not yet been agreed or finalised, an assessment is made of the significance of impact without the mitigation. On this basis, it is considered that the direct loss of Dock wall habitat as a result of the proposed CADP will have a <b>minor</b> impact on the aquatic invertebrates and fish fauna.</p> <p>For all other impacts, there is likely to be <b>no significant residual effect</b> after taking account of the proposed mitigation.</p>
	Completed Development	<p>The proposed CADP will result in the direct loss of approximately 75,000m<sup>2</sup> of surface water area (approximately 18% of the total existing water area in KGV Dock) and approximately 1,800m<sup>2</sup> of dock wall habitat from KGV Dock where the new stands and eastern taxi lane will be constructed. This</p>	<p>A replacement habitat in the form of screens along the side of the Eastern Apron will be implemented before construction with enough for this potential food source to be re-instated once the proposed CADP is operational.</p>	<p>It is concluded that whilst there will a loss of area of aquatic habitat that is exposed to sunlight from KGV Dock, in ecological terms the direct loss of habitat will not affect the functionality or viability of the Royal Docks SBINC. Therefore, the direct</p>

Topic		Summary of Impacts	Proposed Mitigation	Residual Effects
		<p>support a significant biomass of invertebrates which are potential food source for the fish population.</p> <p>All other potential effects to ecology and biodiversity are judged to not be significant.</p>	Measures will be taken to ensure that the quality of all drainage water discharged into KGV Dock meets appropriate discharge limits, such as Biological Oxygen Demand (BOD), and does not create any adverse effects to the ecology of KGV Dock. A discharge permit and conditions will be agreed with the Environment Agency and RoDMA.	<p>loss of habitat resulting from the completed CADP is a <b>negligible permanent adverse</b> impact on the aquatic habitat that is not significant.</p> <p>For all other impacts, there is likely to be <b>no significant residual effect</b> after taking account of the proposed mitigation</p>
Chapter 14- Cultural Heritage	Construction	<p>The Airport and Application Site is located within a LBN designated Archaeological Priority Area. The priority area specifically excludes the area of the water of the Royal Albert Dock and KGV Dock. Much of the development would occur over the latter. There are no Scheduled Ancient Monuments within the Search Area and eight listed buildings. There are a number of statutorily and locally listed buildings within the vicinity of the Airport. The docks are not listed and are not within a designated Conservation Area.</p> <p>Archaeological remains are presently unknown at the site. The desk-based assessment would suggest that any archaeological deposits and remains that may be present will vary from low to medium in significance.</p>	Discussions with the Archaeological Adviser to LBN have suggested that approaches to evaluation and mitigation of these impacts can be addressed through the placing of archaeological planning conditions on any consent.	<p>The Magnitude of Impact on the setting of the dock has been assessed to be Moderate with the overall effect on setting being a <b>Minor</b> effect.</p> <p>The majority of direct effects on the individual structural components of KGV Dock are considered to be Minor, although the effects on buried archaeological remains could vary from Negligible to High. However, information provided within the DBA suggests that any archaeological deposits and remains, that may be present, will vary from Low to Medium significance, leading to an effect that could vary from <b>Neutral to Moderate</b>.</p>
	Completed Development	There is a potential impact to the setting of the KGV Dock as well as impacts to 8 statutorily listed buildings, consisting of 7 Grade II and 1 Grade II* listed buildings.	Discussions with the Archaeological Adviser to the LBN have indicated that approaches to mitigating impacts on setting of historical features of the KGV Docks could be addressed by the placing of "historic building recording" planning	Publication of the results of "historic building recording" will enhance knowledge of recently identified heritage assets and LBN's Archaeological Priority Area.

Topic		Summary of Impacts	Proposed Mitigation	Residual Effects
			conditions on any planning permission.	
Chapter 17 - Waste	Construction	<p>The one-off volume of demolition, earthworks, piling and foundation spoil, and other construction waste will exceed the current baseline waste volume, however this is unlikely to significantly impact the existing and proposed waste management infrastructure.</p> <p>Where possible construction waste will be re-used on-site; over 90% of waste material is to be targeted to be re-cycled, re-used or otherwise diverted away from landfill.</p>	During the construction phase, waste will be segregated and stored on-site within a dedicated compound pending its onward transfer. Within Greater London, there is a significant commitment to improving the existing waste management infrastructure in order to deal with increasing waste generation across the capital and achieve the targets set by the London Plan.	Overall, environmental effects from waste produced during the construction phase would be <b>Negligible to Minor Adverse</b> (at worst).
	Completed Development	<p>Waste production at the Airport will increase under the proposed CADP due to the increase in the number of arriving and departing passengers, and the associated enlargement of passenger facilities within the terminal buildings.</p> <p>Volumes of waste generated as a result of the proposed CADP are relatively small. Additional waste is therefore not likely to adversely impact existing and proposed infrastructure.</p>	Within the Airport's Sustainability Strategy, the Airport propose to minimise operational waste production and promote sustainability by monitoring waste leaving the Airport more closely, raise awareness to staff on recycling and develop ways to monitor how and where waste is generated at the Airport.	Overall, environmental effects from waste produced during the construction phase would be <b>Negligible to Minor Adverse</b> (at worst).
Chapter 16 - Ground Contamination	Construction	<p>A number of potentially contaminative current and historical land uses have been identified both within the Application Site and on sites in proximity to the Airport. Within the landside development areas, the principal historical sources of contamination include the former composition and paint works in the west, a former works in the central area and the fill used to create the</p>	Waste soils arising from the site, including pile arisings, will be disposed of in accordance with the relevant statutes and Duty of Care Regulations. A Site Waste Management Plan (SWMP). Adherence to the CEMP and relevant legislative requirements will significantly reduce any risks posed	There are potential risks to sensitive receptors, such as construction workers, end users and controlled waters, from the disturbance and mobilisation of ground contamination. However, these can be appropriately mitigated through the implementation of environmental management plan, therefore the



Topic		Summary of Impacts	Proposed Mitigation	Residual Effects
		<p>new wharf during construction of KGV Dock. Current sources of contamination include fuel storage areas and a steel yard.</p> <p>The removal of hardstanding could potentially cause contaminants to migrate off-site via wind-blown dust and soil particles. Arisings, generated during land-side piling activities could pose an environmental risk if not stored and disposed of in a responsible manner.</p> <p>The piling process has the potential to generate preferential pathways for the vertical migration of contaminants within shallow soils, the dock sediments or perched groundwater and could also disturb dock sediment releasing previously unidentified contaminants.</p>	<p>to construction site workers by minimising the risk of inhalation, ingestion or contact with contaminated soil, sediment, dust, groundwater or contaminated surface water run-off.</p> <p>A watching brief will be carried out during construction for previously unidentified contamination. Any contamination encountered during the works will be investigated and dealt with appropriately through disposal or containment.</p>	<p>residual effects are <b>negligible</b> to or <b>minor beneficial</b>.</p>
	Completed Development	<p>A number of materials and substances will be stored, including aviation fuel, de-icing fluid and waste materials (e.g. waste oil and jet slops) which could potentially impact the quality of water resources.</p> <p>No significant soil or groundwater contamination has been identified therefore risks are considered to be low.</p> <p>The risks to surface water receptors are also considered to be low due to the absence of significant contamination within the development area and because the neighbouring docks are lined, preventing migration of contamination into these water bodies.</p> <p>The proposed CADP will predominantly be surfaced with building and hardstanding.</p>	<p>The new site drainage system will be fitted with oil interceptors and other pollution controls which will be regularly monitored, cleaned and maintained.</p>	<p>No on-going issues are anticipated following redevelopment of the site and the existing management procedures in place at the Airport will ensure that the operation of the built-out CADP will not result in future adverse effects.</p> <p>Assuming the proposed mitigation measures are adopted, residual effects arising from ground conditions at the site are considered to be of <b>negligible</b> or <b>minor beneficial</b> significance</p>

Topic		Summary of Impacts	Proposed Mitigation	Residual Effects
		There is therefore limited potential for off-site migration of contamination within airborne soil particles or dust to human and ecological receptors.		
Chapter 17 Climate Change	Construction	At this stage the design of the proposed CADP has not progressed to a point at which details of the precise amounts of construction materials can be estimated, however, it is likely that construction-phase embodied carbon and transport emissions would be of relatively low significance compared to the Airport's cumulative emissions over ongoing years of operation, with or without the development.	Scope for mitigation of construction phase GHG emissions exists in the form of efficient materials use (including recycled materials), use of efficient delivery options, and use of well-maintained, fuel-efficient construction plant.	Construction phase impacts have not been assessed, since due to their temporary nature they are assumed to be <b>minor</b> compared to ongoing operational impacts.
	Completed Development	<p>The carbon assessment demonstrates that although the Airport's growth, driven by increasing passenger demand, leads to greater total GHG emissions than in the baseline year, this would be the case with or without the proposed CADP due to the forecast additional demand.</p> <p>Importantly however, with development, total emissions on a per-passenger basis are predicted to be only slightly greater (2.4%) in the future year with the proposed CADP, compared to the future year without development, and they would be slightly less (-4.9%) when compared with the baseline GHG emissions per passenger.</p> <p>This is due to the fact that the proposed CADP will allow the Airport to accommodate greater passenger numbers in energy-efficient new Terminal buildings, and the fact that in the future year, the composition of the fleet of aircraft using the</p>	No further mitigation is recommended, as the proposed CADP will allow the Airport to meet increased passenger demand while keeping GHG emissions per passenger stable, in line with its adopted Sustainability Strategy and Airport Sustainability Action Plan (2012).	<p>Overall, it is predicted that the proposed CADP will enable the Airport to accommodate the predicted 32% increase in passenger numbers with only a small increase in GHG emissions per passenger (within the assumptions of the assessment), compared to if the development did not proceed.</p> <p>In the future year (2023), the Airport's GHG emissions with the proposed CADP are estimated to be greater than if the development did not proceed. However, the proposed CADP will allow the Airport to accommodate greater passenger numbers and aircraft movements, as consented by the 2009 planning permissions, than if the development did not proceed and will also allow greater use of new,</p>

Topic		Summary of Impacts	Proposed Mitigation	Residual Effects
		Airport (with development) is predicted to include an increased number of larger and more efficient models, which have less LTO GHG emissions per passenger.		more efficient aircraft models. GHG emissions on a per-passenger basis With development, therefore, are predicted to be marginally lower in the future year compared to the baseline year and only slightly greater compared to the without development scenario.

## Conclusion

- 19.6 It has been concluded that there is a need for the proposed CADP in order to support broader economic objectives and, consistent with Government aviation policy, to optimise the use of existing runway capacity at airports in the short to medium term. Without the proposed CADP, growth at the Airport will be less sustainable and there would be an adverse impact on business travel demand, particularly inbound business travellers to London.
- 19.7 The proposed CADP will enable the Airport to respond to forecast growth in both aircraft and passenger numbers (particularly at peak periods) and to accommodate new generation aircraft which are physically larger, but also more fuel efficient and quieter than the current fleet.
- 19.8 The ES concludes that the various environmental effects of the proposed CADP will be both positive and negative, ranging in significance from 'negligible' to 'substantial'. Importantly, no significant adverse effects have been identified which could not be adequately mitigated through appropriate environmental controls, including those already in place at the Airport and incorporated through the 2009 planning permission and Planning Agreement. With regard to the key impacts of noise, air quality and climate change, the proposed CADP will result in absolute increases in these emissions. However, the impacts will be proportionately less than in the 'without development' scenario and no breaches in statutory limits are predicted. They are therefore not assessed as being significant.
- 19.9 With regards to noise in particular, the Airport has provided protection to those people close to the Airport, and thus most affected by noise, via the Sound Insulation Scheme, which has been in place for many years. The Airport will continue to operate the Sound Insulation Scheme using the most stringent UK airport daytime trigger limit of 57 dB  $L_{Aeq,16h}$  as a First Tier eligibility criterion, whilst also continuing to apply a Second Tier eligibility criterion offering an enhanced scheme at 66 dB  $L_{Aeq,16h}$  thereby protecting all eligible housing and community buildings that come into these contours. In addition, the Airport will improve the scheme by offering those people most affected by noise, that is, those within the 66 dB  $L_{Aeq,16h}$  contour, improved secondary glazing or a 100% monetary contribution towards high acoustic performance thermal double glazing, together with acoustic ventilation. This will ensure that all of those most affected by noise are afforded the maximum noise protection opportunity.
- 19.10 At the local level, a small number of apartments with north facing 2nd or 3rd floor windows within 100m of the Application Site in Silvertown (to the south of the Airport) would experience likely significant adverse visual effects. However, these receptors represent a very small proportion of the total number of dwellings in Silvertown and no dwellings in any other part of the Study Area are considered likely to experience significant adverse effects. In addition, the visual effect should be seen within the context of the existing Airport and its urbanised surroundings, as a degree of impact on all views would continue to occur with or without the proposed development.
- 19.11 There will be significant economic, environmental and sustainability benefits brought forward by the proposed CADP. Some of these beneficial effects are described more fully within other documents submitted with the planning application, including the Planning Statement, Need

Statement, Transport Assessment and Design and Access Statement. In summary, the ES has identified that the proposed CADP development will deliver the following key benefits:

- a) Construction of seven new aircraft stands to accommodate larger, more fuel efficient aircrafts, allowing the Airport to reach its optimum potential consistent with Government policy towards airports in securing the better use of an existing runway.
- b) Overall, taking all types of employment into account, the CADP proposals would generate an increase in local employment of approximately 1,500 compared to 2012, when the full impact of the hotel is taken into account.
- c) The Proposed Surface Water Drainage Strategy identifies use of attenuation tanks and suitable Sustainable Drainage Systems (SUDS) to reduce the existing discharge flow rate to greenfield runoff rates.
- d) Bespoke wire mesh fish refugia constructed to the dock wall will help re-instate the fish food source that would be otherwise be lost from the construction of the extended apron.
- e) The provision of a new dockside path, creating a new pedestrian link from the east, and additional cycle parking to help encourage walking and cycling over use of the private car. The Travel Plans will promote sustainable modes of transportation to and from the Airport.
- f) The proposed CADP is also expected to generate increased revenue to public transportation links due to increased passenger numbers, with beneficial knock-on effects for users of the local bus and tube services. In the UK the Airport currently has the highest proportion of passengers using public transport (69%). This is expected to rise to 72% with the proposed CADP.

19.12 Where impacts have been identified as part of the assessment of effects during either the construction or the operational stage of the proposed development, appropriate mitigation measures have been recommended in order to minimise these effects to acceptable, non significant levels.

19.13 The full realisation of the identified social, economic and environmental benefits of the proposed development will be taken forward through the detailed design process, including the confirmation of mitigation and enhancement measures recommended in this ES, in consultation with appropriate statutory and non-statutory stakeholders. Where necessary, additional technical and environmental assessments will be undertaken to support these detailed designs, which will be the subject of Section 106 planning agreements with LBN. This will ensure that the environmental effects of the proposed development will remain consistent with, or improve upon, those concluded within this ES.