PL.REF: 20/1870/FUL - No.1 RAILSHEAD ROAD,TWICKENHAM

Flood Risk Assessment

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Flood Risk
Assessment Rv0
16th December 2020

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Quality Management					
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1 INTRODUCTION

1.1 RPS was commissioned to prepare a Flood Risk Assessment (FRA) for a change of use application within the existing first floor level of the building from commercial use to residential flats at *No.1, Railshead Road, Richmond, TW7 7EP*.

1.2 The aim of the FRA is to outline the potential for the site to be impacted by flooding, the impacts of the proposed development on flooding in the vicinity of the site, and the proposed measures which could be incorporated into the development to mitigate the identified risk. The report has been produced in accordance with the guidance detailed in the National Planning Policy Framework (NPPF) and the associated Planning Practice Guidance (PPG). Reference has also been made to, the London Borough of Richmond Strategic Flood Risk Assessment (SFRA), the London Borough of Richmond upon Thames Surface Water Management Plan (SWMP) and the London Borough of Richmond Local Flood Risk Management Strategy.

1.3 This report has been produced in consultation with the Environment Agency (EA) and the London Borough of Richmond as Lead Local Flood Authority (LLFA).

1.4 Reference to information provided / published by the following bodies:

- EA;
- London Borough of Richmond;
- Centre for Ecology and Hydrology;
- British Geological Survey (BGS); and
- Ordnance Survey (OS).

2 PLANNING POLICY CONTEXT

National Planning Policy

2.1 The NPPF was released in March 2012 and was updated in June 2019. The document advises of the requirements for a site-specific Flood Risk Assessment (FRA) for any of the following cases (Planning and Flood Risk paragraph 163 (footnote 50):

- All proposals (including minor development and change of use) located within the EA designated floodplain, recognised as either Flood Zone 2 (medium probability) or Flood Zone 3 (high probability);
- All proposals of 1 hectare (ha) or greater in an area located in Flood Zone 1 (low probability);
- All proposals within an area which has critical drainage problems (as notified to the Local Planning Authority by the EA);
- Land identified in a strategic flood risk assessment as being at increased flood risk in future; and
- Where proposed development may be subject to other sources of flooding, where its development would introduce a more vulnerable use.

2.2 Paragraph 165 of the updated NPPF identifies that major developments (developments of 10 homes or more and to major commercial development) should incorporate Sustainable Drainage Systems unless there is clear evidence that this would be inappropriate. The systems used should:

a. Take account of advice from the Lead Local Flood Authority;
b. Have appropriate proposed minimum operational standards;
c. Have maintenance arrangements in place to ensure an acceptable standard of operation for the lifetime of the development; and
d. Where possible, provide multifunctional benefits.

2.3 Defra published 'Non-statutory technical standards for sustainable drainage systems' in March 2015. The document sets out non-statutory technical standards for sustainable drainage systems and should be read in conjunction with the revised NPPF. The non-statutory technical standards advise the following:

Flood Risk Outside the Development

S1 Where the drainage system discharges to a surface water body that can accommodate uncontrolled surface water discharges without any impact on flood risk from that surface water body (e.g. the sea or a large estuary) the peak flow control standards (S2 and S3 below) and volume control technical standards (S4 and S6) need not apply.

Peak Flow Control

S3 For developments which were previously developed, the peak runoff rate from the development to any drain, sewer or surface water body for the 1 in 1 year rainfall event and the 1 in 100 year rainfall event must be as close as reasonably practicable to the greenfield runoff rate from the development for the same rainfall event, but should never exceed the rate of discharge from the development prior to redevelopment for that event.

Volume Control

S5 Where reasonably practicable, for developments which have been previously developed, the runoff volume from the development to any highway drain, sewer or surface water body in the 1 in 100 year, 6 hour rainfall event must be constrained to a value as close as is reasonably practicable to the greenfield runoff volume for the same event, but should never exceed the runoff volume from the development site prior to redevelopment for that event.

Flood Risk within the Development

S7 The drainage system must be designed so that, unless an area is designated to hold and/or convey water as part of the design, flooding does not occur on any part of the site for a 1 in 30 year rainfall event.

S8 The drainage system must be designed so that, unless an area is designated to hold and/or convey water as part of the design, flooding does not occur during a 1 in 100 year rainfall event in any part of: a building (including a basement); or in any utility plant susceptible to water (e.g. pumping station or electricity substation) within the development.

S9 The design of the site must ensure that, so far as is reasonably practicable, flows resulting from rainfall in excess of a 1 in 100 year rainfall event are managed in exceedance routes that minimise the risks to people and property.

Regional Planning Policy

2.4 The development site is within the London Borough of Richmond, which is covered by The London Plan, as amended March 2016. The London Plan contains the following policy pertaining to flood risk, the relevant aspects of which are reproduced below.

Policy 5.11 Green roofs and development site environs

2.5 This policy promotes the use of green roofs and walls where feasible, to deliver objectives including sustainable urban drainage amongst other wider environmental and sustainability benefits.

Policy 5.12 Flood risk management

2.6 This Policy states that '*the Mayor will work with all relevant agencies including the Environment Agency to address current and future flood issues and minimise risks in a sustainable and cost effective way*.

Development proposals must comply with the flood risk assessment and management requirements set out in the NPPF and the associated technical Guidance on flood risk over the lifetime of the development and have regard to measures proposed in Thames Estuary 2100 and Catchment Flood Management Plans.'

2.7 The Policy sets out requirements for developments for which the NPPF Exception Test is applicable and developments adjacent to flood defences.

2.8 The Intend to Publish version of the new London Plan was issued to the Secretary of State on 9th December 2019. This document retains consideration of the above policy through the following draft policy:

Draft Policy SI 12 Flood Risk Management

A. Current and expected flood risk from all sources (as defined in paragraph 9.12.2) across London should be managed in a sustainable and cost-effective way in collaboration with the

Environment Agency, the Lead Local Flood Authorities, developers and infrastructure providers.

B. 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 co-operate and jointly address cross-boundary flood risk issues including with authorities outside London.

C. 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.

D. 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.

E. 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.

F. 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.

FA. 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.

Local Planning Policy

2.9 The development site is within the London Borough of Richmond administrative area which is covered by the London Borough of Richmond Local Plan, adopted in July 2018. This plan replaced previous policies within the Core Strategy and Development Management Plan. The Plan sets out policies and guidance for the development of the borough until July 2033 or until it is superseded.

2.10 ***Policy LP 21 of the Local Plan, Flood Risk and Sustainable Drainage, states:***

"All developments should avoid, or minimise, contributing to all sources of flooding, including fluvial, tidal, surface water, groundwater and flooding from sewers, taking account of climate change and without increasing flood risk elsewhere. Development will be guided to areas of lower risk by applying the 'Sequential Test' as set out in national policy guidance, and where necessary, the 'Exception Test' will be applied. Unacceptable developments and land uses will be refused in line with national policy and guidance, the Council's Strategic Flood Risk Assessment (SFRA) and as outlined in the table below.

In Flood Zones 2 and 3, all proposals on sites of 10 dwellings or more or 1000sqm of non-residential development or more, or on any other proposal where safe access/egress cannot be achieved, a Flood Emergency Plan must be submitted.

Where a Flood Risk Assessment is required, on-site attenuation to alleviate fluvial and/or surface water flooding over and above the Environment Agency's floodplain compensation is required where feasible.

The policy requires developments to be guided to areas with the lowest risk in line with the revised NPPF. It includes Flood Risk Assessment (FRA) guidance for developers and applicants and outlines requirements for Basements and subterranean developments, Flood defences and Sustainable drainage."

2.11 The London Borough of Richmond upon Thames Strategic Flood Risk Assessment (SFRA), September 2020, informs the Local Plan including the site allocations by assessing the impact that land use changes and development will have on flood risk. The SFRA identifies and maps flood risk from all sources at a Borough-wide scale as well as providing guidance on producing site specific FRAs. Relevant information from the SFRA has been referenced throughout this Flood Risk Assessment report. The SFRA provides the basis for applying the Sequential Test to development sites, thereby directing development away from areas at highest risk.

2.12 The London Borough of Richmond upon Thames Surface Water Management Plan (SWMP), dated June 2011, assesses the risk of surface water flooding within the Borough and identifies options to manage risk to acceptable level, outlining the preferred surface water management strategy in a given location. Relevant information from the SWMP has been reproduced throughout this Flood Risk Assessment report. In this context surface water flooding describes flooding from sewers, drains, groundwater, and runoff from land, ordinary watercourses and ditches that occurs as a result of heavy rainfall.

Flood Risk Assessment - Climate Change Allowances

2.13 In July 2020 the EA updated advice on climate change allowances to support the NPPF. New guidance has updated the climate change allowances to incorporate predictions outlined within the UKCP18 projections. The climate change allowances outlined in Table 1 and 2 of the above guidance are predictions of anticipated change for peak river flow, peak rainfall intensity, sea level rise and offshore wind speed and extreme wave height. Table 2-1 below provides a response to climate change uncertainty which will impact flood risk for the Thames River Basin District.

Table 2-1. Climate Change Allowance Parameters

Parameter	Allowance Category	2015 to 2039	2040 to 2069	2070 to 2115
Peak River Flow	Upper End	25%	35%	70%
	Higher Central	15%	25%	35%
	Central	10%	15%	25%
Peak Rainfall Intensity	Upper End	10%	20%	40%
	Central	5%	10%	20%

2.14 The allowance category which should be applied to calculation is dependent on the type of development and the Flood Zone in which it lies. The proposed development is a change of use residential application classified as more vulnerable and is located within defended Flood Zone 3. It is determined that a 'Upper' and 'Central' allowance (i.e. +20% and 40% of peak rainfall intensity and +25% and 70% peak river flow) will be taken into account, assuming a direct correlation between peak rainfall intensity and flood depth.

Table 2-2. Sea Level allowances for each epoch in mm per year.

Area of England	Allowance Category	2000 to 2035 (mm)	2036 to 2065 (mm)	2066 to 2095 (mm)	2096 to 2125 (mm)	Cumulative rise 2000 to 2125 (metres)
Thames	Upper Estimate	6.9 (242)	11.3 (339)	15.8 (474)	18.2 (546)	1.6
	Higher central Estimate	5.7 (200)	8.7 (261)	11.6 (348)	13.1 (393)	1.2

2.15 The climate change guidance notes that the allowances provided have been derived from national scale research. There may be cases where local evidence supports the use of other local climate change allowances.

3 CONSULTATION

Environment Agency

3.1 The proposed development site is located within Flood Zone 3. Consultation with the EA has been undertaken during this assessment. The EA supplied a Product 4 which outlined site specific flood risk information including modelled flood levels and local flood defence structures. The information outlined within the product 4 has been reproduced throughout this report.

Thames Water

3.2 The public sewer network within the vicinity of the site is operated by Thames Water. Thames Water advised in 2013 that they have no records of flooding in the subject area as a result of the surcharging of public sewers. A foul and a surface water sewer run along Railshead Road to the south of the site. The surface sewer runs under the centre of the site in the north easterly direction.

London Borough of Richmond Upon Thames

3.3 The site is within the administrative boundary of the London Borough of Richmond Upon Thames. The council advised the following:

- The site is located in Flood Zone 3;
- The Council has no details of recorded flood events at this location;
- The Council has no details of sewer flooding at this site; and
- The EA will need to be consulted if any works are to take place within 8m of a main river.

3.4 The London Borough of Richmond Upon Thames Surface Water Management Plan (SWMP) was published in June 2011. It assesses the risk of surface water flooding within the Borough and identifies options to manage risk to an acceptable level. The site has not been identified within a Critical Drainage Area and was therefore not assessed within the report.

Internal Drainage Board

3.5 The site is not located within an IDB District.

4 SITE DESCRIPTION

Site Description

4.1 The site is located at National Grid Reference TQ 16628 75366. It is roughly triangular in shape and occupies an area of approximately 0.20 hectares (ha). The site location is presented in Figure 1.

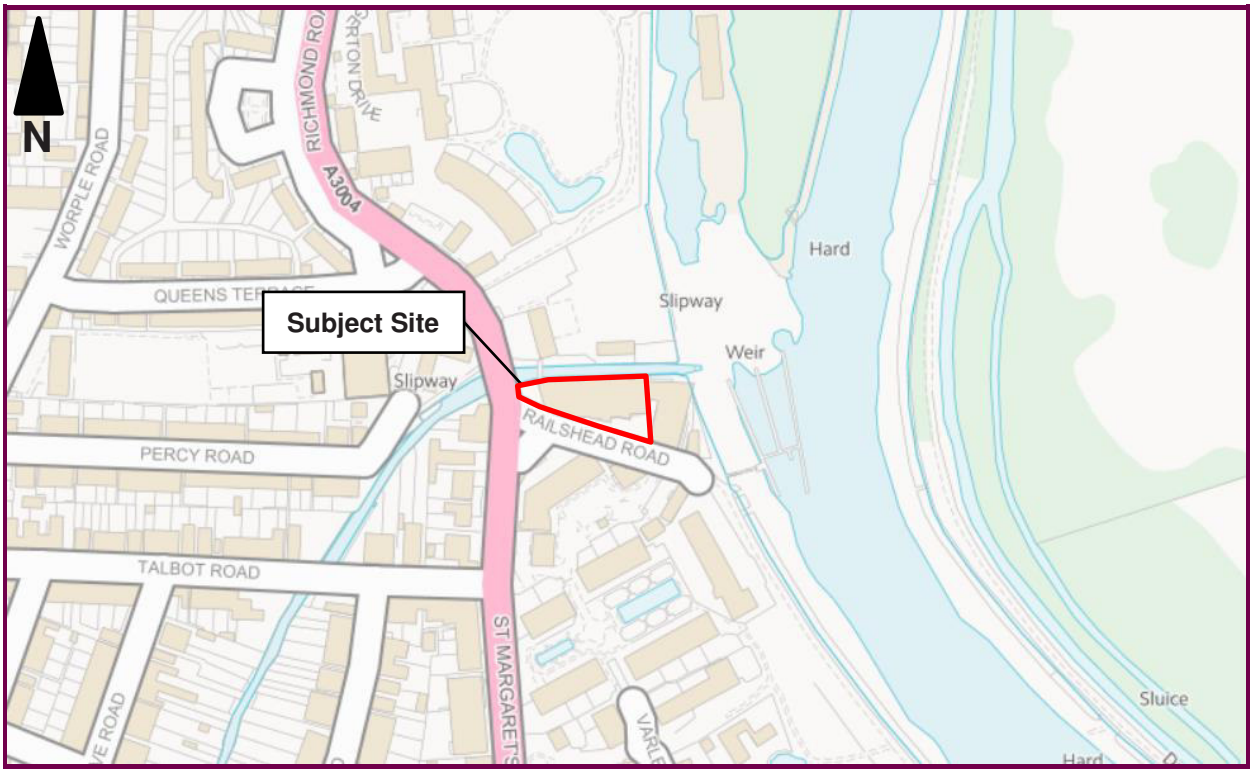


Figure 1. Site Location

4.2 The planning application for the COU of part of the first floor of a current multi-use building. The first-floor level is a mixed commercial / residential building with commercial space at ground floor level and residential otherwise. The site is 100% impermeable.

4.3 Vehicular and pedestrian access to the site is from two access points in the southeast and southwest of the site off of Railshead Road, which runs along the site's southern boundary.

4.4 Currently the entire site is either beneath the footprint of a building or laid to hardstanding.

Surrounding Land Uses

4.5 The site is located within the London Borough of Richmond, approximately 1.4 km to the north west of Richmond Railway Station. The site is within a mixed commercial and residential land use area and is bordered by the River Crane to the north, with residential apartments to the east, south and west.

4.6 Syon Park Site of Special Scientific Interest (SSSI) is located approximately 845 m northeast of the site and Isleworth Local Nature Reserve (LNR) is located approximately 95 m northeast. There are no other designated sensitive areas (e.g. Special Area of Conservation (SAC), Special Protection Area (SPA)) within close proximity to the site.

Topography

4.7 A Topographic survey has been completed for the site by Twickenham Surveys, in September 2012. Reference to this survey indicates that the site generally slopes down from west to east, with levels ranging from approximately 5.3m AOD in the west to 4.66m AOD in the northeast of the site and 4.86 m in the southeast of the site.

4.8 The A3004 (Richmond Road) along the western site boundary is elevated above the subject site, with levels of between 5.66 m AOD and 6.12 m AOD on the stretch of road adjacent to the site.

4.9 The crest level of the River Crane flood defences along the northern site boundary is reported as 5.94m AOD. Full details of the topographical survey can be found in the previous planning application (Reference 13/3390/FUL).

Local Geology

4.10 British Geological Survey (BGS) online mapping (1:50,000 scale) indicates that the site is situated on superficial geology consisting of Kempton Park Gravel Member consisting of sand and gravel. The superficial deposits are underlain by bedrock of the London Clay.

4.11 The soils are described as '*freely draining slightly acid loamy soils'* by the National Soils Research Institute.

4.12 According to the EA's Aquifer Designation Mapping, the superficial deposits at the surface are classified as a Principal aquifer. This is described by the EA as *'formations providing a high level of water storage which may support water supply and / or river base flow on a strategic scale'.* The bedrock deposits underlying the superficial deposits area classified as an Unproductive Stratum. These formations are described as having *'a low permeability and have negligible significance for water supply or base flow'.*

4.13 EA online groundwater Source Protection Zone (SPZ) mapping indicates that the site is not located within a groundwater SPZ. EA online groundwater vulnerability mapping indicates the site is located within an area which is designated to have medium to low vulnerability with soluble rock risk. A medium groundwater vulnerability is classified as areas that offer some groundwater protection. Intermediate between high and low vulnerability.

Existing Drainage / Water Mains

4.14 Reference to Thames Water plans of public sewers from the previous planning application (13/3390/FUL) identifies two 'effluent conduits' (conveying effluent from a sewage treatment works) passing beneath the centre of the site. A surface water drain (750mm diameter) also runs along Railshead to the south of the site passes beneath the southeast of the site. A 150mm foul sewer is recorded beneath Railshead Road to the south of the site, running east to west. Manhole cover levels and invert levels are given in Table 4-1.

Table 4-1. Manhole level details

Manhole Reference	Type of Sewer	Manhole Cover Level (mAOD)	Manhole Invert Level (mAOD)	Invert Depth (m)
6350	Surface Water	5.01	2.06	2.95
6301	Foul	5.14	3.61	1.53

5 PROPOSED DEVELOPMENT

5.1 It is understood that the planning application is for the change of use of part of the first floor of No.1 Railshead Road from commercial space to residential units, proposed to comprise six new apartments. Development plans are shown in Appendix B.

5.2 The proposed site layout plan indicates that no amendments to the external floor space are proposed and the amendments within the site are for internal alterations of the building only. Access will only be taken from the existing residential corridor at first floor level, which will be accessed from the primary entrance along the southern elevation of the property via the lift and stair core. As plans are for internal alterations only, no increase in impermeable area will occur.

5.3 No extra vehicular access is proposed within the site. The pedestrian access will be via the current pedestrian walkway along the vehicular driveway, and via the pedestrian access route in the southwest of the site from Railshead Road.

5.4 No amendments to the external floor levels of the buildings are proposed.

5.5 The proposed use of the site is classified as ‘More Vulnerable’ within the PPG.

6 ASSESSMENT OF FLOOD RISK AND MITIGATION

Hydrological Overview

6.1 Reference to Ordnance Survey Mapping indicates that the nearest surface water feature is the River Crane which flows west to east along the northern boundary of the site and appears to have undergone modification. The River Crane converges with the River Thames 10 m east of the site.

6.2 The Duke of Northumberland River is located approximately 575 m north, and flows in an south-easterly direction, converging with the River Thames approximately 565 m northeast.

6.3 The River Crane, River Thames and Duke of Northumberland River are all classified by the EA as statutory main rivers.

6.4 Unnamed streams are located approximately 665 m north and 885 m southwest of the site and three ponds are located approximately 90 m, 115 m and 185 m south of the site. A sluice is located approximately 440 m south.

Fluvial / Tidal Flood Risk Classification

6.5 The EA Flood Map for Planning, which is available online, indicates that the site is located within Flood Zone 3, whereby the annual probability of flooding is classified as 1 in 100 from river flooding or a 1 in 200 or greater annual probability of flooding from the sea, not taking account of flood defences. The flood map indicates that flood defences are present in the vicinity of the subject site.

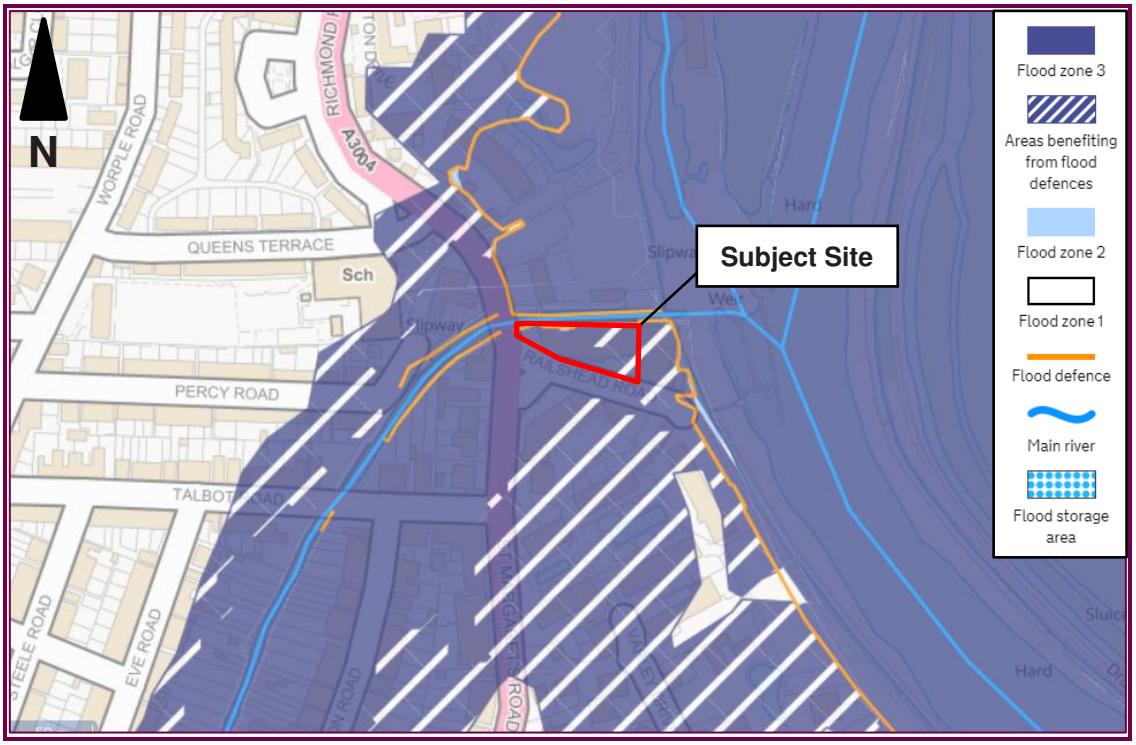


Figure 2. EA Flood Map for Planning

6.6 The London Borough of Richmond upon Thames SFRA confirms the site's location within Flood Zone 3a.

6.7 The EA long term flood risk map, which takes into account flood defences, indicates that the majority of the site including the site entrance is at very low risk of flooding from fluvial and/or tidal flooding. Very low risk is defined as an area having a chance of flooding of less than 0.1%.

6.8 The councils SFRA (2020) fluvial flood hazard maps for the River Thames (Kew and Richmond) and River Crane (Twickenham) (1% chance in any one year plus climate change flood extent), indicates the site has a low hazard rating;

6.9 The councils SFRA (2020) tidal breach flood hazard map for the River Thames and Beverley Brook (maximum likely water level – year 2100 tidal profile) indicates the site has between a significant and extreme breach hazard rating and is located within the vicinity of a modelled defence breach location;

6.10 In-channel flood levels have been provided for the tidal River Thames, taken from the Thames Estuary 2100 study completed by HR Wallingford in 2008. For the node closest to the subject site (reference 2.9u), the extreme water level (i.e. the highest level permitted by the Thames Barrier) for the River Thames is 5.54m AOD. The crest levels of defences at node 2.9u are currently at a height of 5.94m AOD, therefore the area is protected against the most extreme river level permitted by the Thames Barrier. Including an allowance for climate change, the design flood levels increase to 5.83m AOD for 2065 – 2100 and 6.28m AOD for the year 2100.

6.11 The site benefits from the Thames Tidal Defences which offer a 1 in 1,000 year standard of protection. At the node closest to the subject site, defences are on average 0.40m above the extreme water level. The defences are currently rated as '2' good on a scale of 1 (very good) to 5 (very poor). The defences are inspected twice a year to ensure that they are fit for purpose. Further details of the flood defences can be seen in Section 6.20 below.

EA Tidal Breach Inundation Modelling Information

6.12 From June 2017, the EA have started using model data for the tidal Thames floodplain created by Atkins Ltd, as a replacement for the modelling created by CH2M in March 2015 for those areas upstream of the Thames Barrier. The updated modelling simulates 5679 continuous tidal breach locations along the entire extent of the Thames from Teddington to the Thames Barrier. The site is located within the modelled breach extent for the 2005 and for the 2100 scenario (which includes an allowance for climate change).

6.13 EA data (Appendix A) indicates that the site is located within the inundation extent following a breach of the River Thames defences from the 1 in 200 year (2005) and 1 in 200 year plus climate change (2100) scenarios. The maximum modelled levels within the site for a 1 in 200 year (2005) scenario indicates that the northern extent of the site, Railshead Road to the south and Richmond Road to the west would be inundated to approximately 6.673 m AOD, 5.708 m AOD and 5.772 m AOD respectively.

6.14 The maximum modelled level within the site for a 1 in 200 year plus climate change (2100) scenario indicate the northern extent of the site, Railshead Road to the south and Richmond Road to the west would be inundated to approximately 6.51 m AOD, 6.367 m AOD and 6.366 m AOD respectively. However, as a breach of defences is considered unlikely to occur, the tidal risk is considered residual risk only.

6.15 A Topographic survey indicates the site is located at 5.30m AOD in the west to 4.66m AOD in the northeast of the site and 4.86 m in the southeast of the site and Railshead Road to the south of the site is at a similar level to the subject site, with levels ranging from approximately 5.36 m AOD to the southwest of the site, to 4.80m AOD to the southeast of the site. Based on a worst-case scenario the site would be flooded to a depth of approximately 2 m. However, additional flood defences were constructed during the previous planning application (13/3390/FUL) which proposed a wall level of 6.70 mAOD. This is above the maximum flood level within the 1 in 200 year (2005) and 1 in 200

year 2100 scenario. Therefore, the site and the surrounding area is not expected to flood up to the 1 in 200 year 2100 (climate change) scenario.

6.16 However, as the proposed change of use development is located on the first-floor level at 9.308 mAOD of the current building located on-site, if a breach scenario did occur it is not expected that the first-floor (proposed development level) would flood.

6.17 The Thames Tidal Breach Hazard Map indicates for a 1 in 200 year 2005 scenario the site has a hazard rating of between 1.25 and 2.00 (Danger for Most) in the central and southern half of the site, and > 2.00 in the northeast, northwest and along the northern periphery. The max depth ranges from 0.25 – 1 m in the centre of the site, between 1.5 to 2 m in the west and >2 m along the northern periphery of the site. The maximum velocity is predominantly between 0.3 – 1 m/s, increasing up to 1 – 1.5 m/s in the northeast and northwest and 1.5 - 2.5 m/s along the northern periphery of the site. For the 2100 scenario the site has a predominant hazard rating of >2.00 (Danger for All), flood depths are predominantly between 1 – 1.5 m increasing to >2 m in the east, and the maximum velocity is predominantly between 0.3 – 1 m/s increasing to 1.5 – 2.5 m/s along the northern periphery of the site.

6.18 Hazard mapping provided by the EA for a 1 in 200 year 2100 (climate change) tidal breach scenario indicates a hazard surrounding the development considered to be Danger for All reducing to Danger for Most in the west. This corresponds to depths of flooding between 1 – 1.5 m increasing to >2 m in the east and flow velocities of between 0.3 – 1 m/s increasing to 1.5 – 2.5 m/s along the northern periphery of the site. As outlined above the change of use development to residential units within the building would be located at the first-floor level and therefore there would not be expected internal flooding of the building at this level.

6.19 Provided that the Thames Tidal Defences and additional flood defence wall remain operational, this site will be unaffected by tidal flooding. If a breach event were to occur, the first floor level of 9.308 mAOD is above the 1 in 200 plus climate change breach flood level and therefore considered a ‘safe haven’. However, areas approximately 140m to the west of the site are located within Flood Zone 1 and a suitable evacuation route may be available.

6.20 No compensation will be required for a loss of floodplain storage as the site is located within a defended tidal floodplain.

6.21 The PPG details the suitability of different land use within each flood zone. The proposed land use is classified as ‘more vulnerable’ and such uses are generally considered compatible within Flood Zone 3a subject to passing of the Exception Test. Further information regarding the Exception Test is provided in Section 7 of this report. Information provided by the EA is presented in Appendix A.

Flood Defences

6.22 The EA Spatial Flood Defence dataset indicates that a number of tidal flood defences are present along the River Thames to the east and the River Crane to the north and west. Details of the flood defence assets can be found below.

Table 6-1. EA Flood Defence Information

Watercourse	Asset ID	Asset Type	Protection Type	Design Standard	Downstream Crest Level	Upstream Crest Level	Condition
River Thames	327460	Flood Gate	Tidal	.	-	-	3
	17194	Wall	Tidal	1000	-	5.94	2

	17330	Wall	Tidal	1000	-	5.94	-
	13042	Embankment	Tidal	1000	-	5.94	2
	13041	Wall	Tidal	1000	-	5.94	-
River Crane	499611	Wall	Fluvial / Tidal	100	-	5.94	3
	13800	Wall	Tidal	1000	-	5.94	2
	130678	Wall	Fluvial / Tidal	1000	-	5.49	2
	17329	Wall	Tidal	1000	-	5.94	3

6.23 The EA has advised that 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 minimum crest level of 5.94 m AODN (the Statutory Flood Defence Level in this reach of the Thames). The defences along the River Crane are also confirmed with a crest level of 5.94 mAOD.

6.24 Additional flood defences were constructed during the previous planning application (13/3390/FUL). An addition to the river wall was undertaken to comply with the flood defence policy 'TE2100'. The addition to the wall immediately to the east of the site gave the proposed wall a crest level of 6.70 mAOD.

EA Flood Warning Area

6.25 The EA defines a Flood Warning Area as "*geographical areas where we expect flooding to occur and where we provide a Flood Warning Service. They generally contain properties that are expected to flood from rivers or the sea and in some areas, from groundwater*."

6.26 The site is located in the Flood Warning Area "Tidal River Crane at Isleworth".

Flooding from Rising / High Groundwater

6.27 This can occur in low-lying areas when groundwater levels rise above surface levels, or within underground structures. BGS mapping indicates that the site is underlain by superficial deposits consisting of the Kempton Park Gravel Formation. Given the proximity of both the River Crane and the River Thames, there is the potential for shallow groundwater to exist beneath the site.

6.28 The SFRA (2020) BGS Susceptibility to groundwater flooding indicates that the site is located within an area with potential for groundwater flooding to occur at surface. However, the SFRA (2020) indicates that no groundwater flood incidents have occurred on site or within close proximity.

6.29 No new basement levels are proposed for the development as it is solely for the change of use to the first floor to residential units. It is therefore determined that the risk associated with groundwater flooding is considered low.

Sewer / Water Main Failure Assessment

6.30 Sewer flooding can occur during periods of heavy rainfall when a sewer becomes blocked or is of inadequate capacity.

6.31 The SWMP states that the site is not located within a Critical Drainage Area.

6.32 The London Borough of Richmond Upon Thames SFRA (2020) sewer flooding map indicates the number of sewer flooding incidents in the area based on DG5 data is between 1 and 5, however the map does not specify if any of these have been located at the subject site. Thames Water reported in 2013 that there have been no incidences of sewer flooding in close proximity to the subject site

6.33 Adjacent roads are at a similar or higher level than the site. Therefore, in the event of surcharging of sewers on adjacent roads, there is the potential for surcharged water to be directed onto the subject site. However, given the proposed change of us is located at first floor level, the potential for sewer flooding to have a significant impact is reduced.The discharge rate to the existing sewer will be agreed with Thames Water to ensure that there is capacity to receive discharge from the site without significantly increasing flood risk

Surface Water Flood Risk Classification

6.34 Surface water flooding can occur during intense rainfall events, when water cannot soak into the ground or enter drainage systems.

6.35 The EA's updated Flood Map for Surface Water, which is available online, indicates that the site is at very low risk of flooding from surface water. This corresponds with an annual probability of flooding that is less than 0.1%. The updated Flood Map for Surface Water is presented in Figure 3.

6.36 As shown in Figure 3, the entire site and the roads leading up to the site are identified as being is at very low risk of flooding from surface water sources.

6.37 No overland flow pathways are present within the site. Given the local topography, surface water is likely to flow in an easterly direction away from the site.

6.38 The councils SFRA historic flood incidents map indicates surface water flooding events have occurred approximately 125 m to the southwest, 445 m and 740 m southeast of the site, however none were recorded on the subject site. Overall, the risk associated with surface water flooding is considered to be low.

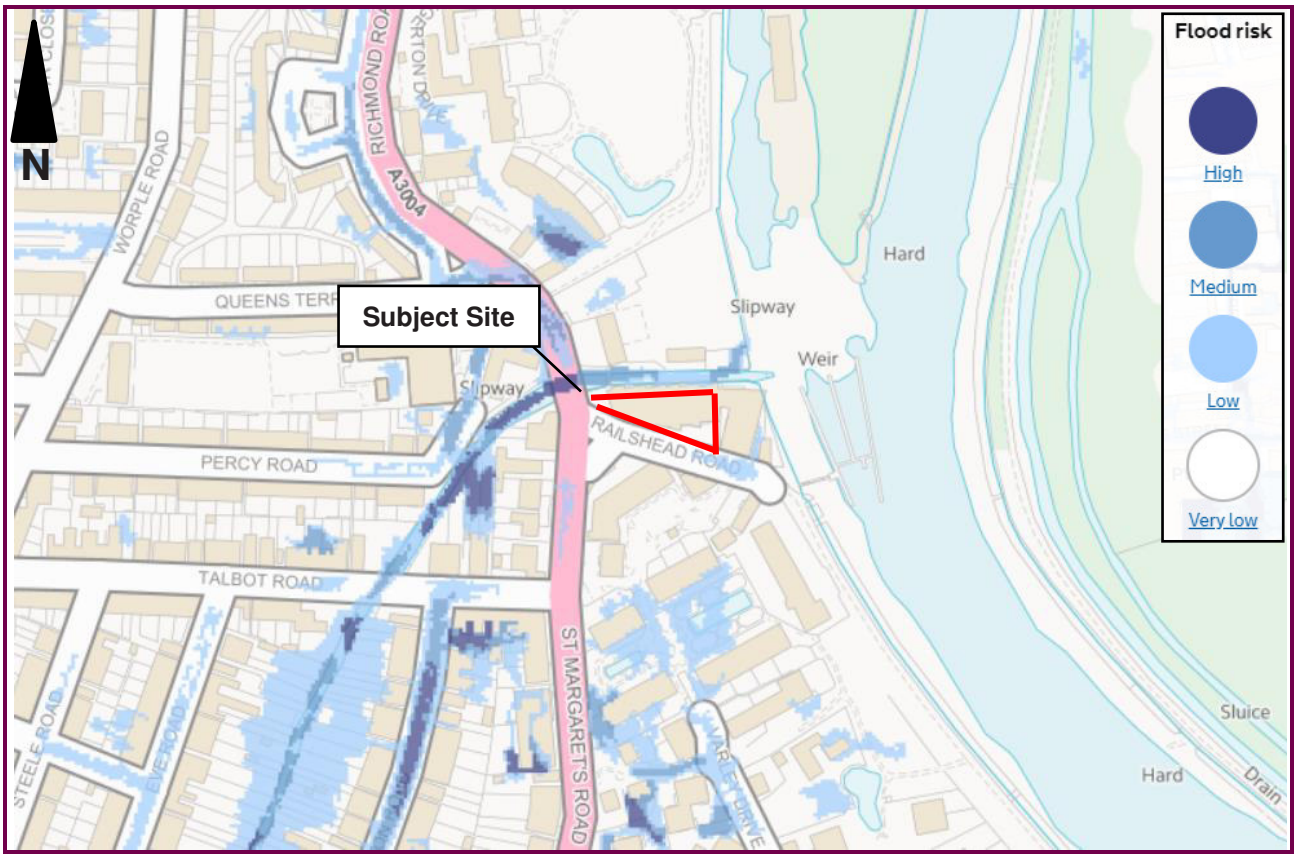


Figure 3. Updated Flood Map for Surface Water

Reservoir Flood Risk Classification

6.39 The EA Long Term Flood Risk map indicates that the site is located within the maximum extent of reservoir flooding associated with a number of reservoirs including the Queen Elizabeth II, King George VI, Wraysbury, Queen Mary and Queen Mother. The owners of each reservoir are Thames Water with the LLFA being Surrey and Windsor and Maidenhead.

6.40 The EA stipulates that a reservoir dam failure is an unlikely event. All large reservoirs are inspected and supervised by reservoir panel engineers. As the enforcement authority for the Reservoir Act 1972 in England, the EA ensure that reservoirs are inspected regularly, and essential safety work is carried out where required. Taking into account the above it is considered the site is at low risk of flooding from reservoir flooding.

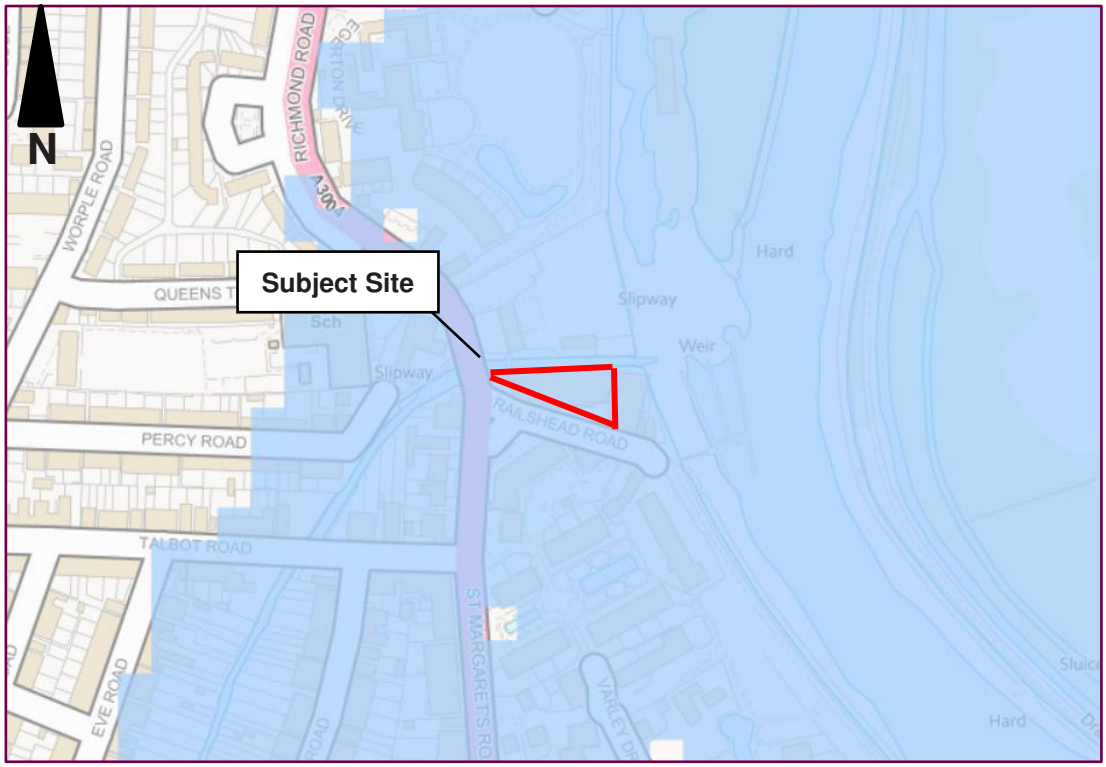


Figure 4. Reservoir Flood Map

Other Sources of Flooding

6.41 There is a limited risk of flooding occurring as a result of a break in a water main. The locations of the water mains in the immediate vicinity of the site are described in Section 4.15. In the event of a burst water main or reservoir flooding, given the proposed change of use is located at the first-floor level of the building, the potential for flooding of the site is reduced.

6.42 EA Long Term Flood Risk map indicates that the site is located within an area potentially at risk from reservoir flooding.

Historical Flood Events

6.43 The SFRA (2020) historic flood incidents map indicates surface water flooding events have occurred approximately 125 m to the southwest, 445 m and 740 m southeast of the site. The site is not shown to have been historically affected by flooding from any fluvial, surface or groundwater sources within the SFRA.

6.44 No historical flood events from fluvial or tidal sources have been recorded by the EA in close proximity to the site.

Proposed Mitigation Measures

Flood Warnings

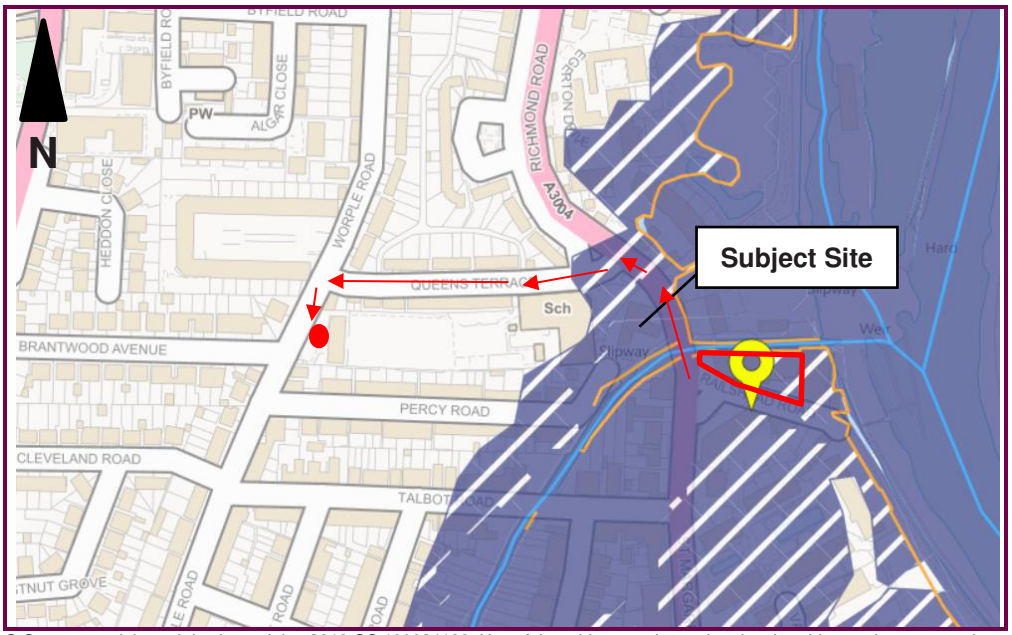
6.45 The proposed development site is located within an area at risk of flooding from tidal sources. The site is located in the Flood Warning Area “Tidal River Crane at Isleworth”.

6.46 The EA aims to provide up to 12 hours before the issue of a Flood Warning. It is recommended that the Site operator liaise with and registered on the EA Flood Warning System and implement on site

management strategies to ensure that they can communicate flood warnings efficiently in order that the Site can be evacuated. It is recommended that the client and each resident sign up to the EA's Flood Warning System. Additional information on the Environment Agency Flood Warnings and advice on what each warning can be found at the flood information surface (https://flood-warninginformation.service.gov.uk/).

Safe Access / Egress

6.47 As noted in 6.45 there is likely to be up to 12 hours before flood water impact upon the site. Therefore, there should be sufficient time for residents to safely evacuate the site. In the event the site would be flooded, based on the EA model outputs and the first-floor level of 9.308 mAOD, no flooding of the proposed development area would occur. However, if residents prefer to evacuate their property safe egress can be achieved by residents heading north up Richmond Road and along Queens Terrace where an area of car parking is available.



Evacuation Point
Evacuation Route

Figure 4. Potential Safe Egress Route

Impact of Development on Flood Risk

6.48 The planning application is for a change of use of the first-floor level from commercial to residential units. It will therefore comprise of internal alterations to the existing building, with no external alterations to the building footprint or drainage system. There will be no increase in off-site flood risk as a result of the works. Therefore, it is determined that a new sustainable drainage strategy is not needed for the development.

7 SEQUENTIAL TEST AND EXCEPTION TEST

Sequential Test

7.1 The NPPF requires the Local Authority to apply the Sequential Test in consideration of new development. The aim of the Test is to steer new development to areas at the lowest probability of flooding. Given that the subject site has not been allocated as one of the Council's proposed future development sites, it has not been specifically assessed within the SFRA. Therefore, the Sequential Test is based on the EA Flood Zones and information contained within the SFRA

7.2 Whilst the site is located within Flood Zone 3a, the proposed change of use is located within the first floor level of a current residential and commercial mixed land use site. Given the high standard of protection afforded by the Thames Tidal Defences, the actual risk of tidal flooding is considered to be low, and the risk of flooding is only residual in case of breach of defences. The flood defences currently offer a 1 in 1,000 year standard of protection and the condition of the defences are currently considered to be 'good'. No other significant risks have been identified in relation to other sources of flooding. The development is therefore considered to meet the requirements of the Sequential Test.

The Exception Test

7.3 The PPG advises that 'more vulnerable' development can be considered appropriate in Flood Zone 3, following satisfactory application of the Exception Test. The Exception Test aims to ensure that more vulnerable property types are not allocated to areas at high risk of flooding. For the Exception Test to be passed:

a) It must be demonstrated that the development provides wider sustainability benefits to the community that outweigh flood risk, informed by a SFRA where one has been prepared;

b) A site-specific flood risk assessment must demonstrate that the development will be safe for its lifetime taking account of the vulnerability of its users, without increasing flood risk elsewhere, and, where possible, will reduce flood risk overall.

7.4 With reference to point (a) above, the proposed development is a first-floor level only change of use from commercial to residential units. The development will result in an increase in the number of residential units and will therefore help toward the current deficit in the housing supply in London. The flood risk is residual and given the change of use is at first-floor level being 9.308 mAOD, the site will not be impacted by flooding up to the 1 in 200-year 2100 climate change event. It is therefore determined that the proposed development will have wider sustainable benefits, outweighing the flood risk.

7.5 With reference to point (b) above, this FRA demonstrates that the development will be safe, without increasing flood risk elsewhere, and will not cause any increase in flood risk due to the sole internal alteration of the development.

7.6 It is considered that the development passes the Exception Test.

8 SUMMARY AND CONCLUSIONS

8.1 The aim of the FRA is to outline the potential for the site to be impacted by flooding, the potential impacts of the development on flooding both onsite and in the vicinity, and the proposed measures which can be incorporated into the development to mitigate the identified risks. The report has been produced in accordance with the guidance detailed in the NPPF. Reference has also been made to the CIRIA SuDS manual (C753), the SFRA and the SWMP and following consultation with the EA's Partnership and Strategic Overview Team.

8.2 The potential flood risks to the site, and the review of measures to mitigate the identified risks, are summarised in Table 8.1.

Table 8-1. Proposed mitigation

Source of Flooding	Identified Risk			Mitigation Proposed	Residual Risk		
	L	M	H		L	M	H
Fluvial	✓			No mitigation measures proposed.	✓		
Tidal			✓	The first floor level is above the maximum breach level of 6.51 m AOD.	✓		
Sewers	✓			No mitigation measures proposed.	✓		
Surface Water	✓			No mitigation measures proposed.	✓		
Groundwater	✓			No mitigation measures proposed.	✓		
Other Sources (e.g. reservoirs, water mains)	✓			The proposed change of use is located at first floor level and therefore potential for inundation is reduced.	✓		

8.3 The site is located within Flood Zone 3, associated with the tidal River Thames. However, the site benefits from flood defences to a 1 in 1000 year standard of protection. The defences in the vicinity of the site are currently rated to be in good condition, therefore a breach is unlikely to occur and the actual risk of tidal flooding is considered to be low. The risk of flooding to the site is residual only, associated with a breach of the defences.

8.4 A Topographic survey indicates the site is located at 5.3m AOD in the west to 4.66m AOD in the northeast of the site and 4.86 m in the southeast of the site. Should a breach of the defences occur, the site could be inundated with flooding to a level of 6.51 mAOD for a 1 in 200 year plus climate change (2100) event. The proposed change of use is located on the first-floor level at 9.308 mAOD and therefore the floor levels of the development will be located above the breach flood level.

8.5 No other significant risk of flooding were identified.

8.6 It has been demonstrated that the development meets the Sequential and Exception Tests imposed under the NPPF.

8.7 Overall, it has been demonstrated that the development would be safe, without increasing flood risk elsewhere.

APPENDICES

Appendix A

EA Detailed Flood Data (Product 4)

Product 4 (Detailed Flood Risk) for: Railshead Rd, Twickenham, Isleworth TW7 7EP
Reference: THM196444
Date: 08/12/2020

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.

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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 Flood Zone 3 - with a 1% chance of flooding from rivers (fluvial flooding) and a 0.5% chance of flooding from the sea (tidal flooding) in any given year

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.

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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 Thames node closest to your site is **2.9u**; the locations of nearby nodes on the River Thames are also shown on the enclosed map.

Details about the TE2100 plan

The Plan sets out how the Environment Agency and our partners can work together to manage tidal flood risk, from now until the end of the century. It is an adaptive plan for managing the Thames Estuary, including the tidal defence system, until 2100 so that current standards of flood protection are maintained or improved taking into account climate change effects e.g. sea level rise. The Plan has 3 phases of activity:

- Until 2035 – maintain and improve current defences, safeguard areas required for future improvements, and monitor climate change indicators.
- 2035-2050 – raise existing walls, defences & smaller barriers whilst reshaping the riverside environment.
- 2050-2100 – determine and implement an option for the future of the Thames Barrier, and adapt other defences as required to work alongside this to protect the estuary.

The Thames Estuary 2100 Plan can be found at: https://www.gov.uk/government/publications/thames-estuary-2100-te2100

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.

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Why are the levels in west London higher than the defence crest levels?

In west London there is a heavy influence from upriver flows (fluvial flows). The flood defences are built to manage tidal flood risk only. With very high fluvial flows, the river levels in west London could be above the 0.1% annual probability tidal level.

Why are the climate change/future west London levels lower than the 2008 levels?

The climate change levels are assessed to determine the future tidal defence levels. For this reason they only account for extreme tidal events and not extreme fluvial flow events. The 2008 levels include extreme flows from upriver (fluvial events) as well as extreme tidal events.

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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.

Node	Easting	Northing	Extreme water level (m)	Present Day Statuatory Defence Level (Thames Left Bank) (m)	Allow for future 2100 defence raising to a level of... (Thames Left Bank)
2.8	516863	175134	5.59	5.94	6.70
2.81	516864	175180	5.59	5.94	6.70
2.9u	516742	175353	5.54	5.94	6.70
2.9d	516766	175416	5.54	5.94	6.70
2.10	516898	175964	5.52	5.94	6.70
2.101	516886	176004	5.52	5.94	6.70
2.11	517096	176100	5.49	5.94	6.70
2.111	517320	176217	5.47	5.94	6.70

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TE2100 climate change levels:

			2065 to 2100		2100	
Node	Easting	Northing	Design water level	Defence level (both banks)	Design water level	Defence level (both banks)
2.8	516863	175134	5.84	6.25	6.29	6.70
2.81	516864	175180	5.84	6.25	6.29	6.70
2.9u	516742	175353	5.83	6.25	6.28	6.70
2.9d	516766	175416	5.83	6.25	6.28	6.70
2.10	516898	175964	5.82	6.25	6.27	6.70
2.101	516886	176004	5.81	6.25	6.26	6.70
2.11	517096	176100	5.79	6.25	6.24	6.70
2.111	517320	176217	5.77	6.25	6.22	6.70

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TE2100 flood levels:

Upstream of the Thames Barrier, the levels provided are the highest levels permitted by the Barrier.
Downstream of the Thames Barrier they are the 1 in 1000 (0.1%) levels.

In West London, there is a heavy influence from upstream (fluvial) flows. The flood defences are built to manage tidal flood risk only. With very high fluvial flows, the river levels in west London could be above the tidal defence level.

Location	Node	Easting	Northing	Present Day Water Level	Future 2065-2100 Water Level	Future 2100 Water Level
	2.6	517278	174807	5.64	5.87	6.32
	a2.6	517173	174880	5.63	5.86	6.31
Richmond	a2.7	517026	174968	5.61	5.85	6.3

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TE2100 defence levels:

The table below shows both the current defence level, and the TE2100 plan future defence levels. New development should either include future defence raising or demonstrate that future raising has been allowed for.

Note: The defence levels near Teddington may be lower than the water levels because they take into account high fluvial events. The defences are tidal only.

Location	Node	Easting	Northing	Current Defence Levels		Allow for future defence raising (both banks) to a level of...	
				Left	Right	2065-2100	2100
	2.6	517278	174807	5.94	5.94	6.45	6.90
	a2.6	517173	174880	5.94	5.94	6.45	6.90
Richmond	a2.7	517026	174968	5.94	5.94	6.45	6.90

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Thames Tidal Upriver Breach Inundation Modelling – 2017 Upstream

The map attached 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 2005 and 2100 epochs were modelled on that basis.

This modelling has two epochs to consider; the 2005 epoch is a representation of today's flood levels without climate change considerations taken into account, and the 2100 epoch which takes into account changes likely to be seen due to climate change.

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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 **5.94** mAODN (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.

Areas not Benefiting from Flood Defences

This area is covered by fluvial flood zones derived from the 2009 Teddington fluvial model which overlap the Thames Tidal flood zones in places. ABDs are classified as areas that benefit from defences during a 1.0% fluvial or a 0.5% tidal event. Therefore, if a fluvial flood zone overlaps a tidal ABD and only has defences with a design standard of less than 1.0% fluvial event the areas covered by the fluvial flood zones from that river, cannot be considered to be benefiting from defences.

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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.

Other Sources of Flood Risk

The Lead Local Flood Authority for your area are responsible for local flood risk (i.e. surface runoff, ground water and ordinary watercourse) and may hold further information .

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.

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Additional Information

Use of Environment Agency Information for Flood Risk / Flood Consequence Assessments

Important

If you have requested this information to help inform a development proposal, then we recommend that you undertake a formal pre-application enquiry using the form available from our website:-

https://www.gov.uk/government/publications/pre-planning-application-enquiry-form-preliminary-opinion

Depending on the enquiry, we may also provide advice on other issues related to our responsibilities including flooding, waste, land contamination, water quality, biodiversity, navigation, pollution, water resources, foul drainage or Environmental Impact Assessment.

In **England**, you should refer to the Environment Agency's Flood Risk Standing Advice, the technical guidance to the National Planning Policy Framework and the existing PPS25 Practice Guide for information about what flood risk assessment is needed for new development in the different Flood Zones. These documents can be accessed via:

https://www.gov.uk/flood-risk-standing-advice-frsa-for-local-planning-authorities

https://www.gov.uk/government/publications/national-planning-policy-framework-technical-guidance

https://www.gov.uk/government/publications/development-and-flood-risk-practice-guide-planning-policy-statement-25

You should also consult the Strategic Flood Risk Assessment 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 / Consequence Assessment (FRA / FCA) 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. The information produced by the local planning authority referred to above may assist here.
3. Where a planning application requires a FRA / FCA and this is not submitted or deficient, the Environment Agency may well raise an objection.
4. For more significant proposals in higher flood risk areas, we would be pleased to discuss details with you ahead of making any planning application, and you should also discuss the matter with your local planning authority.

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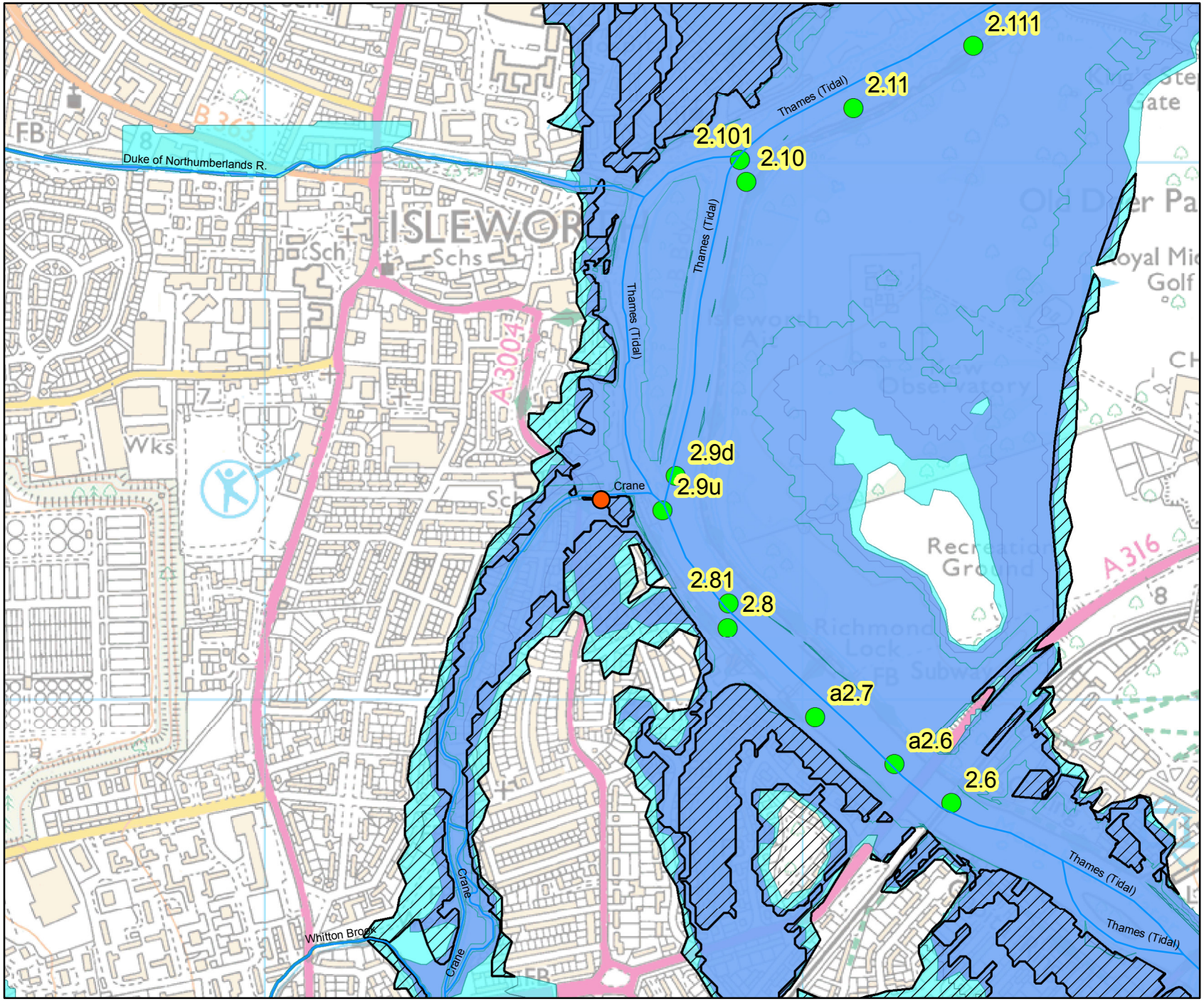
Detailed FRA/FCA for: Railshead Rd, Twickenham, Isleworth TW7 7EP - 08/12/2020 - THM196444



Environment Agency
Alchemy,
Bessemer Road,
Welwyn Garden City,
Hertfordshire,
AL7 1HE

N

0 150 300 600
Metres

Legend

- Main Rivers
- Site location
- TE2100Nodes
- 1707 Flood Outline
- 1928 Flood Outline
- 1953 Flood Outline
- Areas Benefiting from Flood Defences
- Flood Zone 3
- Flood Zone 2

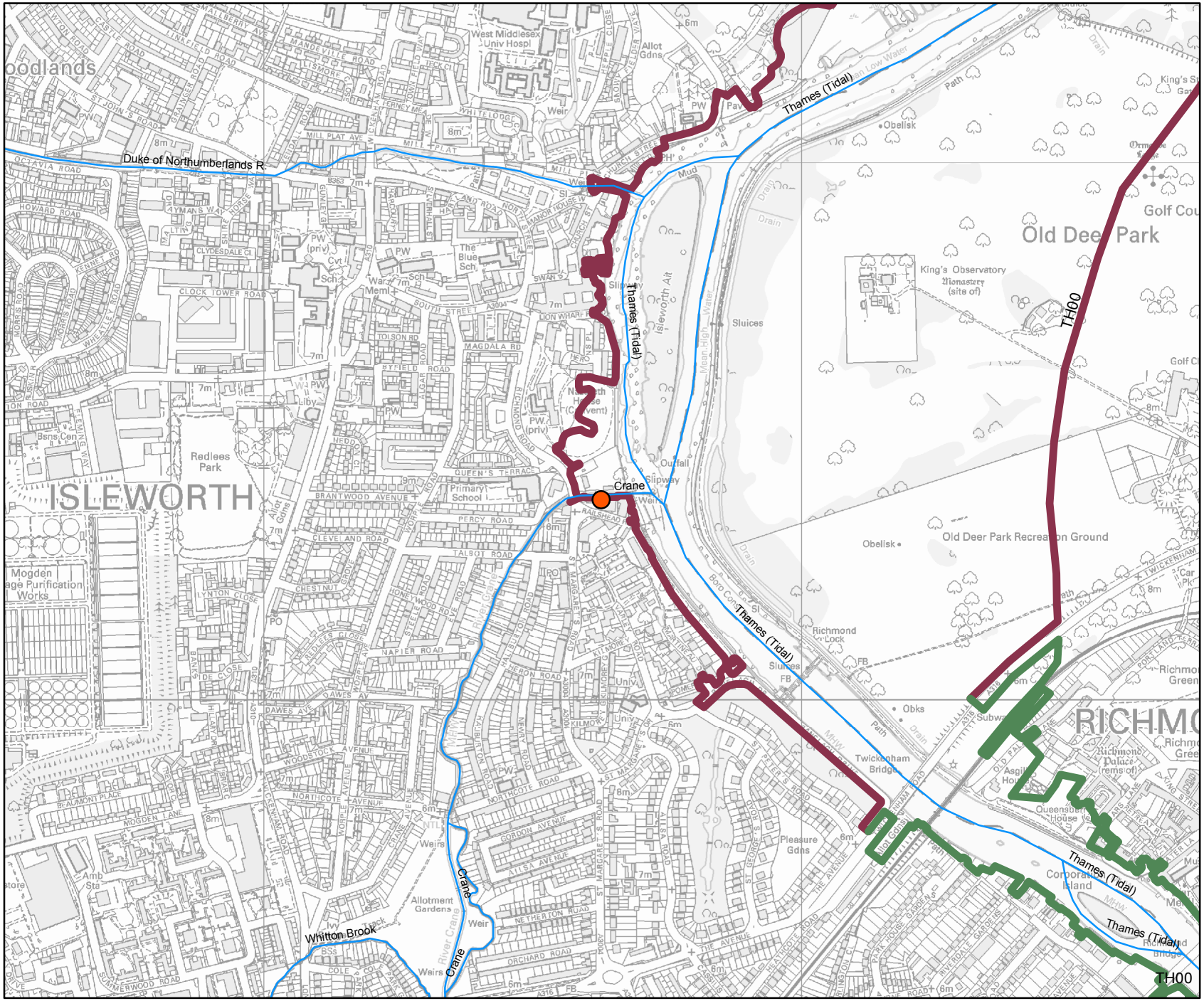
Flood Map for Planning (assuming no defences)

Flood Zone 3 shows the area that could be affected by flooding:
- from the sea with a 1 in 200 or greater chance of happening each year
- or from a river with a 1 in 100 or greater chance of happening each year.

Flood Zone 2 shows the extent of an extreme flood from rivers or the sea with up to a 1 in 1000 chance of occurring each year.

Produced by:
Partnerships & Strategic Overview,
Hertfordshire & North London

Detailed FRA/FCA for: Railshead Rd, Twickenham, Isleworth TW7 7EP - 08/12/2020 - THM196444



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0 150 300 600
Metres

Legend

- Main Rivers
- Site location

TTD Defences SDL (mAODN)

SDL

- 5.94
- 6.02

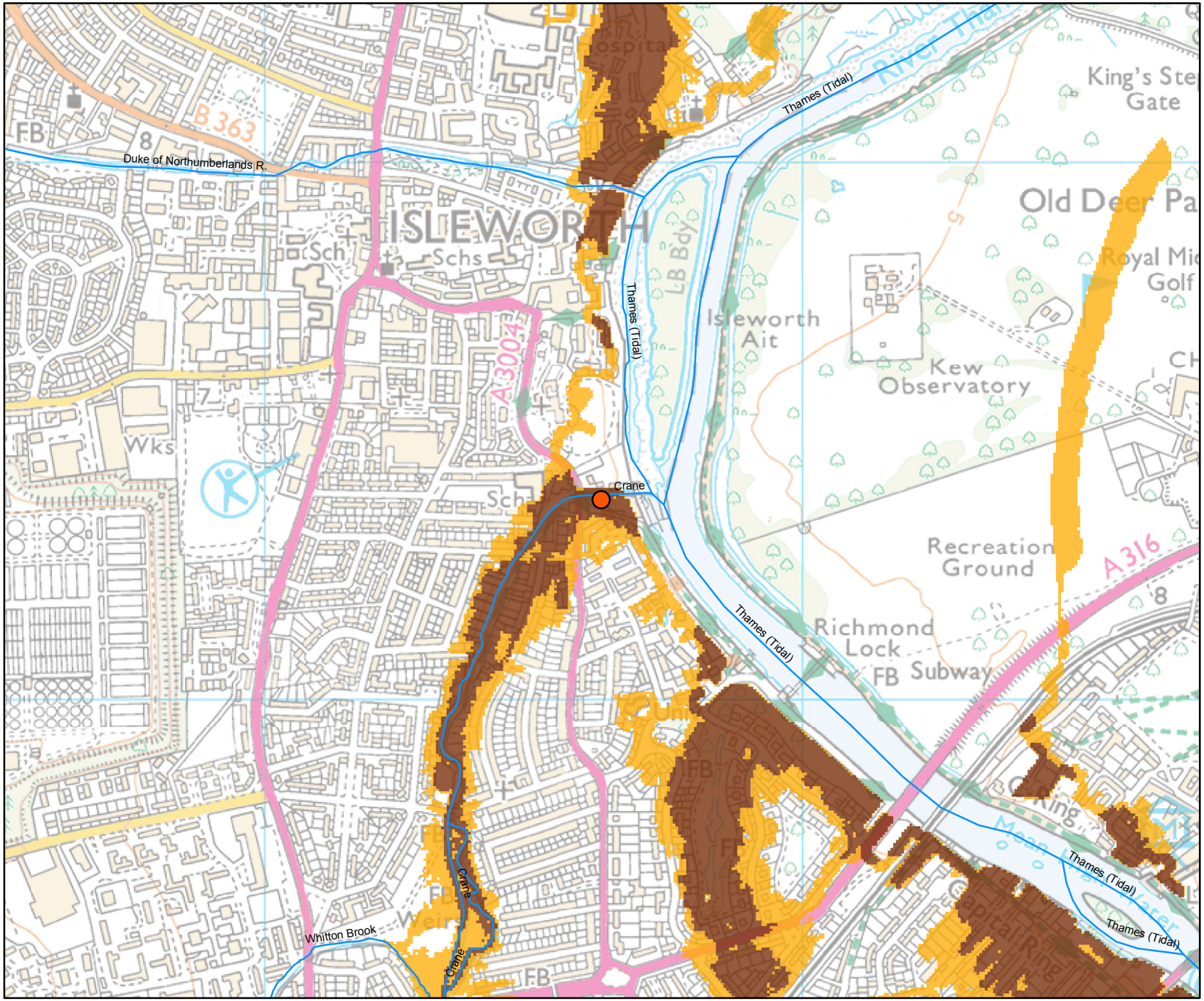
Flood Map for Planning (assuming no defences)

Flood Zone 3 shows the area that could be affected by flooding:
- from the sea with a 1 in 200 or greater chance of happening each year
- or from a river with a 1 in 100 or greater chance of happening each year.

Flood Zone 2 shows the extent of an extreme flood from rivers or the sea with up to a 1 in 1000 chance of occurring each year.

Produced by:
Partnerships & Strategic Overview,
Hertfordshire & North London

Breach Modelling Map for: Railshead Rd, Twickenham, Isleworth TW7 7EP - 08/12/2020 - THM196444



Environment Agency
Alchemy,
Bessemer Road,
Welwyn Garden City,
Hertfordshire,
AL7 1HE

N

0 150 300 600
Metres

Legend

Main Rivers

Site location

Upstream Breach Outlines

Epoch

2005

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.

Produced by:
Partnerships & Strategic Overview,
Hertfordshire & North London

Modelled Flood Levels For: Railshead Rd, Twickenham, Isleworth TW7 7EP - 08/12/2020 - THM196444

Environment Agency
Alchemy,
Bessemer Road,
Welwyn Garden City,
Hertfordshire,
AL7 1HE

N

0 5 10 20
Metres

Legend

- Main Rivers
- Site location

2D Node Results: Heights

- Tidal Breach Height (mAOD) 2005

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.

Produced by:
Partnerships & Strategic Overview,
Hertfordshire & North London

Modelled Flood Levels For: Railshead Rd, Twickenham, Isleworth TW7 7EP - 08/12/2020 - THM196444

Environment Agency
Alchemy,
Bessemer Road,
Welwyn Garden City,
Hertfordshire,
AL7 1HE

N

0 5 10 20
Metres

Legend

- Main Rivers
- Site location

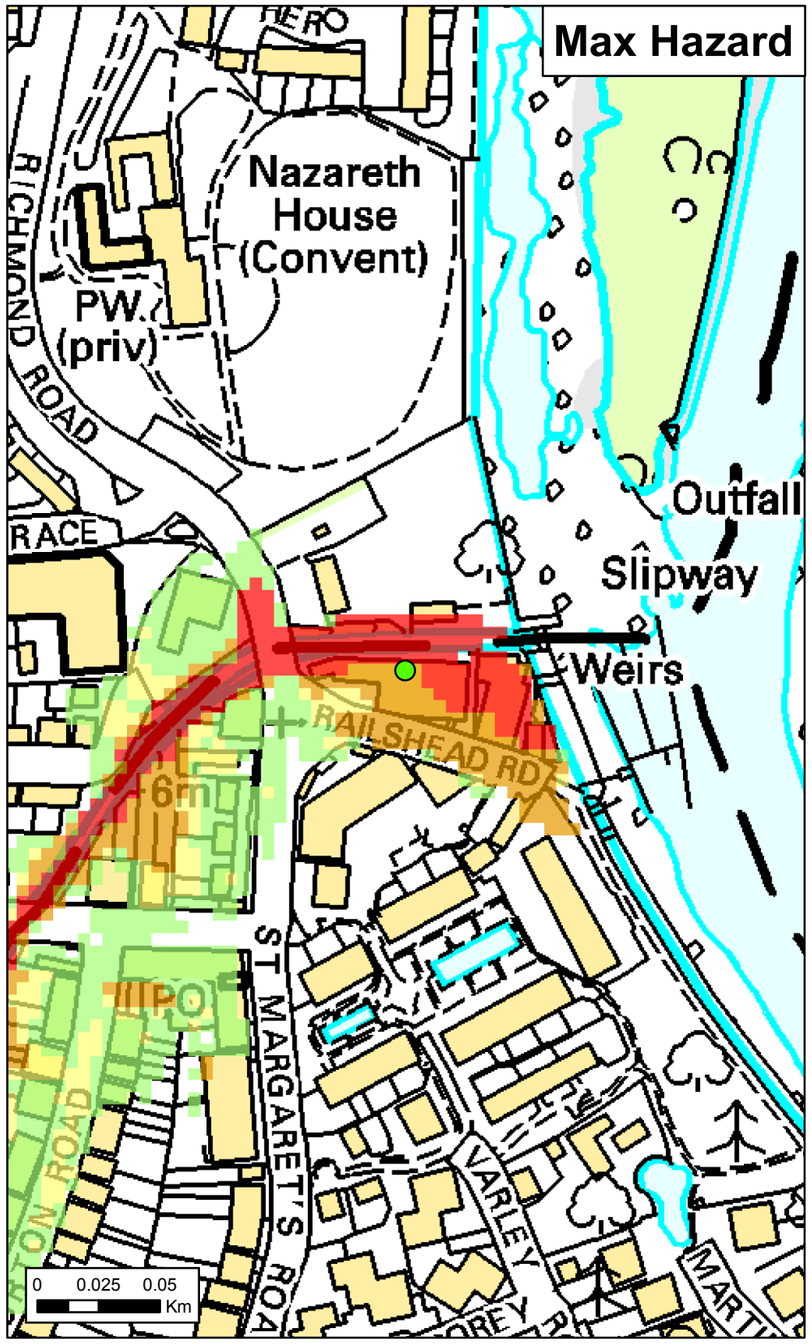
2D Node Results: Heights

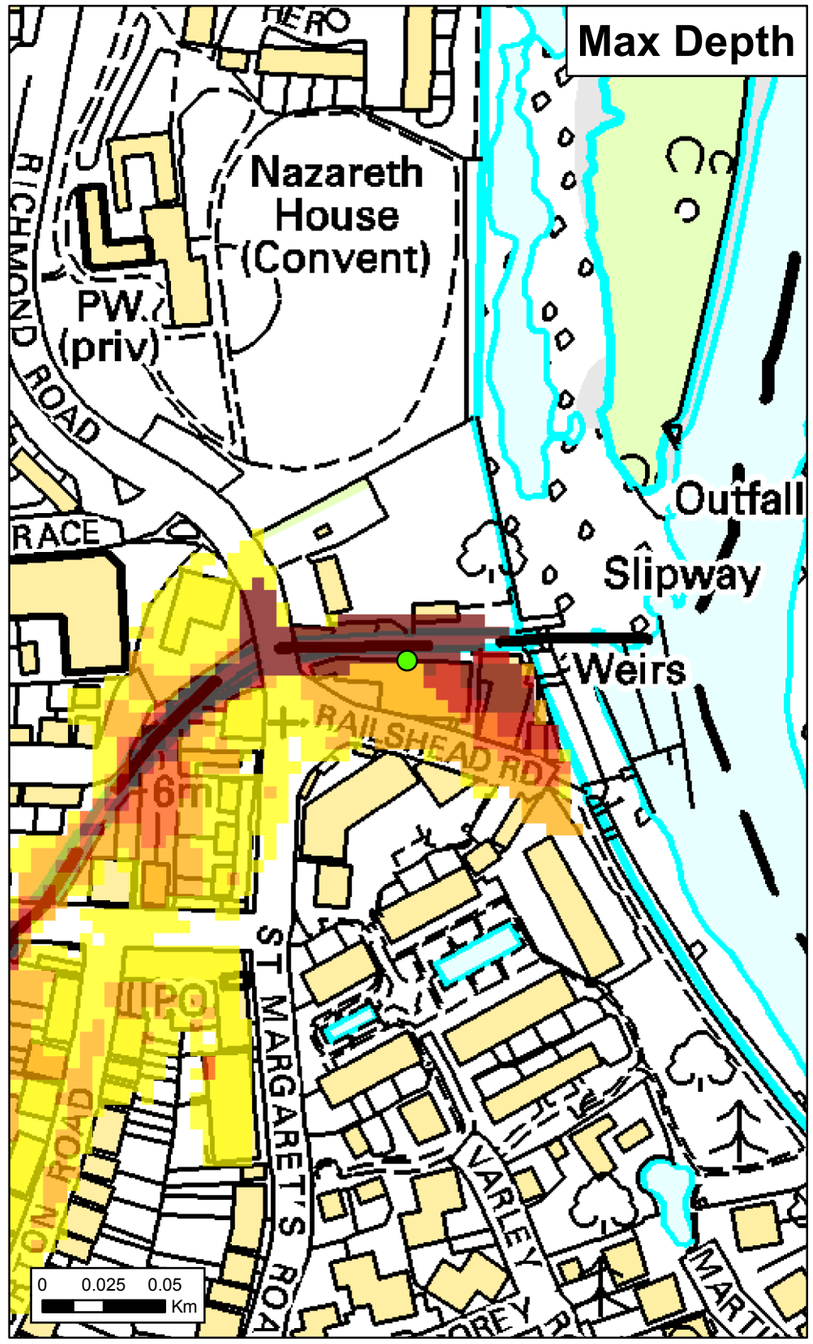
- Tidal Breach Height (mAOD) 2100

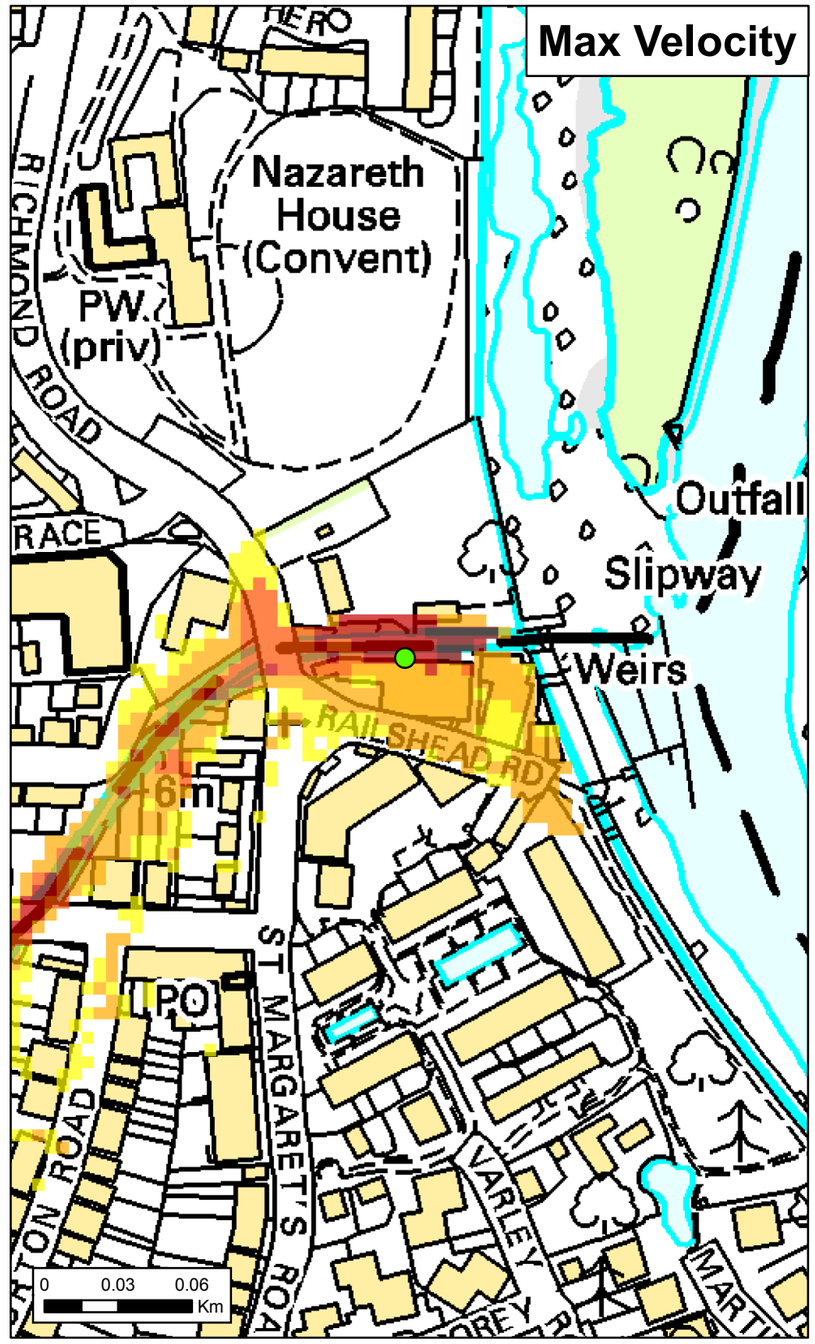
Thames Tidal Upriver Breach Inundation Modelling 2017

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.

Produced by:
Partnerships & Strategic Overview,
Hertfordshire & North London







Max 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)

Max Depth (m)

- 0 - 0.25
- 0.25 - 1.00
- 1.00 - 1.50
- 1.50 - 2.00
- > 2.00

Max Velocity (m/s)

- 0 - 0.3
- 0.3 - 1.0
- 1.0 - 1.5
- 1.5 - 2.5
- > 2.5

Date Printed	08/12/2020	Scenario year	2005	Scenario Annual Chance	0.5% (1 in 200)

This map shows the level of flood hazard to people (called a hazard rating) if our flood defences are breached at certain locations, for a range of scenarios. The hazard rating depends on the depth and velocity of floodwater, and maximum values of these are also mapped.

The map is based on computer modelling of simulated breaches at specific locations. Each breach has been modelled individually and the results combined to create this map. Multiple breaches, other combinations of breaches, different sized tidal surges or flood flows may all give different results.

The map only considers the consequences of a breach, it does not make any assumption about the likelihood of a breach occurring. The likelihood of a breach occurring will depend on a number of different factors, including the construction and condition of the defences in the area. A breach is less likely where defences are of a good standard, but a risk of breaching remains.

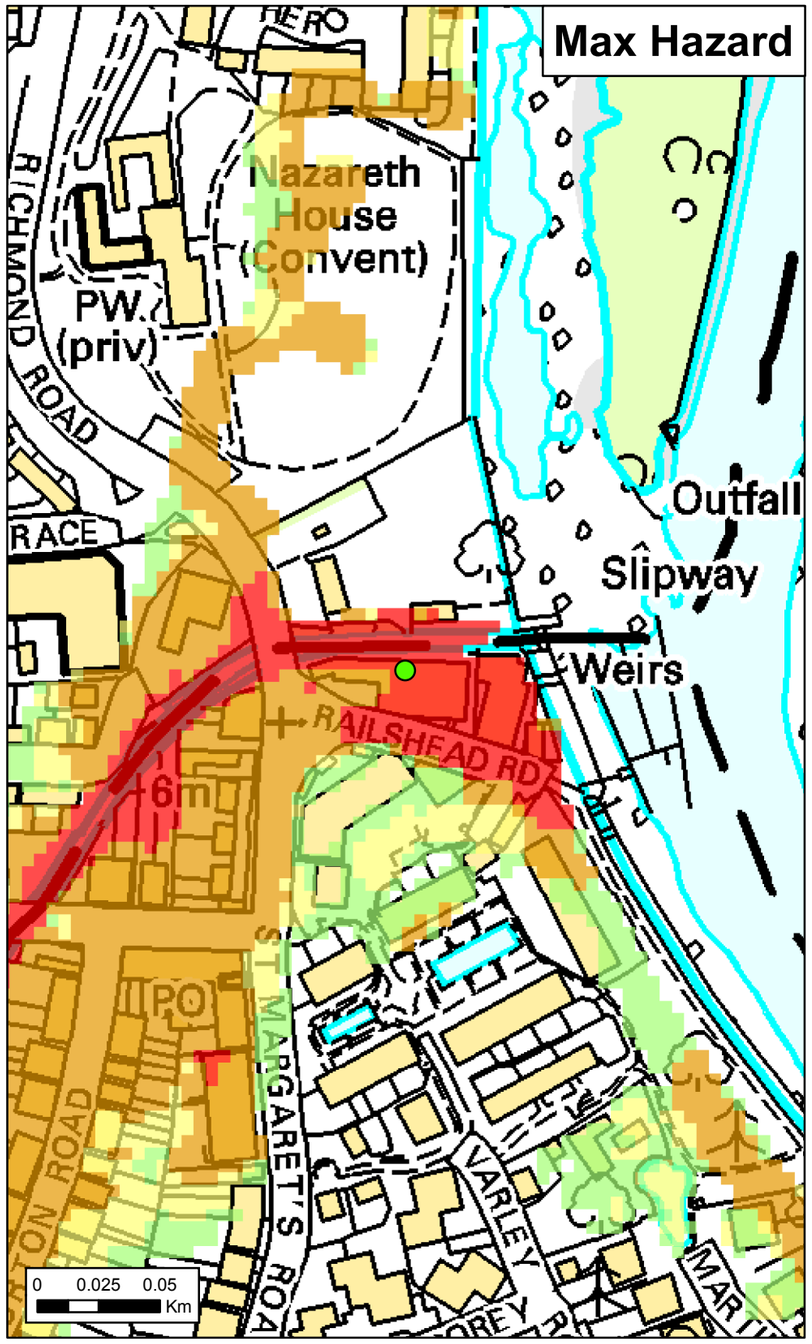
Please contact the Environment Agency for further information on emergency planning associated with flood risk in this area.

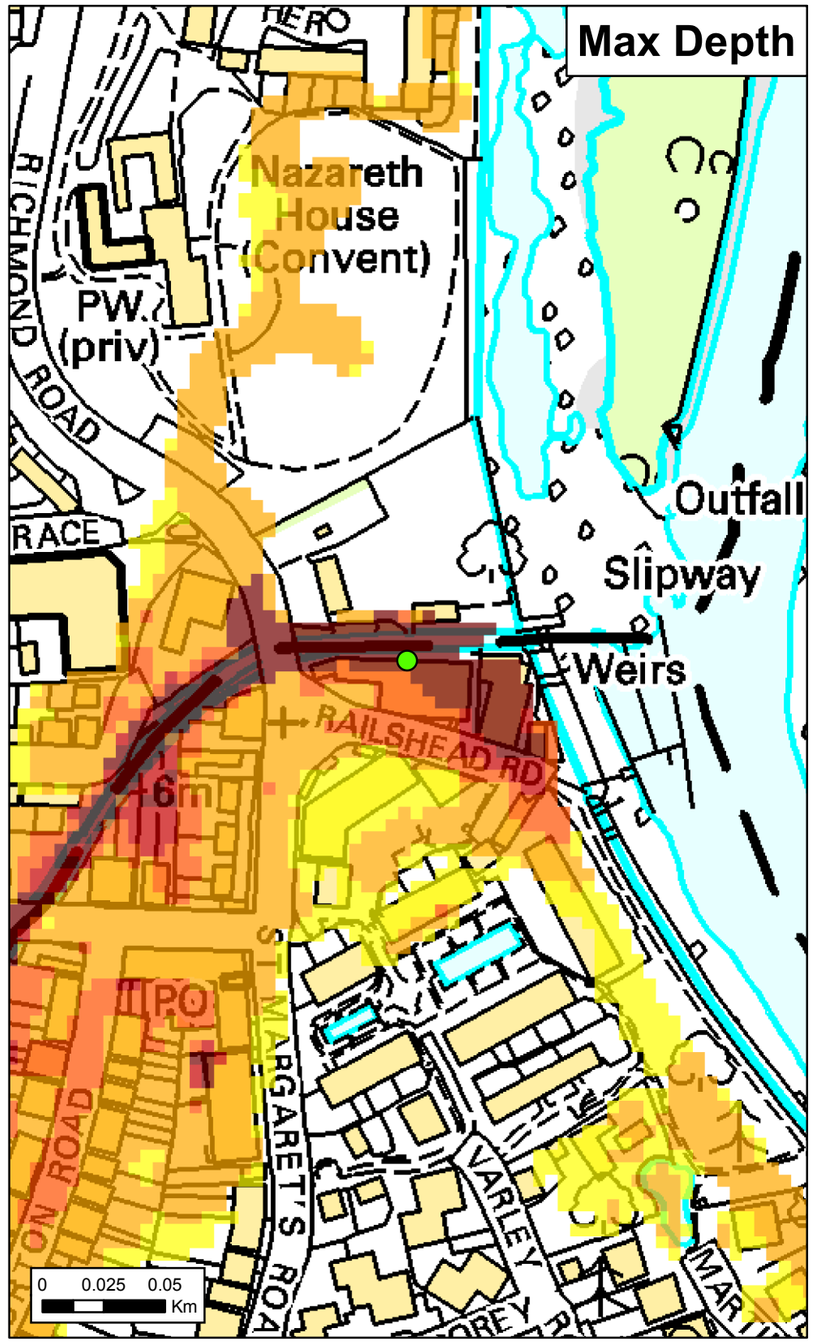
General Enquiries No: 03708 506 506. Weekday Daytime calls cost 5p plus up to 6p per minute from BT Weekend Unlimited. Mobile and other providers' charges may vary

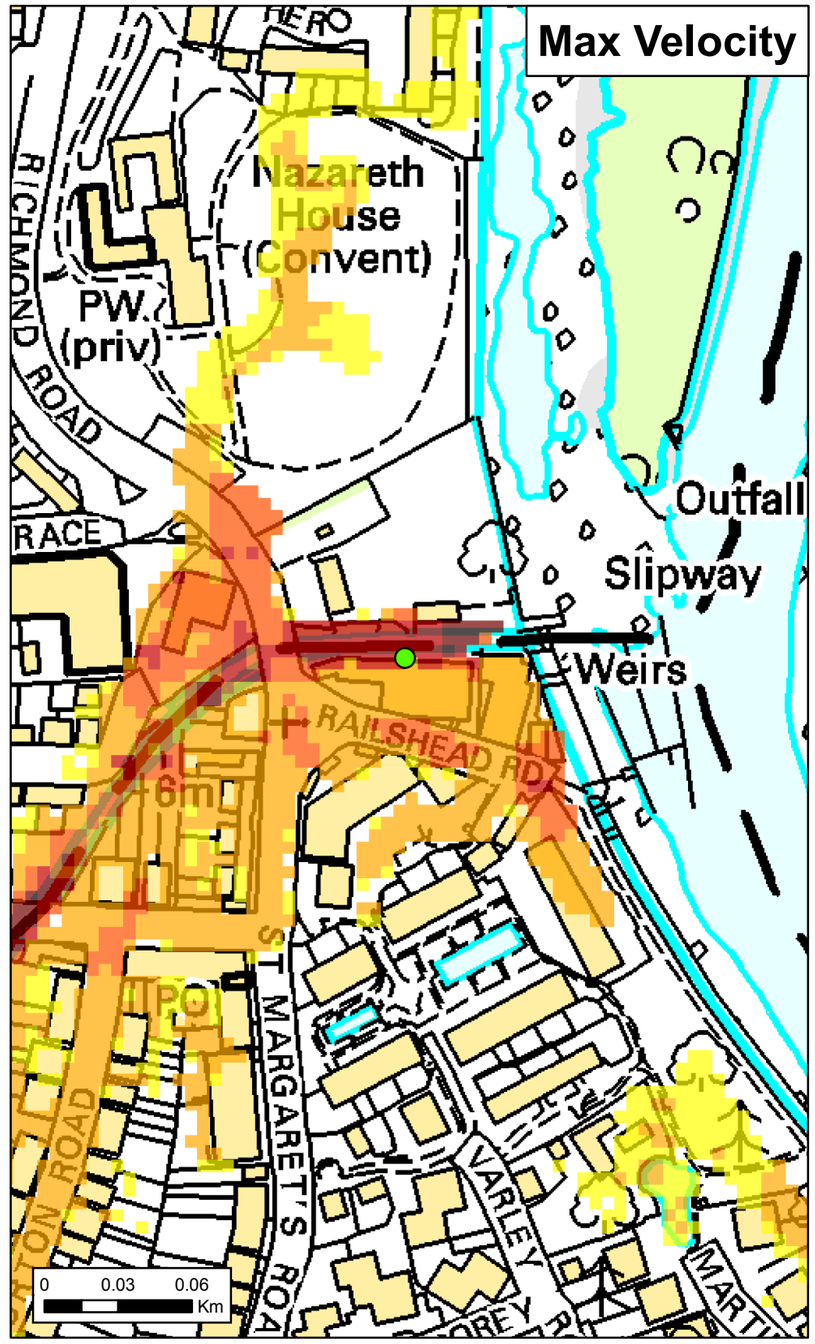
Environment Agency

Thames Tidal Breach Hazard Mapping

Map Centred on 516,629 175,370







Max 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)

Max Depth (m)

- 0 - 0.25
- 0.25 - 1.00
- 1.00 - 1.50
- 1.50 - 2.00
- > 2.00

Max Velocity (m/s)

- 0 - 0.3
- 0.3 - 1.0
- 1.0 - 1.5
- 1.5 - 2.5
- > 2.5

Date Printed	08/12/2020	**Scenario year**	2100	**Scenario Annual Chance**	0.1% (1 in 1000)

This map shows the level of flood hazard to people (called a hazard rating) if our flood defences are breached at certain locations, for a range of scenarios. The hazard rating depends on the depth and velocity of floodwater, and maximum values of these are also mapped.

The map is based on computer modelling of simulated breaches at specific locations. Each breach has been modelled individually and the results combined to create this map. Multiple breaches, other combinations of breaches, different sized tidal surges or flood flows may all give different results.

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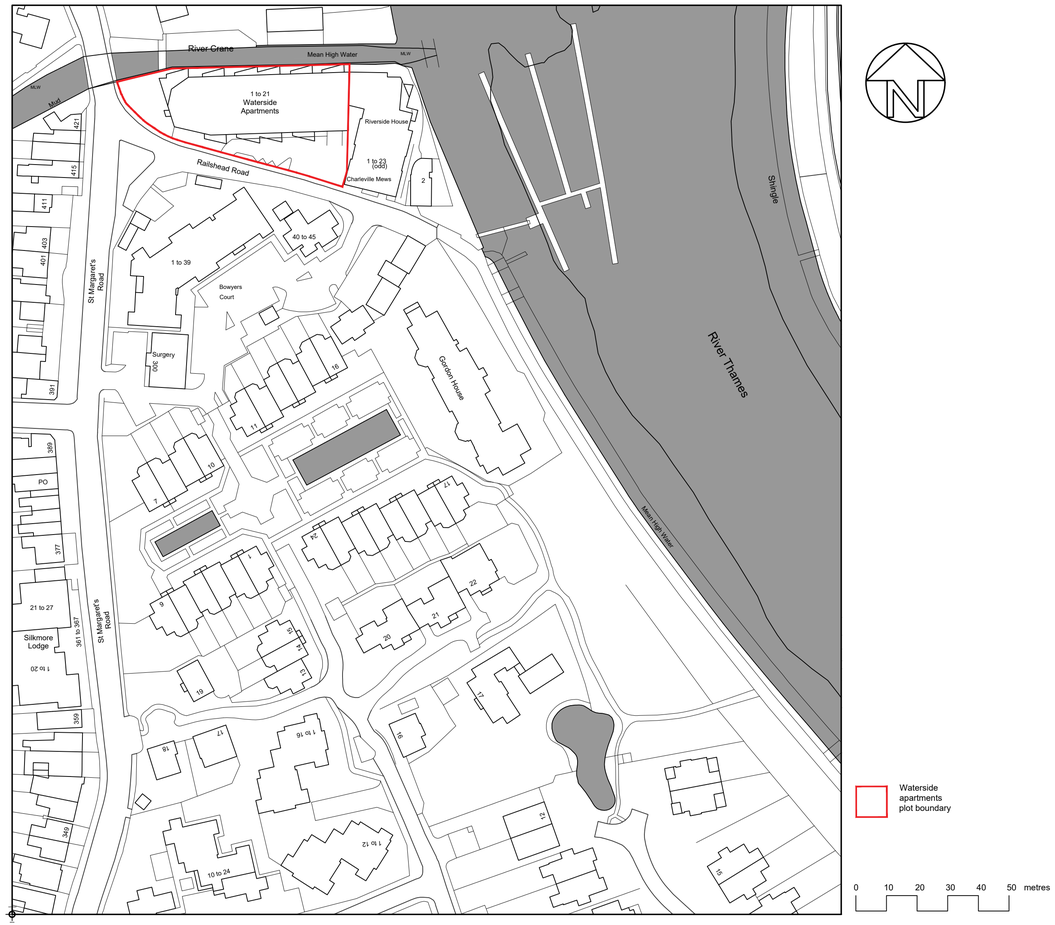
Environment Agency

Thames Tidal Breach Hazard Mapping

Map Centred on 516,629 175,370

Appendix B

Development Plans



Rev	Date	Info

NOTES:
Permission is granted to scale from this drawing for Local Authority Planning Approval purposes only. Refer to title block for original printed paper size.

PLANNING

FORM design architecture
1 Bermondsey Exchange
179-181 Bermondsey Street
London SE1 3UW
020 7407 3336
020 7407 3340 Fax

client Mizen Design Build LTD

project Railshead Road
Isleworth TW7 7DG

drawing Location Plan

drawn TG check JL date 08.04.20 scale 1:1000@A1 no. 859-001 rev. A

PLANNING

Rev	Date	Info

NOTES:
Permission is granted to scale from this drawing for Local Authority Planning Approval purposes only.
Refer to title block for original printed paper size.

FORM design architecture
1 Bermondsey Exchange
179-181 Bermondsey Street
London SE1 3UW
020 7407 3336
020 7407 3340 Fax

client Mizen Design Build
project Waterside
Railshead Road
Isleworth TW7 7DG

drawing Existing
First Floor Plan

drawn JHL check date 27.10.15 scale 1:100@A1 no. 859-012 rev.

Six new proposed units.

A125
1 North Elevation

UNIT 9
UNIT 10
UNIT 11
UNIT 1
UNIT 2
UNIT 3
UNIT 8
Lift Lobby
UNIT 7
UNIT 5
UNIT 6
UNIT 4
green roof

South
2 Elevation
A125

0 5 10 m

PLANNING

Rev	Date	Info

NOTES:
Permission is granted to scale from this drawing for Local Authority Planning Approval purposes only.
Refer to title block for original printed paper size.

FORM design architecture
1 Bermondsey Exchange
179-181 Bermondsey Street
London SE1 3UW
020 7407 3336
020 7407 3340 Fax

client Railshead Commercial Limited
project Railshead Road
Isleworth TW7 7DG

drawing Proposed First Floor Plan

drawn TG check date 08.04.20 scale 1:100 @ A1 no. 859-02-024 rev.

sea scouts
boat house

new trees

river crane

existing flood gate defences
to river crane

listed
bridge

new railings

wooden bench

hedge planting along
boundary wall

See arboricultural
report for planting
strategy

standby
generator

existing
bridge wall

HAGS/SMP 2.4m
Cone Climber
designed for
children of all
ages

500 x 500mm Grassmatt interlocking recycled PVC/rubber tiles for 2.5m Critical Fall Height (BS EN 1177 tested). Rubber surfacing laid straight onto existing grass areas. New turf will be required.

hedge planting along
boundary wall

existing wall restored
with new railings and
copings

wooden seat

PLAY AREA

HAGS/SMP 1m high
classic slide suitable for
younger children.

HAGS/SMP Zingo
Seesaw

early age play
space

HAGS/SMP Polynesia
Bike Springer

new access gate -
pedestrian gates to be
permanently fixed open
between the hours of dawn
to dusk

existing wall restored
with new railings and
copings

EXTERNAL LEVEL 5.140

access control gate
system with audio
visual verification

10 Sheffield Stands for
commercial & visitor use
(20 cycle spaces) covered over

new pedestrian
access gate

existing crossover
re-positioned

boundary wall to be rebuilt eastwards from
pedestrian access in brickwork to match
existing boundary with new railings over

refuse bins temp.
pickup zone

100x100 External Block Curbs
Colour: White
Manufacturer: Charcon

IN : vehicle access control system
with audio visual verification

with audio visual
verification

OUT

commercial units

commercial units

commercial
unit
entrance

commercial
bin store

commercial
entrance

residential
stairwell

residential
entrance

residential
bin store

commercial
entrance

1:60 FALL

rw outlet

2.5m

400x200 External Block Paving
Colour: Silver Fleck
Manufacturer: Charcon

access gate - *pedestrian gates to be permanently fixed open between the hours of dawn to dusk*

charleville
mews

3.5 m

4.8 m

6.0 m

200x100 External Block Paving to
Vehicle Parking Area
Colour - Silver Grey & Midnight Grey
Manufacturer: Charcon

For details of vehicle movement tracking
refer to JSA drawings 1721/SK/15 & 16.

See separate description of vehicle traffic
light control system.

perimeter of bay defined
walk zone defined
std. wheelchair symbol

hedge in place of
wall for improved
vehicle visibility

existing
plant
planter

car ramp

hedge planting along
boundary wall

riverside
house

railshead road

new trees

boundary wall to be rebuilt in brickwork to
match existing boundary with new railings
over

bowyers
court

bowyers
court

st. margarets road

External Lighting:
Will illuminate all
external doors, car
access to garage
and some walkways
leading to flats

external lighting
switched using
photoelectric cell with
manual override

light spill is controlled
by suitable
photometry

low energy lamps
with an efficacy
greater than 40
lumens per circuit
watt are to be used

Letterboxes:
will comply with the
Crime Preventions
Solutions as
described in Secure
by Design
requirements

External Lighting:
Will illuminate all
external doors

Bicycle stands:
Secure by Design
lockable racks will be
provided in the
basement.

Access to Communal
parking area
will be lit. Lighting to
private roads and car
parks to comply with
BS 5489; light
pollution minimised

Utility meters: In this
development cannot
be located on the
ground floor but will
be located in secure
plant rooms and
access controlled by
appointment with
concierge.

- New river access walkway

- Site boundary

CONSTRUCTION

Rev	Date	Info
A	09.02.15	Ground floor plan updated. Grid lines added.
B	05.05.15	Detail added.
C	29.05.15	Secure by design information added.
D	01.07.15	Play area amended. Detail added.
E	08.09.15	vehicle circulation changed, notes added. cycle store covered.
F	13.06.16	landscaped trees updated, wall to exit gate removed and hedge put in place.

0m 5m 10m

scale bar 1:100

N

NOTES:
Refer to Engineers data for structural works.
Use figured dimensions. Do not scale from drawing.
Check all dimensions on site.
Report any discrepancies to the Architects.

FORM design architecture

1 Bermondsey Exchange
179-181 Bermondsey Street
London SE1 3UW
020 7407 3336
020 7407 3340 Fax

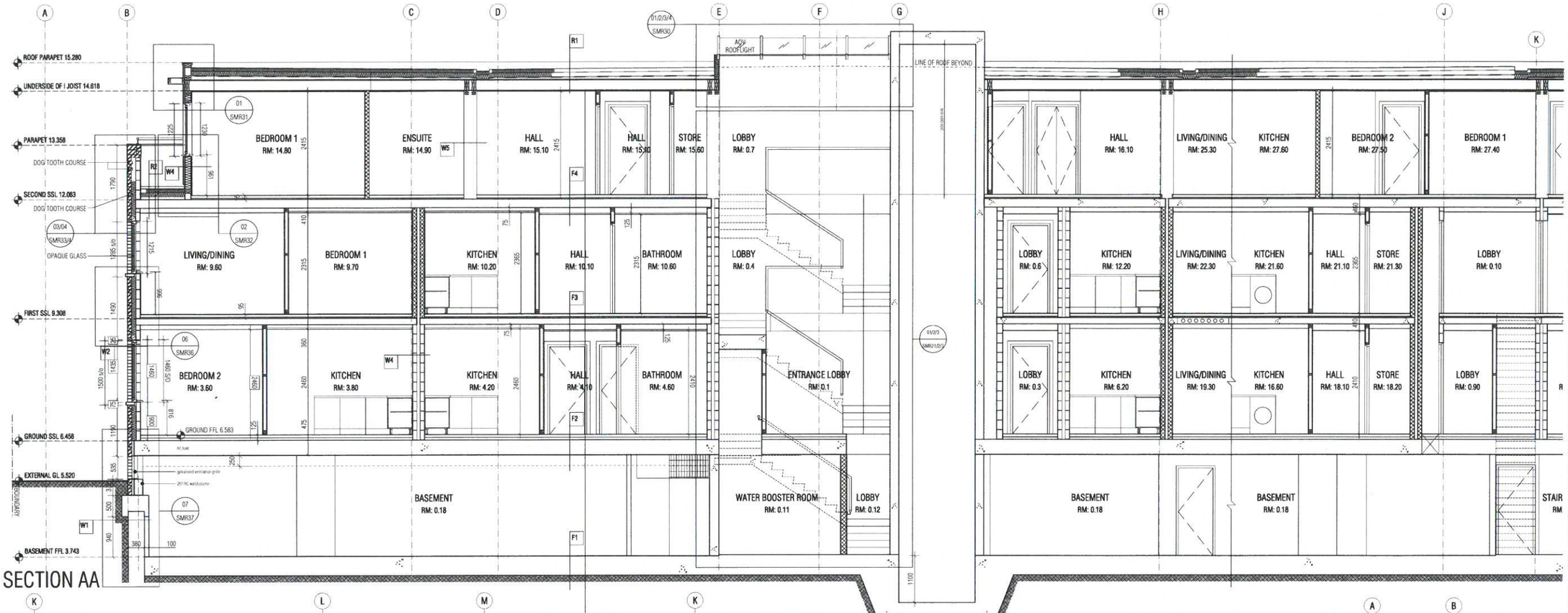
client Mizen Design Build LTD

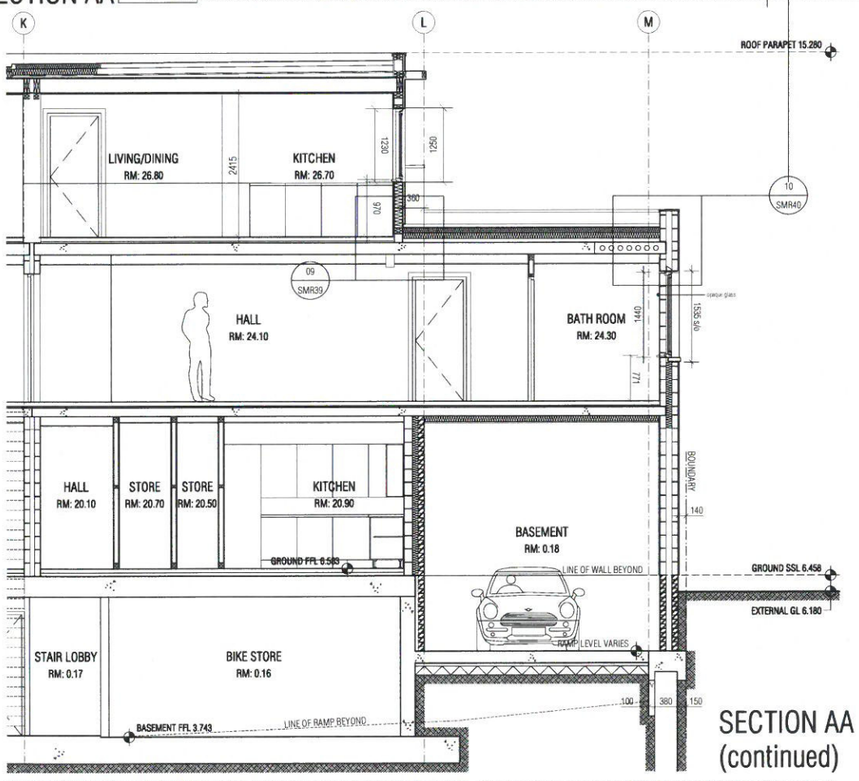
project Railshead Road
Isleworth TW7 7DG

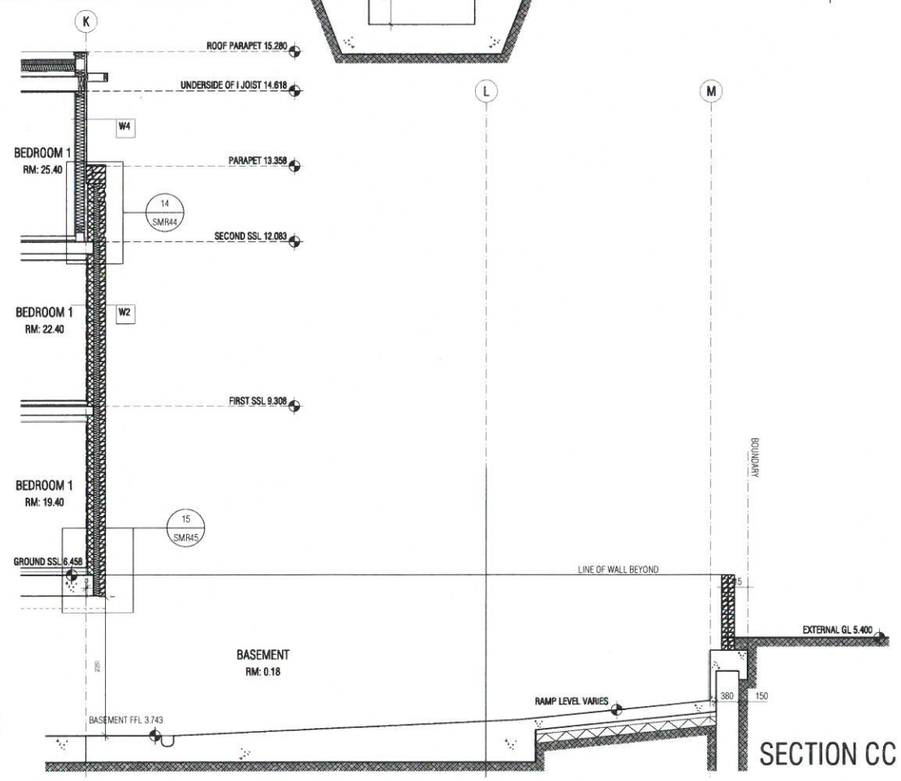
drawing Ground floor plan
with Secured by Design
Information

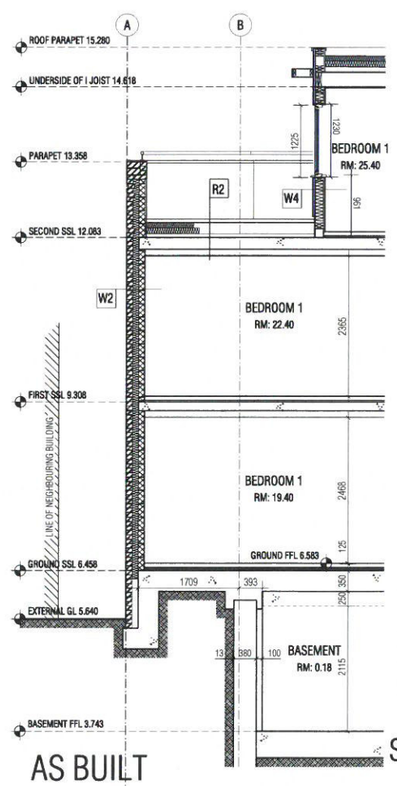
drawn MT check

date 09.12.14 scale 1:100 @ A1 no. 859.002 rev. F









CONSTRUCTION NOTES:

W1 - BASEMENT RETAINING WALL
100mm concrete skin
Waterproof Membrane
380mm sheet piling

W2 - BRICK WALL (0.26 W/m2K min)
100mm facing brickwork TBC
100mm Rockwool Cavity insulation
100mm concrete blockwork 7.5kN
15mm plaster& skim

W3 - RENDER WALL (0.26 W/m2K min
20mm Weberprai M scraped finish
Weber Rendaid primer
100mm concrete blockwork
100mm Rockwool Cavity insulation
100mm concrete blockwork 7.5kN
15mm plaster& skim

W4 - TIMBER FRAME & TRESPA (0.25 W/m2K min??)
8mm Trespa Meteon Urban Grey
25mm Timber battens
Glidevale TF200 thermo breather membrane
9mm OSB sheathing
140mm timber frame with 140mm Rockwool
Flexi insulation
125 micron polythene vapour barrier
12.5mm wallboard duplex
12.5mm wallboard
skim plaster

W5 - MASONRY PARTY WALLS (E-WM-1)
15mm plaster& skim
100mm concrete blockwork
75mm cavity
100mm conceret blockwork
15mm plaster& skim

W6 - TIMBER PARTY WALLS (E-WT-2)
2 x 12.5mm wall board
89mm stud and insulation
9mm OSB sheathing
50mm cavity
9mm OSB sheathing
89mm stud and insulation
2 x 12.5mm wall board

R1 - ROOF(0.13 W/m2K min)
new single ply membrane Sarnafill G410-EL or similar approved adhered to 180mm (100+80) bonded rigid insulation Kingspan Thermaroof TR27 LPC/FM or similar
polythene 1000 guage VCL
18mm wpb plywood
on sw firrings laid to falls (min 1in 80)
18mm wpb plywood
241mm Timber cassettes
2 layers 12.5mm plasterboard and skim

R2 - TERRACE (0.13 W/m2K min)
50mm paving slabs on nylon spacers, on
Protection fleece Sarnafill Type T or similar approved
Single ply membrane Sarafill G410-EL or similar approved adhered to 180mm (100+80) bonded rigid insulation Kingspan Thermaroof TR27 LPC/FM or similar
polythene 1000 guage VCL
Sand cement screed to falls?????
200mm hollow core slabs (300kg/m2 mass per unit area min)
125mm clear void to bathrooms, lobbys & hallways/75mm void to all other rooms and 12.5mm plasterboard and skim on
British Gypsum Gyplyner Universal system

R3 - SEDUM TERRACE (0.13 W/m2K min)
90mm x 400 x 600mm sedum mat trays. on
Protection fleece Sarnafill Type T or similar approved
Single ply membrane Sanafill G410-EL or similar approved adhered to 180mm (100+80) bonded rigid insulation Kingspan Thermaroof TR27 LPC/FM or similar
polythene 1000 guage VCL
Sand cement screed to falls?
200mm hollow core slabs (300kg/m2 mass per unit area min)
125mm clear void to bathrooms, lobbys & hallways/75mm void to all other rooms and 12.5mm plasterboard and skim on British Gypsum Gyplyner Universal system

R4 - UNINUSLATED TERRACE
50mm paving slabs on nylon spacers, on
Protection fleece Sarnafill Type T or similar approved
Single ply membrane Sanafill G410-EL or similar approved adhered to
Sand cement screed to falls?????
350mm RC slab
(250mm zone for services)

F1 - BASEMENT FLOOR (0.20 W/m2K min)
450mm RC Slab
Waterproof membrane
Concrete blinding

F2 - GROUND FLOOR (0.20 W/m2K min)
65mm screed
60mm Kingspan K3 (P/A = 0.195)
350mm RC slab
(250mm zone for services)

F3 - FIRST FLOOR (PCST)
65mm sand cement screed
5mm Cellecta YeloFonHD5 (resilient layer 1)
(10mm Cellecta YeloFon ES10/100 isolating edge strips)
25mm (min) Cellecta Yelofoam X2i insulation
(resilient layer 2)
150mm hollow core slab
(300kg/m2 mass per unit area min)
125mm clear void to bathrooms, lobbys & hallways/75mm void to all other rooms and 12.5mm plasterboard and skim on British Gypsum Gyplyner Universal system

F4 - SECOND FLOOR (PCST)
65mm sand cement screed
5mm Cellecta YeloFonHD5 (resilient layer 1)
(10mm Cellecta YeloFon ES10/100 isolating edge strips)
25mm (min) Cellecta Yelofoam X2i insulation
(resilient layer 2)
200mm hollow core slab
(300kg/m2 mass per unit area min)
125mm clear void to bathrooms, lobbys & hallways/75mm void to all other rooms and 12.5mm plasterboard and skim on British Gypsum Gyplyner Universal system

WINDOWS (1.8W/m2K min)
Arden Hathaway timber casment window

LIFT
Kone R3 8person 630 kg 1800 x 1700 shaft size

ALL DIMENSIONS TO BE CHECKED ON SITE. BRACKETED DIMENSIONS ARE FOR CHECKING AND NOT FOR SETTING OUT PURPOSES. ANY DISCREPANCIES ARE TO BE REPORTED TO THE ARCHITECT BEFORE COMMENCEMENT.

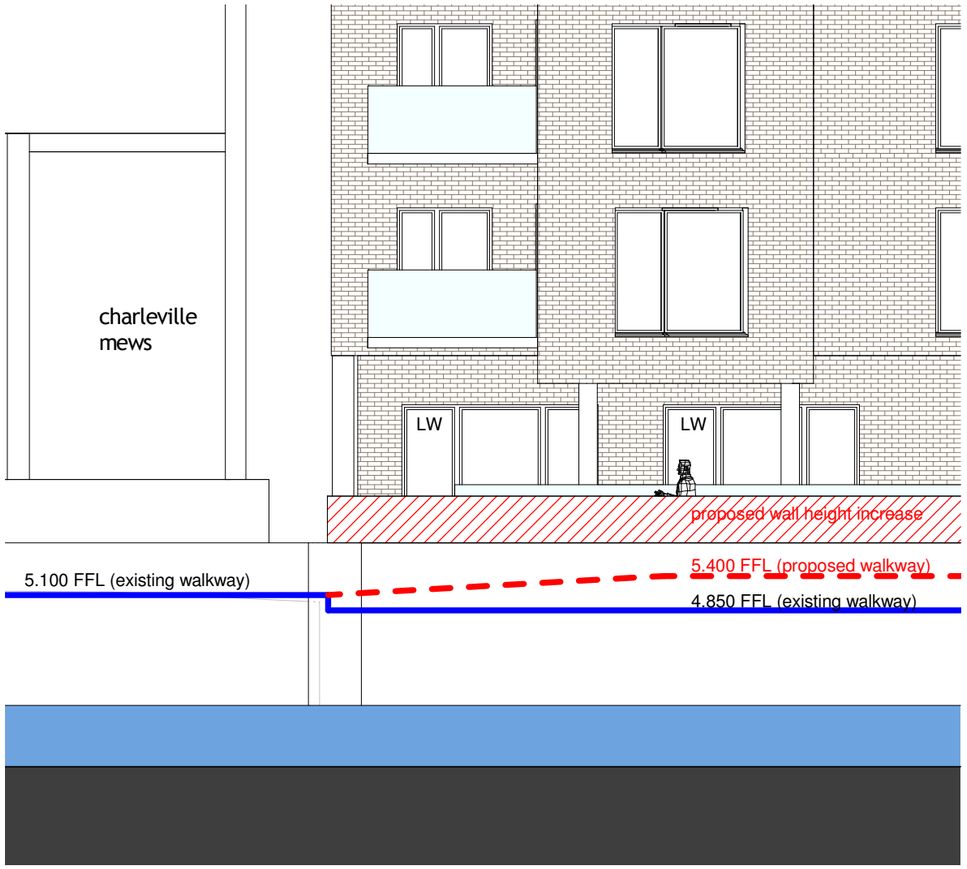
Notes

Revisions
CX - 04.10.2012 Final Construction Issue

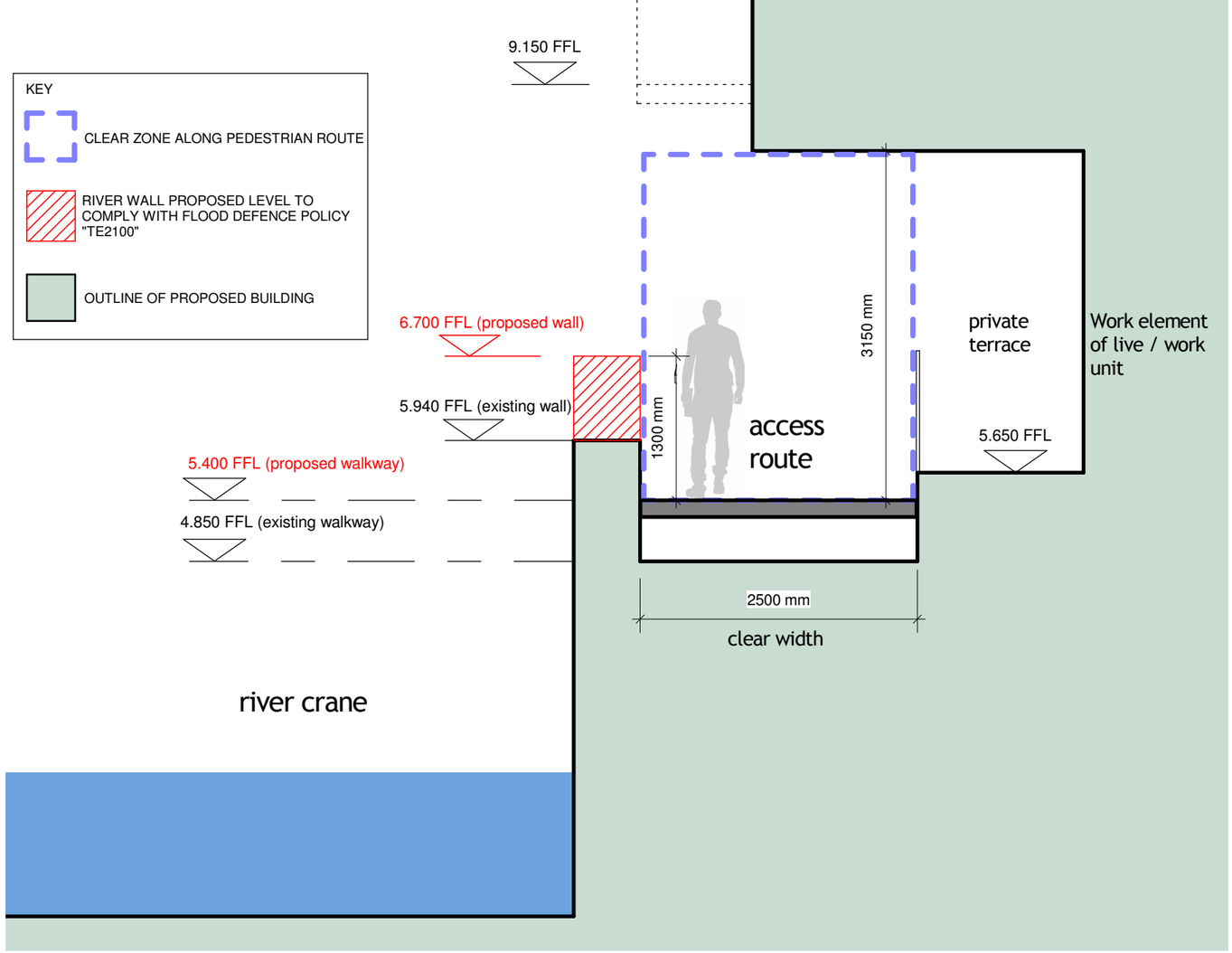
Project: ST MARGARET'S ROAD, TWICKENHAM
Drawing: SECTION AA,BB,CC
Drawing No.: SMR - 14_CX
Scale: 1:50 @ A1
Date: 23.08.10

AS BUILT

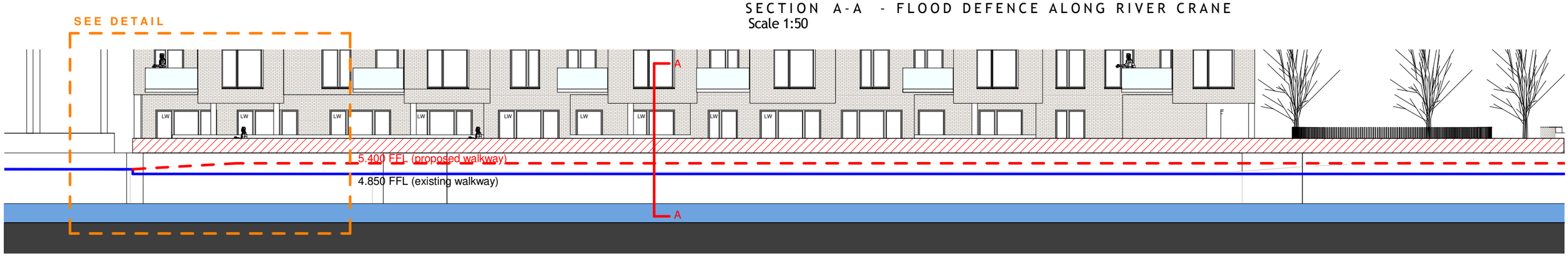
MIZEN
BUILDING EXCELLENCE



FLOOD DEFENCE WALL ELEVATION- DETAIL
Scale 1:100



SECTION A-A - FLOOD DEFENCE ALONG RIVER CRANE
Scale 1:50



FLOOD DEFENCE WALL ELEVATION
Scale 1:200

PROPOSAL TO RAISE THE RIVERSIDE WALK LEVEL IN CONJUNCTION WITH INCREASING THE HEIGHT OF THE FLOOD DEFENCE WALL TO MEET THE TE2100 TARGET LEVEL. THIS SOLUTION MAINTAINS THE RIVER VIEWS.

rev	date	description

This line measures 100mm when this drawing is printed @ A3

17/01/2014 14:38:59

Project
Railshead Rd Richmond
TW7 7DG
PLANNING 02

Drawing Title
Flood Defence - TE2100

Date: 11/07/13
Scale: As indicated
Drawing #: 5346 P3A_41

GOLDCREST architects
3 Hurlingham Business Park
Sulivan Road SW6 3DU
T 0207 731 7111
F 0207 371 7782
E architects@goldcrestland.com