18-20 Ray Mill Road, Maidenhead

Flood Risk Assessment

On behalf of:

ROYAL BOROUGH OF WINDSOR & MAIDENHEAD
WWW.RBWM.GOV.UK

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Registered Office: Buckingham Court Kingsmead Business Park, London Road, High Wycombe, Buckinghamshire, HP11 1JU
Office Address: Caversham Bridge House, Waterman Place, Reading, Berkshire RG1 8DN
T: +44 (0)118 950 0761 E: PBA.Reading@stantec.com

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	Name	Position	Signature	Date
Prepared by:	Richard Fisher	Senior Associate	***R. Fisher***	***18/02/21***
Reviewed by:	John Pulsford	Senior Associate	***pp R. Fisher***	***18/02/21***
Approved by:	Amy Hensler	Director	***A. Hensler***	***18/02/21***
For and on behalf of Stantec UK Limited				

Revision	Date	Description	Prepared	Reviewed	Approved

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Executive Summary

This Flood Risk Assessment (FRA) has been prepared by Peter Brett Associates LLP (PBA), now part of Stantec, to support a proposed change of use returning 18 and 20 Ray Mill Road, Maidenhead, from D1 (Family Centre) to the original C3 residential use.

In accordance with the fundamental objectives of the National Planning Policy Framework (NPPF), the FRA demonstrates that:

(i) The development is safe;

(ii) The development does not increase flood risk; and,

(iii) The development does not detrimentally affect third parties.

The Environment Agency (EA) Flood Zone map shows the site is located in Flood Zone 3 'High Probability' of the River Thames (as defined in Planning Practice Guidance (PPG) 'Flood Risk and Coastal Change' Table 1) as follows:

Flood Zone 3 'High Probability' (greater than 1 in 100 (>1.0%) annual probability of river flooding)

The proposals are for a change of use, from 'Less Vulnerable' to the original 'More Vulnerable' classification (ref: NPPF PPG Table 2). As a proposed change of use, the proposal is not subject to the Sequential or Exception Test, as confirmed in Paragraph 164 of the NPPF, subject to a FRA confirming the proposed development is safe from flooding over its design life.

The NPPF PPG 'Climate Change Allowances' guidance confirms the site criteria requires consideration of peak river flow allowances ranging from +35% ('Higher Central' allowance) to +70% ('Upper End' allowance).

The flood risk mitigation strategy for the development consists of the following elements:

- Ground floor levels are a minimum of 25.06m AOD. This is above all modelled flood levels, including the extreme 1 in 1000 annual probability flood level and the 1 in 100 annual probability +70% 'Upper End' climate change scenario flood level;
- As a change of use, with no impact on building footprint or external ground levels, the development will have no impact on flood flow routes or floodplain storage capacity over the site (the removal of the central conservatory tunnel that currently links the two properties will provide a minor improvement in conveyance/storage);
- Safe access is impacted at the peak of the 1 in 100 annual probability flood event. However, there will be significant advance warning due to the slow responding nature of the Thames, during which time evacuation can occur in a timely manner.

In summary, the FRA demonstrates that the proposed development does not increase flood risk and is in accordance with the requirements of national and local planning policy.

Summary of Key FRA Data

Aspect of flood risk	Applicable Guidance/ Source of Data	Summary	Section of FRA
Site Location	n/a	18-20 Ray Mill Road, Maidenhead	**2**
Existing Ground Levels	Topographic Survey by KND	External ground levels range from 24.70m AOD to 24.98m AOD. Existing building floor levels are 25.06m AOD and 25.15m AOD	**2.2**
Primary source of flood risk	n/a	River Thames	**3**
Presence of flood defences	n/a	Site protected by MWEFAS.	**2.5**
Proposed Development	Proposals by RBWM	Proposed change of use from D1 Family Centre to residential, to provide 2 separate units	**5.1**
Planning Aspects			
Flood Risk Vulnerability	Planning Practice Guidance (PPG) 'Flood Risk and Coastal Change'	'More Vulnerable'	**5.2**
Flood Zone		Flood Zone 3a 'High Probability'	**3.1**
Sequential Test		Sequential Test not required for change of use	**5.2**
Exception Test		Exception Test not required	**5.2**
Applicable Climate Change Allowances	EA climate change allowances guidance	+35% (Higher Central) +70% (Upper End) (Thames River Basin District)	**4**
Reference Flood Levels			
Present Day	EA 2019 Lower Thames Model	1 in 100 annual probability = 24.74m AOD 1 in 1000 annual probability = 24.94m AOD	**3.4**
Climate Change		1 in 100 annual probability +35%= 24.87m AOD 1 in 100 annual probability +70%= 25.05m AOD	**4**
Proposed Mitigation Measures			
Ground Floor Levels	BS8533:2017	Maintained at existing floor levels of 25.06m AOD and 25.15mAOD	**6.1**
Floodplain Storage	RBWM SFRA EA Thames Area guidance	Proposed change of use – no impact on floodplain storage	**6.2**
Flood Flow Routes	RBWM SFRA	Proposed change of use – no impact on floodplain flows	**6.2**
Safe Access	RBWM SFRA	Continuous safe access impacted at present day 1 in 100 annual probability event. No increase in occupancy and reliance on slow responding catchment	**6.3**
Surface Water Drainage	RBC SFRA	No change to existing drainage arrangements	**6.4**

Abbreviations

ABI	-	Association of British Insurers
BGS	-	British Geological Survey
CDM	-	Construction (Design and Management)
CIRIA	-	Construction Industry Research and Information Association
DDA	-	Disability Discrimination Act
DEFRA	-	Department for Environment, Food and Rural Affairs
EA	-	Environment Agency
FAS	-	Flood Alleviation Scheme
FDC	-	Flood Defence Consent
FHR	-	Flood Hazard Rating
FMfSW	-	Flood Map for Surface Water
FRA	-	Flood Risk Assessment
FRAP	-	Flood Risk Activity Permit
FRMP	-	Flood Risk Management Plan
GIS	-	Geographic Information System
LLFA	-	Lead Local Flood Authority
M. AOD	-	Metres Above Ordnance Datum (Newlyn)
NPPF	-	National Planning Policy Framework
PFRA	-	Preliminary Flood Risk Assessment
PPG	-	Planning Practice Guidance
SuDS	-	Sustainable Drainage Systems
SFRA	-	Strategic Flood Risk Assessment
RBWM	-	Royal Borough of Windsor and Maidenhead
UKCP18	-	United Kingdom Climate Change Projections 2018 Study

1 Introduction

1.1 Scope of Report

1.1.1 This Flood Risk Assessment (FRA) has been prepared by Stantec UK ('Stantec') on behalf of our client, Royal Borough of Windsor and Maidenhead, to support a planning application for a proposed change of use of 18 and 20 Ray Mill Road, Maidenhead, from D1 (Family Centre) to C3 (residential).

1.1.2 The two properties are being brought back into residential use after being released by AFC (Achieving for Children). No. 18 Ray Mill Road East is being disposed of by the Council to be refurbished as a single residential dwelling to a private buyer. No. 20 Ray Mill Road East is being fully refurbished and will be retained by the Council and rented out to a Key Worker family.

1.1.3 The report is based on the available flood risk information for the site as detailed in **Section 1.2,** and prepared in accordance with the planning policy requirements set out in **Section 1.3**. The scope of the FRA is consistent with the National Planning Policy Framework (NPPF) requirements and the 'Site-specific Flood Risk Assessment Checklist' from the associated Planning Practice Guidance (PPG).

1.1.4 Stantec has many years of experience in, amongst other areas, the assessment of flood risk, hydrology, flood defence and river engineering. The authors and reviewers of the document are all experienced engineers and members of chartered institutions such as the Chartered Institution of Water and Environmental Management (CIWEM) or the Institution of Civil Engineers (ICE).

1.2 Sources of Information

1.2.1 The FRA has been prepared based on the following sources of information:

- Environment Agency (EA) published **'Open Data'** datasets available online, reproduced with OS mapping under licence to Stantec (contains Ordnance Survey data © Crown copyright and database right [2020], contains Environment Agency information © Environment Agency and database right) (see **Appendix A)**;
- Topographic survey of the site 'Drawing G 30 16 – T'' by KND Surveys Ltd, July 2016 (see **Appendix B**);
- **Proposals** by RBWM (see **Appendix C**);
- **EA Product 4 data** ref. THM160074 dated February 2020, including outputs from the **Lower Thames Modelling Study 2019 (**see **Appendix D**), and the raw model outputs provided as **Product 5/6/7 data** via sharefile link in email dated 4th September 2020;
- The Royal Borough of Windsor and Maidenhead (RBWM) **Preliminary Flood Risk Assessment** (PFRA);
- The **RBWM Level 1 Strategic Flood Risk Assessment** (SFRA), updated June 2017;
- The **RBWM Preliminary Flood Risk Assessment** (PFRA), May 2011 and **Addendum**, 2017;
- The **Thames Catchment Flood Management Plan** (CFMP) Summary Report, dated December 2009.

1.3 Relevant Planning Policy

1.3.1 This FRA has been prepared in accordance with the relevant national, regional and local planning policy and statutory authority guidance as follows:

- National policy contained within the **National Planning Policy Framework (NPPF)** updated March 2020, issued by Communities and Local Government, with reference to Section 14 'Meeting the challenge of climate change, flooding and coastal change';
- The **Planning Practice Guidance (PPG)** released in March 2014 ('Flood Risk and Coastal Change' section) and updated to incorporate the EA **'Flood Risk Assessments: Climate Change Allowances'** guidance (most recently updated March 2020);
- EA regional guidance contained in the **'Thames Area Climate Change Allowances – Guidance for their use in flood risk assessments'** (January 2017), and **'Thames Guidance Statement – Safe Access/Egress for LPAs'** (August 2016);
- Local planning policy contained within the **'RBWM Local Plan'.** RBWM's Development Plan Policy Schedule of the 27th September 2011 confirms that their Local Plan Policy F1 'Development within Areas Liable to Flood' is still current.

> ***Within the area liable to flood as shown on the proposals maps, or within other areas subject to flooding, development will not be permitted for new residential or non-residential development, including extensions in excess of 30 square metres, unless it can be demonstrated to the satisfaction of the Borough Council, that the proposal would not of itself, or cumulatively in conjunction with other development:***
>
> ***- Impede the flow of flood water; or***
>
> ***- Reduce the capacity of the flood plain to store flood water; or***
>
> ***- Increase the number of people or properties at risk from flooding.***

- Policy F1 is supported by RBWM's **'Interpretation of Policy F1 (Development within Areas Liable to Flood)'**, adopted as Supplementary Planning Guidance in May 2004;
- The RBWM draft '**Borough Local Plan 2013-2033',** which was submitted to the Planning Inspector for examination in January 2018 with an update provided in May 2019. Flood risk is addressed in draft **Policy NR 1 'Managing Flood Risk and Waterways'** as detailed below:

> **Managing Flood Risk and Waterways**
>
> 1. Flood zones are defined in the National Planning Practice Guidance and the Council's Strategic Flood Risk Assessment (Level 1). Within designated flood zones development proposals will only be supported where an appropriate flood risk assessment has been carried out and it has been demonstrated that development is located and designed to ensure that flood risk from all sources of flooding is acceptable in planning terms.
> 2. In applying this test, development proposals should show how they have had regard to:
>   a. the availability of suitable alternative sites in areas of lower flood risk (the sequential test)
>   b. the vulnerability of the proposed use and the flood zone designation
>   c. the present and future flood risk
>   d. the scale of potential consequences
>   e. site evacuation plan in the event of potential flooding.

3. In all cases, development should not itself, or cumulatively with other development, materially:
   a. impede the flow of flood water
   b. reduce the capacity of the floodplain to store water
   c. increase the number of people, property or infrastructure at risk of flooding
   d. cause new or exacerbate existing flooding problems, either on the proposal site or elsewhere.
   e. reduce the waterway's viability as an ecological network or habitat for notable species of flora or fauna.
4. Only water compatible uses and essential infrastructure development will be supported in the area defined as functional floodplain. The exception test will still apply.
5. Development proposals should:
   a. increase the storage capacity of the floodplain where possible
   b. incorporate Sustainable Drainage Systems in order to restrict or reduce surface water run-off
   c. reduce flood risk both within and beyond sites wherever practical
   d. be constructed with adequate flood resilience and resistance measures suitable for the lifetime of the development
   e. incorporate flood evacuation plans where appropriate
6. Development proposals will be required to incorporate appropriate comprehensive flood risk management measures as agreed with the Environment Agency or the Council as Local Lead Flood Authority
7. Further development land associated with strategic flood relief measures will be safeguarded, including the proposed River Thames Scheme and the flood relief channel from Datchet to Wraysbury. Development should facilitate the improvement and integration of waterways in Maidenhead, including the completion of the Maidenhead Waterway Project.

- The RBWM **'Sustainable Design and Construction'** Supplementary Planning Document dated June 2009.

1.4 Caveats and Exclusions

1.4.1 This FRA has been prepared in accordance with the NPPF, the associated PPG and Local Planning Policy. The proposed flood management (including ground floor level recommendations) and surface water management strategies are based on the relevant British Standards (BS8533), the standing advice provided by the EA or based on common practice.

1.4.2 The Construction (Design and Management) Regulations 2015 (CDM Regulations) will apply to any future development of this site which involves "construction" work, as defined by the CDM Regulations. As such it is the responsibility of the proposed developer (ultimate client) to fulfil its duties under the CDM Regulations.

1.4.3 The approach for the FRA and proposals for the surface water management strategy are based on the requirements of the EA and RBC in its role as Lead Local Flood Authority (LLFA). The findings of this FRA are based on data available at the time of the study and on the subsequent assessment that has been undertaken in relation to the development proposals as outlined in **Section 5.** As such, we recommend the end user reviews the validity of the flood data on an annual basis with the EA.

1.4.4 It should be noted that the insurance market applies its own tests to properties in terms of determining premiums and the insurability of properties for flood risk. Those undertaking development in areas which may be at risk of flooding are advised to contact their insurers or the Association of British Insurers (ABI) to seek further guidance prior to commencing development. Stantec does not warrant that the advice in this report will guarantee the availability of flood insurance either now or in the future.

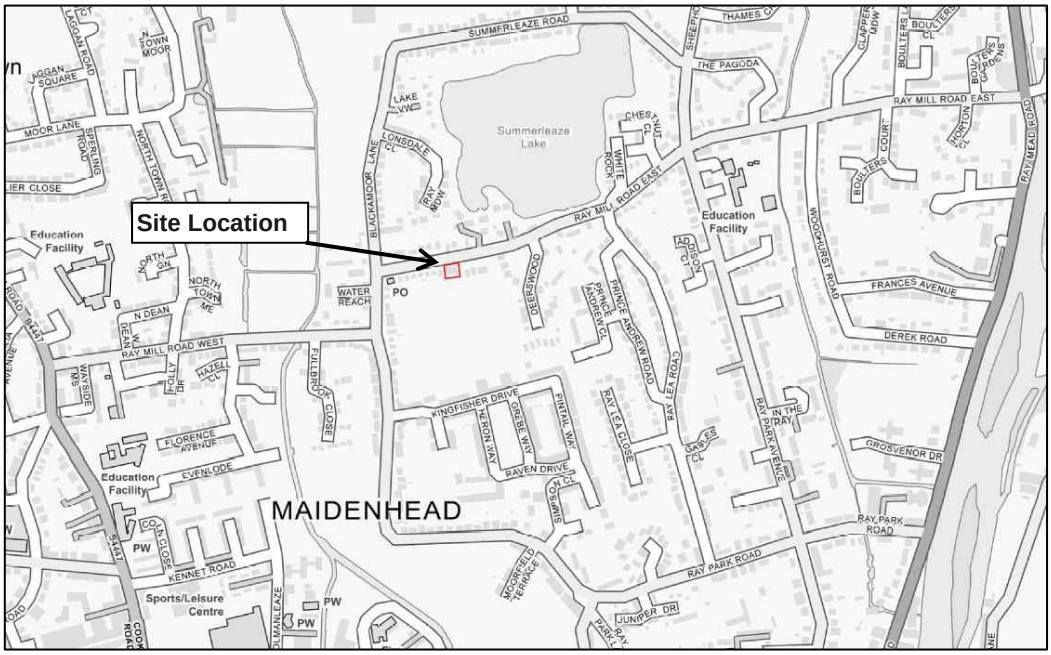
2 Site Setting

2.1 Site Description

2.1.1 The site comprises 2 no. detached dwellings – numbers 18 and 20 – currently used as a Family Centre (Class D1) on Ray Mill Road East, to the north-east of Maidenhead town centre (site centred on OS grid reference 489,400m E, 182,150m N) – see **Figure 2-1**.

2.1.2 The site lies within the administrative boundary of the Royal Borough of Windsor and Maidenhead (RBWM).

Figure 2-1: Site Location Plan (not to scale)



2.1.3 The surrounding area is predominantly residential, backing onto an open field located to the south. Summerleaze Lake is located is located north of Ray Mill Road East.

2.1.4 Pedestrian and vehicular access to the site is from Ray Mill Road East to the immediate north.

2.1.5 To the immediate south of the site is an existing car park. There is an access road into the car park at the east of the properties from Ray Mill Road East.

2.2 Topography

2.2.1 A topographical survey of the site has been carried out by KND Surveys Ltd. In July 2016. This is detailed on 'Drawing G 30 16 – T'' in **Appendix B**.

2.2.2 The ground floor levels of the existing buildings are 25.06m AOD (No. 18) and 25.15m AOD (No. 20).

2.2.3 The surrounding land is located between 24.70m AOD in the back gardens, and 24.98m AOD in the front gardens to the north.

2.2.4 The topography data indicates levels at the road, immediately north of the site, range between 24.43m AOD in the east, to 24.75m AOD in the west. LiDAR levels on Ray Mill Road East indicate that the road level decreases with distance away from the site to 24.0m AOD.

2.3 Hydrological Setting

2.3.1 The **River Thames** is the main watercourse in the area, flowing north to south approximately 980m east of the site. approximately 1km north-east of the site, the river passes through the Boulter's Lock and Weir complex.

2.3.2 **Strand Water** is a main river watercourse located approximately 180m west of the site. It is one of the 'Maidenhead Waterways' flowing south through the centre of Maidenhead.

2.3.3 The **Jubilee River** diverges from the River Thames a short distance upstream of the lock and flows to the east of the main Thames channel, approximately 1.15km east of the site.

2.4 Geology and Hydrogeology

2.4.1 The British Geological Society (BGS) online geology viewer provides the following information on the geology of the site.

- Bedrock: '*Seaford Chalk Formation And Newhaven Chalk Formation (undifferentiated)*'
- Superficial Deposits: '*Shepperton Gravel Member - Sand And Gravel*'

2.4.2 The Cranfield University online 'Soilscapes' website provides an overview of the drainage potential of land across Britain. This indicates the site falls within an area designated as '*Freely draining slightly acid but base-rich soils*'.

2.5 Flood Defences

2.5.1 The Jubilee Channel carries high level flows away from the Maidenhead, Windsor and Eton area and forms part of the **'Maidenhead, Windsor and Eton Flood Alleviation Scheme' ('MWEFAS'),** along with the North Maidenhead Bund.

2.5.2 Further information relating to the MWEFAS is provided in the previous version of the RBWM SFRA as follows (note this information is not included in the current version of the SFRA):

> *"The current maximum capacity of the Jubilee River is estimated at 180m^3/s. Collectively therefore (i.e. incorporating also the capacity of the River Thames main channel), the MWEFAS system therefore offers a total capacity that is broadly equivalent to the 4% (25 year) fluvial flood event. In other words, the MWEFAS provides a 4% AEP (25 year) standard of protection to properties situated within Maidenhead, Windsor and Eton."*

2.5.3 The MWEFAS, including the capacity of Jubilee River, is incorporated into the detailed flood modelling that has been undertaken for the River Thames in the area by the EA. The MWEFAS is incorporated into the detailed flood modelling that has been undertaken for the River Thames in the area by the EA. The EA Product 4 data indicates that part of the site is located within 'defended' Flood Zone 3 and states:

> *'This location is offered protection from the Maidenhead, Windsor and Eton Flood Alleviation Scheme consisting predominantly of the Jubilee River and the North Maidenhead Bund……The site is offered up to 1 in 25 protection (4% chance of occurring annually).'*

3 Overview of Flood Risk

3.1 EA Flood Maps

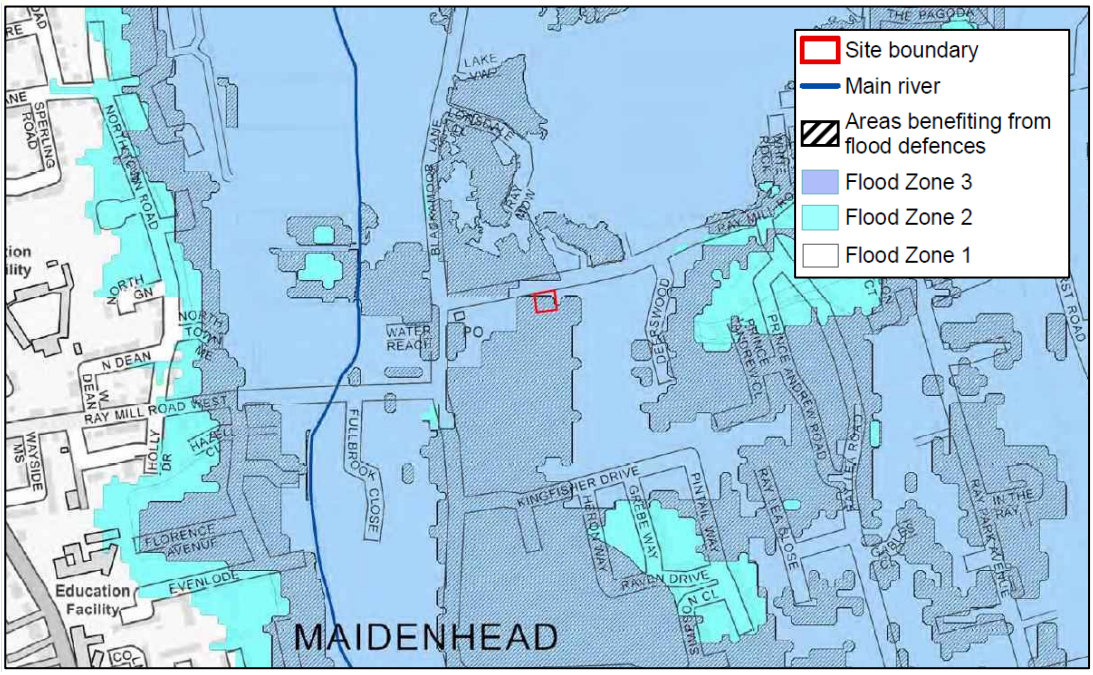
3.1.1 The following maps have been taken from the Stantec GIS flood maps report in **Appendix A** based on the EA Opendata datasets available online and reproduced with OS mapping under licence to Stantec.

Flood Zone Map

3.1.2 The first phase in identifying whether a site is potentially at risk of flooding is to consult the EA's Flood Zone maps, available on the EA's website. This provides an initial indication of the extent of the Flood Zones, which is more detailed site-specific level survey and modelled flood levels. The Flood Zones are defined in Table 1 of the Planning Practice Guidance (PPG) 'Flood Risk and Coastal Change' section as follows:

- **Flood Zone 1 'Low Probability'** – Land at less than 1 in 1000 (0.1%) annual probability of river or sea flooding;
- **Flood Zone 2 'Medium Probability'** – Land between 1 in 100 (1%) and 1 in 1000 (0.1%) annual probability of river flooding, or between 1 in 200 (0.5%) and 1 in 1000 (0.1%) annual probability of sea flooding;
- **Flood Zone 3 'High Probability'** – Land at 1 in 100 (1%) or greater annual probability of river flooding, or 1 in 200 (0.5%) or greater annual probability of sea flooding;

Figure 3-1: EA Flood Zone Map



3.1.3 The EA Flood Zone map indicates the majority of the site within **Flood Zone 3 'High Probability'**. The majority of the site is noted as benefitting from the presence of flood defences, as denoted by the black hatching.

Flood Risk from Reservoirs Map

3.1.4 The EA provides maps showing the risk of flooding in the event of a breach from reservoirs, based only on large reservoirs (over 25,000 cubic metres of water).

3.1.5 While these are no longer available for download as part of the EA Opendata dataset, they remain available for review on the .GOV.UK 'Long Tern Flood Risk Information' at https://flood-warning-information.service.gov.uk/long-term-flood-risk/

3.1.6 These confirm that the site is not within the predicted flood extents of such an event.

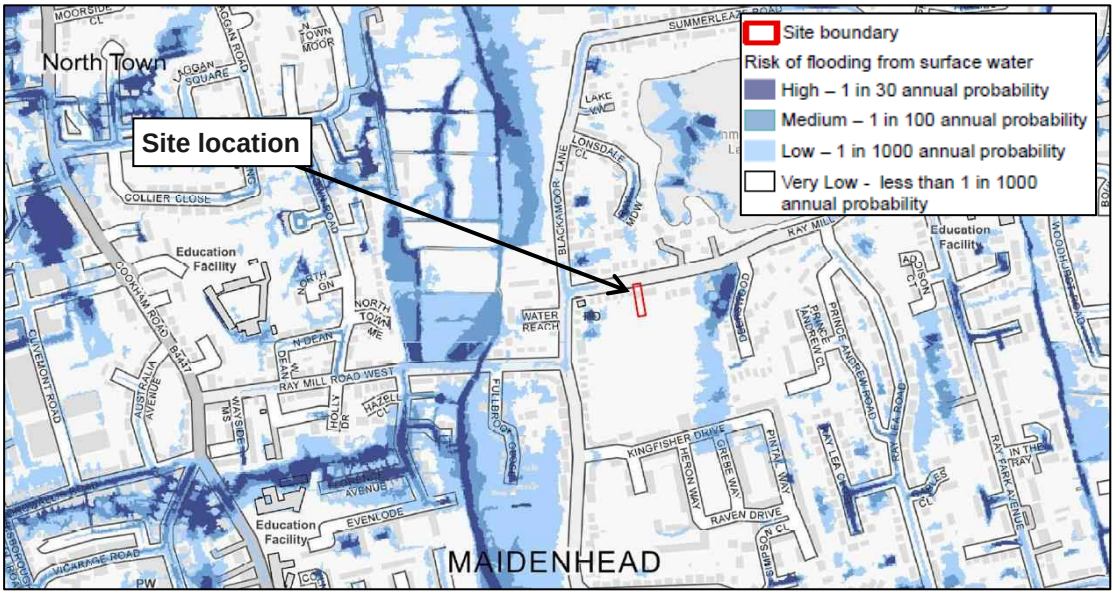
Flood Risk from Surface Water

3.1.7 The EA 'Flood Map for Surface Water' ('FMfSW') shows where areas could be potentially susceptible to surface water flooding in an extreme rainfall event. The latest mapping assesses flooding resulting from severe rainfall events based on the following three scenarios:

- 1 in 30 (3.3%) annual probability rainfall event ('High' risk);
- 1 in 100 (1%) annual probability rainfall event ('Medium' risk);
- 1 in 1000 (0.1%) annual probability rainfall event ('Low' risk).

3.1.8 Land at lower than 1 in 1000 (0.1%) annual probability of flooding is considered to be 'Very Low' risk of flooding

Figure 3-2: EA Flood Map for Surface Water



3.1.9 It should be noted that the surface water maps are generated using a generic methodology on a national scale, whereby rainfall is routed over a ground surface model. The analysis does not take account of any specific local information on below-ground drainage infrastructure and infiltration, although an adjustment is included in urban areas to account for the impact of sewerage and a standard infiltration allowance based on soil type. Consequently, the mapping provides a guide to potentially vulnerable areas based on the general topography of an area.

Historic Flood Map

3.1.10 The EA 'Historic Flood Map' is a dataset showing the maximum extent of all individual recorded flood outlines from river, the sea and groundwater and shows areas of land that have previously been subject to flooding, the extent of historic flooding is contained within **Appendix A.**

3.1.11 The EA also provided individual recorded flood outlines as part of the Product 4 package of flood data (**Appendix D**). The historic flood data shows that the site flooded in the 1947 flood, but did not flood in the more recent events of 2000 or 2003.

3.1.12 No information was provided in relation to the recent flood event of December 2013 to January 2014, but this is known to be in the region of a 1 in 10 (10%) to 1 in 20 (5%) annual probability flood event in the Maidenhead area, and significantly less severe than the flood of 2003. As such, there is no information to suggest the site was impacted by flooding in this event.

3.2 RBWM Preliminary Flood Risk Assessment

3.2.1 The RBWM Preliminary Flood Risk Assessment (PFRA) provides a high-level screening exercise which involves collecting information on historic and potential future floods for the borough. The information of specific relevance to the site is as follows (see copies in **Appendix D**):

- **PFRA Drawing No. 2920/SK/01** '*Historical Flooding*' shows no historic flooding incidences at the site though flooding from an unknown source has affected land both east and west of the site;
- **PFRA Figure 2** '*Flood map for surface water 1 in 200 chance of occurring*' shows the site is not impacted by surface water flooding in the 1 in 200 annual probability event;
- **PFRA Figure 3** '*Areas Susceptible to Groundwater Flooding'* shows the site to be located in an area identified as high ('<75%') potential susceptibility to groundwater flooding. This is based on a relatively coarse analysis (ratings are provided per 1 kilometre square area).

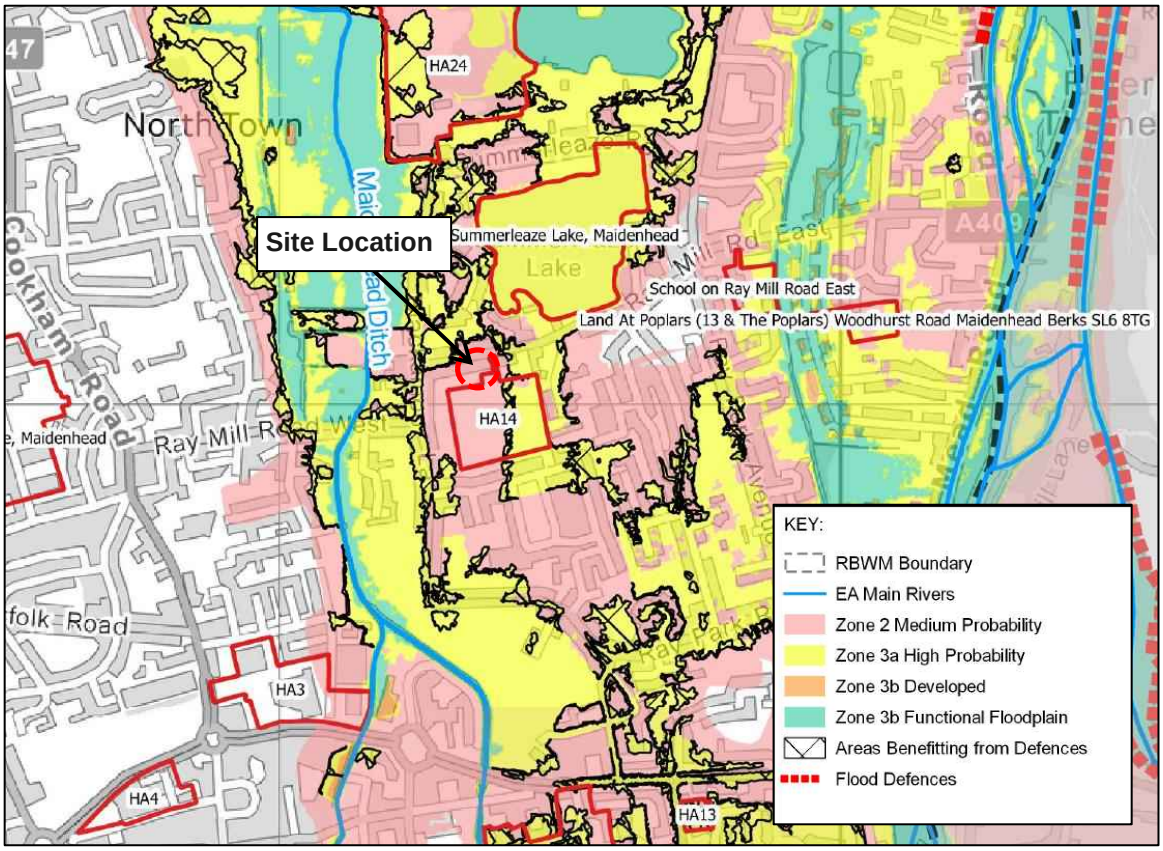
3.3 RBWM Strategic Flood Risk Assessment

3.3.1 The RBWM Strategic Flood Risk Assessment (SFRA) was updated in January 2017 and provides flood risk information on a borough-wide scale.

3.3.2 **SFRA Figure 6** '*Flood Zone Map*' provides a detailed overview of flood risk to Maidenhead. The site is shown to be located in Flood Zone 2 'Medium Probability' (red shading).

3.3.3 It is noted that the latest SFRA Flood Zone mapping differs from that displayed on the EA website – see **Figure 3.3**. This is because the EA Flood Zones have recently been updated to utilise outputs from the new EA Lower Thames model (2019), discussed in **Section 3.4.**

Figure 3.3: Extract of SFRA Figure 6 'Flood Zone'



3.4 EA Hydraulic Modelling

3.4.1 Modelled flood data has been provided by the EA from both the Lower Thames Reach 1 and 2 (2007) hydraulic model, and the new EA Lower River Thames (Hurley to Teddington) Modelling Study, completed December 2019 and provided as Product 5/6/7 data via Sharefile link, which provides the raw model output data from the model.

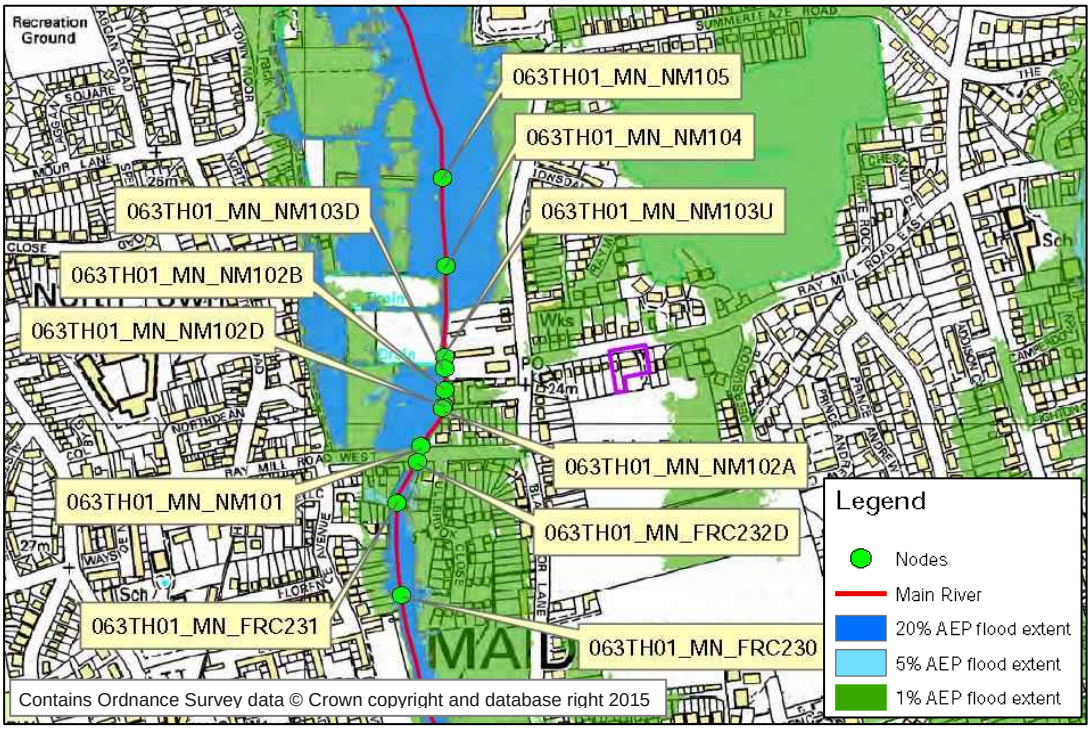
3.4.2 It is acknowledged that the 2019 model is considered the 'best available data' for this reach of the River Thames. However, due to some previously identified localised anomalies (related to Ray Mill Road forming a boundary between domains in the new model), the previously provided data from the 2007 model is also provided for reference.

Lower Thames Reach 1 & 2 Model (2007)

3.4.3 The EA previously provided modelled flood data for the site from their Lower Thames Remodelling Study which was completed in December 2007, see copy of Product 4 data (EA ref: BE_1337_01) in **Appendix D**.

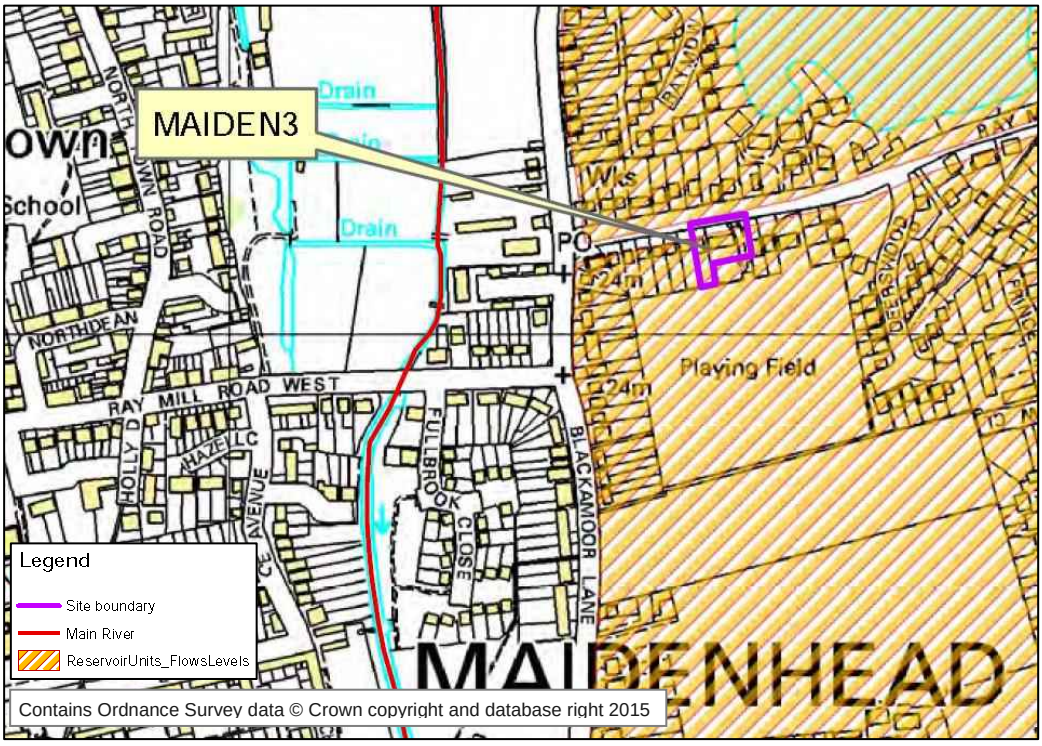
3.4.4 The modelled flood extents, with the in-channel nodes closest to the site in the vicinity of the site are shown in **Figure 3.4** (note that the site boundary covered the site and adjacent units to the west, which were subject of an earlier application).

Figure 3.4: EA Modelled Flood Extents – Thames Reach 1 and 2 Model (2007)



3.4.5 The site lies within an area schematised as a 'reservoir unit' (i.e. an offline storage pond) within the hydraulic model, as indicated by the orange hatching, due to the general pattern of topography of the area (see **Figure 3.5**).

Figure 3.5: EA Modelled Reservoir Unit Extract (2007 model)



3.4.6 The associated modelled flood levels across the site are as detailed in **Table 3.1.** The location of the modelled level node points is shown in **Appendix D**.

Table 3.1: EA Modelled Flood Levels – Thames Reach 1 and 2 Model (2007)

Flood Event (Annual Probability)	Flood Level (m AOD) Reservoir Unit 'MAIDEN3'
1 in 100 (1%)	23.89
1 in 100 plus 20% allowance for climate change	24.40

3.4.7 A comparison of the surveyed topography data and the above modelled flood levels indicates:

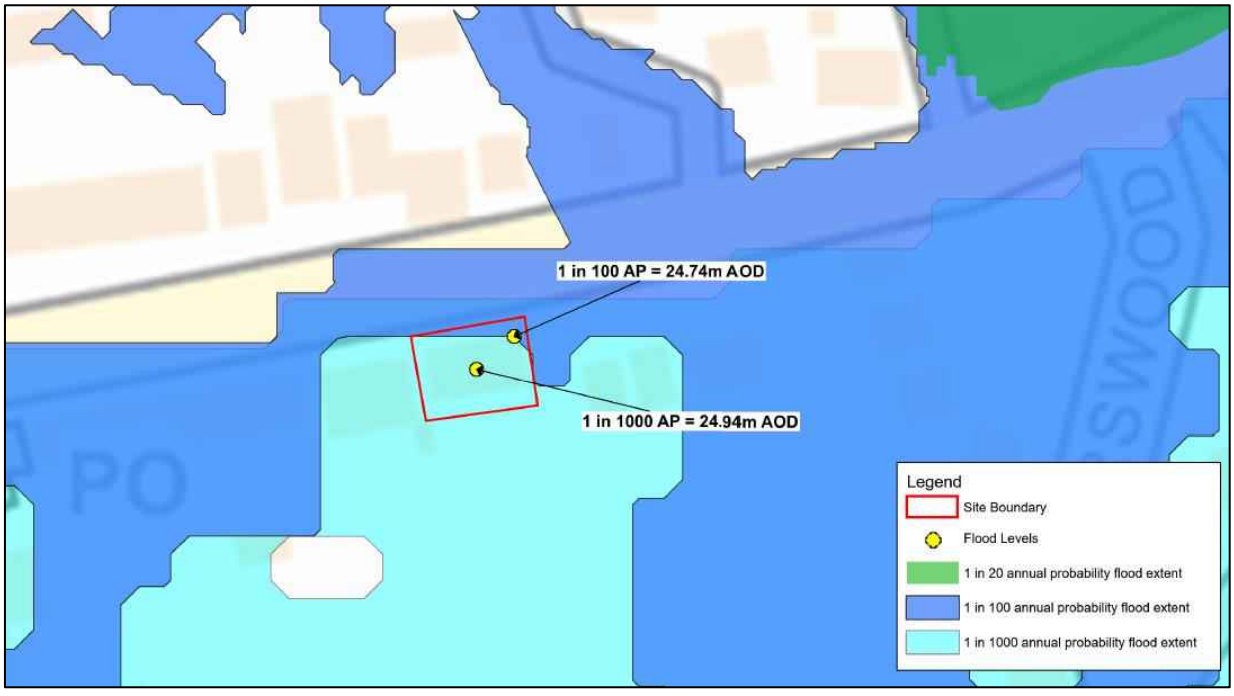
- The site lies outside the modelled current 1 in 100 annual probability floodplain and the 1 in 100 annual probability plus 20% allowance for climate change annual probability flood extent.

  The finished floor levels of the site are located a minimum of 1,170mm above the present day level and 660mm above the 1 in 100 annual probability plus 20% allowance for climate change flood level.

Lower Thames Model (2019)

3.4.8 The model outputs from the new EA Lower Thames Model, supplied by the EA to Stantec, have also been reviewed as part of this FRA and extracted as shown in **Figure 3-6.** The model schematisation is such that Ray Mill Road forms a boundary between the 2D domain to the south and a 'storage unit' on the north side of the road, and there is a large change in flood levels across this boundary which is considered a function of this approach.

Figure 3-6: EA Modelled Flood Extents – Lower Thames 2019 Model



3.4.9 The modelled present day flood levels across the site are summarised in **Table 3-2**.

Table 3-2: EA Modelled Flood Levels – Lower Thames 2019 Model

Flood Event (Annual Probability)	Modelled Flood Level, m AOD
1 in 100 (1%)	**24.74**
1 in 1000 (0.1%)	**24.94**

3.4.10 Comparison of the topographic survey with the modelled flood levels indicates:

- **1 in 100 annual probability event:** The southern side of the site is impacted by shallow flooding (less than 50mm). Existing building floor levels are a minimum of 320mm above flood level;
- **1 in 1000 annual probability event:** The southern side of the site is impacted to approximately 200mm maximum depth. Existing building floor levels are a minimum of 120mm above flood level;

3.4.11 In conclusion, it is noted that the new 2019 model results are significantly higher than the flood levels from the previous 2007 model at the site (by approximately 900mm for the present day 1 in 100 annual probability event). It is unclear precisely why this significant difference occurs, but the 2019 flood levels are used as the 'best available information'.

3.4.12 The potential impacts of climate change over the lifetime of the proposed development have been considered so that mitigation measures can be designed accordingly and are discussed in **Section 4.**

4 Impact of Climate Change

4.1.1 In considering flood risk to the site, it is necessary to fully consider the potential impacts of climate change for the lifetime of the development within the mitigation measures.

4.1.2 In February 2016 the EA released new guidance on the application of climate change allowances in flood risk assessments:

https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances

4.1.3 This guidance provides contingency allowances for potential increases in peak river flow in Table 1, and for potential increases in rainfall intensity in Table 2.

4.1.4 The peak river flow allowances table provides a range of allowances based on percentile (i.e., the degree of certainty of an event occurring, based on the range of climate change scenarios assessed through scientific investigations). The provided allowances are also subject to the vulnerability classification of the proposed use and the river basin district of the site.

4.1.5 The conditions at the site and consequent peak river flow allowances to be considered as part of the FRA are as detailed in **Table 4-1.**

Table 4-1: Climate Change – Peak River Flow Allowances

River Basin District	Flood Zone	Flood Risk Vulnerability Classification	Range of Climate Change Allowances requiring consideration (2070–2115)	
			Higher Central	Upper End
Thames	*3a*	*More Vulnerable*	***+35%***	***+70%***

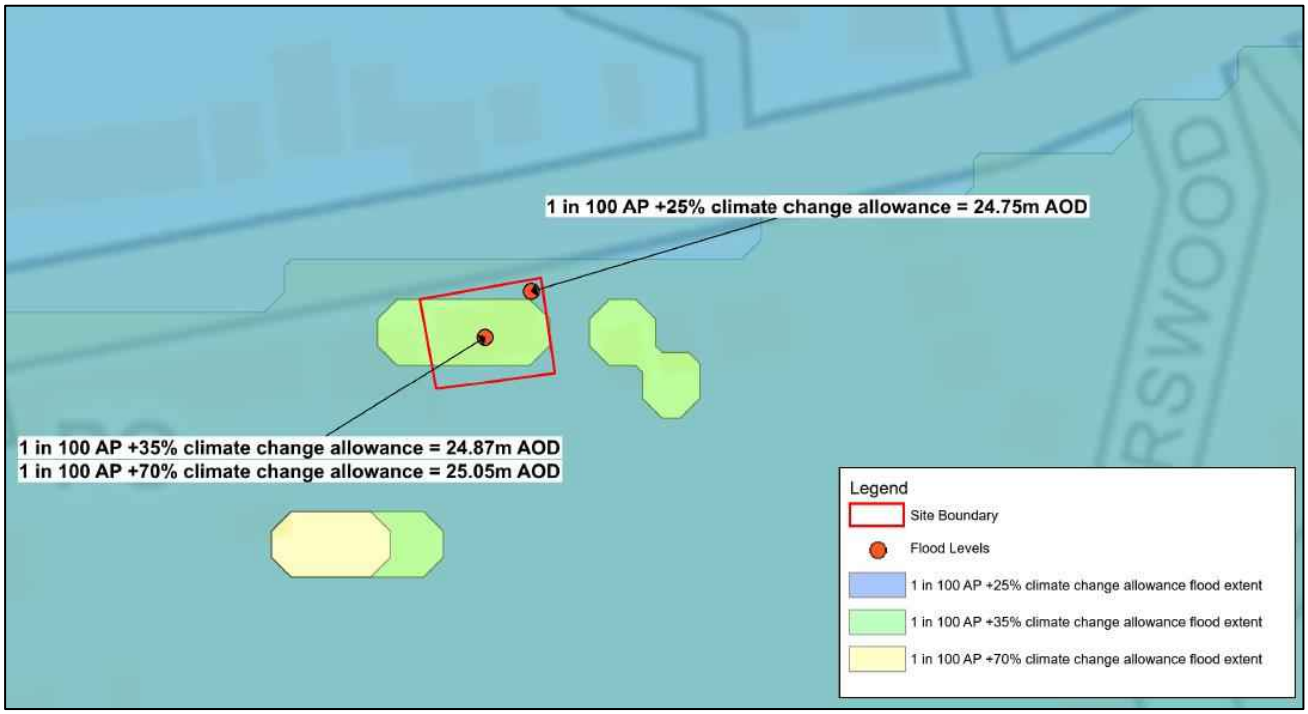
4.1.6 The applicable climate change flood levels at the site from the latest 2019 Thames model are summarised in **Table 4-2.**

Table 4-2: EA Modelled Flood Levels – Climate Change – Lower Thames 2019 Model

Flood Event (1 in 100 Annual Probability plus climate change allowance)	Modelled Flood Level, m AOD
+35% climate change	**24.87**
+70% climate change	**25.05**

4.1.7 The reference climate change allowance floodplain extents extracted from the 2019 model are provided in **Figure 4-1.**

Figure 4-1: EA Modelled Flood Extents – Climate Change – Lower Thames 2019 Model



4.1.8 Comparison of ground levels and climate change flood levels indicates:

- **+35% climate change scenario:** The southern side of the site is impacted by shallow flooding (approximately 150mm). Existing building floor levels are a minimum of 190mm above the reference flood level;

- **+70% climate change scenario:** The southern side of the site is impacted by flooding to a maximum depth of approximately 300mm, with shallow flooding (100mm) around the north side of the properties. Existing building floor levels are a minimum of 10mm above this extreme flood level.

4.1.9 The impact of the above modelled flood levels is discussed in **Section 6.**

5 Proposed Development and Sequential Test

5.1 Proposed Development

5.1.1 This FRA accompanies proposals for:

'alterations and change of land use from D1 (Family Centre) to C3 (Residential) for 18 to 20 Ray Mill Road East, Maidenhead'

5.1.2 The two properties are being returned to the original residential use after being released by AFC (Achieving for Children) who used the two properties as a Family Centre for vulnerable families.

5.1.3 No. 18 Ray Mill Road East is being disposed of by the Council to be refurbished as a single residential dwelling to a private buyer.

5.1.4 No. 20 Ray Mill Road East is being fully refurbished and will be retained by the Council and rented out to a Key Worker family at an affordable market rent.

5.1.5 Details of the proposals are included in **Appendix C.**

5.2 Flood Risk Vulnerability

5.2.1 PPG 'Flood Risk and Coastal Change' Table 2 confirms the *'Flood risk vulnerability classification'* of a site, depending upon the proposed usage. This classification is subsequently applied to PPG 'Flood Risk and Coastal Change' Table 3 to determine whether:

- The proposed development is suitable for the flood zone in which it is located, and;
- Whether an Exception Test is required for the proposed development.

5.2.2 The proposal is a change from the existing 'Less Vulnerable' use to 'More Vulnerable' residential use. However, this alteration returns the buildings to their original use.

5.2.3 As a change of use, the proposal is not subject to the Sequential Test or Exception Test, as confirmed in Paragraph 164 of the NPPF.

6 Flood Mitigation Strategy

6.1 Ground Floor Levels

6.1.1 The ground floor levels of the existing buildings are 25.06m AOD (No. 18) and 25.15m AOD (No. 20). As a change of use, these floor levels are not subject to change and they provide the following minimum freeboard above reference flood events:

- 320mm above the present day 1 in 100 annual probability level;
- 120mm above the extreme present day 1 in 1000 annual probability level;
- 190mm above the 'Higher Central' 1 in 100 annual probability +35% allowance for climate change flood level.
- 10mm above the 'Upper End' 1 in 100 annual probability +70% allowance for climate change flood level.

6.1.2 This demonstrates that the redevelopment will be above all reference flood levels, including the extreme events and climate change scenarios, and the development are therefore not subject to flooding in these reference flood events.

6.2 Floodplain Storage and Flow Routes

6.2.1 Any new development located in the vicinity of a watercourse should be constructed such that it does not detrimentally impact on flow routes or reduce the available floodplain storage over a site; either of which could potentially cause an increase in flood levels on-site or elsewhere. This is considered up to the benchmark of the 1 in 100 annual probability plus allowance for climate change fluvial flood level.

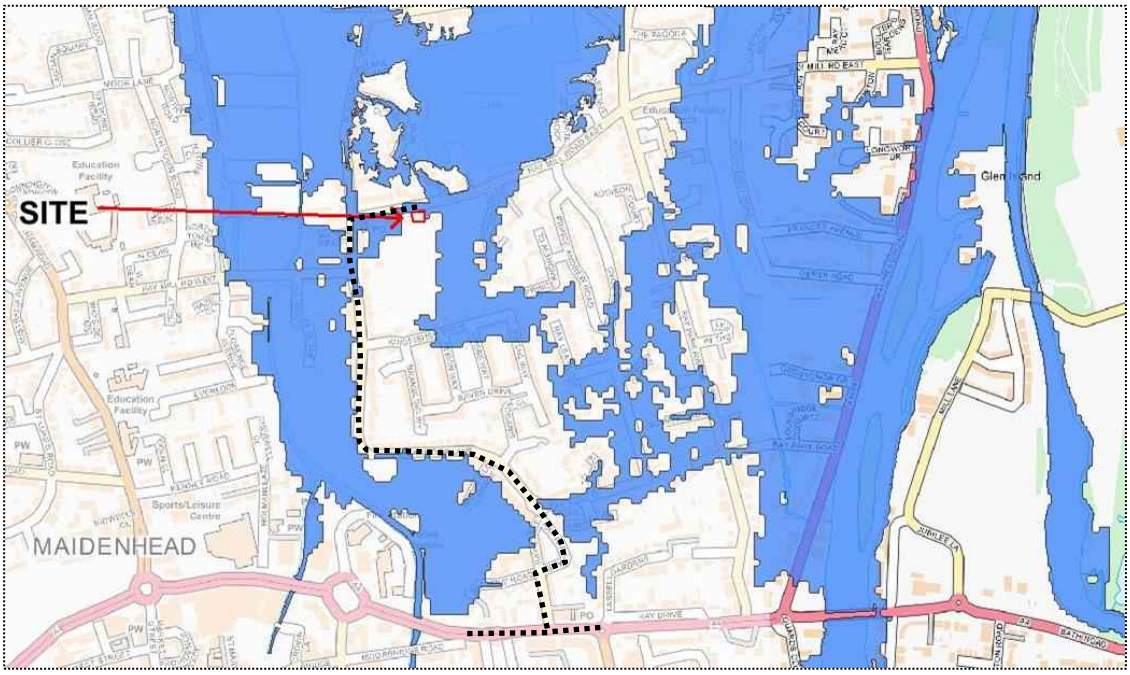
6.2.2 As a change of use, no alterations are proposed either to the existing building footprint or the external ground levels. As such, there will be no impact on flood flow routes or floodplain storage capacity.

6.3 Safe Access

6.3.1 It is necessary to consider and incorporate safe access arrangements as part of the mitigation measures of any new development, to ensure the occupants/users of the development are safe in times of flooding and can achieve access/egress to/from the wider area safely. This is considered up to the reference 1 in 100 (1%) annual probability plus allowance for climate change flood event.

6.3.2 The EA modelled flood levels and extents indicate that continuous safe access will be impacted at the peak of the current 1 in 100 (1%) annual probability flood extent – see **Figure 6.1** – due to localised flooding around the junction of Ray Mill Road and Blackamoor Lane.

Figure 6-1: EA Modelled 1 in 100 Annual Probability Extent – Safe Access



6.3.3 As such, in severe events emphasis would be on a 'managed approach'. In areas where it is possible to forecast flooding from rivers, the EA aims to give advance warning of flooding to the public using a system of flood warning codes. The River Thames catchment in the vicinity of the proposed Site is shown as being within a 'Flood Warning Area' on the EA website ("River Thames at Maidenhead, Bray, Dorney, Windsor and Eton").

6.3.4 It is important to note that the proposals are for a change of use of existing dwellings to return to their original use (albeit they have since converted from such a use to the current D1 'Family Centre'), so the principle of residential development over the site is accepted.

6.3.5 Furthermore, as a slow responding catchment, there would be significant advance warning of potential flooding. It should be noted that there is a significant advance notice of flooding from the River Thames and in both 2003 and the recent events of 2014, there was widespread public awareness of flooding several days before the area was affected. Given that these were generally understood to be of the order of a 1 in 15 (7%) annual probability event, it is reasonable to assume that there would be at least this level of warning during a 1 in 100 (1%) annual probability event or greater. This is a significant factor in forming a safe management scheme during a flood.

6.4 Surface Water Drainage

6.4.1 As of April 2015, the Lead Local Flood Authority (LLFA) has become a statutory consultee on planning applications for surface water management.

6.4.2 As the intention of SuDS is to mimic the natural drainage regime of the undeveloped site, the NPPF PPG states the following (consistent with the Building Regulations H3 hierarchy):

...the aim should be to discharge surface water runoff as high up the following hierarchy of drainage options as reasonably practicable:

- into the ground (infiltration),

- to a surface water body,

- to a surface water sewer, highway drain or another drainage system,

- to a combined sewer

6.4.3 Since the proposal is for a change of use of the existing buildings, there will be no impact on surface water drainage which will continue to utilise the existing drainage arrangements.

7 Residual Risk

7.1.1 It is difficult to completely guard against flooding since extreme events greater than the design standard event are always possible, however, it is practicable to minimise the risk by allowing a substantial freeboard (safety margin) and by using suitable construction and management techniques.

7.1.2 To minimise residual risks, such as climate change and other uncertainties, floor levels of the development are above all modelled flood levels, including both the EA-modelled extreme 1 in 1000 annual probability event and the 1 in 100 annual probability +70% allowance for climate change design flood level.

7.1.3 Continuous safe access in the area is impacted at the present day 1 in 100 annual probability flood event. Therefore a managed approach will be taken regarding access. The proposal returns the buildings to their original use, and it is noted that the River Thames is slow responding so it would be a period of days before safe access was compromised.

7.1.4 As such, the residual risk is considered to be acceptable for the lifetime of the development.

8 Conclusions

8.1.1 This Flood Risk Assessment (FRA) has been prepared by Stantec and supports a planning application for a proposed change of use of 18 and 20 Ray Mill Road, Maidenhead, from D1 (Family Centre) to C3 (residential).

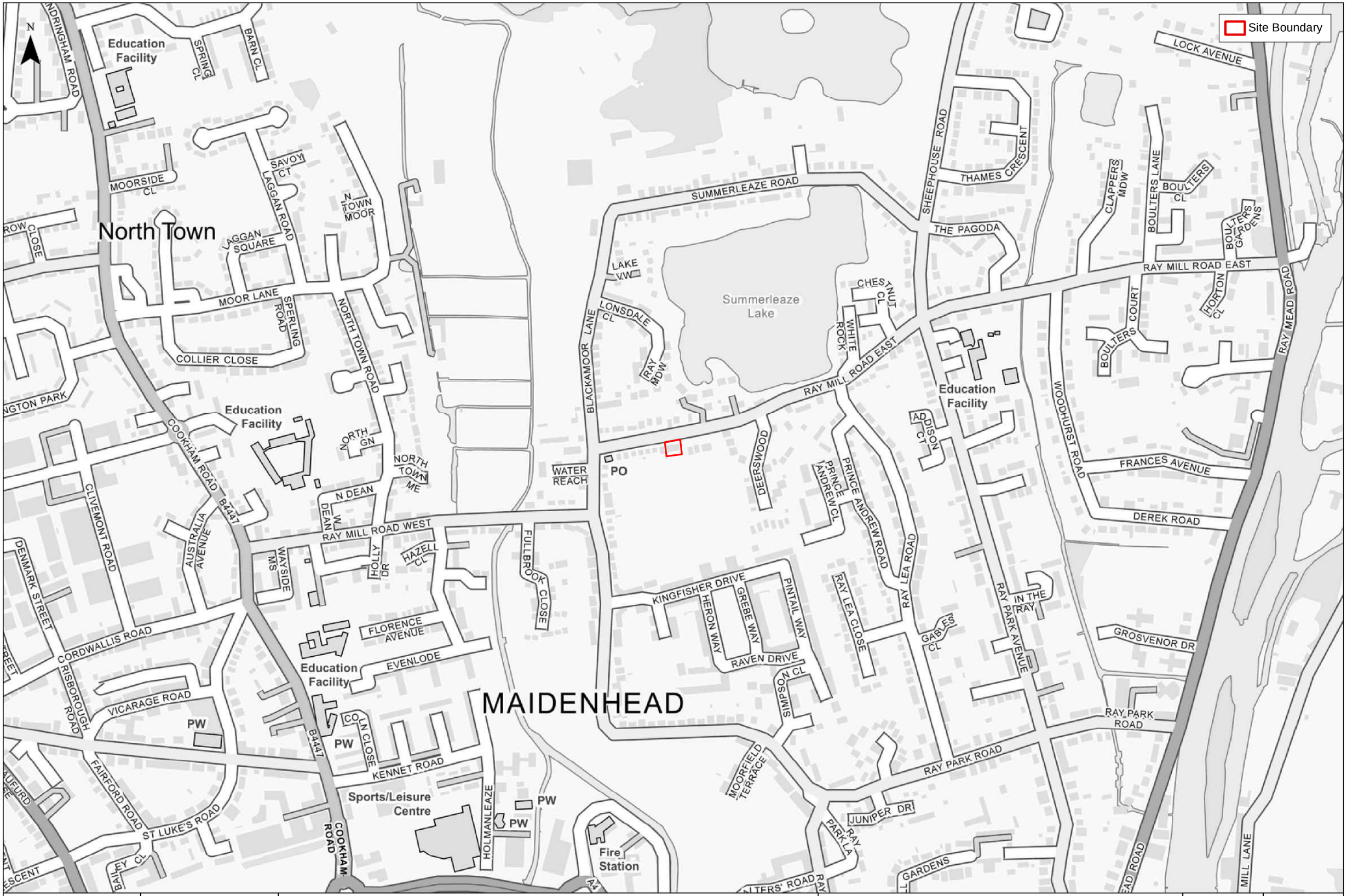
8.1.2 This FRA concludes that:

- Environment Agency (EA) Flood Zone mapping and modelled flood data shows that the site lies within **Flood Zone 3a 'High Probability'** (land at a 1 in 100 or greater annual probability of river flooding).
- As a change of use, the proposal is not subject to the Sequential or Exception Test, as confirmed in Paragraph 164 of the NPPF.
- National climate change guidance set out in the Planning Practice Guidance (PPG) confirms that the site conditions require consideration of increases in peak river flow of +35% to +70% (Thames River Basin, Flood Zone 3a, More Vulnerable development).
- Flood data from the EA Lower Thames 2019 model have been extracted around the site. This provides a present-day 1 in 100 annual probability flood level of 24.74m AOD, which affects the south side of the site area to shallow depths.
- At the reference 1 in 100 annual probability plus 35% allowance for climate change flood level of 24.87m AOD, external flooding is more significant around the site. However, the ground floor levels of the existing buildings are 25.06m AOD (No. 18) and 25.15m AOD (No. 20), and above all modelled levels including climate change scenarios.
- As a change of use, the scheme features no change to building footprint and no alterations to external ground levels. As such, there will be no impact on floodplain storage capacity or flood flow routes.
- The proposals will have no impact on the surface water drainage arrangements over the site.
- Continuous safe access in the area is impacted at the present day 1 in 100 annual probability flood event. Therefore a managed approach will be taken regarding access. The proposal restores the site to its original use, and the River Thames is slow responding so it would be a period of days before safe access was compromised.

8.1.3 In conclusion, the future occupants and users of the proposed development will be safe from flooding and there will be no detrimental impact on third parties. The proposal complies with the National Planning Policy Framework (NPPF) and local planning policy with respect to flood risk and is an appropriate development at this location.

Appendix A OpenData Flood Maps

- Site Location Plan
- Site Location (Aerial Photography)
- Area Topography (LiDAR)
- EA Flood Zone Map
- EA Surface Water Flood Risk
- Reservoir Flood Map
- EA Historic Flood Map



Stantec

Client: Royal Borough of Windsor & Maidenhead

18-20 RAY MILL ROAD, MAIDENHEAD

Site Location

0 250 500 m

1:5,000 @ A3 | Date: 25/01/2021

Drawn: TL | Checked: RF

Figure 001 | Rev A

Z:\Projects\50921\02_mxd\FRA\mxd/Figure007_HistoricFloodMap.mxd

Stantec

Client: Royal Borough of Windsor & Maidenhead

18-20 RAY MILL ROAD, MAIDENHEAD

Site Location (Aerial)

0 250 500 m

Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

1:5,000 @ A3	Date: 25/01/2021
Drawn: TL	Checked: RF
Figure 002	Rev A

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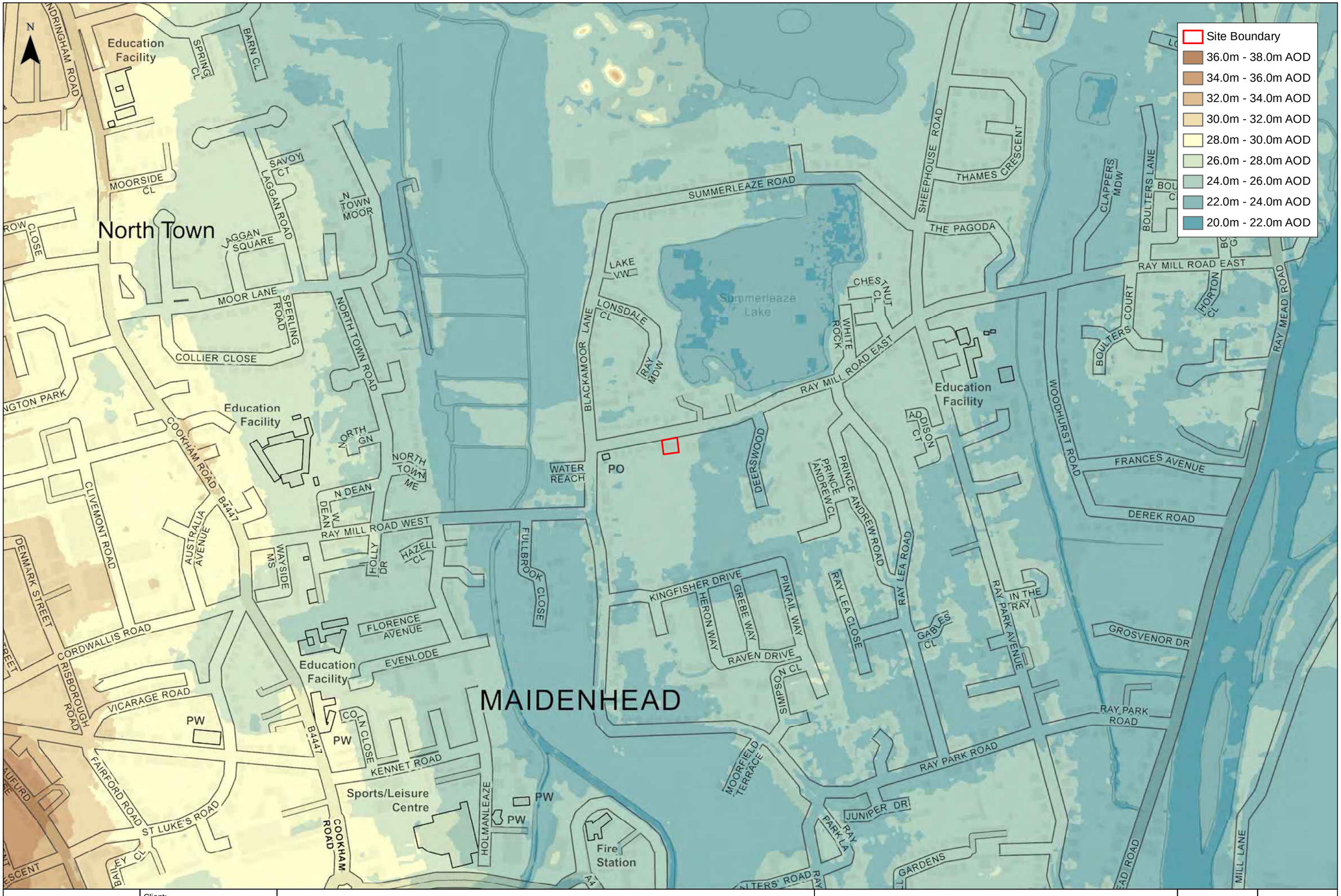

Stantec

Client: Royal Borough of Windsor & Maidenhead

18-20 RAY MILL ROAD, MAIDENHEAD

Topography

1:5,000 @ A3	Date: 25/01/2021
Drawn: TL	Checked: RF
Figure 003	Rev A

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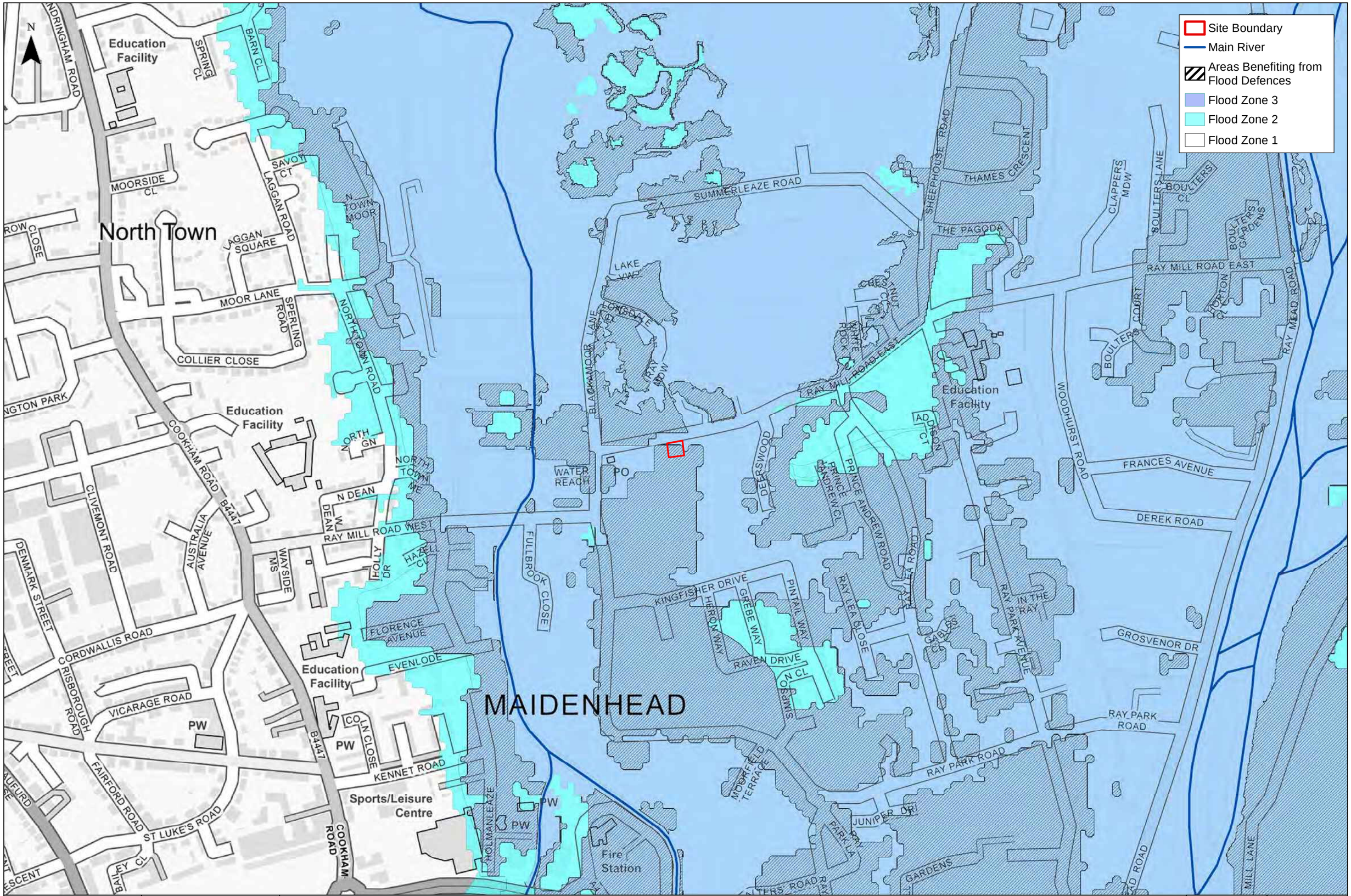

Stantec	Client: ROYAL BOROUGH OF WINDSOR & MAIDENHEAD	**18-20 RAY MILL ROAD, MAIDENHEAD** EA Flood Zone	0 250 500 m Contains Environment Agency information © Environment Agency and/or database right Contains Ordnance Survey data © Crown copyright and database right 2019. Flood Zones refer to the probability of river and/or sea flooding, ignoring the presence of defences	1:5,000 @ A3 | Date: 25/01/2021 Drawn: TL | Checked: RF Figure 004 | Rev A

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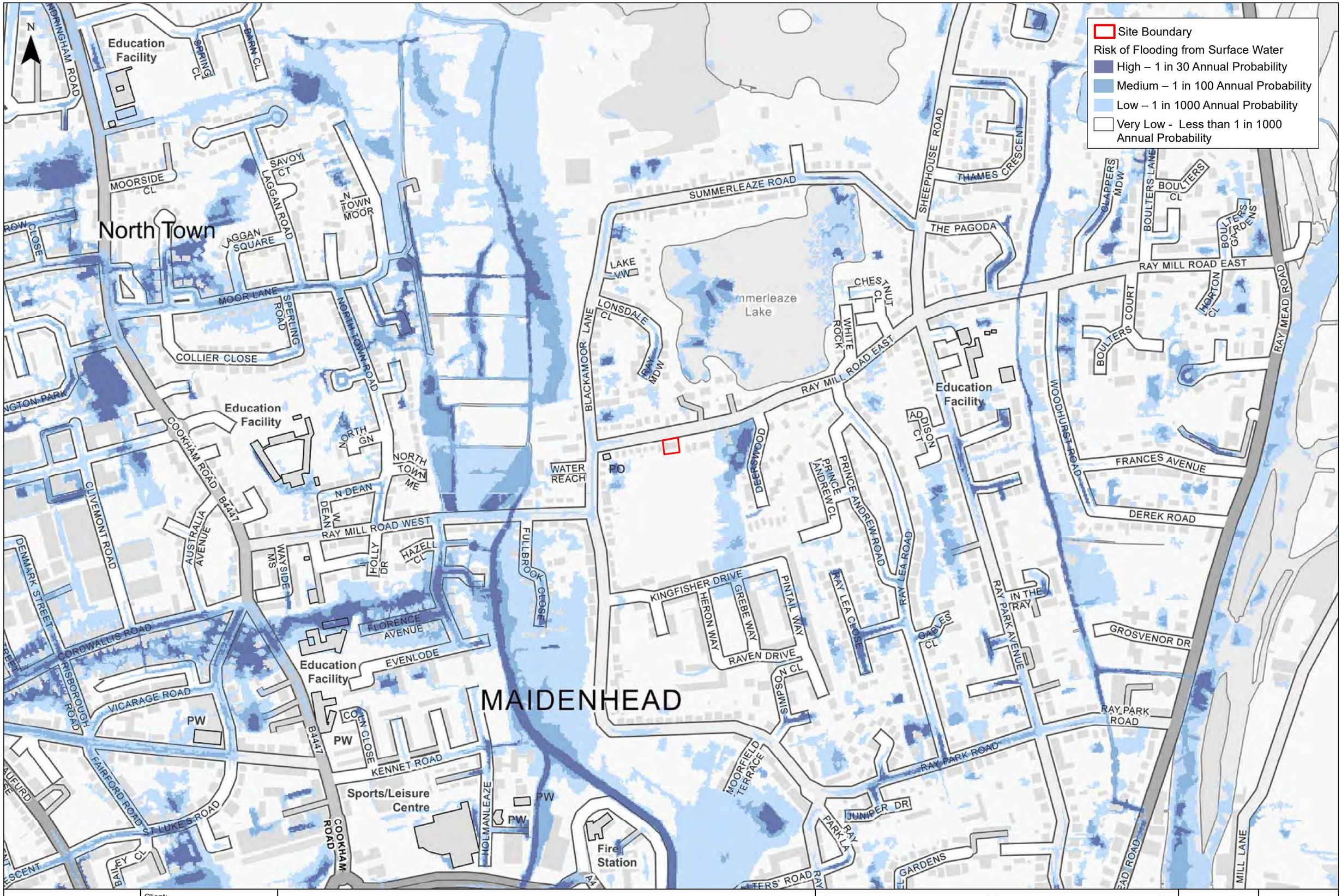

Stantec

Client: Royal Borough of Windsor & Maidenhead

18-20 RAY MILL ROAD, MAIDENHEAD

EA Surface Water Flood Risk

0 250 500 m

1:5,000 @ A3 | Date: 25/01/2021

Drawn: TL | Checked: RF

Figure 005 | Rev A

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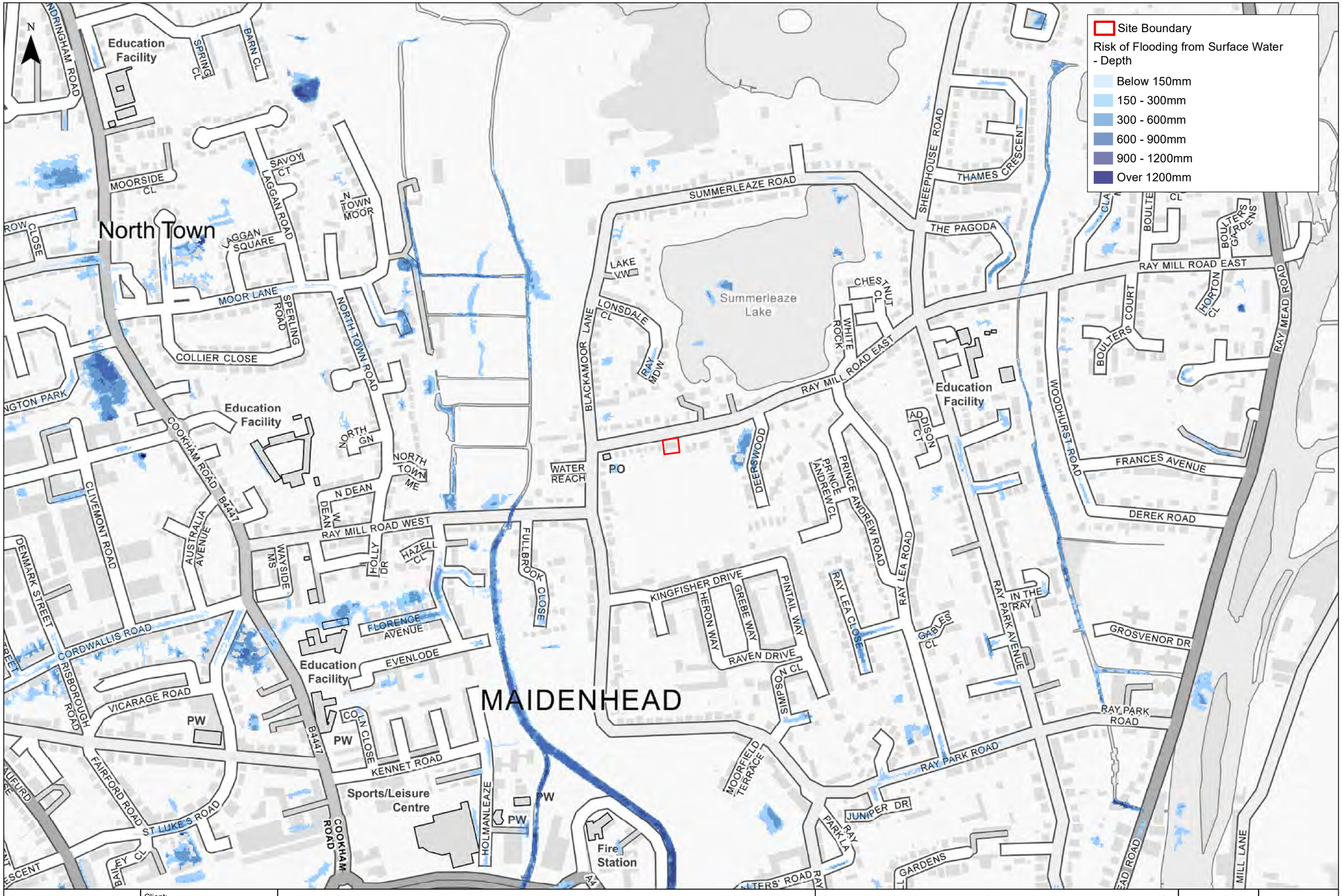

Stantec

Client: Royal Borough of Windsor & Maidenhead

18-20 RAY MILL ROAD, MAIDENHEAD

EA Surface Water Flood Risk - Depth
3.3 Percent Chance

0 250 500 m

1:5,000 @ A3 | Date: 25/01/2021

Drawn: TL | Checked: RF

Figure 005a | Rev A

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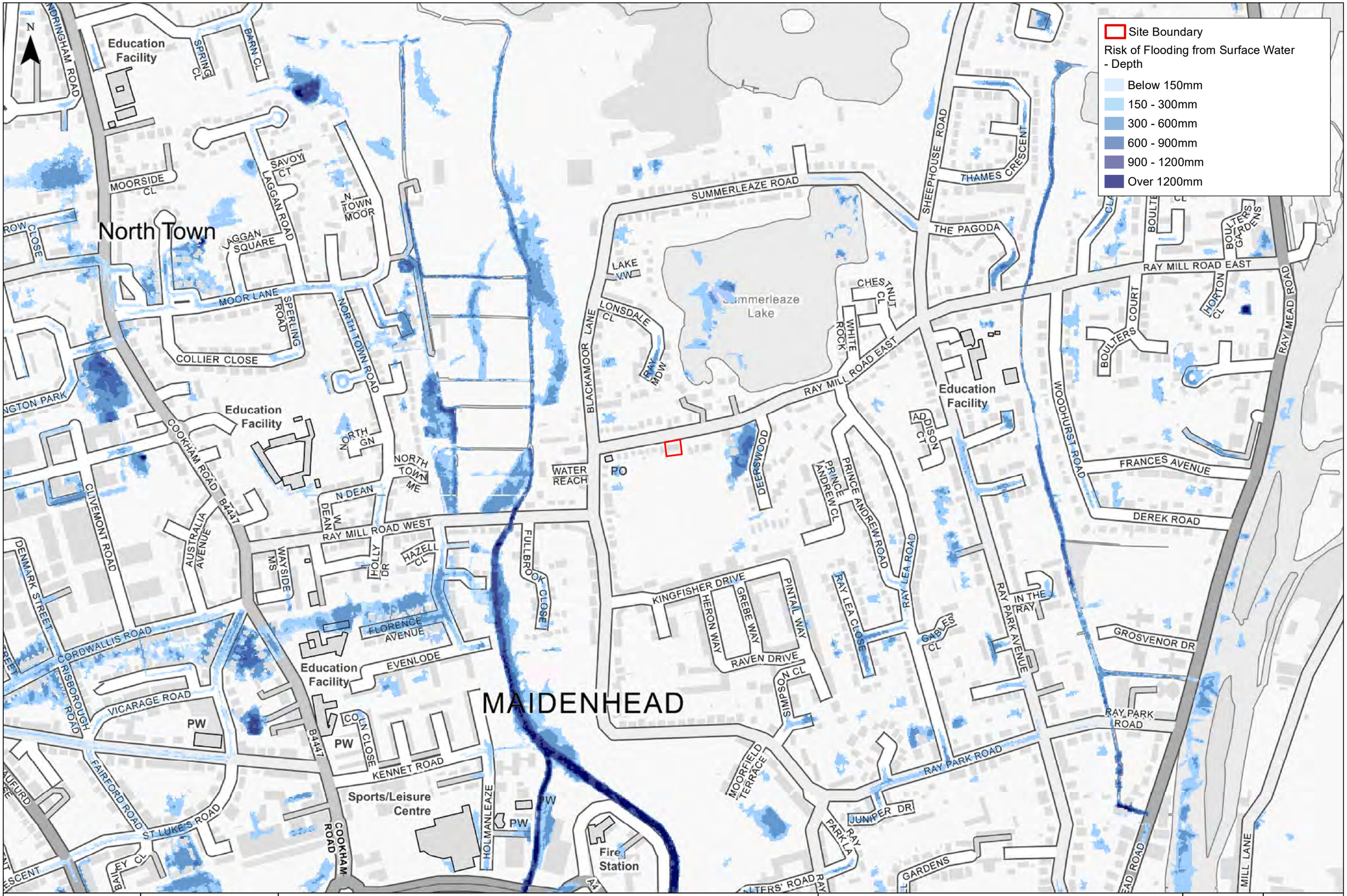

Stantec

Client: Royal Borough of Windsor & Maidenhead

18-20 RAY MILL ROAD, MAIDENHEAD

EA Surface Water Flood Risk - Depth
1.0 Percent Chance

0 250 500 m

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Drawn: TL	Checked: RF
Figure 005b	Rev A

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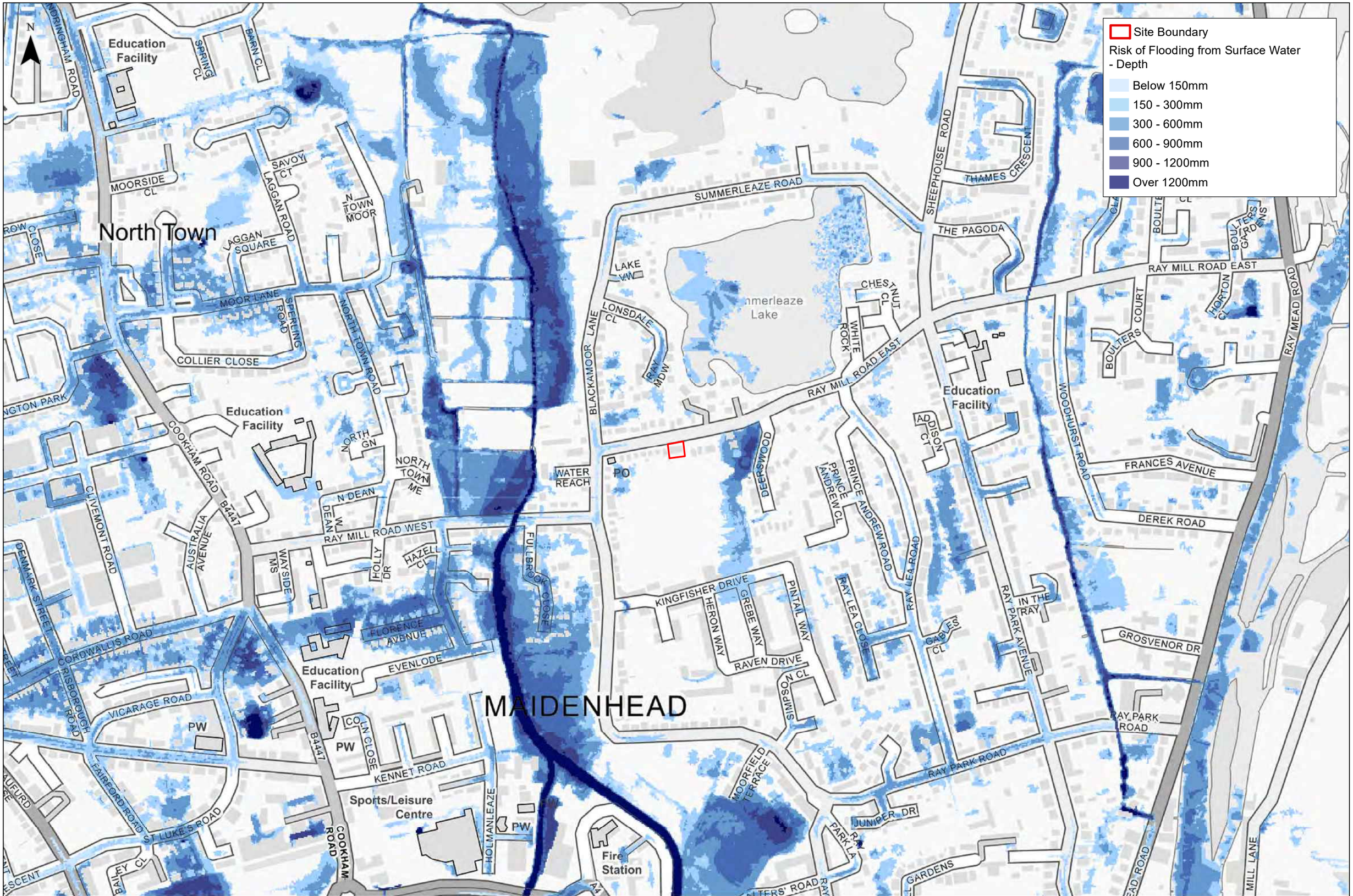

Stantec

Client: Royal Borough of Windsor & Maidenhead

18-20 RAY MILL ROAD, MAIDENHEAD

EA Surface Water Flood Risk - Depth
0.1 Percent Chance

0 250 500 m

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Figure 005c	Rev A

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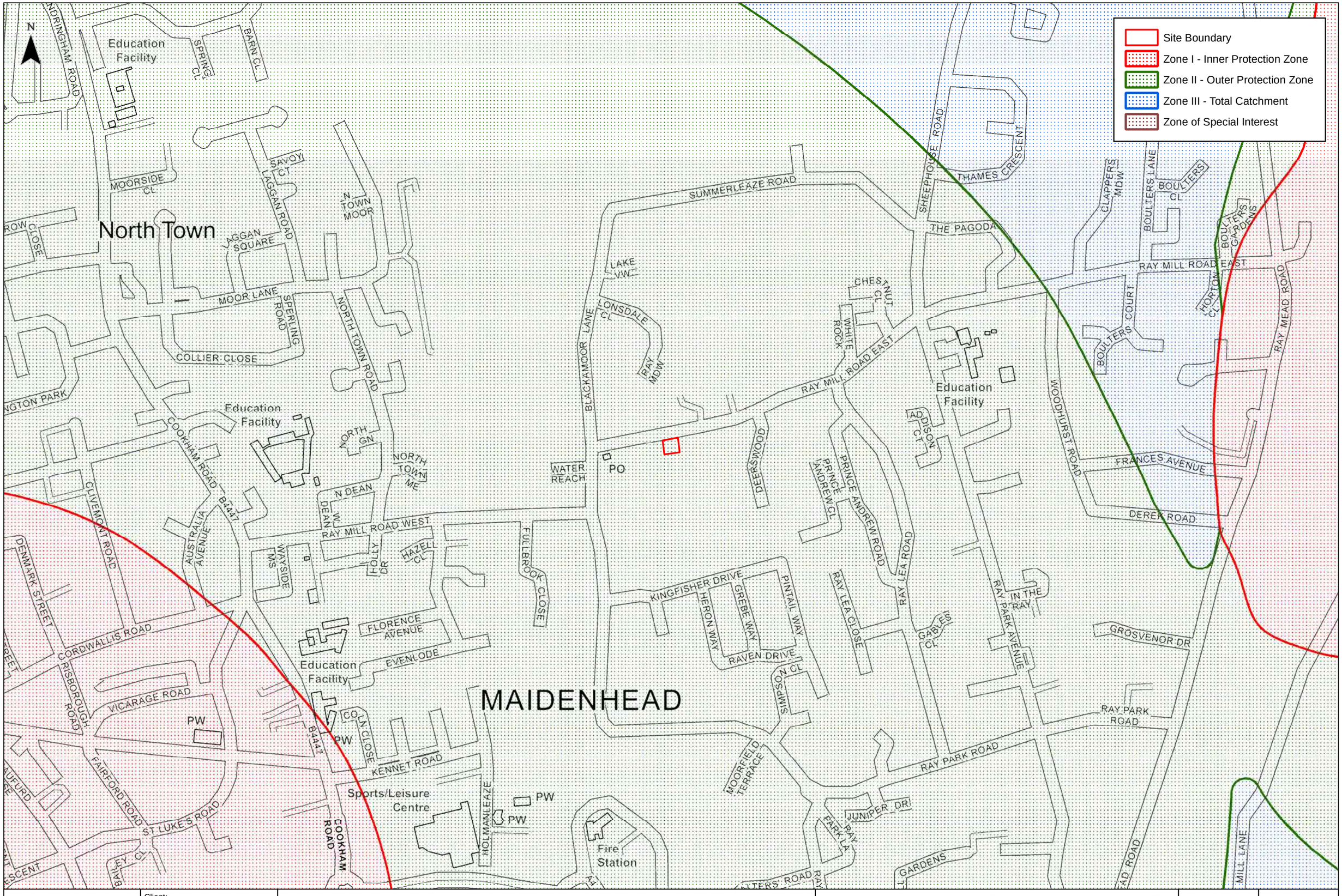

Stantec

Client: Royal Borough of Windsor & Maidenhead

18-20 RAY MILL ROAD, MAIDENHEAD

EA Ground Water Source Protection Zones

0 250 500 m

1:5,000 @ A3	Date: 25/01/2021
Drawn: TL	Checked: RF
Figure 006	Rev A

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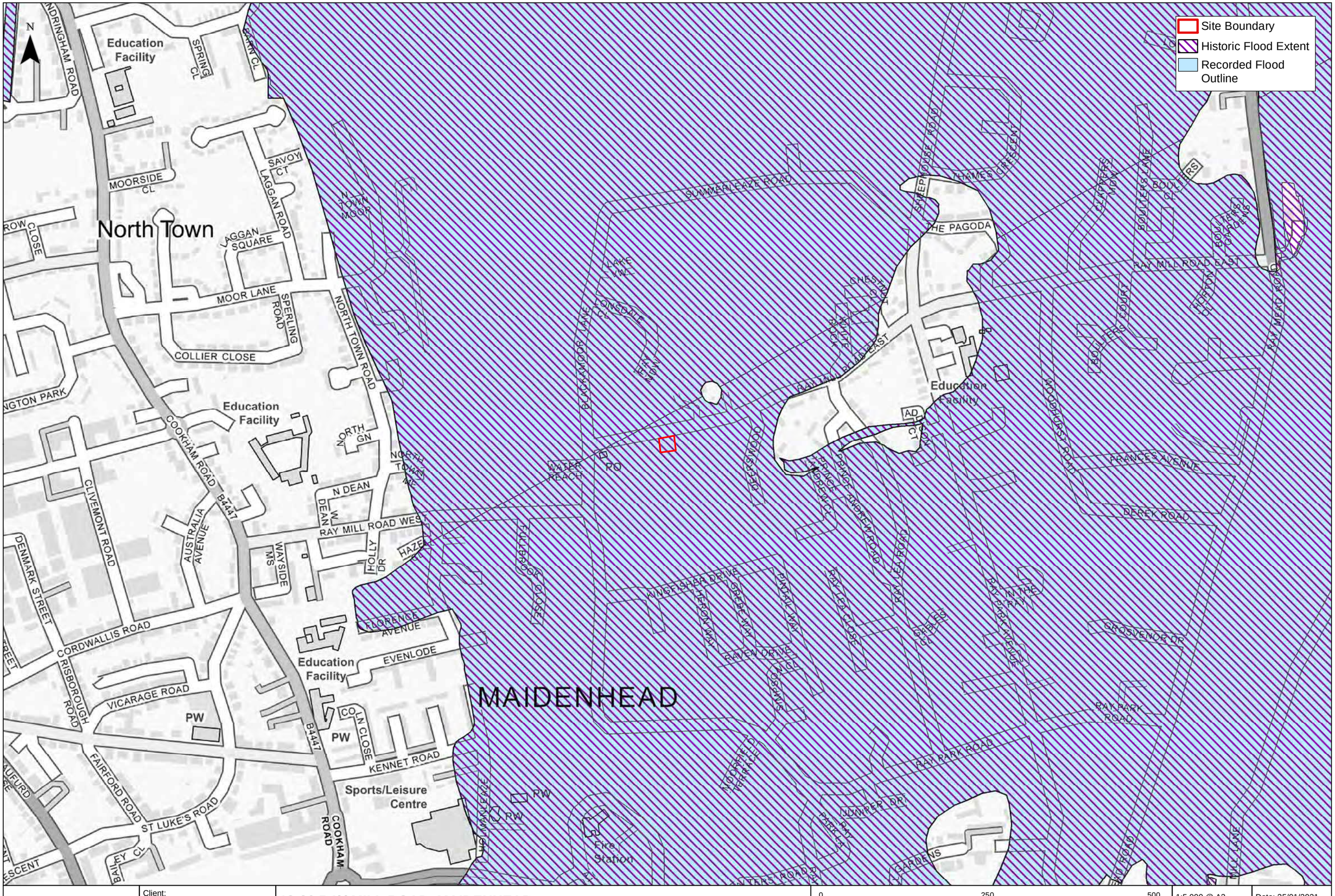


Stantec

Client: Royal Borough of Windsor & Maidenhead

18-20 RAY MILL ROAD, MAIDENHEAD

EA Recorded Historic Flood Extents

Historic Flood Map shows the maximum extent of all individual Recorded Flood Outlines from river, the sea and groundwater springs and shows areas of land that have previously been subject to flooding in England.
Recorded Flood Outlines shows all EA records of historic flooding from rivers, the sea, groundwater and surface water

1:5,000 @ A3	Date: 25/01/2021
Drawn: TL	Checked: RF
Figure 007	Rev A

Z:\Projects\50921\02_mxd\FRA\mxd/Figure007_HistoricFloodMap.mxd

Appendix B Topographic Survey

Topographic Survey by KND Surveys

NOTES

1. LEVELS ARE RELATED TO ORDNANCE SURVEY BY GPS OBSERVATION.
2. SURVEY ORIENTATED NORTH BY GPS OBSERVATION
3. GIRTHS, SPREADS, HEIGHTS AND SPECIES OF TREES ARE INDICATIVE ONLY.
4. SURVEY HAS BEEN CARRIED OUT TO AN ACCURACY COMMENSURATE WITH A 1:100 SCALE DRAWING.
5. DETAILS IN ADJACENT PROPERTIES ARE APPROXIMATE WHERE WE HAVE NO ACCESS.
6. LEVELS SHOWN ON KERB LINES ARE ROAD (CHANNEL) LEVELS.

ABBREVIATION LIST

AV	AIR VALVE
B.	BOLLARD
CL	COVER LEVEL
DK	DROP KERB
DPC	DAMP PROOF COURSING
ECB	ELECTRIC CABLE CABINET
ECP	ELECTRIC CABLE PIT
EP	ELECTICITY POLE
ER	EARTH ROD
FAI	FRESH AIR INLET
FH	FIRE HYDRANT
GU	GULLY
GC	GAS COCK
IL	INVERT LEVEL
LC	LAMP COLUMN
M	SERVICE MARKER
MH	MANHOLE COVER
OHC	OVERHEAD CABLES
RS	ROAD SIGN
RWP	RAIN WATER PIPE
SP	SOIL PIPE
SV	STOP VALVE
SVP	SOIL AND VENT PIPE
TBM	TEMPORARY BENCH MARK
TCB	TELEPHONE CABLE CABINET
TC	TELEPHONE CABLE PIT
TP	TELEPHONE POLE
TOS	TOP OF SILT
TOW	TOP OF WALL
TY	TRAFFIC LIGHT
UL	UNABLE TO LIFT
VP	VENT PIPE
WL	WATER LEVEL
WM	WATER METER
WO	WASH OUT

STATION CO-ORDINATES

NO.	EASTING	NORTHING	LEVEL
1	489355.867	182064.035	24.853
2	489352.721	182089.932	24.828
3	489374.871	182094.181	24.697
4	489381.621	182061.607	24.621
5	489387.120	182050.387	24.510

2 122.11 SURVEY STATION

STATIONS IN HARD SURFACES ARE CROSS HEAD GALVANISED BOLTS.

STATIONS IN SOFT GROUND ARE PEGS AT GROUND LEVEL WITH CROSS HEAD GALVANIZED SCREWS.

NO.	DATE	DETAILS

REVISIONS

KND SURVEYS LTD
74 WATCHET LANE
HOLMER GREEN
HIGH WYCOMBE
BUCKINGHAMSHIRE
HP15 6UG
Tel: 01494 718453
Fax: 01494 717576
e-mail: enquiry@kndsurveys.com

CLIENT

GM BUILDING DESIGN
47 WINTERS WAY
HOLMER GREEN
HIGH WYCOMBE
BUCKS

JOB TITLE

16 - 20 RAY MILL ROAD EAST
MAIDENHEAD

DRAWING TITLE

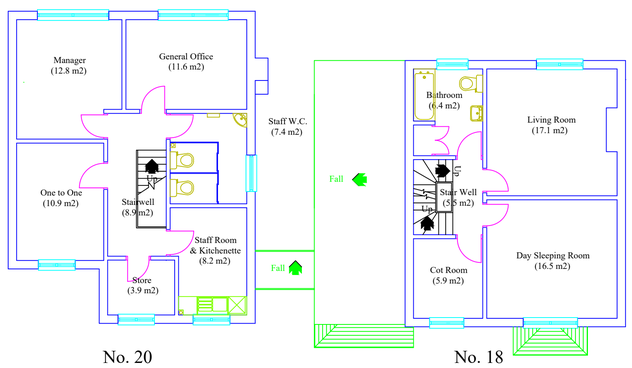
SITE SURVEY

DRAWING No.	DRAWN BY	DATE
G 30 16 - T	JD	22.07.2016
SURVEYED BY		**SCALE**
KL / ACG		1:100

Appendix C Development Proposals

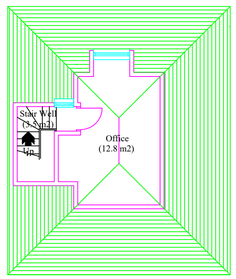
Development Proposals by RBWM

Existing (Offices)



No. 20 No. 18

First Floor Plans



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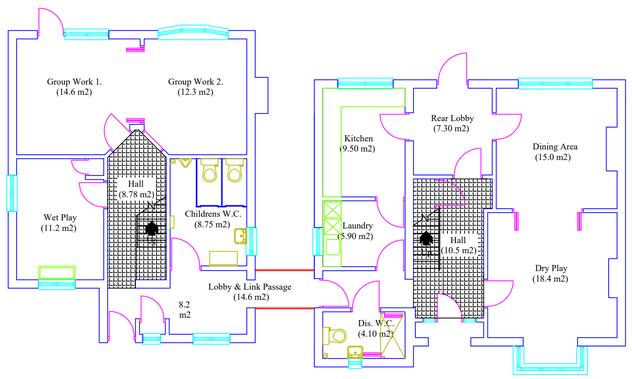
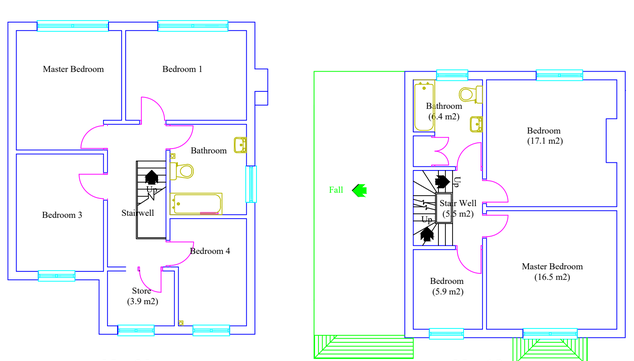


Ground Floor Plans

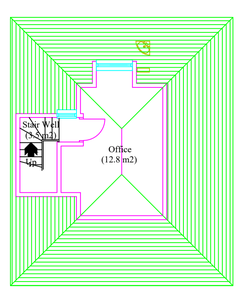
28 Staff total

Proposed (Residential)



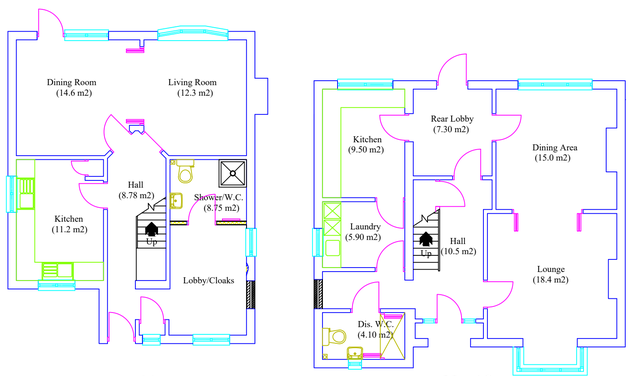
No. 20 No. 18

First Floor Plans



No. 18

Attic Plan



No. 20 No. 18

Ground Floor Plans

Rev.	Date	Amendments	By

Project

18-20 Ray Mill Road East

Title

Change of use

Drawing No.		Rev.
Date	Scale	Size
Drawn by	CAD by	Checked By	Approved
Drawing Path			

Appendix D EA P4 Data

EA Product 4 data reference BE_1337_01, July 2016

- Flood Zone Map
- Defence information
- Hydraulic model information
- Modelled flood extents
- Modelled in channel flood levels
- Historic flood map
- Historic flood data
- Hazard mapping

Product 4 (Detailed Flood Risk) for site in Maidenhead, located at SL6 8ST
Our Ref: BE_1337_01

Product 4 is designed for developers where Flood Risk Standing Advice FRA (Flood Risk Assessment) Guidance Note 3 Applies. This is:

i) "all applications in Flood Zone 3, other than non-domestic extensions less than 250 sq metres; and all domestic extensions", and

ii) "all applications with a site area greater than 1 ha" in Flood Zone 2.

Product 4 includes the following information:

Ordnance Survey 1:25k colour raster base mapping;

Flood Zone 2 and Flood Zone 3;

Relevant model node locations and unique identifiers (for cross referencing to the water levels, depths and flows table);

Model extents showing *defended* scenarios;

FRA site boundary (where a suitable GIS layer is supplied);

Flood defence locations (where available/relevant) and unique identifiers; (supplied separately)

Flood Map areas benefiting from defences (where available/relevant);

Flood Map flood storage areas (where available/relevant);

Historic flood events outlines (where available/relevant, not the Historic Flood Map) and unique identifiers;

Statutory (Sealed) Main River (where available within map extents);

A table showing:

i) Model node X/Y coordinate locations, unique identifiers, and levels and flows for *defended* scenarios.

ii) Flood defence locations unique identifiers and attributes; (supplied seperately)

iii) Historic flood events outlines unique identifiers and attributes; and

iv) Local flood history data (where available/relevant).

Please note:

If you will be carrying out computer modelling as part of your Flood Risk Assessment, please read the enclosed guidance which sets out our requirements and best practice for computer river modelling.

This information is based on that currently 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 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.

This information is provided subject to the enclosed notice which you should read.

This letter is not a Flood Risk Assessment. The information supplied can be used to form part of your Flood Risk Assessment. Further advice and guidance regarding Flood Risk Assessments can be found on our website at

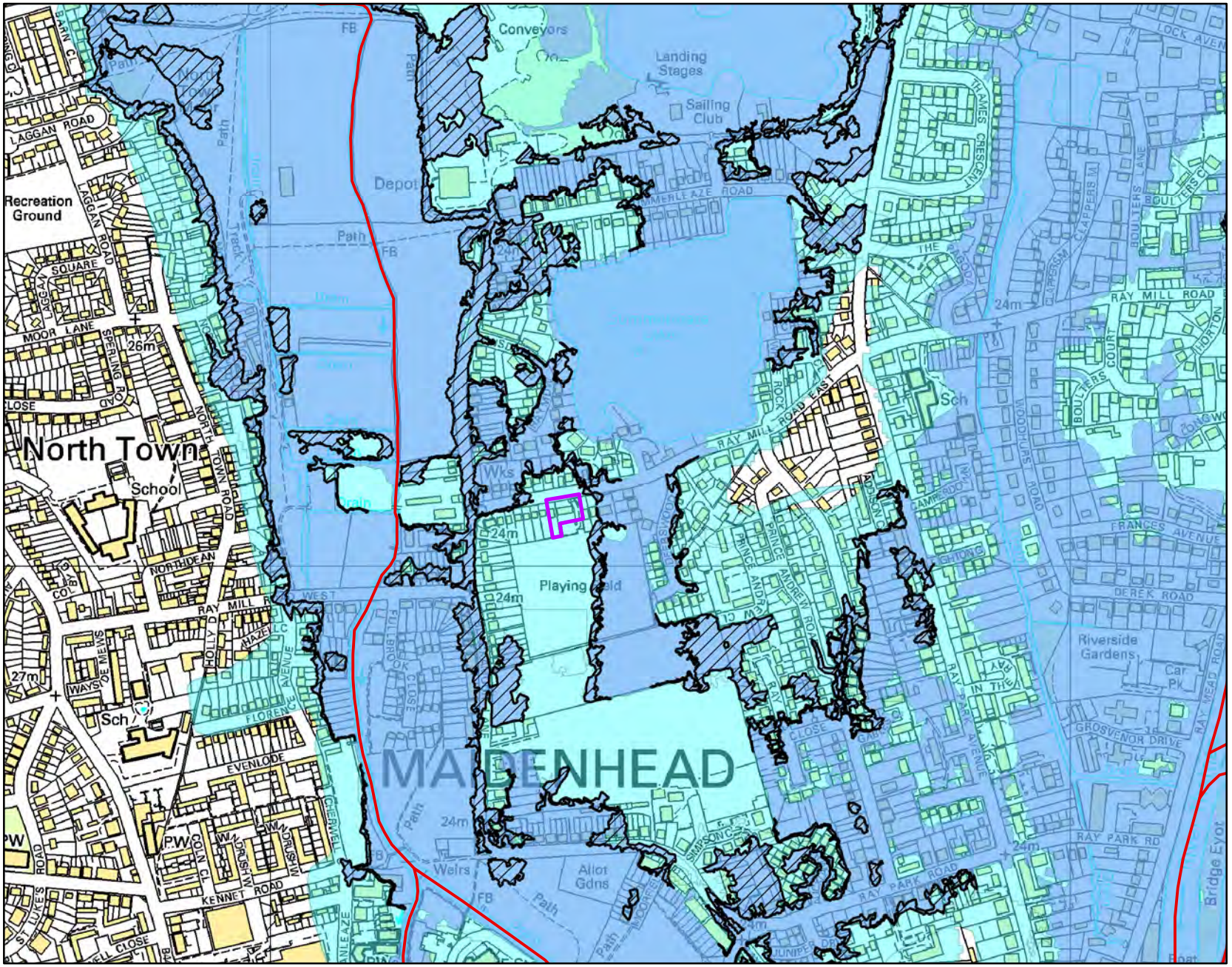
http://www.environment-agency.gov.uk/research/planning/82584.aspx

If you would like advice from us regarding your development proposals you can complete our pre application enquiry form which can be found at

http://www.environment-agency.gov.uk/research/planning/33580.aspx

Red Kite House, Howbery Park, Wallingford, Oxon OX10 8BD
Customer services line: 08708 506 506
Email: WTenquiries@environment-agency.gov.uk

Flood Map for Planning centred site in Maidenhead, located at SL6 8ST
Created on 20/07/2016 REF: BE_1337_01



Environment Agency

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Legend

- Main River
- Areas benefiting from flood defences
- Flooding from rivers or sea (FZ3)
- Extent of extreme flood (FZ2)
- Flood Map - flood storage areas

Flooding from rivers or sea without 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.

The Extent of an extreme flood (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.

Contact Us: National Customer Contact Centre, PO Box 544, Rotherham, S60 1BY. Tel: 08708 506 506 (Mon-Fri 8-6). Email: enquiries@environment-agency.gov.uk

Defence information

BE_1337_01

Defence Location:	Jubilee Channel & Maidenhead Bund
Description:	This location is offered protection from the Maidenhead, Windsor and Eton Flood Alleviation Scheme consisting predominantly of the Jubilee River and the North Maidenhead Bund. The North Maidenhead Bund is a raised earth embankment (approx 1.5m). The Jubilee River is a diversion channel on the River Thames and carries high level flows away from the Maidenhead, Windsor and Eton area. The site is offered up to 1 in 25 protection (4% chance of occurring annually). Although it is given some protection from defences it is still in flood zone 3, we would strongly advise the owner to register to receive direct warnings to enable them to plan sufficiently in a flood event. Both defences are maintained by the Environment Agency. There are no other planned defences in this area.

Model information

BE_1337_01

Model: Thames (Lower) Reach 1 & 2 2007

Description: Lower Thames Reach 1 (Hurley to Cookham) and Reach 2 (Cookham to Windsor):

The information provided is taken from the Lower Thames Remodelling Study which was completed in December 2007. Reaches 1 and 2 of this study were modelled using ISIS 1D.

This model includes the Jubilee River (part of the Maidenhead, Windsor and Eton Flood Alleviation Scheme). The flow in the Jubilee River is limited to approximately 180m3/s and is designed to remain in-bank irrespective of any increase in flows in the River Thames. Where appropriate this will need to be considered when assessing flood risk.

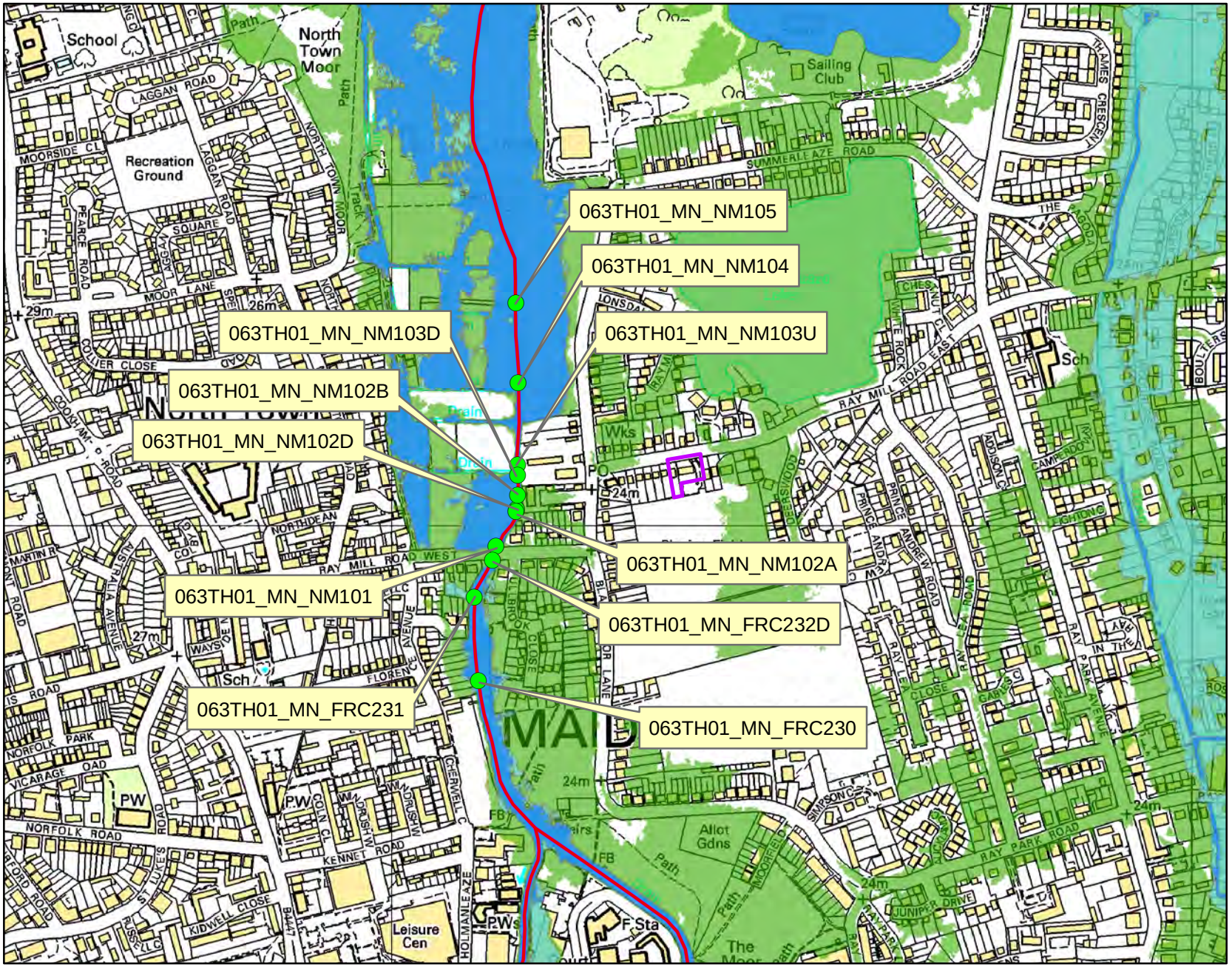
The model accuracy has generally been maintained to be within ± 150mm of the gauged data at the head and tail water levels at the main locks on the River Thames for the calibration event. For the verification event the level difference between modelled and observed flood levels is within ± 150mm for all but three of the main locks on the Thames (Romney tail, Bell head and Sunbury tail). Overall, the model accuracy is within the specified limits of the standard specification and is therefore deemed appropriate.

Model design runs:
1 in 5 / 20% AEP; 1 in 20 / 5% AEP; 1 in 50 / 2% AEP; 1 in 100 / 1% AEP; and 1 in 100+20% / 1% AEP with climate change

Mapped outputs:
1 in 5 / 20% AEP; 1 in 20 / 5% AEP; 1 in 100 /1% AEP; and 1 in 100+20% / 1% AEP with climate change

Model accuracy:
Levels ± 150mm

Detailed FRA Map centred site in Maidenhead, located at SL6 8ST
Created on 20/07/2016 REF: BE_1337_01



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Kilometres

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Legend

- Nodes
- Main River
- 20% AEP flood extent
- 5% AEP flood extent
- 1% AEP flood extent

AEP = Annual Exceedance Probability
The probability of a flood of a particular magnitude, or greater, occuring in any given year

1%CC = 1% Climate Change extent
This is the 1% AEP event with an allowance for climate change (+20% on river flows)

Contact Us: National Customer Contact Centre, PO Box 544, Rotherham, S60 1BY. Tel: 08708 506 506 (Mon-Fri 8-6). Email: enquiries@environment-agency.gov.uk

Modelled in-channel flood flows and levels

BE_1337_01

The modelled flood levels and flows for the closest most appropriate model node points for your site that are within the river channel are provided below:

				Flood Levels (mAOD)				
Node label	Model	Easting	Northing	20% AEP	5% AEP	1% AEP	1% AEP (+20% on river flows)	0.1% AEP
063TH01_MN_NM105	Thames (Lower) Reach 1 & 2 2007	489155	182278	23.60	23.65	24.08	24.54	0.00
063TH01_MN_NM104	Thames (Lower) Reach 1 & 2 2007	489158	182178	23.59	23.64	24.08	24.53	0.00
063TH01_MN_NM103U	Thames (Lower) Reach 1 & 2 2007	489157	182076	23.36	23.42	24.04	24.47	0.00
063TH01_MN_NM103D	Thames (Lower) Reach 1 & 2 2007	489157	182063	23.34	23.40	24.03	24.45	0.00
063TH01_MN_NM102D	Thames (Lower) Reach 1 & 2 2007	489156	182020	23.27	23.35	24.02	24.44	0.00
063TH01_MN_NM102A	Thames (Lower) Reach 1 & 2 2007	489155	182017	23.26	23.34	24.02	24.44	0.00
063TH01_MN_NM101	Thames (Lower) Reach 1 & 2 2007	489130	181974	23.20	23.29	24.01	24.44	0.00
063TH01_MN_FRC231	Thames (Lower) Reach 1 & 2 2007	489103	181910	23.06	23.15	23.94	24.41	0.00
063TH01_MN_NM102B	Thames (Lower) Reach 1 & 2 2007	489157	182038	23.30	23.37	24.02	24.45	0.00
063TH01_MN_FRC232D	Thames (Lower) Reach 1 & 2 2007	489126	181956	23.18	23.27	24.01	24.43	0.00
063TH01_MN_FRC230	Thames (Lower) Reach 1 & 2 2007	489108	181806	22.98	23.07	23.93	24.41	0.00

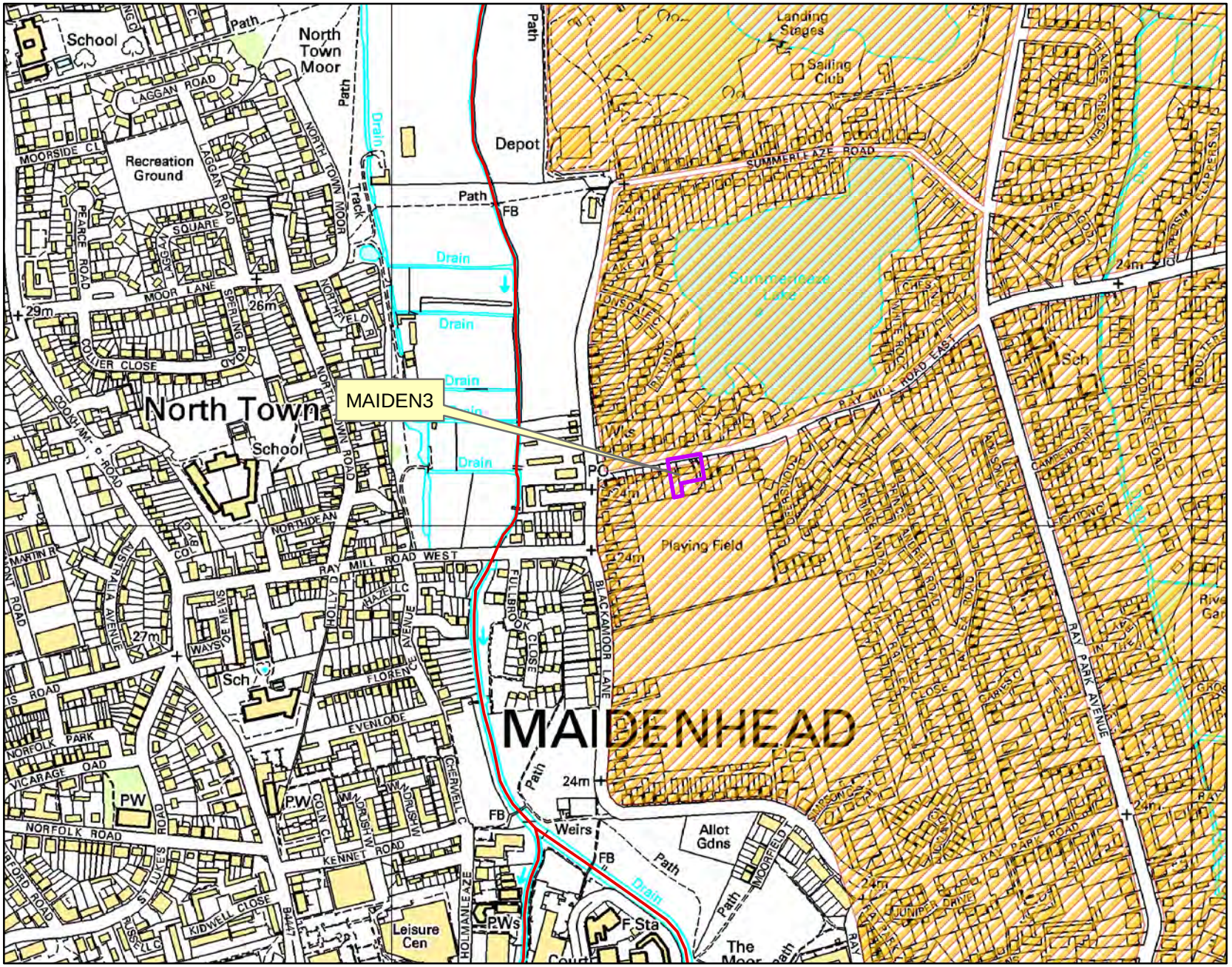
				Flood Flows (m3/s)				
Node label	Model	Easting	Northing	20% AEP	5% AEP	1% AEP	1% AEP (+20% on river flows)	0.1% AEP
063TH01_MN_NM105	Thames (Lower) Reach 1 & 2 2007	489155	182278	4.66	5.30	10.15	27.02	0.00
063TH01_MN_NM104	Thames (Lower) Reach 1 & 2 2007	489158	182178	4.66	5.30	10.43	28.31	0.00
063TH01_MN_NM103U	Thames (Lower) Reach 1 & 2 2007	489157	182076	4.66	5.30	11.91	30.84	0.00
063TH01_MN_NM103D	Thames (Lower) Reach 1 & 2 2007	489157	182063	4.66	5.30	11.91	30.84	0.00
063TH01_MN_NM102D	Thames (Lower) Reach 1 & 2 2007	489156	182020	4.66	5.30	11.48	23.75	0.00
063TH01_MN_NM102A	Thames (Lower) Reach 1 & 2 2007	489155	182017	4.66	5.30	11.48	23.74	0.00
063TH01_MN_NM101	Thames (Lower) Reach 1 & 2 2007	489130	181974	4.66	5.30	11.48	23.72	0.00
063TH01_MN_FRC231	Thames (Lower) Reach 1 & 2 2007	489103	181910	4.66	5.30	11.27	13.12	0.00
063TH01_MN_NM102B	Thames (Lower) Reach 1 & 2 2007	489157	182038	4.66	5.30	11.92	30.82	0.00
063TH01_MN_FRC232D	Thames (Lower) Reach 1 & 2 2007	489126	181956	4.66	5.30	11.48	23.72	0.00
063TH01_MN_FRC230	Thames (Lower) Reach 1 & 2 2007	489108	181806	4.66	5.30	11.29	13.16	0.00

Note:

Due to recent changes in guidance on the allowances for climate change, the 20% increase in river flows should no longer to be used for development design purposes.
The data included in this Product can be used for interpolation of levels as part of an Intermediate level assessment.

For further advice on the new allowances please visit
https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances

Reservoir Units Map centred on site in Maidenhead, located at SL6 8ST
Created on 16/08/2016 REF: BE_1337_02 (THM17860)



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Legend

- Site boundary
- Main River
- ReservoirUnits_FlowsLevels

Flooding from rivers or sea without 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.

The Extent of an extreme flood (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.

Contact Us: National Customer Contact Centre, PO Box 544, Rotherham, S60 1BY. Tel: 08708 506 506 (Mon-Fri 8-6). Email: enquiries@environment-agency.gov.uk

Modelled flood levels for reservoir units

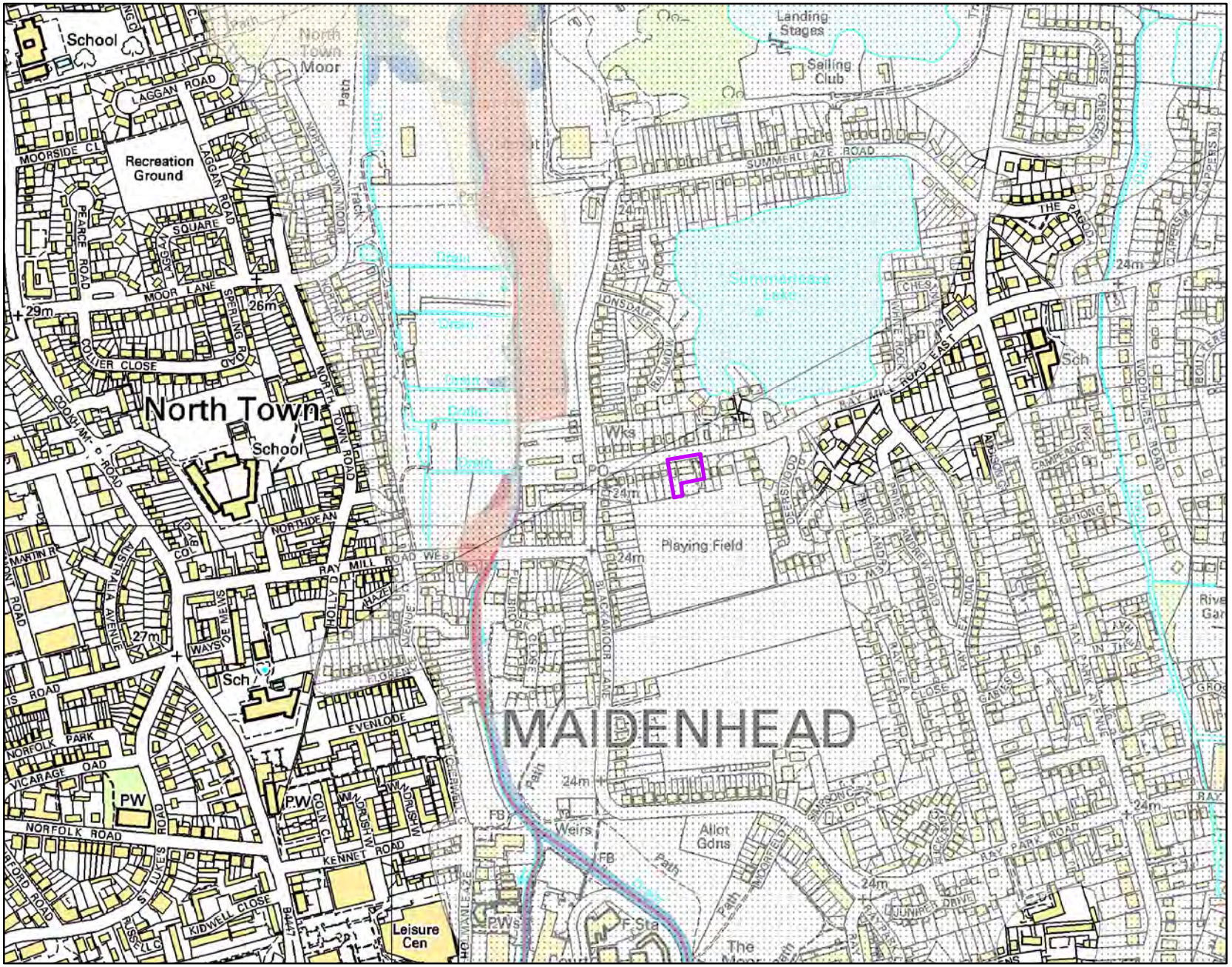
BE_1337_02 (THM17860)

The modelled flood levels for the reservoir unit closest to your site is provided below:

				flood levels (mAOD)				
Reservoir label	Model	Centre-point Easting	Centre-point Northing	20% AEP	5% AEP	1% AEP	1% AEP (+20% on river flows)	0.1% AEP
MAIDEN3	Lower Thames Reach 1 & 2 - ISIS model 2007	489620	181776	22.00	22.00	23.89	24.40	N/A

This flood model has represented some parts of the floodplain with reservoir units.
The flood water levels have been calculated for these areas directly.
Therefore, for a site located within a reservoir unit, in-channel water levels are not relevant and are not supplied.

Detailed FRA Map centred site in Maidenhead, located at SL6 8ST
Created on 20/07/2016 REF: BE_1337_01



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Legend

Flood Event Outline

- 1947
- 1990
- 2000
- 2002
- Main River

Flooding from rivers or sea without 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.

The Extent of an extreme flood (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.

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Historic flood data

BE_1337_01

Our records show that the area of your site has been affected by flooding.
Information on the floods that have affected your site is provided in the table below:

Flood Event Code	Flood Event Name	Start Date	End Date	Source of Flooding	Cause of Flooding
EA0619470300431b	06MarchSpring1947	01/01/1947	12/12/1947	main river	channel capacity exceeded (no raised defences)
EA0619470300431a	06MarchSpring1947	01/01/1947	12/12/1947	main river	channel capacity exceeded (no raised defences)

Please note the Environment Agency maps flooding to land not individual properties. Floodplain extents are an indication of the geographical extent of a historic flood. They do not provide information regarding levels of individual properties, nor do they imply that a property has flooded internally.

Start and End Dates shown above may represent a wider range where the exact dates are not available.