Technical Note

Project:	London City Airport CADP1		
Subject:	Response to GLA Stage 1 Report, Sustainability and Environment		
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Date:	25/04/2023	Project No.:	5213978
Distribution:	Sean Bashforth (Quod)	Representing:	London City Airport

This technical note responds to the sustainability and environment comments at paragraphs 47 to 53 of the GLA Stage 1 Report dated 20 March 2023 (Ref: GLA/2023/0094/S1/01) which provided comments on the Section 73 application to vary conditions attached to the CADP1 planning permission 13/01228/FUL.

Paragraph 47: *The London Plan requires all major developments to meet a net-zero carbon target. Reductions in carbon emissions beyond Part L of the 2013 Building Regulations should be met on-site. Only where it is clearly demonstrated that the zero-carbon target cannot be fully achieved on-site a contribution to a carbon offset fund or reductions provided off site can be considered*.

Response: Paragraph 47 is a statement only. The CADP1 scheme was designed in 2013 and approved by the Secretary of State in 2016. The approved works remain as per the 2016 consent (as amended) and are not proposed to change as part of the current Section 73 application. Construction commenced in 2017 and continued until the end of 2020 when works were paused due to the effects of the Covid-19 pandemic. Prior to the pause of construction, the major civil engineering works associated with CADP1; namely, the construction of the new taxiway adjacent to the runway and the creation of a concrete deck over King George V Dock to provide the 8 new aircraft stands, were completed as well as the foundations and deck for the East Terminal Extension (ETE) and New East Pier (NEP) and erection of the East Energy Centre (EEC) envelope. When construction restarts, it is expected that the remaining terminal buildings will be built out in accordance with the previously approved plans.

The Revised Energy and Low-Carbon Strategy which was submitted with the Section 73 application was prepared based on a detailed review of the approved design and identifies where the approved design could be enhanced to align with the London Plan and other contemporary guidance as well as to better aligning to the airport's Net Zero ambitions. The revised strategy then outlines the steps to enhance the performance of the approved design which are being progressed as part of the proposed amendments. The improvements to the previously approved design are likely to cost in the region of £11-16 million above the costs of the previously approved strategy and include:

1. **Further efficiencies to the previously approved terminal design**:

(a) Reduction in air leakage through the building(s) envelope.

(b) Improving the efficiency of air handling units, heat recovery and air-cooled chillers.

(c) Providing luminaire efficacy of 110 lumens / circuit Watt, compared to 85 lumens / circuit Watt, with more effective lighting control.

(d) Installing kitchen extract heat recovery systems for commercial application.

(e) Replacing high air volume/energy systems with local systems, reducing auxiliary power demand.

2**. Replacing the previously approved gas fired CHP system with a more sustainable onsite heat network**:
(a) A combination of Air Source and Water Source Heat Pumps to deliver low temperature hot water (LTHW) at a Coefficient of Performance (COP) of 2.8 to serve both space heating and domestic hot water, in lieu of gas fired systems.
(b) Allowance for valved and capped connections and space for heat exchangers to allow future connectivity to a district heating scheme should a commercially and technically viable solution come forward.

3. **Delivering almost 1,200m² of Photovoltaic (PV) panels on the roof of the CADP1 terminal buildings and piers**.

Paragraph 48: *An energy statement has been submitted with the application. The energy statement does not yet comply with Policies SI2, SI3 and SI4 of the London Plan. The applicant is required to further refine the energy strategy and submit further information to fully comply with London Plan requirements. Full details have been provided to the Council and applicant in a technical memo that should be responded to in full; however outstanding policy requirements include:*

- *Be Lean – justification of modelling assumptions;*
- *Be Clean – further exploration of DHN potential with network operator and energy strategy to be futureproofed for connection to future DHN;*
- *Be Green – demonstration that renewable energy has been maximised, including roof layouts showing the extent of PV provision and details of the proposed air source heat pumps;*
- *Be Seen – confirmation of compliance with this element of policy, with compliance to be secured within the S106 agreement;*
- *Energy infrastructure – further details on the design of future district heating network connection is required, the future connection to the DHN must be secured by condition or obligation.*.

Response:

‘Be Lean’ Thermal Model Inputs & Assumptions

The summary of the energy modelling inputs that were used are shown in Appendix A.

It should be noted that, during the time of the modelling, photovoltaic (PV) panels were excluded as part of the modelling, as the thermal model was looking at optimising the design towards Net Zero of the building itself and modelled the PV separately. For clarity, the already approved CADP1 development includes for 1165m^2 of PV panels, as explained in ‘Be Green’ section below.

‘Be Clean’ DHN potential

There is no immediate availability for a decentralised heat network supply in the proximity of the site.

The Eastern Energy Centre (EEC) safeguards for a connection to a future district heating system should one come forward in the future that is reliable, commercially viable and technically feasible. The measures installed in the EEC include an allowance for future heat exchangers and valved and capped off pipework connections.

In 2012, LBN commissioned an energy infrastructure report for the Royal Docks and Canning Town, as highlighted in the previous 2013 Strategy. The report noted the potential for district heating schemes to be created but there was uncertainty around the long-term future of the major heat production opportunities identified (as experienced with the delay of the London Thames Gateway Heat Network). Since CADP1 was approved in 2016, to our knowledge no new schemes have come online in the vicinity of the site.

As part of the preparation of the Revised Energy and Low Carbon Strategy that accompanied the S73 application, investigation into the current feasibility of a 'District Heating' connection took place through discussions held with the GLA, GLA Royal Docks Team, E.ON and Equans.

Discussions have taken place with E.ON regarding its proposed District Heating and Ectogrid schemes at Silvertown and these are being progressed to establish whether a future connection to the airport might be feasible and viable.

The next steps would involve the technical teams identifying a possible DHN route, which connects the Energy Centre at LCY with a heat offtake substation located at Tate & Lyle Sugar Factory. This would involve traversing the existing railway line and finding a suitable route that could be possible however, it is likely to requires approx. 1.5 km of trench (3km of pipework) and a separate agreement with Tate & Lyle for the waste heat connection. It would also require analysis from EON and the airport on whether any such scheme could be financially viable or not.

The previously approved 2013 Energy and Low Carbon Strategy (LBN Ref. 13/01228/FUL) includes an onsite decentralised heat supply system connected to the EEC only. This ensures the required resilience and remains a fundamental part of CADP1 (while also safeguarding for future connections to district heating). The Revised Strategy ensures this approach is maintained awaiting a viable option for connection to a future DHN.

The CADP1 heat network will be phased as the CADP1 buildings are delivered and will contribute to meet the demand for heating and domestic hot water in the new CADP1 terminal buildings.

'Be Green' Maximising Renewable Energy

Current PV Design

The approved CADP1 works include 1,165m^2 of PV panels, the details of which were approved by LBN in 2019 under condition 64 of the CADP1 consent (approval ref.19/02559/AOD).

Specification of the approved PV details are shown in Figure 0-1 below.

Item	
PV Cell Type	Monocrystalline
PV Panel Dimensions (mm x mm x mm)	1689 x 996 x 35
Weight (kg)	18.7
Max load	Static Load, Front: 5400Pa, Back: 2400Pa
Power Output per Panel (W_{max}) @ STC	340Wp
Number of Panels	457 units
Efficiency (%)	20.2
Maximum Power Voltage (V Vmp)	34.63
Maximum Power Current (A Imp)	9.82
Orientation and vertical inclination of the PV modules	South-facing and 10 degrees respectively

Figure 0-1 - PV panel details as approved by London Borough of Newham under Condition 64

The output of the above would reduce carbon emissions by circa 22,346 kgCO_2e/yr.

Maximising PV provision:

No changes were proposed within the Section 73 application to the existing PV provision on the terminal buildings, however, we have reviewed the current level of photovoltaics associated with the approved CADP1 development and believe that subject to further feasibility and design analysis, further provision could be accommodated.

The additional areas where PV might be accommodated are shown on the plan included at Appendix B and include some areas on top of the Eastern Terminal Extension (ETE) and ETE 'Gold Box'.

There may also be other areas but these were modest arrays between 5-15 PVs and they were discounted as roofs already contain mechanical equipment or roof-light in many cases.

Further detailed design and feasibility will be required in order to fully develop the above opportunities for additional PV. Subject to completion, the airport will re-submit details for approval to LBN under condition 64 of the CADP1 consent.

Subject to approval of details, it is estimated that the above opportunity could yield an additional 830m^2 of PV panels equating to a further carbon emissions reduction of circa 15,920 $kgCO_2e$/yr.

The airport has published its Sustainability Roadmap that sets out its ambitions to become London's first net zero emissions airport (Scope 1 and 2) by 2030. While not part of the CADP1 development, these ambitions are likely to be delivered over a similar timescale. To achieve the ambitions set out in the Sustainability Strategy, the airport is likely to make a further significant investment in solar technology to supplement the approved CADP1 development. The future investment, which would be subject to detailed feasibility and securing the necessary consents and could be accommodated through a combination of roof mounted PV on other onsite buildings, surface car parks and/or on floating pontoons in KGV Dock. This is indicatively shown Section 4 of the Benefits and Mitigation Statement which accompanied the S73 application.

Proposed Air Source Heat Pump (ASHP) details:

A heating strategy was included in the previously approved Energy and Low Carbon Strategy and Energy Assessment (LBN Ref. 13/01228/FUL) that incorporated energy efficient CHP and gas boiler systems. The CHP unit strategy included 1no. CHP unit with a 357kW thermal and a 229kW electrical output for the terminal building, and 1no. CHP unit with a 357kW thermal and a 229kW electrical output for the future Hotel. The EEC and services infrastructure were constructed between 2017 and 2020, during which period the CHP equipment was purchased ready for installation. Gas fired boiler plant and gas fired CHP now have a negative effect on carbon emissions compared to alternative systems and are therefore no longer appropriate for the CADP1 scheme and incompatible with LCY's aspiration of reaching 'net zero carbon' by 2030, as highlighted in their Sustainability Roadmap.

Despite the gas fired CHP plant already being purchased, it is now proposed to replace it and instead build out the EEC served with AIR Source Heat Pumps (ASHPs) to further reduce carbon emissions compared to the previously approved CADP1 scheme. The ASHPs will heat water to 45°C and then a Water Source Heat Pump (WSHP) will heat the water from 45°C to 78°C. It is proposed to have 5no. i-FX-N-G05/A-1152 Air source Heat Pumps at 769 kW, with 16no. EW-HT/0612 WSHP's at 280.4 kW.

The details of the heat pumps provisional selections are shown in Appendix C and Appendix D.

'Be Seen' Energy Monitoring

Although the Be Seen' energy monitoring guidance were only issued in September 2021 and not in place when CADP1 was first submitted for planning or when permission was granted. The airport has reviewed this document and, where practically possible, will comply with the following:

a) Prior to each Building being occupied, LCY will provide updated accurate and verified 'as-built' design estimates of the 'Be Seen' energy performance indicators for each building of the development, as per the methodology outlined in the energy monitoring guidance.

   All data and supporting evidence will be submitted to the GLA.

LCY will also confirm that suitable monitoring devices have been installed and maintained for the monitoring of the in-use energy performance indicators.

b) Upon completion of the first year of Occupation or following the end of the Defects Liability Period and for the following four years after that date, LCY will provide accurate and verified annual in-use energy performance data for each building of the development as per the methodology outlined in the energy monitoring guidance document.

   All data and supporting evidence will be submitted to the GLA.

c) In the event that the ‘In-use stage’ evidence shows that the ‘As-built stage’ performance estimates have not been or are not being met, LCY shall investigate and identify potentially causes of underperformance and review potential mitigation measures. An action plan, identifying measures which would be reasonably practicable to implement will be investigated. The action plan shall be implemented, where possible, by LCY as soon as reasonably practicable.

Paragraph 49: *For the non-domestic, the development is estimated to achieve a 46% reduction in carbon dioxide emissions compared to 2013 Building Regulations*.

Response: Statement only. No Response Required.

Paragraph 50: *The development falls short of the net zero-carbon target in Policy SI2 of the London Plan, although it meets the minimum 35% reduction on site required by policy. As such, a carbon offset payment is required to be secured. This should be calculated based on a net-zero carbon target using the GLA's recommended carbon offset price (£95/tonne) or, where a local price has been set, the borough's carbon offset price. The draft Section106 agreement should be submitted when available to evidence the agreement with the borough*.

Response: Whilst Paragraph 50 is noted, to achieve the ambitions set out in the London City Airport Sustainability Strategy, the airport is likely to make a further significant investment in solar technology to supplement the approved CADP1 development with the end result being to offset all operational energy on site associated with the entire building stock, not just CADP1. The future investment, which would be subject to detailed feasibility and securing the necessary consents and could be accommodated through a combination of roof mounted PV on other onsite buildings, surface car parks and/or on floating pontoons in KGV Dock. Works have been commissioning by London City Airport, and are currently ongoing, to review all buildings on the site of the Airport to understand the total amount of Carbon Emissions that need to be offset before details can be published.

Paragraph 51 to 53:

51. *In accordance with London Plan Policy SI2 the applicant is required to calculate and reduce whole life-cycle carbon (WLC) emissions to fully capture the development's carbon footprint. As the proposal does not include the increase in permitted aircraft movements, officers comments relate to changes resulting from surface access movements.*

52. The applicant has not submitted a full whole life-cycle carbon assessment and the reasoning that the applicant has provided as to why a WLC assessment has not been completed is not robust enough. At construction stage the applicant should have adequate information to be able to produce a WLC assessment as the main data source for a WLC assessment is a cost plan which the project should have. It should be noted that most of the planning stage WLC assessments the GLA receive are based on Stage 2 cost plans so it is expected that the applicant has enough information to be able to complete a WLC assessment.

53. On this basis the Council should ensure that the applicant produce a WLC assessment of the entire Proposed Development (not just the s73 scope) in line with GLA recommendations made at pre-application stage. If the applicant believes they cannot produce a WLC assessment they should provide robust reasoning as to why they cannot.

Response: Atkins has prepared a whole life carbon assessment for CADP 1 and this is enclosed at Appendix E: CADP1 Whole Life Carbon Assessment.

This report details the methodology and assumptions adopted for the WLC assessment undertaken and outlines the results from the WLC assessment, highlighting where the biggest carbon impacts are and opportunities to reduce the carbon impact of the development.

The results from the Embodied Carbon assessment undertaken at the detailed planning stage are as follows:

- Upfront Carbon (A1-A5) = 44,741 tonnesCO_2e equating to 1,099 kgCO_2e/m_2GIA (excl. Sequestration)
- Embodied Carbon (A-B-C) (excl. B6) = 69,582 tonnesCO_2e equating to 1,709 kgCO_2e/m2GIA

The results from the Operational Carbon assessment undertaken are as follows:

- Regulated Energy emissions: 24,120 tonnes CO_2e
- Unregulated energy emissions: 36,415 tonnes CO_2e
- Total operational energy emissions: 60,535,340 kgCO2e, equal to 1,487 kgCO_2e/m^2

The whole life carbon emissions for the whole development, including both embodied and operational carbon impacts are 130,117 TonnesCO2e, equal to 3,195 kgCO2e/m^2.

There is very limited opportunity to influence embodied carbon reduction due to already completed construction; fixed design and advanced stages of procurement. However, opportunities to reduce the energy consumption of the development have been identified and incorporated. The Revised Energy and Low Carbon Strategy goes into further detail, highlighting key areas to minimise the energy consumption and reduce the operational carbon of the building. The outputs from the energy report have been integrated into this whole life carbon assessment to reflect the updated design since the original proposal was developed.

Appendices

Appendix A. **Energy Modelling Inputs**

Appendix B. **PV Panel Layouts**

Appendix C. **ASHP Selection**

Appendix D. **WSHP Selection**

Appendix E. **CADP1 Whole Life Carbon Assessment**

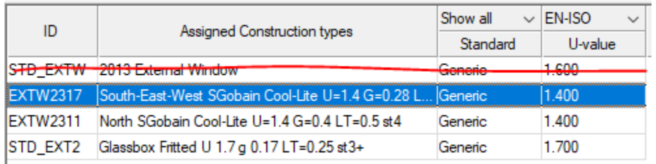
Appendix A. Energy Modelling Inputs

IES Thermal Modelling Check List- Preliminary	
Project:	LCY
Job Number:	5213978
Date Issued:	
Key Contact:	
Purpose:	
Version of IES:	VE2021 EP4
Responsible Engineer:	SL
Project Stage:	Stage 4

Note: Please issue as much of the following information as possible, which will enable us to complete the dynamic model. Where information is missing we may be able to make assumptions and will be discussed at the appropriate time. Software default figure will be used if information unconfirmed.

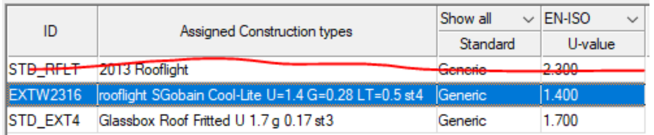
ITEM	DESCRIPTION	INPUT DATA
1	Site Data	
1.1	Location (& preference for weather data TRY or DSY)	London TRY
1.2	Orientation (degree clockwise to north)	1.28 to north
1.3	Information of surrounding buildings	not modelled
1.4	Clear definition of areas to be modelled	yes
2	Project Drawings & Model Geometry	

2.1	Scaled plans, sections and elevations	n/a
2.2	Interior layouts and environmental strategy (zoning) drawings	n/a
2.3	AutoCAD DWG or DXF files and/or	n/a
2.4	3D model files, Revit, gbXML, Sketchup	n/a
3	Construction Details (materials, thickness, thermal mass, U and g-values where appropriate)	
3.1	External wall	0.2
3.2	Roof (heated/unheated)	0.15
3.3	Ground Floor (contact with the ground?)	0.18 exposed/0.085 with ground contact
3.4	Ceilings/Floors (ceiling void?)	yes
3.5	Internal Wall	



ID	Assigned Construction types	Show all / Standard	EN-ISO / U-value
~~STD_EXTW~~	~~2013 External Window~~	~~Generic~~	~~1.600~~
EXTW2317	South-East-West SGobain Cool-Lite U=1.4 G=0.28 L...	Generic	1.400
EXTW2311	North SGobain Cool-Lite U=1.4 G=0.4 LT=0.5 st4	Generic	1.400
STD_EXT2	Glassbox Fitted U 1.7 g 0.17 LT=0.25 st3+	Generic	1.700

3.6	Windows (including frames, % of frames)	



ID	Assigned Construction types	Show all / Standard	EN-ISO / U-value
~~STD_RFLT~~	~~2013 Rooflight~~	~~Generic~~	~~2.300~~
EXTW2316	rooflight SGobain Cool-Lite U=1.4 G=0.28 LT=0.5 st4	Generic	1.400
STD_EXT4	Glassbox Roof Fitted U 1.7 g 0.17 st3	Generic	1.700

3.7	Roof lights (including frames, % of frames)	
3.8	Shading Devices	refer to the review document, solid shading was modelled
4	Occupancy	
4.1	Numbers	NCM
4.2	Timings & Daily profiles	NCM
4.3	Activities	see the NCM activity tab, large areas are not included in building regs analysis
4.4	Seasonal and Weekend/ weekend	NCM
5	Casual Gains (magnitude and profiles)	
5.1	Lighting, heat output and electrical consumption	n/a
5.2	Small power/ equipment, sensible, latent and electrical consumption	n/a

5.3	Other	n/a
6	Environmental Controls:	
6.1	Temperature controls, operating set points and plant on/off profiles	NCM
6.2	Lighting control mechanisms	need detailed review from electrical engineer
7	Outdoor Design Conditions	
7.1	Winter dry bulb	n/a
7.2	Summer dry bulb and wet bulb	n/a
8	Air Distribution	
8.1	Air permeability and infiltration rates	5 using CIBSE23
8.2	Inter-zone air movement	n/a
8.3	Aperture crackage/ leakage data	n/a
8.4	Details supply/ extract ventilation (temp. and volume flow rates)	n/a
8.5	Nat. Vent. Philosophy (window operation, opening etc.)	n/a
9	Mechanical	
9.1	Servicing Strategy	Stage 4 DX system (heating using Gas?? Cooling 6.56 0.73% heat recovery) Stage 4 FCU (heating using gas, air cooled EER4.29 and nominal EER 2.87) 1.6SFP, 80% HR efficiency Stage 4 Treated Fresh air - heating using gas, air cooled EER4.29 and nominal EER 2.87) 1.1SFP, 73% HR efficiency Stage 4 VAV - Single duct VAV system same COP and EER, 1.6 SFP and 80% heat recovery. some FCU and VAV system has dedicated extract fans with flow rate?
9.2	Seasonal plant efficiencies, Heating COP	95%
9.3	Seasonal plant efficiencies, Cooling SSEER	air cooled EER4.29 and nominal EER 2.87
9.4	Fan Power SFP's (l/s/W)	1.6/1.1/0.3 for FCU
9.5	Pump power and type (variable, constant speed)	variable speed
9.6	Thermal distribution and temp exchange efficiency (heat recovery %, type)	73-80%
9.7	Room emitter details	DX, FCU, VAV constant volume and VAV single duct
10	Electrical Equipment	
10	Lighting efficiencies (lum/W, W/m2, W/m2/100Lux)	90-85 Lum/W
10	Electric power factor	>0.95

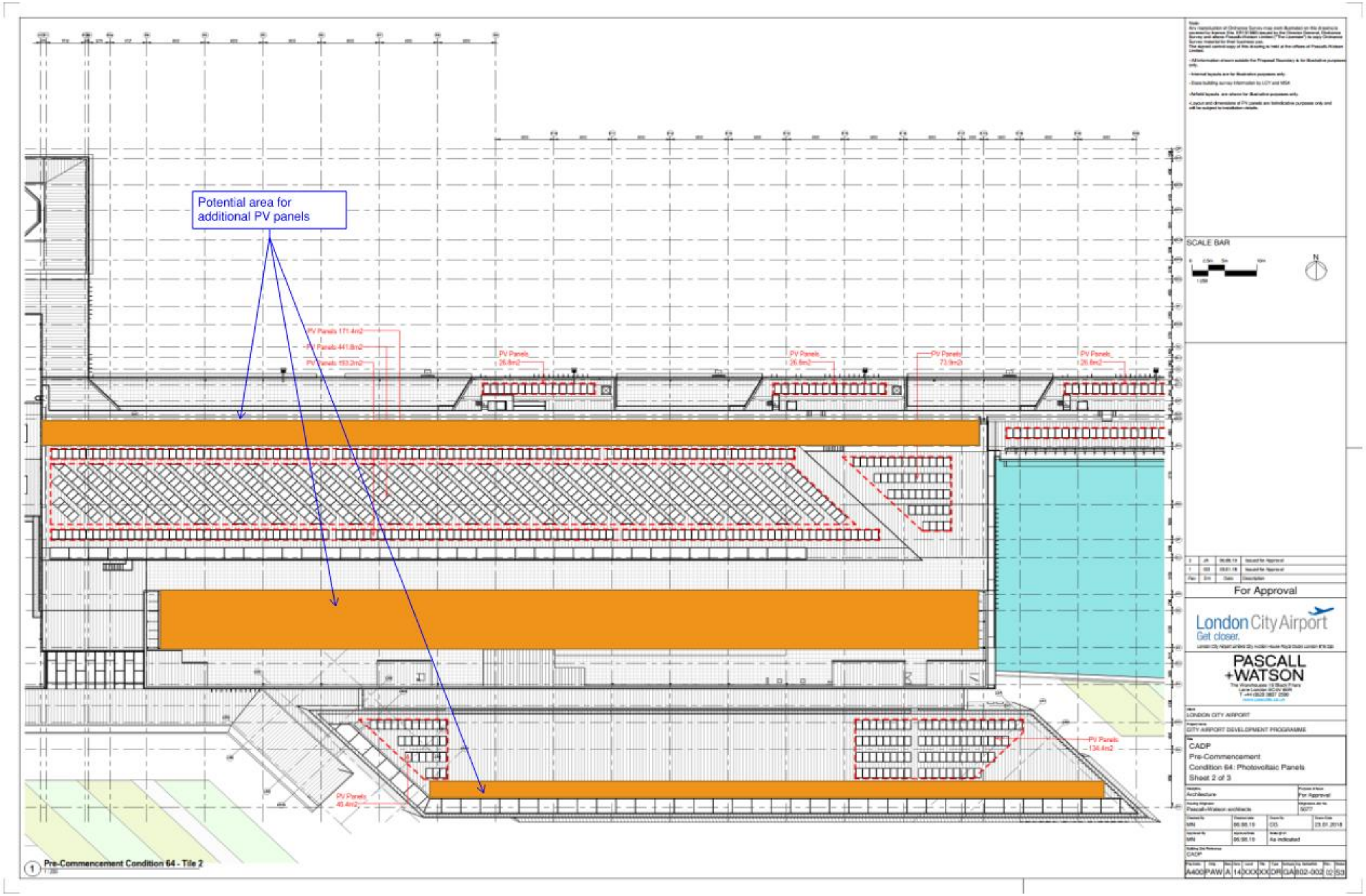
10	Lighting systems provision for metering? (Y/N)	Yes
10	Lighting systems metering warns of out of range values? (Y/N)	Yes
11	Hot Water (DHW)	
11	Hot water boiler efficiency	95%
11	DHW Delivery efficiency	1
11	Mean cold water inlet temp	10
11	Hot water supply temp	60
12	Storage system? Volume (L)	ETE1000/instantaneous 0/MTB 1000/NEP 300/
12	Storage insulation thickness or losses (kWh/(l.day))	80mm factory insulated
12	Secondary circulation, what are the losses (W/m)	9.54/9.2/8.36
12	Loop length	424/482/205
12	Pump power (kW)	0.22/0.7/0.05
12	Renewables (solar water heating)	
12	Solar water heating area (m2)	n/a
12	Azimuth (degree clockwise from north)	n/a
12	Tilt (degree horizontal)	n/a
12	Shading factor (using simulation to define)	n/a
13	Degradation factor	n/a
13	Conversion efficiency at ambient temperature	n/a
13	First order heat loss coefficient (a1) (W/m2K)	n/a
13	Second order heat loss coefficient (a20 9W/m2K)	n/a
13	Flow rate (l/h.m2)	n/a
12	Heat exchanger effectiveness (%)	n/a
12	Storage volume (l)	n/a
12	Storage losses at max temperature (kWh/(l.day))	n/a
13	Renewables (PV)	
13	PV array type (i.e. monocrystalline silicone)	not modelled
13	PV module nominal efficiency	not modelled
13	Nominal cell temperature (NOCT) (degree)	not modelled
13	Reference irradiance for NOCT (W/m2)	not modelled
14	Temperate coefficient for module efficiency (1/K)	not modelled
14	Degradation factor	not modelled
14	Shading factor (using simulation to define)	not modelled
14	Electrical conversion efficiency	not modelled

14	Area	not modelled
13	Azimuth (degree clockwise from north)	not modelled
13	Tilt (degree horizontal)	not modelled
14	Renewable Wind	
14	Hub height	n/a
14	Rated power	n/a
14	Power curve	n/a
15	Renewable CHP	
15	Fuel type	is not activated in the model
15	Performance at rated output (Heat output kW)	is not activated in the model
15	Performance at rated output (power efficiency)	is not activated in the model
15	Performance at rated output (thermal efficiency)	is not activated in the model
16	Performance at minimum output (fraction of rated heat output)	is not activated in the model
16	Performance at minimum output (thermal efficiency)	is not activated in the model
16	Performance at minimum output (power efficiency)	is not activated in the model
16	Profile for heat matching strategy (on continuously)	is not activated in the model
16	Additional Information	
16	Building address	n/a
16	Building Type	n/a
16	Clients Address	n/a

Appendix B. PV Panel Layouts

Markup on drawing by Pascall +Watson showing the existing proposed PV panels, and suggested areas which could potentially provide space for additional PV panels (highlighted in Orange).

City Airport Development Programme (CADP1)
Pre-commencement Condition 64: Photovoltaic Panels



Appendix C. ASHP Selection

Mitsubishi i-FX-N-G05 /A /1152 - Reversible unit, air source, VSD screw compressors and EC fans

1.1 PERFORMANCE AT DESIGN CONDITIONS

RUNNING CONDITIONS		
HEAT EXCHANGER USER SIDE		
Fluid type		WATER
Glycol	%	0
Fouling factor	m²K/kW	0.000
Fluid inlet temperature (heating mode)	°C	68.00
Fluid outlet temperature (heating mode)	°C	78.00
Water flow	l/s	6.846
Pressure drop at the heat exchanger	kPa	12.9
Available unit head	kPa	0.00
HEAT EXCHANGER SOURCE SIDE		
Fluid		WATER
Glycol	%	0
Fouling factor	m²K/kW	0.000
Fluid inlet temperature (heating mode)	°C	45.00
Fluid outlet temperature (heating mode)	°C	40.00
Water flow	l/s	10.49
Pressure drop at the heat exchanger	kPa	38.2
Available unit head	kPa	0.00

HEATING (EN14511)		
Total heating capacity	kW	280.4
Compressors power input (heating mode)	kW	66.75
Total power input	kW	67.90
COP	kW/kW	4.130

SCOP		
SCOP Official (Reg. 813/2013 EU)		
MEDIUM TEMPERATURE		
Type climate		Average
Temperature application	°C	55
Type flow		Fixed
Type Temperature		Variable
Bivalent temperature	°C	-7.0
PDesign	kW	157
Qhe	kWh	98660
SCOP		3.30
Performance ηs	%	124
Seasonal efficiency class		-

Appendix D. WSHP Selection

Mitsubishi EW-HT /0612 - Water to water heat pumps, heating only, high temperature water

1.1 PERFORMANCE AT DESIGN CONDITIONS

RUNNING CONDITIONS		
COOLING		
HEAT EXCHANGER USER SIDE		
Fluid type		WATER
Glycol	%	0
Fouling factor	m²K/kW	0.000
Fluid inlet temperature (cooling mode)	°C	12.00
Fluid outlet temperature (cooling mode)	°C	7.00
Water flow	l/s	55.17
Pressure drop at the heat exchanger	kPa	37.5
Available unit head	kPa	0.00
OUTDOOR CONDITION		
Air temperature (cooling mode)	°C	35.0
HEATING		
HEAT EXCHANGER USER SIDE		
Fluid type		WATER
Glycol	%	0
Fouling factor	m²K/kW	0.000
Fluid inlet temperature (heating mode)	°C	40.00
Fluid outlet temperature (heating mode)	°C	45.00
Water flow	l/s	41.53
Pressure drop at the heat exchanger	kPa	21.2
Available unit head	kPa	0.00
OUTDOOR CONDITION		
Air temperature (heating mode)	°C	-4.0

COOLING (EN 14511)		
Capacity control	%	100.0
Cooling capacity	kW	1153
Compressor power input	kW	349.7
Fans power input (cooling mode)	kW	40.80
Total power input	kW	393.5
EER	kW/kW	2.930
ESEER EN 14511	kW/kW	4.560

HEATING (EN14511)		
% Capacity control on heating	%	100.0
Total heating capacity	kW	769.0
Compressors power input (heating mode)	kW	276.8
Fan power input (heating mode)	kW	20.40
Total power input	kW	292.4
COP	kW/kW	2.630

Appendix E. CADP1 Whole Life Carbon Assessment

ATKINS
Member of the SNC-Lavalin Group

London City Airport
Whole Life Carbon Assessment

London City Airport

22 May 2023

Notice

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This document has 18 pages including the cover. The appendices have been provided separately.

Document history

Document title: Whole Life Carbon Assessment

Revision	Purpose description	Originated	Checked	Reviewed	Authorised	Date
1.0	First Issue	AI	CC	WL	RJ	12.05.2023
2.0	Updated to incorporate comments	AI	CC	WL	RJ	22.05.2023

Client signoff

Client	London City Airport
Project	London City Airport
Job number	5214932
Client signature/date	

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1. Introduction

1.1. Policy Context

The Mayor of London has declared a climate emergency and has set an ambition for London to be net zero-carbon by 2030. The Mayor's London Plan sets the targets and policies required to achieve this. It includes:

- A net zero carbon target for all major developments
- A requirement for all major developments to 'be seen' i.e., monitor and report its energy performance post construction to ensure the actual carbon performance of the development is aligned with the mayor's net zero carbon target.
- A requirement for all planning applications to calculate and reduce whole life cycle carbon emissions to fully capture a development's carbon impact

In line with the London Plan and Greater London Authority (GLA) Guidance, major developments are expected to work towards net zero by incorporating a series of Whole Life Carbon (WLC) Principles outlined as follows:

Table 1-1 – GLA's WLC Principles

No.	Whole Life Cycle Principle
1	Reuse and retrofit of existing built structures
2	Use repurposed or recycled materials
3	Material selection
4	Minimise operational energy use
5	Minimise the carbon emissions associated with operational water use
6	Disassembly and reuse
7	Building shape and form
8	Regenerative design
9	Designing for durability and flexibility
10	Optimisation of the relationship between operational and embodied carbon
11	Building life expectancy
12	Local sourcing
13	Minimising waste
14	Efficient construction
15	Lightweight construction
16	Circular economy

These principles aim to reduce the carbon footprint arising from developments, to reduce emissions and work towards Net-Zero Carbon.

1.2. Airport Proposals to Vary Existing Consent

The airport has submitted a Section 73 application to vary conditions that are attached to the existing airport planning permission which was approved by the Secretaries of State in 2016. For clarity, the approved City Airport Development Programme (CADP1) works include:

a) Demolition of existing buildings and structures.

b) Works to provide 4 upgraded aircraft stands and 7 new aircraft parking stands.

c) The extension and modification of the existing airfield to include the creation of a taxi lane 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.

The current Section 73 application does not seek to materially change any of the previously approved infrastructure. In particular, the design and layout of the consented terminal buildings and other infrastructure remain as approved in 2016 under the CADP1 permission and varied thereafter by several non-material amendment applications approved by the London Borough of Newham.

While there are no new infrastructure proposals associated with the s73 application, the GLA have sought a Whole Life Cycle assessment with respect to the construction of the previously approved CADP1 works (GLA Stage 1 response, para's 51 – 53).

Atkins has been commissioned to produce a whole life carbon assessment for the CADP1 works with support from Arcadis (cost consultants) with respect to quantities for superstructure, substructure, internal finishes, mechanical and electrical services. This ensured that over 95% of the development construction materials were accounted for in the WLC assessment, in line with the GLA requirements.

1.3. General Description of Project Site and Proposed Development

The CADP1 scheme (as described above) was designed in 2013 and approved by the Secretary of State in 2016. The approved works remain as per the 2016 consent (as amended) and are not proposed to change as part of the current Section 73 application.

Construction commenced in 2017 and continued until the end of 2020 when works were paused due to the effects of the Covid-19 pandemic. Prior to the pause of construction, the major civil engineering works associated with CADP1; namely, the construction of the new taxiway adjacent to the runway and the creation of a concrete deck over King George V Dock to provide the 8 new aircraft stands, were completed as well as the foundations and deck for the East Terminal Extension (ETE) and New East Pier (NEP) and erection of the East Energy Centre (EEC) envelope. The parallel taxiway and 4 of the new stands are now fully operational.

Figure 1-1 - 2022 CADP1 Site Plan (Full plan can be found in Appendix D)

It is expected that the remaining infrastructure, which primarily involves the build out of the approved terminal extensions and NEP, will be built out once passenger numbers sufficiently rebound from the Covid-19 pandemic.

This WLC assessment has been prepared to measure the embodied carbon associated with the CADP1 construction as requested by the GLA.

In the spirit of the Greater London Authority requirement to identify and incorporate opportunities to reduce greenhouse gas emissions during construction and operation following a Whole Life Cycle Assessment, the assessment focuses on the four building sections of the development where construction is incomplete. This allows the assessment results to focus on potential opportunities for improvement, where the design can be influenced and where opportunities for lower carbon design can still be incorporated. This also aligns this assessment with the complementing Operational Energy assessment, "Carbon Reduction Strategy Options". The key remaining elements of the CADP1 build included in the assessment are the New East Pier, East Terminal Extension, West Terminal Extension and West Energy Centre, as outlined in **Table 1-2**.

Table 1-2 - GIA breakdown of the buildings included in the WLC assessment.

Building	GIA
New East Pier	13,280m^2
East Terminal Extension	21,570m^2
West Energy Centre	650m^2
West Terminal Extension	5,220m^2
Total	**40,720m^2**

The total Gross Internal Area (GIA) adopted for the WLC assessment is made up of the four buildings included in the assessment. This results in a total GIA of **40,720m^2**.

Figure 1-2 – Approved CADP1 terminal and airport site

2. Embodied Carbon Methodology

This section outlines the details of the embodied carbon assessment, details what was included in the scope of the assessment and what assumptions were made in the absence of design information at this stage.

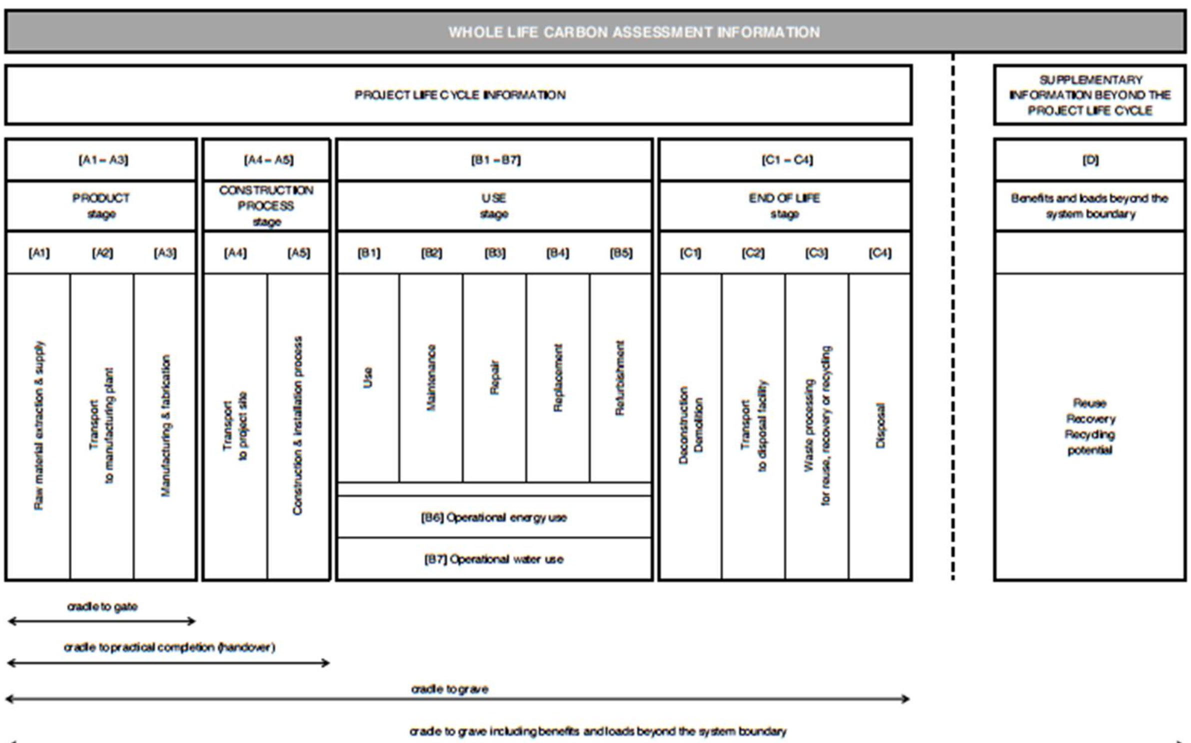
2.1. Life Cycle Assessment Method

An LCA study provides quantified environmental information to assess the environmental performance of a building over its life. In this study, the CO_2e relates to the development and is based on a 60-year reporting period, as per the GLA Guidance.

EN 15804:2019 (Sustainability of construction works. Environmental product declarations. Core rules for the product category of construction products) stipulates that all greenhouse gases that cause damage to the atmosphere (including carbon dioxide, methane, and nitrous oxide) can be expressed in terms of an equivalent quantity of carbon dioxide (CO2e) in the atmosphere for 100 years. This environmental impact indicator is known as the Global Warming Potential (GWP). In a whole life cycle assessment of a building the CO_2e include all these emission sources associated with the construction and the use of the building over its life.

The following table outlines the Whole Life Cycle categories as defined by EN15978. These categories aim to standardise the WLC assessment based on the different stages of a life cycle of a building.

Table 2-1 - Life Cycle stages (EN 15978 Sustainability of construction works. Assessment of environmental performance of buildings. Calculation method) illustrating the stages within the Whole Life Cycle assessment scope



Emissions are attributed to four main categories as specified in EN 15978:2011. These are:

1. **Construction process stages (A1 - A5)**
   a. Product Manufacture (A1 - A3)
   b. Transport to Site (A4)
   c. Construction activities (A5a) and Construction Waste (A5w)
2. **In Use stage (B1 - B7)**
3. **End of Life stage (C1 – C4)**

2.2. Scope of Assessment

The assessment follows the classification set out within the BS EN 15978: 2011 (Sustainability of Construction Works – Assessment of Environmental Performance of Buildings – Calculation Method) for the lifecycle modules and the building elements classification provided by the RICS PS, as outlined in the table below.

Table 2-2 - Scope of the embodied carbon assessment based on the Life Cycle modules outlined in BS EN 15978: 2011

Lifecycle Stage	EN 15978 Modules	In Scope
Product Stage	A1 Raw material supply A2 Transport A3 Manufacturing	✓
Construction Stage	A4 Transport	✓
	A5 Construction Energy	✓
	A5 Construction Waste	✓
In-Use Stage	B1 Use	✓
	B2 Maintenance	✓
	B3 Repair	✓
	B4 Replacement	✓
	B5 Refurbishment	✓
Operational Carbon	B6 Operational Energy use	✓
	B7 Operational Water Use	×
End of Life	C1 Deconstruction / demolition C2 Transport C3 Waste processing C4 Disposal	✓
Supplementary Information beyond the Building Lifecycle	D Reuse, Recovery, Recycling Potential	×

Table 2-3 - Building categories included in the assessment

Code	Building Category	Building element	In Scope
	Demolition	0.1 Toxic/Hazardous/Contaminated Material treatment 0.2 Major Demolition Works	✓
0	Facilitating Works	0.3 and 0.5 Temporary/Enabling Works 0.4 Specialist groundworks	✓
1	Substructure	1.1 Substructure	✓
2	Superstructure	2.1 Frame 2.2 Upper floors incl. balconies 2.3 Roof 2.4 Stairs and ramps	✓
	Superstructure – façade	2.5 External Walls 2.6 Windows and External Doors	✓
	Superstructure- Internal Layout	2.7 Internal Walls and Partitions 2.8 Internal Doors	✓
3	Finishes	3.1 Wall finishes 3.2 Floor finishes 3.3 Ceiling finishes	✓
4	Fittings, furnishings, and equipment (FF&E)	4.1 Fittings, Furnishings & Equipment incl. Building-related and non-building-related	×
5	Building services/MEP	5.1–5.14 Services inc. building-related and non-building-related	✓
6	Prefabricated Buildings and Building Units	6.1 Prefabricated Buildings and Building Units	×
7	Work to Existing Building	7.1 Minor Demolition and Alteration Works	×
8	External works	8.1 Site preparation works 8.2 Roads, Paths, Paving and Surfacing 8.3 Soft landscaping, Planting, and Irrigation Systems 8.4 Fencing, Railings and Walls 8.5 External fixtures 8.6 External drainage 8.7 External Services 8.8 Minor Building Works and Ancillary Buildings	✓

2.3. Data Sources

Embodied Carbon

The material quantities for the carbon model were based on the Cost Estimate Quantities provided by Arcadis on the 18th of April 2023, along with dimensions and other information from the drawings and supplementary information provided by the design team. A summary of these inputs is outlined in Appendix A.

Operational Energy and Carbon

The energy assessment was carried out based on the current Part L 2013 building regulations and the associated carbon factors. In line with the GLA requirements, and to meet the London Plan CO_2 reduction targets, the energy assessments were undertaken using SAP10, and the energy outputs were converted into carbon using the SAP 10 emission factors listed below:

- Natural gas: 0.210 $kgCO_2$/kWh
- Grid electricity: 0.233 $kgCO_2$/kWh

Operational energy figures are detailed in the London City Airport Carbon Reduction Strategy Options Technical Note, along with the BRUKL Output Document.

Note: The energy to carbon conversion does not take into account the long-term decarbonisation of the electricity grid, in line with GLA recommendations[1]. This also doesn't account for the London City Airport's plans of decarbonisation and Net Zero target.

Carbon Assessment Tool

The Whole Life Carbon assessment has been undertaken using **OneClick LCA**, an industry recognised tool for calculating the carbon emissions over a project's lifecycle in compliance with GLA requirements. This tool references a number of industry leading verified carbon data sources as its primary carbon conversion factors.

2.4. Assumptions

Where design information was not available yet, and was not provided in the cost plan, a number of assumptions were adopted in order to complete the assessment to a sufficient level of detail. Refer to Appendix B for a full breakdown of the whole life carbon assessment input, along with any assumptions taken in term of material specifications and material quantity, while the list below refers to some high level general structural assumptions.

- The superstructure concrete specification is assumed as C32/40 with a 50% GGBS. There are a few exceptions highlighted in Appendix B
- The substructure concrete specification is assumed as C25/30 with a 50% GGBS. There are a few exceptions highlighted in Appendix B
- Ground beam reinforcement is assumed as 230kg/m^3
- Column reinforcement is assumed as 150kg/m^3
- Wall reinforcement is assumed as 110kg/m^3
- Pile cap reinforcement is assumed as 115 kg/m^3
- Slab reinforcement is assumed as 150 kg/m^3
- Plank reinforcement is assumed as 80 kg/m^3
- Foundation reinforcement is assumed as 100 kg/m3
- All rebar is assumed as UK steel rebar with 97% recycled content
- In the cost plan provided by Arcadis, surface area of concrete was provided instead of thicknesses on several occasions. Design advice on sensible assumptions was taken by suitable structural engineers, though conservative thicknesses were generally assumed in the absence of more detailed information. Please refer to Appendix B for full list.

Due to limited information available on staircase specification, additional design advice was taken to estimate the embodied carbon for the staircases:

- Staircase are assumed to have a concrete specification of C20/25 with a 50% GGBS
- 4% volume density of reinforcement
- Landing depth of 2m

[1] Section 2.8 in the GLA Whole Life-Cycle Carbon Assessments document, March 2022.

- 42° inclination angle for staircase
- 2 landings per story unless specified otherwise by Arcadis

Please refer to Appendix C for an example calculation of the material quantities of a concrete staircase.

General Assumptions:

- The project floor area is taken in line with the GIA which is **40,720m²** as defined by the cost consultants in the areas schedule.
- In relation to construction and procurement information, the assumptions adopted were as standard – provided by the RICS Professional Statement guidance, summarised in **Table 3-8**

Table 2-3 - List of assumptions adopted in the embodied carbon assessment

Source	Life Cycle Module	Life Cycle Stage	Assumptions
RICS	A4	Transport Distances	• Locally manufactured = 50 km • Nationally manufactured = 300 km • European Manufactured = 1500 km • Globally manufactured = ○ 200 km by road ○ 10,000 km by sea
	A5a	On-Site Construction Impacts	1,400 $kgCO_2e$ / £100k of project value*
OneClick LCA	A5w	Construction Waste	Waste factors assumed in line with those recommended by carbon software One Click LCA

***Note**: On-site construction impacts factor was applied only to the project value of the buildings considered as part of this assessment (outlined in **Table 1-2**).*

Refrigerants:

Due to unavailability of information regarding refrigerants used for the development, this was excluded from the assessment at this stage. Refrigerants impacts should be updated and recorded at the post-construction stage assessment

Contingency:

In line with the PAS2080:2023 guidance, the carbon results from the embodied carbon assessment have been subject to a 5% uplift to account for any missing information that wasn't included in the assessment.

Study Period

In line with the GLA and RICS guidance, the Whole Life Carbon Assessment Period was considered as 60 years.

2.5. Climate Change Assessment

A Climate Change Assessment (CCA) has previously been completed in support of the S73 planning application to enable growth to 9mppa by consultants Ecolyse. This reports on the Greenhouse Gas (GHG) Emissions released as a result of proposed growth of the airport from its existing permission of 6.5 mppa to 9mppa and includes all of LCY's activities. The scope of their assessment was established to meet requirements of the EIA regulations and includes the upfront embodied carbon impacts associated with the construction of new airport assets (including assets already constructed), as well as the wider airport activities such as Aircraft Landing and Take-off Cycles, Staff Travel, passenger travel, Airport airside vehicles and plant, and others. The scope of the CCA assessment, as well as number of underlying methodologies and assumptions is therefore necessarily different to the scope used by this WLCA and consequently the results of each are therefore not directly comparable. The CCA can be found as chapter 11 of the Environmental Statement.

While the scopes of these assessments both incorporate elements of LCY's built assets, the CCA report includes the wider Airport's Operational GHG emissions as a transport hub including aviation activity, and therefore concludes a considerably higher carbon impact. The scope of this WLCA solely focuses on the new-build construction activities of the Airport terminal itself, along with the maintenance and energy required to operate the building, without considering aircraft and user impacts.

3. Embodied Carbon Results

3.1. Baseline Assessment

The results from the Embodied Carbon assessment undertaken at the detailed planning stage are outlined in the table below:

- Upfront Carbon (A1-A5) = 44,741 tonnesCO_2e equating to 1,099 kgCO_2e/m^2_{GIA} (excl. Sequestration)
- Embodied Carbon (A-B-C) (excl. B6) = 69,582 tonnesCO_2e equating to 1,709 kgCO_2e/m^2_{GIA}

Operational Carbon emissions over 60 years:

- Regulated Energy emissions: 24,120 tonnes CO_2e
- Unregulated energy emissions: 36,415 tonnes CO_2e
- Total operational energy emissions: 60,535,340 kgCO2e, equal to 1,487 kgCO2e/m^2

The whole life carbon emissions for the whole development, including both embodied and operational carbon impacts are **130,117 TonnesCO_2e**, equal to **3,195 kgCO_2e/m^2**

Table 3-1 and Table 3-2 detail the results from the WLC assessment in terms of both RICS Building Categories Life Cycle modules. Please refer to Appendix A for a detailed breakdown of the Whole Life Carbon Assessment results.

Table 3-1 - Project embodied carbon assessment results by life cycle module.

Building Life Cycle	Module	Carbon Emissions	
		KgCO_2e	KgCO_2e / m^2 GIA
Carbon Sequestration		-29,0663.94	-7
Product Stage	A1-A3	38,736,948	951
Transport	A4	742,798	18
Construction	A5a	3,439,800	84
	A5w	1,821,565	45
Upfront Carbon (Excluding Sequestration)	**A1-A5**	**44,741,111**	**1,099**
In-Use Phase	B1-B5	23,980,574	589
Operational Carbon	B6	60,535,340	1,487
End-Of-Life Phase	C1-C4	1,151,027	28
Total – Life Cycle Embodied Carbon (Including Sequestration)	**A-B-C Excl. B6**	**69,582,049**	**1,709**
Total – Whole Life Carbon	**A-B-C Incl. B6**	**130,117,389**	**3,195**

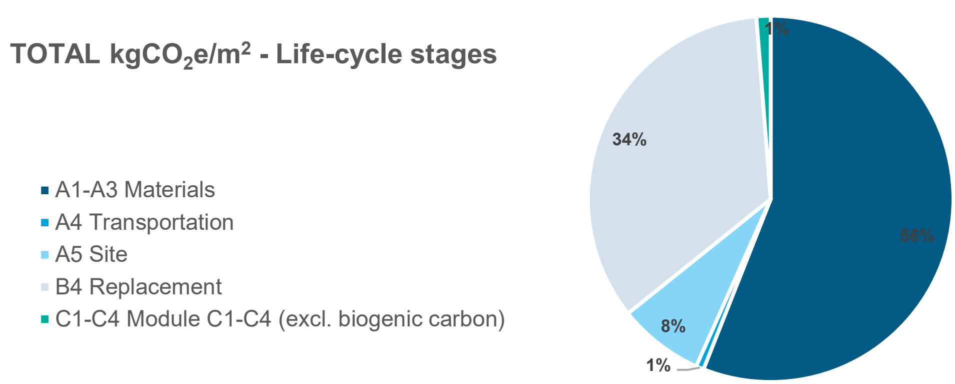


Figure 3-1 – London City Airport Embodied Carbon impact breakdown.

3.2. Breakdown by Category

Table 3-2 - Project embodied carbon assessment results by building category

RICS Building Category	A1-A5		Total A-C	
	$kgCO_2e$	$kgCO_2e/m^2$	$kgCO_2e$	$kgCO_2e/m^2$
0.1 Toxic Mat.	N/A	N/A	N/A	N/A
0.2 Demolition	N/A	N/A	145,370	4
0.3 Supports	N/A	N/A	N/A	N/A
0.4 Groundworks	N/A	N/A	N/A	N/A
0.5 Diversion	N/A	N/A	N/A	N/A
1 Substructure	4,332,707	106	4,500,724	111
2.1 Frame	10,644,285	261	14,592,571	358
2.2 Upper Floors	1,254,304	31	1,300,253	32
2.3 Roof	5,828,807	143	12,913,016	317
2.4 Stairs & Ramps	201,253	5	203,700	5
2.5 Ext. Walls	7,813,837	192	7,835,317	192
2.6 Windows & Ext. Doors	496,312	12	757,598	19
2.7. Int. Walls & Partitions	760,002	19	843,583	21
2.8 Int. Doors	193,351	5	391,197	10
3 Finishes	3,253,776	80	5,237,186	129
4 Fittings, furnishings & equipment	N/A	N/A	N/A	N/A
5 Services (MEP)	6,520,679	160	17,419,699	428
6 Prefabricated	N/A	N/A	N/A	N/A
7 Existing building	N/A	N/A	N/A	N/A
8 Ext. works	N/A	N/A	N/A	N/A
Other or overall site construction	3,439,800	84	3,439,800	84
Unclassified / Other	N/A	N/A	N/A	N/A
TOTAL	**44,741,111**	**1,099**	**69,582,049**	**1,709**

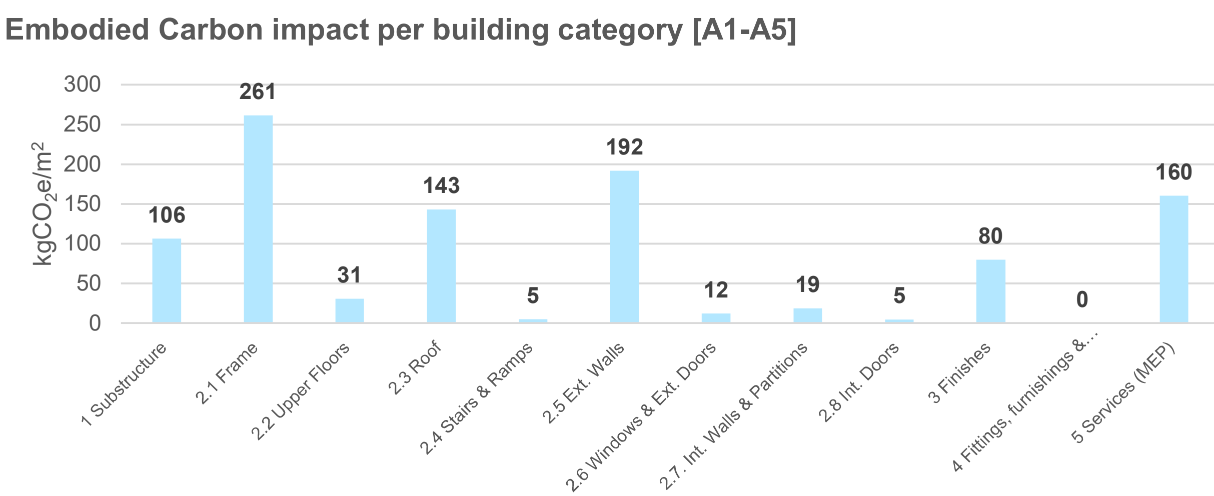


Figure 3-2 – London City Airport Embodied Carbon impact breakdown per building category

3.3. Breakdown by Material

The following diagrams outline the materials that have the biggest contributing carbon impact in the development. This indicates the areas of focus that the design should target to reduce the embodied carbon impact of the development.

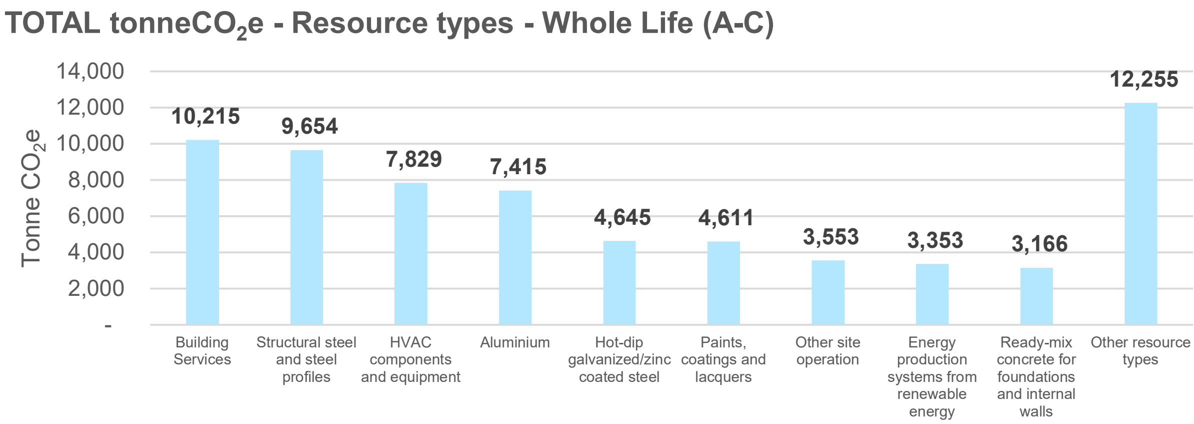


Figure 3-3 - London City Airport Embodied Carbon impact breakdown per Material Impact over whole life cycle.

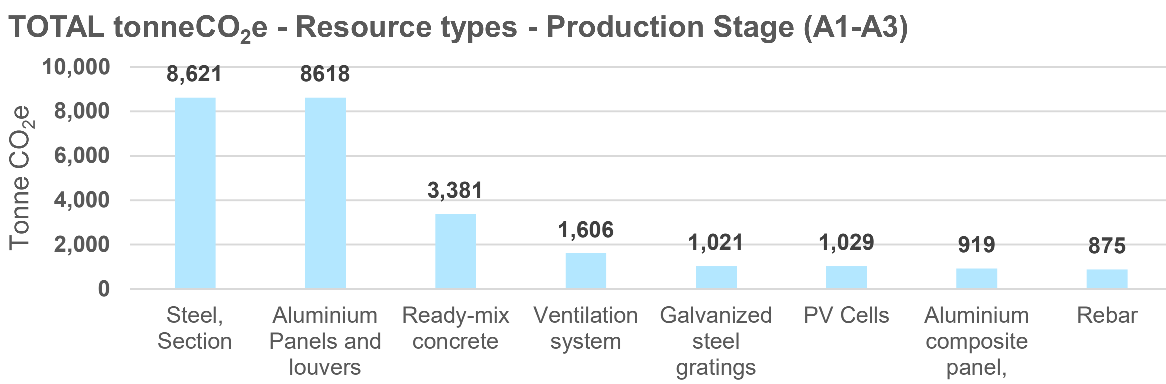


Figure 3-4 - London City Airport biggest contributing materials upfront carbon at production stage (A1-A3)

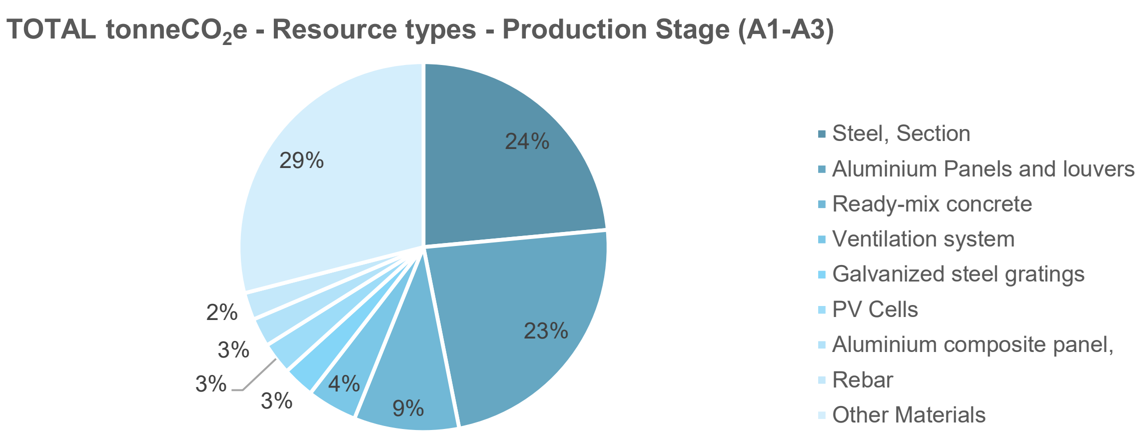


Figure 3-5 - London City Airport biggest contributing materials upfront carbon at production stage (A1-A3)

4. Conclusion

This report details the methodology and assumptions adopted for the WLC assessment undertaken for the London City Airport CADP development, and outlines the results from the WLC assessment, highlighting where the biggest carbon impacts are and opportunities to reduce the carbon impact of the development.

The results from the **Embodied Carbon** assessment undertaken at the detailed planning stage are as follows:

- Upfront Carbon (A1-A5) = 44,741 tonnesCO_2e equating to 1,099 kgCO_2e/m^2_{GIA} (excl. Sequestration)
- Embodied Carbon (A-B-C) (excl. B6) = 69,582 tonnesCO_2e equating to 1,709 kgCO_2e/m^2_{GIA}

The results from the **Operational Carbon** assessment undertaken are as follows:

- Regulated Energy emissions: 24,120 tonnes CO_2e
- Unregulated energy emissions: 36,415 tonnes CO_2e
- Total operational energy emissions: 60,535,340 kgCO_2e, equal to 1,487 kgCO_2e/m^2

The whole life carbon emissions for the whole development, including both embodied and operational carbon impacts are **130,117 TonnesCO_2e**, equal to **3,195 kgCO_2e/m^2**

There is very limited opportunity to influence embodied carbon reduction due to already completed construction; fixed design and advanced stages of procurement. However, opportunities to reduce the energy consumption of the development have been identified and incorporated. The "Revised Energy and Low Carbon Strategy" report issue in December 2022 goes into further detail, highlighting the key interventions to improve the overall performance of the CADP1 development compared to the previously approved documents and to achieve the projected reductions. The outputs from the energy report have been integrated into this whole life carbon assessment to reflect the updated design since the original proposal was developed. The report goes into further detail, but here is a summary of the enhancements that have been included:

1. Further efficiencies to the previously approved terminal design, including:
    a. Reduction in air leakage through the building(s) envelope.
    b. Improving the efficiency of air handling units, heat recovery and air-cooled chillers.
    c. Providing luminaire efficacy of 110 lumens / circuit Watt, compared to 85 lumens / circuit Watt, with more effective lighting control.
    d. Installing kitchen extract heat recovery systems for commercial application.
    e. Replacing high air volume/energy systems with local systems, reducing auxiliary power demand.
2. Replacing the previously approved gas fired CHP system with a more sustainable onsite heat network, including:
    a. A combination of Air Source and Water Source Heat Pumps to deliver low temperature hot water (LTHW) at a Coefficient of Performance (COP) of 2.8 to serve both space heating and domestic hot water, in lieu of gas fired systems.
    b. Allowance for valved and capped connections and space for heat exchangers to allow future connectivity to a district heating scheme should a commercially and technically viable solution come forward.
3. Delivering almost 1,200m 2 of Photovoltaic (PV) panels on the roof of the CADP1 terminal buildings and piers.

Due to the bespoke nature of airport developments, and to the ongoing development of Embodied Carbon benchmarks in the construction industry, there are currently no carbon benchmarks for airports to compare against other projects, and therefore there is very limited opportunity to assess how the development is performing in comparison to 'similar' developments. However, when comparing against Embodied Carbon assessments completed by the experienced Atkins team for other Transport developments in the UK, the CADP development appears to be approximately in line with expectations for assets of this nature, with a whole life carbon impact significantly reduced through the new energy strategy. This suggests that the London City Airport development falls within the Carbon limits for a low carbon development. Nevertheless, this should not discourage further opportunities to reduce the carbon footprint of the development. Wherever possible, opportunities for reducing the embodied and operational carbon impact of the development should be encouraged and adopted to continually improve the design and work towards a Net-Zero Carbon development.

Appendices

Appendix A. Detailed Embodied Carbon Assessment Results

The 2 tables below detail the results from the embodied carbon assessment.

Table B-1 details the results in kgCO2e, and Table B-2 in kgCO2e/m2 GIA.

Results in $kgCO_2e$

Result category	Biogenic carb	A1-A3 Produc	A4 Transporta	A5 Site operat	A1-A5	B1	B2	B3	B4 Material re	B5	B1-B5	B6 Operational	B7 Operational	C1 Deconstr	C2 Waste tr	C3 Waste pr	C4 Waste	C1-C4	TOTAL kg CO	D External imp
0.1 Toxic Mat.																				-
0.2 Demolition														145,370				145,370	145,370	-
0.3 Supports																			-	-
0.4 Groundworks																			-	-
0.5 Diversion																			-	-
1 Substructure	(72,261)	3,855,650	306,623	165,477	4,327,750						-			-	148,538	91,740	-	240,278	4,495,768	(826,238)
2.1 Frame		10,042,397	26,644	389,799	10,458,840				3,696,735		3,696,735			-	228,530	12,965	321	241,816	14,397,391	(2,101,253)
2.2 Upper Floors	0	1126591.904	76965.9975	52631.859	1,256,190	0	0	0	0	0	-			0	41833.806	4115.097	0	45,949	1,302,139	(227,593)
2.3 Roof	0	5660607.467	13389.579	126889.8855	5,800,887	0	0	0	6971747.223	0	6,971,747			0	19344.948	53211.48	41.1915	72,598	12,845,232	(2,081,037)
2.4 Stairs & Ramps	0	192510.822	2628.8325	5875.7895	201,015	0	0	0	0	0	-			0	2202.6795	174.636	69.888	2,447	203,463	(72,878)
2.5 Ext. Walls	0	7194625.862	1596.7245	613922.7045	7,810,145	0	0	0	0	0	-			0	16347.8805	4757.466	374.577	21,480	7,831,625	(2,066,187)
2.6 Windows & Ext. Doors	0	494477.4555	780.2445	0	495,258	0	0	0	255124.506	0	255,125			0	5826.681	50.0115	77.6685	5,954	756,337	(34,129)
2.7. Int. Walls & Partitions	-28362.285	696986.955	5243.784	54059.145	756,290	0	0	0	55142.0625	0	55,142			0	27315.057	29367.282	368.4555	57,051	840,120	(40,042)
2.8 Int. Doors	-176676.045	184527.6405	764.631	0	185,292	0	0	0	187540.227	0	187,540			0	588.1785	178255.949	79.8735	178,924	375,080	-
3 Finishes	-11891.9115	2940409.847	7201.173	277946.3715	3,225,557	0	0	0	1886498.271	0	1,886,498			0	35792.295	61181.3055	41.097	97,015	5,197,178	(1,110,377)
4 Fittings, furnishings & equipments					-						-				0	0	0	-	-	-
5 Services (MEP)	-1472.6985	6346302.785	20686.197	125269.851	6,492,259			0	10805148.45	0	10,805,148	60,535,340			36927.9855	4643.9295	538.356	42,110	17,338,045	(4,834,397)
6 Prefabricated								0											-	-
7 Existing bldg								0											-	-
8 Ext. works	0	1859.7075	8.5365	114.198				0							32.0355	2.877	0.2205		-	(1,759)
Other or overall site construction				3439800	3,439,800														3,439,800	-
Unclassified / Other																			-	-
TOTAL kg CO2e	(290,664)	38,736,948	462,533	5,251,786	44,451,267				23,857,936		23,857,936	60,535,340		145,370	563,280	440,465	1,912	1,151,027	69,169,566	(13,395,890)

Results in $kgCO_2e/m^2$ GIA

Result category	Biogenic carb	A1-A3 Produc	A4 Transporta	A5 Site operat	A1-A5	B1	B2	B3	B4 Material re	B5	B1-B5			C1 Deconstr	C2 Waste tr	C3 Waste pr	C4 Waste	C1-C4	TOTAL kg CO	D External imp
0.1 Toxic Mat.	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0	0	0	0
0.2 Demolition	0	0	0	0	0	0	0	0	0	0	0			4	0	0	0	4	4	0
0.3 Supports	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0	0	0	0
0.4 Groundworks	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0	0	0	0
0.5 Diversion	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0	0	0	0
1 Substructure	-2	95	8	4	106	0	0	0	0	0	0			0	4	2	0	6	110	-20
2.1 Frame	0	247	1	10	257	0	0	0	91	0	91			0	6	0	0	6	354	-52
2.2 Upper Floors	0	28	2	1	31	0	0	0	0	0	0			0	1	0	0	1	32	-6
2.3 Roof	0	139	0	3	142	0	0	0	171	0	171			0	0	1	0	2	315	-51
2.4 Stairs & Ramps	0	5	0	0	5	0	0	0	0	0	0			0	0	0	0	0	5	-2
2.5 Ext. Walls	0	177	0	15	192	0	0	0	0	0	0			0	0	0	0	1	192	-51
2.6 Windows & Ext. Doors	0	12	0	0	12	0	0	0	6	0	6			0	0	0	0	0	19	-1
2.7. Int. Walls & Partitions	-1	17	0	1	19	0	0	0	1	0	1			0	1	1	0	1	21	-1
2.8 Int. Doors	-4	5	0	0	5	0	0	0	5	0	5			0	0	4	0	4	9	0
3 Finishes	0	72	0	7	79	0	0	0	46	0	46			0	1	2	0	2	128	-27
4 Fittings, furnishings & equipments	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0	0	0	0
5 Services (MEP)	0	35	3	7	159	0	0	0	265	0	265	1487		0	1	0	0	1	426	-119
6 Prefabricated	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0	0	0	0
7 Existing bldg	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0	0	0	0
8 Ext. works	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0	0	0	0
Other or overall site construction	0	0	0	84	84	0	0	0	0	0	0			0	0	0	0	0	84	0
Unclassified / Other	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0	0	0	0
TOTAL kg CO2e	-7	951	11	129	1092	0	0	0	586	0	586	1487		4	14	11	0	28	1699	-329

Appendix B. Carbon Assessment Inputs

The following table outlines all the inputs to the embodied carbon assessment. Please refer to the separate attachment.

opment S	Building section	Category	RICS Code	Sub-Category	Code	Description	Materials	Cost Plan Quantity	Unit	Assessment Quantity	Unit	Notes	Quantity Assumptions	Material Specification Assumption
		Enabling Works												
		Enabling / Demolition Works	0.2	Major Demolition Works										
		Enabling	**0.2**	**Major Demolition Works**	**0.2.1**		**0**			**2610**	**m2**			**0**
B	West Terminal Extension (WTE)	Enabling	0.2	Major Demolition Works	0.2.1	Breakout existing surface (to WTE footprint) and dispose of excavated material		2160	m2	2160	m2			
B	West Terminal Extension (WTE)	Enabling	0.2	Major Demolition Works	0.2.2	Demolish walls and floors/roof of existing building attached to West Pier		450	m2	450	m2			
A	New East Pier	Enabling / Demolition Works	0.1	Facilitating Works.	0.1.1	Move substation into new East	0	1	Nr	0	0		N/A	0
		Substructure	**1.1**											
		Substructure	**1.1**	**Standard Foundations**										
		Substructure	**1.1**	**Standard Foundations**	**1.1.1.1**		**Precast Concrete UK C25/30**			**1267**	**m3**		**Assumed 12 is the number of piles Assumed 90kg/m3 reinforcement**	**Precast Concrete UK C25/30 (50% GGBS)**
A	East Terminal Extension	Substructure	1.1	Standard Foundations	1.1.1	Substructure piling, base slab e	Precast Concrete UK C25/30	3690.00	m2	1152.24	m3		Insufficient information, assumed base slab thcikness 300mm, 64 piles based on a 7.5m spacing 10m depth 0.3m diammeter	Precast Concrete UK C25/30 (50% GGBS)
A	East Terminal Extension	Sub Structures	1.2	Specialist Foundations	1.2.1	Specialist Connection to new K	Precast Concrete UK C25/30	4850.00	m2	115.2238934	m3		Insufficient information - assumed 10% concrete volume from 1.1.1 is connections	Precast Concrete UK C25/30 (50% GGBS)
		Substructure	**1.1**	**Lowest Floor Construction**	**1.1.1**		**Concrete Insitu UK C20/25 (50%GGBS)**			**347**	**m3**		**Assumed 12 is the number of piles Assumed 90kg/m3 reinforcement**	**Concrete Insitu UK C32/40 (50%GGBS) and UK Rebar 97% recyled**
A	West Energy Centre (WEC)	Substructure	1.1	Lowest Floor Construction	1.1.47	Blinding concrete 50mm thick	Concrete Insitu UK C20/25 (50%GGBS)	13	m	16.25	m3		Assumed 300kg/m3 rein	Concrete Insitu UK C32/40 (50%GGBS) and UK Rebar 97% recyled
A	West Energy Centre (WEC)	Substructure	1.1	Lowest Floor Construction	1.1.50	Extra over for 2m wide section	Concrete Insitu UK C20/25 (50%GGBS)			256	m3			
A	West Energy Centre (WEC)	Substructure	1.1	Lowest Floor Construction	1.1.57	Reinforced concrete plinth 150	Concrete Insitu UK C20/25 (50%GGBS)			10.8	m3			
A	East Terminal Extension	Sub Structures	1.3.1	Substructure	1.3.2.10	Concrete topping 150mm thick	Concrete Insitu UK C20/25 (50%GGBS)	1.00	item	64	m3		Further information requi	0.00
		Substructure	**1.1**	**Secant Piling**	**1.1.2**		**Concrete Insitu UK C25/30 (50%GGBS)**			**13404**	**m3**			
A	West Energy Centre (WEC)	Substructure	1.1	Secant Piling	1.1.21	Contractor designed reinforced	Concrete Insitu UK C25/30 (50%GGBS)	12	m	33.92920066	m3		Assumed 12 is the numb	Concrete Insitu UK C25/30 (50%GGBS)
A	West Energy Centre (WEC)	Substructure	1.1	Secant Piling	1.1.25	Pile caps to secant pile wall 90	Concrete Insitu UK C25/30 (50%GGBS)	52	m	49.14	m3			Concrete Insitu UK C25/30 (50%GGBS)
A	West Energy Centre (WEC)	Substructure	1.1	Secant Piling	1.1.26	Pile caps to secant pile wall 21	Concrete Insitu UK C25/30 (50%GGBS)	12	m	26.46	m3			Concrete Insitu UK C25/30 (50%GGBS)
A	West Energy Centre (WEC)	Substructure	1.1	Secant Piling	1.1.27	Reinforced waterproof concrete	Concrete Insitu UK C25/30 (50%GGBS)	238	m2	71.256	m3			Concrete Insitu UK C25/30 (50%GGBS)
B	West Terminal Extension (WTE)	Substructure	1.1	Substructure	1.1.16	Concrete to concrete pile caps	Concrete Insitu UK C25/30 (50% GGBS)	125	m3	125	m3			Concrete Insitu UK C25/30 (50% GGBS)
B	West Terminal Extension (WTE)	Substructure	1.1	Substructure	1.1.17	Concrete to concrete ground be	Concrete Insitu UK C25/30 (50% GGBS)	220	m3	220	m3			Concrete Insitu UK C25/30 (50% GGBS)
B	West Terminal Extension (WTE)	Substructure	1.1	Substructure	1.1.18	Concrete to concrete slab	Concrete Insitu UK C25/30 (50% GGBS)	570	m3	570	m3			Concrete Insitu UK C25/30 (50% GGBS)
B	West Terminal Extension (WTE)	Substructure	1.1	Substructure	1.1.19	Extra over allowance for formin	Concrete Insitu UK C25/30 (50% GGBS)	5	Nr	75	m3		Assumed volume of 15m3 per lift, giving total volume 75m3	Concrete Insitu UK C25/30 (50% GGBS)
A	West Energy Centre (WEC)	Substructure	1.1	Specialist Foundations	1.1.10	Contractor designed reinforced	Concrete Insitu UK C25/30 (50%GGBS)	13	no	66.16194128	m3		N/A	Concrete Insitu UK C25/30 (50%GGBS)
A	West Energy Centre (WEC)	Substructure	1.1	Specialist Foundations	1.1.11	Contractor designed reinforced	Concrete Insitu UK C25/30 (50%GGBS)	31	no	157.7707831	m3		N/A	Concrete Insitu UK C25/30 (50%GGBS)
A	West Energy Centre (WEC)	Substructure	1.1	Secant Piling	1.1.20	Contractor designed reinforced	Concrete Insitu UK C25/30 (50%GGBS)	52	m	176.4318434	m3		Assumed 52 is the numb	Concrete Insitu UK C25/30 (50%GGBS)
A	New East Pier	Substructure	1.1	Standard Foundations	1.1.1	Specialist Foundations - allowa	Concrete Insitu UK C25/30 (50%GGBS)	5395	m2	1348.75	m3		Assumed 250mm thick	Concrete Insitu UK C25/30 (50%GGBS)
A	East Terminal Extension	Sub Structures	1.3.1	Substructure	1.3.2.2	1500mm dia piles say 24m long	Concrete Insitu UK C25/30 (50%GGBS)	6.00	nr	254.4690049	m3		0.00	Concrete Insitu UK C25/30 (50%GGBS)
A	East Terminal Extension	Sub Structures	1.3.1	Substructure	1.3.2.4	New concrete beams	Concrete Insitu UK C25/30 (50%GGBS)	9339.00	m2	42	m3			Concrete Insitu UK C25/30 (50%GGBS)
A	East Terminal Extension	Sub Structures	1.3.1	Substructure	1.3.2.6	New concrete planks	Concrete Insitu UK C25/30 (50%GGBS)	0.00	m2	10188	m3		N/A	Concrete Insitu UK C25/30 (50%GGBS)
		Substructure	**1.1**	**Secant Piling**	**1.1.3**		**Concrete Insitu UK C32/40 (50%GGBS)**			**1308**	**m3**			
A	West Energy Centre (WEC)	Substructure	1.1	Secant Piling	1.1.18	Piling guide wall	Concrete Insitu UK C32/40 (50%GGBS)	64	m	383	m3		Please provided addition	Concrete Insitu UK C32/40 (50%GGBS)
A	West Energy Centre (WEC)	Substructure	1.1	Lowest Floor Construction	1.1.61	Bunds around transformers & g	Concrete Insitu UK C32/40 (50%GGBS)	29	m3	29	m3		0	Concrete Insitu UK C32/40 (50%GGBS)
B	West Terminal Extension (WTE)	Substructure	1.1	Substructure	1.1.3	Install reinforced concrete piles	Concrete Insitu UK C32/40(50% GGBS)	119	Nr	336.4645732	m3			Concrete Insitu UK C32/40(50% GGBS)
A	West Energy Centre (WEC)	Substructure	1.1	Lowest Floor Construction	1.1.43	Infill voids	Concrete Insitu UK C32/40 (50%GGBS)	129	m3	129	m3			Concrete Insitu UK C32/40 (50%GGBS)
A	West Energy Centre (WEC)	Substructure	1.1	Lowest Floor Construction	1.1.33	Basement slab raft overall 900	Concrete Insitu UK C32/40 (50%GGBS)	230	m2	207	m3			Concrete Insitu UK C32/40 (50%GGBS)
A	West Energy Centre (WEC)	Substructure	1.1	Lowest Floor Construction	1.1.35	Universal beam 500mm x 2000	Concrete Insitu UK C32/40 (50%GGBS)	26	m	26	m3			Concrete Insitu UK C32/40 (50%GGBS)
A	West Energy Centre (WEC)	Substructure	1.1	Lowest Floor Construction	1.1.37	Universal beam 900mm x 2000	Concrete Insitu UK C32/40 (50%GGBS)	7	m	12.6	m3			Concrete Insitu UK C32/40 (50%GGBS)
A	West Energy Centre (WEC)	Substructure	1.1	Lowest Floor Construction	1.1.39	Universal beam 900mm x 2000	Concrete Insitu UK C32/40 (50%GGBS)	17	m	30.6	m3		0	Concrete Insitu UK C32/40 (50%GGBS)
A	West Energy Centre (WEC)	Substructure	1.1	Lowest Floor Construction	1.1.44	Ground floor slab 500mm thick	Concrete Insitu UK C32/40 (50%GGBS)	95	m2	47.5	m3			Concrete Insitu UK C32/40 (50%GGBS)
A	West Energy Centre (WEC)	Substructure	1.1	Lowest Floor Construction	1.1.48	Suspended reinforced concrete	Concrete Insitu UK C32/40 (50%GGBS)	263	m2	78.9	m3			Concrete Insitu UK C32/40 (50%GGBS)
A	West Energy Centre (WEC)	Substructure	1.1	Lowest Floor Construction	1.1.51	Ground beam 1, 750 x 600mm	Concrete Insitu UK C32/40 (50%GGBS)	30	m	13.5	m3			Concrete Insitu UK C32/40 (50%GGBS)
A	West Energy Centre (WEC)	Substructure	1.1	Lowest Floor Construction	1.1.53	Reinforced concrete wall 300m	Concrete Insitu UK C32/40 (50%GGBS)	38	m2	11.472	m3			Concrete Insitu UK C32/40 (50%GGBS)
A	West Energy Centre (WEC)	Substructure	1.1	Lowest Floor Construction	1.1.55	Columns, 500 x 500mm, incluc	Concrete Insitu UK C32/40 (50%GGBS)	13	m	3.135	kg			Concrete Insitu UK C32/40 (50%GGBS)
		Substructure	**1.1**	**Standard Foundations**	**1.1.4**		**Disposal**			**1671**	**m3**			
A	West Energy Centre (WEC)	Substructure	1.1	Standard Foundations	1.1.5	Disposal	Disposal	1591	m3	1591	m3		0	0
A	West Energy Centre (WEC)	Substructure	1.1	Standard Foundations	1.1.6	Extra over for disposal of contar	Disposal	80	m3	80	m3		0	0
		Substructure	**1.1**	**Standard Foundations**	**1.1.5**		**Excavation**			**2665**	**m3**			
A	West Energy Centre (WEC)	Substructure	1.1	Standard Foundations	1.1.2	Extra over for hard dig	Excavation	139	m3	139	m3		0	0
A	West Energy Centre (WEC)	Substructure	1.1	Standard Foundations	1.1.3	Excavation for ground floor slab	Excavation	204	m3	204	m3		0	0
A	West Energy Centre (WEC)	Substructure	1.1	Standard Foundations	1.1.4	Extra over for hard dig	Excavation	20	m3	20	m3		0	0
A	West Energy Centre (WEC)	Substructure	1.1	Standard Foundations	1.1.1	Excavation for basement slab	Excavation	1387	m3	1387	m3		0	0
B	West Terminal Extension (WTE)	Substructure	1.1	Substructure	1.1.7	Excavation for pile caps and dis	Excavation	125	m3	125	m3			
B	West Terminal Extension (WTE)	Substructure	1.1	Substructure	1.1.8	Excavation for ground beams a	Excavation	220	m3	220	m3			
B	West Terminal Extension (WTE)	Substructure	1.1	Substructure	1.1.9	Excavation for slab and disposa	Excavation	570	m3	570	m3			
		Substructure	**1.1**	**Substructure**	**1.1.6**		**Formwork**			**62**	**m3**		**assume 50mm thick**	**assume timber**
B	West Terminal Extension (WTE)	Substructure	1.1	Substructure	1.1.10	Formwork to reinforced concret	Formwork	695	m2	695	m2		N/A	assume timber
B	West Terminal Extension (WTE)	Substructure	1.1	Substructure	1.1.11	Formwork to reinforced concret	Formwork	400	m2	400	m2		N/A	assume timber
B	West Terminal Extension (WTE)	Substructure	1.1	Substructure	1.1.12	Formwork to reinforced concret	Formwork	150	m2	150	m2		N/A	assume timber
		Substructure	**1.1**	**Secant Piling**	**1.1.7**		**Membrane**			**729**	**m2**			
A	West Energy Centre (WEC)	Substructure	1.1	Secant Piling	1.1.31	Gas proof membrane behind pi	Membrane	70	m2	70	m2		N/A	0
A	West Energy Centre (WEC)	Substructure	1.1	Lowest Floor Construction	1.1.42	Gas proof membrane behind U	Gas Membrane	325	m2	325	m2		0	Concrete Insitu UK C20/25 (50%GGBS)
A	West Energy Centre (WEC)	Substructure	1.1	Lowest Floor Construction	1.1.46	Gas proof membrane below sla	Gas Membrane	38	m2	38	m2		Assumed 70kg/m3 reinfo	Concrete Insitu UK C32/40 (50%GGBS) and UK Rebar 97% recyled
A	West Energy Centre (WEC)	Substructure	1.1	Secant Piling	1.1.30	Gas proof membrane behind w	Gas Membrane	295	m2	295	m2		N/A	0
		Substructure	**1**	**Substructure**	**1.1.8**		**Piling Mat**			**2847**	**m2**			
B	West Terminal Extension (WTE)	Substructure	1.1	Substructure	1.1.1	Install piling mat	Piling Mat	2160	m2	2160	m2		N/A	
A	West Energy Centre (WEC)	Substructure	1.1	Specialist Foundations	1.1.7	Install piling mat	Piling Mat	687	m2	687	m2		Please provided addition	Wait for Andy's info
		Substructure	**1.1**	**Lowest Floor Construction**	**1.1.9**		**Steel Rebar UK 97% recycled EAF production**			**695256**	**kg**		**0**	**Concrete Insitu UK C32/40 (50%GGBS)**
A	West Energy Centre (WEC)	Substructure	1.1	Specialist Foundations	1.1.10.1	Contractor designed reinforced	Steel Rebar UK 97% recycled EAF production			7608.623248	kg			
A	West Energy Centre (WEC)	Substructure	1.1	Specialist Foundations	1.1.11.1	Contractor designed reinforced	Steel Rebar UK 97% recycled EAF production			18143.64005	kg			
A	West Energy Centre (WEC)	Substructure	1.1	Secant Piling	1.1.18		Steel Rebar UK 97% recycled EAF production			42148	kg		Assumed 110kg/m3 rein	Steel Rebar UK 97% recycled EAF production
A	West Energy Centre (WEC)	Substructure	1.1	Secant Piling	1.1.20.1	Contractor designed reinforced	Steel Rebar UK 97% recycled EAF production			20289.66199	kg			
A	West Energy Centre (WEC)	Substructure	1.1	Secant Piling	1.1.21.1	Contractor designed reinforced	Steel Rebar UK 97% recycled EAF production			3901.858076	kg			
A	New East Pier	Substructure	1.1	Standard Foundations	1.1.2		Steel rebar UK 97% recycled EAF production			134875	kg		reinforcement 100kg/m3	Steel rebar UK 97% recycled EAF production
A	East Terminal Extension	Sub Structures	1.1.1	Substructure		Reinforcement	Steel- Rebar- UK 97% recycled EAF production			171252.4774	kg		115kg/m3 reinforcement	Steel- Rebar- UK 97% recycled EAF production
A	East Terminal Extension	Sub Structures	1.3.1	Substructure	1.3.2.3	1500mm dia piles say 24m long	Steel Rebar UK 97% recycled EAF production			29263.93557	kg		Assumed 115kg/m3 rein	Steel Rebar UK 97% recycled EAF production
A	East Terminal Extension	Sub Structures	1.3.1	Substructure	1.3.2.5	New concrete beams	Steel Rebar UK 97% recycled EAF production			9339	kg		Assumed 220kg/m3 rein	Steel Rebar UK 97% recycled EAF production
A	East Terminal Extension	Sub Structures	1.3.1	Substructure	1.3.2.7	New concrete planks	Steel Rebar UK 97% recycled EAF production			0	kg		Assume 80kg/m3 reinfor	Steel Rebar UK 97% recycled EAF production
A	East Terminal Extension	Sub Structures	1.3.1	Substructure	1.3.2.8	Joint at south dock wall	Steel Rebar UK 97% recycled EAF production				kg		Square mesh A393 Mas	Steel Rebar UK 97% recycled EAF production
A	East Terminal Extension	Sub Structures	1.3.1	Substructure	1.3.2.11	Reinforcing mesh	Steel Rebar UK 97% recycled EAF production			2614.92	kg			
B	West Terminal Extension (WTE)	Substructure	1.1	Substructure	1.1.3		Steel- Rebar- UK 97% recycled EAF production			38693.42592	kg		Assumed 115kg/m3 rein	Steel- Rebar- UK 97% recycled EAF production
B	West Terminal Extension (WTE)	Substructure	1.1	Substructure	1.1.13	Reinforcement to concrete grou	Steel- Rebar- UK 97% recycled EAF production	35	t	35000	kg			Steel- Rebar- UK 97% recycled EAF production
B	West Terminal Extension (WTE)	Substructure	1.1	Substructure	1.1.14	Reinforcement to concrete pile	Steel- Rebar- UK 97% recycled EAF production	20	t	20000	kg			Steel- Rebar- UK 97% recycled EAF production
B	West Terminal Extension (WTE)	Substructure	1.1	Substructure	1.1.15	Reinforcement to concrete slab	Steel- Rebar- UK 97% recycled EAF production	90	t	90000	kg			Steel- Rebar- UK 97% recycled EAF production
A	West Energy Centre (WEC)	Substructure	1.1	Secant Piling	1.1.25	Reinforcement	Steel Rebar UK 97% recycled EAF production			4422.6	kg		Assumed 90kg/m3 reinfo	Steel Rebar UK 97% recycled EAF production
A	West Energy Centre (WEC)	Substructure	1.1	Secant Piling	1.1.26	Reinforcement	Steel Rebar UK 97% recycled EAF production			2381.4	kg		Assumed 90kg/m3 reinfo	Steel Rebar UK 97% recycled EAF production
A	West Energy Centre (WEC)	Substructure	1.1	Secant Piling	1.1.27	Reinforcement	Steel Rebar UK 97% recycled EAF production			6413.04	kg		Assumed 90kg/m3 reinfo	Steel Rebar UK 97% recycled EAF production
B	West Terminal Extension (WTE)	Substructure	1.1	Substructure	1.1.19	Reinforcement	Steel- Rebar- UK 97% recycled EAF production			7500	kg		Assumed reinforcement 100kg/m3	Steel- Rebar- UK 97% recycled EAF production
A	West Energy Centre (WEC)	Substructure	1.1	Lowest Floor Construction	1.1.34	reinforcement	UK Steel Rebar 97% recyled			21735	kg		105kg/m3	UK Steel Rebar 97% recyled
A	West Energy Centre (WEC)	Substructure	1.1	Lowest Floor Construction	1.1.36	reinforcement	UK Steel Rebar 97% recyled			5200	kg		200kg/m3 reinforcement	UK Steel Rebar 97% recyled
A	West Energy Centre (WEC)	Substructure	1.1	Lowest Floor Construction	1.1.38	reinforcement	UK Steel Rebar 97% recyled			2520	kg		200kg/m3 reinforcement	UK Steel Rebar 97% recyled
A	West Energy Centre (WEC)	Substructure	1.1	Lowest Floor Construction	1.1.40	reinforcement	UK Steel Rebar 97% recyled			6120	kg		200kg/m3 reinforcement	UK Steel Rebar 97% recyled
A	West Energy Centre (WEC)	Substructure	1.1	Lowest Floor Construction	1.1.45	reinforcement	UK Steel Rebar 97% recyled			4275	kg		90kg/m3 reinforcement	UK Steel Rebar 97% recyled
A	West Energy Centre (WEC)	Substructure	1.1	Lowest Floor Construction	1.1.49	reinforcement	UK Steel Rebar 97% recyled			7101	kg		90kg/m3 reinforcement	UK Steel Rebar 97% recyled
A	West Energy Centre (WEC)	Substructure	1.1	Lowest Floor Construction	1.1.52	reinforcement	UK Steel Rebar 97% recyled			2700	kg		200 kg/m3 reinforcemen	UK Steel Rebar 97% recyled
A	West Energy Centre (WEC)	Substructure	1.1	Lowest Floor Construction	1.1.54	reinforcement	UK Steel Rebar 97% recyled			1032.48	kg		90kg/m3 reinforcement	UK Steel Rebar 97% recyled
A	West Energy Centre (WEC)	Substructure	1.1	Lowest Floor Construction	1.1.56	reinforcement	UK Steel Rebar 97% recyled			282.15	kg		90kg/m3 reinforcement	UK Steel Rebar 97% recyled
A	West Energy Centre (WEC)	Substructure	1.1	Lowest Floor Construction	1.1.58	Reinforced concrete plinth 150	UK Steel Rebar 97% recyled	72	m2	443.52	kg			
		Substructure	**1.1**	**Lowest Floor Construction**	**1.1.11**		**Steel- UK closed section**			**842**	**kg**			
A	West Energy Centre (WEC)	Substructure	1.1	Lowest Floor Construction	1.1.41	Steel vertical cross bracing; 15	Steel- UK closed section	325	m2	841.8490442	kg		N/A	0
		Superstructure	**2.1 - 2.7**											
		Superstructure	**2.1**	**Frame**										
		Superstructure	**2.1**	**Frame**	**2.1.1**	**Sprayed Fireproofing**	**Intumescent Paint**			**80**	**m3**		**Assumed 1mm thick**	**Amotherm steel WB EPD**
A	New East Pier	Superstructure	2.1	Frame	2.1.5	Sprayed Fireproofing	Intumescent Paint	36500	m2	36.5	m3		Assumed 1mm thick	Amotherm steel WB EPD
A	East Terminal Extension	Superstructure	2.1	Frame	2.1.5	Sprayed Fireproofing	Intumescent Paint	33395.00	m2	33.395	m3		Assumed 1mm thick	Amotherm steel WB EPD
A	West Energy Centre (WEC)	Superstructure	2.1	Frame	2.1.7	Intumescent paint	Intumescent Paint	526	m2	0.526	m3		Assumed 1mm thick	Amotherm steel WB EPD
B	West Terminal Extension (WTE)	Superstructure	2.1	Frame	2.1.5	Sprayed Fireproofing	Intumescent Paint	9300	m2	9.3	m3		Assumed 1mm thick	Amotherm steel WB EPD
		Superstructure	**2.1**	**Frame**	**2.1.2**		**Concrete Insitu UK C20/25 (50%GGBS)**			**3**	**m3**			
A	West Energy Centre (WEC)	Superstructure	2.1	Frame	2.1.9	500mm sq. rc column	Concrete Insitu UK C20/25 (50%GGBS)	3	m3	3	m3		0	Concrete Insitu UK C20/25 (50%GGBS)
		Superstructure	**2.1**	**Frame**	**2.1.3**		**Steel UK open rolled sections**			**5559086**	**kg**			**Steel UK open rolled sections**
A	New East Pier	Superstructure	2.1	Frame	2.1.1	Steel Beams	Steel UK open rolled sections	1902.975733	t	1902976	kg		0	Steel UK open rolled sections
A	New East Pier	Superstructure	2.1	Frame	2.1.2	Steel Columns	Steel UK open rolled sections	489.435775	t	489436	kg		0	Steel UK open rolled sections
A	New East Pier	Superstructure	2.1	Frame	2.1.3	Steel Bracing	Steel UK open rolled sections	58.80469844	t	58805	kg		0	Steel UK open rolled sections
A	New East Pier	Superstructure	2.1	Frame	2.1.4	Allowance for fittings	Steel UK open rolled sections	122.5608103	t	122561	kg		0	Steel UK open rolled sections
A	East Terminal Extension	Superstructure	2.1	Frame	2.1.1	Steel Beams	Steel UK open rolled sections	1783.51	t	1783505.39	kg		0.00	Steel UK open rolled sections
A	East Terminal Extension	Superstructure	2.1	Frame	2.1.2	Steel Columns	Steel UK open rolled sections	309.52	t	309518.4752	kg		0.00	Steel UK open rolled sections
A	East Terminal Extension	Superstructure	2.1	Frame	2.1.3	Steel Bracing	Steel UK open rolled sections	109.09	t	109093.3202	kg		0.00	Steel UK open rolled sections
A	East Terminal Extension	Superstructure	2.1	Frame	2.1.4	Allowance for fittings	Steel UK open rolled sections	110.11	t	110105.8593	kg		0.00	Steel UK open rolled sections
A	West Energy Centre (WEC)	Superstructure	2.1	Frame	2.1.1	Columns 254 x 254 x 73kg/m	Steel UK open rolled sections	7	t	7321.9	kg		0	Steel UK open rolled sections
A	West Energy Centre (WEC)	Superstructure	2.1	Frame	2.1.2	Columns SHS 200 x 200 x 12.5	Steel UK open rolled sections	1	t	1000	kg		0	Steel UK open rolled sections
A	West Energy Centre (WEC)	Superstructure	2.1	Frame	2.1.3	Primary beams 254kg/m	Steel UK open rolled sections	9	t	9340	kg		0	Steel UK open rolled sections
A	West Energy Centre (WEC)	Superstructure	2.1	Frame	2.1.4	Secondary tie beams 191kg /m	Steel UK open rolled sections	3	t	3110	kg		0	Steel UK open rolled sections
A	West Energy Centre (WEC)	Superstructure	2.1	Frame	2.1.6	Wind posts to strengthen block	Steel UK open rolled sections	2	t	1720	kg		0	Steel UK open rolled sections
B	West Terminal Extension (WTE)	Superstructure	2.1	Frame	2.1.1	Steel Beams	Steel UK open rolled sections	258.4698878	t	258469.8878	kg			Steel UK open rolled sections
B	West Terminal Extension (WTE)	Superstructure	2.1	Frame	2.1.2	Steel Columns	Steel UK open rolled sections	329.913162	t	329913.162	kg			Steel UK open rolled sections
B	West Terminal Extension (WTE)	Superstructure	2.1	Frame	2.1.3	Steel Bracing	Steel UK open rolled sections	31.22935958	t	31229.35958	kg			Steel UK open rolled sections
B	West Terminal Extension (WTE)	Superstructure	2.1	Frame	2.1.4	Allowance for fittings	Steel UK open rolled sections	30.98062047	t	30980.62047	kg			Steel UK open rolled sections
		Superstructure	**2.1**	**Frame**	**2.1.4**		**Steel-Plate**			**5056**	**kg**			**Steel-Plate**
A	West Energy Centre (WEC)	Superstructure	2.1	Frame	2.1.5	Allowance for fittings	Steel-Plate	4	t	4498.38	kg		0	Steel-Plate
A	West Energy Centre (WEC)	Superstructure	2.1	Frame	2.1.11	Holding down base plate 400 x	Steel-Plate	17	no	533.8	kg		0	Steel-Plate
A	West Energy Centre (WEC)	Superstructure	2.1	Frame	2.1.12	Holding down base plate 350 x	Steel-Plate	1	no	24.040625	kg		0	Steel-Plate
A	West Energy Centre (WEC)	Superstructure	2.1	Frame	2.1.10	Lifting beam		1	no				Dimensions? Material sp	0
		Superstructure	**2.2**	**Upper Floors**										
		Superstructure	**2.2**	**Upper Floors**	**2.2.1**		**Concrete Insitu UK C20/25 (50%GGBS)**			**104**	**m3**			
A	West Energy Centre (WEC)	Superstructure	2.2	Upper Floors	2.2.1	400mm th rc ceiling / suspende	Concrete Insitu UK C20/25 (50%GGBS)	260	m2	104	m3		0	Concrete Insitu UK C20/25 (50%GGBS)
		Superstructure	**2.2**	**Upper Floors**	**2.2.2**		**Concrete Insitu UK C25/30 (50% GGBS)**			**552**	**m3**			**Concrete Insitu UK C25/30 (50% GGBS)**
B	West Terminal Extension (WTE)	Superstructure	2.2	Upper Floors	2.2	In-situ reinforced concrete com	Concrete Insitu UK C25/30 (50% GGBS)	3680	m2	552	m3			Concrete Insitu UK C25/30 (50% GGBS)
		Superstructure	**2.2**	**Upper Floors**	**2.2.3**		**Concrete Insitu UK C32/40**			**3184**	**m3**			**Concrete Insitu UK C32/40**
A	East Terminal Extension	Superstructure	2.2	Upper Floors	2.2.1	In-Situ reinforced concrete com	Concrete Insitu UK C32/40	12140.00	m2	1821	m3		0.00	Concrete Insitu UK C32/40
A	New East Pier	Superstructure	2.2	Upper Floors	2.2.1	In-situ reinforced concrete com	Concrete Insitu UK C32/40.	9084	m2	1362.6	m3		0	Concrete Insitu UK C32/40.
		Superstructure	**2.2**	**Upper Floors**	**2.2.5**		**Steel rebar UK 97% recycled EAF production**			**336204**	**kg**			
A	New East Pier	Superstructure	2.2	Upper Floors	2.2.2	In-situ reinforced concrete com	Steel rebar UK 97% recycled EAF production			122634	kg			Steel rebar UK 97% recycled EAF production
A	East Terminal Extension	Superstructure	2.2	Upper Floors	2.2.2	In-Situ reinforced concrete com	Steel rebar UK 97% recycled EAF production			163890	kg			Steel rebar UK 97% recycled EAF production
B	West Terminal Extension (WTE)	Superstructure	2.2	Upper Floors	2.3		Steel- Rebar- UK 97% recycled EAF production			49680	kg			Steel- Rebar- UK 97% recycled EAF production
		Superstructure	**2.3**	**Roof**										
		Superstructure	**2.3**	**Roof**	**2.3.1**		**Aluminium Cladding**			**1188**	**kg**			
A	East Terminal Extension	Superstructure	2.3	Roof	2.3.1.3	Aluminium silver metal claddin	Aluminium Cladding	83.26	m2	1188.05	kg		14.27 kg/m2	Aluminium
		Superstructure	**2.3**	**Roof**	**2.3.2**		**Aluminium Frame - PV**			**21858**	**kg**		**4 kg/m2**	**Aluminium Frame**
B	West Terminal Extension (WTE)	Superstructure	2.3	Roof	2.3.12	Metal support framework for PV	Aluminium Frame - PV	236.35	m2	945	kg		4 kg/m2	Aluminium Frame
A	New East Pier	Superstructure	2.3	Roof	2.3.3.3	Metal support framework for PV	Aluminium Frame - PV	1323.56	m2	5294	kg		4 kg/m2	Aluminium Frame
A	East Terminal Extension	Superstructure	2.3	Roof	2.3.4.3	Metal support framework for PV	Aluminium Frame - PV	2389.58	m2	9558	kg		4 kg/m2	Aluminium Frame
A	West Energy Centre (WEC)	Superstructure	2.1	Frame	2.1.8	Allow for PV panels support fra	Aluminium Frame - PV	6	t	6060	kg		4 kg/m2	0
		Superstructure	**2.3**	**Roof**	**2.3.3**		**Aluminium Louvers**			**5376**	**kg**		**27.14 kg/m2**	**Aluminium louvers**
A	East Terminal Extension	Superstructure	2.3	Roof	2.3.3.1	Double glazed skylight louvres	Aluminium Louvers	222.68	m2	5376	kg		27.14 kg/m2	Aluminium louvers
		Superstructure	**2**	**Roof**	**2.3.5**		**Aluminium Roof Seam**			**137607**	**kg**		**14.27 kg/m2**	**Aluminium**
B	West Terminal Extension (WTE)	Superstructure	2.3	Roof	2.3.2	Dark grey metal standing seam	Aluminium Roof Seam	128	m2	1826.56	kg		14.27 kg/m2	Aluminium
B	West Terminal Extension (WTE)	Superstructure	2.3	Roof	2.3.3	Metal standing seam over insul	Aluminium Roof Seam	89	m2	1270.03	kg		14.27 kg/m2	Aluminium
A	New East Pier	Superstructure	2.3	Roof	2.3.1.1	Metal standing seam over insul	Aluminium Roof Seam	4155	m2	59291.85	kg		14.27 kg/m2	Aluminium
A	New East Pier	Superstructure	2.3	Roof	2.3.1.3	Metal standing seam as coverin	Aluminium Roof Seam	399	m2	5693.73	kg		14.27 kg/m2	Aluminium
A	East Terminal Extension	Superstructure	2.3	Roof	2.3.1.2	Metal standing seam over insul	Aluminium Roof Seam	4872.11	m2	69524.97	kg		14.27 kg/m2	Aluminium
		Superstructure	**2**	**Roof**	**2.3.6**		**Cable**			**945**	**m**			
B	West Terminal Extension (WTE)	Superstructure	2.3	Roof	2.3.13	Cable-based fall protection syst	Cable	220	m	220	m			
A	New East Pier	Superstructure	2.3	Roof	2.3.4.4	Cable-based fall protection syst	Cable	365	m	365	m		0	0
A	East Terminal Extension	Superstructure	2.3	Roof	2.3.4.4	Cable-based fall protection syst	Cable	360.00	m	360	m		0.00	0.00
		Superstructure	**2.3**	**Roof**	**2.3.7**		**Concrete Insitu UK C20/25 (50%GGBS)**			**76**	**m3**			
A	West Energy Centre (WEC)	Superstructure	2.3	Roof	2.3.1	Roof slab rc 200mm th	Concrete Insitu UK C20/25 (50%GGBS)	381	m2	76.2	m3		0	Concrete Insitu UK C20/25 (50%GGBS)
		Superstructure	**2.3**	**Roof**	**2.3.11**		**Outlet**			**8**	**#**			
A	West Energy Centre (WEC)	Superstructure	2.3	Roof	2.3.2	Rainwater outlets	Outlet	8	no	8	no		0	0

		Superstructure	**2.3**	**Roof**	**2.3.12**		**PE Pipes**			**845**	**m**		**50mm diameter - 1.4kg**	**PE**
A	New East Pier	Superstructure	2.3	Roof	2.3.2.1	Allowance for drainage system	PE Pipes	210	m	210	m		50mm diameter - 1.4kg/	PE
A	East Terminal Extension	Superstructure	2.3	Roof	2.3.2.1	Allowance for drainage system	PE Pipes	360.00	m	360.00	m		50mm diameter - 1.4kg/	PE
B	West Terminal Extension (WTE)	Superstructure	2.3	Roof	2.3.6	Rainwater downpipes	PE Pipes	220	m	220	m		50mm diameter - 1.4kg/m	
A	West Energy Centre (WEC)	Superstructure	2.3	Roof	2.3.3	Rainwater downpipes	PE Pipes	40	m	40	m		110mm	PE Pipes
A	West Energy Centre (WEC)	Superstructure	2.3	Roof	2.3.4	Drainage channel to roof	PE Pipes	15	m	15	m		110mm	PE Pipes
		Superstructure	**2**	**Roof**	**2.3.13**		**Precast Concrete Tiles**			**1677**	**m2**		**80mm thick**	
A	New East Pier	Superstructure	2.3	Roof	2.3.3.4	Roof Pavers	Precast Concrete Tiles	1677	m2	1677	m2		80mm thick	Precast Concrete tiles
		Superstructure	**2.3**	**Roof**	**2.3.14**		**Roof Layers**			**4272**	**m2**			**120mm EPS Insulation Membrane 200mm Pebbles 80mm Concrete Pavers**
A	New East Pier	Superstructure	2.3	Roof	2.3.1.2	Insulated inverted roof on conc	Roof Layers	1213	m2	1213	m2		120mm EPS Insulation Membrane 200mm Pebbles 80mm Concrete Pavers	EPS Insulation
A	East Terminal Extension	Superstructure	2.3	Roof	2.3.1.1	Insulated inverted roof on conc	Roof Layers	1185.74	m2	1185.74	m2		120mm EPS InsulationM	EPS Insulation
B	West Terminal Extension (WTE)	Superstructure	2.3	Roof	2.3.1	Insulated inverted roof on conc	Roof Layers	1873	m2	1873	m2		120mm thick	EPS Insulation
		Superstructure	**2.3**	**Roof**	**2.3.15**		**Skylight**			**810**	**m2**	**0**		
A	East Terminal Extension	Superstructure	2.3	Roof	2.3.2	Double glazed skylight	Skylight	809.88	m2	809.88	m2		0.00	0.00
		Superstructure	**2**	**Roof**	**2.3.16**		**Steel Mesh**			**49763**	**kg**	**0**	**2mm thick - 22 kg/m2**	**Galvanised Steel**
A	New East Pier	Superstructure	2.3	Roof	2.3.3.1	External metal mesh walkway	Steel Mesh	626	m2	13772	kg		2mm thick - 22 kg/m2	Galvanised Steel
B	West Terminal Extension (WTE)	Superstructure	2.3	Roof	2.3.10	External grated metal mesh wa	Steel Mesh	23.26	m2	512	kg		2mm thick - 22 kg/m2	Galvanised Steel
A	East Terminal Extension	Superstructure	2.3	Roof	2.3.1.4	External grated metal mesh to	Steel Mesh	1612.68	m2	35479	kg		2mm thick - 22 kg/m2	Galvanised Steel
		Superstructure	**2**	**Roof**	**2.3.17**		**Steel Railing**			**1238**	**m**	**Stainless Steel**	**1.15 kg/m**	**Stainless Steel**
A	New East Pier	Superstructure	2.3	Roof	2.3.3.2	Handrails to external metal mes	**Steel Railing**	600	m	600	m		1.15 kg/m	Stainless Steel
A	East Terminal Extension	Superstructure	2.3	Roof	2.3.4.1	Steel handrail to roof edges	**Steel Railing**	555.57	m	555.57	m		1.15 kg/m	Stainless Steel
A	East Terminal Extension	Superstructure	2.3	Roof	2.3.4.2	Allowance for stairs with steel h	**Steel Railing**	5.00	nr	5.00	nr		0.00	0.00
A	West Energy Centre (WEC)	Superstructure	2.3	Roof	2.3.7	Metal balustrade to roof	**Steel Railing**	64	m	64	m		1.15 kg/m	Stainless Steel
B	West Terminal Extension (WTE)	Superstructure	2.3	Roof	2.3.11	Handrails to external grated me	**Steel Railing**	13.656	m	13.656	m		1.15 kg/m	Stainless Steel
A	New East Pier	Superstructure	2.3	Roof	2.3.3.1	Allowance for works to roof acc	0	22	nr	0	0		0	0
A	East Terminal Extension	Superstructure	2.3	Roof	2.3.3.3	Allowance for works to roof access hatches/smoke vents		2.00	nr				0.00	0.00
A	East Terminal Extension	Superstructure	2.3	Roof	2.3.1.5	Allowance for stair cover		31.94	m2				0.00	Please provide more information
B	West Terminal Extension (WTE)	Superstructure	2.3	Roof	2.3.4	Allowance for strengthening of areas for equipment transfer		80	m2					
B	West Terminal Extension (WTE)	Superstructure	2.3	Roof	2.3.8	Allowance for works to roof access hatches/smoke vents		2	nr					
A	West Energy Centre (WEC)	Superstructure	2.3	Roof	2.3.5	Access hatch to roof		1	no				0	0
A	West Energy Centre (WEC)	Superstructure	2.3	Roof	2.3.6	Roof Light		1	no				0	0
		Superstructure	**2.4**	**Stairs & Ramps**										
		Superstructure	**2.4**	**Stairs & Ramps**	**2.4.1**		**Stainless Steel Staircase**			**17613**	**kg**		**207.21 kg/m - assume**	**Galvanised Steel staircase**
B	West Terminal Extension (WTE)	Superstructure	2.4	Stairs & Ramps	2.4.25	Roof access stairs (L20 to L30)	Stainless Steel Staircase	1	nr	10360.5	kg		Provisionally take worst	Stainelss Steel Staircase
A	West Energy Centre (WEC)	Superstructure	2.4	Stairs & Ramps	2.4.1	Staircase from basement to gro	Steel staircase	1	no	1450	kg		assume 7m per stair	0
A	West Energy Centre (WEC)	Superstructure	2.4	Stairs & Ramps	2.4.2	Staircase from ground floor to r	Steel staircase	1	no	5802	kg		assume 4 floors	0
		Superstructure	**2.4**	**Stairs & Ramps**	**2.4.2**		**Ladder**			**6**	**m**			**Stainless Steel**
A	West Energy Centre (WEC)	Superstructure	2.4	Stairs & Ramps	2.4.6	Cat ladder 450mm wide	Ladder	6	m	6	m		0	0
		Superstructure	**2.4**	**Stairs & Ramps**	**2.4.3**		**Precast Concrete C20/25**			**120**	**m3**	**Precast Concrete C20/25 (50%**	**4% rebar volume, angl**	**Precast Concrete C20/25 (50%GGBS)**
A	East Terminal Extension	Superstructure	2.4	Stairs & Ramps	2.4.1	Precast concrete stairs(GL E2:I	Precast Concrete C20/25	1.00	nr	8.02	m3		4% rebar volume, angle	Precast Concrete C20/25 (50%GGBS)
A	East Terminal Extension	Superstructure	2.4	Stairs & Ramps	2.4.4	Precast concrete half landing st	Precast Concrete C20/25	1.00	nr	3.41	m3		4% rebar volume, angle	Precast Concrete C20/25 (50%GGBS)
A	East Terminal Extension	Superstructure	2.4	Stairs & Ramps	2.4.7	Precast concrete half landing st	Precast Concrete C20/25	1.00	nr	3.38	m3		4% rebar volume, angle	Precast Concrete C20/25 (50%GGBS)
A	East Terminal Extension	Superstructure	2.4	Stairs & Ramps	2.4.10	Precast concrete half landing st	Precast Concrete C20/25	1.00	nr	3.39	m3		4% rebar volume, angle	Precast Concrete C20/25 (50%GGBS)
A	East Terminal Extension	Superstructure	2.4	Stairs & Ramps	2.4.13	Precast concrete half landing st	Precast Concrete C20/25			3.39	m3			
A	East Terminal Extension	Superstructure	2.4	Stairs & Ramps	2.4.16	Precast concrete half landing st	Precast Concrete C20/25			3.49	m3			
A	East Terminal Extension	Superstructure	2.4	Stairs & Ramps	2.4.19	Precast concrete half landing st	Precast Concrete C20/25			3.5	m3			
A	East Terminal Extension	Superstructure	2.4	Stairs & Ramps	2.4.22	Precast concrete half landing st	Precast Concrete C20/25			4.22	m3			
A	East Terminal Extension	Superstructure	2.4	Stairs & Ramps	2.4.25	Precast concrete half landing st	Precast Concrete C20/25			3.37	m3			
A	East Terminal Extension	Superstructure	2.4	Stairs & Ramps	2.4.28	Precast concrete half landing st	Precast Concrete C20/25			3.39	m3			
A	East Terminal Extension	Superstructure	2.4	Stairs & Ramps	2.4.31	Precast ramp; 2000mm wide x	Precast Concrete C20/25			4.18275	m3			
A	East Terminal Extension	Superstructure	2.4	Stairs & Ramps	2.4.33	Precast ramp; 2000mm wide x	Precast Concrete C20/25			19.44	m3			
A	New East Pier	Superstructure	2.4	Stairs & Ramps	2.4.1	Precast concrete stairs (gridline	Precast Concrete C20/25	1	nr	5.84	m3		4% rebar volume, angle	Precast Concrete UK C20/25 (50% GGBS)
A	New East Pier	Superstructure	2.4	Stairs & Ramps	2.4.4	Precast concrete half landing st	Precast Concrete C20/25	1	nr	2.8	m3		4% rebar volume, angle	Precast Concrete UK C20/25 (50% GGBS)
A	New East Pier	Superstructure	2.4	Stairs & Ramps	2.4.7	Precast concrete half landing st	Precast Concrete C20/25	1	nr	2.99	m3		4% rebar volume, angle	Precast Concrete UK C20/25 (50% GGBS)
A	New East Pier	Superstructure	2.4	Stairs & Ramps	2.4.10	Precast concrete half landing st	Precast Concrete C20/25			3.89	m3			
A	New East Pier	Superstructure	2.4	Stairs & Ramps	2.4.13	Precast concrete half landing st	Precast Concrete C20/25			3.99	m3			
A	New East Pier	Superstructure	2.4	Stairs & Ramps	2.4.16	Precast concrete half landing st	Precast Concrete C20/25			3.03	m3			
B	West Terminal Extension (WTE)	Superstructure	2.4	Stairs & Ramps	2.4.1	Precast concrete dogleg stairs(	Precast Concrete C20/25	1	nr	3.76	m3		4% rebar volume, angle	Precast Concrete C20/25 (50%GGBS)
B	West Terminal Extension (WTE)	Superstructure	2.4	Stairs & Ramps	2.4.4	Precast concrete dogleg stairs(	Precast Concrete C20/25	1	nr	3.52	m3		4% rebar volume, angle	Precast Concrete C20/25 (50%GGBS)
B	West Terminal Extension (WTE)	Superstructure	2.4	Stairs & Ramps	2.4.7	Precast concrete dogleg stairs(	Precast Concrete C20/25	1	nr	3.47	m3		4% rebar volume, angle	Precast Concrete C20/25 (50%GGBS)
B	West Terminal Extension (WTE)	Superstructure	2.4	Stairs & Ramps	2.4.10	Precast concrete dogleg stairs(	Precast Concrete C20/25	1	nr	4.48	m3		4% rebar volume, angle	Precast Concrete C20/25 (50%GGBS)
B	West Terminal Extension (WTE)	Superstructure	2.4	Stairs & Ramps	2.4.13	Precast concrete dogleg stairs(	Precast Concrete C20/25	1	nr	4.42	m3		4% rebar volume, angle	Precast Concrete C20/25 (50%GGBS)
B	West Terminal Extension (WTE)	Superstructure	2.4	Stairs & Ramps	2.4.16	Precast concrete dogleg stairs(	Precast Concrete C20/25	1	nr	4.33	m3		4% rebar volume, angle	Precast Concrete C20/25 (50%GGBS)
B	West Terminal Extension (WTE)	Superstructure	2.4	Stairs & Ramps	2.4.19	Precast concrete dogleg stairs(	Precast Concrete C20/25	1	nr	3.55	m3		4% rebar volume, angle	Precast Concrete C20/25 (50%GGBS)
B	West Terminal Extension (WTE)	Superstructure	2.4	Stairs & Ramps	2.4.22	Precast concrete dogleg stairs(	Precast Concrete C20/25	1	nr	3.5	m3		4% rebar volume, angle	Precast Concrete C20/25 (50%GGBS)
A	New East Pier	Superstructure	2.4	Stairs & Ramps	2.4.19	Precast concrete half landing st	Precast Concrete C20/25			3.11	m3			
		Superstructure	**2.4**	**Stairs & Ramps**	**2.4.4**		**Steel plate**			**2664**	**kg**		**4% rebar volume, angl**	**Steel plate**
A	East Terminal Extension	Superstructure	2.4	Stairs & Ramps	2.4.3	Precast concrete half landing st	Steel plate	1.00	nr	161	kg		4% rebar volume, angle	Precast Concrete C20/25 (50%GGBS)
A	East Terminal Extension	Superstructure	2.4	Stairs & Ramps	2.4.6	Precast concrete half landing st	Steel plate	1.00	nr	100	kg		4% rebar volume, angle	Precast Concrete C20/25 (50%GGBS)
A	East Terminal Extension	Superstructure	2.4	Stairs & Ramps	2.4.9	Precast concrete half landing st	Steel plate	1.00	nr	100	kg		4% rebar volume, angle	Precast Concrete C20/25 (50%GGBS)
A	East Terminal Extension	Superstructure	2.4	Stairs & Ramps	2.4.12	Precast concrete half landing st	Steel plate	4.00	nr	100	kg		Assumed 135kg/m3 rein	Precast Concrete C20/25 (50%GGBS), Steel- Rebar-UK 97% recyled EAF production
A	East Terminal Extension	Superstructure	2.4	Stairs & Ramps	2.4.15	Precast concrete half landing st	Steel plate			103	kg			
A	East Terminal Extension	Superstructure	2.4	Stairs & Ramps	2.4.18	Precast concrete half landing st	Steel plate			103	kg			
A	East Terminal Extension	Superstructure	2.4	Stairs & Ramps	2.4.21	Precast concrete half landing st	Steel plate			103	kg			
A	East Terminal Extension	Superstructure	2.4	Stairs & Ramps	2.4.24	Precast concrete half landing st	Steel plate			107	kg			
A	East Terminal Extension	Superstructure	2.4	Stairs & Ramps	2.4.27	Precast concrete half landing st	Steel plate			100	kg			
A	East Terminal Extension	Superstructure	2.4	Stairs & Ramps	2.4.30	Precast concrete half landing st	Steel plate			100	kg			
A	New East Pier	Superstructure	2.4	Stairs & Ramps	2.4.3	Precast concrete half landing st	Steel plate	10	nr	155	kg		4% rebar volume, angle	Precast Concrete UK C20/25 (50% GGBS)
A	New East Pier	Superstructure	2.4	Stairs & Ramps	2.4.6	Precast concrete half landing st	Steel plate	1	nr	87	kg		4% rebar volume, angle	Precast Concrete UK C20/25 (50% GGBS)
A	New East Pier	Superstructure	2.4	Stairs & Ramps	2.4.9	Precast concrete half landing st	Steel plate			95	kg			
A	New East Pier	Superstructure	2.4	Stairs & Ramps	2.4.12	Precast concrete half landing st	Steel plate			116	kg			
A	New East Pier	Superstructure	2.4	Stairs & Ramps	2.4.15	Precast concrete half landing st	Steel plate			116	kg			
A	New East Pier	Superstructure	2.4	Stairs & Ramps	2.4.18	Precast concrete half landing st	Steel plate			99	kg			
A	New East Pier	Superstructure	2.4	Stairs & Ramps	2.4.21	Precast concrete half landing st	Steel plate			99	kg			
B	West Terminal Extension (WTE)	Superstructure	2.4	Stairs & Ramps	2.4.3	Precast concrete dogleg stairs(	Steel plate	1	nr	96	kg			Steel plate
B	West Terminal Extension (WTE)	Superstructure	2.4	Stairs & Ramps	2.4.6	Precast concrete dogleg stairs(	Steel plate	1	nr	97	kg			Steel plate
B	West Terminal Extension (WTE)	Superstructure	2.4	Stairs & Ramps	2.4.9	Precast concrete dogleg stairs(	Steel plate	1	nr	97	kg			Steel plate
B	West Terminal Extension (WTE)	Superstructure	2.4	Stairs & Ramps	2.4.12	Precast concrete dogleg stairs(	Steel plate	1	nr	112	kg			Steel plate
B	West Terminal Extension (WTE)	Superstructure	2.4	Stairs & Ramps	2.4.15	Precast concrete dogleg stairs(	Steel plate	1	nr	112	kg			Steel plate
B	West Terminal Extension (WTE)	Superstructure	2.4	Stairs & Ramps	2.4.18	Precast concrete dogleg stairs(	Steel plate	1	nr	112	kg			Steel plate
B	West Terminal Extension (WTE)	Superstructure	2.4	Stairs & Ramps	2.4.21	Precast concrete dogleg stairs(	Steel plate	1	nr	97	kg			Steel plate
B	West Terminal Extension (WTE)	Superstructure	2.4	Stairs & Ramps	2.4.24	Precast concrete dogleg stairs(	Steel plate	1	nr	97	kg			Steel plate
		Superstructure	**2.4**	**Stairs & Ramps**	**2.4.5**		**Steel- Rebar- UK 97% recycled EAF production**			**6177**	**kg**		**4% rebar volume, angl**	**Steel- Rebar- UK 97% recycled EAF production**
A	New East Pier	Superstructure	2.4	Stairs & Ramps	2.4.2	Precast concrete half landing st	Steel- Rebar- UK 97% recycled EAF production	10	nr	181	kg		4% rebar volume, angle	Precast Concrete UK C20/25 (50% GGBS)
A	New East Pier	Superstructure	2.4	Stairs & Ramps	2.4.5	Precast concrete half landing st	Steel- Rebar- UK 97% recycled EAF production	1	nr	87	kg		4% rebar volume, angle	Precast Concrete UK C20/25 (50% GGBS)
A	New East Pier	Superstructure	2.4	Stairs & Ramps	2.4.8	Precast concrete half landing st	Steel- Rebar- UK 97% recycled EAF production			93	kg			
A	New East Pier	Superstructure	2.4	Stairs & Ramps	2.4.11	Precast concrete half landing st	Steel- Rebar- UK 97% recycled EAF production			121	kg			
A	New East Pier	Superstructure	2.4	Stairs & Ramps	2.4.14	Precast concrete half landing st	Steel- Rebar- UK 97% recycled EAF production			124	kg			
A	New East Pier	Superstructure	2.4	Stairs & Ramps	2.4.17	Precast concrete half landing st	Steel- Rebar- UK 97% recycled EAF production			94	kg			
A	New East Pier	Superstructure	2.4	Stairs & Ramps	2.4.20	Precast concrete half landing st	Steel- Rebar- UK 97% recycled EAF production			97	kg			
A	East Terminal Extension	Superstructure	2.4	Stairs & Ramps	2.4.2	Precast concrete half landing st	Steel- Rebar-UK 97% recyled EAF production	1.00	nr	249	kg		4% rebar volume, angle	Precast Concrete C20/25 (50%GGBS)
A	East Terminal Extension	Superstructure	2.4	Stairs & Ramps	2.4.5	Precast concrete half landing st	Steel- Rebar-UK 97% recyled EAF production	1.00	nr	106	kg		4% rebar volume, angle	Precast Concrete C20/25 (50%GGBS)
A	East Terminal Extension	Superstructure	2.4	Stairs & Ramps	2.4.8	Precast concrete half landing st	Steel- Rebar-UK 97% recyled EAF production	1.00	nr	105	kg		4% rebar volume, angle	Precast Concrete C20/25 (50%GGBS)
A	East Terminal Extension	Superstructure	2.4	Stairs & Ramps	2.4.11	Precast concrete half landing st	Steel- Rebar-UK 97% recyled EAF production	1.00	nr	105	kg		Assumed 135kg/m3 rein	Precast Concrete C20/25 (50%GGBS), Steel- Rebar-UK 97% recyled EAF production
A	East Terminal Extension	Superstructure	2.4	Stairs & Ramps	2.4.14	Precast concrete half landing st	Steel- Rebar-UK 97% recyled EAF production			105	kg			
A	East Terminal Extension	Superstructure	2.4	Stairs & Ramps	2.4.17	Precast concrete half landing st	Steel- Rebar-UK 97% recyled EAF production			108	kg			
A	East Terminal Extension	Superstructure	2.4	Stairs & Ramps	2.4.20	Precast concrete half landing st	Steel- Rebar-UK 97% recyled EAF production			109	kg			
A	East Terminal Extension	Superstructure	2.4	Stairs & Ramps	2.4.23	Precast concrete half landing st	Steel- Rebar-UK 97% recyled EAF production			131	kg			
A	East Terminal Extension	Superstructure	2.4	Stairs & Ramps	2.4.26	Precast concrete half landing st	Steel- Rebar-UK 97% recyled EAF production			105	kg			
A	East Terminal Extension	Superstructure	2.4	Stairs & Ramps	2.4.29	Precast concrete half landing st	Steel- Rebar-UK 97% recyled EAF production			105	kg			
A	East Terminal Extension	Superstructure	2.4	Stairs & Ramps	2.4.32	Precast ramp; 2000mm wide x	Steel- Rebar-UK 97% recyled EAF production			564.67125	kg			
A	East Terminal Extension	Superstructure	2.4	Stairs & Ramps	2.4.34	Precast ramp; 2000mm wide x	Steel- Rebar-UK 97% recyled EAF production			2624.4	kg			
B	West Terminal Extension (WTE)	Superstructure	2.4	Stairs & Ramps	2.4.2	Precast concrete dogleg stairs(	Steel- Rebar- UK 97% recycled EAF production	1	nr	117	kg			Steel- Rebar- UK 97% recycled EAF production
B	West Terminal Extension (WTE)	Superstructure	2.4	Stairs & Ramps	2.4.5	Precast concrete dogleg stairs(	Steel- Rebar- UK 97% recycled EAF production	1	nr	109	kg			Steel- Rebar- UK 97% recycled EAF production
B	West Terminal Extension (WTE)	Superstructure	2.4	Stairs & Ramps	2.4.8	Precast concrete dogleg stairs(	Steel- Rebar- UK 97% recycled EAF production	1	nr	108	kg			Steel- Rebar- UK 97% recycled EAF production
B	West Terminal Extension (WTE)	Superstructure	2.4	Stairs & Ramps	2.4.11	Precast concrete dogleg stairs(	Steel- Rebar- UK 97% recycled EAF production	1	nr	139	kg			Steel- Rebar- UK 97% recycled EAF production
B	West Terminal Extension (WTE)	Superstructure	2.4	Stairs & Ramps	2.4.14	Precast concrete dogleg stairs(	Steel- Rebar- UK 97% recycled EAF production	1	nr	137	kg			Steel- Rebar- UK 97% recycled EAF production
B	West Terminal Extension (WTE)	Superstructure	2.4	Stairs & Ramps	2.4.17	Precast concrete dogleg stairs(	Steel- Rebar- UK 97% recycled EAF production	1	nr	134	kg			Steel- Rebar- UK 97% recycled EAF production
B	West Terminal Extension (WTE)	Superstructure	2.4	Stairs & Ramps	2.4.20	Precast concrete dogleg stairs(	Steel- Rebar- UK 97% recycled EAF production	1	nr	110	kg			Steel- Rebar- UK 97% recycled EAF production
B	West Terminal Extension (WTE)	Superstructure	2.4	Stairs & Ramps	2.4.23	Precast concrete dogleg stairs(	Steel- Rebar- UK 97% recycled EAF production	1	nr	109	kg			Steel- Rebar- UK 97% recycled EAF production
		Superstructure	**2.4**	**Stairs & Ramps**	**2.4.6**		**Steel Ballustrade**			**71**	**m**	**0**	**assume 7m per stair**	**Stainless Steel**
A	West Energy Centre (WEC)	Superstructure	2.4	Stairs & Ramps	2.4.4	Staircase balustrade	Steel Ballustrade	48	m	48	m		1.15 kg/m	Stainless Steel
A	West Energy Centre (WEC)	Superstructure	2.4	Stairs & Ramps	2.4.5	Staircase handrail	Steel Ballustrade	23	m	23	m		1.15 kg/m	Stainless Steel
A	West Energy Centre (WEC)	Superstructure	2.4	Stairs & Ramps	2.4.3	Stair over sprinkler tank outlet		1	no				0	0
		Superstructure	**2.5**	**External Walls**										
		Superstructure	**2.5**	**External walls**	**2.5.1**		**Aluminium Cladding**			**3713**	**m2**		**4 mm thick , 9 kg/m2**	**Aluminium**
A	New East Pier	Superstructure	2.5	External walls	2.5.3.7	Dark grey metal cladding on co	Aluminium Cladding	157.64328	m2	157.64328	m2		4 mm thick , 9 kg/m2	Aluminium
A	New East Pier	Superstructure	2.5	External walls	2.5.3.8	Gold coloured metal cladding (t	Aluminium Cladding	110.3310587	m2	110.3310587	m2		4 mm thick , 9 kg/m2	Aluminium
A	East Terminal Extension	Superstructure	2.5	External Walls	2.5.3.2	Silver coloured metal cladding	Aluminium Cladding	74.40	m2	74.40	m2		4 mm thick , 9 kg/m2	Aluminium
A	East Terminal Extension	Superstructure	2.5	External Walls	2.5.3.3	Gold cladding	Aluminium Cladding	1222.05	m2	1222.05	m2		4 mm thick , 9 kg/m2	Aluminium
A	East Terminal Extension	Superstructure	2.5	External Walls	2.5.3.4	Gold cladding to parapet	Aluminium Cladding	539.80	m2	539.80	m2		4 mm thick , 9 kg/m2	Aluminium
A	East Terminal Extension	Superstructure	2.5	External Walls	2.5.3.5	Gold cladding to back of parape	Aluminium Cladding	539.80	m2	539.80	m2		4 mm thick , 9 kg/m2	Aluminium
A	East Terminal Extension	Superstructure	2.5	External Walls	2.5.3.6	Gold metal canopy cladding to	Aluminium Cladding	327.48	m2	327.48	m2		4 mm thick , 9 kg/m2	Aluminium
A	East Terminal Extension	Superstructure	2.5	External Walls	2.5.3.7	Gold cladding to roof of canopy	Aluminium Cladding	211.94	m2	211.94	m2		4 mm thick , 9 kg/m2	Aluminium
A	West Energy Centre (WEC)	Superstructure	2.5	External Walls	2.5.1	Metal cladding to block walls	Aluminium Cladding	530	m2	530	m2		4 mm thick , 9 kg/m2	Aluminium
		Superstructure	**2.5**	**External walls**	**2.5.3**		**Aluminium Mesh**			**18258**	**m2**		**10.83 kg/m2**	**Aluminium**
A	New East Pier	Superstructure	2.5	External walls	2.5.3.1	Natural anodised aluminium ex	Aluminium Mesh	5801.609696	m2	5801.609696	m2		10.83 kg/m2	Aluminium
A	New East Pier	Superstructure	2.5	External walls	2.5.3.2	Natural anodised aluminium ex	Aluminium Mesh	2506.739	m2	2506.739	m2		10.83 kg/m2	Aluminium
A	New East Pier	Superstructure	2.5	External walls	2.5.3.4	Gold anodised aluminium expa	Aluminium Mesh	3480.055404	m2	3480.055404	m2		10.83 kg/m2	Aluminium
A	New East Pier	Superstructure	2.5	External walls	2.5.3.5	Gold anodised aluminium expa	Aluminium Mesh	14.79895	m2	14.79895	m2		10.83 kg/m2	Aluminium
A	New East Pier	Superstructure	2.5	External walls	2.5.3.6	Natural anodised aluminium ex	Aluminium Mesh	1788.750355	m2	1788.750355	m2		10.83 kg/m2	Aluminium
A	East Terminal Extension	Superstructure	2.5	External Walls	2.5.1.4	Dark grey anodised aluminium	Aluminium Mesh	259.40	m2	259.40	m2		10.83 kg/m2	Aluminium
B	West Terminal Extension (WTE)	Superstructure	2.5	External Walls	2.5.4	Dark grey anodised aluminium	Aluminium Mesh	115.0176	m2	115.0176	m2		10.83 kg/m2	Aluminium
B	West Terminal Extension (WTE)	Superstructure	2.5	External Walls	2.5.8	Natural anodised aluminium me	Aluminium Mesh	1009.215758	m2	1009.215758	m2		10.83 kg/m2	Aluminium
B	West Terminal Extension (WTE)	Superstructure	2.5	External Walls	2.5.9	Natural anodised aluminium me	Aluminium Mesh	413.07948	m2	413.07948	m2		10.83 kg/m2	Aluminium
A	East Terminal Extension	Superstructure	2.5	External Walls	2.5.3.1	Natural anodised aluminium ex	Aluminium Mesh	2869.46	m2	2869.46	m2		10.83 kg/m2	Aluminium
		Superstructure	**2.5**	**External walls**	**2.5.4**		**Composite Panel**			**21626**	**m2**	**0**	**7.04 kg/m2**	
A	New East Pier	Superstructure	2.5	External walls	2.5.1.1	Dark grey (RAL 7021) insulated	Composite Panel	12224.60231	m2	12224.60231	m2		7.04 kg/m2	any specfic manufacturer?
A	New East Pier	Superstructure	2.5	External walls	2.5.1.2	Dark grey (RAL 7021) insulated	Composite Panel	2739.25348	m2	2739.25348	m2		7.04 kg/m2	any specfic manufacturer?
A	East Terminal Extension	Superstructure	2.5	External Walls	2.5.1.1	Dark grey (RAL 7021) insulated	Composite Panel	3073.91	m2	3073.91	m2		7.04 kg/m2	0.00
A	East Terminal Extension	Superstructure	2.5	External Walls	2.5.1.2	Dark grey (RAL 7021) insulated	Composite Panel	1274.12	m2	1274.12	m2		7.04 kg/m2	0.00
B	West Terminal Extension (WTE)	Superstructure	2.5	External Walls	2.5.1	Dark grey (RAL 7021) insulated	Composite Panel	1503.100135	m2	1503.100135	m2		7.04 kg/m2	
B	West Terminal Extension (WTE)	Superstructure	2.5	External Walls	2.5.2	Dark grey (RAL 7021) insulated	Composite Panel	413.07948	m2	413.07948	m2		7.04 kg/m2	
B	West Terminal Extension (WTE)	Superstructure	2.5	External Walls	2.5.3	Dark grey (RAL 7021) insulated	Composite Panel	124.40377	m2	124.40377	m2		7.04 kg/m2	
A	East Terminal Extension	Superstructure	2.5	External Walls	2.5.1.3	Dark grey (RAL 7021) insulated	Composite Panel	273.17	m2	273.17	m2		7.04 kg/m2	0.00
		Superstructure	**2.5**	**External Walls**	**2.5.5**		**EPS Insulation**			**64**	**m3**		**120mm**	**EPS Insulation**
A	West Energy Centre (WEC)	Superstructure	2.5	External Walls	2.5.3	Thermal insulation	EPS Insulation	530	m2	64	m3		120mm	EPS Insulation
		Superstructure	**2.5**	**External walls**	**2.5.7**		**Soffit - Alum - EPS**			**2735**	**m2**	**4 mm thick , 9 kg/m2**	**4 mm thick , 9 kg/m2**	**AluminiumEPS Insulation**
A	New East Pier	Superstructure	2.5	External walls	2.5.4.1	Allowance for external soffit to I	Soffit - Alum - EPS	2734.906	m2	2734.906	m2		4 mm thick , 9 kg/m2	AluminiumEPS Insulation
		Superstructure	**3**	**External walls**	**2.5.8**		**Steel Mesh**			**3025**	**m2**		**2mm thick - 22 kg/m2**	**Galvanised Steel**
A	New East Pier	Superstructure	2.5	External walls	2.5.2.1	Expanded mesh fins perpendic	Steel Mesh	126	nr	302	m2		2mm thick - 22 kg/m2	Galvanised Steel
A	New East Pier	Superstructure	2.5	External walls	2.5.2.2	Expanded mesh fins perpendic	Steel Mesh	100	nr	340	m2		2mm thick - 22 kg/m2	Galvanised Steel
A	New East Pier	Superstructure	2.5	External walls	2.5.5.1	External grated metal access w	Steel Mesh	1499.235	m2	1499	m2		16.66 kg / m2	Galvanised Steel
B	West Terminal Extension (WTE)	Superstructure	2.5	External Walls	2.5.6	Expanded mesh fins perpendic	Steel Mesh	27	nr	162	m2		2mm thick - 22 kg/m2	Galvanised Steel
B	West Terminal Extension (WTE)	Superstructure	2.5	External Walls	2.5.7	Expanded mesh fins perpendic	Steel Mesh	28	nr	133	m2		2mm thick - 22 kg/m2	Galvanised Steel
A	East Terminal Extension	Superstructure	2.5	External Walls	2.5.2.1	Expanded mesh fins perpendic	Steel Mesh	11.00	nr	72	m2		2mm thick - 22 kg/m2	Galvanised Steel
A	East Terminal Extension	Superstructure	2.5	External Walls	2.5.2.2	Expanded mesh fins perpendic	Steel Mesh	5.00	nr	48	m2		2mm thick - 22 kg/m2	Galvanised Steel
A	East Terminal Extension	Superstructure	2.5	External Walls	2.5.2.3	Expanded mesh fins perpendic	Steel Mesh	18.00	nr	150	m2		2mm thick - 22 kg/m2	Galvanised Steel
A	East Terminal Extension	Superstructure	2.5	External Walls	2.5.2.4	Fins to box glazed panel; 0.5 x	Steel Mesh	9.00	nr	54	m2		2mm thick - 22 kg/m2	Galvanised Steel
A	East Terminal Extension	Superstructure	2.5	External Walls	2.5.4.1	External grated metal access w	Steel Mesh	120.00	m2	120	m2		16.66 kg / m2	Galvanised Steel
A	West Energy Centre (WEC)	Superstructure	2.5	External Walls	2.5.2	Expanded metal mesh to scree	Steel Mesh	145	m2	145	m2		2mm thick - 22 kg/m2	Galvanised Steel
A	New East Pier	Superstructure	2.5	External walls	2.5.1.3	Extra over external walls for for	0	255	nr				0	0
B	West Terminal Extension (WTE)	Superstructure	2.5	External Walls	2.5.5	Extra over external walls for forming openings for doors/windows		27	nr					
A	East Terminal Extension	Superstructure	2.5	External Walls	2.5.1.5	Extra over external walls for forming openings for doors/windows		18.00	nr				0.00	0.00
		Superstructure	**2.6**	**Windows & External Doors**										
		Superstructure	**2.6**	**Windows and External Doors**	**2.6.1**		**Aluminium louvers**			**52**	**m2**		**27.14 kg/m2**	**Aluminium louvers**
A	East Terminal Extension	Superstructure	2.6	Windows and External Doors	2.6.2.1	Allowance for louvre screen at e	Aluminium louvers	51.69	m2	51.69	m2		27.14 kg/m2	Aluminium louvers
		Superstructure	**2.6**	**Windows and External Doors**	**2.6.2**		**Double glazing panels**			**5386**	**m2**	**0**		**0**
A	New East Pier	Superstructure	2.6	Windows and External Doors	2.6.1.1	External double glazed panels i	Double glazing panels	4081.056197	m2	4081.056197	m2		0	0
A	East Terminal Extension	Superstructure	2.6	Windows and External Doors	2.6.1.1	External double glazed panels i	Double glazing panels	845.00	m2	845.00	m2		0.00	0.00
A	East Terminal Extension	Superstructure	2.6	Windows and External Doors	2.6.1.2	Box glazed panel in RAL 7021	Double glazing panels	160.66	m2	160.66	m2		0.00	0.00
B	West Terminal Extension (WTE)	Superstructure	2.6	Windows & External Doors	2.6.1	External double glazed panels i	Double glazing panels	294.71	m2	294.71	m2			
A	West Energy Centre (WEC)	Superstructure	2.6	Windows & External Doors	2.6.1	External windows	Double glazing panels	5	m2	5	m2		0	Double glazed?
		Superstructure	**2.6**	**Windows and External Doors**	**2.6.3**		**Glazed Door**			**4**	**nr**	**0**		
A	East Terminal Extension	Superstructure	2.6	Windows and External Doors	2.6.3.3	Glazed sliding door	Glazed Door	3.00	nr	3.00	nr		0.00	0.00
A	East Terminal Extension	Superstructure	2.6	Windows and External Doors	2.6.3.4	OBB Access Speed Door	Glazed Door	1.00	nr	1.00	nr		0.00	Glass door
		Superstructure	**2.6**	**Windows and External Doors**	**2.6.4**		**Metal Door**			**119**	**nr**			
A	New East Pier	Superstructure	2.6	Windows and External Doors	2.6.2.1	Double leaf door, including all ir	Metal Door	28	nr	28	nr		0	Metal Door
A	New East Pier	Superstructure	2.6	Windows and External Doors	2.6.2.2	Single leaf door, including all ir	Metal Door	38	nr	38	nr		0	Metal Door
A	East Terminal Extension	Superstructure	2.6	Windows and External Doors	2.6.3.1	Double leaf door, including all ir	Metal Door	7.00	nr	7.00	nr		0.00	Metal Door
A	East Terminal Extension	Superstructure	2.6	Windows and External Doors	2.6.3.2	Single leaf door, including all ir	Metal Door	11.00	nr	11.00	nr		0.00	Metal Door
A	West Energy Centre (WEC)	Superstructure	2.6	Windows & External Doors	2.6.2	External double doors	Metal Door	3	no	3	no		0	Metal Doors

A	West Energy Centre (WEC)	Superstructure	2.6	Windows & External Doors	2.6.3	External single doors	Metal Door	9	no	9	no		0	Metal Doors
A	West Energy Centre (WEC)	Superstructure	2.6	Windows & External Doors	2.6.4	External double louvered doors	Metal Door	4	no	4	no		0	Metal Doors
B	West Terminal Extension (WTE)	Superstructure	2.6	Windows & External Doors	2.6.2	Double leaf door, including all ir	Metal Door	9	nr	9	nr			Metal Door
B	West Terminal Extension (WTE)	Superstructure	2.6	Windows & External Doors	2.6.3	Single leaf door, including all iro	Metal Door	10	nr	10	nr			Metal Door
		Superstructure	**2.6**	**Windows and External Doors**	**2.6.5**		**Metal Shutter**			**134**	**m2**		**0**	**Steel Shutters**
A	New East Pier	Superstructure	2.6	Windows and External Doors	2.6.2.3	Roller Shutter	Metal Shutter	51.30878	m2	51.30878	m2		0	Steel Shutters
B	West Terminal Extension (WTE)	Superstructure	2.6	Windows & External Doors	2.6.4	Roller shutter to baggage belt o	Metal Shutter	4	nr	8	m2		Assume 2m2 per openin	Steel Shutter
B	West Terminal Extension (WTE)	Superstructure	2.8	Internal Doors	2.8.3	Allowance for fire shutter	Metal Shutter	75.16425	m2	75.16425	m2			
		Superstructure	**2.7**	**Internal Walls & Partitions**										
		Superstructure	**2.7**	**Internal Walls & Partitions**	**2.7.1**		**Blockwork**			**778**	**m2**			
A	West Energy Centre (WEC)	Superstructure	2.7	Internal Walls & Partitions	2.7.2	Internal Blockwork walls 225mr	Blockwork	778	m2	778	m2		0	0
		Superstructure	**2.7**	**Internal Walls & Partitions**	**2.7.2.1**		**Concrete Insitu UK C25/30(50% GGBS)**			**80**	**m3**		**Assumed 300mm thick**	
A	West Energy Centre (WEC)	Superstructure	2.7	Internal Walls & Partitions	2.7.3	300mm rc walls to access ladd	Concrete Insitu UK C25/30(50% GGBS)	43	m2	13	m3		Assumed 300mm thick	Concrete Insitu UK C20/25 (50%GGBS)
A	West Energy Centre (WEC)	Superstructure	2.7	Internal Walls & Partitions	2.7.4	Render 15mm thick	Concrete Insitu UK C25/30(50% GGBS)	1010	m2	15	m3		0	Concrete Insitu UK C20/25 (50%GGBS)
A	West Energy Centre (WEC)	Superstructure	2.7	Internal Walls & Partitions	2.7.1	RC core walls to staircase	Concrete Insitu UK C32/40(50% GGBS)	172	m2	52	m3		Assumed 300mm thick	Concrete Insitu UK C32/40/25 (50%GGBS)
		Superstructure	**2.7**	**Internal Walls & Partitions**	**2.7.2.2**		**UK Steel Rebar 97% recyled**			**5805**	**kg**		**Assumed 90kg/m3**	
A	West Energy Centre (WEC)	Superstructure	2.7	Internal Walls & Partitions		Reinforcement	UK Steel Rebar 97% recyled			4644	kg		Assumed 90kg/m3	UK Steel Rebar 97% recyled
A	West Energy Centre (WEC)	Superstructure	2.7	Internal Walls & Partitions		Reinforcement	UK Steel Rebar 97% recyled			1161	kg		Assumed 90kg/m3	
		Superstructure	**2.7**	**Internal walls and partitions**	**2.7.4**		**Glazing - Alu Frame**			**1968**	**m2**	**aluminium frame**		**aluminium frame**
A	New East Pier	Superstructure	2.7	Internal walls and partitions	2.7.2	Internal glazed wall panels	Glazing - Alu Frame	650.2648	m2	650.2648	m2		0	aluminium frame
B	West Terminal Extension (WTE)	Superstructure	2.7	Internal Walls & Partitions	2.7.4	Internal Glazing - E-gates mon	Glazing - Alu Frame	1	nr	3	m2			aluminium frame
A	East Terminal Extension	Superstructure	2.7	Internal walls and partitions	2.7.3	WF-90 Internal glazed partitior	Glazing - Alu Frame	1314.45	m2	1314.45	m2		0.00	aluminium frame
		Superstructure	**2.7**	**Internal Walls & Partitions**	**2.7.5**		**Plasterboard - Acoustic**			**28**	**m2**	**Stainless Steel**	**12.5mm plasterboard**	
A	West Energy Centre (WEC)	Superstructure	2.7	Internal Walls & Partitions	2.7.5	Acoustic plasterboard and shee	Plasterboard - Acoustic	28	m2	28	m2		12.5mm plasterboard	0
		Superstructure	**2.7**	**Internal Walls & Partitions**	**2.7.6**		**Steel Ballustrade**			**235**	**m**		**1.15 kg/m**	**Stainless Steel**
B	West Terminal Extension (WTE)	Superstructure	2.7	Internal Walls & Partitions	2.7.6	Stairs balustrade; including finis	Steel Ballustrade			167	m		1.15 kg/m	Stainless Steel
B	West Terminal Extension (WTE)	Superstructure	2.7	Internal Walls & Partitions	2.7.7	Stairs balustrade and handrail;	Steel Ballustrade			68	m		1.15 kg/m	Stainless Steel
		Superstructure	**2.7**	**Internal walls and partitions**	**2.7.7**		**Steel stud Partition - Phenolic Insulation - Fire rated**			**39799**	**m2**		**12.5mm plasterboard**	**Metal Studs**
A	East Terminal Extension	Superstructure	2.7	Internal walls and partitions	2.7.2	EO internal stud walls for reinfo	Steel stud Partition	1040.00	m2	1040.00	m2		12.5mm plasterboard	Metal Studs
A	New East Pier	Superstructure	2.7	Internal walls and partitions	2.7.1	Internal walls (1 hour fire rated	Steel stud Partition - Phenolic Insulation - Fire rated	14235.50973	m2	14235.50973	m2		12.5mm plasterboard	0
A	East Terminal Extension	Superstructure	2.7	Internal walls and partitions	2.7.1	Internal walls (1 hour fire rated	Steel stud Partition - Phenolic Insulation - Fire rated	18344.94	m2	18344.94	m2		12.5mm plasterboard	0.00
B	West Terminal Extension (WTE)	Superstructure	2.7	Internal Walls & Partitions	2.7.1	Internal walls (1 hour fire rated	Steel stud Partition	5876.100018	m2	5876.100018	m2		12.5mm plasterboard	
B	West Terminal Extension (WTE)	Superstructure	2.7	Internal Walls & Partitions	2.7.2	EO internal stud walls for reinfo	Steel stud Partition	302	m2	302	m2		12.5mm plasterboard	Metal Studs
A	New East Pier	Superstructure	2.7	Internal walls and partitions	2.7.3	Extra over for forming openings	0						0	0
A	East Terminal Extension	Superstructure	2.7	Internal walls and partitions	2.7.4	Extra over for forming openings in walls, for internal doors and the like							0.00	0.00
B	West Terminal Extension (WTE)	Superstructure	2.7	Internal Walls & Partitions	2.7.3	Extra over for forming openings in walls, for internal doors and the like		112	nr					
B	West Terminal Extension (WTE)	Superstructure	2.7	Internal Walls & Partitions	2.7.5	Allowance for proprietary impact and bumper guards, protections strips and corner protectors		129	m					
		Superstructure	**2.7**	**Internal Walls & Partitions**	**2.7.8**		**Wall Lining**			**1556**	**m2**			
		Superstructure	**2.8**	**Internal Doors**										
		Superstructure	**2.8**	**Internal Doors**	**2.8.2**		**Timber door**			**12**	**m2**			**Timber doors**
A	West Energy Centre (WEC)	Superstructure	2.8	Internal Doors	2.8.2	Internal doors	Timber door	3	no	3	no		0	Timber doors
		Superstructure	**2.8**	**Internal doors**	**2.8.3**		**Timber fire door**			**2808**	**m2**	**Timber fire door**		
A	New East Pier	Superstructure	2.8	Internal doors	2.9.1	Internal single leaf FD60 doors;	Timber fire door	142	nr	142	nr		0	Timber fire door
A	New East Pier	Superstructure	2.8	Internal doors	2.9.2	Internal double leaf FD60 doors	Timber fire door	146	nr	146	nr		0	Timber fire door
B	West Terminal Extension (WTE)	Superstructure	2.8	Internal Doors	2.8.1	Internal single leaf FD60 doors;	Timber fire door	78	nr	78	nr			Timber fire door
B	West Terminal Extension (WTE)	Superstructure	2.8	Internal Doors	2.8.2	Internal double leaf FD60 doors	Timber fire door	34	nr	34	nr			Timber fire door
A	East Terminal Extension	Superstructure	2.8	Internal doors	2.9.1	Internal single leaf FD60 doors;	Timber fire door	149.00	nr	149.00	nr		0.00	Timber fire door
A	East Terminal Extension	Superstructure	2.8	Internal doors	2.9.2	Internal double leaf FD60 doors	Timber fire door	153.00	nr	153.00	nr		0.00	Timber fire door
		Superstructure	**2.8**	**Balustrades and handrails**										
		Superstructures	**2.8**	**Balustrades and handrails**	**2.8.4**		**Barrier**			**37**	**kg**	**0**	**1.6 kg/m**	
A	East Terminal Extension	Superstructures	2.8	Balustrades and handrails	2.8.9	Security barrier post	Barrier	23.00	nr	36.80	kg		assume 1m per barrier	0.00
		Superstructures	**2.8**	**Balustrades and handrails**	**2.8.5**		**Glass Rail**			**973**	**m2**	**Glass and Steel railing**		
A	New East Pier	Superstructures	2.8	Balustrades and handrails	2.8.2	Glass railings and balustrades	Glass Rail	133.444	m	147	m2		0	0
A	New East Pier	Superstructures	2.8	Balustrades and handrails	2.8.3	Stairs balustrade; including finis	Glass Rail	534.36	m	588	m2		0	Glass and Steel railing
A	East Terminal Extension	Superstructures	2.8	Balustrades and handrails	2.8.5	WF-80 Glass railings and balu	Glass Rail	216.74	m	238	m2		0.00	0.00
		Superstructures	**2.8**	**Balustrades and handrails**	**2.8.6**		**Steel Rail**			**200**	**m**	**Stainless Steel**	**1.15 kg/m**	**Stainless Steel**
A	East Terminal Extension	Superstructures	2.8	Balustrades and handrails	2.8.6	A-Safe Atlas Barrier (entrance t	Steel Rail	55.00	m	55.00	m		0.00	0.00
A	East Terminal Extension	Superstructures	2.8	Balustrades and handrails	2.8.7	Loading dock safety railing	Steel Rail	25.00	m	25.00	m		1.15 kg/m	Stainless Steel
A	East Terminal Extension	Superstructures	2.8	Balustrades and handrails	2.8.8	Metal balustrade to baggage pr	Steel Rail	120.00	m	120.00	m		1.15 kg/m	Stainless Steel
A	New East Pier	Superstructures	2.8	Balustrades and handrails	2.8.1	Allowance for proprietary impact and bumper guards, protections strips and corner protectors		50	m				0	0
A	East Terminal Extension	Superstructures	2.8	Balustrades and handrails	2.8.1	Bump rails		339.14	m				0.00	0.00
A	East Terminal Extension	Superstructures	2.8	Balustrades and handrails	2.8.2	Allowance for proprietary impact and bumper guards, protections strips, and corner protector		1.00	item				0.00	0.00
A	East Terminal Extension	Superstructures	2.8	Balustrades and handrails	2.8.3	Allowance for handrail and balustrade to disable WC; including finishes and all necessary fixi		7.00	nr				0.00	0.00
A	East Terminal Extension	Superstructures	2.8	Balustrades and handrails	2.8.4	Allowance for handrail and balustrade to disable WC shower; including finishes and all neces		2.00	nr				0.00	0.00
		Internal Finishes	**3.1-3.4**											
		Internal Finishes	**3.1**	**Wall Finishes**										
		Internal Finishes	**3.1**	**Wall Finishes**	**3.1.1**		**cement lining**			**24**	**m2**	**9mm thick**	**9mm thick**	**cement lining**
A	West Energy Centre (WEC)	Internal Finishes	3.1	Wall Finishes	3.1.2	Dry lining to walls	cement lining	24	m2	24	m2		9mm thick	cement lining
		Internal Finishes	**3.1**	**Wall Finishes**	**3.1.2**		**glass mineral wool**			**28**	**m3**	**50mm thick, 1.2 kg/m2**	**50mm thick, 1.2 kg/m2**	**glass mineral wool**
A	West Energy Centre (WEC)	Internal Finishes	3.1	Wall Finishes	3.1.3	Sound insulation to walls	glass mineral wool	558	m2	28	m3		50mm thick, 1.2 kg/m2	glass mineral wool
		Internal Finishes	**3.1**	**Wall Finishes**	**3.1.3**		**Green Wall**			**90**	**m2**	**0**	**0.8mm thick**	
B	West Terminal Extension (WTE)	Internal Finishes	3.1	Wall Finishes	3.1.15	WF-100 Green Living Wall (in	Green Wall	90	m2	90	m2			
		Internal finishes	**3.1**	**Wall finishes**	**3.1.4**		**HPL Panel**			**159**	**m2**		**8mm thick, 11.2 kg/m2**	
A	East Terminal Extension	Internal finishes	3.1	Wall finishes	3.1.11	WF-40 Laminate/HPI panels -	HPL Panel	34.00	nr	102	m2		16mm thick - 22.4 kg/m2	0.00
B	West Terminal Extension (WTE)	Internal Finishes	3.1	Wall Finishes	3.1.11	WF-40 Laminate/HPI panels -	HPL Panel	19	nr	57	m2		16mm thick - 22.4 kg/m2	
		Internal finishes	**3.1**	**Wall finishes**	**3.1.5**		**MDF**			**1809**	**m2**		**4mm thick**	
A	New East Pier	Internal finishes	3.1	Wall finishes	3.1.2	WF-10 Skirting to the above; 2	MDF	4646.172036	m	929	m2		0	0
A	New East Pier	Internal finishes	3.1	Wall finishes	3.1.4	WF-11 Skirting to the above; 1	MDF	278.006152	m	42	m2		0	0
A	East Terminal Extension	Internal finishes	3.1	Wall finishes	3.1.2	WF-10 Skirting to the above; 2	MDF	414.62	m	83	m2		0.00	0.00
A	East Terminal Extension	Internal finishes	3.1	Wall finishes	3.1.4	WF-11 Skirting to the above; 1	MDF	3236.51	m	485	m2		0.00	0.00
B	West Terminal Extension (WTE)	Internal Finishes	3.1	Wall Finishes	3.1.2	WF-10 Skirting to the above; 2	MDF	298.596029	m	60	m2			
B	West Terminal Extension (WTE)	Internal Finishes	3.1	Wall Finishes	3.1.4	WF-11 Skirting to the above; 1	MDF	1401.225798	m	210	m2			
		Internal Finishes	**3.1**	**Wall Finishes**	**3.1.6**		**Paint**			**54635**	**m2**			
A	West Energy Centre (WEC)	Internal Finishes	3.1	Wall Finishes	3.1.1	Painting to all walls	Paint	1580	m2	1580	m2		0	0
										53055	m2			
		Internal finishes	**3.1**	**Wall finishes**	**3.1.7**		**Plasterboard**			**53055**	**m2**		**12.5mm thick**	
A	New East Pier	Internal finishes	3.1	Wall finishes	3.1.1	WF-10 High durability plasterb	Plasterboard	15921.11748	m2	15921.11748	m2		12.5mm thick	0
A	New East Pier	Internal finishes	3.1	Wall finishes	3.1.3	WF-11 Plasterboard (paint finis	Plasterboard	7756.726204	m2	7756.726204	m2		12.5mm thick	0
A	East Terminal Extension	Internal finishes	3.1	Wall finishes	3.1.1	WF-10 High durability plasterb	Plasterboard	1204.23	m2	1204.23	m2		12.5mm thick	0.00
A	East Terminal Extension	Internal finishes	3.1	Wall finishes	3.1.3	WF-11 Plasterboard (paint finis	Plasterboard	19449.57	m2	19449.57	m2		12.5mm thick	0.00
A	East Terminal Extension	Internal finishes	3.1	Wall finishes	3.1.5	WF-12 Plasterboard (paint finis	Plasterboard	1080.08	m2	1080.08	m2		12.5mm thick	0.00
B	West Terminal Extension (WTE)	Internal Finishes	3.1	Wall Finishes	3.1.1	WF-10 High durability plasterb	Plasterboard	915.51	m2	915.51	m2		12.5mm thick	
B	West Terminal Extension (WTE)	Internal Finishes	3.1	Wall Finishes	3.1.3	WF-11 Plasterboard (paint finis	Plasterboard	6727.65	m2	6727.65	m2		12.5mm thick	
		Internal Finishes	**3.1**	**Wall Finishes**	**3.1.8**		**Plywood**			**24**	**m2**	**14mm thick**	**14mm thick**	
A	West Energy Centre (WEC)	Internal Finishes	3.1	Wall Finishes	3.1.5	Plywood lining to walls of office	Plywood	24	m2	24	m2		14mm thick	0
		Internal finishes	**3.1**	**Wall finishes**	**3.1.9**		**Porcelain**			**4668**	**m2**		**12mm thick**	
A	New East Pier	Internal finishes	3.1	Wall finishes	3.1.12	WF-50 Fully tiled walls (porcel	Porcelain	1655.562832	m2	1655.562832	m2		12mm thick	0
A	East Terminal Extension	Internal finishes	3.1	Wall finishes	3.1.12	WF-50 Fully tiled walls (porcel	Porcelain	1897.37	m2	1897.37	m2		12mm thick	0.00
B	West Terminal Extension (WTE)	Internal Finishes	3.1	Wall Finishes	3.1.12	WF-50 Fully tiled walls (porcel	Porcelain	1095.01	m2	1095.01	m2		12mm thick	
A	West Energy Centre (WEC)	Internal Finishes	3.1	Wall Finishes	3.1.4	Tiled walls to toilet	Porcelain	20	m2	20	m2		12mm thick	Porcelain
		Internal Finishes	**3.1**	**Wall Finishes**	**3.1.11**	**Checker Plate**	**Stainless Steel**			**2298**	**m2**		**3.2mm thick - 26.79 kg**	**Stainless Steel - 3.2mm thick**
B	West Terminal Extension (WTE)	Internal Finishes	3.1	Wall Finishes	3.1.10	WF-30 Checker plate (1.875m	Stainless Steel	227.0574957	m2	227.0574957	m2		3.2mm thick - 26.79 kg/	Stainless Steel - 3.2mm thick
A	East Terminal Extension	Internal finishes	3.1	Wall finishes	3.1.10	WF-30 Checker plate (1.875m	Stainless Steel	2071.06	m2	2071.06	m2		3.2mm thick - 26.79 kg/	Stainless Steel - 3.2mm thick
		Internal Finishes	**3.2**	**Floor Finishes**										
		Internal finishes	**3.2**	**Floor finishes**	**3.2.1**		**Carpet**			**3546**	**m2**		**pile weight 700 g/m2**	
A	New East Pier	Internal finishes	3.2	Floor finishes	3.2.4	FT-20/21 BoH Offices - Carpet	Carpet	43.691	m2	43.691	m2		pile weight 600 g/m2	0
A	East Terminal Extension	Internal finishes	3.2	Floor finishes	3.2.4	FT-20/21 BoH Offices - Carpet	Carpet	2428.51	m2	2428.51	m2		pile weight 600 g/m2	0.00
A	West Energy Centre (WEC)	Internal Finishes	3.2	Floor Finishes	3.2.1	Flooring to office areas	Carpet	6	m2	6	m2		0	Is this carpets?
B	West Terminal Extension (WTE)	Internal Finishes	3.2	Floor Finishes	3.2.4	FT-20/21 BoH Offices - Carpet	Carpet	957.051	m2	957.051	m2		pile weight 600 g/m2	
B	West Terminal Extension (WTE)	Internal Finishes	3.2	Floor Finishes	3.2.7	FT-50/51/52 Primary/Seconda	Carpet	110.487	m2	110.487	m2			
		Internal finishes	**3.2**	**Floor finishes**	**3.2.2**		**Epoxy**			**10946**	**m2**		**0.33 mm thick**	
A	New East Pier	Internal finishes	3.2	Floor finishes	3.2.5	FT-30/31 BoH Plant, Circulatic	Epoxy	704.442	m2	704.442	m2		0	0
A	East Terminal Extension	Internal finishes	3.2	Floor finishes	3.2.5	FT-30/31 BoH Plant, Circulatic	Epoxy	4204.13	m2	4204.13	m2		0.00	0.00
A	East Terminal Extension	Internal finishes	3.2	Floor finishes	3.2.12	FT-82 OBB Floor Coating	Epoxy	4290.00	m2	4290.00	m2		0.00	0.00
A	West Energy Centre (WEC)	Internal Finishes	3.2	Floor Finishes	3.2.3	Dust seal / epoxy floor paint	Epoxy	642	m2	642	m2		0	0
B	West Terminal Extension (WTE)	Internal Finishes	3.2	Floor Finishes	3.2.5	FT-30/31 BoH Plant, Circulatic	Epoxy	1105.054	m2	1105.054	m2			
		Internal finishes	**3.2**	**Floor finishes**	**3.2.3**		**Galvanised Steel**			**1090**	**m2**		**2mm thick, 22kg/m2**	**Galvanised Steel**
A	New East Pier	Internal finishes	3.2	Floor finishes	3.2.9	FT-61 Galvanised Steel open r	Galvanised Steel	558.054	m2	558.054	m2		16.66 kg / m2	Galvanised Steel
B	West Terminal Extension (WTE)	Internal Finishes	3.2	Floor Finishes	3.2.9	FT-61 Galvanised Steel open r	Galvanised Steel	127.02	m2	127.02	m2		16.66 kg / m2	Galvanised Steel
A	East Terminal Extension	Internal finishes	3.2	Floor finishes	3.2.9	FT-61 Galvanised Steel open r	Galvanised Steel	404.70	m2	404.70	m2		16.66 kg / m2	Galvanised Steel
		Internal finishes	**3.2**	**Floor finishes**	**3.2.4**		**Porcelain**			**18928**	**m2**		**12mm thick**	
A	New East Pier	Internal finishes	3.2	Floor finishes	3.2.1	FT-10/11 Light grey porcelain t	Porcelain	7327.301	m2	7327.301	m2		12mm thick	0
A	New East Pier	Internal finishes	3.2	Floor finishes	3.2.2	FT-12/13 Dark grey porcelain t	Porcelain	2722.014	m2	2722.014	m2		12mm thick	0
A	East Terminal Extension	Internal finishes	3.2	Floor finishes	3.2.1	FT-10/11 Light grey porcelain t	Porcelain	4762.10	m2	4762.10	m2		12mm thick	0.00
A	East Terminal Extension	Internal finishes	3.2	Floor finishes	3.2.2	FT-12/13 Dark grey porcelain t	Porcelain	1447.15	m2	1447.15	m2		12mm thick	0.00
A	East Terminal Extension	Internal finishes	3.2	Floor finishes	3.2.3	FT-14/15 Porcelain tiling (sma	Porcelain	144.15	m2	144.15	m2		12mm thick	0.00
B	West Terminal Extension (WTE)	Internal Finishes	3.2	Floor Finishes	3.2.1	FT-10/11 Light grey porcelain t	Porcelain	2468.479	m2	2468.479	m2		12mm thick	
B	West Terminal Extension (WTE)	Internal Finishes	3.2	Floor Finishes	3.2.2	FT-12/13 Dark grey porcelain t	Porcelain	31.315	m2	31.315	m2		12mm thick	
B	West Terminal Extension (WTE)	Internal Finishes	3.2	Floor Finishes	3.2.3	FT-14/15 Porcelain tiling (sma	Porcelain	21.539	m2	21.539	m2		12mm thick	
A	West Energy Centre (WEC)	Internal Finishes	3.2	Floor Finishes	3.2.2	Tiled floor to toilet	Porcelain	4	m2	4	m2		12mm thick	Porcelain
		Internal Finishes	**3.2**	**Floor Finishes**	**3.2.5**		**Rubber Floor**			**993**	**m2**		**3.5mm thick - 3.7 kg/m2**	
B	West Terminal Extension (WTE)	Internal Finishes	3.2	Floor Finishes	3.2.6	FT-40/41 BoH Spaces & Stairs	Rubber Floor	201.592	m2	201.592	m2		3.5mm thick - 3.7 kg/m2	
A	East Terminal Extension	Internal finishes	3.2	Floor finishes	3.2.6	FT-40/41 BoH Spaces & Stairs	Rubber Floor	791.42	m2	791.42	m2		3.5mm thick - 3.7 kg/m2	0.00
		Internal Finishes	**3.2**	**Floor Finishes**	**3.2.6**		**Screed**			**3060**	**m2**		**100mm thick**	
B	West Terminal Extension (WTE)	Internal Finishes	3.2	Floor Finishes	3.2.11	FT-80/81 Floor by concessiona	Screed	100.806	m2	100.806	m2		100mm thick	
A	East Terminal Extension	Internal finishes	3.2	Floor finishes	3.2.11	FT-80/81 Floor by concessiona	Screed	2959.59	m2	2959.59	m2		100mm thick	0.00
A	New East Pier	Internal finishes	3.2	Floor finishes	3.2.13	Floor not in scope (lifts/escalators/travelators/etc)		1922	m2				0	0
B	West Terminal Extension (WTE)	Internal Finishes	3.2	Floor Finishes	3.2.13	Floor not in scope (lifts/enclosed/voids/baggage belt)		94.657	m2					
A	East Terminal Extension	Internal finishes	3.2	Floor finishes	3.2.13	Floor not in scope (escalators/lifts)		136.00	m2				0.00	0.00
		Internal Finishes	**3.3**	**Ceiling Finishes**										
		Internal finishes	**3.3**	**Ceiling finishes**	**3.3.1**		**Aluminium Perforated**			**2751**	**m2**		**2mm - 8.5 kg/m2**	
A	East Terminal Extension	Internal finishes	3.3	Ceiling finishes	3.3.1.3	CT-13 Feature Ceiling - Silver	Aluminium Perforated	437.98	m2	437.98	m2		0.00	0.00
B	West Terminal Extension (WTE)	Internal Finishes	3.3	Ceiling Finishes	3.3.7	CT-22 FoH Perforated Metal P	Aluminium Perforated	507.831	m2	507.831	m2			
A	East Terminal Extension	Internal finishes	3.3	Ceiling finishes	3.3.1.4	CT-14 Feature Ceiling - Gold A	Aluminium Perforated	1805.05	m2	1805.05	m2		2mm - 8.5 kg/m2	0.00
		Internal finishes	**3.3**	**Ceiling finishes**	**3.3.2**		**Metal Ceiling**			**14217**	**m2**			
A	New East Pier	Internal finishes	3.3	Ceiling finishes	3.3.2.2	CT-22 FoH Perforated Metal P	Metal Ceiling	4775.6336	m2	4775.6336	m2		0	0
A	New East Pier	Internal finishes	3.3	Ceiling finishes	3.3.4.1	CT-40 FoH Circulation - Reces	Metal Ceiling	4164.2636	m2	4164.2636	m2		0	0
A	East Terminal Extension	Internal finishes	3.3	Ceiling finishes	3.3.2.2	CT-22 FoH Perforated Metal P	Metal Ceiling	798.40	m2	798.40	m2		0.00	0.00
A	East Terminal Extension	Internal finishes	3.3	Ceiling finishes	3.3.4.1	CT-40 FoH Circulation - Reces	Metal Ceiling	2791.12	m2	2791.12	m2		0.00	0.00
B	West Terminal Extension (WTE)	Internal Finishes	3.3	Ceiling Finishes	3.3.10	CT-40 FoH Circulation - Reces	Metal Ceiling	1687.228	m2	1687.228	m2			
A	West Energy Centre (WEC)	Internal Finishes	3.3	Ceiling Finishes	3.3.1	Suspended ceiling	Metal Ceiling	1	item				0	metal ceiling
		Internal finishes	**3.3**	**Ceiling finishes**	**3.3.3**		**Mineral Fibre**			**6131**	**m2**		**45.6 mm, 24.1 kg/m2**	**Fiber reinforced plasterboard for ceilings**
A	New East Pier	Internal finishes	3.3	Ceiling finishes	3.3.2.1	CT-20/21 BoH Mineral Fibre La	Mineral Fibre	88.535	m2	88.535	m2		0	0
B	West Terminal Extension (WTE)	Internal Finishes	3.3	Ceiling Finishes	3.3.6	CT-20/21 BoH Mineral Fibre La	Mineral Fibre	1688.37	m2	1688.37	m2			
A	East Terminal Extension	Internal finishes	3.3	Ceiling finishes	3.3.2.1	CT-20/21 BoH Mineral Fibre La	Mineral Fibre	4354.01	m2	4354.01	m2		0.00	0.00
		Internal finishes	**3.3**	**Ceiling finishes**	**3.3.4**		**Plasterboard - Moisture**			**5135**	**m2**		**12.5mm thck**	
A	New East Pier	Internal finishes	3.3	Ceiling finishes	3.3.3.1	CT-30/31 Plasterboard (RAL 9	Plasterboard - Moisture	3054.454	m2	3054.454	m2		12.5mm thck	0
B	West Terminal Extension (WTE)	Internal Finishes	3.3	Ceiling Finishes	3.3.9	CT-30/31 Plasterboard (RAL 9	Plasterboard - Moisture	703.431	m2	703.431	m2		12.5mm thck	
A	East Terminal Extension	Internal finishes	3.3	Ceiling finishes	3.3.3.1	CT-30/31 Plasterboard (RAL 9	Plasterboard - Moisture	1377.51	m2	1377.51	m2		12.5mm thck	0.00
		Internal Finishes	**3.3**	**Ceiling Finishes**	**3.3.5**	**Extra - CC**	**Plasterboard Paint**			**5135**	**m2**	**Extra - CC**		
A		Internal Finishes	3.3	Ceiling Finishes	3.3.1	Extra - CC	Plasterboard Paint							
A	East Terminal Extension	Internal finishes	3.3	Ceiling finishes	3.3.5.1	CT-50 Ceiling by concessionaire		3242.32	m2				0.00	Please provide more information
		Services	**5.0**											
		Services	5.1	Sanitary Installations										
		Services (Mechanical and	**5.1**	**Sanitary Installations**	**5.1.1**		**Basin**			**123**	**Nr**			
A	New East Pier	Services (Mechanical and E	5.1	Sanitary Installations	5.1.2	WHB	Basin	6	Nr	6	Nr			0
B	West Terminal Extension (WTE)	Services	5.1	Sanitary Installations		WHB	Basin	36	Nr	36	Nr			
B	West Terminal Extension (WTE)	Services	5.1	Sanitary Installations		Wudu	Basin	1	Nr	1	Nr			
A	East Terminal Extension	Services (Mechanical and E	5.1	Sanitary Installations	5.1.2	WHB	Basin	76.00	Nr	76.00	Nr			0.00
A	East Terminal Extension	Services (Mechanical and E	5.1	Sanitary Installations	5.1.6	Wudu	Basin	3.00	Nr	3.00	Nr			0.00
A	West Energy Centre (WEC)	Services	5.10	Sanitary Installations	5.1.1	Sanitaryware		1	no	1	no		0	0
		Services (Mechanical and	**5.1**	**Sanitary Installations**	**5.1.2**		**Cubicle**			**131**	**Nr**			
A	New East Pier	Services (Mechanical and E	5.1	Sanitary Installations	5.1.7	Cubicles	Cubicle	6	Nr	6	Nr			0
B	West Terminal Extension (WTE)	Services	5.1	Sanitary Installations		Cubicles	Cubicle	43	Nr	43	Nr			
A	East Terminal Extension	Services (Mechanical and E	5.1	Sanitary Installations	5.1.7	Cubicles	Cubicle	82.00	Nr	82.00	Nr		Office cubicle separation	0.00
		Services	**5.1**	**Sanitary Installations**	**5.1.3**		**Hand Dryer**			**82**	**Nr**			
B	West Terminal Extension (WTE)	Services	5.1	Sanitary Installations		Hand Dryers	Hand Dryer	15	Nr	15	Nr			
A	New East Pier	Services (Mechanical and E	5.1	Sanitary Installations	5.1.8	Hand Dryers	Hand Dryer	36	nr	36	nr			0
A	East Terminal Extension	Services (Mechanical and E	5.1	Sanitary Installations	5.1.8	Hand Dryers	Hand Dryer	31.00	nr	31.00	nr		Hand dryer, 4.34 kg/unit	0.00
		Services (Mechanical and	**5.1**	**Sanitary Installations**	**5.1.4**		**Shower**			**8**	**Nr**	**0**		
A	East Terminal Extension	Services (Mechanical and E	5.1	Sanitary Installations	5.1.5	Accessible / Unisex WC inc. Sh	Shower	4.00	Nr	4.00	Nr			0.00
A	East Terminal Extension	Services (Mechanical and E	5.1	Sanitary Installations	5.1.6	Shower	Shower	4.00	nr	4.00	nr		Acrylic shower tray, 32 k	0.00
		Services	**5.1**	**Sanitary Installations**	**5.1.5**		**urinal**			**53**	**Nr**			
B	West Terminal Extension (WTE)	Services	5.1	Sanitary Installations		Urinal	urinal	18	Nr	18	Nr			
A	New East Pier	Services (Mechanical and E	5.1	Sanitary Installations	5.1.3	Urinal	urinal	3	Nr	3	Nr			0
A	East Terminal Extension	Services (Mechanical and E	5.1	Sanitary Installations	5.1.3	Urinal	urinal	32.00	Nr	32.00	Nr			0.00
		Services (Mechanical and	**5.1**	**Sanitary Installations**	**5.1.6**		**WC**			**175**	**Nr**			
A	New East Pier	Services (Mechanical and E	5.1	Sanitary Installations	5.1.1	WC	WC	6	Nr	6	Nr			0
A	New East Pier	Services (Mechanical and E	5.1	Sanitary Installations	5.1.4	Accessible / Unisex WC	WC	32	Nr	32	Nr			0
B	West Terminal Extension (WTE)	Services	5.1	Sanitary Installations		WC	WC	43	Nr	43	Nr			
B	West Terminal Extension (WTE)	Services	5.1	Sanitary Installations		Accessible/Unisex WC	WC	5	Nr	5	Nr			
A	East Terminal Extension	Services (Mechanical and E	5.1	Sanitary Installations	5.1.1	WC	WC	82.00	Nr	82.00	Nr			0.00
A	East Terminal Extension	Services (Mechanical and E	5.1	Sanitary Installations	5.1.4	Accessible / Unisex WC	WC	7.00	Nr	7.00	Nr			0.00
		Services (Mechanical and E	5.3	Disposal Installations										
		Services	**5.3**	**Disposal Installations**	**5.3.1**	**Foul Drainage above ground**	**0**			**440**	**m**		**0**	**0**
A	West Energy Centre (WEC)	Services	5.3	Disposal Installations	5.3.3	Drainage channel to basement B10		15	nr	15	m		0	0
A	New East Pier	Services (Mechanical and E	5.3	Disposal Installations	5.2.1	Foul Drainage above ground		79	Nr	79	m		0	0
A	East Terminal Extension	Services (Mechanical and E	5.3	Disposal Installations	5.2.1	Foul Drainage above ground		223.00	Nr	223.00	m		0.00	0.00

B	West Terminal Extension (WTE)	Services	5.3	Disposal Installations	5.3.1	Foul Drainage above ground (pipework from riser to sanitary fittings)		108	Nr	108	m			
B	West Terminal Extension (WTE)	Services	5.3	Disposal Installations	5.3.3	Foul Drainage Risers inc vent		1	Nr	1	m			
A	New East Pier	Services (Mechanical and E	5.3	Disposal Installations	5.2.3	Foul Drainage Risers including Vents		10	Nr	10	m		0	0
A	East Terminal Extension	Services (Mechanical and E	5.3	Disposal Installations	5.2.3	Foul Drainage Risers including Vents		4.00	Nr	4.00	m		0.00	0.00
		Services (Mechanical and	**5.3**	**Disposal Installations**	**5.3.2**	**Foul Drainage below ground**	**0**			**16002**	**m2**			
A	New East Pier	Services (Mechanical and E	5.3	Disposal Installations	5.2.2	Foul Drainage below ground		5395	m2	5395	m2		0	0
A	East Terminal Extension	Services (Mechanical and E	5.3	Disposal Installations	5.2.2	Foul Drainage below ground		8560.00	m2	8560.00	m2		0.00	0.00
B	West Terminal Extension (WTE)	Services	5.3	Disposal Installations	5.3.2	Foul Drainage below ground		2047	m2	2047	m2			
		Services (Mechanical and	**5.3**	**Disposal Installations**	**5.3.3**	**New Rainwater pipework**	**0**			**38610**	**m2**			**PVC Pipework**
A	East Terminal Extension	Services (Mechanical and E	5.3	Disposal Installations	5.2.4	New Rainwater pipework		20310.00	m2	20310.00	m2		0.00	PVC Pipework
B	West Terminal Extension (WTE)	Services	5.3	Disposal Installations	5.3.4	New Rainwater pipework		5022.537	m2	5022.537	m2			PVC Pipework
A	New East Pier	Services (Mechanical and E	5.3	Disposal Installations	5.2.4	Rainwater		13277.502	m2	13277.502	m2		0	PVC Pipework
		Services	**5.3**	**Disposal Installations**	**5.3.4**	**Pump**	**0**			**2**	**#**			
A	West Energy Centre (WEC)	Services	5.3	Disposal Installations	5.3.1	Foul water pump station for level 00 toilet		1	item	1	#		0	0
A	West Energy Centre (WEC)	Services	5.3	Disposal Installations	5.3.2	Sump pump for basement drainage		1	item	1	#		0	0
		Services (Mechanical and E	5.4	Water Installations										
		Services (Mechanical and	**5.4**	**Water Installations**	**5.4.1**	**Cold Water Risers**	**0**			**429**	**m**		**0**	
A	New East Pier	Services (Mechanical and E	5.4	Water Installations	5.3.7	Chilled water pipes from West Energy Centre		2	nr	2	m		0	0
A	East Terminal Extension	Services (Mechanical and E	5.4	Water Installations	5.3.7	Cold Water Distribution		2.00	nr	2.00	m		0.00	0.00
A	New East Pier	Services (Mechanical and E	5.4	Water Installations	5.3.2	Cold Water Distribution to sanitary ware		79	Nr	79	m		0	0
A	East Terminal Extension	Services (Mechanical and E	5.4	Water Installations	5.3.2	Cold Water Distribution to sanitary ware		223.00	Nr	223.00	m		0.00	0.00
B	West Terminal Extension (WTE)	Services	5.4	Water Installations	5.4.2	Cold Water Distribution to sanitary ware		108	Nr	108	m			
B	West Terminal Extension (WTE)	Services	5.4	Water Installations	5.4.3	Cold Water Risers		1	Nr	1	m			
A	New East Pier	Services (Mechanical and E	5.4	Water Installations	5.3.3	Cold Water Risers		10	Nr	10	m		0	0
A	East Terminal Extension	Services (Mechanical and E	5.4	Water Installations	5.3.3	Cold Water Risers		4.00	Nr	4.00	m		0.00	0.00
		Services (Mechanical and	**5.4**	**Water Installations**	**5.4.2**	**Condensate pipework**	**0**			**38610**	**m2**		**0**	
A	New East Pier	Services (Mechanical and E	5.4	Water Installations	5.4.1	Condensate pipework		13277.502	m2	13277.502	m2		0	0
A	East Terminal Extension	Services (Mechanical and E	5.4	Water Installations	5.4.1	Condensate pipework		20310.00	m2	20310.00	m2		0.00	0.00
B	West Terminal Extension (WTE)	Services	5.5	Heat Source		Condensate pipework		5022.537	m2	5022.537	m2			
		Services	**5.4**	**Water Installations**	**5.4.3**	**Control panel**	**0**			**1**	**nr**		**0**	
A	West Energy Centre (WEC)	Services	5.4	Water Installations	5.4.5	Control panel		1	nr	1	nr		0	0
		Services	**5.4**	**Water Installations**	**5.4.4**	**Domestic water booster pum**	**0**			**2**	**nr**		**0**	
A	West Energy Centre (WEC)	Services	5.4	Water Installations	5.4.3	Domestic water booster pump		1	nr	1	nr		0	0
A	West Energy Centre (WEC)	Services	5.4	Water Installations	5.4.4	Pump set with 4 invertor driven pumps		1	nr	1	nr		0	0
		Services	**5.4**	**Water Installations**	**5.4.5**	**Domestic water storage tank**	**0**			**27**	**m3**		**0**	
A	West Energy Centre (WEC)	Services	5.4	Water Installations	5.4.2	Domestic water storage tank (3m x 3m x 3m)		1	nr	27	m3		0	0
		Services	**5.4**	**Water Installations**	**5.4.6**	**Electric water heater in toilet**	**0**			**1**	**nr**		**0**	
A	West Energy Centre (WEC)	Services	5.4	Water Installations	5.4.6	Electric water heater in toilet		1	nr	1	nr		0	0
		Services (Mechanical and	**5.4**	**Water Installations**	**5.4.7**	**Hot water distribution**	**0**			**197**	**m**		**0**	
A	East Terminal Extension	Services (Mechanical and E	5.4	Water Installations	5.3.8	Hot water distribution		2.00	nr	2.00	m		0.00	0.00
A	New East Pier	Services (Mechanical and E	5.4	Water Installations	5.3.5	Hot Water Distribution to sanitary ware		38	Nr	38	m		0	0
A	East Terminal Extension	Services (Mechanical and E	5.4	Water Installations	5.3.5	Hot Water Distribution to sanitary ware		98.00	Nr	98.00	m		0.00	0.00
A	New East Pier	Services (Mechanical and E	5.4	Water Installations	5.3.8	Hot water pipes from West Energy Centre		2	nr	2	m		0	0
B	West Terminal Extension (WTE)	Services	5.4	Water Installations	5.4.5	Hot Water Distribution to sanitary ware		42	Nr	42	m			
B	West Terminal Extension (WTE)	Services	5.4	Water Installations	5.4.6	Hot Water Risers		1	Nr	1	m			
A	New East Pier	Services (Mechanical and E	5.4	Water Installations	5.3.6	Hot Water Risers		10	Nr	10	m		0	0
A	East Terminal Extension	Services (Mechanical and E	5.4	Water Installations	5.3.6	Hot Water Risers		4.00	Nr	4.00	m		Please provide indicatior	0.00
		Services (Mechanical and	**5.4**	**Water Installations**	**5.4.8**	**Hot water Supply**	**0**			**38610**	**m2**		**0**	
A	New East Pier	Services (Mechanical and E	5.4	Water Installations	5.3.4	Hot water Supply		13277.502	m2	13277.502	m2		0	0
B	West Terminal Extension (WTE)	Services	5.4	Water Installations	5.4.4	Hot water Supply		5022.537	m2	5022.537	m2			
A	East Terminal Extension	Services (Mechanical and E	5.4	Water Installations	5.3.4	Hot water Supply		20310.00	m2	20310.00	m2		0.00	0.00
		Services (Mechanical and	**5.4**	**Water Installations**	**5.4.9**	**Mains Water Supply**	**0**			**38610**	**m2**		**0**	
A	New East Pier	Services (Mechanical and E	5.4	Water Installations	5.3.1	Mains Water Supply		13277.502	m2	13277.502	m2		0	0
B	West Terminal Extension (WTE)	Services	5.4	Water Installations	5.4.1	Mains Water Supply		5022.537	m2	5022.537	m2			
A	East Terminal Extension	Services (Mechanical and E	5.4	Water Installations	5.3.1	Mains Water Supply		20310.00	m2	20310.00	m2		0.00	0.00
		Services (Mechanical and E	5.6	Space Heating & Air Conditioning										
		Services (Mechanical and	**5.6**	**Space Heating & Air Conditionii**	**5.6.1**	**LTHW heating system**	**0**			**38610**	**m2**		**0**	
A	New East Pier	Services (Mechanical and E	5.6	Space Heating & Air Conditioning	5.5.1	LTHW heating system		13277.502	m2	13277.502	m2		0	0
A	East Terminal Extension	Services (Mechanical and E	5.6	Space Heating & Air Conditioning	5.5.1	LTHW heating system		20310.00	m2	20310.00	m2		0.00	0.00
B	West Terminal Extension (WTE)	Services	5.6	Space Heating & Air Conditioning		LTHW heating system		5022.537	m2	5022.537	m2			
		Services (Mechanical and	**5.6**	**Space Heating & Air Conditionii**	**5.6.2**	**Chilled water system**	**0**			**38610**	**m2**		**0**	
A	New East Pier	Services (Mechanical and E	5.6	Space Heating & Air Conditioning	5.5.2	Chilled water system		13277.502	m2	13277.502	m2		0	0
A	East Terminal Extension	Services (Mechanical and E	5.6	Space Heating & Air Conditioning	5.5.2	Chilled water system		20310.00	m2	20310.00	m2		0.00	0.00
B	West Terminal Extension (WTE)	Services	5.6	Space Heating & Air Conditioning		Chilled water system		5022.537	m2	5022.537	m2			
		Services	**5.6**	**Space Heating & Air Conditionii**	**5.6.3**	**Perimeter electrical panel rac**	**0**			**7**	**m**		**assume 1unit / 10m**	
A	West Energy Centre (WEC)	Services	5.6	Space Heating & Air Conditioning	5.6.1	Perimeter electrical panel radiators for frost protection		70	m	70	m		0	How many units?
		Services	**5.6**	**Space Heating & Air Conditionii**	**5.6.5**	**Vapour Compression Air Coc**	**0**			**3**	**nr**			
A	West Energy Centre (WEC)	Services	5.6	Space Heating & Air Conditioning	5.6.2	Vapour Compression Air Cooled chillers 3no		2250	kW	3	nr		Please specify refrigeran	Please specify what kind of refrigerant?
		Services	**5.6**	**Space Heating & Air Conditionii**	**5.6.6**	**Primary twin head circulating**	**0**			**3**	**nr**			
A	West Energy Centre (WEC)	Services	5.6	Space Heating & Air Conditioning	5.6.4	Primary twin head circulating pump		1	item	1	nr		0	0
A	West Energy Centre (WEC)	Services	5.6	Space Heating & Air Conditioning	5.6.5	Secondary twin head circulating pump		2	nr	2	nr		0	0
A	West Energy Centre (WEC)	Services	5.6	Space Heating & Air Conditioning	5.6.6	PHEX plate heat exchangers (absorption cooling circuits)		2	nr				0	0
A	West Energy Centre (WEC)	Services	5.6	Space Heating & Air Conditioning	5.6.7	Pressurisation unit & ass Expansion Vessels		1	item				0	0
A	West Energy Centre (WEC)	Services	5.6	Space Heating & Air Conditioning	5.6.8	CHW headers - flow & return		2	nr				0	0
A	West Energy Centre (WEC)	Services	5.6	Space Heating & Air Conditioning	5.6.9	Mechanical control panel		1	item				0	0
A	West Energy Centre (WEC)	Services	5.6	Space Heating & Air Conditioning	5.6.10	Ductwork		1	item				0	0
A	West Energy Centre (WEC)	Services	5.6	Space Heating & Air Conditioning	5.6.11	Valves & sensors		1	item				0	0
A	West Energy Centre (WEC)	Services	5.6	Space Heating & Air Conditioning	5.6.12	Provision for pumps, pipework , ductwork, insulation, trace heating, leak detection		1	item				0	0
		Services (Mechanical and E	5.7	Ventilation Systems										
		Services	**5.7**	**Ventilation Systems**	**5.7.1**	**Extraction Fan**	**0**			**4**	**#**			
A	West Energy Centre (WEC)	Services	5.7	Ventilation Systems	5.7.1	Basement extraction fan		1	item	1	#		0	0
A	West Energy Centre (WEC)	Services	5.7	Ventilation Systems	5.7.4	Smoke extract fan 300l/s		1	item	1	#		0	0
A	West Energy Centre (WEC)	Services	5.7	Ventilation Systems	5.7.3	Extract System (Observation Room)		1	item	1	#		0	0
A	West Energy Centre (WEC)	Services	5.7	Ventilation Systems	5.7.2	Extract System (Toilets)		1	item	1	#		0	0
		Services (Mechanical and	**5.7**	**Ventilation Systems**	**5.7.2**	**Extract System**	**0**			**102553**	**m2**			
A	East Terminal Extension	Services (Mechanical and E	5.7	Ventilation Systems	5.6.4	Kitchen extract system		20310.00	m2	20310.00	m2		0.00	0.00
B	West Terminal Extension (WTE)	Services	5.7	Ventilation Systems		Kitchen extract system		5022.537	m2	5022.537	m2			
A	New East Pier	Services (Mechanical and E	5.7	Ventilation Systems	5.6.5	Smoke extract installation		13277.502	m2	13277.502	m2		0	0
A	East Terminal Extension	Services (Mechanical and E	5.7	Ventilation Systems	5.6.5	Smoke extract installation		20310.00	m2	20310.00	m2		0.00	0.00
B	West Terminal Extension (WTE)	Services	5.7	Ventilation Systems		Smoke extract installation		5022.537	m2	5022.537	m2			
A	New East Pier	Services (Mechanical and E	5.7	Ventilation Systems	5.6.3	Toilet extract ventilation		13277.502	m2	13277.502	m2		0	0
A	East Terminal Extension	Services (Mechanical and E	5.7	Ventilation Systems	5.6.3	Toilet extract ventilation		20310.00	m2	20310.00	m2		0.00	0.00
B	West Terminal Extension (WTE)	Services	5.7	Ventilation Systems		Toilet extract ventilation		5022.537	m2	5022.537	m2			
		Services (Mechanical and	**5.7**	**Ventilation Systems**	**5.7.3**	**Extract System**	**0**			**44**	**Nr**			
A	New East Pier	Services (Mechanical and E	5.7	Ventilation Systems	5.6.1	Local and Special Ventilation (to Electrical/Mechanical rooms)		20	Nr	20	Nr		Air volume regulator for |	0
A	East Terminal Extension	Services (Mechanical and E	5.7	Ventilation Systems	5.6.1	Local and Special Ventilation (to Electrical/Mechanical Rooms)		12.00	Nr	12.00	Nr		Air volume regulator for |	Please indicate ventilaiton system?
B	West Terminal Extension (WTE)	Services	5.7	Ventilation Systems		Local and Special Ventilation (to Electrical/Mechanical Rooms)		12	Nr	12	Nr		Air volume regulator for |	What is the ventilaiton system?
		Services (Mechanical and	**5.7**	**Ventilation Systems**	**5.7.4**	**Extract System**	**0**			**38610**	**m2**			
A	New East Pier	Services (Mechanical and E	5.7	Ventilation Systems	5.6.2	Supply and extract air conditioning system		13277.502	m2	13277.502	m2		0	0
A	East Terminal Extension	Services (Mechanical and E	5.7	Ventilation Systems	5.6.2	Supply and extract air conditioning system		20310.00	m2	20310.00	m2		0.00	0.00
B	West Terminal Extension (WTE)	Services	5.7	Ventilation Systems		Supply and extract air conditioning system		5022.537	m2	5022.537	m2			
		Services (Mechanical and E	5.8	Electrical Installations										
		Services	**5.8**	**Electrical Installations**	**5.8.1**	**Additional cost for 2 no. 2Mv.**	**0**			**2**	**no**			
A	West Energy Centre (WEC)	Services	5.8	Electrical Installations	5.8.1	Additional cost for 2 no. 2MvA transformers + equipment		2	no	2	no		0	0
		Services	**5.8**	**Electrical Installations**	**5.8.2**	**Containment to support cabl**	**0**			**39894**	**m2**			
A	West Energy Centre (WEC)	Services	5.8	Electrical Installations	5.8.6	Containment to support cables and ladder rack		642	m2	642	m2		0	0
A	New East Pier	Services (Mechanical and E	5.8	Earthing and Bonding Systems	5.8.1	Earthing and bonding		13277.502	m2	13277.502	m2		0	0
A	East Terminal Extension	Services (Mechanical and E	5.8	Earthing and Bonding Systems	5.8.1	Earthing and bonding		20310.00	m2	20310.00	m2		0.00	0.00
A	West Energy Centre (WEC)	Services	5.8	Electrical Installations	5.8.14	Earthing and bonding		642	m2	642	m2		0	0
B	West Terminal Extension (WTE)	Services	5.8	Electrical Installations		Earthing and Bonding		5022.537	m2	5022.537	m2			
		Services (Mechanical and	**5.8**	**Electrical Installations**	**5.8.3**	**Emergency lighting installati**	**0**			**38610**	**m2**			
A	New East Pier	Services (Mechanical and E	5.8	Electrical Installations	5.7.5	Emergency lighting installations		13277.502	m2	13277.502	m2		0	0
A	East Terminal Extension	Services (Mechanical and E	5.8	Electrical Installations	5.7.5	Emergency lighting installations		20310.00	m2	20310.00	m2		0.00	0.00
B	West Terminal Extension (WTE)	Services	5.8	Electrical Installations		Emergency Lighting Installations		5022.537	m2	5022.537	m2			
		Services (Mechanical and	**5.8**	**Electrical Installations**	**5.8.4**	**Lighting Installations**	**0**			**38610**	**m2**			
A	New East Pier	Services (Mechanical and E	5.8	Electrical Installations	5.7.4	Lighting Installations		13277.502	m2	13277.502	m2			0
A	East Terminal Extension	Services (Mechanical and E	5.8	Electrical Installations	5.7.4	Lighting Installations		20310.00	m2	20310.00	m2			0.00
B	West Terminal Extension (WTE)	Services	5.8	Electrical Installations		Lighting Installations		5022.537	m2	5022.537	m2			
		Services	**5.8**	**Electrical Installations**	**5.8.5**	**Luminaires X8**	**0**			**74**	**no**			
A	West Energy Centre (WEC)	Services	5.8	Electrical Installations	5.8.8	Luminaires X8		60	no	60	no			0
A	West Energy Centre (WEC)	Services	5.8	Electrical Installations	5.8.9	External lighting X3/X3E		14	m2	14	m2			0
		Services	**5.8**	**Electrical Installations**	**5.8.6**	**LV Distribution & Switchboar**	**0**			**3**	**nr**			
A	West Energy Centre (WEC)	Services	5.8	Electrical Installations	5.8.4	LV Distribution & Switchboards		642	m2	1	nr			0
A	West Energy Centre (WEC)	Services	5.8	Electrical Installations	5.8.2	Incoming HV 11kV & dist boards		1	no	1	no			0
A	West Energy Centre (WEC)	Services	5.8	Electrical Installations	5.8.3	Incoming LV 11kV & dist boards		1	no	1	no			0
		Services	**5.8**	**Electrical Installations**	**5.8.7**	**Photo Voltaic Cells**	**0**			**3990**	**m2**			**Monocrystalline panels**
A	West Energy Centre (WEC)	Services	5.8	Electrical Installations	5.8.13	Photo Voltaic Cells		41	m2	41	m2			0
A	East Terminal Extension	Services (Mechanical and E	5.13	Specialist Electrical /Electronic Ins	5.13.5	Photovoltaic Cells		2389.58	m2	2389.58	m2		0.00	0.00
A	New East Pier	Services (Mechanical and E	5.13	Specialist Electrical /Electronic Ins	5.13.4	PV Panels		1323.56	m2	1323.56	m2		0	0
B	West Terminal Extension (WTE)	Services	5.13	Specialist Installations		Photovoltaic Cells		236.35	m2	236.35	m2			Monocrystalline panels
		Services (Mechanical and	**5.8**	**Electrical Installations**	**5.8.8**	**Electric Mains and Sub-main**	**0**			**39894**	**m2**			
A	New East Pier	Services (Mechanical and E	5.8	Electrical Installations	5.7.1	Electric Mains and Sub-mains Distribution		13277.502	m2	13277.502	m2			0
A	East Terminal Extension	Services (Mechanical and E	5.8	Electrical Installations	5.7.1	Electric Mains and Sub-mains Distribution		20310.00	m2	20310.00	m2			0.00
B	West Terminal Extension (WTE)	Services	5.8	Electrical Installations		Electric Mains and Sub-mains Distribution		5022.537	m2	5022.537	m2			
A	New East Pier	Services (Mechanical and E	5.8	Electrical Installations	5.7.2	Power Installations		13277.502	m2	13277.502	m2			0
A	East Terminal Extension	Services (Mechanical and E	5.8	Electrical Installations	5.7.2	Power Installations		20310.00	m2	20310.00	m2			0.00
B	West Terminal Extension (WTE)	Services	5.8	Electrical Installations		Power Installations		5022.537	m2	5022.537	m2			
A	New East Pier	Services (Mechanical and E	5.8	Electrical Installations	5.7.3	power to mechanical services		13277.502	m2	13277.502	m2			0
A	East Terminal Extension	Services (Mechanical and E	5.8	Electrical Installations	5.7.3	power to mechanical services		20310.00	m2	20310.00	m2			0.00
B	West Terminal Extension (WTE)	Services	5.8	Electrical Installations		Power to mechanical services		5022.537	m2	5022.537	m2			
A	West Energy Centre (WEC)	Services	5.8	Electrical Installations	5.8.7	Small power		642	m2	642	m2			0
A	West Energy Centre (WEC)	Services	5.8	Electrical Installations	5.8.5	M & E		642	m2	642	m2		0	0
		Services	**5.8**	**Electrical Installations**	**5.8.9**	**Standby generator 450kVa: e**	**0**			**1**	**#**			
A	West Energy Centre (WEC)	Services	5.8	Electrical Installations	5.8.10	Standby generator 450kVa: enclosure 75dBA		1	kVA	1	#		0	0
A	East Terminal Extension	Services (Mechanical and E	5.8	Electrical Installations	5.7.6	Substation including HV cables from main substation and all switchgear and panels		2.00	nr				0.00	0.00
A	New East Pier	Services (Mechanical and E	5.8	Electrical Installations	5.7.6	Substation Installation		3	nr				0	0
		Services	5.9	Fuel Installations										
		Services (Mechanical and	**5.9**	**Fuel Installations**	**5.9.1**	**Fuel Distribution Systems (g**	**0**			**25333**	**m2**			
A	East Terminal Extension	Services (Mechanical and E	5.9	Fuel Installations	5.9.1	Fuel Distribution Systems (gas services to kitchens)		20310.00	m2	20310.00	m2		0.00	0.00
B	West Terminal Extension (WTE)	Services	5.9	Fuel Installations		Fuel Distribution Systems (gas services to kitchens)		5022.537	m2	5022.537	m2			
		Services (Mechanical and E	5.10	Lift and Conveyor Installations										
		Services (Mechanical and	**5.10**	**Lift and Conveyor Installations**	**5.10.1**	**FoH Lifts**	**0**			**25**	**Nr**			
A	New East Pier	Services (Mechanical and E	5.10	Lift and Conveyor Installations	5.10.1	FoH Lifts		14	Nr	14	Nr		0	0
A	East Terminal Extension	Services (Mechanical and E	5.10	Lift and Conveyor Installations	5.10.1	BoH Lift		2.00	Nr	2.00	Nr		0.00	0.00
A	East Terminal Extension	Services (Mechanical and E	5.10	Lift and Conveyor Installations	5.10.2	PRM Lift		2.00	Nr	2.00	Nr		0.00	0.00
A	East Terminal Extension	Services (Mechanical and E	5.10	Lift and Conveyor Installations	5.10.3	BoH Platform Lift		2.00	Nr	2.00	Nr		0.00	0.00
A	East Terminal Extension	Services (Mechanical and E	5.10	Lift and Conveyor Installations	5.10.4	CIP Lift		2.00	Nr	2.00	Nr		0.00	0.00
B	West Terminal Extension (WTE)	Services	5.10	Lift Installations		Goods/Waste Lift		2	Nr	2	Nr			
B	West Terminal Extension (WTE)	Services	5.10	Lift Installations		PRME Lift		1	Nr	1	Nr			
		Services (Mechanical and	**5.10**	**Lift and Conveyor Installations**	**5.10.2**	**Escalators**	**0**			**24**	**Nr**			
A	New East Pier	Services (Mechanical and E	5.10	Lift and Conveyor Installations	5.10.2	New Escalators		22	Nr	22	Nr		0	0
A	East Terminal Extension	Services (Mechanical and E	5.10	Lift and Conveyor Installations	5.10.5	Escalators		2.00	Nr	2.00	Nr		0.00	0.00
A	New East Pier	Services (Mechanical and E	5.10	Lift and Conveyor Installations	5.10.3	Moving Pavements - Travelator 18m long		24	Nr				0	0
		Services	5.11	Fire & Lightning Protection										
		Services	**5.11**	**Fire & Lightning Protection**	**5.11.1**	**Dry riser and hose reel instal**	**0**			**38610**	**m2**			
B	West Terminal Extension (WTE)	Services	5.11	Fire & Lightning Protection		Dry riser and hose reel installation		5022.537	m2	5022.537	m2			
A	New East Pier	Services (Mechanical and E	5.11	Fire & Lightning Protection	5.11.1	Dry riser and hose reels installation		13277.502	m2	13277.502	m2			0
A	East Terminal Extension	Services (Mechanical and E	5.11	Fire & Lightning Protection	5.11.1	Dry riser and hose reels installation		20310.00	m2	20310.00	m2			0.00
		Services (Mechanical and	**5.11**	**Fire & Lightning Protection**	**5.11.2**	**Fire Suppression installation**	**0**			**57**	**Nr**			
A	New East Pier	Services (Mechanical and E	5.11	Fire & Lightning Protection	5.11.3	Fire Suppression installation to Comms room		20	Nr	20	Nr			0
A	East Terminal Extension	Services (Mechanical and E	5.11	Fire & Lightning Protection	5.11.3	Fire Suppression installation to Comms room		22.00	Nr	22.00	Nr			0.00
B	West Terminal Extension (WTE)	Services	5.11	Fire & Lightning Protection		Fire suppression installation to Comms room		12	Nr	12	Nr			
A	West Energy Centre (WEC)	Services	5.11	Fire & Lightning Protection	5.11.6	Fire suppression Systems - gas + dampers		3	no	3	no			0
		Services (Mechanical and	**5.11**	**Fire & Lightning Protection**	**5.11.3**	**Lightning Protection**	**0**			**39252**	**m2**			
A	New East Pier	Services (Mechanical and E	5.11	Fire & Lightning Protection	5.11.5	Lightning Protection		13277.502	m2	13277.502	m2			0
A	East Terminal Extension	Services (Mechanical and E	5.11	Fire & Lightning Protection	5.11.5	Lightning Protection		20310.00	m2	20310.00	m2			0.00
A	West Energy Centre (WEC)	Services	5.11	Fire & Lightning Protection	5.11.7	Lightning protection		642	m2	642	m2			0
B	West Terminal Extension (WTE)	Services	5.11	Fire & Lightning Protection		Lightning Protection		5022.537	m2	5022.537	m2			
		Services (Mechanical and	**5.11**	**Fire & Lightning Protection**	**5.11.4**	**Sprinkler protection**	**0**			**39252**	**m2**			
A	New East Pier	Services (Mechanical and E	5.11	Fire & Lightning Protection	5.11.2	Sprinkler protection		13277.502	m2	13277.502	m2			0
A	East Terminal Extension	Services (Mechanical and E	5.11	Fire & Lightning Protection	5.11.2	Sprinkler protection		20310.00	m2	20310.00	m2			0.00
B	West Terminal Extension (WTE)	Services	5.11	Fire & Lightning Protection		Sprinkler protection		5022.537	m2	5022.537	m2			
A	West Energy Centre (WEC)	Services	5.11	Fire & Lightning Protection	5.11.2	Sprinklers		642	m2	642	m2			0
		Services	**5.11**	**Fire & Lightning Protection**	**5.11.5**	**Sprinkler tank 14 x 5 x 3m hg**	**0**			**1**	**item**			
A	West Energy Centre (WEC)	Services	5.11	Fire & Lightning Protection	5.11.1	Sprinkler tank 14 x 5 x 3m hg		1	item	1	item			0
		Services	5.12	Communications, Security & Control Systems										
A	West Energy Centre (WEC)	Services	5.12	Communications, Security & Cont	5.12.6	BMS installation		642	m2				0	0
A	New East Pier	Services (Mechanical and E	5.12	Communication, Security & Contr	5.12.5	Central Control/Building Management Systems		13277.502	m2				0	0
A	East Terminal Extension	Services (Mechanical and E	5.12	Communication, Security & Contr	5.12.5	Central Control/Building Management Systems		20310.00	m2				0.00	0.00
B	West Terminal Extension (WTE)	Services	5.12	Communications, Security & Control System		Central Control/Building Management Systems		5022.537	m2					
A	West Energy Centre (WEC)	Services	5.12	Communications, Security & Cont	5.12.2	Connection to airport site wide head end		1	item				0	0
A	West Energy Centre (WEC)	Services	5.12	Communications, Security & Cont	5.12.5	Connection to airport site wide head end		1	item				0	0
A	West Energy Centre (WEC)	Services	5.12	Communications, Security & Cont	5.12.7	Connection to airport site wide head end		1	no				0	0
A	West Energy Centre (WEC)	Services	5.12	Communications, Security & Cont	5.12.1	Fire alarm system		642	m2				0	0
B	West Terminal Extension (WTE)	Services	5.12	Communications, Security & Control System		Fire and smoke detection and alarm		5022.537	m2					
A	New East Pier	Services (Mechanical and E	5.12	Communication, Security & Contr	5.12.1	Fire and smoke detection and alarm		13277.502	m2				0	0
A	East Terminal Extension	Services (Mechanical and E	5.12	Communication, Security & Contr	5.12.1	Fire and smoke detection and alarm		20310.00	m2				0.00	0.00

A	New East Pier	Services (Mechanical and E	5.12	Communication, Security & Contr	5.12.4	intruder detection		13277.502	m2				0	0
A	East Terminal Extension	Services (Mechanical and E	5.12	Communication, Security & Contr	5.12.4	intruder detection		20310.00	m2				0.00	0.00
B	West Terminal Extension (WTE)	Services	5.12	Communications, Security & Control System		Intruder detection		5022.537	m2					
A	West Energy Centre (WEC)	Services	5.12	Communications, Security & Cont	5.12.3	Security system and CCTV controls		1	item				0	0
A	New East Pier	Services (Mechanical and E	5.12	Communication, Security & Contr	5.12.3	Security Systems		13277.502	m2				0	0
A	East Terminal Extension	Services (Mechanical and E	5.12	Communication, Security & Contr	5.12.3	Security Systems		20310.00	m2				0.00	0.00
B	West Terminal Extension (WTE)	Services	5.12	Communications, Security & Control System		Security Systems		5022.537	m2					
A	West Energy Centre (WEC)	Services	5.12	Communications, Security & Cont	5.12.4	Security to doors		16	no				0	0
A	New East Pier	Services (Mechanical and E	5.12	Communication, Security & Contr	5.12.7	Structured cable installation		13277.502	m2				0	0
A	East Terminal Extension	Services (Mechanical and E	5.12	Communication, Security & Contr	5.12.7	Structured cable installation		20310.00	m2				0.00	0.00
B	West Terminal Extension (WTE)	Services	5.12	Communications, Security & Control System		Structured cabling installation		5022.537	m2					
B	West Terminal Extension (WTE)	Services	5.12	Communications, Security & Control System		Voice public address system		5022.537	m2					
A	New East Pier	Services (Mechanical and E	5.12	Communication, Security & Contr	5.12.2	Voice/public address system		13277.502	m2				0	0
A	East Terminal Extension	Services (Mechanical and E	5.12	Communication, Security & Contr	5.12.2	Voice/public address system		20310.00	m2				0.00	0.00
A	New East Pier	Services (Mechanical and E	5.12	Communication, Security & Contr	5.12.6	Wireways for telephones, data and structure cable		13277.502	m2				0	0
A	East Terminal Extension	Services (Mechanical and E	5.12	Communication, Security & Contr	5.12.6	Wireways for telephones, data and structure cable		20310.00	m2				0.00	0.00
B	West Terminal Extension (WTE)	Services	5.12	Communications, Security & Control System		Wireways for telephones, data and structured cabling		5022.537	m2					
		Services	5.13	Specialist Installations										
A	New East Pier	Services (Mechanical and E	5.13	Specialist Electrical /Electronic Ins	5.13.6	Allowance for automatic visual docking guidance system (A-VDGS) & SEGS Controller		11	nr				0	0
A	New East Pier	Services (Mechanical and E	5.13	Specialist Electrical /Electronic Ins	5.13.5	Apron Lighting Post		13	nr				0	0
A	East Terminal Extension	Services (Mechanical and E	5.13	Specialist Electrical /Electronic Ins	5.13.4	Baggage Tug Charging Point - 50kW Rapid Charger Unit inc. Batteries		1.00	nr				0.00	0.00
B	West Terminal Extension (WTE)	Services	5.13	Specialist Installations		Ceia Walk through Metal Detector		4	nr					
A	East Terminal Extension	Services (Mechanical and E	5.13	Specialist Electrical /Electronic Ins	5.13.6	CUSS		61.00	nr				0.00	0.00
B	West Terminal Extension (WTE)	Services	5.13	Specialist Installations		E-gates		10	nr					
A	New East Pier	Services (Mechanical and E	5.13	Specialist Electrical /Electronic Ins	5.13.1	Flight information display system (FIDS)		24	Nr				0	0
A	East Terminal Extension	Services (Mechanical and E	5.13	Specialist Electrical /Electronic Ins	5.13.1	Flight information display system (FIDS)		20.00	nr				0.00	0.00
B	West Terminal Extension (WTE)	Services	5.13	Specialist Installations		Flight Information Display Systems (FIDS)		6	nr					
A	New East Pier	Services (Mechanical and E	5.13	Specialist Electrical /Electronic Ins	5.13.2	Flight Information systems connections		24	nr				0	0
A	East Terminal Extension	Services (Mechanical and E	5.13	Specialist Electrical /Electronic Ins	5.13.2	Flight Information systems connections		20.00	nr				0.00	0.00
B	West Terminal Extension (WTE)	Services	5.13	Specialist Installations		Flight Information systems connections		6	nr					
A	New East Pier	Services (Mechanical and E	5.13	Specialist Electrical /Electronic Ins	5.13.3	Gateroom E-Gates Boarding Card Readers		24	nr				0	0
B	West Terminal Extension (WTE)	Services	5.13	Specialist Installations		Large Goods Screening Machine - Level 00		1	nr					
B	West Terminal Extension (WTE)	Services	5.13	Specialist Installations		MachH GenII smart security lane		6	nr					
B	West Terminal Extension (WTE)	Services	5.13	Specialist Installations		MachH Matrix system for security lane		6	nr					
B	West Terminal Extension (WTE)	Services	5.13	Specialist Installations		RapiScan Carry-on Baggage X-Ray Machine		6	nr					
B	West Terminal Extension (WTE)	Services	5.13	Specialist Installations		RapiScan Customs Hold-Baggage Capable X-Ray Machine		1	nr					
B	West Terminal Extension (WTE)	Services	5.13	Specialist Installations		Roland Schwartz Passenger Body Scanner		6	nr					
A	East Terminal Extension	Services (Mechanical and E	5.13	Specialist Electrical /Electronic Ins	5.13.3	Scrubber Tug Charging Point - 50kW Rapid Charger Unit inc. Batteries		1.00	nr				0.00	0.00
B	West Terminal Extension (WTE)	Services	5.13	Specialist Installations		Shoe X-Ray		0	nr					
B	West Terminal Extension (WTE)	Services	5.13	Specialist Installations		Smiths Explosive Trace Detection (ETD) Machine		0	nr					
		Services	5.14	Builder's Work in Connection with Services										
A	New East Pier	Services (Mechanical and E	5.14	Builder's Work in Connection with	5.14.1	Builder's Work in Connection with Services		13278	m2				0	0
B	West Terminal Extension (WTE)	Services	5.14	Builder's Work in Connection with Services		Builder's Work in Connection with Services		0.02	%					
B	West Terminal Extension (WTE)	Services	5.14	Builder's Work in Connection with Services		Testing & Commissioning of Services		0.025	%					
B	West Terminal Extension (WTE)	Services	5.14	Builder's Work in Connection with Services		Design - from Stage 3+ onwards		0.03	%					
B	West Terminal Extension (WTE)	Services	5.14	Builder's Work in Connection with Services		MEP Contractor Prelims		0.08	%					
B	West Terminal Extension (WTE)	Services	5.14	Builder's Work in Connection with Services		MEP Overhead and profit		0.05	%					
A	East Terminal Extension	Services (Mechanical and E	5.14	Builder's Work in Connection with	0.00	Builder's Work in Connection with Services		0.02	%				0.00	0.00
A	East Terminal Extension	Services (Mechanical and E	5.14	Builder's Work in Connection with	0.00	Testing & Commissioning of Services		0.03	%				0.00	0.00
A	East Terminal Extension	Services (Mechanical and E	5.14	Builder's Work in Connection with	0.00	Design - from Stage 3+ onwards		0.03	%				0.00	0.00
A	East Terminal Extension	Services (Mechanical and E	5.14	Builder's Work in Connection with	0.00	MEP Contractor Prelims		0.08	%				0.00	0.00
A	East Terminal Extension	Services (Mechanical and E	5.14	Builder's Work in Connection with	0.00	MEP Overhead and profit		0.05	%				0.00	0.00
		External Works	**8.0**											
		External Works	8.0	External Works										
A	New East Pier	External Works	8.0	External Works	8.7	External Services	-	13278	m2				0	0
		External Works	**8.0**	**External Works**	**8.2.14**	**External Drainage**	**Drainage**			**13278**	**m2**			
A	New East Pier	External Works	8.0	External Works	8.6	External Drainage	Drainage	13278	m2	13278	m2		0	0

Appendix C. Example Concrete Staircase Calculation

Please refer to the separate attachment.

Precast Stair	Min		Notes:
H	4.41	m	
h	2.055	m	
angle	42	deg	
x	6.96	m	
r	0.15	m	From Mannok precast product brochure (https://www.mannokbuild.com/precast/stairs-and-landings/)
g	0.22	m	From Mannok
No. rise	27.4	per m	
z	0.15	m	From Mannok
w	1.35	m	From Mannok
Volume	4.03947	m3	

(pink)	User input
(blue)	Output
(green)	From data source
(orange)	Embodied Carbon Output

Landing			
hland	0.15	m	(assuming same as waist of stair)
f	0.3	m	
wland	3	m	(Assuming 2x width of stair, plus gap of 'f' for railings)
dland	2	m	input
No. landings	2	per story	
Volume	1.8	m3	

Total		
Volume	5.83947	m3
Concrete density	2400	kg/m3
Mass	14014.728	kg

Carbon factor (taken from IStructE *How to Calculate Embodied Carbon* (2nd edition)

Lower	0.086	kgCO2e/kg	(UK 20/25, 50% GGBS)

Embodied Carbon, concrete

Lower	1205.266608	kgCO2e

%age decrease

Rebar		
Upper	4	%
Steel density	7750	kg/m3
Mass	181.02357	kg

Carbon factor	0.76	kgCO2e/kg	(UK 97% recycled EAF production)

Embodied Carbon, rebar	137.5779132	kgCO2e

Precast Stair Embodied Carbon, Total	1342.844521	kgCO2e

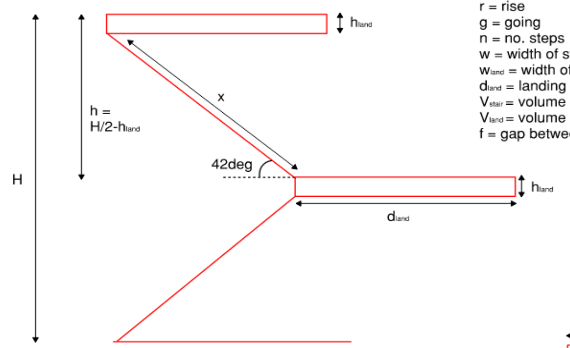
Steel Handrail			
Outer diameter	0.048	m	
Thickness	0.005	m	(assumed hollow)
Inner diameter	0.043	m	
Length (rail)	35.14	m	
No. posts per m	1		
No. posts	21		(assuming 1 per m)
Length (post)	1	m	
Total length	56.14	m	
Volume	0.020061975	m3	
Mass	155.4803068	kg	
Carbon factor, steel	2.46	kgCO2e/kg	(Steel, plate)
Embodied carbon	382.4815546	kgCO2e	

Handrail Coating			(assumed polyster powder coated)
Embodied carbon	19.12407773	kgCO2e	(assumed 5% of total hand rail embodied carbon)

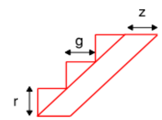
Steel Handrail Embodied Carbon, Total

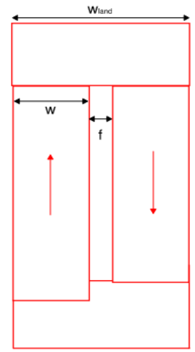
Embodied carbon	401.6056324	kgCO2e

Source: https://www.morrisfabrications.co.uk/balustrade-handrail/



z = waist
r = rise
g = going
n = no. steps
w = width of stair
w_{land} = width of landing
d_{land} = landing depth
V_{stair} = volume of stair per story
V_{land} = volume of landing per story
f = gap between staircases (if >0)



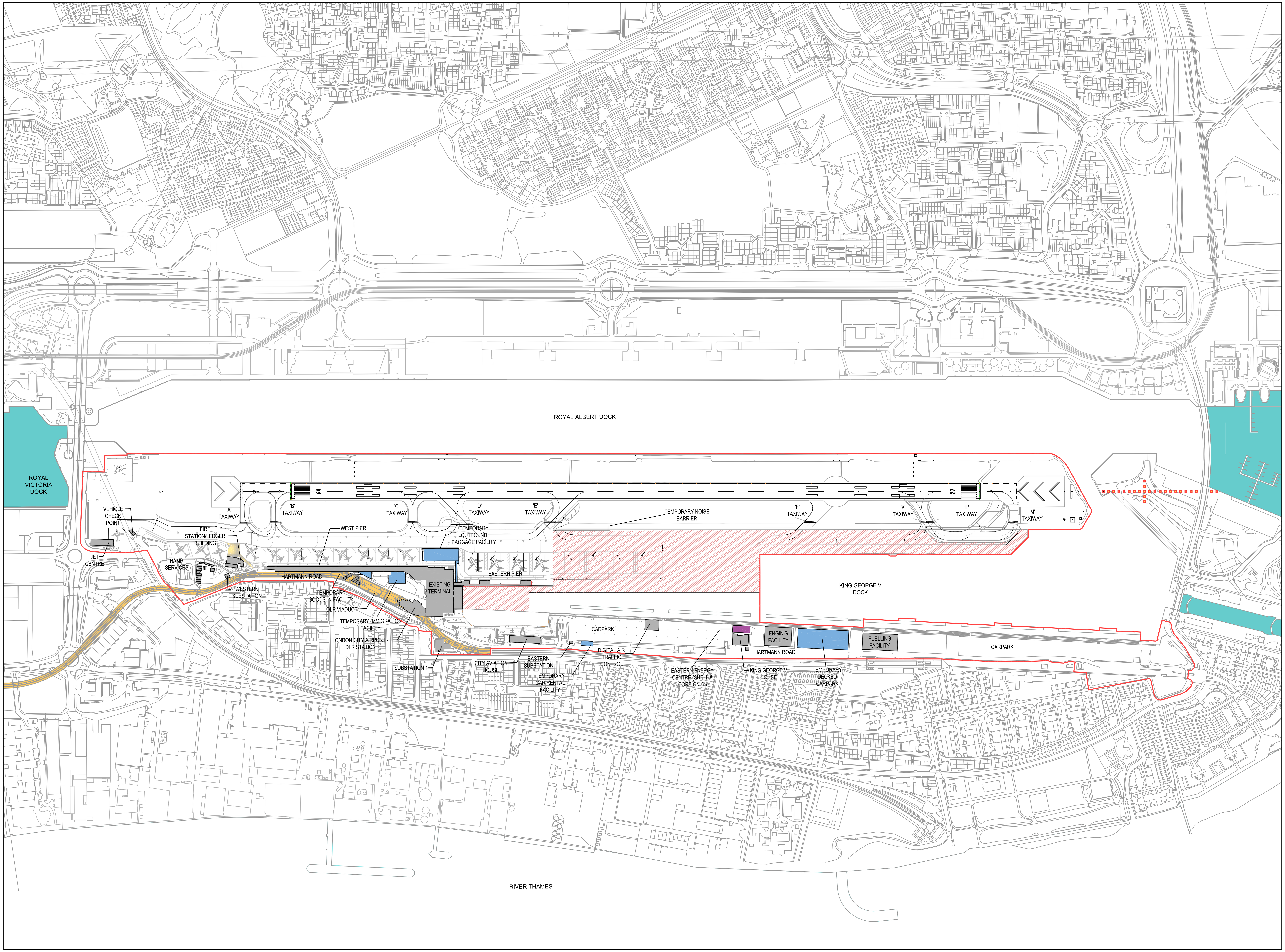


$h = H/2 - h_{land}$
$x = h/\sin 42$
$n = 2h/r$
$w_{land} = (2*w) + f$

$V_{stair} = 2*w*((0.5*r*g*n) + (2*z*x))$
$V_{land} = 2* w_{land} * h_{land} * d_{land}$

Appendix D. 2022 CADP1 Site Plan

None :Model files attached.



1 Existing Site Plan 2022
1:3500

ISO A1 Landscape - Side

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REVISION NOTE:

0 50m 100m 200m
N

LEGEND

- PROPOSED DEVELOPMENT BOUNDARY LINE
- EXISTING DLR VIADUCT
- EXISTING PERMANENT BUILDINGS
- COMPLETED CADP BUILDINGS
- EXISTING TEMPORARY PERMITTED DEVELOPMENT FACILITIES SUBJECT TO SEPARATE APPLICATION
- EXISTING DECK WORKS OVER DOCK

Rev	Drn	Date	Description
-	MN	09.11.22	Issued for Planning

FOR APPROVAL

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Client
LONDON CITY AIRPORT

Project Name
CITY AIRPORT DEVELOPMENT PROGRAMME

Title
1.0B SITE PLAN 2022

Discipline			Project Phase
Architecture			PLANNING
Drawing Originator			Originator's Job No.
Pascall+Watson architects			6772
Checked By	Checked Date	Drawn By	Drawn Date
NC	17.03.2022	TM	17.03.2022
Approved By	Approval Date	Scale	
MN	17.03.2022	1:3500 @ A1	

Building Grid Reference
SITE

Proj. Code	Orig.	Disc.	Zone	Level	Type	Subtype	Drg. Series/No.	Rev.	Status
A400	PAW	A	14	XXX	DR	GA	900-004	-	S2

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