Appendix 11.1: Flood Risk Assessment (FRA)

NEW CITY COURT

Flood Risk Assessment -Addendum

AKT II

3948 New City Court

Flood Risk Assessment

July 2021

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Contents

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E	09.07.2021	Issued for Information
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C	15.04.2021	Issued for Information
B	31.03.2021	2nd Draft Issue
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Approved by:	Michael Duff

1 Introduction

AKT II have been commissioned to undertake a Flood Risk Assessment (FRA) in support of the proposed redevelopment of New City Court, 4-26 St Thomas Street, London, SE1 9RS ('the Site'). This report is intended to cover only flood risk and to provide the guidelines and parameters for the detailed design.

This report has been prepared in accordance with the guidance contained in the National Planning Policy Framework (NPPF) and the accompanying Planning Practice Guidance.

This report was updated and re-submitted in July 2021 to reflect revisions to the detailed design of the proposals since the planning and listed building application submission in April 2021. This latest revision updates the figures and sketches to reflect the revised architectural drawings, but the analysis remains unaffected.

2 The Site

2.1 Site location

The Site is located between St Thomas Street (North); King's Head Yard (South); and occupied retail buildings running along Borough High Street and Guy's hospital Buildings (East). It is located in close proximity to London Bridge station, the Shard and Borough Market. (Fig 2.2)

The Site is currently occupied by office blocks with pedestrian access from St Thomas Street and vehicular access to the building from the carpark located in the south west.

The wider contextual location (Fig 2.3) shows the Site located approximately 180m south of the River Thames and within walking distance to London Bridge station.

The south east corner of the development is bounded by the adjacent nurses' accommodation.

2.2 Site description

The Site is currently occupied by office blocks with pedestrian access from St. Thomas Street and vehicular access to the building from the carpark located on the SW corner, plus a loading bay on St. Thomas Street.

The levels adjacent to the Site boundary range from approximately 4.25m Above Ordnance Datum (AOD), at the north east corner of the Site, to 3.50m AOD at the south east corner of the Site on King's Head Yard / White Hart Yard. The elevation of Borough High Street parallel to the Site on the western side ranges from 5.34m AOD to 4.96m AOD with a slope towards the south. St. Thomas Street to the north ranges from 4.97m AOD to 4.25m AOD with a slope in westerly direction, towards Borough High Street.

For topographical survey information refer to Appendix A.

Figure 2.1 Site Location

Figure 2.2 Aerial image Site Location, London Bridge

Figure 2.3 Wider contextual location of the site

3 Proposed Development

The Site to be redeveloped is located in the London borough of Southwark in the London Bridge area. The Site boundary lies directly along the south side of St. Thomas Street, between the cross roads of London Bridge Street, to the east; and Borough High Street, to the west. It is located adjacent to the Guy's Hospital accommodation and King's College Guy's Campus buildings. The Site is bordered by Kings Head Yard, to the south.

The project comprises the construction of a ≥6-storey building (with mezzanine and two basement levels), adjacent to King's Head Yard, after demolishing the existing New City Court office building.

Keats House, a smaller building located in the northeast corner, will be reconstructed with a new internal structure intended to reflect the Venetian style of its facade. The existing Keats House front facade is to be relocated by approximately 6m to the West to allow for space for a servicing access.

The whole expansion of the existing level of basement and the construction of a second level across the Site is proposed, to accommodate extensive cycle parking in addition to servicing and plantrooms.

Additionally the proposed development will provide office floorspace, flexible office/retail floorspace, restaurant/café floorspace and a public rooftop garden, associated public realm and highways improvements, provision for a new access to the Borough High Street entrance to the Underground Station, cycling parking, car parking, service, refuse and plant areas, and all ancillary or associated works.

Finally, the project proposes to retain and refurbish the existing terrace houses located along St. Thomas Street (no. 4 to 16), following special requirements for listed buildings (Grade II).

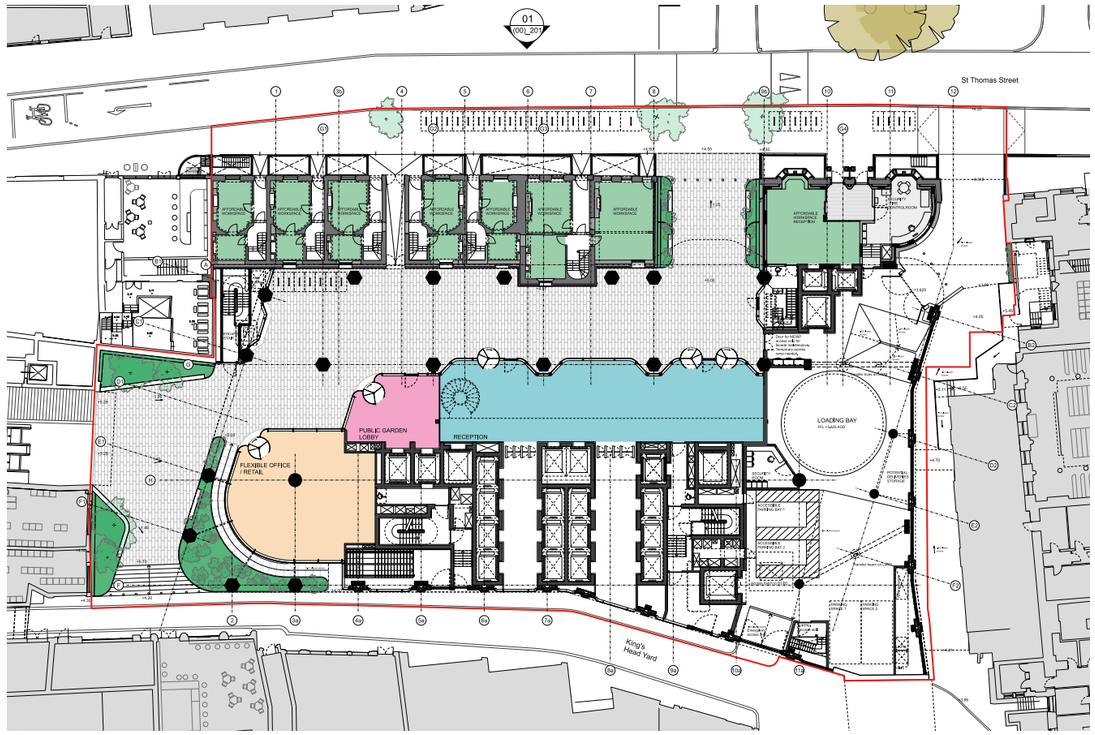


Figure 3.1 New City Court, Proposed Ground Floor Layout

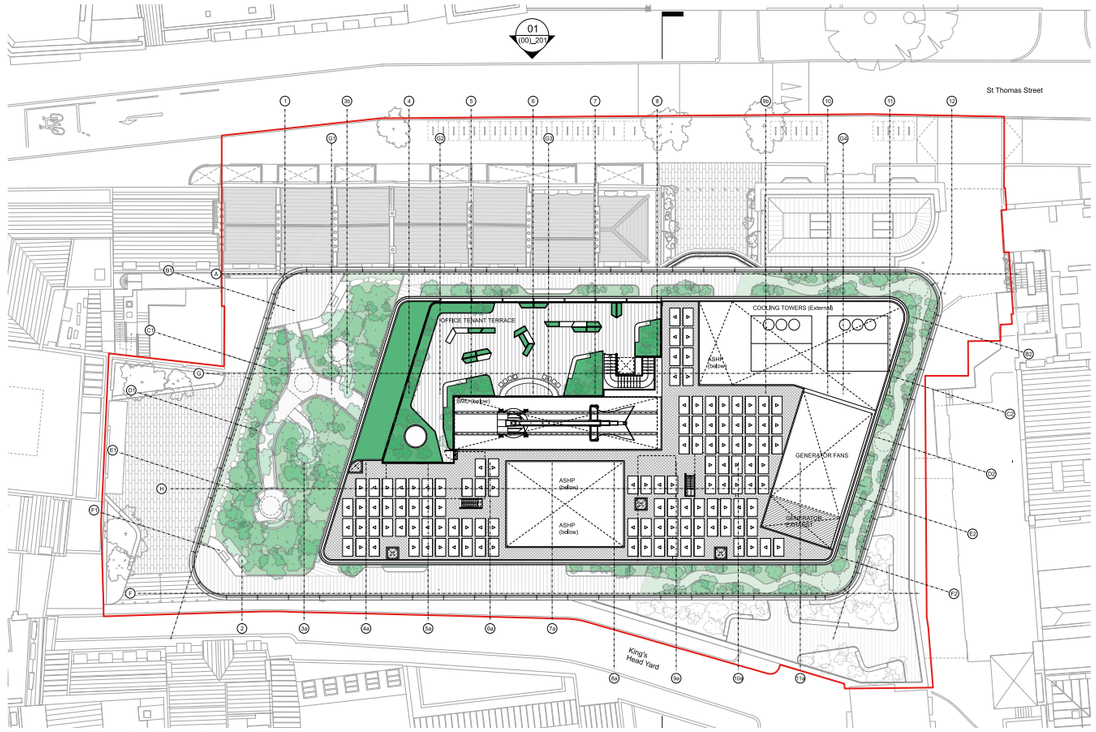


Figure 3.2 New City Court, Proposed Roof Layout

4 Requirements of National Planning Policy Framework and Local Policies

4.1 Summary

The NPPF has recently superseded the Planning Policy Statement 25 "Development and Flood Risk" (PPS 25) although the requirements and goals remain essentially the same:

- The susceptibility of land to flooding is a material planning consideration;
- The Environment Agency has the lead role in providing advice on flood issues, at a strategic level and in relation to planning applications;
- Planning decisions should apply the precautionary principle to the issue of flood risk, using a risk-based search sequence to avoid inappropriate development on undeveloped and undefended flood plains etc;
- Developers should fund flood defences and warning measures required because of the development;
- Planning policies and decisions should recognise that the consideration of flood risk and its management needs to be applied on a whole-catchment basis and not only be restricted to flood plains.

With regard to the NPPF, those proposing particular developments are responsible for:

- Providing an assessment of whether any proposed development is likely to be affected by flooding and whether it will increase flood risk elsewhere and the measures proposed to deal with these effects and risks and;
- Satisfying the local planning authority that any flood risk to the development or additional risk arising from the proposal will be successfully managed with the minimum environmental effect thus ensuring the safe development and secure future occupancy of the site.

After this has been addressed, it is then the local planning authority's responsibility (advised as necessary by the Environment Agency) to determine an application for planning permission after taking into account all material considerations, including the issue of flood risk and how it might be managed or mitigated. Local planning authorities are required to adopt a risk-based approach to proposals for development in flood risk areas. The assessment of risk should take into account:

- The area liable to flooding;
- The probability of it occurring, both now and over time;
- The extent and standard of existing flood defences and their effectiveness over time;
- The likely depth of flooding;
- The rates of flow likely to be involved; and
- The nature of the development proposed and the extent to which it is designed to deal with flood risk.

Local planning authorities in conjunction with the Environment Agency are responsible for determining that the threat of flooding should be managed. This is to ensure that the development is and remains safe throughout its lifetime (i.e. it has an appropriate degree of protection) and does not increase flood risk elsewhere.

Following flooding in December 2000 the Environment Agency (EA) provided indicative flood plain maps to all authorities and published them on the EA website. In addition to these indicative maps (following a national programme adopted by the EA in 1996), detailed data and maps for priority areas at risk are available, to provide precise information for building developments.

The Government looks to local planning authorities under the NPPF to apply the risk-based approach to their decisions on development control through a sequential test. Under the test, sites are to be categorised under the following zones.

1. Areas with little or no potential risk of flooding (annual probability less than 0.1% for rivers, tidal & coastal). These areas would have no constraints on development other than the need to ensure that the development does not increase run-off from the site to greater than that from the site in its undeveloped or presently developed state. For development proposals on sites located within Flood Zone 1 comprising one hectare or above the vulnerability to flooding from other sources as well as from river and the sea flooding, and the potential to increase flood risk elsewhere through the addition of hard surfaces and the effect of the new development on surface water run-off, should be incorporated in a FRA.
2. Areas with low potential risk of flooding (annual probability between 1.0% - 0.1% for rivers and between 0.5% - 0.1% for tidal & coastal). These areas would be suitable for most developments.

3a. Areas with high potential risk of flooding (annual probability greater than 1.0% for rivers and greater than 0.5% for tidal & coastal). These areas will generally be suitable for "Less Vulnerable" uses such as commercial, retail and industrial uses, provided there are adequate flood defences in place, that ensure buildings are designed to resist flooding, there are suitable warning and evacuation procedures in place and the new development does not add to flood risk downstream. "More Vulnerable" uses such as residential, health and education will require the Exception Test to be passed.

3b. Areas at highest risk from flooding (including those areas behind defences that offer a standard of defence less than 1% for rivers and less than 0.5% for tidal & coastal or where there is a significant risk that failure could lead to rapid inundation by fast flowing water). These areas may be suitable for recreation, sport and conservation use.

4.2 Local Policies

The London Plan 2021

Policy SI 12 Flood Risk Management

- Current and expected flood risk from all sources (as defined in paragraph 9.2.12) across London should be managed in a sustainable and cost-effective way in collaboration with the Environment Agency, the Lead Local FloodAuthorities, developers and infrastructure providers.
- Development Plans should use the Mayor's Regional Flood Risk Appraisal and their Strategic Flood Risk Assessment as well as Local Flood Risk Management Strategies, where necessary, to identify areas where particular and cumulative flood risk issues exist and develop actions and policy approaches aimed at reducing these risks. Boroughs should cooperate and jointly address cross-boundary flood risk issues including with authorities outside London.
- Development proposals should ensure that flood risk is minimised and mitigated, and that residual risk is addressed. This should include, where possible, making space for water and aiming for development to be set back from the banks of watercourses.
- Developments Plans and development proposals should contribute to the delivery of the measures set out in Thames Estuary 2100 Plan. The Mayor will work with the Environment Agency and relevant local planning authorities, including authorities outside London, to safeguard an appropriate location for a new Thames Barrier.
- Development proposals for utility services should be designed to remain operational under flood conditions and buildings should be designed for quick recovery following a flood.
- Development proposals adjacent to flood defences will be required to protect the integrity of flood defences and allow access for future maintenance and upgrading. Unless exceptional circumstances are demonstrated for not doing so, development proposals should be set back from flood defences to allow for any foreseeable future maintenance and upgrades in a sustainable and cost-effective way.
- Natural flood management methods should be employed in development proposals due to their multiple benefits including increasing flood storage and creating recreational areas and habitat.

Policy SI 13 Sustainable drainage

- Lead Local Flood Authorities should identify – through their Local Flood Risk Management Strategies and Surface Water Management Plans – areas where there are particular surface water management issues and aim to reduce these risks. Increases in surface water run-off outside these areas also need to be identified and addressed.
- Development proposals should aim to achieve greenfield run-off rates and ensure that surface water run-off is managed as close to its source as possible. There should also be a preference for green over grey features, in line with the following drainage hierarchy:

1) rainwater use as a resource (for example rainwater harvesting, blue roofs for irrigation)

2) rainwater infiltration to ground at or close to source

3) rainwater attenuation in green infrastructure features for gradual release (for example green roofs, rain gardens)

4) rainwater discharge direct to a watercourse (unless not appropriate)

5) controlled rainwater discharge to a surface water sewer or drain

6) controlled rainwater discharge to a combined sewer.

- Development proposals for impermeable surfacing should normally be resisted unless they can be shown to be unavoidable, including on small surfaces such as front gardens and driveways.
- Drainage should be designed and implemented in ways that promote multiple benefits including increased water use efficiency, improved water quality, and enhanced biodiversity, urban greening, amenity and recreation.

Southwark's Sustainable Design Supplementary Planning Document

Section 9.3 outlines the requirements of sustainable drainage systems (SuDS) in order to manage flood risk through the borough.

5 Strategic Flood Risk Assessments

Strategic Flood Risk Assessments (SFRA) are produced by Local Authorities in order to form the basis for preparing appropriate policies for flood risk management. The EA advise that Developers "should consult the Strategic Flood Risk Assessment prepared by your local planning authority" when preparing their design.

The site has been the subject of to the London Borough of Southwark (LBS) Strategic Flood Risk Assessment updated January 2017. The key findings and recommendations from this report relating to the development site are summarised in the following section and have been used to inform the preparation of this site-specific Flood Risk Assessment.

5.1 Summary

LBS commissioned Conway | AECOM to undertake the January 2017 SFRA to update the previous February 2008 SFRA utilising the new datasets that have become available in the interim. The key recommendation / conclusions that impact the proposed development area are as follows:

- The main source of flood risk in Southwark is as a result of tidal activity within the River Thames. However, the Borough is currently protected by the Thames Tidal Defences up to the 1 in 1000 year event.
- LBS should ensure the Sequential Test is undertaken for all strategic land allocations to reduce flood risk to the allocation and ensure that the vulnerability classification of the proposed land use is appropriate to the Flood Zone classification. The Sequential and Exception Tests requirements are given in greater detail in Section 6.1. of this report.
- If development is to be constructed with less vulnerable uses on the ground level, covenants need to be put in place to prevent future alteration of these areas to 'more vulnerable' uses without further consideration of the associated flood risk.
- Basement dwellings are classified as highly vulnerable developments and should not be permitted in Flood Zone 3. Basement access threshold levels should be raised above the 1 in 100 year flood level with climate change, and all basements must include provision of internal staircases to upper floors. Flood resilient construction techniques should be employed and consideration given to all forms of flood risk. See Section 6.1 for a Sequential Test confirming that the proposed basement is acceptable in Flood Zone 3a.
- All developments in the Borough will be required to incorporate Sustainable urban Drainage Systems (SuDS) to reduce both the volume and speed of surface water run-off unless there are practical reasons for not doing so.
- The underlying geology within Southwark is likely to impose constraints on the implementation of infiltration SuDS in many areas across the Borough. This is likely to necessitate the installation of tanked systems (not allowing infiltration into the ground)to provide attenuation and reduction of runoff rates, requiring reuse of runoff or discharge to local surface water bodies or drainage systems.
- Developments will be expected to achieve greenfield run-off rates and at least 50% attenuation of undeveloped site's surface water run-off at peak times, and where possible to achieve 100% attenuation.

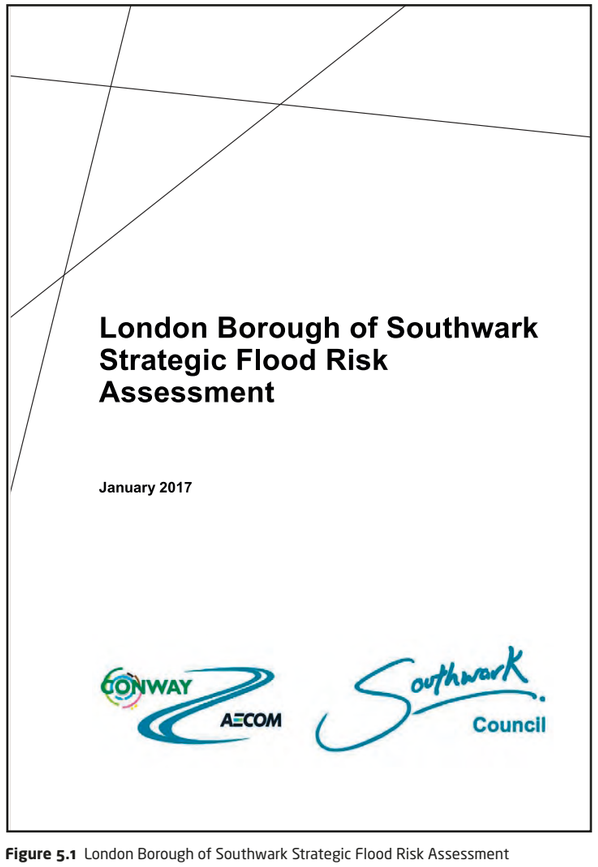


Figure 5.1 London Borough of Southwark Strategic Flood Risk Assessment

6 Sources of Flooding

In accordance with the NPPF, it is a requirement to assess the flood risk to the site from all potential sources. For the purposes of this assessment this has been broken down into five potential sources:

- Flooding from rivers and sea
- Flooding from sewers
- Flooding from groundwater
- Flooding from artificial sources (e.g. reservoirs and canals)
- Flooding from surface water

These sources are discussed and assessed in more detail in Sections 6.2 to 6.7 below.

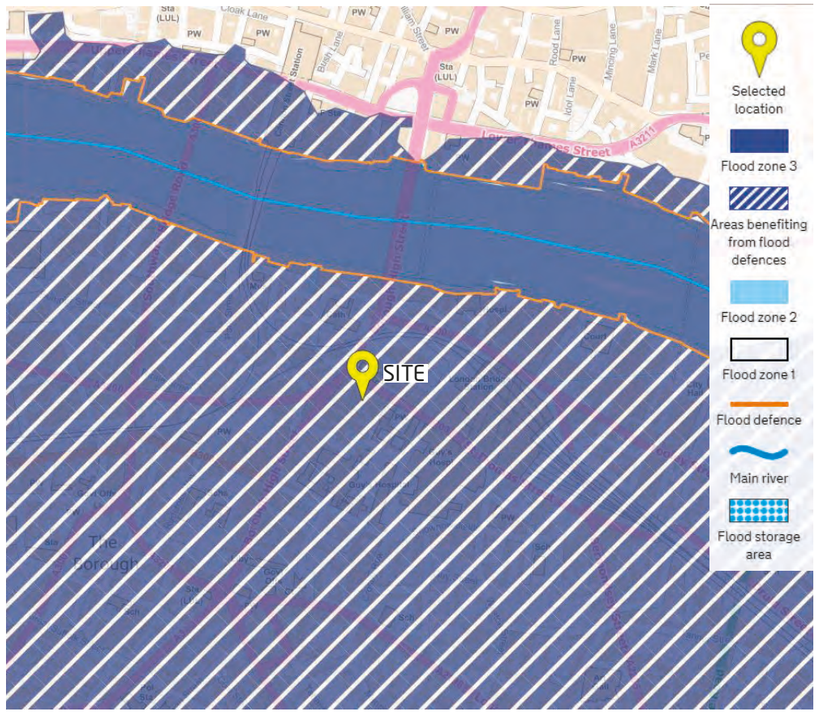


Figure 6.1 Environment Agency Flood Map for Planning (Rivers and Sea)

6.1 Sequential Test

A risk-based Sequential test should be applied at all stages of the planning process. It's aim is to steer developments to areas at the lowest probability of flooding (i.e. to Flood Zone 1).

Based on the Environment Agency's "Flood Map for Planning (Rivers and Sea)" (refer to Figure 6.1), the site is located within Flood Zone 3a - an area assessed as having a 1 in 100 or greater annual probability of river flooding (>1%) or a 1 in 200 or greater annual probability of flooding from the sea (>0.5%). However, the site benefits from the presence of flood defences along the River Thames. According to the Environment Agency Product 4 data (see Appendix E), The Thames Barrier and associated defence system has a 1 in 1000 year standard which means it ensures that flood risk is managed up to an event that has 0.1% annual probability. This is also confirmed by the Thames Estuary 2100 (2012) report.

The proposed development (including 2 levels of basement) comprises predominantly of office use, including retail and public areas. In accordance with NPPF Table 2 (reproduced below), these are classified as a **"less vulnerable" uses**.

Referring to NPPF Table 3 (reproduced below) "less vulnerable" land uses are suitable in Flood Zones 1, 2 and 3a. As the development is classified as "less vulnerable" and being within Zone 3a, the **Exception Test is not required** for this development.

Flood Risk vulnerability classification (see Table 2)		Essential Infrastructure	Water Compatible	Highly Vulnerable	More Vulnerable	Less Vulnerable
Flood Zone (see table 1)	Zone 1	✓	✓	✓	✓	✓
	Zone 2	✓	✓	Exception Test required	✓	✓
	Zone 3a	Exception Test required	✓	✗	Exception Test required	✓
	Zone 3b functional floodplain	Exception Test required	✓	✗	✗	✗

National Planning Policy Framework: Table 3 - Flood Risk Vulnerability and Flood Zone "Compatibility"

Essential infrastructure
- Essential transport infrastructure (including mass evacuation routes) which has to cross the area at risk.
- Essential utility infrastructure which has to be located in a flood risk area for operational reasons, including electricity generating power stations and grid and primary substations; and water treatment works that need to remain operational in times of flood.
- Wind turbines.

Highly vulnerable
- Police stations, ambulance stations and fire stations and command centres and telecommunications installations required to be operational during flooding.
- Emergency dispersal points.
- Basement dwellings.
- Caravans, mobile homes and park homes intended for permanent residential use.
- Installations requiring hazardous substances consent (Where there is a demonstrable need to locate such installations for bulk storage of materials with port or other similar facilities, or such installations with energy infrastructure or carbon capture and storage installations, that require coastal or water-side locations, or need to be located in other high flood risk areas, in these instances the facilities should be classified as "essential infrastructure").

More vulnerable
- Hospitals.
- Residential institutions such as residential care homes, children's homes, social services homes, prisons and hostels.
- Buildings used for dwelling houses, student halls of residence, drinking establishments, nightclubs and hotels.
- Non-residential uses for health services, nurseries and educational establishments.
- Landfill and sites used for waste management facilities for hazardous waste.
- Sites used for holiday or short-let caravans and camping, *subject to a specific warning and evacuation plan.*

Less vulnerable
- Police, ambulance and fire stations which are not required to be operational during flooding.
- Buildings used for shops, financial, professional and other services, restaurants and cafes, hot food takeaways, offices, general industry, storage and distribution, non-residential institutions not included in "more vulnerable", and assembly and leisure.
- Land and buildings used for agriculture and forestry.
- Waste treatment (except landfill and hazardous waste facilities).
- Minerals working and processing (except for sand and gravel working).
- Water treatment works which do not need to remain operational during times of flood.
- Sewage treatment works (if adequate measures to control pollution and manage sewage during flooding events are in place).

Water-compatible development
- Flood control infrastructure.
- Water transmission infrastructure and pumping stations.
- Sewage transmission infrastructure and pumping stations.
- Sand and gravel working.
- Docks, marinas and wharves.
- Navigation facilities.
- Ministry of Defence defence installations.
- Ship building, repairing and dismantling, dockside fish processing and refrigeration and compatible activities requiring a waterside location.
- Water-based recreation (excluding sleeping accommodation).
- Lifeguard and coastguard stations.
- Amenity open space, nature conservation and biodiversity, outdoor sports and recreation and essential facilities such as changing rooms.
- Essential ancillary sleeping or residential accommodation for staff required by uses in this category, *subject to a specific warning and evacuation plan.*

National Planning Policy Framework: Table 2 - Flood Risk Vulnerability Classification

6.2 Flooding from Rivers and Sea

Fluvial flooding is caused by rivers, watercourses or ditches overflowing. Tidal flooding is caused by elevated sea levels or overtopping by wave action. In estuarine areas such as London, flooding might arise from either fluvial or tidal flooding, or a combination of the two.

Based on the Environment Agency's "Flood Risk from Rivers or the Sea" (refer to Figure 6.2), the site is at very low risk - an area assessed as having less than 0.1% annual probability (1 in 1000 annual probability) of river or sea flooding.

The EA data contained in Appendix E confirms that the flood defences in the area are maintained in good condition.

The Southwark SFRA also confirms that the flood defences in the area are maintained in good condition and are therefore unlikely to fail.

Using all the available evidence it is therefore considered that the site has **a very low probability of flooding from fluvial and tidal sources.**

There is a residual risk to the development from a potential breach in the River Thames flood defences. The risk associated with the breach is discussed further in Section 7.

6.3 Flooding from Sewers

Sewer and highway drainage flooding occurs when the capacity of systems are exceeded, or the function of the system is impeded (e.g. tide locking), which results in surcharging of the system and water being forced to the surface via gullies, manholes, foul water appliances such as toilets or other dedicated overflows.

The available Thames Water record plan (Figure 6.3 below) indicates that there are a number of large combined public sewers in the vicinity of the site. As all the drainage infrastructure in the area is combined, the consequences of sewer flooding may be high due to the limited inflow capacity of road drains in the event of an extreme storm. This may be worsened by blocked drains or gullies. However, the SFRA indicates that the Borough's drainage infrastructure is regularly cleaned and maintained.

Map A2 in Appendix B - 'Flooding History' in the Southwark SFRA indicates that there has been a 'localised flooding incident' close to the site. However as a more detailed check, a Sewer Flooding History Enquiry has been lodged with Thames Water who have confirmed that there is no recorded history of sewer flooding at the site (refer to Appendix C).

Using all the available evidence it is therefore considered that the site has **a low probability of flooding from sewers and the local drainage network**, as long as they continue to be adequately maintained in the future.

6.4 Flooding from Groundwater

Groundwater flooding is caused by the emergence of water originating from sub-surface permeable strata and is often highly localised and complex. After a prolonged period of rainfall, a considerable rise in the water table can result in inundation for extended periods of time.

MAp A5 in Appendix B - 'Areas at Risk of Flooding from Groundwater' in the Southwark SFRA confirms that the site is located within an area with potential for groundwater flooding of property situated below ground level.

Desktop studies carried out by AKT II confirms that perched groundwater is likely to be encountered during the basement construction. The groundwater in the site is expected to be relatively shallow. It is therefore recommended that in the construction of the proposed basement, suitable protection should be offered via an appropriate waterproofing strategy as a precaution. Refer to Appendix D for an extract from the desktop study.

Based on this evidence, we believe that the site is at **low risk of flooding from groundwater sources** if an appropriate waterproofing strategy is implemented.

6.5 Flooding from Artificial Sources

Where infrastructure retains, transmits or controls the flow of water; flooding may result if there is a structural, hydraulic, geotechnical or mechanical failure of the infrastructure.

The Thames Water Water Asset Map (Fig. 6.4) indicates that there are 800mm dia. trunk and 250mm dia. distribution mains running parallel to the development area in St. Thomas Street which both then turn into Borough High Street and increase in diameter to 900mm and 300mm, respectively. Additionally a 180mm dia. distribution main is located south of the site in King's Head Yard. Although unlikely, a water main can burst at anytime which can result in the flooding of nearby properties.

Thames Water are currently replacing the Victorian water mains across London which will reduce the probability of water mains bursting and therefore reduce the risk of flooding to the development.

The topography of the surrounding roads suggest that flooding due to any burst would continue to flow southward along Borough High Street and westward along St. Thomas Street rather than entering the site. The surface water flooding assessment in Section 6.6 below further reinforces this conclusion.

To further reduce the flood risk from water mains, any initial sign of a burst water main should be reported to Thames Water as soon as possible and the local highway drainage system should be adequately maintained.

There are no artificial sources which could cause flooding in the immediate vicinity of the site. Figure 6.5 shows the Environment Agency's Flood Map for Reservoirs which indicates that the site is not at risk from flooding associated with reservoirs or artificial sources.

Based on this information it is therefore considered that the site is at **low risk of flooding from artificial sources**.

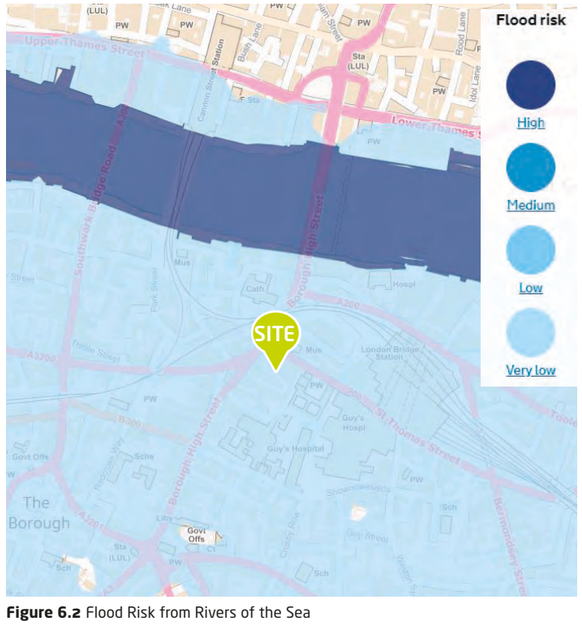


Figure 6.2 Flood Risk from Rivers of the Sea

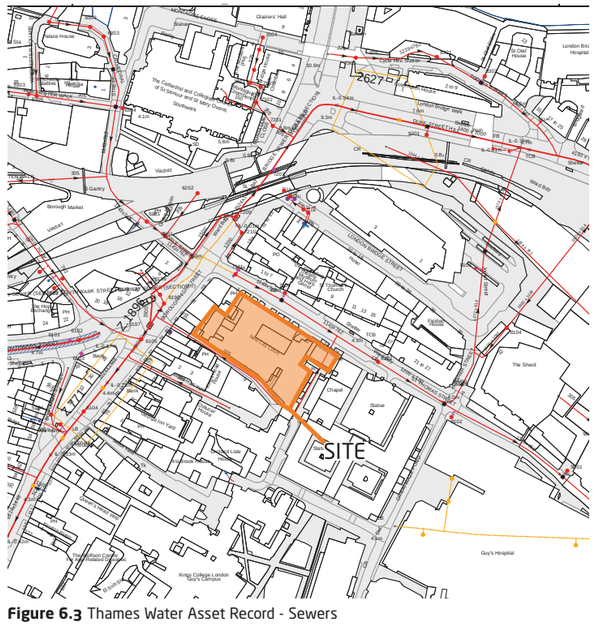


Figure 6.3 Thames Water Asset Record - Sewers

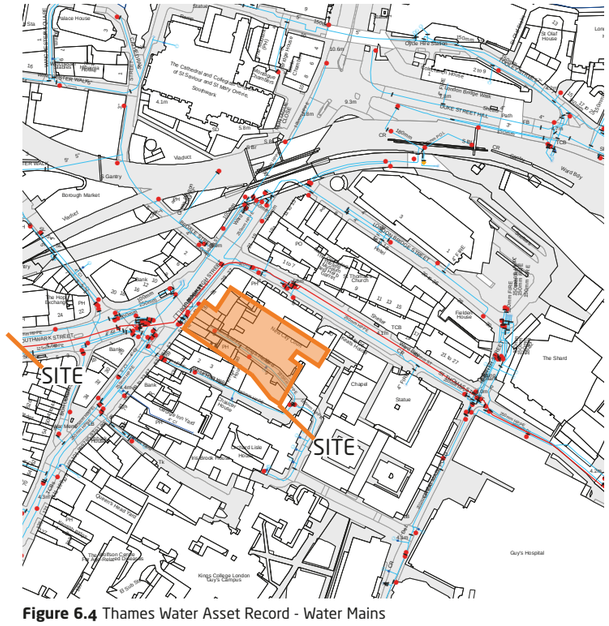


Figure 6.4 Thames Water Asset Record - Water Mains

Figure 6.5 Environment Agency Flood Map - Reservoirs

6.6 Flooding from Surface Water

Surface water flooding can occur as a result of either overland flow or ponding. Overland flow occurs following heavy or prolonged rainfall, snow melt, or where intense rainfall is unable to soak into the ground or enter drainage systems due to blockages or capacity issues. Unless it is channelled elsewhere, the run-off travels overland, following the gradient of the land. Ponding occurs as the overland flow reaches low lying areas in the local topography. These flood events tend to have a short duration and depend on a number of factors such as geology, topography, rainfall, saturation, extent of urbanisation and vegetation.

As the surrounding area is highly developed it entirely comprises of impermeable hardstanding area which, during high intensity storms, will generate large surface water runoff flows. Map A4 'Flood Map for Surface Water' of the SFRA (Appendix B) shows that the site is located within an area identified as a Critical Drainage Area and the site appears to be located within an area identified as a low to medium risk of flooding (between 1 in 100 years and 1 in 1000 years).

The Environment Agency's Risk of Flooding from Surface Water map indicates that the central part of the site is at medium risk of surface water flooding but the surrounding roads have a very low to high risk of flooding.

The Environment Agency provide further maps which break down this flooding into probabilities ranging from "High" to "Very Low" risk of occurring where "High" is a greater than 1 in 30 (3.3%) chance of occurring, "Medium" is a between 1 in 30 (3.3%) and 1 in 100 (1%) chance of occurring, "Low" is a between 1 in 100 (1%) and 1 in 1000 (0.1%) chance of occurring and "Very Low" is a less than 1 in 1000 (0.1%) chance of occurring. Refer to Figure 6.13 for the Flood Risk from Surface Water map.

- The "High" probability maps in Figs. 6.6 & 6.7 indicate that there is a potential for small patch of slow moving water on King's Head Yard south east of the site. (less than 300mm deep and less than 0.25 m/s).
- The "Medium" probability maps in Figs. 6.8 & 6.9 show localised flooding on the site which occurs in the internal courtyard. This courtyard will be remodelled and adequate drainage provision proposed in the new scheme to mitigate this risk. The extent of flooding on King's Head Yard is larger in plan and exceeds 300mm in depth with the velocity more than 0.25m/s.
- The "Low" probability maps in Figs. 6.10 and 6.11 show further increase in flooding on the surrounding roads with potential for a small patch of water extending onto the south east corner of the site. There is also surface water flooding alongside the eastern site boundary which appears to be associated with the existing lightwell. This lightwell will be removed in the proposed scheme to mitigate this risk.

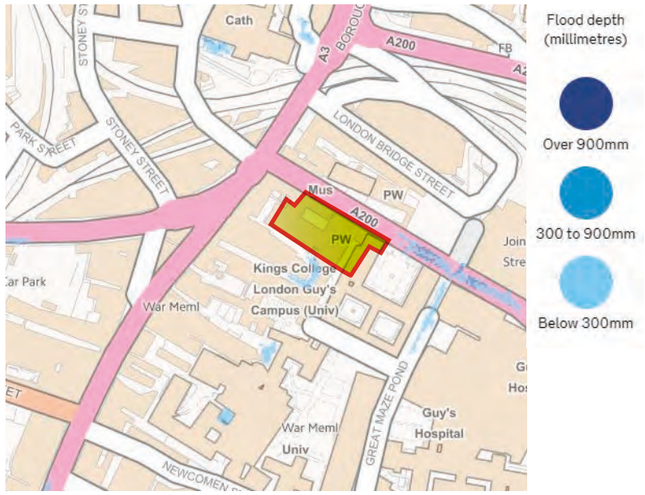


Figure 6.6 Environment Agency's Flooding from Surface Water Map (High Probability - Depth)

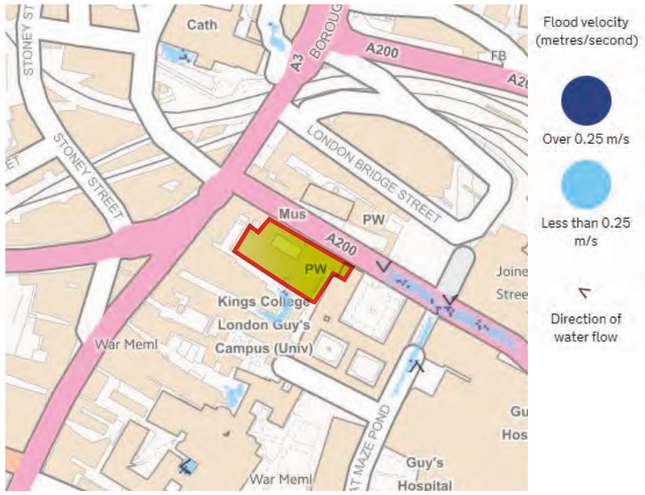


Figure 6.7 Environment Agency's Flooding from Surface Water Map (High Probability - Velocity)

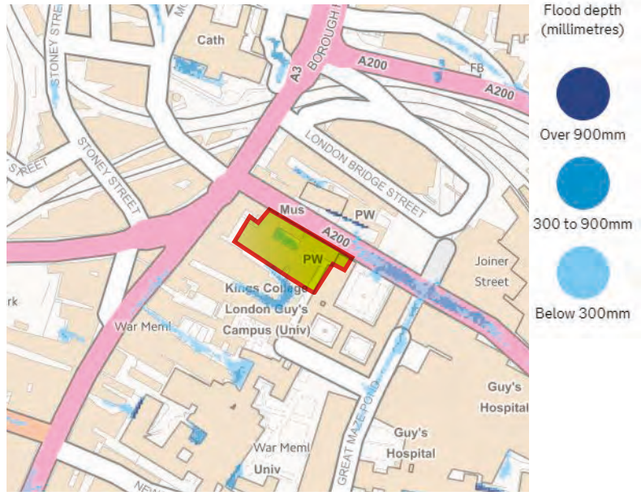


Figure 6.8 Environment Agency's Flooding from Surface Water Map (Medium Probability - Depth)

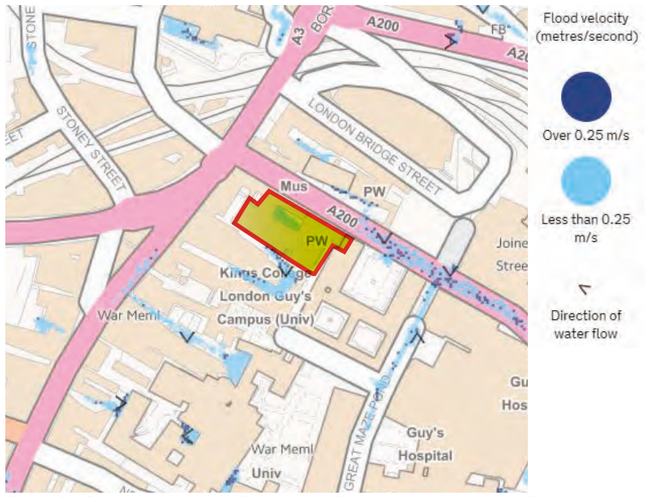


Figure 6.9 Environment Agency's Flooding from Surface Water Map (Medium Probability - Velocity)

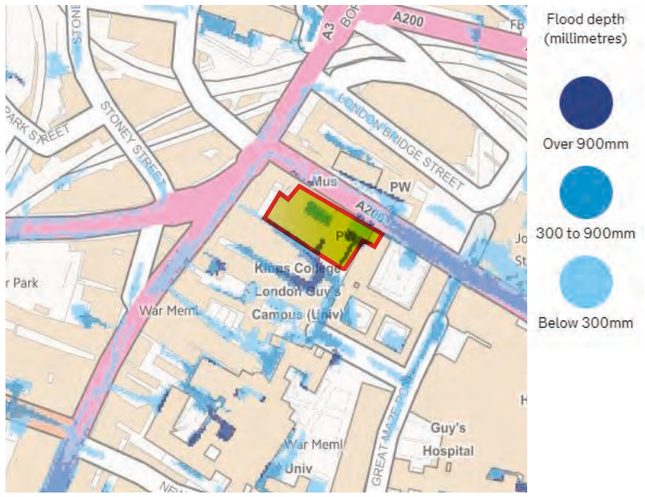


Figure 6.10 Environment Agency's Flooding from Surface Water Map (Low Probability - Depth)

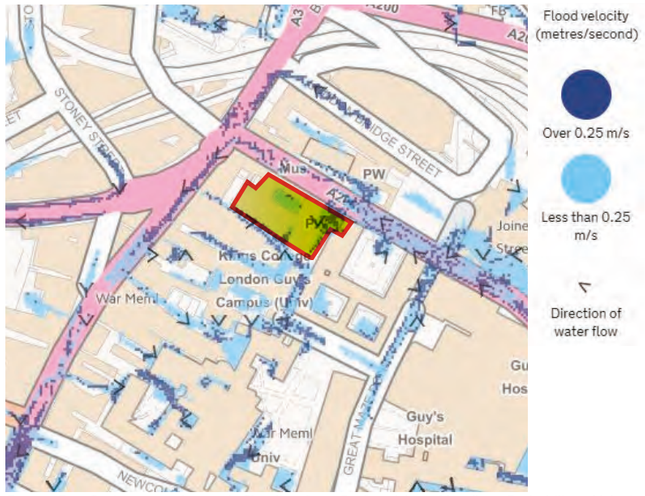


Figure 6.11 Environment Agency's Flooding from Surface Water Map (Low Probability - Velocity)

Small patch of water is evident on St. Thomas Street, however, it is believed to be associated with existing lightwells as the extent of surface water flooding on the adjacent highway does not appear to be as severe. The main risk to the development is from King's Head Yard where the surface water flooding exceeds a depth of 900mm with a velocity greater than 0.25m/s.

In summary, the flooding associated with the existing internal courtyard and the eastern lightwell will be mitigated by re-modelling & removing them in the proposed scheme.

There is a risk of surface water flooding from the low point in levels on King's Head Yard. It is recommended that temporary flood barriers or permanent flood resilient doors included within the design of the building entrances in order to prevent flood water entering the property and causing damage. Refer to sketch CSK-004 in Appendix F for the proposed flood mitigation measures.

Given that surface water flooding is not easily predicted and occurs rapidly and in a short time frame from short peak rainfall events, we would recommend that the flood protection to Kings Head Yard is provided by flood resilient doors which will in the main be closed when the buildings in not in use/overnight and which could be closed quickly in the event of intense periods of heavy rainfall and evidence of water level rising in the external carriageway areas.

New vehicular access from St. Thomas Street into the loading bay will retain the existing levels at the back of footpath which would keep the development safe from the surface water flooding seen to the east of the vehicular access in St Thomas Street.

It is considered that implementation of the above measures will reduce the risk from the surface water flooding to low.

6.6.1 Safe Access

The occupiers could safely remain in the buildings during any flood in the surrounding area without endangering themselves.

In the event that occupiers do wish to leave the site during flood events, the EA and Defra published FD2321/TR2 "Flood Risks to People" in March 2006. Guidance Note 2, Figure 6.12 provides details on combinations of flood depth and velocities that cause danger to people. This table shows that people can become endangered in shallow but fast moving water through to still but deep water (refer to Fig. 6.12).

From the Environment Agency Surface Water Flooding Maps discussed above, the maximum depth of water could potentially exceed 900mm in King's Head Yard to the south. However, the area on St Thomas Street is subject to shallow flood water which is less than 300mm deep and over 0.25 m/sec. According to Figure 6.12 this situation does present a very low hazard to people so the occupiers could exit the building on this elevation and walk westward in order to reach dry ground on Borough High Street or Bedale Street. This route is indicated in Figure 6.13 for reference.

In addition to the escape route, Map A9 of the Southwark SFRA contained in Appendix B confirms that the site is located within a **Flood Warning / Flood Alert area** meaning that occupiers would be given advance warning by the building management team of potential flood events and therefore could choose their escape route prior to the event.

Velocity (m/s) \ Depth (m)	0.05	0.10	0.20	0.25	0.30	0.40	0.50	0.6	0.75	0.80	1.00	1.25	1.50	1.75	2.00	2.25	2.50
0.00	0.53	0.55	0.60	0.63	1.15	1.20	1.25	1.30	1.38	1.40	1.45	1.50	1.63	1.75	1.88	2.00	2.13
0.10	0.53	0.56	0.62	0.65	1.18	1.24	1.30	1.36	1.45	1.48	1.54	1.60	1.75	1.90	2.05	2.20	2.35
0.30	0.54	0.58	0.66	0.70	1.24	1.32	1.40	1.48	1.60	1.64	1.72	1.80	2.00	2.20	2.40	2.60	2.80
0.50	0.55	0.60	0.70	0.75	1.30	1.40	1.50	1.60	1.75	1.80	1.90	2.00	2.25	2.50	2.75	3.00	3.25
0.75	0.56	0.63	0.75	0.81	1.38	1.50	1.63	1.75	1.94	2.00	2.13	2.25	2.56	2.88	3.19	3.50	3.81
1.00	0.58	0.65	0.80	0.88	1.45	1.60	1.75	1.90	2.13	2.20	2.35	2.50	2.88	3.25	3.63	4.00	4.38
1.50	0.60	0.70	0.90	1.00	1.60	1.80	2.00	2.20	2.50	2.60	2.80	3.00	3.50	4.00	4.50	5.00	5.50
2.00	0.63	0.75	1.00	1.13	1.75	2.00	2.25	2.50	2.88	3.00	3.25	3.50	4.13	4.75	5.38	6.00	6.63
2.50	0.65	0.80	1.10	1.25	1.90	2.20	2.50	2.80	3.25	3.40	3.70	4.00	4.75	5.50	6.25	7.00	7.75
3.00	0.68	0.85	1.20	1.38	2.05	2.40	2.75	3.10	3.63	3.80	4.15	4.50	5.38	6.25	7.13	8.00	8.88
3.50	0.70	0.90	1.30	1.50	2.20	2.60	3.00	3.40	4.00	4.20	4.60	5.00	6.00	7.00	8.00	9.00	10.00
4.00	0.73	0.95	1.40	1.63	2.35	2.80	3.25	3.70	4.38	4.60	5.05	5.50	6.63	7.75	8.88	10.00	11.13
4.50	0.75	1.00	1.50	1.75	2.50	3.00	3.50	4.00	4.75	5.00	5.50	6.00	7.25	8.50	9.75	11.00	12.25
5.00	0.78	1.05	1.60	1.88	2.65	3.20	3.75	4.30	5.13	5.40	5.95	6.50	7.88	9.25	10.63	12.00	13.38

Flood Hazard Rating (HR)	Colour Code	Hazard to People Classification
< 0.75		Very low hazard - Caution
0.75 to 1.25		Danger for some – includes children, the elderly and the infirm
1.25 to 2.00		Danger for most – includes the general public
> 2.00		Danger for all – includes the emergency services

Figure 6.12 FD2321/TR2 "Flood Risk to People" Extract

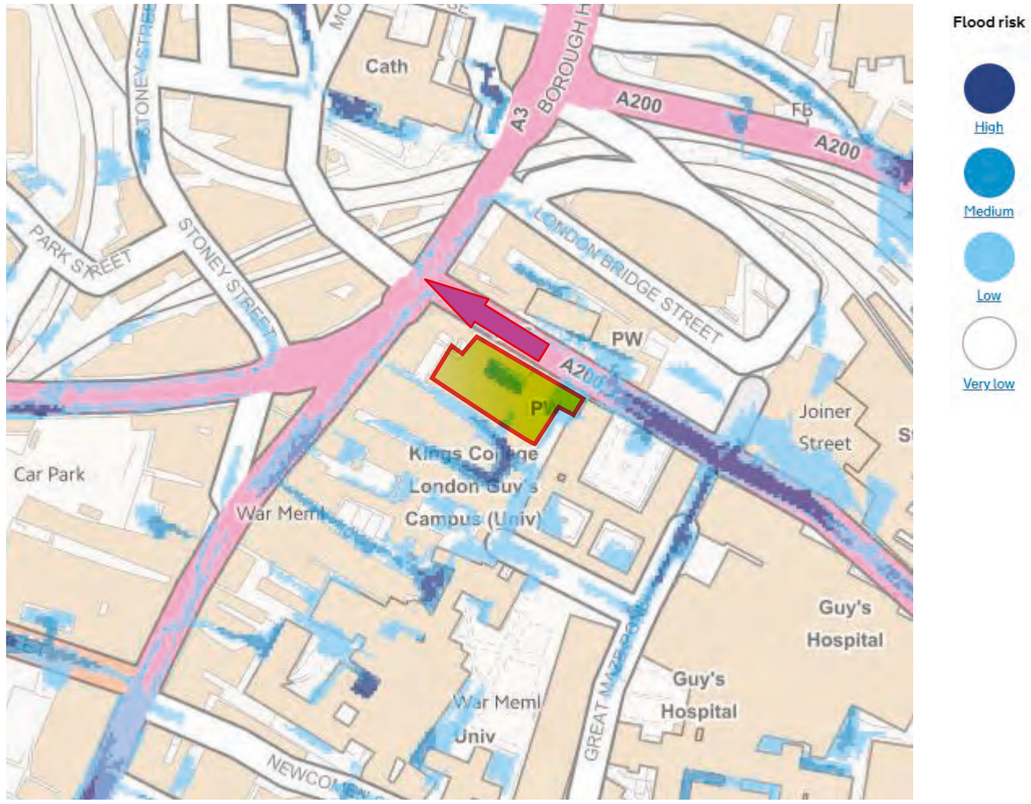


Figure 6.13 Safe access route

7 EA Breach Modelling

7.1 Thames Tidal Breach Modelling

The Environment Agency have provided the modelled flood extents from their 'Thames Tidal Upriver Breach Inundation Modelling Study 2017' completed by Atkins Ltd in May 2017. Those levels are based upon the Thames defences being breached.

The modelled breach extent in Figure 7.1 and Table 1 confirm that the site is impacted by the breach of the flood defences and the resulting maximum flood level is 4.75m for Epoch 2100. The site is not impacted by the Epoch 2014 levels.

Comparison of the site topographic survey and the modelled inundation flood level mentioned above indicates that:

- site would be impacted by a maximum depth in excess of 1.2m in King's Head Yard at node 12
- site would be impacted by a maximum depth in excess of 0.07m in St Thomas Street at node 4
- loading bay would be impacted by a maximum depth in excess of 1.09m at node 8

The Environment Agency have confirmed that the site is within an area benefiting from flood defences. The flood defences are inspected twice a year to ensure that they remain fit for purpose. The current condition grade for defences in the area is 2 (good), on scale of 1 (very good) to 5 (very poor).

7.2 Mitigation Measures

- The building management team will be registered with the EA Flood Warning System and the Flood Warning and Evacuation Plan will be developed.
- The proposed development does not contain any habitable areas at ground floor and basement levels. The occupiers could safely evacuate to a 1st floor level and above and safely remain inside the building.
- It is recommended that temporary flood barrier or permanent flood resilient doors barriers are included within the design of the building entrances in order to prevent flood water entering the property and causing damage. This would mitigate the potential cost and time of a post-flood recovery of the building. Refer to Appendix F for sketch CSK-004 outlining the affected areas.
- Due to the risk associated with the surface water flooding in King's Head Yard, it is recommended that all doors are capable of resisting the head of water to a maximum breach level of 4.75m AOD. Refer to Appendix F for the proposed mitigation measures.
- It is recommended that a Flood Management Plan (FMP) is developed in order to outline an appropriate emergency response to fluvial flooding. THE FMP should cover the following:
  - Explain flood warning arrangement.
  - Clarify roles and responsibilities of the management.
  - Describe what actions are required by the management.
  - Detail how the FMP is triggered, by who and when.

Figure 7.1 Environment Agency Node Location Map

	National Grid Reference		Modelled levels in mAODN for Max Likely Water Level	
Node	Easting	Northing	2014	2100
1	532717	180187	Nil return	4.61
2	532734	180177	Nil return	4.60
3	532754	180166	Nil return	4.72
4	532774	180154	Nil return	4.72
5	532789	180140	Nil return	4.71
6	532708	180169	Nil return	4.75
7	532733	180160	Nil return	4.73
8	532745	180145	Nil return	4.73
9	532766	180136	Nil return	4.73
10	532742	180133	Nil return	4.73
11	532761	180118	Nil return	4.72
12	532694	180155	Nil return	4.75
13	532709	180140	Nil return	4.73
14	532727	180130	Nil return	4.73
15	532741	180115	Nil return	4.73
16	532756	180102	Nil return	4.72

Table 1 Site-specific modelled breach flood levels

8 Run-off Assessment

This section demonstrates that the proposed development complies with the surface water discharge requirements set out in The London Plan 2021 which states that 'Development proposals should aim to achieve greenfield run-off rates'.

Refer to AKT II Drainage Strategy report dated April 2021 for the proposed storm water drainage strategy.

8.1 Existing Site Run-off

The existing site area excluding the existing listed Georgian terrace buildings (Grade II) which will be restored (nos. 4-16 St Thomas Street) and the public highways is approximately 2,980 m^2. In accordance with the Modified Rational Method, the peak existing run-off from the site is calculated from the formula:

$Q = 3.61 \times C_v \times A \times i$

where C_v is the volumetric runoff coefficient, A is the catchment area in hectares and i is the peak rainfall intensity in mm/hr.

For the peak 1 in 1 year return period storm event this gives an existing discharge rate from the site of:

$\mathbf{Q_1}$ = 3.61 x 0.75 x 0.298 x 38.3 = **30.9 litres/sec**

and for the peak 1 in 100 year return period storm event this gives an existing discharge rate from the site of:

$\mathbf{Q_{100}}$ = 3.61 x 0.75 x 0.298 x 104.7 = **84.4 litres/sec**

8.2 Proposed Site Run-off

The proposed impermeable area will remain as existing. Again using the Modified Rational Method, the proposed (unattenuated) peak run-off from the site for the 1 in 1 year return period storm would be:

$\mathbf{Q_1}$ = 3.61 x 0.75 x 0.298 x 38.3 = **30.9 litres/sec**

and for the peak 1 in 100 year return period storm event:

$\mathbf{Q_{100}}$ = 3.61 x 0.75 x 0.298 x 104.7 = **84.4 litres/sec**

The EA have recently updated their guidance on climate change allowance to give a lower (20%) and upper (40%) bound to be considered depending on the sensitivity of the site and the proposed surface water drainage design. Making an allowance for climate change of 40% (worst case) this would give an unattenuated design discharge of:

$\mathbf{Q_{1\,(+40\%)}}$ = **43.3 litres/sec** and $\mathbf{Q_{100\,(+40\%)}}$ = **118.2 litres/sec**

In accordance with the EA's guidelines, the Building Regulations and the Water Authority's advice, the preferred means of surface water drainage for any new development is into a suitable soakaway or infiltration drainage system. Sustainable urban Drainage Systems (SuDS) can reduce the impact of urbanisation on watercourse flows, ensure the protection and enhancement of water quality and encourage recharging of groundwater in a manner which mimics nature.

In addition to this, the NPPF requires that surface water arising from a developed site should, as far as is practicable, be managed in a sustainable manner to mimic surface water flows arising from the site prior to the proposed development, whilst reducing flood risk to the site itself and elsewhere, taking climate change into account.

Therefore, as an absolute minimum, the proposed site discharge under the 1 in 100 year storm plus climate change should be no greater than the existing 1 in 100 year storm discharge (i.e. it should mitigate the impact of climate change and any increase in the area of hardstanding). In this case, this would mean that, rather than discharging 118.2 litres/sec, the maximum permissible discharge from the site would be **84.4 litres/sec**.

Further to the above, the London Plan's Policy 5.13 states that "Development proposals should aim to get as close to greenfield run-off rates as possible depending on site conditions" but "recognises that in such a densely built-up city as London this may not always be possible in particular given that the vast majority of development is targeted on brownfield sites". The EA also suggests that Developers should aim to achieve greenfield run off from their site. In accordance with the method outlined in the Institute of Hydrology Report 124, the Greenfield runoff for the site is calculated from the formula:

$Q_{BAR} = 0.00108 \times AREA^{0.89} \times SAAR^{1.17} \times SOIL^{2.17}$

where AREA is the site area in km^2 (pro rata of 50ha if the site is less than 50ha), SAAR is the Standard Average Annual Rainfall in mm and SOIL is the Soil Index, both read from The Wallingford Procedure maps. This gives a greenfield runoff for the site of:

$\mathbf{Q_{BAR}} = 0.00108 \times 0.5^{0.89} \times 600^{1.17} \times 0.45^{2.17}$ = **183.41 litres/sec (for 50ha)**

Scaling this for the actual site area gives:

$\mathbf{Q_{BAR}}$ = (76.1 x 0.298) / 50 = **1.09 litres/sec**

Using the Hydrological Growth Curve for south east England, the growth factor from Q_{BAR} to Q_{100} is 3.190 which gives a value for $\mathbf{Q_{100}}$ = **3.49 litres/sec.**

Section 8.3 discusses the potential approaches that can be taken to meet these requirements.

Applies across all of England	Total potential change anticipated for the '2020s' (2015 to 2039)	Total potential change anticipated for the '2050s' (2040 to 2069)	Total potential change anticipated for the '2080s' (2070 to 2115)
Upper end	10%	20%	40%
Central	5%	10%	20%

Figure 8.1 Flood risk assessments climate change allowances: Table 2 - Peak rainfall intensity allowance in small and urban catchments (use 1961 to 1900 baseline)

8.3 Disposal Methods

SuDS Management Train

A useful concept used in the development of sustainable drainage systems is the SuDS management train (sometimes referred to as the treatment train). Just as in a natural catchment, drainage techniques can be used in series to change flow and quality characteristics of the runoff in stages. There are a variety of measures that can be implemented to achieve these goals:

Site Management / Prevention

Site management procedures are used to limit or prevent runoff and pollution and include:

- Minimising the hardened areas within the site.
- Frequent maintenance of impermeable surfaces.
- Minimising the use of de-icing products.

Source Control

Source control techniques will be used where possible as they control runoff at source in smaller catchments. They can also provide effective pollution control and treatment, thereby improving the quality of the effluent discharged to the receiving waters.

Site Control

Where source control techniques do not provide adequate protection to the receiving watercourses in terms of flood protection and pollution control, site control may be required.

Regional Control

Where large areas of public space are available regional control can be incorporated to provide additional "communal" storage and treatment to runoff from a number of sites. However, in this case, all storage and treatment will be implemented on-site.

Drainage Hierarchy

Based on the above, the following drainage hierarchy will therefore need to be considered when preparing the surface water disposal strategy:

1. Store water for later use.
2. Use infiltration techniques such as porous surfaces in non-clay area.
3. Attenuate rainwater in ponds or open water features for gradual release to a watercourse.
4. Attenuate rainwater by storing in tanks or sealed water features for gradual release to a watercourse.
5. Discharge rainwater direct to a watercourse.
6. Discharge rainwater to a surface water drain.
7. Discharge rainwater to a combined sewer.

As the project is a new build, it should be possible to install a rainwater harvesting system where roof water could be collected for re-use to flush toilets or irrigate planted areas. Its use should therefore be investigated further at the next design stages to determine its suitability in terms of the plant space requirements, the need for a secondary water distribution network, the available yield and demand.

There is also a potential to provide Green Roofs which will provide an element of attenuation and treatment to the surface water runoff from the site in addition to amenity and ecology benefits. This option should be explored during the next design stage.

As the development will comprise of a basement that covers the entire site area, it will not be possible to utilise infiltration devices, ponds or water features for surface water disposal as they cannot be located suitably distant from foundations to comply with Building Regulations. Also, the anticipated presence of clay soils beneath the site would further exclude the use of infiltration solutions.

There are no watercourses in the immediate vicinity of the site and so it will not be possible to discharge to one.

It is therefore believed that the most viable solution for the site is to connect to existing public sewers. **The total attenuation volume based upon the greenfield run-off rate of 3.49 litres/sec for a range of discharge rates plus 40% climate change is approximately 190 m³.**

The proposed attenuation features will comprise mainly blue roof systems at various levels with a small area being drained into an attenuation tank inside the basement. The attenuation tank should be located high enough to achieve a gravity discharge into the public sewers. This will need to be investigate during the next design stage.

It is also recommended that, if possible, the existing sewer connection(s) from the site are reused to prevent the need for constructing a new sewer connection. This would minimise both the cost of the work and the disruption to St. Thomas Street and Borough High Street which is a busy thoroughfare and would consequently require significant pedestrian and traffic management to be provided during the work. This is all subject to a CCTV survey which is yet to be undertaken to confirm the condition of existing outfall points.

9 Conclusions

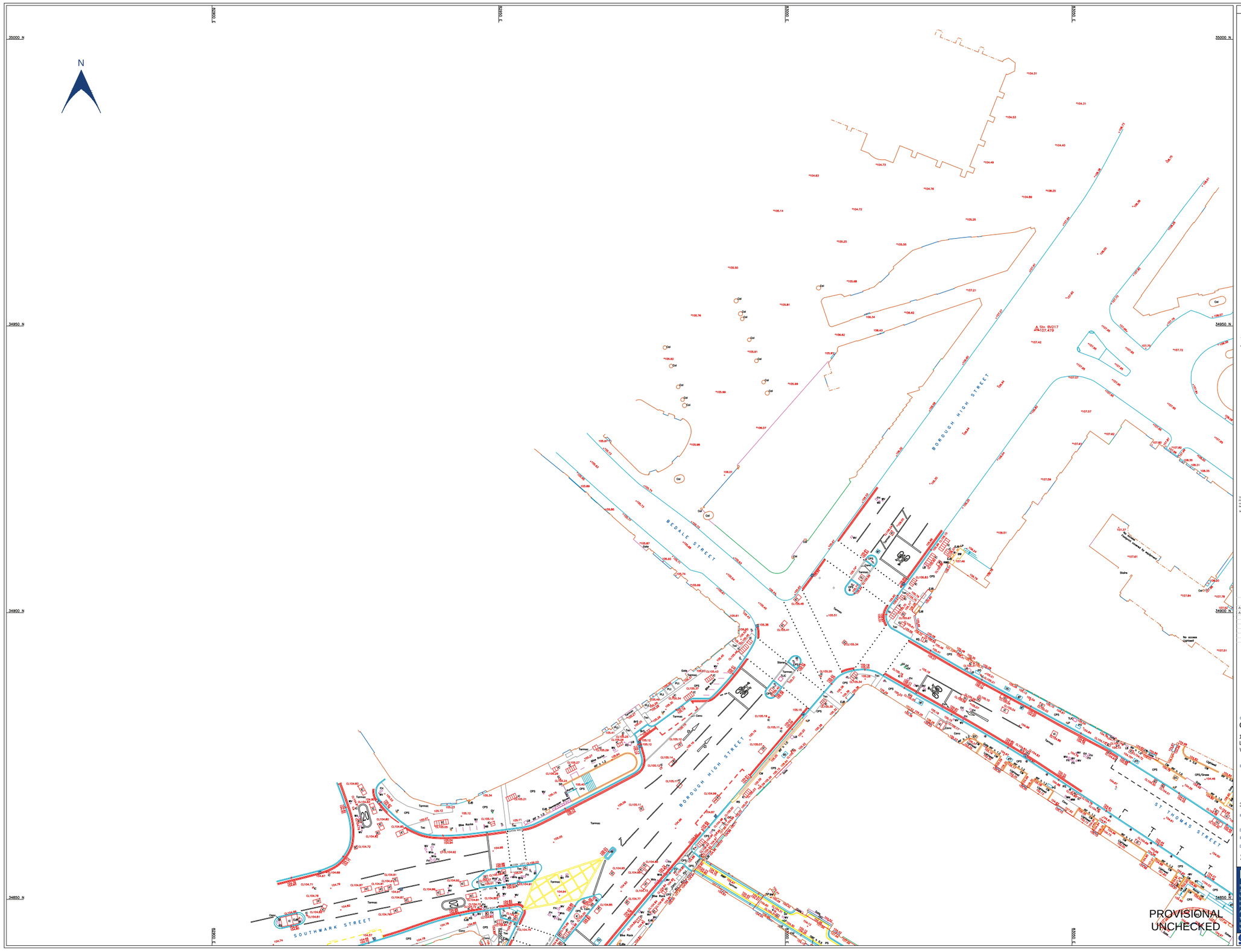
- In accordance with the National Planning Policy Framework, the site would be categorised as lying within Flood Zone 3a - an area assessed as having a 1 in 100 or greater annual probability of river flooding (>1%) or a 1 in 200 or greater annual probability of flooding from the sea (>0.5%). However, the site benefits from the presence of flood defences along the River Thames. According to the EA Product 4 data (see Appendix E), The Thames Barrier and associated defence system has a 1 in 1000 year standard which means it ensures that flood risk is managed up to an event that has 0.1% annual probability. This is also confirmed by the Thames Estuary 2100 (2012) report.
- In accordance with the NPPF, the proposed retail and office uses are acceptable within Flood Zone 3a.
- The development does not require the Exception Test to be applied and therefore the development is considered appropriate to the location.
- The site has been assessed as being at very low risk of flooding from rivers or tidal sources.
- In the event of breach the occupants can evacuate to higher levels and safely remain inside or can leave the site early having been alerted by the Flood Warning Service.
- The Developer should register for the EA's Flood Warning Service as a precaution.
- The site has been assessed as being at low risk from surcharging sewers.
- The site has been assessed as being at low risk from groundwater sources.
- The site has been assessed as being at low risk from artificial sources.
- The site has been assessed as being at risk from surface water flooding from King's Head Yard. It is recommended that the mitigation measures specified in Sections 6.6 & 7.2 are implemented. Implementation of any of the recommended measures would reduce the risk from the surface water flooding to low.
- Temporary flood barriers and flood resilient doors should be provided to the building entrances (See Sections 6.6 & 7.2 for details).
- The proposed redevelopment has an acceptable flood risk within the terms and requirements of the NPPF, subject to implementation of the mitigation measures outlined in this report.
- In order to comply with legislative requirements the existing surface water discharge should be reduced to the greenfield rate of 3.49 litres/sec.

The comments stated above are based on information received from other consultees. The flood risk classification of this site has been based on the above observations, and the recommendations stated.

3948
New City Court

Appendix A

Topographic Survey



STANDARD ABBREVIATIONS

A/C	Air Conditioner	LB	Litter Bin
A/W	Automatic Vending Machine	LC	Level Crossing
B	Bollard	Mm	Manhole
BB	Bellisha Beacon	Mh	Mailbox
Al	Aluminium	Mn	Manhole
Bl	Block	Mo	Minimum
BS	Bus Stop	Mo	Motor Box
BWM	Brick Retaining Wall	NB	Notice Board
BS	Bus Stop	NP	Name Plate
BW	Brick Wall	OHF	Overhead Fence
BW	Brick Wall	OH	Overhead
BWP	Barbed Wire Fence	OSBM	Ordnance Survey Bench Mark
CBP	Close Boarded Fence	P	Post
CCTV	Closed Circuit Television	PB	Pillar Box
CF	Concrete Post Fence	PGM	Permanent Ground Marker
Co	Cover Level	PLL	Pedestrian Light
CLF	Chain Link Fence	PM	Parking Meter
Col	Column	PRF	Post and Rail Fence
Conc	Concrete	PS	Paying Stones
CW	Concrete Wall	PVCF	Plastic Coated Fence
CPS	Consumer Parking Stalls	RE	Reading Eye
CTV	Cable Television IC	RG	Road Gully
D	Door	RL	Railing Level
DC	Dwarf Cover	RSJ	Rolled Steel Joist
DH	Dwarf Height	RWP	Rain Water Pipe
DP	Down Pipe	s.	spotted
DrC	Drainage Chamber	SB	Sign Board
EIC	Electrical Inspection Cover	SBM	Site Bench Mark
EJB	Electrical Junction Box	SC	Stop Cock
EP	Electricity Pole	SF	Security Fence
ER	Electric Reader	SL	Street Light
ESB	Electrical Switchgear	SL	Survey Level
FB	Flower Bed	SO	Scrape Outlet
Fm	Fire Hydrant	SP	Sign Post
FL	Floor Level	SV	Stop Valve
FH	Fence Height	T	Telephone
g	gully	Tap	Tactile Paving
G	Gully	TBM	Temporary Bench Mark
GC	Gas Cock	TCB	Telephone Call Box
GM	Gas Meter	TCP	Traffic Control Post
GV	Gas Valve	TIC	Telephone Inspection Cover
GV	Gas Valve	TJB	Telephone Junction Box
h	height	TL	Traffic Light
HydM	Hydrant Marker	TLCB	Traffic Light Control Box
IB	Illuminated Bollard	TLIC	Traffic Light Inspection Cover
IC	Inspection Cover	TP	Telephone Pole
IL	Invert Level	Typ	Typical
IRF	Iron Railing Fence	V	Vent
JB	Junction Box/Road Sign	VP	Vent Pipe
JB	Junction Box	W	Window
KG	Kerb Outlet	WM	Water Meter
L	Light	WV	Water Value

LEGEND

Step arrows point up

Assumed detail

SHEET LAYOUT

35722T-01-1	35722T-01-2
35722T-01-3	35722T-01-4
	35722T-01-5

ISSUES & REVISIONS

Issue	Details	By	Date
A prov 1	Zone T1 Provisional Topo (LU Grid)	PCL	05/08/2016
A prov 2	Zone T1 & T2 Provisional Topo (LU Grid)	PCL	09/09/2016

This survey is commensurate with band F accuracy, as outlined in the RICS survey detail accuracy banding table.

All levels are in metres and are above London Survey Grid (LU) Datum. (OS Newlyn Datum +100m).

The survey grid shown on this drawing is positioned on London Survey Grid (LU) at stations LB52A, LB53 and BV217.

All quoted dimensions are in metres.

Drawing units are metres.

CLIENT

Gardiner & Theobald LLP

10 South Crescent
London
WC1E 7BD

PROJECT TITLE

BIM New City Court

3D Topographic Survey

PRESENTATION SCALE 1:200 @ A0

DATE OF ORIGINAL SURVEY 28th July 2016

PC PROJECT No. 35722 CHECKED HT

DRAWING No. 35722T-01-1 ISSUE A prov 2

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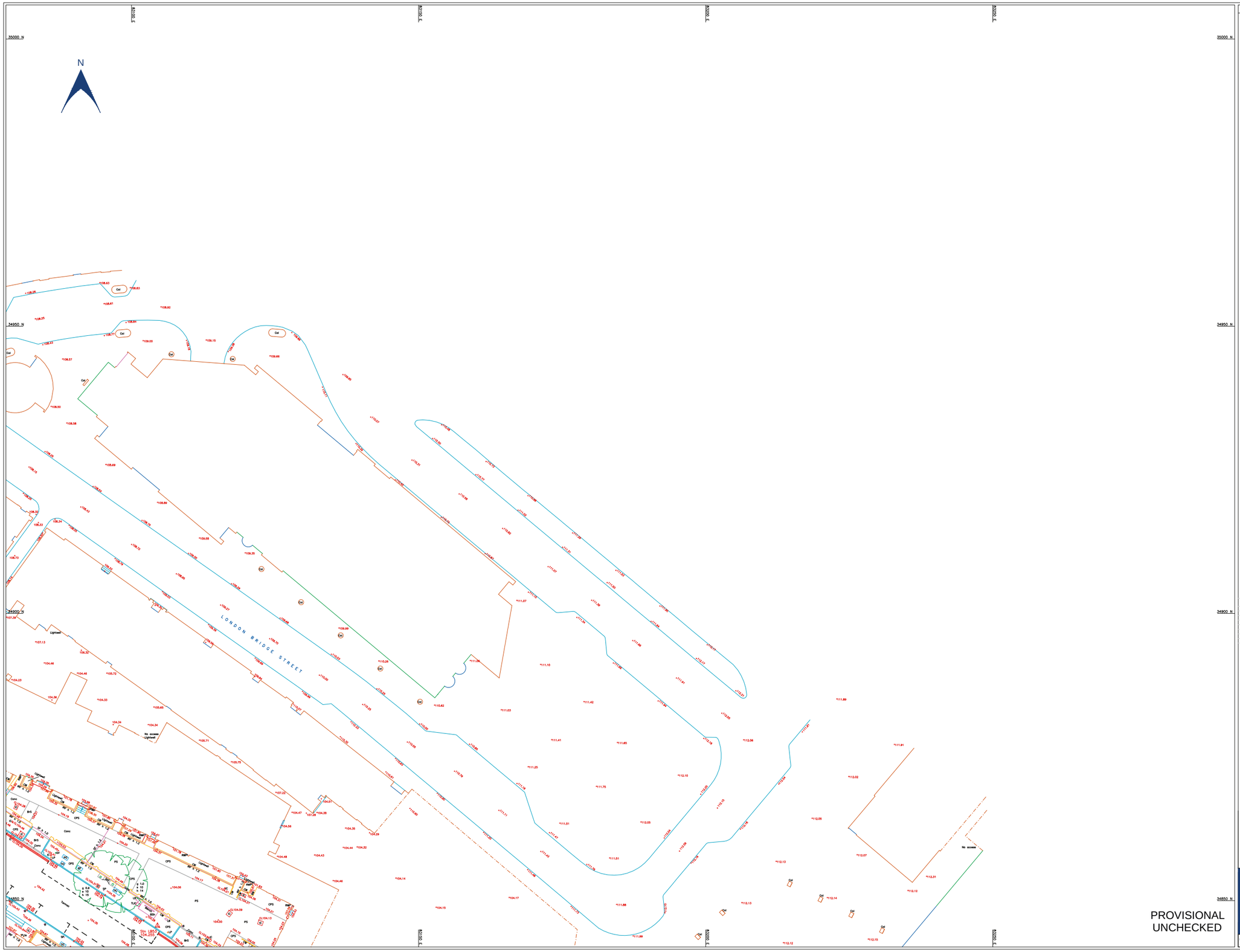

STANDARD ABBREVIATIONS

A/C	Air Conditioner	L/B	Letter Bin
ATM	Automated Teling Machine	LP	Lamp Post
B	Bollard	LS	Light Source
BB	Bellmin Beacon	ML	Multiduct
BE	Bookstale	MH	Manhole
BH	Bore Hole	MK	Marker
BrS	Brick Sets	Mo	Meter
BRW	Brick Retaining Wall	NB	Notice Board
BS	Bus Stop	NP	Name Plate
BT	British Telecom	OBP	Open Boarded Fence
BW	Bin Weight	OHL	Overhead Line
BWF	Barbed Wire Fence	OSBM	Ordnance Survey Bench Mark
CBP	Close Boarded Fence	P	Pole
CCTV	Closed Circuit Television	PB	Post Box
CF	Corrugated Iron Fence	PHW	Pressurised Ground Water
CL	Crane Level	PLL	Pavement Light
CLF	Chain Link Fence	PM	Parking Meter
Col	Column	PRF	Post and Rail Fence
CP	Car Park	PS	Pump Station
CoW	Cable on Wall	PWF	Post and Wire Fence
CPS	Concrete Paving Slabs	RB	Rodding Bye
CTV	Cable Television (C	RG	Road Gully
C	depth	RS	Road Sign
D	Door Sill Level	RSG	Road Stud Gold
DH	Dust Height	RWP	Rain Water Pipe
DP	Drain Pipe	s	spread
E	Electric Cupboard	SB	Sign Board
EC	Electrical Inspection Cover	SBM	Site Bench Mark
EJB	Electrical Junction Box	SC	Stop Cock
EP	Electricity Post	SF	Security Fence
ER	Earthing Rod	SMB	Shoot Bell
ES	Electrical Switch/gear	SP	Sign Post
FB	Flower Bed	SC	Socket Outlet
FH	Fire Hydrant	SP	Sign Post
FL	Floor Level	TF	Timber Fence
Ph	Phone	T	Telephone
g	grid	Tac	Tactile Paving
G	Gully	TBM	Temporary Bench Mark
GC	Gas Cock	TCB	Telephone Call Box
GI	Gas Inlet	TC	Tree Canopy
GP	Gate Post	TIC	Telephone Inspection Cover
GV	Gas Valve	TJB	Telephone Junction Box
h	height	TL	Traffic Light
H	Hydrant	TLB	Traffic Light Junction Box
IB	Illuminated Bollard	TLIC	Traffic Light Inspection Cover
IC	Inspection Cover	TP	Telephone Pole
IL	Invert Level	Typ	Typical
IPF	Iron Post Fence	t	tree
JRS	Illuminated Road Sign	VP	Vent Pipe
JB	Junction Box	W	Window
KG	Kerb Guide	WM	Water Meter
L	Light	WV	Water Valve

LEGEND

Step arrows point up

Assumed detail

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SHEET LAYOUT

35722T-01-1	35722T-01-2
35722T-01-3	35722T-01-4
	35722T-01-5

ISSUES & REVISIONS

Issue	Details	By	Date
A prov 1	Zone T1 Provisional Topo (LU Grid)	PCL	05/08/2016
A prov 2	Zone T1 & T2 Provisional Topo (LU Grid)	PCL	09/09/2016

This survey is commensurate with band F accuracy, as outlined in the RICS survey detail accuracy banding table.

All levels are in metres and are above London Survey Grid (LU) Datum. (OS Newlyn Datum +100m).

The survey grid shown on this drawing is positioned on London Survey Grid (LU) at stations LB52A, LB53 and BV217.

All quoted dimensions are in metres.

Drawing units are metres.

CLIENT

Gardiner & Theobald LLP

10 South Crescent
London
WC1E 7BD

PROJECT TITLE

BIM New City Court

3D Topographic Survey

PRESENTATION SCALE 1:200 @ A0

DATE OF ORIGINAL SURVEY 28th July 2016

PC PROJECT No. 35722 CHECKED HT

DRAWING No. 35722T-01-2 ISSUE A prov 2

Plowman Craven

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Lower Luton Road
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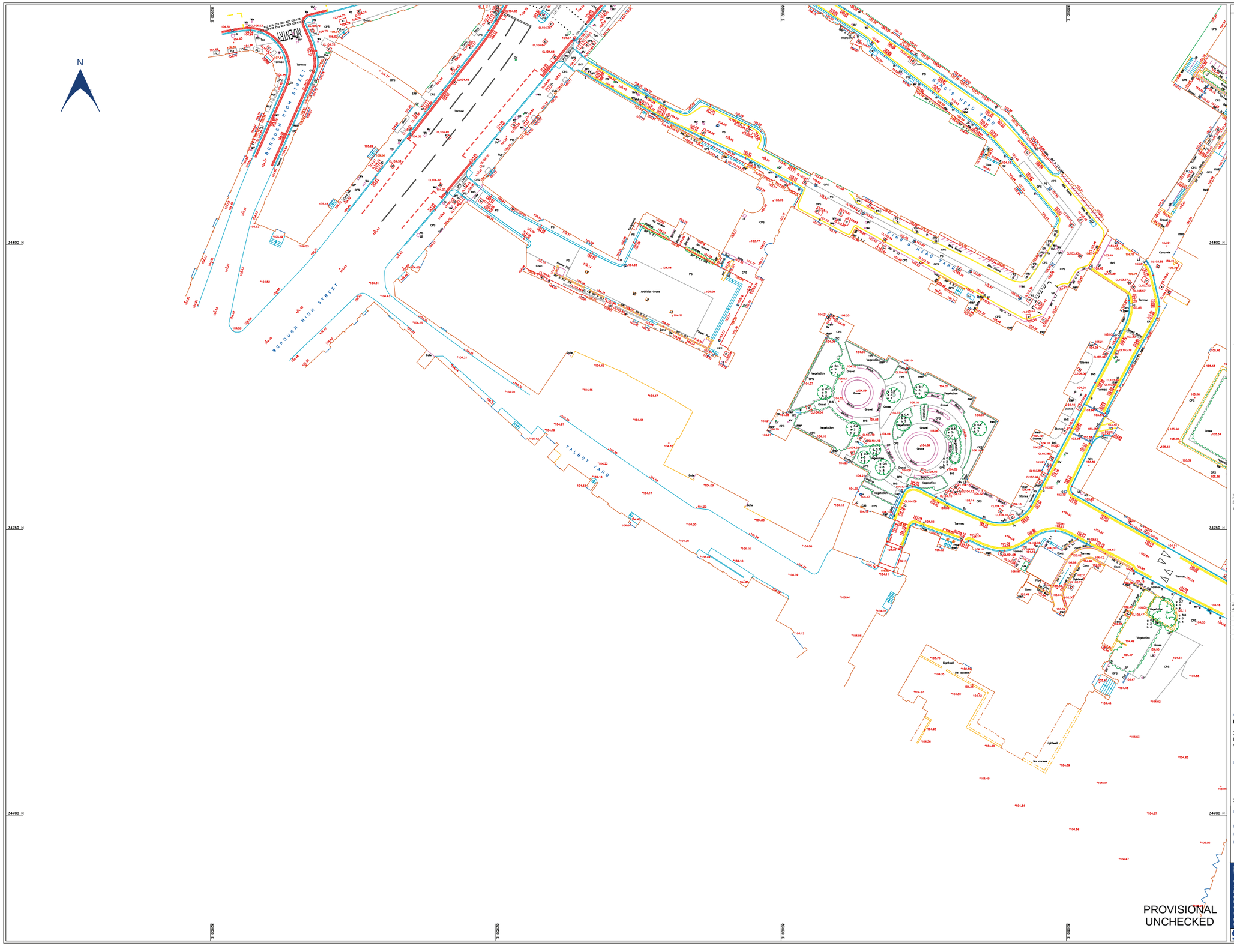
Tel: +44 (0)1582 765566
Tel: +44 (0)207 490 7700

Email: post@plowmancraven.co.uk
Web: www.plowmancraven.co.uk



STANDARD ABBREVIATIONS

A/C	Air Conditioner	L/B	Letter Box
ATM	Automated Teling Machine	L/P	Lamp Post
B	Bollard	M/H	Manhole
BB	Bulletin Between	M/L	Mullion
BE	Bookstile	MH	Meinloch
BH	Bore Hole	MK	Markers
BS	Brick Sets	MM	Mirror
BRW	Brick Retaining Wall	NB	Notice Board
BS	Bus Stop	NP	Name Plate
BT	Bollds Tritleuce	OBP	Open Bowdoin Fence
BW	Bin Wall	OHL	Overhead Line
BWF	Bedford Wire Fence	OSBM	Ordnance Survey Bench Mark
CBF	Close Boarded Fence	P	Post
CCTV	Closed Circuit Television	PB	Post Box
CF	Corrugated Iron Fence	PBW	Permanent Ground Water
CL	Crane Level	PLL	Placement Light
CLF	Chain Link Fence	PM	Parking Meter
CW	Column	PRF	Post and Rail Fence
CWF	Cattle Fence	PS	Pump Stone
CWR	Cattle on Wall	PWF	Post and Wire Fence
CPS	Concrete Paving Slabs	RB	Rodding Eye
CTV	Cable Television (C)	RD	Road Gully
C	Depth	RG	Road Sign
D	Drain Hole	RGS	Road Signs Gate
DH	Dust Height	RWP	Rain Water Pipe
DP	Drain Pipe	S	Spinnel
E	Electric Cabinet	SB	Sign Board
EC	Electrical Inspection Cover	SBM	Site Bench Mark
EJB	Electrical Junction Box	SC	Stop Cock
EP	Electricity Pole	SF	Security Fence
ER	Kerbing Raised	SMB	Stone Bollard
FB	Flower Bed/Flower/Urn	SP	Sign Post
FB	Flower Bed	SC	Socket Outlet
FH	Fire Hydrant	SP	Sign Post
FL	Floor Level	TF	Trellis Fence
FL	Flagstone	TH	Telephone
G	grid	Tac	Tactile Paving
G	Gully	TBM	Temporary Bench Mark
GC	Gas Cock	TCB	Telephone Call Box
GF	Gas Flare	TCC	Telephone Cabinet
GP	Gate Post	TIC	Telephone Inspection Cover
GV	Gas Valve	TJB	Telephone Junction Box
H	Height	T	Traffic Light
H	Hydrant	TLB	Traffic Light Junction Box
IB	Illuminated Bollard	TLIC	Traffic Light Inspection Cover
IC	Inspection Cover	TP	Telephone Pole
IL	Invert Level	Typ	Typical
IRF	Iron Railing Fence	V	Vent
JRS	Illuminated Road Sign	VP	Vent Pipe
JB	Junction Box	W	Window
KG	Kerb Guide	WM	Water Meter
L	Light	WV	Water Valve

LEGEND

Step arrows point up

Assumed detail

The identification of service covers has been made by a surface inspection only - critical identifications should be verified by the lifting of covers or a full utilities survey

Due to the inherent instability of paper materials, drawings plotted on paper may be stretched and distorted - dimensions scaled from paper plots should therefore be treated with caution

SHEET LAYOUT

35722T-01-1	35722T-01-2
35722T-01-3	35722T-01-4
	35722T-01-5

ISSUES & REVISIONS

Issue	Details	By	Date
A prov 1	Zone T1 Provisional Topo (LU Grid)	PCL	05/08/2016
A prov 2	Zone T1 & T2 Provisional Topo (LU Grid)	PCL	09/09/2016

This survey is commensurate with band F accuracy, as outlined in the RICS survey detail accuracy banding tattle.

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All quoted dimensions are in metres.

Drawing units are metres.

CLIENT

Gardiner & Theobald LLP

10 South Crescent
London
WC1E 7BD

PROJECT TITLE

BIM New City Court

3D Topographic Survey

PRESENTATION SCALE 1:200 @ A0

DATE OF ORIGINAL SURVEY 28th July 2016

PC PROJECT No. 35722 CHECKED HT

DRAWING No. ISSUE

35722T-01-3 A prov 2

Plowman Craven

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115 Southwark Bridge Road
London
SE1 0AX
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Email: post@plowmancraven.co.uk
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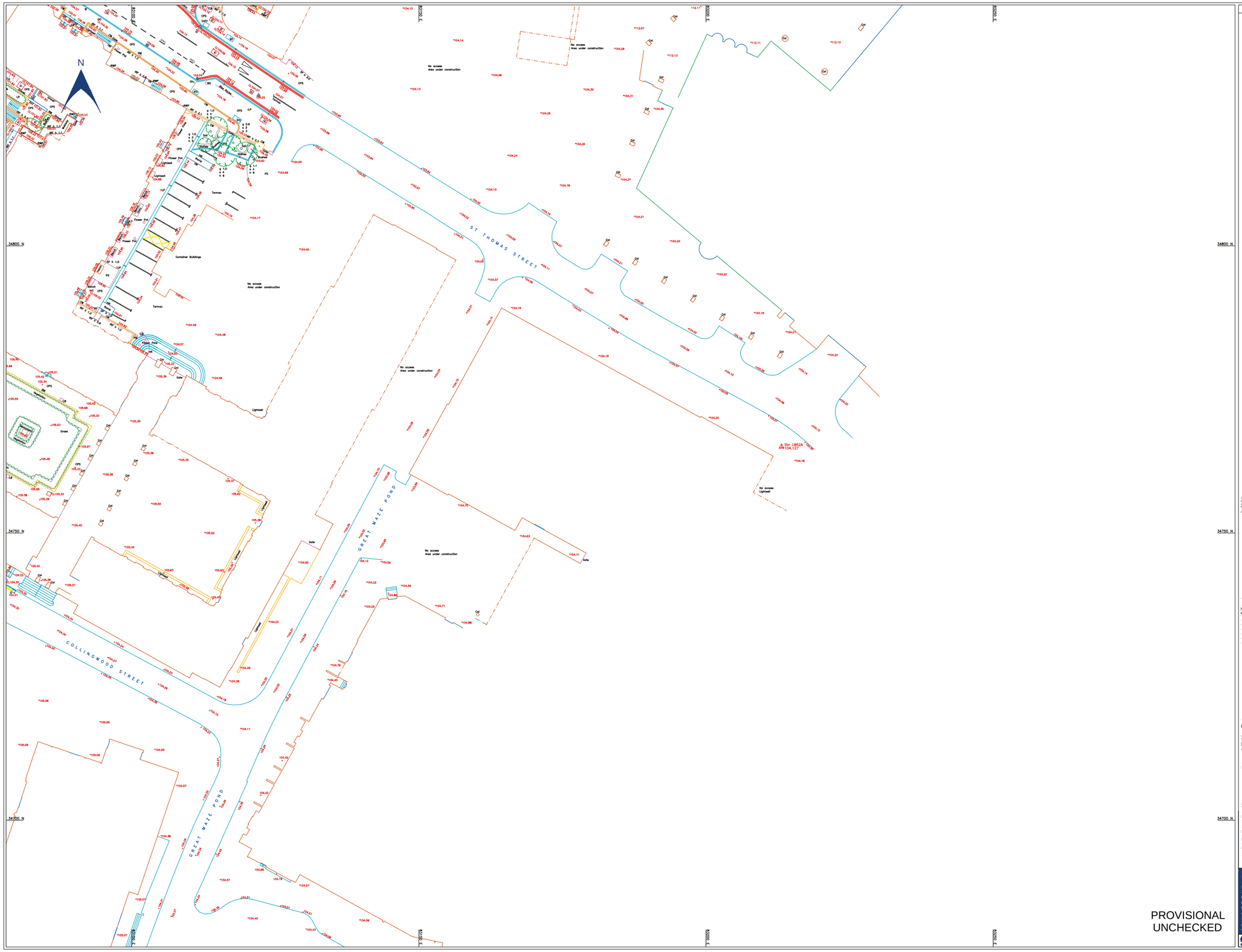

PROVISIONAL
UNCHECKED

STANDARD ABBREVIATIONS

A/C	Air Conditioner	LB	Litter Bin
ATM	Automated Telling Machine	LP	Lamp Post
B	Bollard	Max	Maximum
BB	Belisha Beacon	Mb	Multibole
Bh	Borehole	MH	Manhole
Br	Brick	Min	Minimum
BrS	Brick Setts	Mkr	Marker
BRW	Brick Retaining Wall	NB	Notice Board
BS	Bus Stop	NP	Name Plate
BT	British Telecom	OBF	Open Boarded Fence
BW	Brick Wall	O/H	Overhead
BWF	Barbed Wire Fence	OSBM	Ordnance Survey Bench Mark
CBF	Close Boarded Fence	P	Post
CCTV	Closed Circuit Television	PB	Pillar Box
CIF	Corrugated Iron Fence	PGM	Permanent Ground Marker
CL	Cover Level	PLt	Pavement Light
CLF	Chain Link Fence	PM	Parking Meter
Col	Column	PRF	Post and Rail Fence
Conc	Concrete	PS	Paving Stones
CoW	Cable on Wall	PWF	Post and Wire Fence
CPS	Concrete Paving Slabs	RE	Rodding Eye
CTV	Cable Television IC	RG	Road Gully
d	depth	RS	Road Sign
DC	Duct Cover	RSJ	Rolled Steel Joist
DH	Duct Height	RWP	Rain Water Pipe
DP	Down Pipe	s	spread
DrC	Drainage Channel	SB	Sign Board
EIC	Electrical Inspection Cover	SBM	Site Bench Mark
EJB	Electrical Junction Box	SC	Stop Cock
EP	Electricity Pole	SF	Security Fence
ER	Earthing Rod	ShB	Shrub Bed
ESG	Electrical Switchgear	SL	Sump Level
FB	Flower Bed	SO	Smoke Outlet
FH	Fire Hydrant	SP	Sign Post
FL	Floor Level	SV	Stop Valve
Flt	Floodlight	T	Telephone
g	girth	Tac	Tactile Paving
G	Gully	TBM	Temporary Bench Mark
GC	Gas Cock	TCB	Telephone Call Box
GM	Gas Meter	TCP	Traffic Control Post
GP	Gate Post	TIC	Telephone Inspection Cover
GV	Gas Valve	TJB	Telephone Junction Box
h	height	TL	Traffic Light
HR	Handrail	TLCB	Traffic Light Control Box
IB	Illuminated Bollard	TLIC	Traffic Light Inspection Cover
IC	Inspection Cover	TP	Telephone Pole
IL	Invert Level	Typ	Typical
IRF	Iron Railing Fence	V	Vent
IRS	Illuminated Road Sign	VP	Vent Pipe
JB	Junction Box	W	Window
KO	Kerb Outlet	WM	Water Meter
L	Light	WV	Water Valve

LEGEND

Step arrows point up

Assumed detail

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This drawing has been produced for the purpose of the original commissioning agent. Plowman Craven Limited will accept no responsibility for details that are subsequently found to be the consequence of undisclosed facts or that were obscured from view at the time of survey or that have been altered since the survey.

See www.plowmancraven.co.uk for full terms and conditions of contract.

SHEET LAYOUT

35722T-01-1	35722T-01-2
35722T-01-3	35722T-01-4
	35722T-01-5

ISSUES & REVISIONS

Issue	Details	By	Date
A prov 1	Zone T1 Provisional Topo (LU Grid)	PCL	05/08/2016
A prov 2	Zone T1 & T2 Provisional Topo (LU Grid)	PCL	09/09/2016

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CLIENT
Gardiner & Theobald LLP

10 South Crescent
London
WC1E 7BD

PROJECT TITLE

BIM New City Court

3D Topographic Survey

PRESENTATION SCALE 1:200 @ A0

DATE OF ORIGINAL SURVEY 28th July 2016

PC PROJECT No. 35722 CHECKED HT

DRAWING No. 35722T-01-4 ISSUE A prov 2

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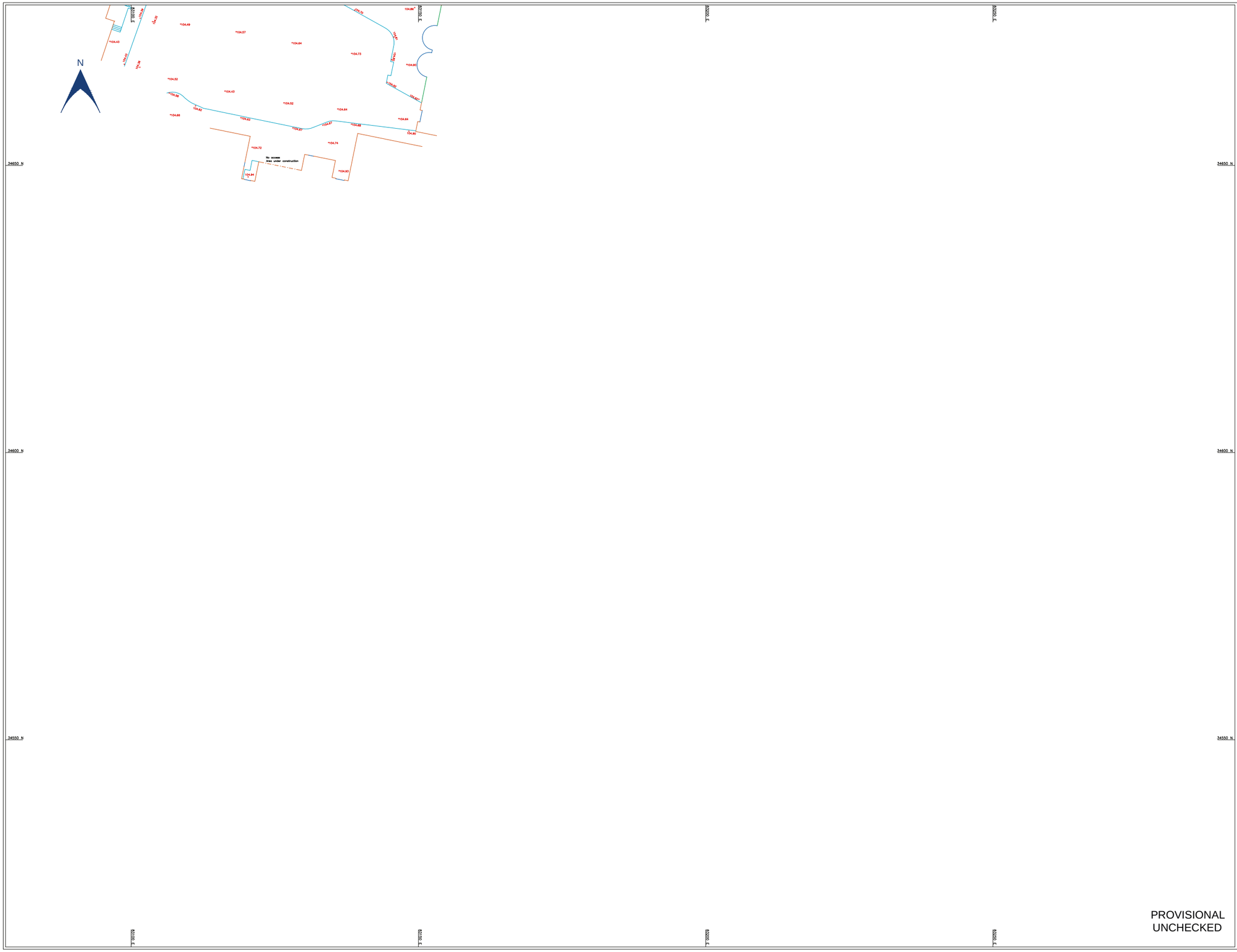

PROVISIONAL
UNCHECKED

STANDARD ABBREVIATIONS

A/C	Air Conditioner	LB	Letter Box
ATM	Automated Teling Machine	LC	Level Cover
B	Bollard	Mh	Manhole
BB	Bellisha Beacon	Ms	Scaffolde
Bh	Borehole	Mm	Maelstom
Bk	Brick	Mn	Minimum
BS	Bus Stop	Mp	Mile Post
BRW	Brick Retaining Wall	NB	Notice Board
BS	Bus Stop	NP	Name Plate
BT	British Telecom	OBF	Open Boarded Fence
BW	Brick Wall	OH	Overhead
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CBP	Close Boarded Fence	P	Post
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CF	Chain Link Fence	PCB	Point Control Ground Marker
CL	Crown Land	PLL	Pavement Light
CLF	Chain Link Fence	PM	Parking Meter
Col	Column	PWF	Post and Rail Fence
Cone	Cemetery	PS	Paving Stones
CW	Concrete Wall	PSF	Post and Strand Fence
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D	Door	RL	Railing
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ERC	Electrical Rising Cover	SL	Street Light
FB	Flower Bed	SO	Sewer Outlet
FH	Fire Hydrant	SP	Sign Post
FL	Floor Level	SV	Stop Valve
G	Gate/Door	Sy	Synagogue
g	grille	Tap	Tactile Paving
G	Gully	TBM	Temporary Bench Mark
GC	Gas Cock	TCB	Telephone Call Box
GM	Gas Meter	TCP	Traffic Control Post
GV	Gas Valve	TCC	Telephone Junction Cover
GVC	Gas Valve	TJB	Telephone Junction Box
s	Sargel	TL	Traffic Light
H	Hydrant	TLB	Traffic Light Control Box
M	Manhole/ Bollard	TLC	Traffic Light Junction Cover
IC	Inspection Cover	TP	Telephone Pole
IL	Invert Level	Typ	Typical
IRF	Iron Railing Fence	V	Vent
JB	Junction Box/ Sign	VP	Vent Pipe
JE	Junction Box	W	Window
KO	Kerb Outlet	WM	Water Meter
L	Light	WV	Water Valve

LEGEND

Step arrows point up

Assumed detail

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SHEET LAYOUT

35722T-01-1	35722T-01-2
35722T-01-3	35722T-01-4
	35722T-01-5

ISSUES & REVISIONS

Issue	Details	By	Date
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CLIENT

Gardiner & Theobald LLP

10 South Crescent
London
WC1E 7BD

PROJECT TITLE

BIM New City Court

3D Topographic Survey

PRESENTATION SCALE 1:200 @ A0

DATE OF ORIGINAL SURVEY 28th July 2016

PC PROJECT No. 35722 CHECKED HT

DRAWING No. ISSUE

35722T-01-5 A prov 2

Plowman Craven

Plowman Craven House
2 Lea Business Park
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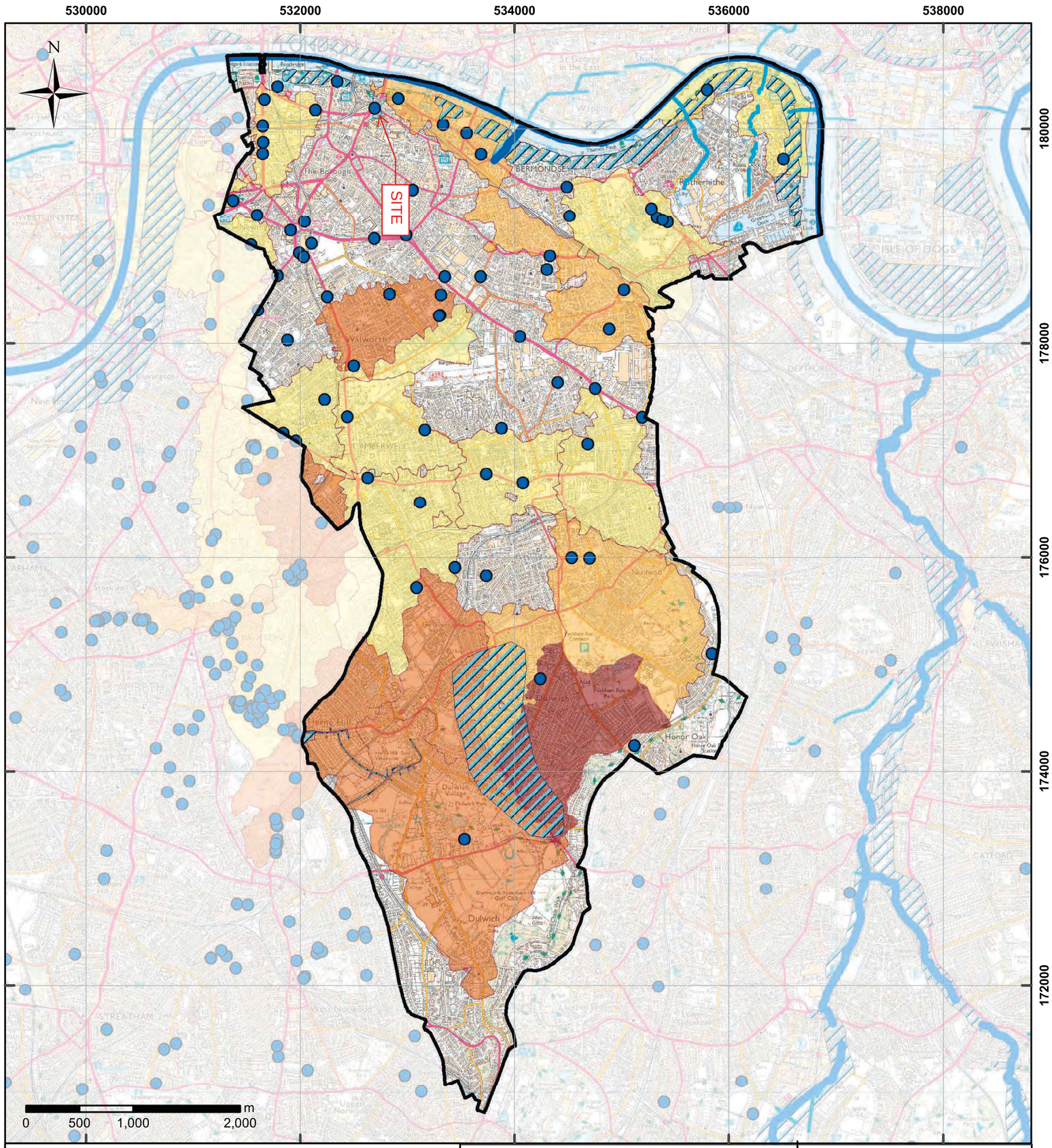
Email: print@plowmancraven.co.uk
Web: www.plowmancraven.co.uk

3948
New City Court

Appendix B

London Borough of Southwark SFRA Maps



Legend

- Southwark Borough Boundary
- Main River
- Ordinary Watercourse
- Culvert
- Localised Flood Incident
- Historic Flood Outline

Total Properties Flooded by Overloaded Sewers by Postcode Area

- 1 - 2
- 3 - 6
- 7 - 11
- 12 - 37

Flooding History

CONWAY AECOM
Shaping London's Highways

Sunley House, 4 Bedford Park
Croydon, Surrey, CR0 2AP

Tel: +44 (0) 208 639 3500
www.aecom.com

GIS:	Checked:	Approved:
KLD	AD	GP

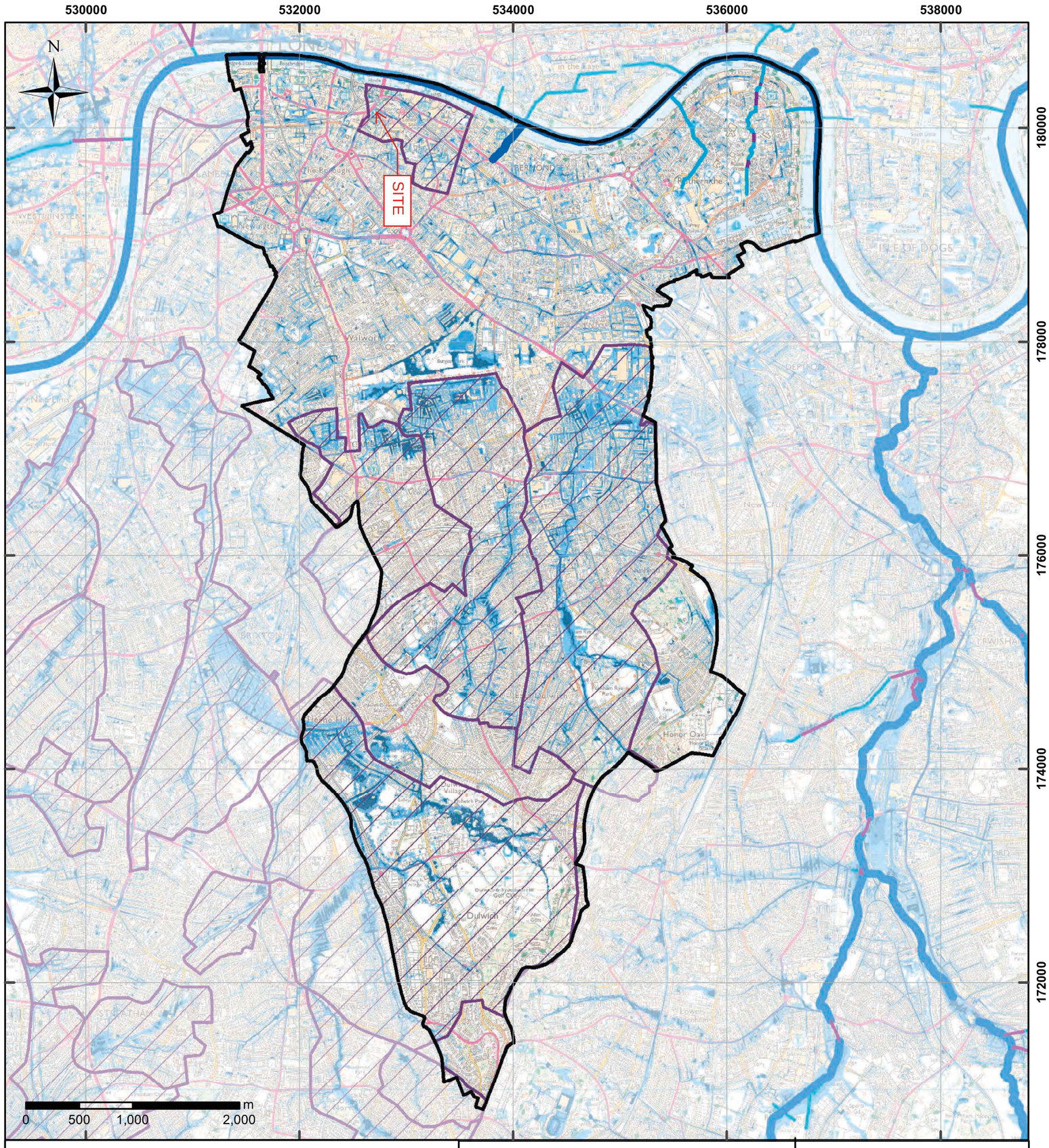
Scale at A4: 1:48,000 Scale at A3: 1:35,000 Scale at A1: 1:17,000	Date: 07/12/2016 **MAP A2**

London Borough of Southwark

Southwark Council

Strategic Flood Risk Assessment

Licensing Information:



Legend

- Southwark Borough Boundary
- Main River
- Ordinary Watercourse
- Culvert
- Critical Drainage Area
- High Risk of Flooding (1 in 30 years)
- Medium Risk of Flooding (1 in 100 years)
- Low Risk of Flooding (1 in 1000 years)

Flood Map for Surface Water

JONWAY AECOM
Shaping London's Highways

Sunley House, 4 Bedford Park
Croydon, Surrey, CR0 2AP

Tel: +44 (0) 208 639 3500
www.aecom.com

GIS:	Checked:	Approved:
AD	SB	GP

Scale at A4: 1:48,000
Scale at A3: 1:35,000
Scale at A1: 1:17,000

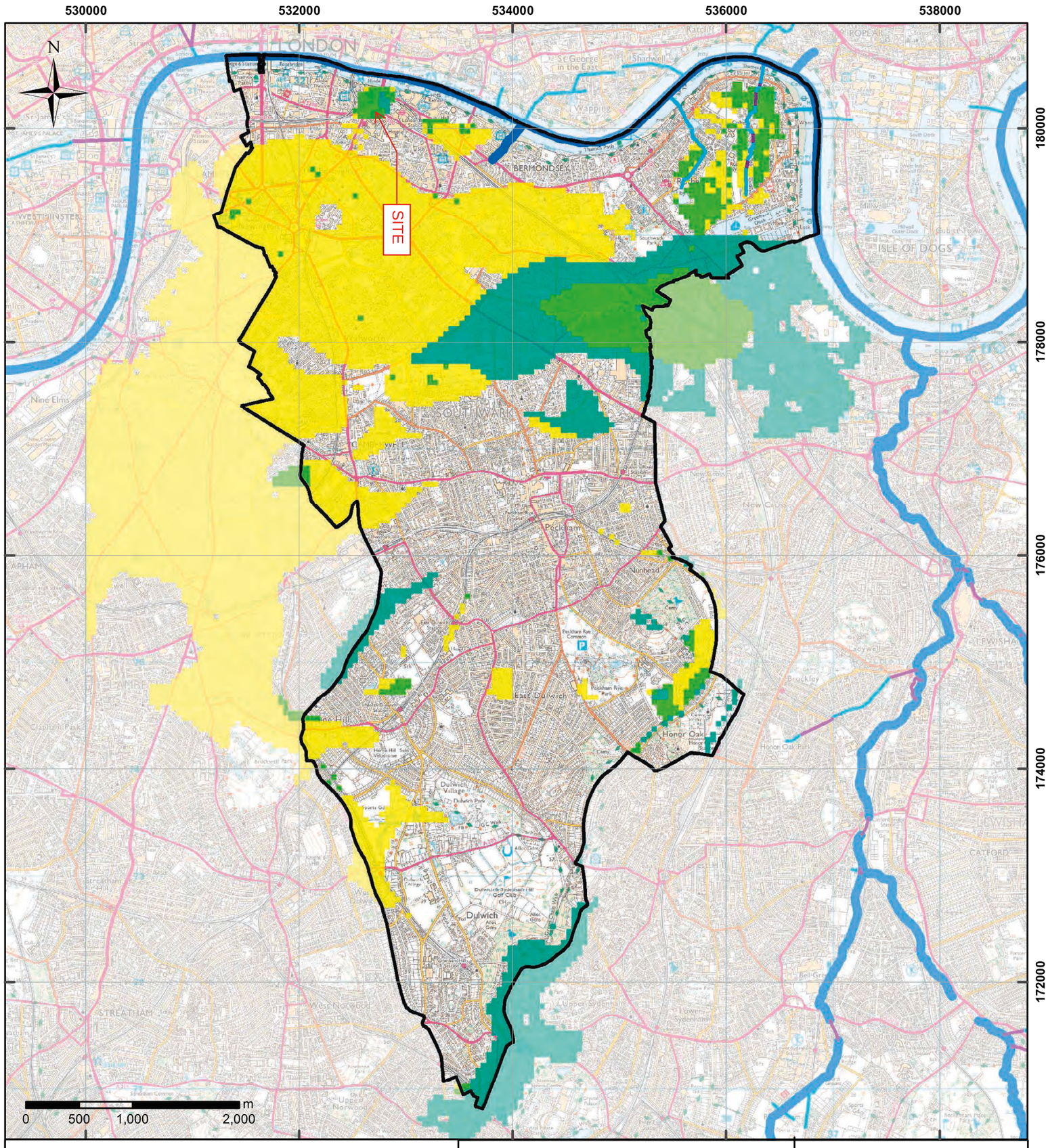
Date: 07/09/2016

MAP A4

London Borough of Southwark

Southwark Council

Strategic Flood Risk Assessment



Legend

- Southwark Borough Boundary
- Main River
- Ordinary Watercourse
- Culvert
- Limited potential for groundwater flooding to occur
- Potential for groundwater flooding of property situated below ground level
- Potential for groundwater flooding to occur at surface

Areas at Risk of Flooding from Groundwater

CONWAY AECOM
Shaping London's Highways

Sunley House, 4 Bedford Park
Croydon, Surrey, CR0 2AP

Tel: +44 (0) 208 639 3500
www.aecom.com

London Borough of Southwark

Southwark Council

Strategic Flood Risk Assessment

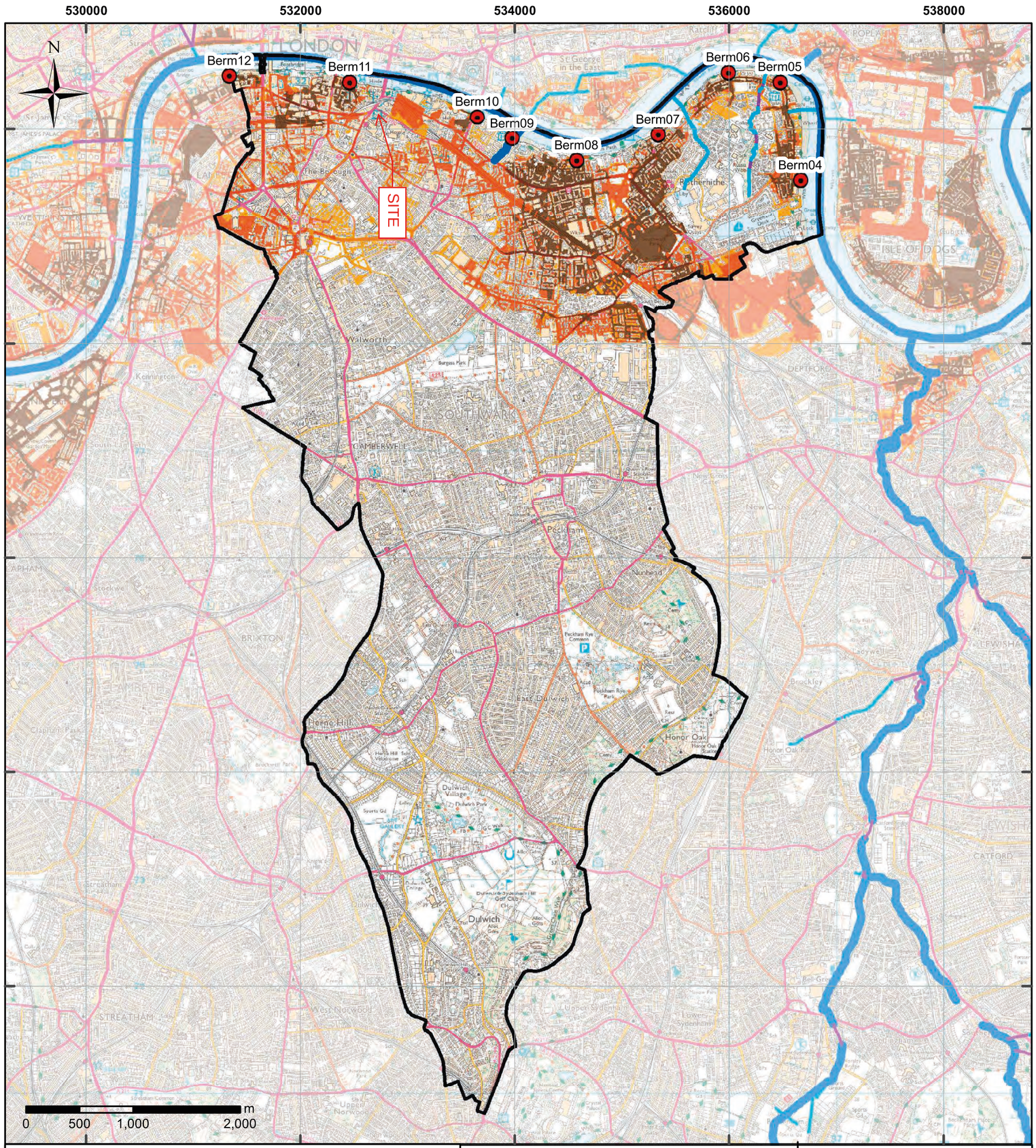
GIS:	Checked:	Approved:
AD	SB	GP

Scale at A4: 1:48,000
Scale at A3: 1:35,000
Scale at A1: 1:17,000

Date: 15/09/2016

MAP A5

Licensing Information:



Legend

- Southwark Borough Boundary
- Main River
- Ordinary Watercourse
- Culvert
- Breach Location

Maximum Predicted Flood Extent - Year

- 2014
- 2065
- 2100

Breach Assessment Maximum Predicted Flood Extents

JONWAY AECOM
Shaping London's Highways

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Croydon, Surrey, CR0 2AP

Tel: +44 (0) 208 639 3500
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London Borough of Southwark

Southwark Council

Strategic Flood Risk Assessment

GIS:	Checked:	Approved:
AD	SB	GP

Scale at A4: 1:48,000
Scale at A3: 1:35,000
Scale at A1: 1:17,000

Date: 15/09/2016

MAP A8.1

Licensing Information:

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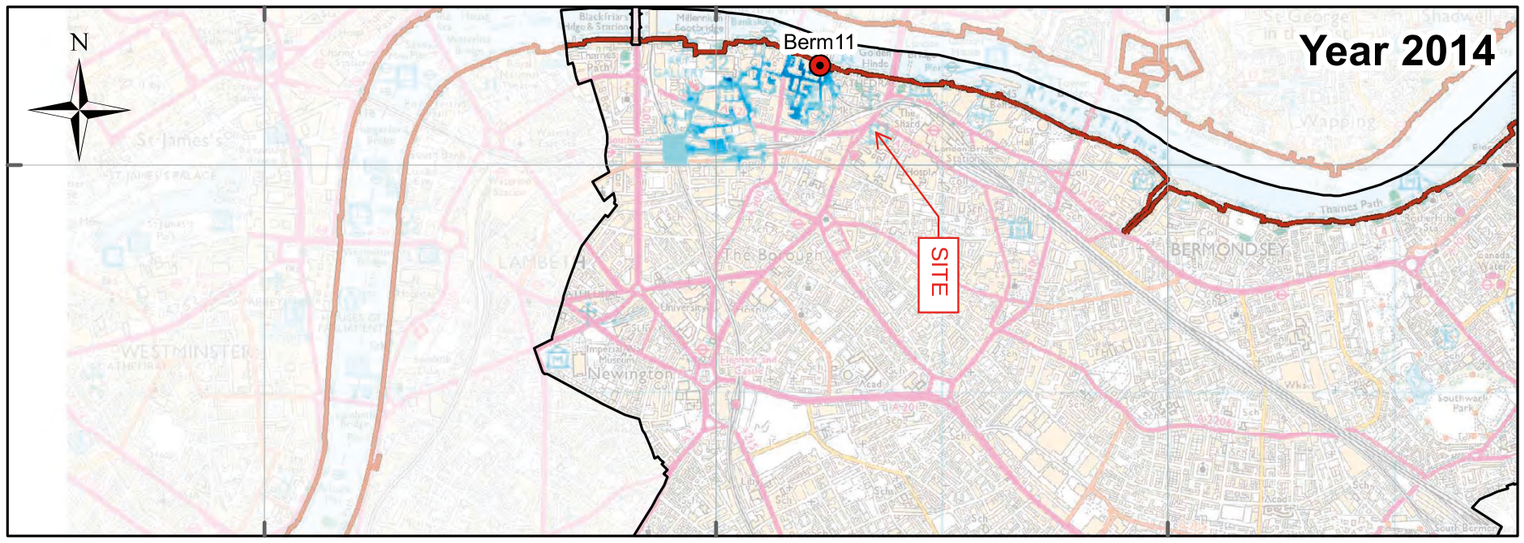
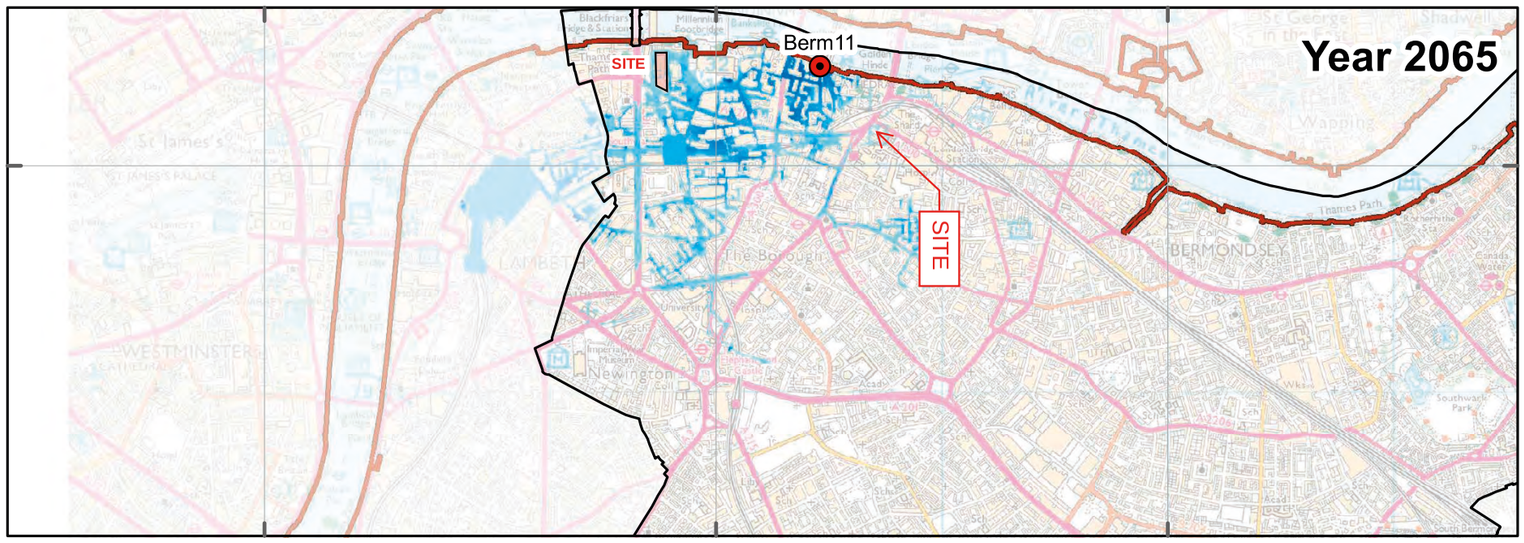
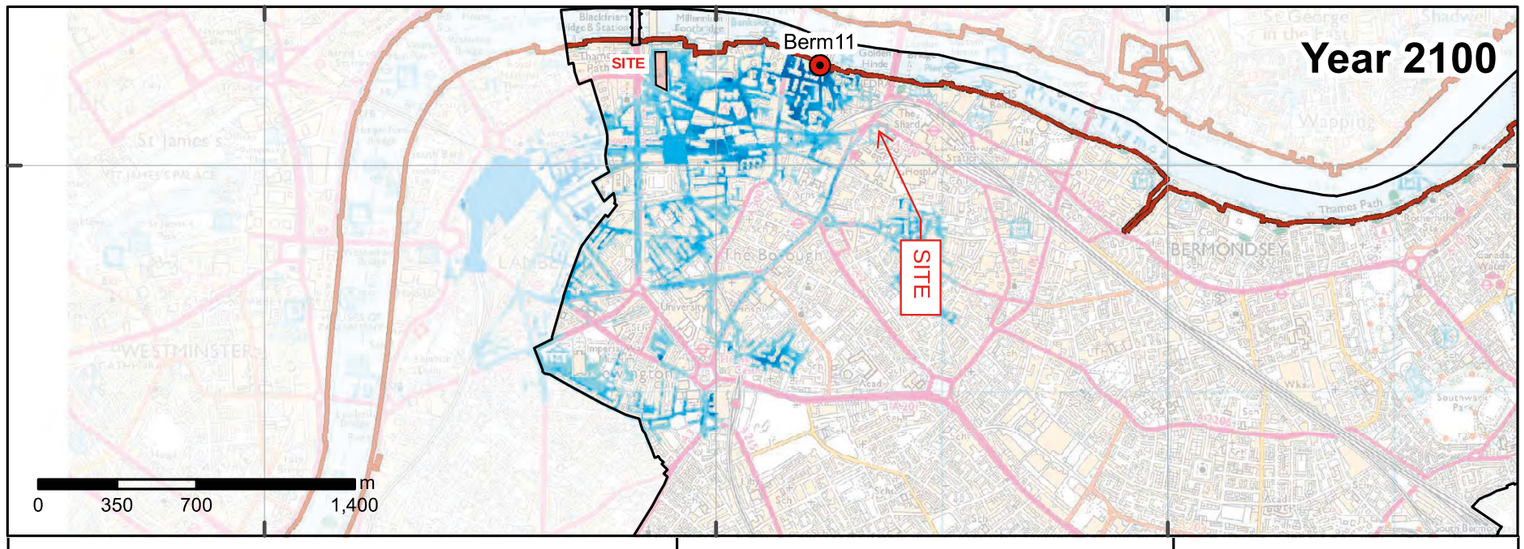






Legend

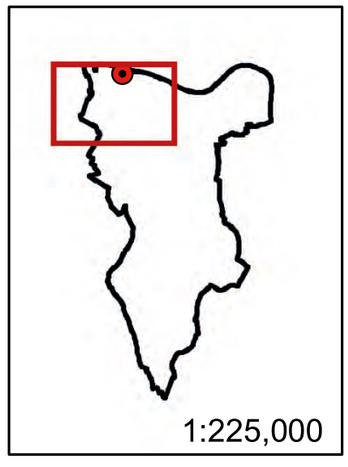
- Borough Boundary
- Breach Location
- Flood Defence

Flood Depth (m)

High : 14

Medium : 7

Low : 0



Berm11
Breach Assessment
Flood Depth

CONWAY AECOM
Shaping London's Highways

Sunley House, 4 Bedford Park
Croydon, Surrey, CR0 2AP

Tel: +44 (0) 208 639 3500
www.aecom.com

London Borough of Southwark

Southwark Council

Strategic Flood Risk Assessment

GIS:	Checked:	Approved:
AD	SB	GP

Scale at A4: 1:33,500
Scale at A3: 1:23,500
Scale at A1: 1:11,500

Date: 15/09/2016

MAP A8.2.8

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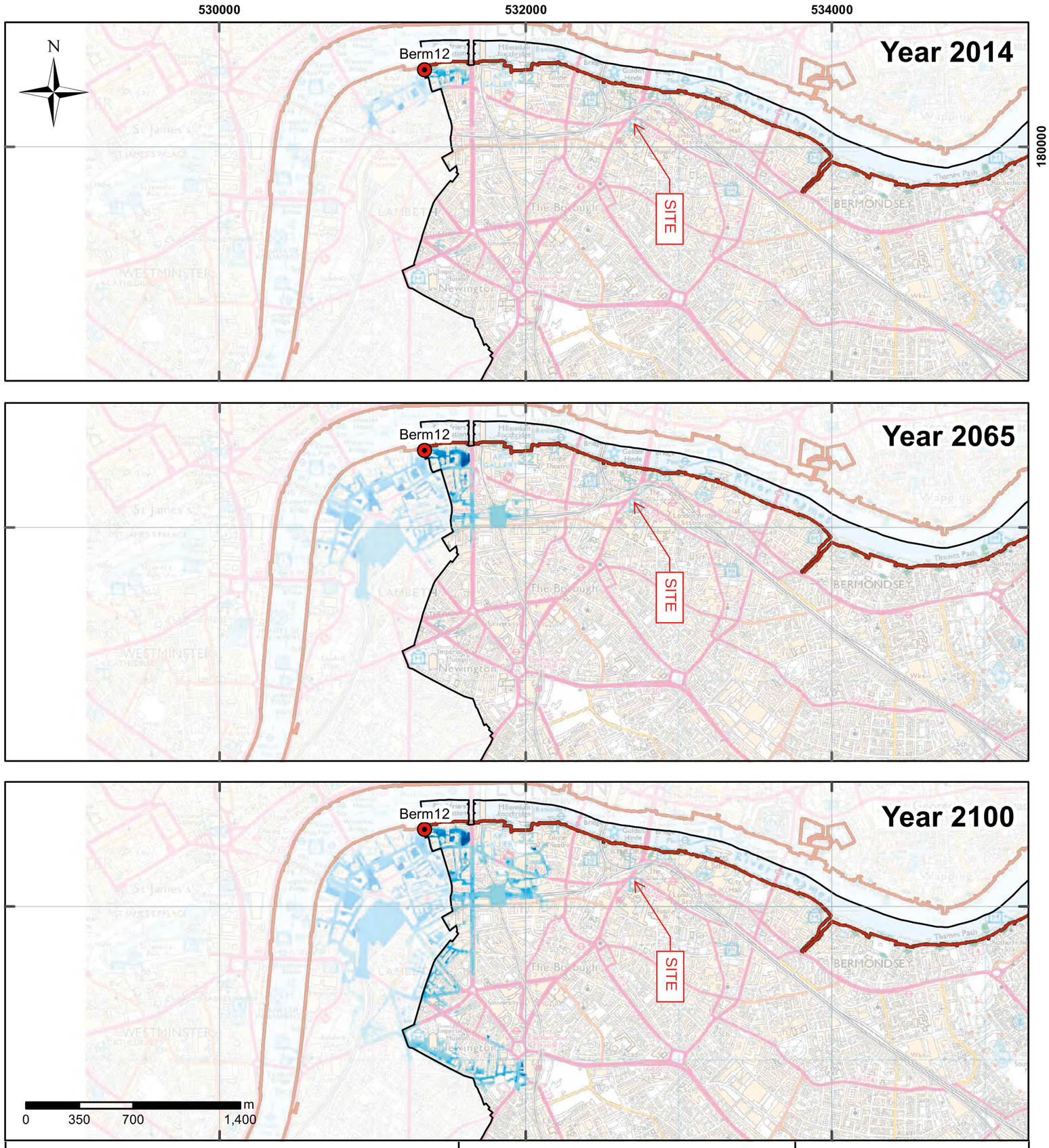


Legend

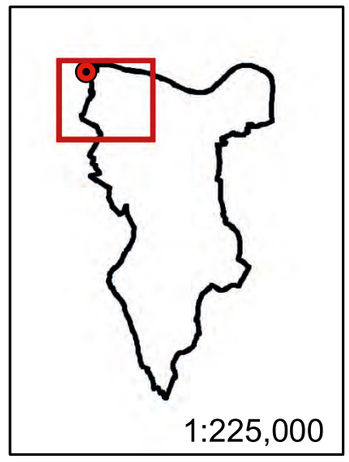
- Borough Boundary
- Breach Location
- Flood Defence

Flood Depth (m)

High : 14

Medium : 7

Low : 0



Berm12
Breach Assessment
Flood Depth

CONWAY AECOM
Shaping London's Highways

Sunley House, 4 Bedford Park
Croydon, Surrey, CR0 2AP

Tel: +44 (0) 208 639 3500
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London Borough of Southwark

Southwark Council

Strategic Flood Risk Assessment

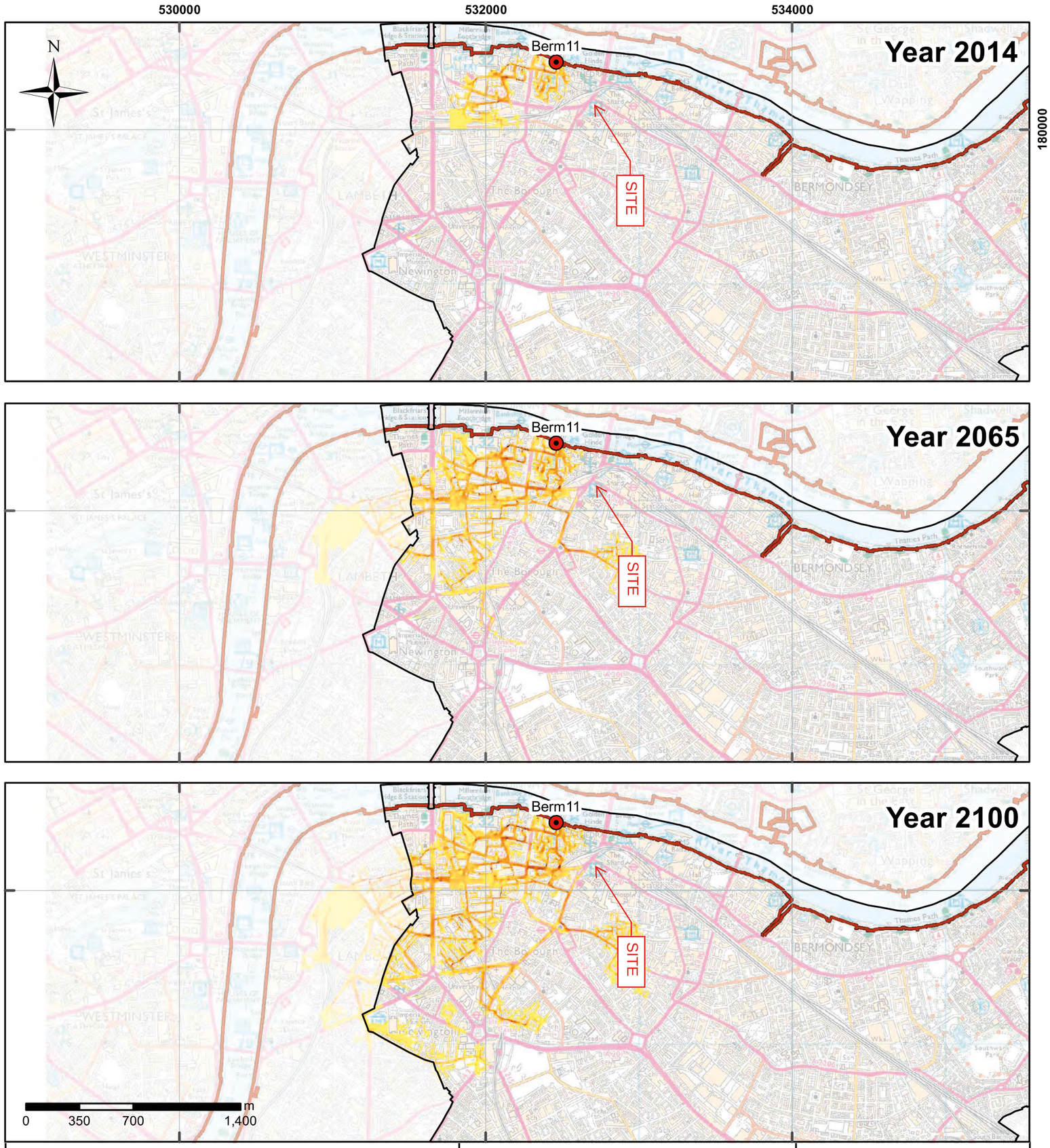
GIS:	Checked:	Approved:
AD	SB	GP

Scale at A4: 1:33,500
Scale at A3: 1:23,500
Scale at A1: 1:11,500

Date: 15/09/2016

MAP A8.2.9

Licensing Information:

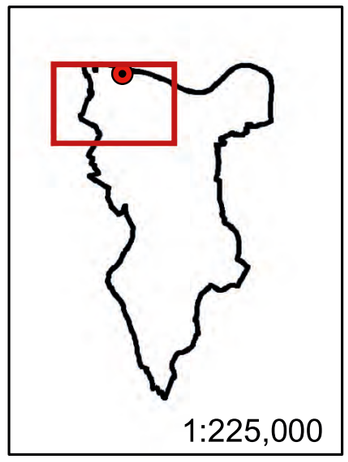


Legend

- Borough Boundary
- Breach Location
- Flood Defence

Velocity (m/s)

- High : 9.15
- Medium : 4.5
- Low : 0



Berm11
Breach Assessment
Flood Velocity

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Croydon, Surrey, CR0 2AP

Tel: +44 (0) 208 639 3500
www.aecom.com

London Borough of Southwark

Southwark Council

Strategic Flood Risk Assessment

GIS:	Checked:	Approved:
AD	SB	GP

Scale at A4: 1:33,500	Date: 15/09/2016
Scale at A3: 1:23,500	
Scale at A1: 1:11,500	**MAP A8.2.8**

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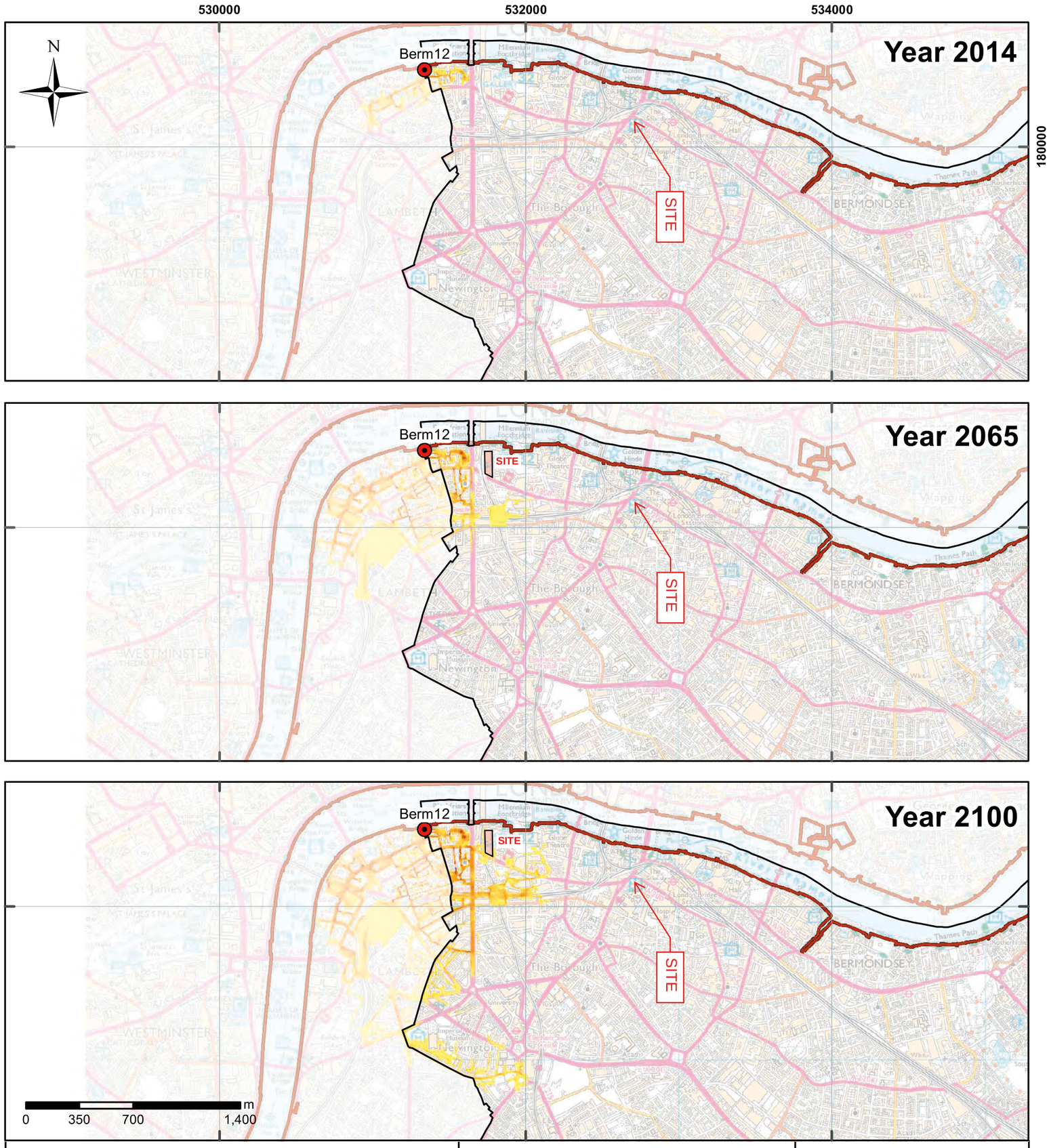
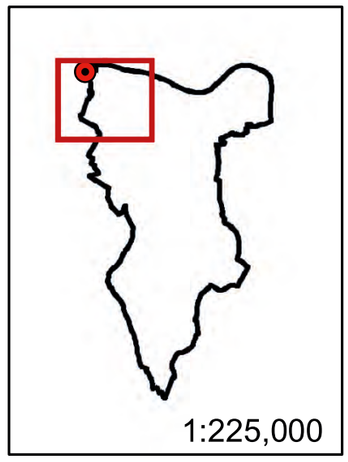


Legend

- Borough Boundary
- Breach Location
- Flood Defence

Velocity (m/s)

- High : 9.15
- Medium : 4.5
- Low : 0



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GIS:	Checked:	Approved:
AD	SB	GP

Scale at A4: 1:33,500
Scale at A3: 1:23,500
Scale at A1: 1:11,500

Date: 15/09/2016

MAP A8.2.9

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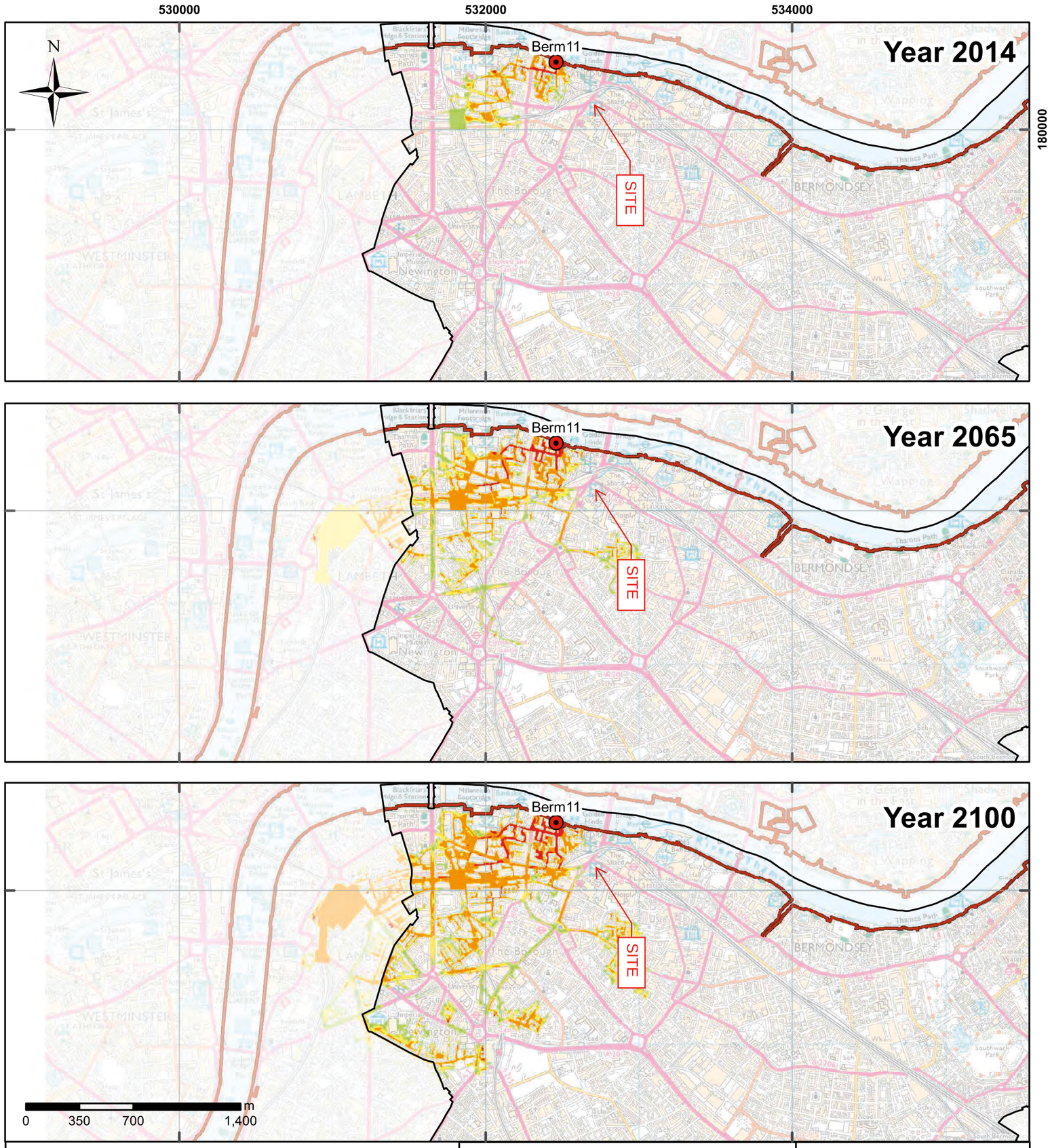
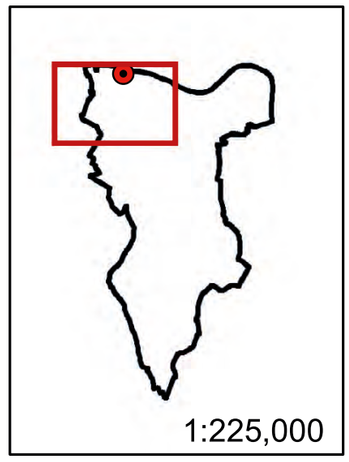


Legend

- Borough Boundary
- Breach Location
- Flood Defence

Maximum Hazard

- Less than 0.75 (Low Hazard)
- Between 0.75 and 1.25 (Danger for Some)
- Between 1.25 and 2.00 (Danger for Most)
- Greater than 2.00 (Danger for All)



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Breach Assessment
Flood Hazard

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GIS:	Checked:	Approved:
KLD	AD	GP

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Scale at A1: 1:11,500

Date: 20/12/2016

MAP A8.4.8

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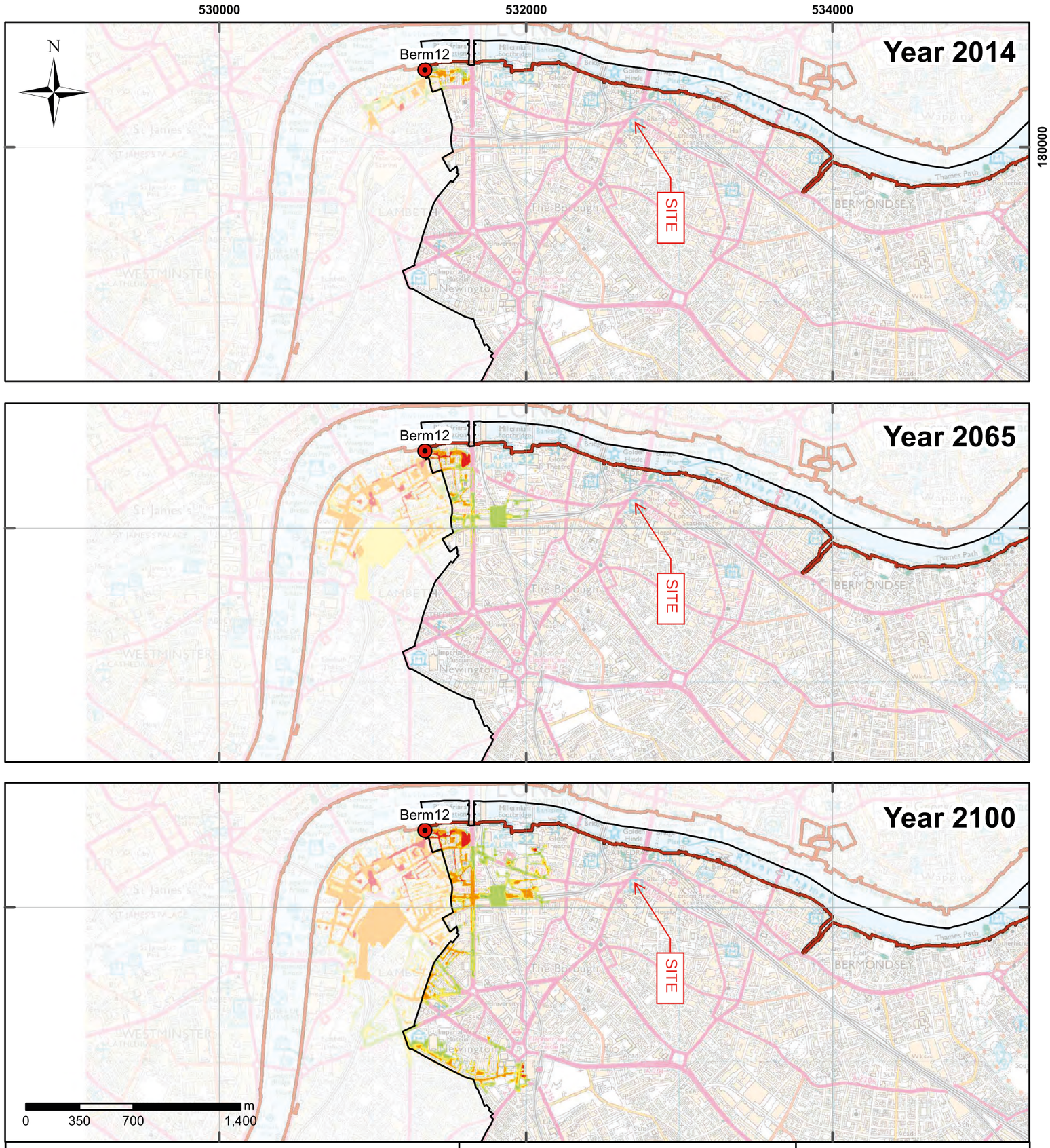
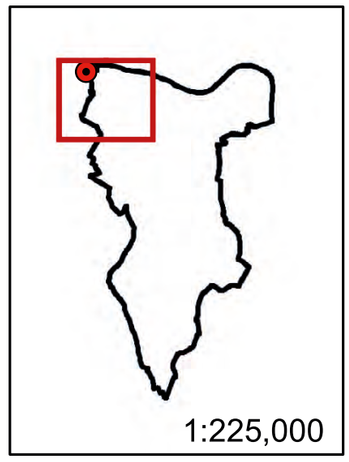


Legend

- Borough Boundary
- Breach Location
- Flood Defence

Maximum Hazard

- Less than 0.75 (Low Hazard)
- Between 0.75 and 1.25 (Danger for Some)
- Between 1.25 and 2.00 (Danger for Most)
- Greater than 2.00 (Danger for All)



Berm12
Breach Assessment
Flood Hazard

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Scale at A4: 1:33,500
Scale at A3: 1:23,500
Scale at A1: 1:11,500

Date: 20/12/2016

MAP A8.4.9

London Borough of Southwark

Southwark Council

Strategic Flood Risk Assessment

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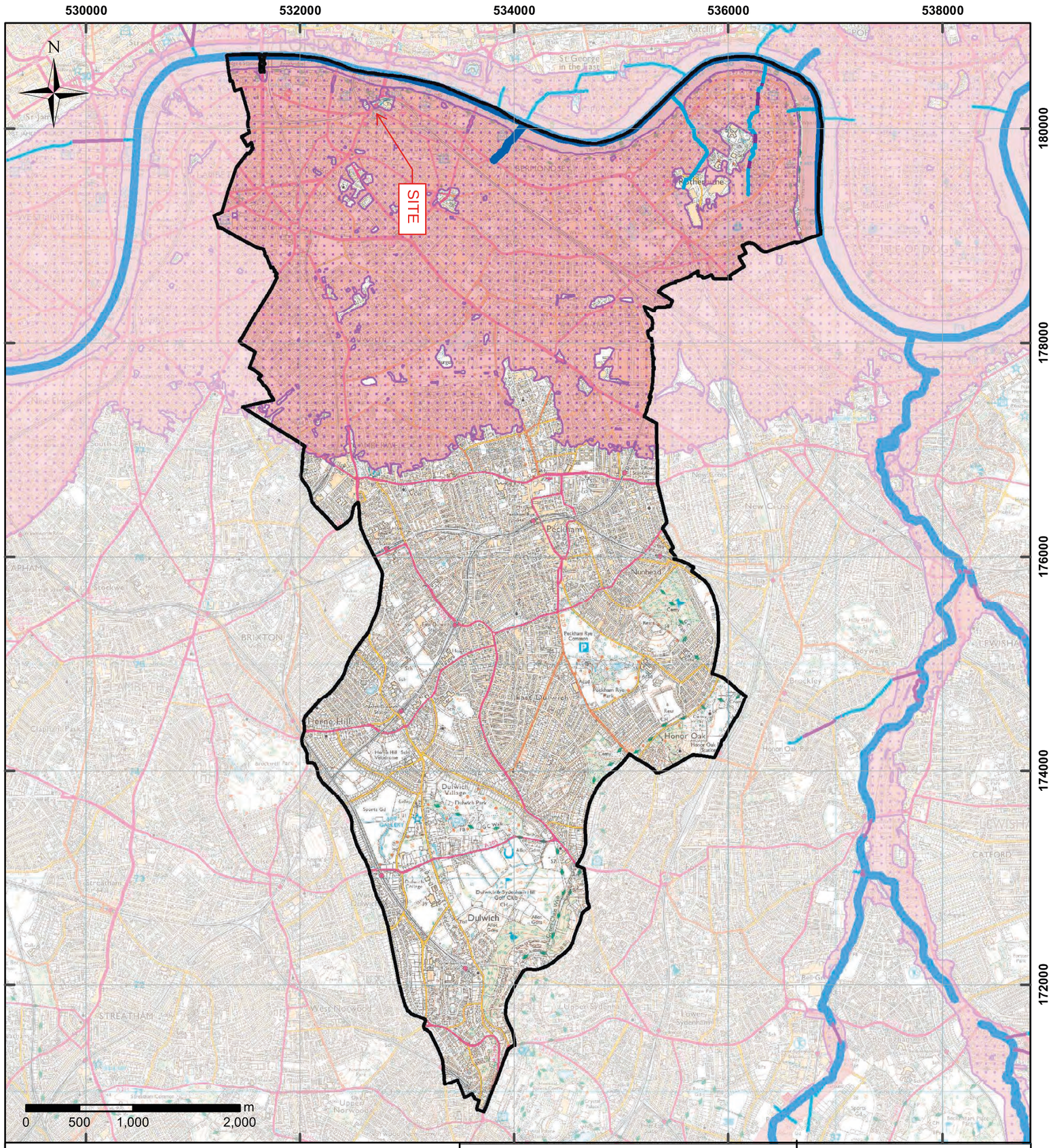

Legend

- Southwark Borough Boundary
- Main River
- Ordinary Watercourse
- Culvert
- Flood Warning Area
- Flood Alert Area

Emergency Flood Planning

London Borough of Southwark

Strategic Flood Risk Assessment

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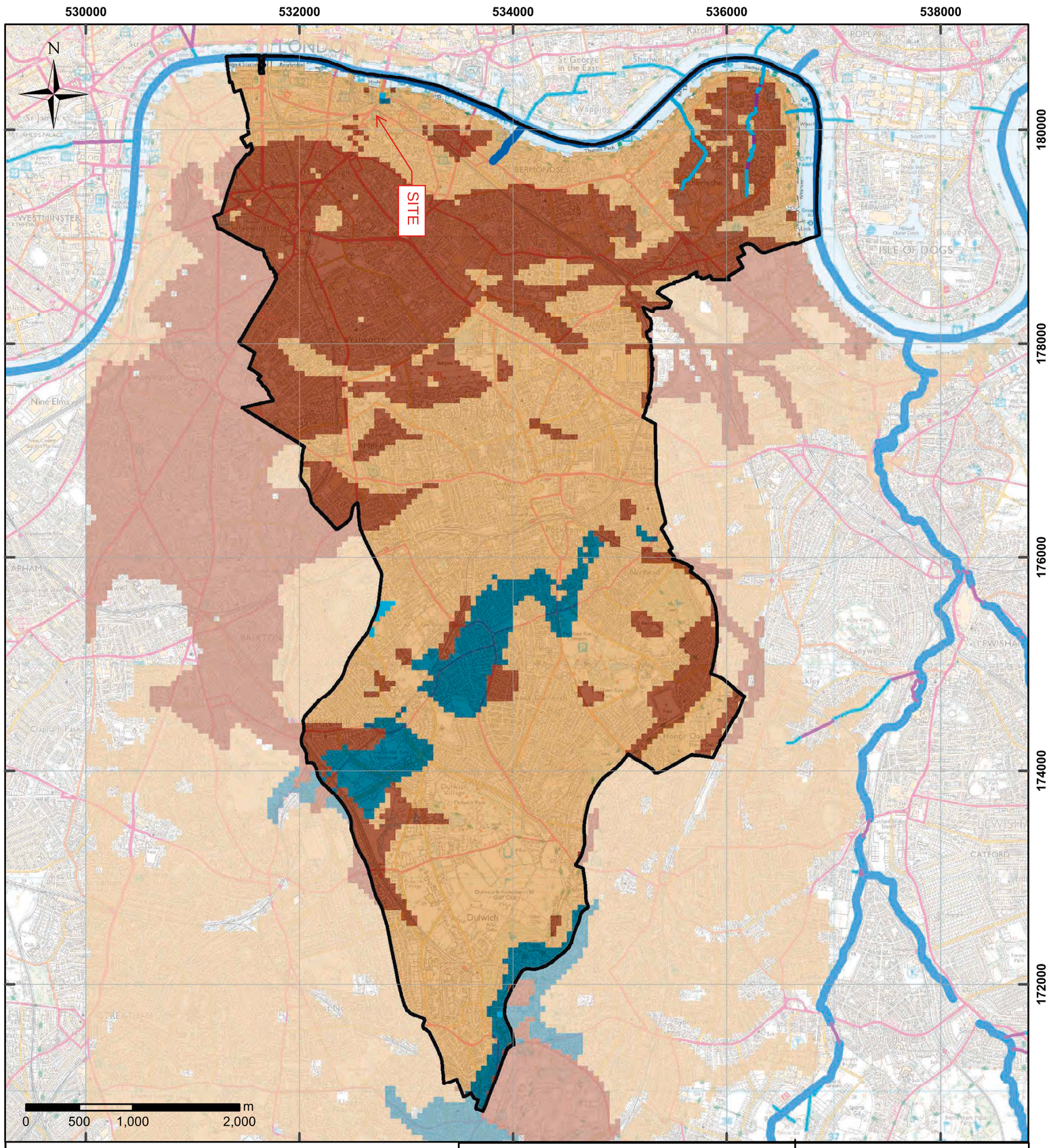
Scale at A4: 1:48,000
Scale at A3: 1:35,000
Scale at A1: 1:17,000

Date: 15/09/2016

MAP A9



Legend

- Southwark Borough Boundary
- Main River
- Ordinary Watercourse
- Culvert

Subsurface Suitability for Infiltration SuDS

- Highly Suitable
- Probably Suitable
- Potentially Suitable for Bespoke Designs
- Unlikely to be Suitable

SuDS Infiltration Suitability

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GIS:	Checked:	Approved:
KLD	AD	GP

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Scale at A3: 1:35,000
Scale at A1: 1:17,000

Date: 05/12/2016

MAP A11

London Borough of Southwark

Southwark Council

Strategic Flood Risk Assessment

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3948
New City Court

Appendix C

Thames Water Correspondence

Sewer Flooding

History Enquiry

Property Searches

AKT II Ltd

St John Street

Search address supplied	New City Court 20 St Thomas Street London SE1 9RS

Your reference	3948 - New City Court
Our reference	SFH/SFH Standard/2021_4383109
Received date	**17 March 2021**
Search date	**29 March 2021**

Thames Water Utilities Ltd
Property Searches, PO Box 3189, Slough SL1 4WW
DX 151280 Slough 13

Sewer Flooding

History Enquiry

Property Searches

Search address supplied: New City Court,20,St Thomas Street,London,SE1 9RS

This search is recommended to check for any sewer flooding in a specific address or area

TWUL, trading as Property Searches, are responsible in respect of the following:-

(i) any negligent or incorrect entry in the records searched;

(ii) any negligent or incorrect interpretation of the records searched;

(iii) and any negligent or incorrect recording of that interpretation in the search report

(iv) compensation payments

Sewer Flooding

History Enquiry

Thames Water Property Searches

History of Sewer Flooding

Is the requested address or area at risk of flooding due to overloaded public sewers?

The flooding records held by Thames Water indicate that there have been no incidents of flooding in the requested area as a result of surcharging public sewers.

For your guidance:

- A sewer is “overloaded” when the flow from a storm is unable to pass through it due to a permanent problem (e.g. flat gradient, small diameter). Flooding as a result of temporary problems such as blockages, siltation, collapses and equipment or operational failures are excluded.
- “Internal flooding” from public sewers is defined as flooding, which enters a building or passes below a suspended floor. For reporting purposes, buildings are restricted to those normally occupied and used for residential, public, commercial, business or industrial purposes.
- “At Risk” properties are those that the water company is required to include in the Regulatory Register that is presented annually to the Director General of Water Services. These are defined as properties that have suffered, or are likely to suffer, internal flooding from public foul, combined or surface water sewers due to overloading of the sewerage system more frequently than the relevant reference period (either once or twice in ten years) as determined by the Company’s reporting procedure.
- Flooding as a result of storm events proven to be exceptional and beyond the reference period of one in ten years are not included on the At Risk Register.
- Properties may be at risk of flooding but not included on the Register where flooding incidents have not been reported to the Company.
- Public Sewers are defined as those for which the Company holds statutory responsibility under the Water Industry Act 1991.
- It should be noted that flooding can occur from private sewers and drains which are not the responsibility of the Company. This report excludes flooding from private sewers and drains and the Company makes no comment upon this matter.
- For further information please contact Thames Water on Tel: 0800 316 9800 or website www.thameswater.co.uk

Thames Water Utilities Ltd
Property Searches, PO Box 3189, Slough SL1 4WW
DX 151280 Slough 13

3948
New City Court

Appendix D

AKT II Deskstudy Extract

4 Ground Conditions

4.1 Typical Geology

Alluvium

Alluvium consists of a variety of materials ranging from soft compressible variable clays to silts, sands, gravels and also commonly contain organic material in the form of peat and vegetation remains. It may have previously been removed during excavations of the existing site and replaced by Made Ground, therefore it is only likely to be anticipated of a thickness of 0.5m to 1m.

Terrace Gravels

Terrace Gravels are a mixture of quartz sand, comminuted quartz and mainly brown flint and chert gravel. The proportions of sand and gravel vary considerably in short lateral and vertical distances, depending on the local conditions at deposition. There are also frequent zones of finer-grained material, such as clay and silty sand and even occasional organic deposits. The Terrace Gravel is typically medium dense to dense orange brown, very sandy (medium to coarse) sub-angular to sub-rounded, fine to coarse, flint gravel.

It is anticipated that it is likely to encounter Terrace Gravels at thickness of approximately 1.5-5.5m underlying the site.

London Clay

London Clay is well documented locally and is generally weathered with silty sandy bands and Limestone nodules, becoming firm grey fissured silty clay with depth. It is generally characterised by a high plasticity, high shrinkage potential, low to very low compressibility and low hydraulic conductivity.

It is anticipated that it is likely to encounter London Clay at thicknesses of approximately 20-25m underlain the site.

Lambeth Group

Lambeth Group is well documented throughout the London and Hampshire basins, comprising of a variable series of clay, loam, sand and pebble beds which are locally cemented into sandstone or conglomerate. It consists of three formations

The Reading Formation is a series of lenticular mottled clays and masses of fine sands converted into quartzite.

The Woolwich Formation consists of grey clays and pale sands, often full of estuarine shells with pebble beds located at the base.

The Upnor formation consists of light coloured false bedded sands. Where it overlies Thanet Sands, it is formed of an argillaceous greensand with rounded flint pebbles. Where it directly overlies chalk, it is more clayey and the flints are less rounded and are green-coated.

It is anticipated that it is likely to encounter the Lambeth Group at thicknesses of approximately 15-17m underlying the clay.

Thanet Beds

The Thanet Sand formation is the oldest deposit from the Palaeogene. At the base, the "Bullhead bed" comprising a conglomerate of rounded flint pebbles and almost unworn nodular flints "Bullhead". The flints are typically coated with dark green glauconite and lie within a matrix of glauconitic sandy clay. The bulk of the Thanet Sand comprises of silty, fine-grained sand. The colour varies between greenish and brownish grey. At the surface, the sands weather to a pale yellowish grey.

It is anticipated that it is likely to encounter Thanet Sands at thicknesses of approximately 10-11m.

Upper Chalk

The Upper Chalk band is softer than the Middle Chalk. Flints are abundant as a general rule. The base of the division is a hard band called the Chalk Rock, which in the area north of the Thames, is the most prominent horizon in the Chalk. It consists of one or more beds of hard, creamy limestone each approximately 1 foot thick, usually with scattered green grains of glauconite. Between the creamy limestone bands are layers of hard nodular chalk formed in a softer matrix.

Risks

Although the boreholes purchased from BGS provide a good indication of the likely conditions on the site, it is recommended that a full site investigation is carried out in order to investigate the ground conditions specific to the site.

Preliminary geotechnical design parameters are advised in this report. This data is based on referenced material and AKT II's experience of the geology local to the site and will be confirmed by a comprehensive, site specific investigation.

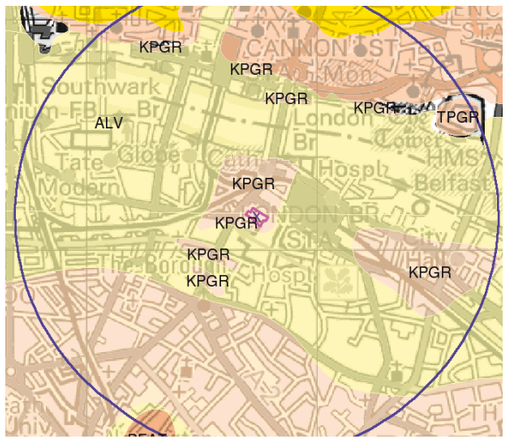


Figure 4.1 Superficial geology

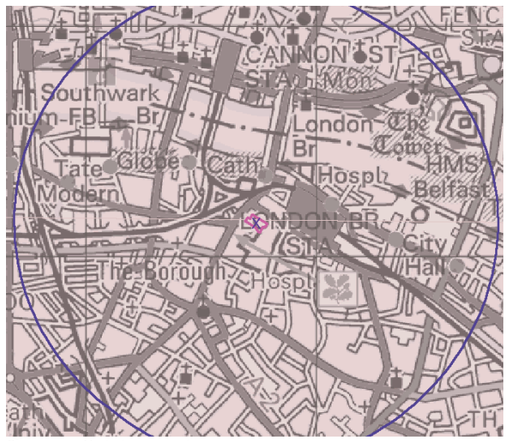


Figure 4.2 Underlaying geology

Figure 4.3 Topography 3D Map

Superficial Geology

Map Colour	Lex Code	Rock Name	Rock Type	Min and Max Age
	ALV	Alluvium	Clay and Silt	Flandrian - Pleistocene
	KPGR	Kempton Park Gravel Formation	Sand and Gravel	Devensian - Ipswichian
	LASI	Langley Silt Member	Silt	Devensian - Ipswichian
	TPGR	Taplow Gravel Formation	Sand and Gravel	Wolstonian - Chokierian
	HAGR	Hackney Gravel Member	Sand and Gravel	Wolstonian - Chokierian
	PEAT	Peat	Peat [Unlithified Deposits Coding Scheme]	Quaternary - Ryazanian

Bedrock and Faults

Map Colour	Lex Code	Rock Name	Rock Type	Min and Max Age
	LC	London Clay Formation	Clay	Eocene - Eocene
	LMBE	Lambeth Group	Clay, Silt, Sand and Gravel	Paleocene - Paleocene

Figure 4.4 Geology strata

4.2 Anticipated Ground Conditions

The results from the Envirocheck report form the outline description of the ground conditions and borehole information taken within close vicinity to the site.

This allows an initial picture to be developed of the underlying geology and depth of the key layers outlined in section 4.1 although none of the boreholes have been taken directly on the site of the proposed development.

Whilst no boreholes are available for the actual site the borehole records that are available from the wider area (Figure 4.5) indicate the site to be highly consistent in terms of the depth of each layer of strata below the surface.

The deep borehole logs show that the London Clay extends only to a depth of approximately 27 m, and sits on the Lambeth group layer.

The superficial geology and borehole logs showed the site to be underlaid by 5 main layers:

Made ground

Made ground is a layer of fill material considered to have little or no bearing capacity, usually consisting of a variety of materials, often sands and gravels but in some cases concrete and brick among other substances. The thickness of the made ground, and its composition, vary accross the borehole logs. On the Eastern side within the site of Guy's & St. Thomas' a larger thickness of made ground is found ranging from 9m to 12.5m (Boreholes 4 & 5). The investigations have found the made ground to consist of topsoil, coarse gravel sized brick, concrete, flint and some coal fragments.

Alluvium

The alluvium layer is found in three out of the 5 chosen borehole logs (1,2 &3) which range from 40-110mm in thickness, therefore it is possible that alluvium will be found on site. The alluvium consists of a 'soft bluish-grey mottled grey and black sandy clay'. The stiffness range in laboratory tests range from very soft to stiff in nature.

Kempton Park Gravels

Kempton Park Gravels are a form of terrace gravels, a layer of material deposited by the river and are a mixture of quartz sand, comminuted quartz and mainly brown flint and chert gravel. From the borehole logs it is assumed that the site may experience terrace gravels from om to -6m (AOD).

London Clay

London Clay is well documented locally and the clay located can be expected to be approximately 20m in depth. Formation is described to consist of stiff to very stiff grey-brown clay with occasional pockets of light grey silt.

During the construction of the Shard, located close to the proposed New city Court site, a fault was discovered below the site running north-to-south direction, with a downthrow of about 6m to the SE. This is documented in Pile test reported by Byrne Looby partners in 2012. To the West another fault of similar displacement and orientation was encountered during the JLE construction. Along these two geological faults, the ground forms a minor horst feature, with marginally elevated London clay.

Lambeth Group

Lambeth group is expected to be in between 30m and 35m below ground level and consists of a very stiff clay matrix, either grey or multicoloured fissured clay, with gravel, green gravelly sand or green shelly gravelly clay pebbles.

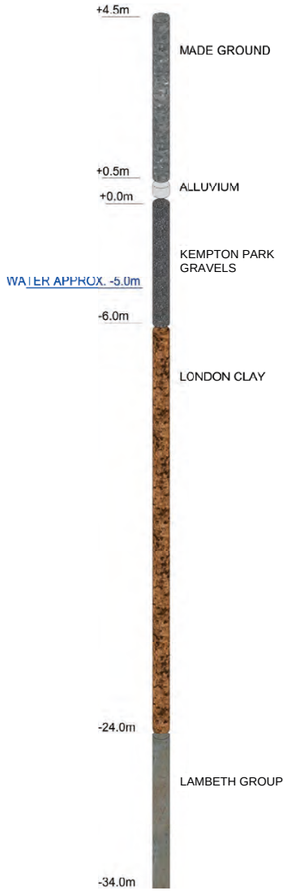


Figure 4.5 Predicted borehole diagram

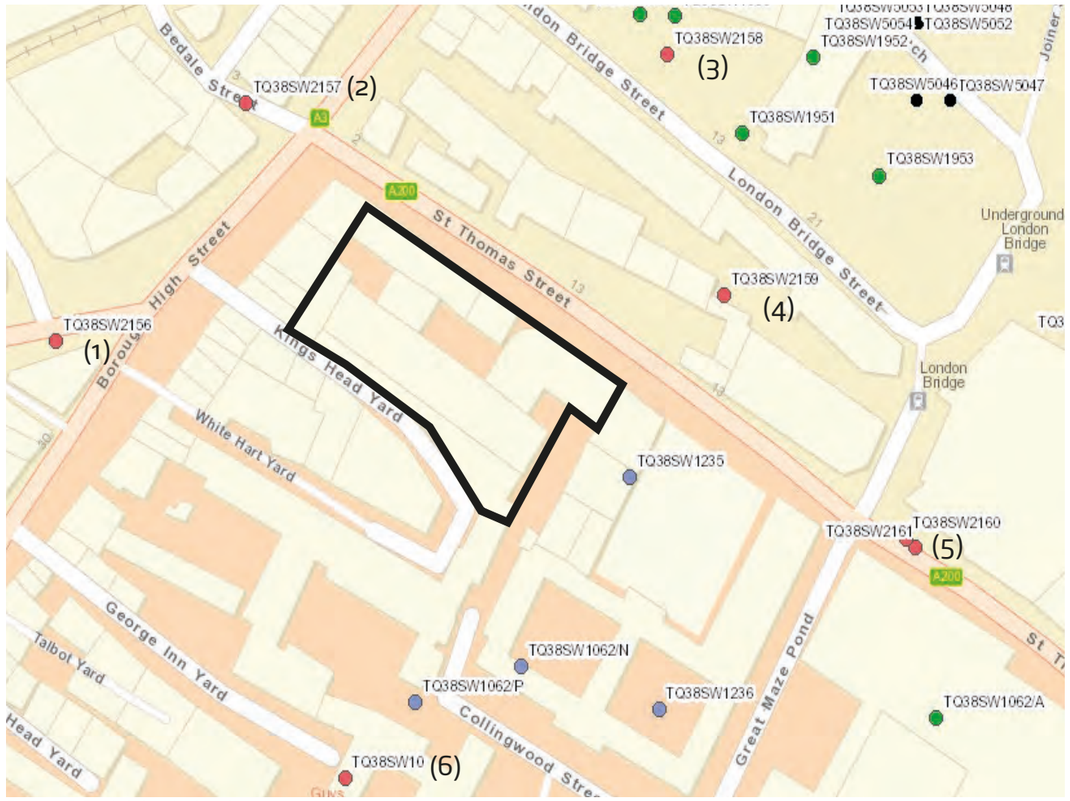


Figure 4.6 Borehole location key plan map

4.3 Hydrogeology and hydrology

4.3.1 Environmental Agency Classification

A Principal Aquifer is defined by the Environment Agency as layers of rock or drift deposits that have high intergranular and/or fracture permeability - meaning they usually provide a high level of water storage. They may support water supply and/or river base flow on a strategic scale.

A Secondary A Aquifer is defined by the environment Agency as permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers.

A Secondary B Aquifer is defined by the Environment Agency as predominantly lower permeability layers which may store and yield limited amounts of groundwater due to localised features such as fissures, thin permeable horizons and weathering.

A Secondary Undifferentiated (U) Aquifer is defined by the Environment Agency as has been assigned in cases where it has not been possible to attribute either category A or B to a rock type.

According to the Envirocheck Superficial Aquifer Map in Figure 4.7, the site is underlain by a Secondary A Aquifer with surrounding areas of A secondary Undifferentiated Aquifer.

According to the Bedrock Aquifer Map in Figure 4.8, the bedrock underlying the site is defined as unproductive Strata. Unproductive Strata have negligible permeability and are generally regarded as not containing groundwater in exploitable quantities. In this stratum, the groundwater flows imperceptibly and requires consideration for the risk of slow degrading pollutants.

London Clay and Lambeth Group are classified as non-aquifers and should provide a natural barrier to prevent contaminants migrating to the deep Thanet Sands and Chalk Aquifers. A summary of the hydrogeological properties of the main geological units that are anticipated to underlie the site is shown in Figure 4.9.

The superficial geology is designated as a Secondary A Aquifer with a potential for groundwater flooding owing to its close proximity with the River Thames.

4.3.2 Groundwater Level

Indications from the available boreholes suggests that the water table is generally 5m below ground level (0.00m AOD). A few boreholes show higher water which could be a result of some rain water retained in a less permeable made ground layer.

This information will be confirmed in subsequent stages further to ground investigations.

4.3.3 Source Protection zone

The EA have defined Source Protection Zones (SPZ's) for groundwater sources such as wells, boreholes and springs used for public drinking water supply. The zones are defined by the EA as outline below:

- The Inner Protection Zone is the distance travelled by groundwater from any point below the water table to the abstraction in 50 days for a particular area. It has a minimum radius of 50m.
- The Outer Protection Zone is the distance travelled by groundwater from any point below the water table to the abstraction in 400 days for a particular area. It has a minimum radius of 250m.
- The Total Catchment Zone is the area around the abstraction within which all groundwater recharge is presumed to be discharged to the source.

The SPZ Map from Envirocheck indicates that the site is not located within a Protection Zone. It is likely that the ground water abstractions are from the Chalk Aquifer. This means that there is no risk of pollutants or contaminants from the site making their way into a source of drinking water.

4.4 Construction within archaeological remains

Due to the location and previous history of the site and surrounding area, it is believed that there is a low potential for archaeological remains to be present at the site. However if archaeological remains were to be found, the presence of the existing building on the site means that they are likely to have been partially truncated by basement, foundation or service trench excavations. If archaeological remains are to be found, there are engineering principles to reduce the impact of construction on the archaeological heritage:

- Minimise the extent of excavation required for the construction
- Minimise the number of vertical penetrations
- Minimise the extent of excavation required for the foundations

Activities such as level reduction, new basement and foundation construction, new service trenches or demolition works for example will raise archaeological issues.

4.5 Risks associated with Geology

Unknown geology is often one of the biggest risks facing a project due to the difficulty in knowing the exact profile of the soil across the entire site.

The existing piled structure and the extensive works carried out in the area as part of the Jubilee line extension would suggest that the risk is low. However, issues to be aware of include:

Inclusions of weak or strong layers which can affect capacity of piles and ability to bore

- Perched water tables
- Local fissures
- Variable properties
- Existing Thames Water Sewer

Whilst this list is not exhaustive it gives a background to elements that might be encountered.

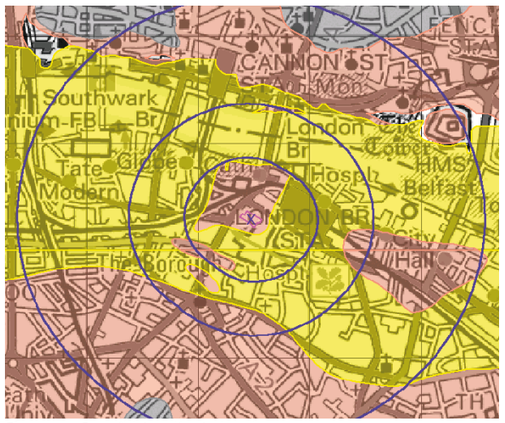


Figure 4.7 Superficial aquifer designation

Figure 4.8 Bedrock aquifer designation

Strata	Hydrogeological significance	Classification (Environment Agency)
Alluvium	Has potential to transmit relatively small quantities of water. The site is located in close vicinity of the River Thames, so it is likely to contain significant quantities of groundwater.	Secondary (U)
Terrace Gravel	Has potential to transmit significant quantities of water. The site is located in close vicinity of the River Thames and the Terrace Gravel is underlain by relatively impermeable Clay, so it is likely to contain significant quantities of groundwater.	Secondary (A)
London Clay	The London Clay is an aquitard and therefore will not contain significantly large quantities of groundwater.	Unproductive Stratum
Lambeth Group	The Lambeth Group is unlikely to contain significantly large quantities of groundwater, however the lower part of the stratum where the material has less clay content may be in hydraulic continuity with the lower layers.	Unproductive Stratum
Thanet sands	This strata is highly permeable and is often in hydraulic continuity with the underlying Chalk.	Principal Aquifer

Figure 4.9 Summary of Environmental Agency aquifer classification of the anticipated geology

3948
New City Court

Appendix E

Environment Agency Flood Data

Environment Agency

Product 4 (Detailed Flood Risk) for: New City Court, 20 St Thomas Street, SE1 9RG
Requested by: Thomas Mealey, AKT II
Reference: KSL 97505 AB
Date: 29 August 2018

Contents

The information provided is based on the best data available as of the date of this letter.

You may feel it is appropriate to contact our office at regular intervals, to check whether any amendments/ improvements to the data for this location have been made. Should you re-contact us after a period of time, please quote the above reference in order to help us deal with your query.

Please refer to the Open Government Licence which explains the permitted use of this information.

Orchard House, Endeavour Park, London Road, Addington, West Malling, Kent, ME19 5SH.
Customer services line: 020 8474 6848
Email: kslenquiries@environment-agency.gov.uk
Website: https://www.gov.uk/government/organisations/environment-agency

Environment Agency

Flood Map for Planning (Rivers and Sea)

The Flood Map:

Our Flood Map shows the natural floodplain for areas at risk from river and tidal flooding. The floodplain is specifically mapped ignoring the presence and effect of defences. Although flood defences reduce the risk of flooding they cannot completely remove that risk as they may be over topped or breached during a flood event.

The Flood Map indicates areas with a 1% (0.5% in tidal areas), Annual Exceedance Probability (AEP) - the probability of a flood of a particular magnitude, or greater, occurring in any given year, and a 0.1% AEP of flooding from rivers and/or the sea in any given year. In addition, the map also shows the location of some flood defences and the areas that benefit from them.

The Flood Map is intended to act as a guide to indicate the potential risk of flooding. When producing it we use the best data available to us at the time and also take into account historic flooding and local knowledge. The Flood Map is updated on a quarterly basis to account for any amendments required. These amendments are then displayed on the internet at https://www.gov.uk/check-flood-risk

At this Site:

The Flood Map shows that this site lies within the outline of Flood Zone 3. This zone comprises land assessed as having a 0.5% (1 in 200) or greater annual probability of tidal flooding.

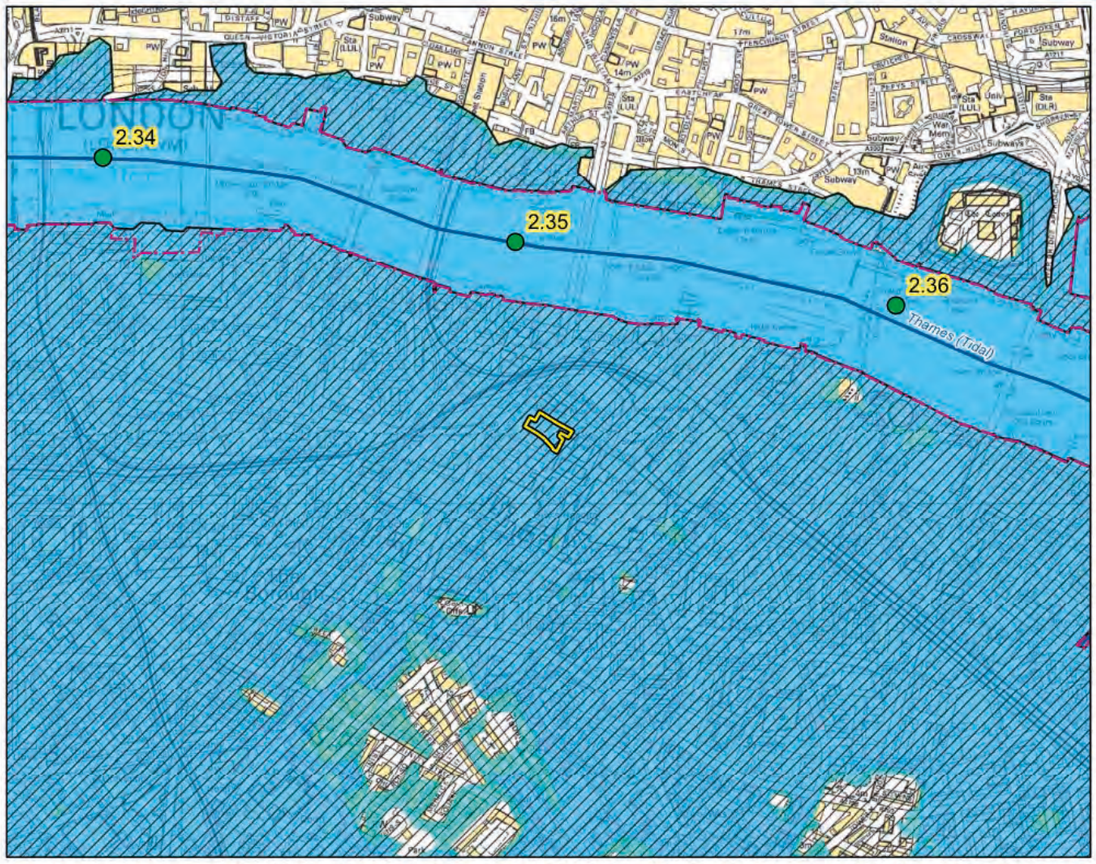
Enclosed is an extract of our Flood Map which shows this information for your area.

Method of production

The Flood Map at this location has been derived using detailed modelling of the tidal River Thames through the Thames Tidal Defences Study completed in 2006 by Halcrow Ltd.

Orchard House, Endeavour Park, London Road, Addington, West Malling, Kent, ME19 5SH.
Customer services line: 020 8474 6848
Email: kslenquiries@environment-agency.gov.uk
Website: https://www.gov.uk/government/organisations/environment-agency

Detailed FRA/FCA Map centred on SE1 9RG created 29 August 2018 [Ref: KSL 97505 AB]



Environment Agency

Scale 1: 10,000

Legend

- Site Location
- TE2100 Model Nodes
- Main Rivers
- Flood Map - Defences
- Flood Map - Flood Storage Areas
- Areas Benefiting from Flood Defences
- Flood Map - Flood Zone 3
- Flood Map - Flood Zone 2

Flood Map for Planning (assuming no defences)

Flood Zone 3 shows the area that could be affected by flooding:
- from the sea with a 0.5% or greater chance of occurring each year
- or from a river with a 1% or greater chance of occurring each year.

Flood Zone 2 shows the extent of an extreme flood from rivers or the sea with up to a 0.1% chance of occurring each year.

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Thames Estuary 2100 (TE2100)

You have requested in-channel flood levels for the tidal river Thames. These have been taken from the Thames Estuary 2100 study completed by HR Wallingford in 2008. The modelled node closest to your site is **2.35**; the locations of nearby nodes are also shown on the enclosed map.

Details about the TE2100 plan

The TE2100 plan is now live and within it are a set of levels on which the flood risk management strategy is based. The plan is the overarching flood management strategy for the Thames Estuary and therefore any development planning should be based on the same underlying data.

Details about the TE2100 in-channel levels

The TE2100 in-channel levels take into account operation of the Thames Barrier when considering future levels. The Thames Barrier requires regular maintenance and with additional closures the opportunity for maintenance will be reduced. When this happens, river levels – for which the Barrier would normally shut for the 2008 epoch – will have to be allowed through to ensure that the barrier is not shut too often. For this reason, levels upriver of the barrier will increase and the tidal walls will need to be heightened to match.

Why is there no return period for levels upriver of the barrier?

The levels upriver of the barrier are the highest levels permitted by the operation of the Thames Barrier. If levels and flows are forecast to be any higher, the Thames Barrier would shut, ensuring that the tide is blocked and the river maintained to a low level. For this reason the probability of any given water level upriver of the Barrier is controlled and therefore any associated return period becomes irrelevant. The Thames Barrier and associated defence system has a 1 in 1000 year standard which means it ensures that flood risk is managed up to an event that has a 0.1% annual probability. The probability of water levels upriver is ultimately controlled by the staff at the Thames Barrier.

For further information about the Thames Barrier please visit our website at:

https://www.gov.uk/the-thames-barrier

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TE2100 2008 levels:

Levels downriver of the Thames Barrier are 0.1% AEP (1 in 1000) and levels upriver are the highest levels permitted by the Thames Barrier, described as the Maximum Likely Water Levels (MLWLs). The defence levels (left defence, right defence) are the minimum levels to which the defences should be built.

Location	Node	Easting	Northing	Extreme water level (m)	Left defence (m)	Right defence (m)	Allow for future defence raising to a level of...	
							Left Bank (m)	Right Bank (m)
	2.33	530716	180429	4.83	5.41	5.41	6.35	6.35
	2.34	531841	180694	4.82	5.41	5.41	6.35	6.35
	2.35	532671	180524	4.81	5.41	5.41	6.35	6.35
				4.81	5.41	5.41	6.35	6.35
				4.81	5.28	5.28	6.35	6.35
Tower	2.36	533437	180397	4.80	5.28	5.28	6.35	6.35
	2.37	534519	179917	4.78	5.28	5.28	6.35	6.35

TE2100 climate change levels:

				2065 to 2100		2100	
Location	Node	Easting	Northing	Design water level	Defence level (both banks)	Design water level	Defence level (both banks)
	2.33	530715	180428	5.32	5.85	5.79	6.35
	2.34	531841	180694	5.31	5.85	5.85	6.35
	2.35	532671	180524	5.31	5.85	5.78	6.35
Tower	2.36	533437	180396	5.30	5.85	5.77	6.35
	2.37	534519	179917	5.27	5.85	5.76	6.35

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Thames Tidal Upriver Breach Inundation Modelling - 2017

The table below displays site-specific modelled flood levels at your site. These have been taken from the Thames Tidal Upriver Breach Inundation Modelling Study 2017 completed by Atkins Ltd. in May 2017.

We have developed a modelling approach where all upriver breach locations along the Thames are equitably modelled, to ensure a consistent approach across London. This modelling simulates 5679 continuous tidal breaches along the entire extent of the Thames from Teddington to the Thames Barrier. For hard and composite defences breaches are set at 20 m wide; for soft defences, breaches are 50 m wide. In both cases, the defence breach scour distance was assumed to extend into the floodplain by the same distance as the breach width.

For breaches upriver of the Thames Barrier, there is no return period for modelled levels as the levels are controlled by barrier closures. The levels used are referred to as Maximum Likely Water Levels (MLWLs). Therefore 2014 and 2100 epochs were modelled on that basis.

This model has been designed for catchment wide flood risk mapping. It should be noted that it was not created to produce flood levels for specific development sites within London.

	National Grid Reference		Modelled levels in mAODN for Max Likely Water Level	
Node	Easting	Northing	2014	2100
1	532717	180187	Nil return	4.61
2	532734	180177	Nil return	4.60
3	532754	180166	Nil return	4.72
4	532774	180154	Nil return	4.72
5	532789	180140	Nil return	4.71
6	532708	180169	Nil return	4.75
7	532733	180160	Nil return	4.73
8	532745	180145	Nil return	4.73
9	532766	180136	Nil return	4.73
10	532742	180133	Nil return	4.73
11	532761	180118	Nil return	4.72
12	532694	180155	Nil return	4.75
13	532709	180140	Nil return	4.73
14	532727	180130	Nil return	4.73

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	National Grid Reference		Modelled levels in mAODN for Max Likely Water Level	
Node	Easting	Northing	2014	2100
15	532741	180115	Nil return	4.73
16	532756	180102	Nil return	4.72

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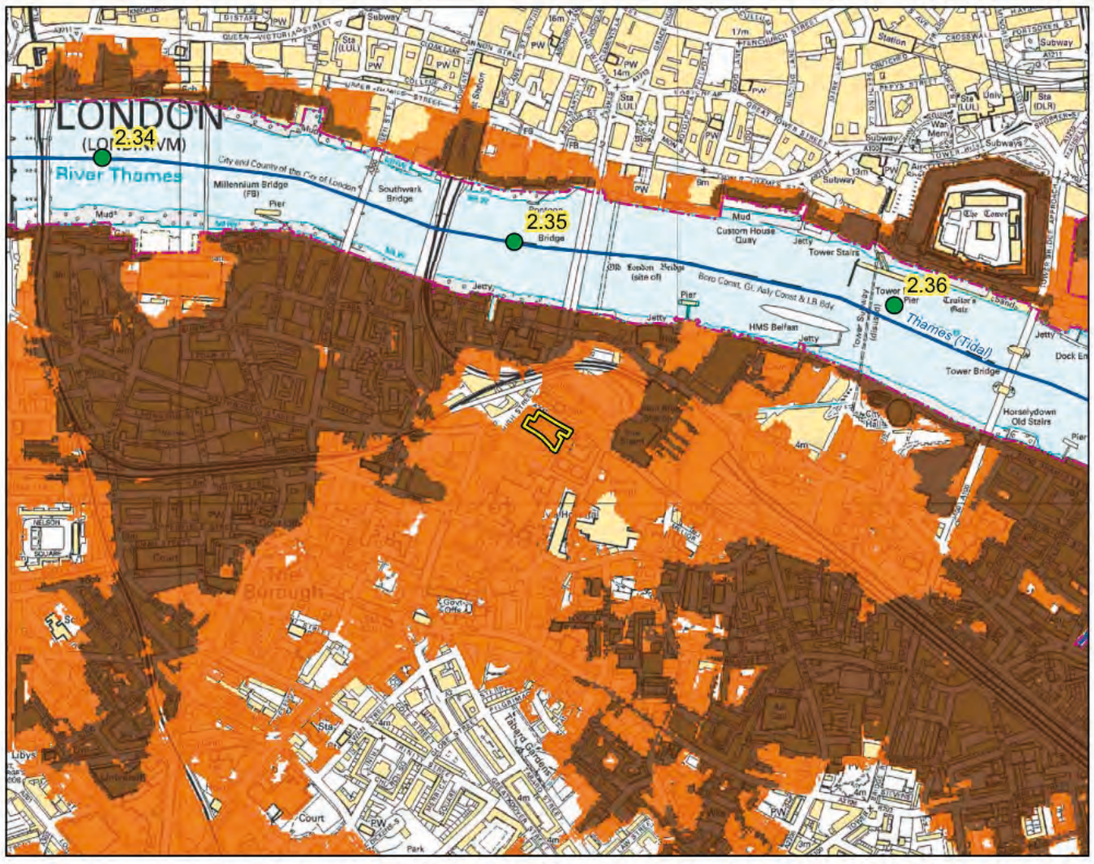
Upriver Breach Inundation Modelling Map centred on SE1 9RG created 29 August 2018 [Ref: KSL 97505 AB]



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Scale 1: 10,000

Legend

- Site Location
- TE2100 Model Nodes
- Main Rivers
- Flood Map - Defences

Upriver MLWL Breach Inundation

Epoch

- 2014
- 2100

Thames Tidal Upriver Breach Inundation Modelling 2017

A modelled representation of all upriver tidal breach locations along the Thames from Teddington to the Thames Barrier, based on low floodplain topography. For hard and composite defences breaches are set at 20 m wide; for soft defences, breaches are 50 m wide. In both cases, the defence breach scour distance was assumed to extend into the floodplain by the same distance as the breach width.
The modelling is based on the 2008 TE2100 in-channel levels, with an allowance for climate change for epoch 2100.

Node Location Map centred on SE1 9RG created 29 August 2018 [Ref: KSL 97505 AB]

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Scale 1: 1,000

Legend

▲ Node Point Locations

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Defence Details

The design standard of protection of the flood defences in this area of the Thames is 0.1% AEP; they are designed to defend London up to a 1 in 1000 year **tidal** flood event. The defences are all raised, man-made and privately owned. It is the riparian owners' responsibility to ensure that they are maintained to a crest level of 5.41 m AODN (the Statutory Flood Defence Level in this reach of the Thames). We inspect them twice a year to ensure that they remain fit for purpose. The current condition grade for defences in the area is 2 (good), on a scale of 1 (very good) to 5 (very poor). For more information on your rights and responsibilities as a riparian owner, please see our document 'Living on the edge' found on our website at:

https://www.gov.uk/government/publications/riverside-ownership-rights-and-responsibilities

There are no planned improvements in this area. Please see the 'Thames Estuary 2100' document on our website for the short, medium and long term Flood Risk Management strategy for London:

https://www.gov.uk/government/publications/thames-estuary-2100-te2100

Areas Benefiting from Flood Defences

This site is within an area benefiting from flood defences, as shown on the enclosed extract of our Flood Map. Areas benefiting from flood defences are defined as those areas which benefit from formal flood defences specifically in the event of flooding from rivers with a 1% (1 in 100) chance in any given year, or flooding from the sea with a 0.5% (1 in 200) chance in any given year.

If the defences were not there, these areas would be flooded. An area of land may benefit from the presence of a flood defence even if the defence has overtopped, if the presence of the defence means that the flood water does not extend as far as it would if the defence were not there.

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Environment Agency

Recorded Flood Events Data

We do not hold records of historic flood events from rivers and/or the sea affecting the area local to this site. However, please be aware that this does not necessarily mean that flooding has not occurred here in the past, as our records are not comprehensive.

Due to the fact that our records are not comprehensive, we would advise that you make further enquiries locally with specific reference to flooding at this location. You should consider contacting the relevant Local Planning Authority and/or water/sewerage undertaker for the area.

We map flooding to land, not individual properties. Our historic flood event record outlines are an indication of the geographical extent of an observed flood event. Our historic flood event outlines do not give any indication of flood levels for individual properties. They also do not imply that any property within the outline has flooded internally.

Please be aware that flooding can come from different sources. Examples of these are:

- from rivers or the sea;
- surface water (i.e. rainwater flowing over or accumulating on the ground before it is able to enter rivers or the drainage system);
- overflowing or backing up of sewer or drainage systems which have been overwhelmed,
- groundwater rising up from underground aquifers

Currently the Environment Agency can only supply flood risk data relating to the chance of flooding from rivers or the sea. However you should be aware that in recent years, there has been an increase in flood damage caused by surface water flooding and drainage systems that have been overwhelmed.

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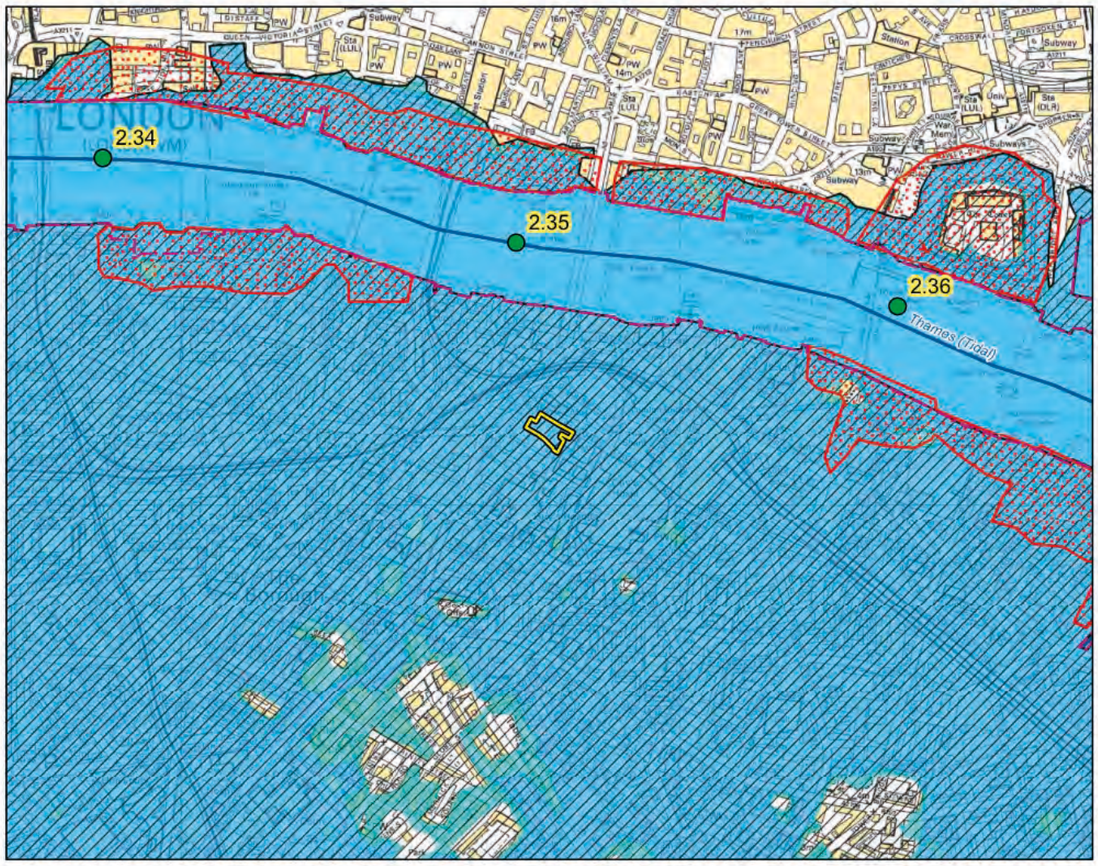
Historic Flood Map centred on SE1 9RG created 29 August 2018 [Ref: KSL 97505 AB]



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Scale 1: 10,000

Legend

- Site Location
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- Main Rivers
- Flood Map - Defences
- Flood Map - Flood Storage Areas
- Areas Benefiting from Flood Defences
- Flood Map - Flood Zone 3
- Flood Map - Flood Zone 2
- Jan 1928 Flood Outline

Flood Map for Planning (assuming no defences)

Flood Zone 3 shows the area that could be affected by flooding:
– from the sea with a 0.5% or greater chance of occurring each year
– or from a river with a 1% or greater chance of occurring each year.

Flood Zone 2 shows the extent of an extreme flood from rivers or the sea with up to a 0.1% chance of occurring each year.

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Additional Information

Information Warning - OS background mapping

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Planning advice and guidance

The Environment Agency are keen to work with partners to enable development which is resilient to flooding for its lifetime and provides wider benefits to communities. If you have requested this information to help inform a development proposal, then we recommend engaging with us as early as possible by using the pre-application form available from our website:
https://www.gov.uk/government/publications/pre-planning-application-enquiry-form-preliminary-opinion

Complete the form in the link and email back to kslplanning@environment-agency.gov.uk

We recognise the value of early engagement in development planning decisions. This allows complex issues to be discussed, innovative solutions to be developed that both enables new development and protects existing communities. Such engagement can often avoid delays in the planning process following planning application submission, by reaching agreements up-front. We offer a charged pre-application advice service for applicants who wish to discuss a development proposal.
We can also provide a preliminary opinion for free which will identify environmental constraints related to our responsibilities including flooding, waste, land contamination, water quality, biodiversity, navigation, pollution, water resources, foul drainage or Environmental Impact Assessment.

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Flood Risk Assessments guidance

Flood risk standing advice for applicants

In preparing your planning application submission, you should refer to the Environment Agency's Flood Risk Standing Advice and the Planning Practice Guidance for information about what flood risk assessment is needed for new development in the different Flood Zones. This information can be accessed via:

https://www.gov.uk/flood-risk-assessment-standing-advice

http://planningguidance.planningportal.gov.uk/

https://www.gov.uk/guidance/flood-risk-assessment-for-planning-applications

https://www.gov.uk/guidance/flood-risk-and-coastal-change

You should also consult the Strategic Flood Risk Assessment and flood risk local plan policies produced by your local planning authority.

You should note that:

1. Information supplied by the Environment Agency may be used to assist in producing a Flood Risk Assessment where one is required, but does not constitute such an assessment on its own.
2. This information covers flood risk from main rivers and the sea, and you will need to consider other potential sources of flooding, such as groundwater or overland runoff. You should discuss surface water management with your Lead Local Flood Authority.
3. Where a planning application requires a FRA and this is not submitted or deficient, the Environment Agency may well raise an objection due to insufficient information

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Surface Water

We have provided two national Surface Water maps, under our Strategic Overview for flooding, to your Lead Local Flood Authority who are responsible for local flood risk (i.e. surface runoff, ground water and ordinary watercourse), which alongside their existing local information will help them in determining what best represents surface water flood risk in your area.

Your Lead Local Flood Authority have reviewed these and determined what it believes best represents surface water flood risk. You should therefore contact this authority so they can provide you with the most up to date information about surface water flood risk in your area.

You may also wish to consider contacting the appropriate relevant Local Planning Authority and/or water/sewerage undertaker for the area. They may be able to provide some knowledge on the risk of flooding from other sources. We are working with these organisations to improve knowledge and understanding of surface water flooding.

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Appendix F

Storm Water Attenuation and Flood Protection Measures

TOTAL CATCHMENT AREA (EXCLUDING EXISTING GEORGIAN TOWNHOUSES AND PUBLIC HIGHWAY = 2,980 m2)

MAX. DISCHARGE RATE = **3.49 l/sec**

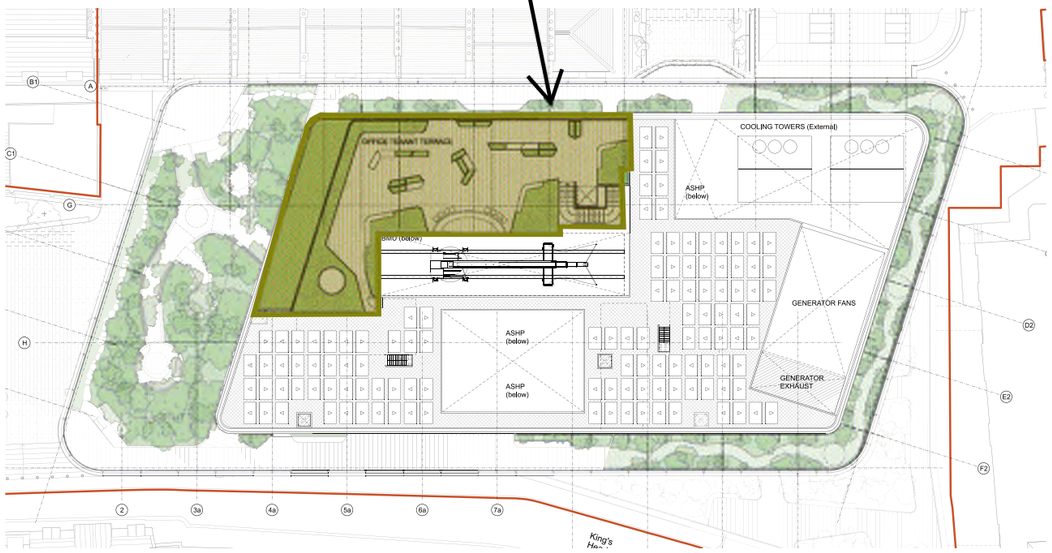
APPROX. ATTENUATION VOLUME REQUIRED = **190 m3**

BLUE ROOF LEVEL 26:

MAX. DISCHARGE RATE = 0.37 l/sec

APPROX. CATCHMENT AREA = 300 m2

APPROX. ATTENUATION VOLUME REQUIRED = 19 m3



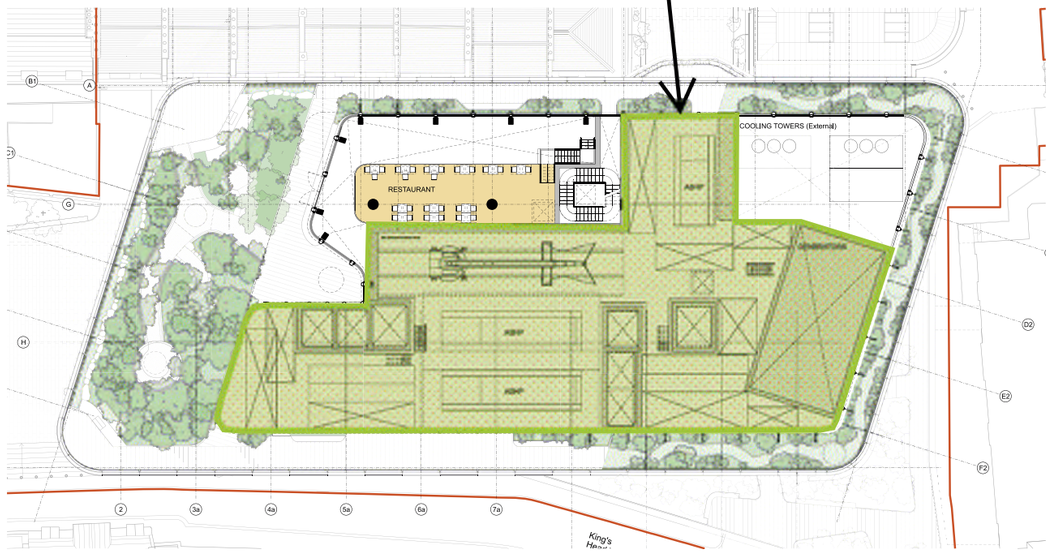
LEVEL 26

BLUE ROOF LEVEL 25:

MAX. DISCHARGE RATE = 0.94 l/sec

APPROX. CATCHMENT AREA = 835 m2

APPROX. ATTENUATION VOLUME REQUIRED = 53 m3



LEVEL 25

PROJECT NEW CITY COURT		TITLE SURFACE WATER ATTENUATION STRATEGY - SHEET 1	
DATE JUL 2021	SCALE N.T.S.	CAD FILENAME -	STATUS PRELIMINARY
DRAWN DN / CHECKED DP	PROJECT No. 3948	DRAWING No. 3948-CSK001	REV P6

TOTAL CATCHMENT AREA (EXCLUDING EXISTING GEORGIAN TOWNHOUSES AND PUBLIC HIGHWAY= 2,980 m2)

MAX. DISCHARGE RATE = **3.49 l/sec**

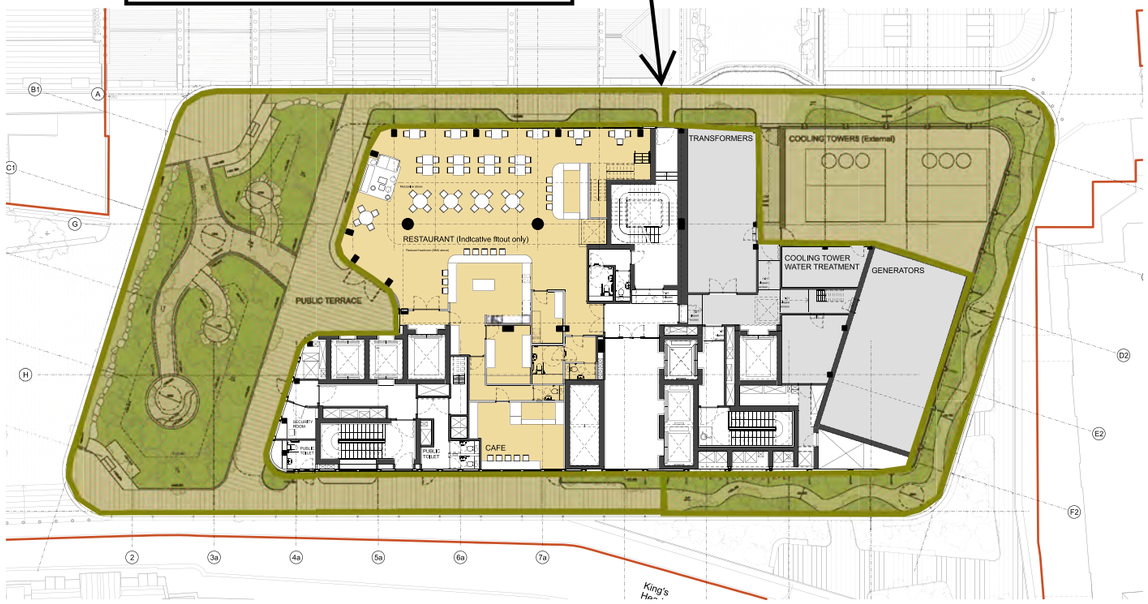
APPROX. ATTENUATION VOLUME REQUIRED = **190 m3**

BLUE ROOF LEVEL 24:

MAX. DISCHARGE RATE = 1.07 l/sec

APPROX. CATCHMENT AREA = 960 m2

APPROX. ATTENUATION VOLUME REQUIRED = 63 m3



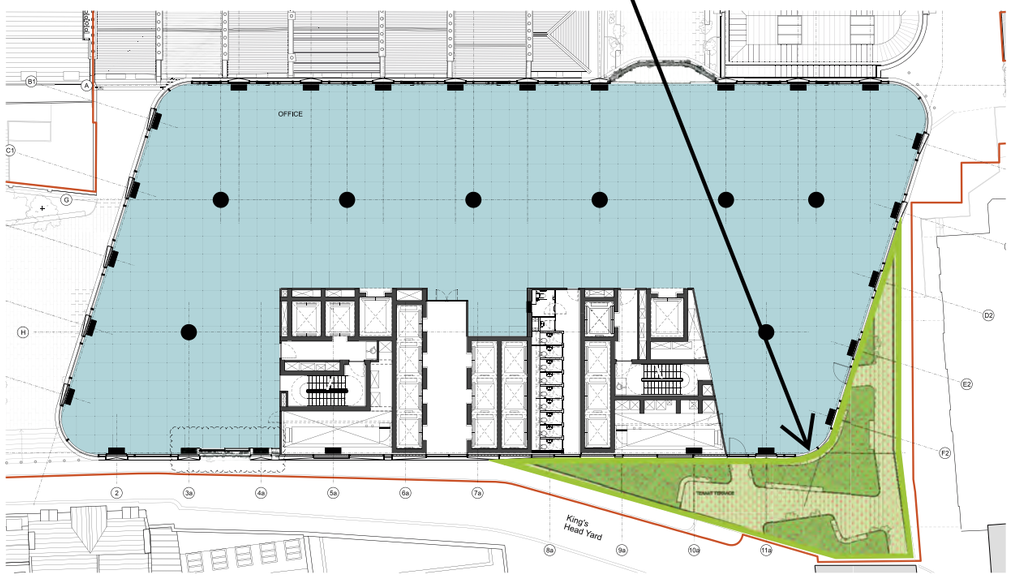
LEVEL 24

BLUE ROOF LEVEL 3:

MAX. DISCHARGE RATE = 0.24 l/sec

APPROX. CATCHMENT AREA = 190 m2

APPROX. ATTENUATION VOLUME REQUIRED = 12 m3



LEVEL 3

PROJECT NEW CITY COURT		TITLE SURFACE WATER ATTENUATION STRATEGY - SHEET 2	
DATE JUL 2021	SCALE N.T.S.	CAD FILENAME -	STATUS PRELIMINARY
DRAWN DN	CHECKED DP	PROJECT No. 3948	DRAWING No. 3948-CSK002	REV P6

SYSTEM 2 (GRANULAR SUBBASE):

MAX. DISCHARGE RATE = 0.13 l/sec

APPROX. CATCHMENT AREA = 95 m2

APPROX. ATTENUATION VOLUME REQUIRED = 6 m3

TOTAL CATCHMENT AREA (EXCLUDING EXISTING GEORGIAN TOWNHOUSES AND PUBLIC HIGHWAY = 2,980 m2)

MAX. DISCHARGE RATE = **3.49 l/sec**

APPROX. ATTENUATION VOLUME REQUIRED = **190 m3**

FREE DISCHARGE FROM THE EXISTING GRADE II LISTED BUILDINGS TO REMAIN (EXISTING SURFACE WATER DRAINAGE IS TO REMAIN)

SYSTEM 3 (ATTENUATION TANK INSIDE BASMENT):

MAX. DISCHARGE RATE = 0.40 l/sec

APPROX. CATCHMENT AREA = 325 m2

APPROX. ATTENUATION VOLUME REQUIRED = 20 m3

SYSTEM 1 (GRANULAR SUB-BASE) :

MAX. DISCHARGE RATE = 0.34 l/sec

APPROX. CATCHMENT AREA = 270 m2

APPROX. ATTENUATION VOLUME REQUIRED = 17 m3

GROUND FLOOR

PROJECT NEW CITY COURT		TITLE SURFACE WATER ATTENUATION STRATEGY - SHEET 3	
DATE JUL 2021	SCALE N.T.S.	CAD FILENAME -	STATUS PRELIMINARY
DRAWN DN / CHECKED DP	PROJECT No. 3948	DRAWING No. 3948-CSK003	REV P6

	National Grid Reference		Modelled levels in mAODN for Max Likely Water Level	
Node	Easting	Northing	2014	2100
1	532717	180187	Nil return	4.61
2	532734	180177	Nil return	4.60
3	532754	180166	Nil return	4.72
4	532774	180154	Nil return	4.72
5	532789	180140	Nil return	4.71
6	532708	180169	Nil return	4.75
7	532733	180160	Nil return	4.73
8	532745	180145	Nil return	4.73
9	532766	180136	Nil return	4.73
10	532742	180133	Nil return	4.73
11	532761	180118	Nil return	4.72
12	532694	180155	Nil return	4.75
13	532709	180140	Nil return	4.73
14	532727	180130	Nil return	4.73
15	532741	180115	Nil return	4.73
16	532756	180102	Nil return	4.72

× 4.60 APPROXIMATE ENVIRONMENT AGENCY MODELLED BREACH LEVEL

ENTRANCES TO HAVE TEMPORARY BARRIERS AVAILABLE OR FLOOD RESISTANT DOORS CAPABLE OF RESITING THE HEAD OF WATER UP TO MAXIMUM LEVEL = 4.75

RAISE WALLS OF EXISTING LIGHTWELLS ABOVE THE BREACH LEVEL OF 4.72m AOD

FACADES TO BE CAPABLE OF RESITING THE HEAD OF WATER UP TO MAX. LEVEL OF 4.75m AOD (BREACH LEVEL) ANY OPENINGS TO BE LOCATED ABOVE THE BREACH LEVEL OF 4.75m AOD

akt II

PROJECT NEW CITY COURT		TITLE REVIEW OF THE ENVIRONMENT AGENCY MODELLED BREACH LEVELS IN RELATION TO THE FINISHED FLOOR LEVELS	
DATE JUL 2021	SCALE N.T.S.	CAD FILENAME -	STATUS PRELIMINARY
DRAWN DN / CHECKED DP	PROJECT No. 3948	DRAWING No. 3948-CSK-004	REV P5