



The Oracle, Reading Yield Hall Place 1 & 2

Flood Risk Assessment

On behalf of: **The Oracle Partnership Ltd.**

Project Ref: 332110757/FRA | Rev: - | Date: February 2024

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Executive Summary

Flood Risk Assessments (FRAs) were prepared in November 2022 to support planning applications for the mixed-use re-development of the former Debenhams Department Store (ref. 221916) and the Vue Cinema complex (ref. 221917) at The Oracle in Reading.

The Former Debenhams Store re-development is to be known as Yield Hall Place 1 (YHP1) and the Vue Cinema complex re-development is to be known as Yield Hall Place 2 (YHP2).

The Environment Agency (EA) provided a consultation response in June 2023 to the FRAs prepared by Byrne Looby (ref. L1451-CIV-R001 and R002) objecting to the proposals on the basis of a lack of detailed assessment using the EA River Kennet 2018 model and the site topographic survey to refine the flood zones at the site and inadequate information on mitigation to manage risk to the River Kennet.

Stantec has prepared this FRA, supplemented with the EA River Kennet hydraulic model information to address the objections.

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 sites are located within **Flood Zone 1 'Low Probability' (less than a 1 in 1000 (0.1%) annual probability of river flooding)** (as defined in Planning Practice Guidance (PPG) 'Flood Risk and Coastal Change' Table 1). Small areas of **Flood Zone 2 'Medium Probability'** and **Flood Zone 3 'High Probability'** are located adjacent to the banks of the River Kennet.

The NPPF PPG 'Climate Change Allowances' guidance confirms the site criteria requires consideration of a peak 'central' river flow allowance of +25% (2080s epoch – 2070-2115).

A comparison of the EA River Kennet modelled flood levels and the site topographic survey confirms that the sites are located outside of all modelled floodplains up to and including the 1 in 1000 (0.1%) annual probability floodplain (these are contained in-bank) and are located within Flood Zone 1.

The proposals are for 'More Vulnerable' residential development (1st floor and above) and 'Less Vulnerable' development (ground floor) (ref: NPPF PPG Table 2). These forms of development are to be located within Flood Zone 1 and areas of low risk from other sources in accordance with the Sequential Approach. The Exception Test is not required.

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

- The ground floor levels of the proposed buildings will be set at a minimum of 38.15m AOD which provides a freeboard in excess of 600mm above the modelled 1 in 100 annual probability +25% allowance for climate change flood level which is in excess of British Standard and EA requirements;
- The groundwater table is anticipated to be consistent with the normal water level of the River Kennet (typically 36.30m AOD). The floor levels will have a minimum 1.85m freeboard above this water level and therefore the risk of groundwater flooding to the proposed development is not considered to be significant;

- The buildings will be located outside of the reference climate change floodplain and as such will have no impact on flood flow routes or floodplain storage capacity over the site;
- The site and access routes are located within Flood Zone 1 and therefore continuous safe and dry access is available to occupants;
- Surface water runoff will be managed via the use of SuDS techniques with a controlled discharge to the River Kennet.

In summary, the FRA demonstrates that the proposed development is safe and 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	Former Debenhams Store (YHP1), RG1 2AS, OS grid reference 471,668m E; 173,328m N. Vue Cinema Complex (YHP2), RG1 2AG, OS grid reference 471,693m E; 173, 237m N.	3.1
Existing Ground Levels	Topographic Survey by Ruxton Surveys	YHP1: External ground levels range from 38.00m AOD to 39.25m AOD. Threshold/floor levels: 38.17m AOD - 38.39m AOD YHP2: External ground levels range from 38.25m AOD to 39.40m AOD. Threshold/floor levels: 38.55m AOD-39.11m AOD	3.2
Primary source of flood risk	n/a	River Kennet	3.3
Presence of flood defences	n/a	No existing defences adjacent to site. Wider defences upstream and downstream.	3.3
Proposed Development	Proposals by CallisonRTKL Ltd.	<i>Debenhams 221916/FUL – Mixed use development comprising part demolition of former department store and erection of new building comprising up to 218no. build to rent residential dwellings (Class C3) and 1,209sqm commercial uses within Uses Class E and/or bar (Sui Generis Use). Reconfiguration and change of use of up to 5,866sqm remaining department store floorspace (Class E) to uses within Use Class E and/or bar (Sui Generis Use) and/or experiential leisure use (Sui Generis Use). Associated public realm, infrastructure works and external alterations to shopping centre, including creation of new shopping centre entrance.</i> <i>Vue Cinema – 221917/FUL – Mixed use development comprising demolition of existing buildings and erection of new building comprising up to 218no. build to rent residential dwellings (Class C3) and up to 3,046sqm commercial floorspace comprising cinema (Sui Generis) and ground floor commercial uses within Class E and/or Bar (Sui Generis Use). Associated public realm and infrastructure works.</i>	6.1
Planning Aspects			
Flood Risk Vulnerability	Planning Practice Guidance (PPG) 'Flood Risk and Coastal Change'	'More Vulnerable' & 'Less Vulnerable'	6.2
Flood Zone		Flood Zone 1 'Low Probability'. Small areas of Flood Zone 2 and 3 adjacent to banks of River Kennet	4.1

Sequential Test		Complies with Sequential Approach as all built development to be located within areas of Flood Zone 1 and low risk of flooding from other sources.	6.2
Exception Test		Not required	6.2
Applicable Climate Change Allowances	EA climate change allowances guidance	+21% (Central - 2080s epoch (2070-2115)) – using modelled +25% as a proxy	5
Reference Flood Levels			
Present Day	EA 2018 Kennet Model 'Tyle Mill to Thames Confluence'	1 in 20 (5.0%) annual probability = 37.04m AOD 1 in 100 (1.0%) annual probability = 37.27m AOD 1 in 1000 (0.1%) annual probability = 37.65m AOD	4.3
Climate Change		1 in 100 annual probability +25%cc = 37.54m AOD	5
Proposed Mitigation Measures			
Ground Floor Levels	BS8533:2017 RBC L1 SFRA section 12.3 EA Thames Area guidance	Ground floor levels to be set at 38.15m AOD which provides a freeboard in excess of 600mm above the 1 in 100 AP +25%cc level and 1.85m above the approximate water level in the River Kennet/approximate groundwater level for the area (36.30m AOD).	7.1
Floodplain Storage & Flood Flow Routes	RBC L1 SFRA Section 12.5/12.6 EA Thames Area guidance	Proposed buildings will be located within Flood Zone 1 with all floodplains contained within the banks of the River Kennet. No impact on floodplain storage or flood flow routes.	7.2
Safe Access	RBC L2 SFRA Section 3.4	Site and access routes are located within Flood Zone 1. Continuous safe and dry access available.	7.3
Surface Water Drainage	RBC SFRA	Surface water runoff is to be managed via the use of SuDS techniques with a controlled discharge to the River Kennet at greenfield rates.	7.4

Abbreviations

ABI	-	Association of British Insurers
BGS	-	British Geological Survey
CDM	-	Construction (Design and Management)
DEFRA	-	Department for Environment, Food and Rural Affairs
EA	-	Environment Agency
FHR	-	Flood Hazard Rating
FMfSW	-	Flood Map for Surface Water
FRA	-	Flood Risk Assessment
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
RBC	-	Reading Borough Council
SuDS	-	Sustainable Drainage Systems
SFRA	-	Strategic Flood Risk Assessment

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1 Introduction

1.1 Scope of Report

- 1.1.1 Flood Risk Assessments (FRAs) were submitted in November 2022 to support planning applications for the mixed-use re-development of the former Debenhams Department Store (ref. 221916) and the Vue Cinema complex (ref. 221917) at The Oracle in Reading.
- 1.1.2 The Former Debenhams Store re-development is to be known as Yield Hall Place 1 (YHP1) and the Vue Cinema complex re-development is to be known as Yield Hall Place 2 (YHP2).
- 1.1.3 The Environment Agency (EA) provided a consultation response in June 2023 to the FRAs prepared by Byrne Looby (ref. L1451-CIV-R001 and R002) with the following reasons for objection:

Former Debenhams Department Store (YHP1) only

"1) Proposed development incompatible with Flood Zone

We object to the proposed development as it falls within a flood risk vulnerability category that is inappropriate to the Flood Zone in which the application site is located....According to our flood modelling (Kennet-Tyle Mill to Thames Confluence 2018), part of the development lies within Flood Zone 3b 'Functional Floodplain'.....The development is classed as more vulnerable in accordance with Annex 3 of the NPPF. Table 2 of PPG makes it clear that this type of development is no compatible with this Flood Zone and should therefore not be permitted.

The FRA does not currently contain a detailed enough review of the computer flood modelling to demonstrate that any development would lie outside of the 5% annual exceedance probability (AEP) flood extent (Flood Zone 3b). Comparing modelled flood levels with a site topographical survey will indicate which areas of the site fall within Flood Zone 3b. More Vulnerable development is not permitted in Flood Zone 3b so the FRA will need to demonstrate that any proposed development is outside of Flood Zone 3b for the objection to be removed.

Both Former Debenhams Department Store (YHP1) and Vue Cinema Complex (YHP2)

2) Inadequate FRA

The FRA does not adequately assess the flood risks posed by the development. In particular, the FRA fails to:

- *Include computer flood modelled data to demonstrate flood extents and levels for a range of flooding events.*
- *Demonstrate that finished floor levels are set above the 1% annual exceedance probability plus an appropriate allowance for climate change (1% AEP CC) flood level. Therefore, the development may not be safe for its lifetime.*
- *Assess the impacts of the development on floodplain storage.*
- *Demonstrate that any loss of floodplain storage within the 1% annual exceedance probability (AEP) plus an appropriate allowance for climate change flood extent caused by the proposed development can be mitigated for.*

To overcome our objection, the applicant should submit a revised FRA which addresses the points highlighted above.

3) Building Next to a Main River – Unlikely to Grant Permit

The submitted applications and associated documents indicate that the River Kennet will be adversely affected, and a flood risk activity permit will be required. We do not have enough information to know if the proposed development can meet our requirements for mitigation of adverse environmental effects because inadequate details of the mitigation measures has been provided.”

1.1.4 Stantec UK ('Stantec') has prepared this revised FRA, supplemented with the detailed EA hydraulic model information for the River Kennet, to address the objections above.

- The assessment of modelled flood levels and the site topographic survey to address Objection 1
- Objection 2 is addressed in **Section 4.4**.
- Objection 3 is addressed in **Section 7.5**.

1.1.5 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 2**. 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).

1.1.6 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:

- **EA published 'Open Data' datasets available online**, reproduced with OS mapping under licence to Stantec (contains Ordnance Survey data © Crown copyright and database right [2024], contains Environment Agency information © Environment Agency and database right) (see **Appendix A**);
- **Topographic survey of the site** (Drawing reference RS2200121/01) undertaken by Ruxton Surveys in July 2022 (see **Appendix B**);
- **Outputs from the EA Kennet (Tyle Mill to Thames Confluence) 2018 hydraulic model**, provided as a Product 4 ref. THM315890 in July 2023 (see **Appendix C**);
- **Proposals by CallisonRTKL Ltd.** (see **Appendix E**);
- **The Reading Borough Council (RBC) Preliminary Flood Risk Assessment (PFRA)**, June 2011 and **Addendum**, 2017;
- **The Reading Borough Council (RBC) Level 1 Strategic Flood Risk Assessment (SFRA)**, **June 2017**; and

- **The Reading Borough Council (RBC) Level 2 Strategic Flood Risk Assessment (SFRA), December 2017.**

1.3 Caveats and Exclusions

- 1.3.1 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.
- 1.3.2 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.
- 1.3.3 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.
- 1.3.4 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 do not warrant that the advice in this report will guarantee the availability of flood insurance either now or in the future.

2 Planning Policy Context

- 2.1.1 This FRA has been prepared in accordance with the relevant national, regional, and local planning policy and statutory authority guidance as detailed below.

2.2 National Policy and Guidance

- 2.2.1 National policy in relation to flood risk is contained within the **National Planning Policy Framework (NPPF)**, updated December 2023, issued by the Ministry of Housing, Communities and Local Government, with reference to Section 14 'Meeting the challenge of climate change, flooding and coastal change'.
- 2.2.2 The associated **Planning Practice Guidance (PPG)** was released in March 2014 (with reference to the 'Flood Risk and Coastal Change' section) and last updated in August 2022.
- 2.2.3 The NPPF and PPG demonstrate a flood risk management approach for the lifespan of the proposed development considering the effects of climate change. The document sets the framework to minimise vulnerability, provide resilience to the impacts of climate change, and to fully consider the potential impacts of climate change for the lifetime of the development within the mitigation measures.
- 2.2.4 In May 2022, the guidance within the PPG on the application of climate change allowances in FRAs was significantly updated:
- <https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances>.
- 2.2.5 The guidance provides contingency allowances for the potential increases in peak river flow, peak rainfall intensity and sea level rise which are considered accordingly subject to the site conditions – discussed further in **Section 5**.
- 2.2.6 The NPPF sets out the requirement for the Sequential Test and Exception Test in paragraphs 168 and 169 respectively – see below.

"168. The aim of the sequential test is to steer new development to areas with the lowest risk of flooding from any source. Development should not be allocated or permitted if there are reasonably available sites appropriate for the proposed development in areas with a lower risk of flooding. The strategic flood risk assessment will provide the basis for applying this test. The sequential approach should be used in areas known to be at risk now or in the future from any form of flooding).

169. If it is not possible for development to be located in areas with a lower risk of flooding (taking into account wider sustainable development objectives), the exception test may have to be applied. The need for the exception test will depend on the potential vulnerability of the site and of the development proposed, in line with the Flood Risk Vulnerability Classification set out in Annex 3."

- 2.2.7 These Tests are to be applied where appropriate, depending on the proposed development flood risk 'vulnerability' and the Flood Zone in which it is located. This is detailed further in **Section 5**.

2.3 Local Policy and Guidance

Reading Borough Local Plan

- 2.3.1 Local planning policy contained within the ‘**Reading Borough Local Plan**,’ adopted November 2019, with specific reference to **Policy EN18 ‘Flooding and Sustainable Drainage Systems’**, which states:

Policy EN18: Flooding and Sustainable Drainage Systems

Development will be directed to areas at lowest risk of flooding in the first instance, following the Sequential and Exceptions Test set out in the NPPF, and taking into account the effects of climate change. It will consider flooding from all sources, including fluvial, surface water, groundwater, and sewer flooding. Where development in areas at risk of flooding is necessary, it will not reduce the capacity of the flood plain to store floodwater, impede the flow of floodwater or in any way increase the risks to life and property arising from flooding. Wherever possible, development should be designed to reduce flood risk, both on- and off-site.

All major developments must incorporate sustainable drainage systems (SuDS) as appropriate and in line with the Government’s Technical Standards. Smaller schemes are encouraged to incorporate SuDS, where possible. Runoff rates should aim to reflect greenfield conditions and, in any case, must be no greater than the existing conditions of the site. Schemes should ensure that the movement of water through vertical infiltration as well as horizontal run-off does not worsen contamination effects. Wherever possible, SuDS provision should maximise ecological benefits, link into the existing Green Network, incorporate tree planting and landscaping and avoid damage to existing significant trees, including through changes to the site hydrology. All new developments in areas of flood risk should give priority to SuDS.

All developments will demonstrate how they have been designed to incorporate measures to adapt to climate change. The following measures shall be incorporated into development...

- *...All development shall minimise the impact of surface water runoff from the development in the design of the drainage system, and where possible incorporate mitigation and resilience measures for any increases in river flooding levels as a result of climate change.”*

Strategic Flood Risk Assessment

- 2.3.2 The **Reading Borough Council (RBC) Strategic Flood Risk Assessment (SFRA) Level 1** was released in 2017 and forms part of the Local Plan evidence base, to inform future spatial planning and to assist in developing planning policies to address flood risk. Moreover, the document provides an overall understanding of the flood risk within the study area considering all potential sources and provides recommendations for safe access for developments in the Borough.
- 2.3.3 It is essential therefore, that the Council are in a position to make informed decisions, providing a careful balance between the risk of flooding and other unrelated planning constraints that may place pressure upon ‘at risk’ areas.
- 2.3.4 A Level 2 SFRA was also released in December 2017 that considers flood risk for allocated sites. The site is not allocated within this report and therefore the SFRA is of limited relevance.

Preliminary Flood Risk Assessment

- 2.3.5 The RBC is defined as the Lead Local Flood Authority (LLFA) under the Flood and Water Management Act 2010. The first element of the Flood Risk Regulations (2009) is for LLFAs to produce a **Preliminary Flood Risk Assessment (PFRA)** providing a high-level overview of flood risk from all sources within a local area, including consideration of surface water, groundwater and ordinary (minor) watercourses. The RBC PFRA was released in 2011 and Addendum released in 2017 and has been reviewed to ascertain any details of historic flooding at the site as part of this study – see **Section 4.3**.

3 Site Setting

3.1 Site Description

3.1.1 The site consists of the following areas:

- The former Debenhams site (YHP1) is 0.75 hectares (ha) in area forms part of the wider Oracle Shopping Centre in Central Reading. The site is located to the west of Yield Hall Place and along the northern bank of the River Kennet (postcode RG1 2AS, OS grid reference 471,670m E; 173,330m N);
- The Vue Cinema complex (YHP2) is 1.10ha in area is located along the southern bank of the River Kennet and to the north of the Queens Road/A329 Inner Distribution Road (IDR) (postcode RG1 2AG, OS grid reference 471,690m E; 173,240m N);
- Yield Hall Place to the east of the buildings and a small area of open space to the north-east of the Yield Hall Place bridge that crosses over the River Kennet;
- London Street and area immediately east.

3.1.2 The site locations are shown on **Figure 3.1** and **Appendix A**.

3.1.3 The sites are located within the administrative boundary of RBC.

Figure 3.1: Site Location Plan (not to scale)



3.2 Topography

3.2.1 The topographic survey by Ruxton Surveys is provided in **Appendix B** shows the following for the ground levels around the existing buildings and threshold/ground floor levels:

- YHP1:
 - External ground levels range from 38.00m AOD to 39.25m AOD.
 - Threshold/ground floor levels: 38.17m AOD - 38.39m AOD
- YHP2:
 - External ground levels range from 38.25m AOD to 39.40m AOD.
 - Threshold/ground floor levels: 38.55m AOD-39.11m AOD

3.2.2 Levels along the River Kennet brick/concrete retaining walls adjacent to the sites range from 37.40m AOD to 41.20m AOD.

3.3 Hydrological Setting

3.3.1 The **River Kennet** flows north-east through the centre of Reading between the two sites to its confluence with the **River Thames** approximately 1,000 metres (m) east of the sites at Kennetmouth.

3.3.2 The **Holy Brook** is located 50-100m to the north of the site and flows eastwards to join the River Kennet shortly downstream of the site.

3.3.3 The EA Flood Zone map in **Appendix A** shows the presence of flood defences (retaining walls) along the reach of the River Kennet to the west of the site and along the Holy Brook to the north of the site.

3.4 Geology and Hydrogeology

3.4.1 The British Geological Survey (BGS) Geology of Britain Viewer suggests that the site lies on superficial deposits of Alluvium (Clay, Silt, Sand and Gravel) overlying the bedrock of the Seaford Chalk Formation and Newhaven Chalk Formation (White Chalk).

3.4.2 The site does not lie within an EA Groundwater Source Protection Zone and lies on a principal designated bedrock aquifer, and within an area of Groundwater Vulnerability designated 'Medium - High.'

4 Overview of Flood Risk

4.1 EA Flood Maps

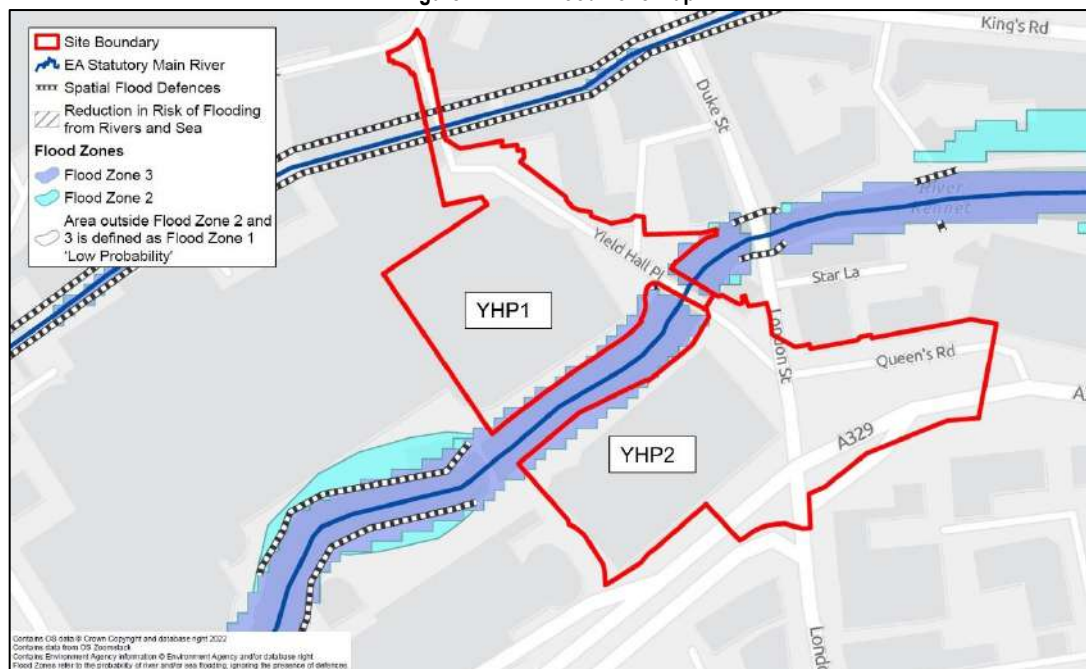
- 4.1.1 The following maps have been taken from the Stantec GIS flood maps report in **Appendix A** based on the EA Open Data datasets available online and reproduced with OS mapping under licence to Stantec.

Flood Zone Map

- 4.1.2 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 (AP) of river or sea flooding;
- **Flood Zone 2 'Medium Probability'** – Land between 1 in 100 (1.0%) and 1 in 1000 (0.1%) AP of river flooding, or between 1 in 200 (0.5%) and 1 in 1000 (0.1%) AP of sea flooding;
- **Flood Zone 3 'High Probability'** – Land at 1 in 100 (1.0%) or greater AP of river flooding, or 1 in 200 (0.5%) or greater AP of sea flooding.

Figure 4.1: EA Flood Zone Map



- 4.1.3 The EA Flood Zone map in **Figure 4.1** indicates the majority of the site is located within **Flood Zone 1 'Low Probability'**, with narrow areas of Flood Zone 2 and Flood Zone 3 located immediately south and north of the main YHP1 and YHP2 areas respectively and within the small area of open space to the north of the Yield Hall Place bridge.

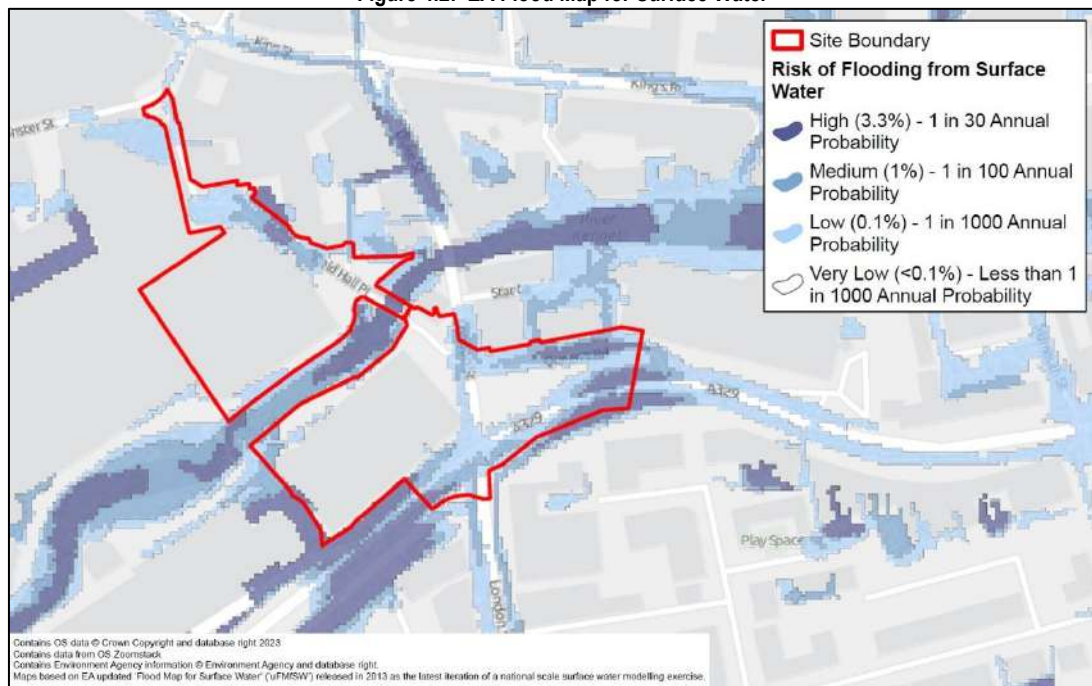
Flood Risk from Reservoirs Map

- 4.1.4 The EA provides maps showing the risk of flooding in the event of a reservoir failure. The reservoir breach extents captured in the baseline flood maps have been taken from the Stantec GIS flood maps report in **Appendix A**.
- 4.1.5 The EA reservoir maps show two flooding scenarios, a 'dry-day' and a 'wet-day.' The 'dry-day' scenario predicts the flooding that would occur if the dam or reservoir failed when rivers are at normal levels. The 'wet day' scenario predicts how much worse the flooding might be if a river is already experiencing an extreme natural flood.
- 4.1.6 The mapping confirms that the sites are not at risk of reservoir breach during a 'dry-day' or a 'wet-day' scenario.

Flood Risk from Surface Water

- 4.1.7 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 scenarios:
- 'High' Risk: 1 in 30 (3.3%) or greater AP rainfall event;
 - 'Medium' Risk: Between a 1 in 100 (1.0%) and 1 in 30 (3.3%) AP rainfall event;
 - 'Low' Risk: Between 1 in 1000 (0.1%) and 1 in 100 (1.0%) AP rainfall event;
 - 'Very Low' Risk: Lower than 1 in 1000 (0.1%) AP rainfall event.
- 4.1.8 The Surface Water Flood Map (**Figure 4.2**) indicates the following in relation to the sites:
- The YHP1 area has a 'Very Low' risk of surface water flooding, with the exception of a narrow strip in the south-western corner of the site which has a 'Low' risk of surface water flooding;
 - The majority of the YHP2 area has a 'Very Low' risk of surface water flooding. Small areas of 'Low' to 'High' surface water flood risk are present around the building perimeter;
 - Areas along Yield Hall Place in the northern part of the site along/to the east of London Street have a 'Low' to 'High' surface water flood risk.
- 4.1.9 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.

Figure 4.2: EA Flood Map for Surface Water



Historic Flood Map

4.1.10 The EA 'Historic Flood Map' is a dataset showing the maximum extent of all individual recorded flood outlines from rivers, the sea and groundwater and shows areas of land that have previously been subject to flooding (see **Appendix A**). This shows that the site was unaffected in historic flood events, based on available records.

4.2 Strategic Flood Risk Assessment

4.2.1 The current RBC Strategic Flood Risk Assessment (SFRA) Level 1 and Level 2 reports were prepared by PBA (now Stantec) in 2017 and provide advice to RBC on flood risk issues within the Borough. This document has been reviewed and key information relevant to the site has been extracted.

- **Historic Flooding:** Map F2_C1 shows that the lower riverside area to the west of the sites was impacted in the August 1977 and January 2003 flood events. The sites were not impacted in these or other recorded historic flood events. Two recorded incidences of flooding were recorded by Royal Berkshire Fire and Rescue Service on Duke Street to the east of the site and at the main Oracle Shopping Centre to the north-west of the site;
- **Flood Zones:** Map F4_C shows the Flood Zone maps across the area, indicating the sites are located within Flood Zone 2, with areas of Flood Zone 3a and 3b contained within the banks of the River Kennet. The EA Flood Zone map in **Figure 4.1**, is based on more recent EA River Kennet modelling and therefore this SFRA map is superseded by the latest version;
- **Modelled Flood Extents:** SFRA map series references F5_N and F5_N_CC provide modelled present day and climate change flood extents through the Borough. The flood extents shown are superseded by the information discussed in **Section 4.4**;
- **Surface Water:** SFRA map series reference F6 provides the surface water flood risk through the Borough. These outputs are consistent with the surface water flood maps discussed in **Section 4.1**;

- **Reservoir Breach:** SFRA Map F7 shows the flood risk associated with reservoir breach in the area (the only reservoir affecting the Borough being Whiteknights Lake at Reading University). The mapping confirms that any flooding as a result of a breach is limited to land to the south-east of Reading and the area of the site is unaffected;
- **Groundwater:** SFRA Map F8 provides a high-level overview of areas susceptible to groundwater flooding, taken from a national dataset and based on underlying geological conditions across 1km grid squares to show what percentage of the 1km area could be susceptible to groundwater flooding. The site is shown in an area at '75%' susceptibility.

The mapping provides an indication of the degree of susceptibility of groundwater flooding that is present within a broad area based on a combination of topography and underlying ground conditions. It is not based on recorded or anecdotal information on groundwater flooding within the area and is not related to a specific probability.

The site is located in close to proximity to the River Kennet and it is considered that the groundwater level will be consistent with the typical river level at approximately 36.30m AOD (taken from the site topographic survey in **Appendix B**). The site levels are set at a minimum of 38.00m AOD (see **Section 3.2**) which provides a minimum 1.7m freeboard above the water level in the river; therefore, the risk of groundwater flooding is considered to be low;

- **Sewers:** Map F9 provides a summary of Thames Water sewer flooding incidents by postcode, indicating the site postcode area has 21-50 recorded sewer flooding incidents from both internal and external sources.

4.3 RBC Preliminary Flood Risk Assessment

- 4.3.1 The RBC Preliminary Flood Risk Assessment (PFRA) was prepared by PBA (now Stantec) in 2011 and Addendum dated 2017 provides a high-level assessment of flood risk issues within the Borough. This document has been reviewed and key information relevant to the site has been extracted.
- 4.3.2 Records within the PFRA indicate two incidences of historic flooding to the east of the site and to the north-west of the site, but no site-specific data is available. This is consistent with the SFRA information above.

4.4 EA River Kennet 'Tyle Mill To Thames Confluence' Model 2018

- 4.4.1 The EA has provided Product 4 information for the sites which include modelled flood levels and extents from the EA 2018 Kennet 'Tyle Mill to Thames Confluence' 1D-2D model (received from the EA in July 2022 ref. THM315890) and these are provided in **Table 4.1** for nodes 'Floodplain 4' (upstream) and 'Floodplain 2' (downstream).

Table 4.1: EA Modelled Flood Levels – Present Day

Flood Event (Annual Probability)	Modelled Flood Level, m AOD	
	Floodplain 4 (Upstream)	Floodplain 2 (Downstream)
1 in 20 (5.0%)	N/A	37.04
1 in 100 (1.0%)	37.27	37.23
1 in 1000 (0.1%)	37.65	37.60

- 4.4.2 The modelled flood levels have been superimposed over the site topographic survey and this is shown on **Stantec drawing 332110757/4000/001** in **Appendix D**. The drawing confirms that all modelled floodplains up to and including the 1 in 1000 (0.1%) annual probability flood event

are contained within the banks of the River Kennet and confirms that the site is located within Flood Zone 1 'Low Probability'.

4.4.3 The minimum ground level at the site is 38.00m AOD and therefore has a minimum freeboard above the modelled flood levels as follows:

- 1 in 20 (5.0%) AP event: 960mm
- Present-day 1 in 100 (1.0%) AP event: 730mm
- 1 in 1000 (0.1%) AP event: 350mm

5 Impact of Climate Change

5.1.1 The NPPF and PPG place emphasis on the need to fully consider – and design for – the impacts of climate change as set out in the planning guidance. This guidance provides contingency allowances for potential increases due to climate change in:

- Peak river flow;
- Rainfall intensity;
- Sea level rise.

5.1.2 These elements are discussed in turn below, except for sea level rise which is not applicable to the sites.

Peak River Flow

5.1.3 The peak river flow allowances provide 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 applicable values for a site are dependent on the 'River Management Catchment' in which the site is located, which can be confirmed via the online mapping tool embedded within the guidance.

5.1.4 The peak river flow allowances provide a range of scenarios 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 subject to the sub-catchments of river basin district (known as management catchments) and the vulnerability classification of the proposed use of the site.

5.1.5 The applicable allowances are subject to the Flood Zone classification of a site, and the vulnerability classification of the proposed use. The Central allowance is identified as the design standard for most forms of proposed development in all appropriate Flood Zones.

5.1.6 The sites are located within the Kennet and Tributaries Management catchment and within Flood Zone 1 and therefore the 'Central' allowance is applicable. The lifetime of development based on 'More Vulnerable' residential development is considered to be 100 years and therefore the 2080s epoch (i.e. 2070 to 2115) 'Central' allowance of **+21%** is applicable.

5.1.7 The 1 in 100 annual probability +21% allowance for climate change event has not been modelled. Therefore, the modelled +25% allowance for climate change flood level included in the outputs from the EA River Kennet (Tyle Mill to Thames Confluence) 2018 model has been used as a conservative proxy and is provided in **Table 5.1**.

Table 5.1: EA Modelled Flood Levels – Climate Change

Flood Event (1 in 100 Annual Probability plus climate change allowance)	Modelled Flood Level, m AOD	
	Floodplain 4 (Upstream)	Floodplain 2 (Downstream)
+25% climate change (Conservative proxy for potential impacts in the 2080s Epoch (2070 to 2115))	37.54	37.49

5.1.8 **Stantec drawing 332110757/4000/001** in **Appendix D** shows that the modelled 1 in 100 annual probability +25% allowance for climate change floodplain is contained within the banks of the River Kennet and does not impact the site. The sites have a minimum ground level of 38.00m

AOD and therefore they have a minimum 460mm freeboard above the reference flood level with climate change.

Peak Rainfall

- 5.1.9 The potential increase in peak rainfall intensity needs to be considered in the surface water drainage strategy for new developments.
- 5.1.10 The anticipated changes in peak rainfall intensity in small catchments (less than 5km²), or urbanised drainage catchments are summarised in **Table 5.2** ('Table 1' from the associated guidance). For large rural drainage catchments, the peak river flow allowances are applied.
- 5.1.11 The appropriate climate change allowances have been applied to the surface water drainage strategy outlined in **Section 7.4**.

Table 5.2: Climate Change – Peak Rainfall Intensity Allowances

Wey and Tributaries Management Catchment	Total potential change anticipated (2070s epoch – i.e. 2061 to 2125)	
	Central	Upper End
3.3% (1 in 30-year) rainfall	25%	35%
1.0% (1 in 100-year) rainfall	25%	40%

6 Proposed Development

6.1 Proposed Development

6.1.1 This FRA accompanies a planning application for the following:

“Debenhams – 221916/FUL – Mixed use development comprising part demolition of former department store and erection of new building comprising up to 218no. build to rent residential dwellings (Class C3) and 1, 209 sqm commercial uses within Uses Class E and/or bar (Sui Generis Use). Reconfiguration and change of use of up to 5,866 sqm remaining department store floorspace (Class E) to uses within Use Class E and/or bar (Sui Generis Use) and/or experiential leisure use (Sui Generis Use). Associated public realm, infrastructure works and external alterations to shopping centre, including creation of new shopping centre entrance.

Vue Cinema – 221917/FUL – Mixed use development comprising demolition of existing buildings and erection of new building comprising up to 218no. build to rent residential dwellings (Class C3) and up to 3,046 sqm commercial floorspace comprising cinema (Sui Generis) and ground floor commercial uses within Class E and/or Bar (Sui Generis Use). Associated public realm and infrastructure works.”

6.1.2 Details of the proposals by CallisonRTKL Ltd. are included in **Appendix E**.

6.2 Flood Risk Vulnerability & Sequential Approach

6.2.1 NPPF Annex 3 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 2 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.

6.2.2 The proposals are for predominately residential development which is classed as ‘More Vulnerable’ development with commercial elements on the ground floor which is classified as ‘Less Vulnerable’ development.

6.2.3 Whilst there are small areas of Flood Zone 2 and 3 within the site boundary due to the adjacent River Kennet, the proposed buildings are located within the areas of lowest probability flooding (i.e. Flood Zone 1 and at low probability of flooding from other sources) in accordance with the Sequential Approach.

7 Flood Mitigation Strategy

7.1 Ground Floor Levels

- 7.1.1 Standard requirements for ground floor levels of new development are set out in BS8533:2017 'Assessing and Managing Flood Risk in New Development – Code of Practice.' This recommends floor levels are set a minimum of 300mm above the modelled 1 in 100 (1.0%) annual probability plus allowance for climate change flood level.
- 7.1.2 The finished ground floor level of the proposed buildings at both YHP1 and YHP2 will be set at 38.15m AOD, which provides a freeboard in excess of 600mm above the 1 in 100 annual probability +25% allowance for climate change flood level and is therefore in excess of the British Standard and EA requirements.
- 7.1.3 As mentioned in **Section 4.2**, whilst the SFRA indicates that the susceptibility to groundwater flooding is 'high', this is based on coarse mapping generated by a broad assessment of the underlying geology and ignoring site-specific conditions. The groundwater table is anticipated to be in continuity with the normal water level of the River Kennet (36.30m AOD), while the ground levels and proposed finished floor levels have a minimum of 1.7m and 1.85m freeboard above the typical water level in the River Kennet (and the freeboard as specified previously above the extreme flood levels).

7.2 Floodplain Storage and Flow Routes

- 7.2.1 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 (1.0%) annual probability plus allowance for climate change fluvial flood level.
- 7.2.2 The sites are located within Flood Zone 1 and therefore proposed development will not impact on floodplain storage or flood flow routes.

7.3 Safe Access

- 7.3.1 It is necessary to consider and incorporate safe access arrangements as part of the mitigation, to ensure the users/occupants of the development are safe in times of flooding.
- 7.3.2 The sites and surrounding access routes to/from the sites are located within Flood Zone 1 'Low Probability' and therefore continuous safe and dry access is available for the occupants of the proposed development.

7.4 Surface Water Drainage

- 7.4.1 As of April 2015, RBC as the Lead Local Flood Authority (LLFA) for the area has become a statutory consultee on planning applications for surface water management.
- 7.4.2 The strategy for surface water drainage for the proposed development has been developed and is included in a report prepared by Stantec and submitted separately. The key principles of the strategy are in accordance with stakeholder and policy requirements. These are:
- Following the discharge hierarchy surface water from the development will be discharged to the adjacent River Kennet main river via the existing outfalls.
 - The network will be designed not to flood during a 1 in 100 annual probability +40% allowance for climate change rainfall event.

- The proposals incorporate areas of green roof which capture and store surface water on the building roof. The areas of green roof will provide retention, attenuation, treatment of rainwater and promote evapotranspiration.
- Surface water from the development will be attenuated within underground cellular storage tanks before being discharged to the River Kennet at a controlled rate, significantly reduced rate in comparison to the existing drainage network.

7.5 Flood Risk Activity Permit Requirements

- 7.5.1 Proposed works in, over, under or near a Main River or a flood defence require a 'Flood Risk Activity Permit' (FRAP) application to be made to the EA. This is required to demonstrate that any new development does not have a detrimental impact on flood risk.
- 7.5.2 The objection to the EA raises concerns to the impact of the proposed re-developments on the River Kennet. However, it should be noted that the proposed buildings will be set at a similar distance as the existing buildings from the river. In addition, surface water runoff will be improved through the provision of attenuation before it is discharged to the river.

8 Residual Risk

8.1.1 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 as follows:

- Residual risks, such as climate change and other uncertainties, will be minimised as ground floor levels have a freeboard in excess of 600mm above the EA-modelled 1 in 100 annual probability +25% allowance for climate change design flood level and in excess of 1.8m above the approximate water level of the River Kennet/assumed groundwater table for the area.
- The sites are located within Flood Zone 1 and therefore there is no impact on floodplain storage or flood flow routes. Access routes to/from the site are also located within Flood Zone 1 and therefore continuous safe and dry access is available for occupants of the proposed development.
- Continuous safe and dry access will be available in both the present-day 1 in 100 (1.0%) annual probability and equivalent +25% allowance for climate change events.
- Surface water runoff will be managed via the use of SuDS techniques with a controlled discharge to the River Kennet.

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

9 Conclusions

- 9.1.1 This FRA has been prepared to address the EA objections on the planning applications for the mixed-use re-development of the former Debenhams Department Store (ref. 221916 – Yield Hall Place 1 (YHP1)) and the Vue Cinema complex (ref. 221917 – Yield Hall Place (YHP2)) at The Oracle in Reading.

Vulnerability and Sequential Test

- 9.1.2 The proposals are predominantly residential 'More Vulnerable' development with some elements of commercial 'Less Vulnerable' development on the ground floor.
- 9.1.3 Environment Agency (EA) Flood Zone mapping and modelled flood data shows that the majority of the site lies within Flood Zone 1 'Low Probability' (land at a 1 in 1000 (0.1%) or less annual probability of river flooding) and is at a low risk from other sources. Small areas of Flood Zone 2 and 3 are shown adjacent to the banks of the River Kennet.
- 9.1.4 The proposed uses are appropriate in Flood Zone 1 and are located within areas of lowest probability of flood risk. The Sequential Test is therefore de-facto passed and the Exception Test is not required.

Flood Risk

- 9.1.5 The main source of flood risk for the site is fluvial. The data shows the site is affected by flooding from the River Thames and it lies within Flood Zone 1 'Low Probability', with areas of Flood Zone 2 and Flood Zone 3 contained within the banks of the River Kennet that flows between the sites.
- 9.1.6 Sewer, surface water and reservoir flood risk are considered to be low. The Reading SFRA indicates that the groundwater susceptibility at the site is high; however, the groundwater susceptibility mapping is based on a coarse mapping of 1km square areas, and at the site the groundwater table would be in continuity with the water levels within the River Kennet. These are typically at least 1.7m lower than the site ground levels and 1.85m below the proposed finished floor level of the development, so the risk of groundwater flooding is therefore considered to be low.
- 9.1.7 National climate change guidance set out in the Planning Practice Guidance (PPG) confirms that the site conditions require consideration of an increase in peak river flow of +21% ('Central' allowance, 'Kennet and Tributaries' management catchment, Flood Zone 1, More Vulnerable development). The +21% climate change scenario has not been modelled by the EA and therefore the modelled +25% scenario has been used as a conservative proxy.
- 9.1.8 The EA Kennet 'Tyle Mill to Thames Confluence' 2018 model information confirms that flows remain in bank up to and including the 1 in 1000 (0.1%) annual probability event, confirming that the sites are located within Flood Zone 1 'Low Probability'. Flows during the reference 1 in 100 annual probability +25% allowance for climate change event also remain in bank.

Mitigation Strategy

- 9.1.9 The flood risk mitigation strategy for the development consists of the following elements:
- The ground floor levels of the proposed buildings will be set at a minimum of 38.15m AOD which provides a freeboard in excess of 600mm above the modelled 1 in 100 annual probability +25% allowance for climate change flood level which is in excess of British Standard and EA requirements;

- The proposed finished floor levels will have a minimum 1.85m freeboard above the approximate water level of the River Kennet/assumed groundwater table in the area.
- The proposed buildings are located within Flood Zone 1 and therefore there is no impact on floodplain storage or flood flow routes. Access routes to/from the site are also located within Flood Zone 1 and therefore continuous safe and dry access is available for occupants of the proposed development;
- Surface water runoff will be managed via the use of SuDS techniques with a controlled discharge to the River Kennet.

Summary

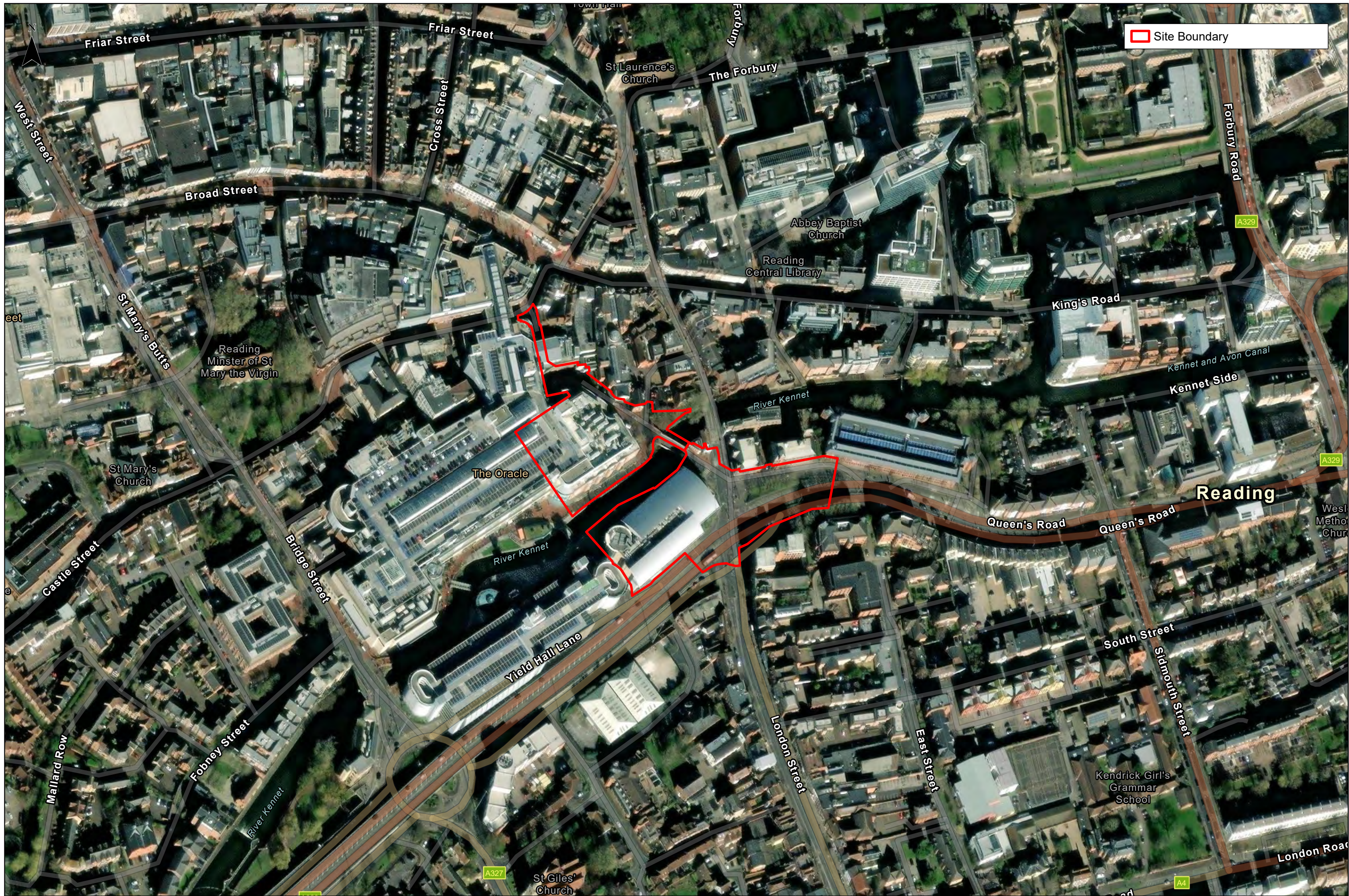
- 9.1.10 In conclusion, the future occupants and users of the proposed development will be safe from flooding and there will be no detrimental impact on third parties. The proposal complies with the National Planning Policy Framework (NPPF) and local planning policy with respect to flood risk and is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

Appendix A Open Data Flood Maps

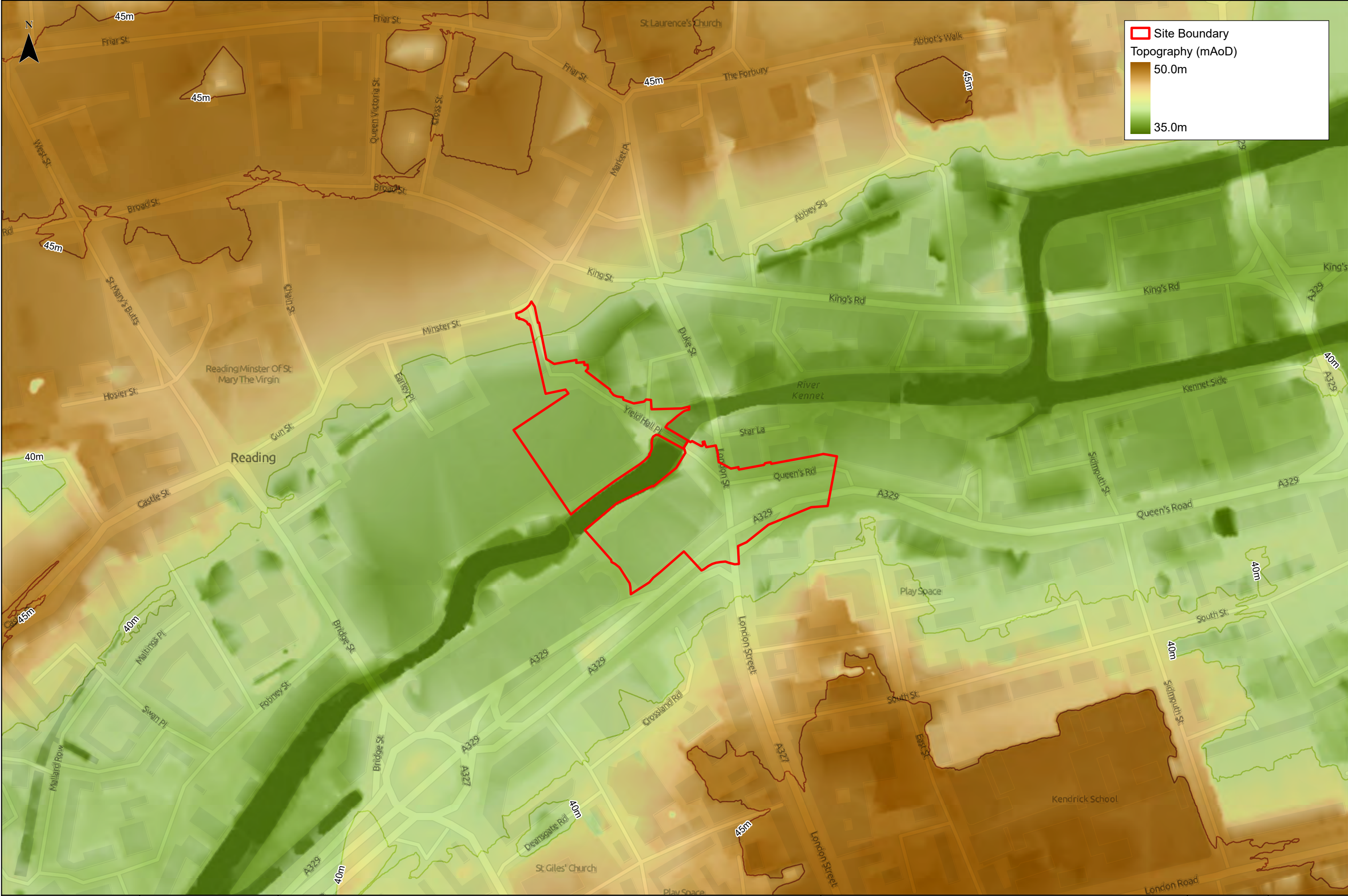
- Site Location Plan
- Site Location (Aerial Photography)
- Area Topography (LiDAR)
- EA Flood Zone Map
- EA Surface Water Flood Risk
- Reservoir Flood Map
- EA Historic Flood Map



	Client The Oracle Limited Partnership	THE ORACLE, READING Site Location	0125250 m Contains OS data © Crown Copyright and database right 2023 Contains data from OS Zoomstack	1:2,500 @ A3	Date: 26/07/2023
				Drawn: ZW	Checked: RF
				Figure: 01	Rev: A



	Client The Oracle Limited Partnership	THE ORACLE, READING Site Location - Aerial	0 125 250 m Maxar, Microsoft, Esri Community Maps Contributors, Esri UK, Esri, HERE, Garmin, Foursquare, GeoTechnologies, Inc, METI/NASA, USGS	1:2,500 @ A3 Drawn: ZW Figure: 02	Date: 26/07/2023 Checked: RF Rev: A
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Site Boundary

Topography (mAoD)

50.0m

35.0m

Stantec	Client		THE ORACLE, READING		0250		1:2,500 @ A3		Date: 26/07/2023	
	The Oracle Limited Partnership		Topography		Contains OS data © Crown Copyright and database right 2023 Contains data from OS Zoomstack, Contains OS data © Crown Copyright and database right 2019		Drawn: ZW		Checked: RF	
							Figure: 03		Rev: A	



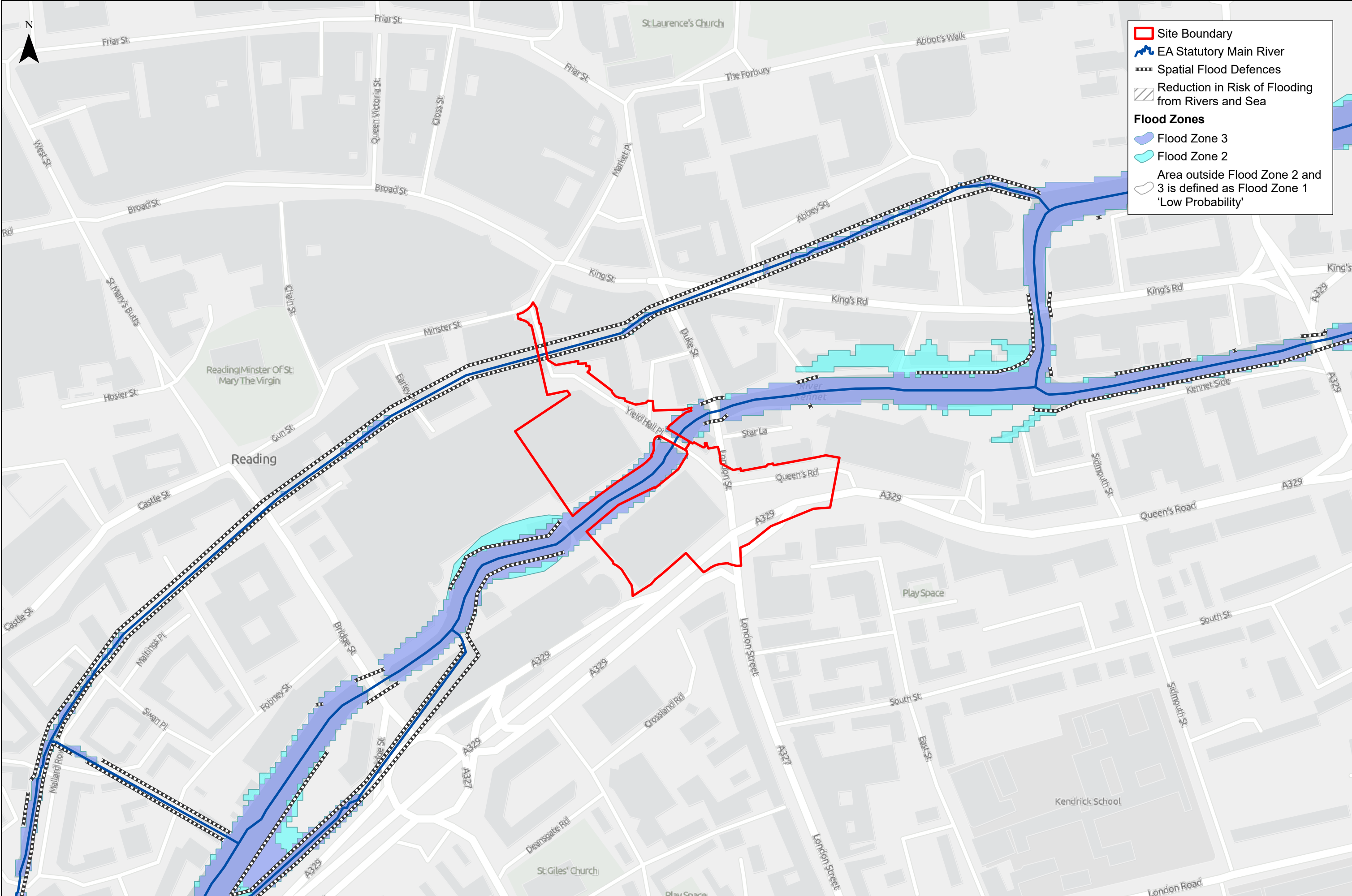
Site Boundary

Topography (mAoD)

45.0m

35.0m

	Client	THE ORACLE, READING Topography - Detailed	050100 Contains OS data © Crown Copyright and database right 2023 Contains data from OS Zoomstack, Contains OS data © Crown Copyright and database right 2019	1:1,000 @ A3	Date: 26/07/2023
	The Oracle Limited Partnership		Drawn: ZW	Checked: RF	
			Figure: 03.1		Rev: A



Site Boundary

EA Statutory Main River

Spatial Flood Defences

Reduction in Risk of Flooding from Rivers and Sea

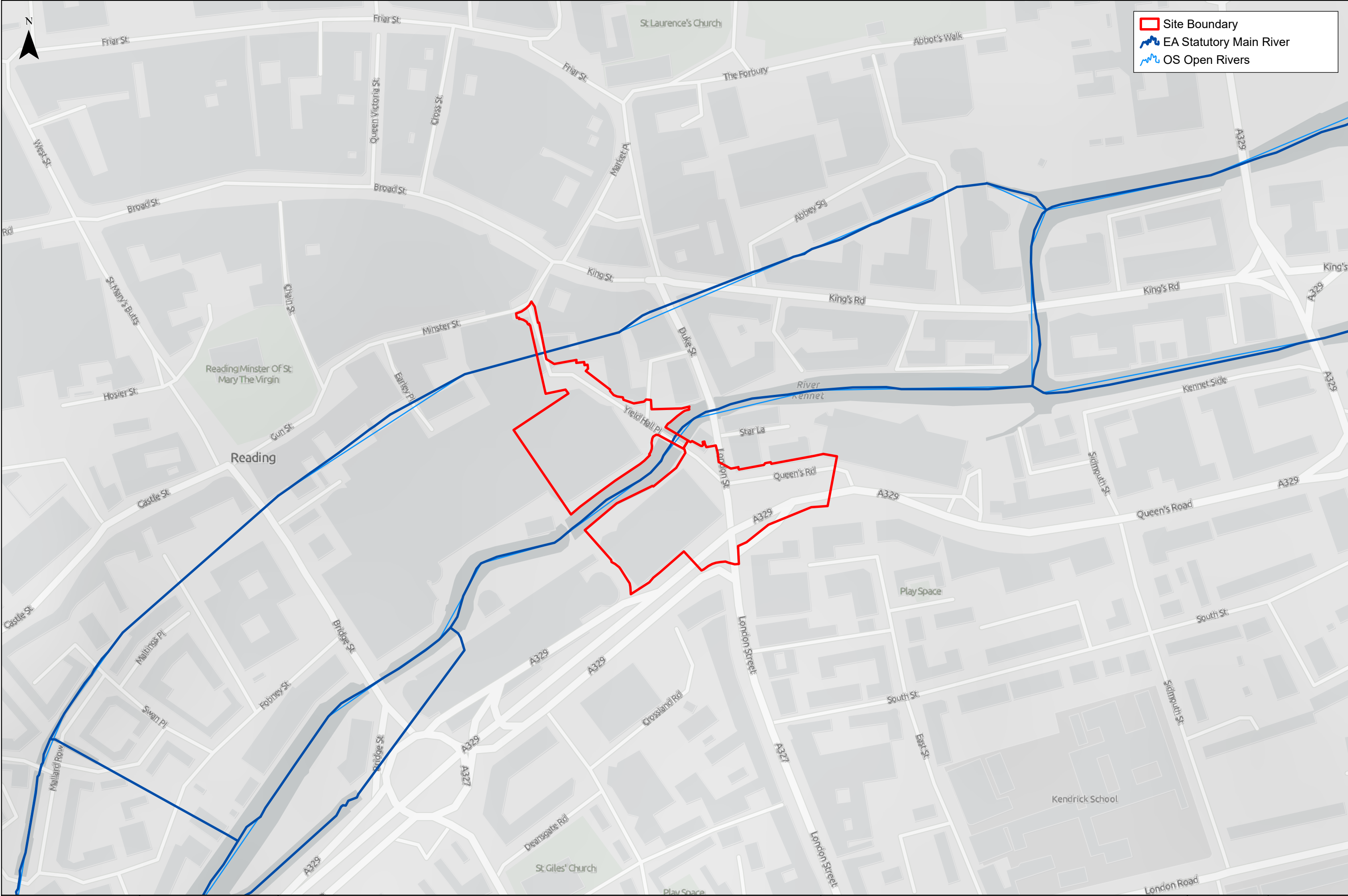
Flood Zones

Flood Zone 3

Flood Zone 2

Area outside Flood Zone 2 and 3 is defined as Flood Zone 1 'Low Probability'

Stantec	Client		THE ORACLE, READING		0250		1:2,500 @ A3		Date: 26/07/2023	
	The Oracle Limited Partnership		Environment Agency Flood Map for Planning		Contains OS data © Crown Copyright and database right 2023 Contains data from OS Zoomstack Contains Environment Agency information © Environment Agency and/or database right Flood Zones refer to the probability of river and/or sea flooding, ignoring the presence of defences.		Drawn: ZW		Checked: RF	
							Figure: 04		Rev: A	



Site Boundary

EA Statutory Main River

OS Open Rivers

	Client	THE ORACLE, READING Watercourse Location	0125250 m Contains OS data © Crown Copyright and database right 2023 Contains data from OS Zoomstack, Contains OS data © Crown Copyright and database right 2019 Contains OS data © Crown copyright and database right 2021 Contains Ordnance Survey data © Crown copyright and database right 2022 © Environment Agency copyright and/or database right. Contains OS data © Crown copyright and database right 2023	1:2,500 @ A3	Date: 26/07/2023	
	The Oracle Limited Partnership		Drawn: ZW	Checked: RF		
			Figure: 04.1		Rev: A	



Site Boundary

Risk of Flooding from Surface Water

High (3.3%) - 1 in 30 Annual Probability

Medium (1%) - 1 in 100 Annual Probability

Low (0.1%) - 1 in 1000 Annual Probability

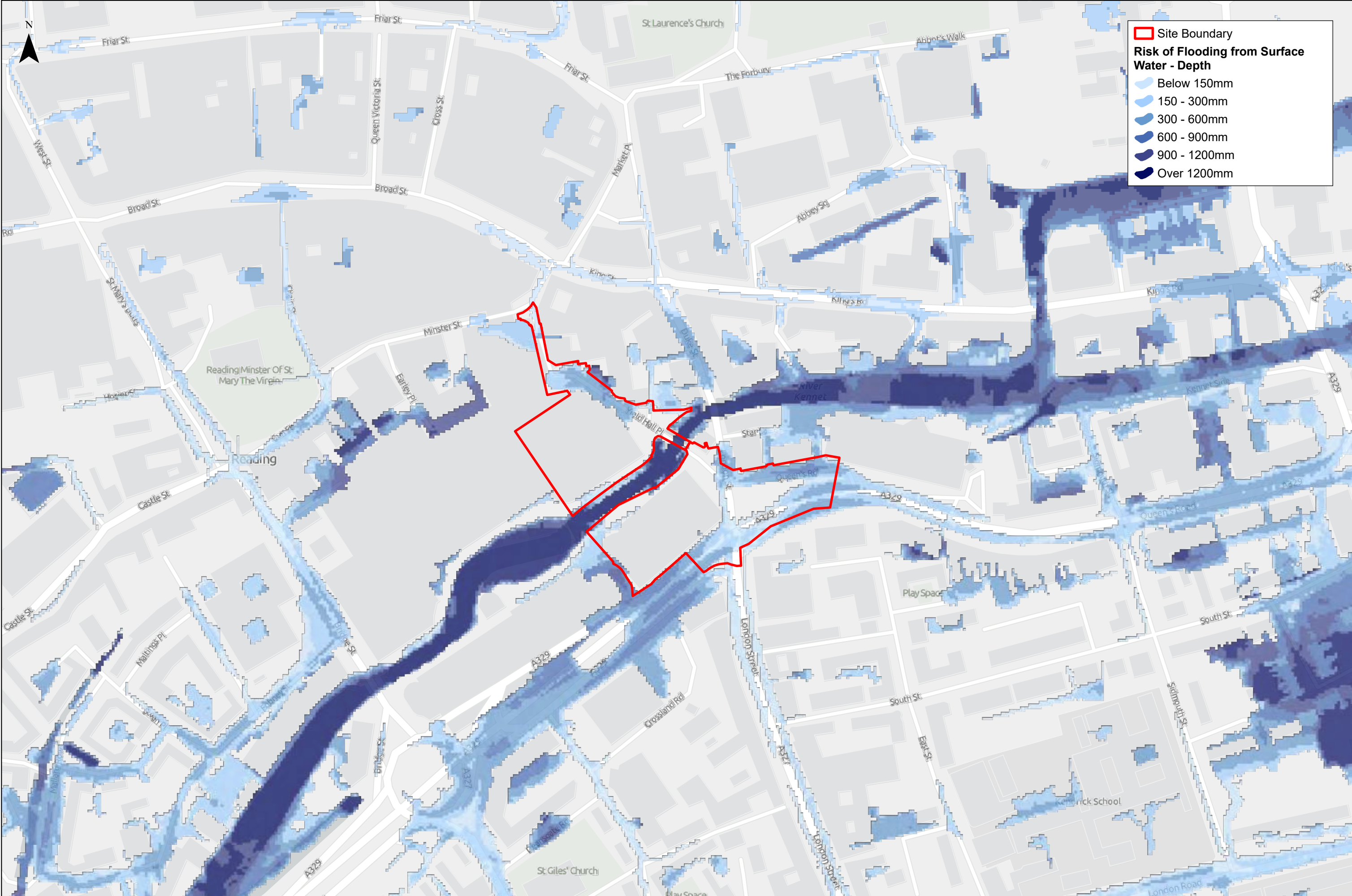
Very Low (<0.1%) - Less than 1 in 1000 Annual Probability



	Client	THE ORACLE, READING EA Surface Water Flood Risk - Depth 3.3 Percent Chance	0 125 250 m		1:2,500 @ A3	Date: 26/07/2023
	The Oracle Limited Partnership		Contains OS data © Crown Copyright and database right 2023 Contains data from OS Zoomstack Contains Environment Agency information © Environment Agency and database right. Maps based on EA updated 'Flood Map for Surface Water' (uFMSW) released in 2013 as the latest iteration of a national scale surface water modelling exercise.		Drawn: ZW	Checked: RF
					Figure: 05.1	Rev: A



	Client	THE ORACLE, READING EA Surface Water Flood Risk - Depth 1.0 Percent Chance	0125250 m Contains OS data © Crown Copyright and database right 2023 Contains data from OS Zoomstack Contains Environment Agency information © Environment Agency and database right. Maps based on EA updated 'Flood Map for Surface Water' (uFMSW) released in 2013 as the latest iteration of a national scale surface water modelling exercise.	1:2,500 @ A3	Date: 26/07/2023
	The Oracle Limited Partnership			Drawn: ZW	Checked: RF
	Figure: 05.2			Rev: A	



	Client	THE ORACLE, READING EA Surface Water Flood Risk - Depth 0.1 Percent Chance	0125250 m Contains OS data © Crown Copyright and database right 2023 Contains data from OS Zoomstack Contains Environment Agency information © Environment Agency and database right. Maps based on EA updated 'Flood Map for Surface Water' (uFMSW) released in 2013 as the latest iteration of a national scale surface water modelling exercise.	1:2,500 @ A3	Date: 26/07/2023
	The Oracle Limited Partnership			Drawn: ZW	Checked: RF
	Figure: 05.3			Rev: A	



	Client	THE ORACLE, READING Risk of Flooding from Reservoirs - Maximum Flood Extent	0 125 250 m		1:2,500 @ A3	Date: 26/07/2023
	The Oracle Limited Partnership		Contains OS data © Crown Copyright and database right 2023 Contains data from OS Zoomstack Contains Environment Agency information © Environment Agency and database right.		Drawn: ZW	Checked: RF
					Figure: 06	Rev: A



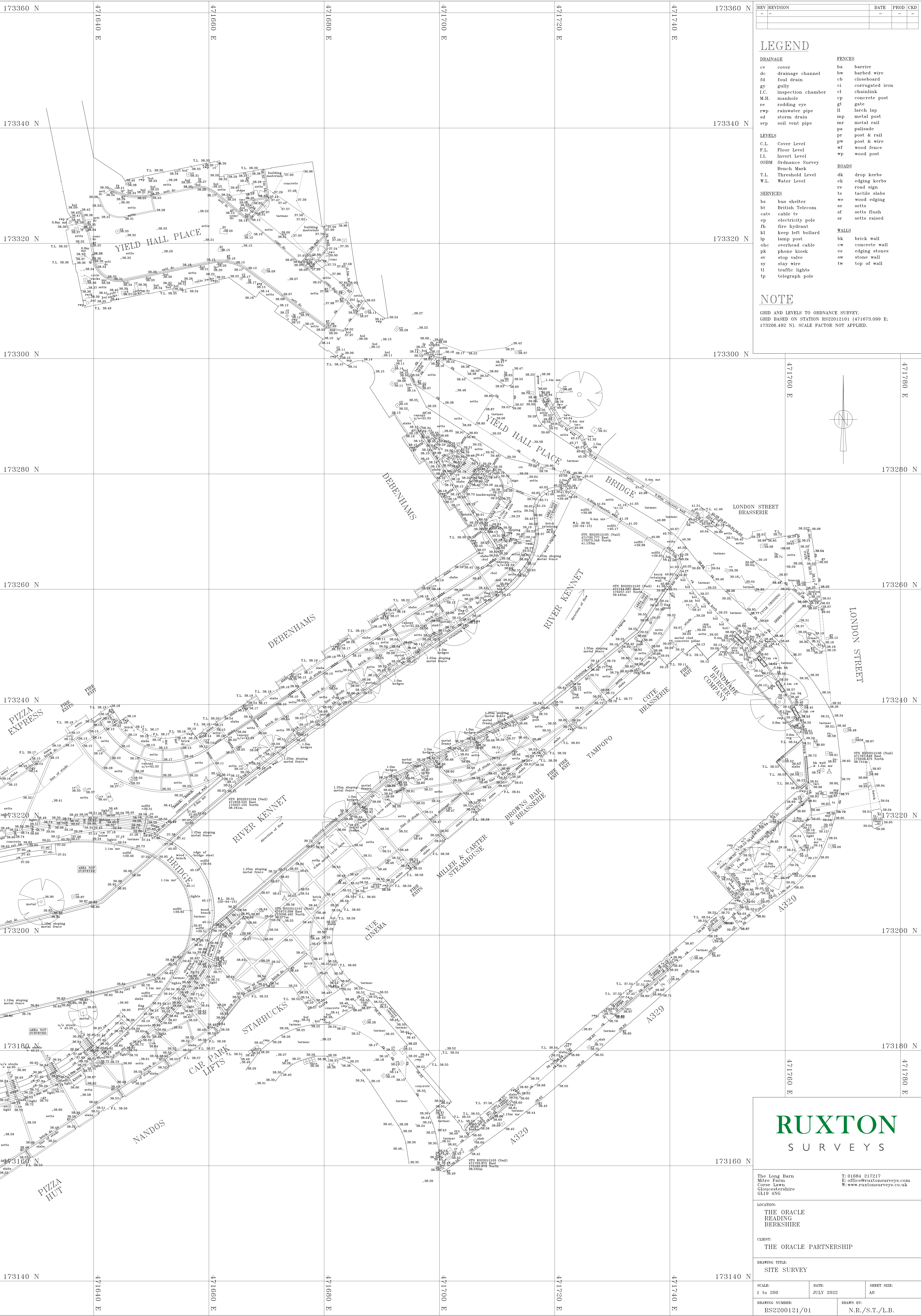
	Client	THE ORACLE, READING EA Ground Water Source Protection Zones	
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	Client		THE ORACLE, READING		0 125 250 m		1:2,500 @ A3		Date: 26/07/2023	
	The Oracle Limited Partnership		EA Recorded Historic Flood Extents		Contains OS data © Crown Copyright and database right 2023 Contains data from OS Zoomstack Contains Environment Agency information © Environment Agency and database right. 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		Drawn: ZW		Checked: RF	
							Figure: 08		Rev: A	

Appendix B Topographic Survey

- Drawing RS2200121/01 by Ruxton Surveys dated July 2022



REV	REVISION	DATE	PROD	CKD
-	-	-	-	-

LEGEND	
DRAINAGE	FENCES
cv cover	ba barrier
dc drainage channel	bw barbed wire
fd foul drain	cb closeboard
gy gully	ci corrugated iron
I.C. inspection chamber	cl chainlink
M.H. manhole	cp concrete post
re rodding eye	gl gate
rwp rainwater pipe	ll larch lap
sd storm drain	mp metal post
svp soil vent pipe	mr metal rail
	pa palisade
	pr post & rail
	pw post & wire
	wp wood post
LEVELS	
C.L. Cover Level	
F.L. Floor Level	
I.L. Invert Level	
OSBM Ordnance Survey Bench Mark	
T.L. Threshold Level	dk drop kerbs
W.L. Water Level	ek edging kerbs
	rs road sign
	ts tactile slabs
ROADS	
	we wood edging
SERVICES	
bs bus shelter	bk brick wall
bt British Telecom	ce concrete wall
catv cable tv	cs edging stones
ep electricity pole	sf setts flush
fh fire hydrant	sr setts raised
lp keep left bollard	
ohc overhead cable	
pk phone kiosk	
sv stop valve	
sy stay wire	
tl traffic lights	
tp telegraph pole	
	WALLS
	bk brick wall
	ce concrete wall
	cs edging stones
	sw stone wall
	tw top of wall

NOTE

GRID AND LEVELS TO ORDNANCE SURVEY.
GRID BASED ON STATION RS22012101 (471673.099 E;
173206.492 N). SCALE FACTOR NOT APPLIED.

471780 E	173280 N
471760 E	173260 N
471760 E	173240 N
471760 E	173220 N
471760 E	173200 N
471760 E	173180 N
471760 E	173160 N
471760 E	173140 N

RUXTON

SURVEYS

The Long Barn
Mitre Farm
Corse Lawn
Gloucestershire
GL19 4NG

LOCATION:
THE ORACLE
READING
BERKSHIRE

CLIENT:
THE ORACLE PARTNERSHIP

DRAWING TITLE:
SITE SURVEY

SCALE:
1 to 200

DRAWING NUMBER:
RS2200121/01

DATE:
JULY 2022

DRWN BY:
N.R./S.T./L.B.

SHEET SIZE:
A0

Appendix C Environment Agency Information

- Product 4 information ref. THM315890 dated July 2023

Edney, Elizabeth

From: Enquiries_THM <enquiries_THM@environment-agency.gov.uk>
Sent: 14 July 2023 11:15
To: Gavin McCabrey
Subject: THM315890 - PRODUCT-The Oracle, Reading, Debenhams and Vue Sites Flood Risk Assessment data (Product 4)
Attachments: THM315890.pdf

Dear Mr McCabrey,

Reference: THM315890

Provision of Modelled Flood Levels for: The Oracle Shopping Centre, Reading RG1 2AT

Please accept our apologies for the delay in responding. We have been experiencing a significant rise in the volume of enquires. We appreciate your patience and understanding at this time.

Thank you for your request for modelled flood levels. We respond to these requests under the Freedom of Information Act 2000 and Environmental Information Regulations 2004. Please find attached the requested data (referred to as product 4).

Please be aware that the Environment Agency supply data, but we do not interpret it for use in a Flood Risk Assessment. Flood Risk Assessment's should be completed by a suitably competent and qualified person.

You may be interested in the following guidance / information publically available:

- **'Planning Practice Guidance'** - provides information about planning considerations in areas at risk of flooding. <https://www.gov.uk/government/collections/planning-practice-guidance>
- **'Planning applications: assessing flood risk'** - information about completing Flood Risk Assessments. <https://www.gov.uk/guidance/flood-risk-assessment-for-planning-applications>
- **'Site specific flood risk assessment: Checklist'** – a checklist to help ensure you have considered all the relevant factors in your flood risk assessment. <https://www.gov.uk/guidance/flood-risk-and-coastal-change#Site-Specific-Flood-Risk-Assessment-checklist-section>

Please be aware that from 20th July 2021 the climate change allowances required in flood risk assessments have been updated. Please see <https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances#contents> for more information.

We recommend that you discuss your proposals with the Local Planning Authority at the earliest opportunity. They will be able to advise you on a wide range of planning matters in addition to flood risk.

Please 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> .

Please refer to the table below for the permitted use of the supplied information.

Name	Product 4
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Description	Detailed Flood Risk Assessment Map for The Oracle Shopping Centre, Reading RG1 2AT
Licence	Open Government Licence
Information Warning - OS background mapping	<i>The mapping of features provided as a background in this product is © Ordnance Survey. It is provided to give context to this product. The Open Government Licence does not apply to this background mapping. You are granted a non-exclusive, royalty free, revocable licence solely to view the Licensed Data for non-commercial purposes for the period during which the Environment Agency makes it available. You are not permitted to copy, sub-license, distribute, sell or otherwise make available the Licensed Data to third parties in any form. Third party rights to enforce the terms of this licence shall be reserved to OS.</i>
Attribution	Contains Environment Agency information © Environment Agency and/or database rights. Contains Ordnance Survey data © Crown copyright 2017 Ordnance Survey 100024198.

I hope that we have correctly interpreted your request.

Please get in touch if you have any further queries or contact us within two months if you'd like us to review the information we have sent.

Customers & Engagement Team - **Thames**



External: 0203 0259 804



enquiries_THM@environment-agency.gov.uk



Environment Agency | Red Kite House, Howbery Park, Wallingford, OX10 8BD

ARE YOU AT RISK FROM FLOODING?
Check your flood risk today



From: Gavin McCabrey <GMcCabrey@ByrneLooby.com>

Sent: 23 June 2023 14:16

To: Enquiries_THM <enquiries_THM@environment-agency.gov.uk>

Cc: Mark Gamble <MGamble@ByrneLooby.com>; Cat White <cat.white@turley.co.uk>

Subject: THM315890 - PRODUCT-The Oracle, Reading, Debenhams and Vue Sites Flood Risk Assessment data (Product 4)

You don't often get email from gmcabrey@byrneblooby.com. [Learn why this is important](#)

Dir Sir / Madam,

ByrneLooby Partners Ltd have been engaged as the civil engineers on behalf of our client whom is seeking planning permission to redevelop the Debenhams and Vue Cinema sites within the Oracle Complex, Reading.

Please provide the Flood Risk Data (Product 4) and if possible products 5, 6 & 7 for the 2(two) sites at addresses below. A redline boundary, created using the online tool, has been attached to this email for both sites.

Debenhams site: The Oracle Shopping Centre, Reading RG1 2AT

Easting: 471,666

Northing: 173,272

Vue Cinema site: Riverside Rd, Reading RG1 2AG

Easting: 471,722

Northing: 173,207

Regards,

Gavin

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Information in this message may be confidential and may be legally privileged. If you have received this message by mistake, please notify the sender immediately, delete it and do not copy it to anyone else. We have checked this email and its attachments for viruses. But you should still check any attachment before opening it. We may have to make this message and any reply to it public if asked to under the Freedom of Information Act, Data Protection Act or for litigation. Email messages and attachments sent to or from any Environment Agency address may also be accessed by someone other than the sender or recipient, for business purposes.

Product 4 (Detailed Flood Risk) for The Oracle, Reading

Our Ref: THM 315890

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 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 separately)
- 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 request our guidance which sets out the 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:

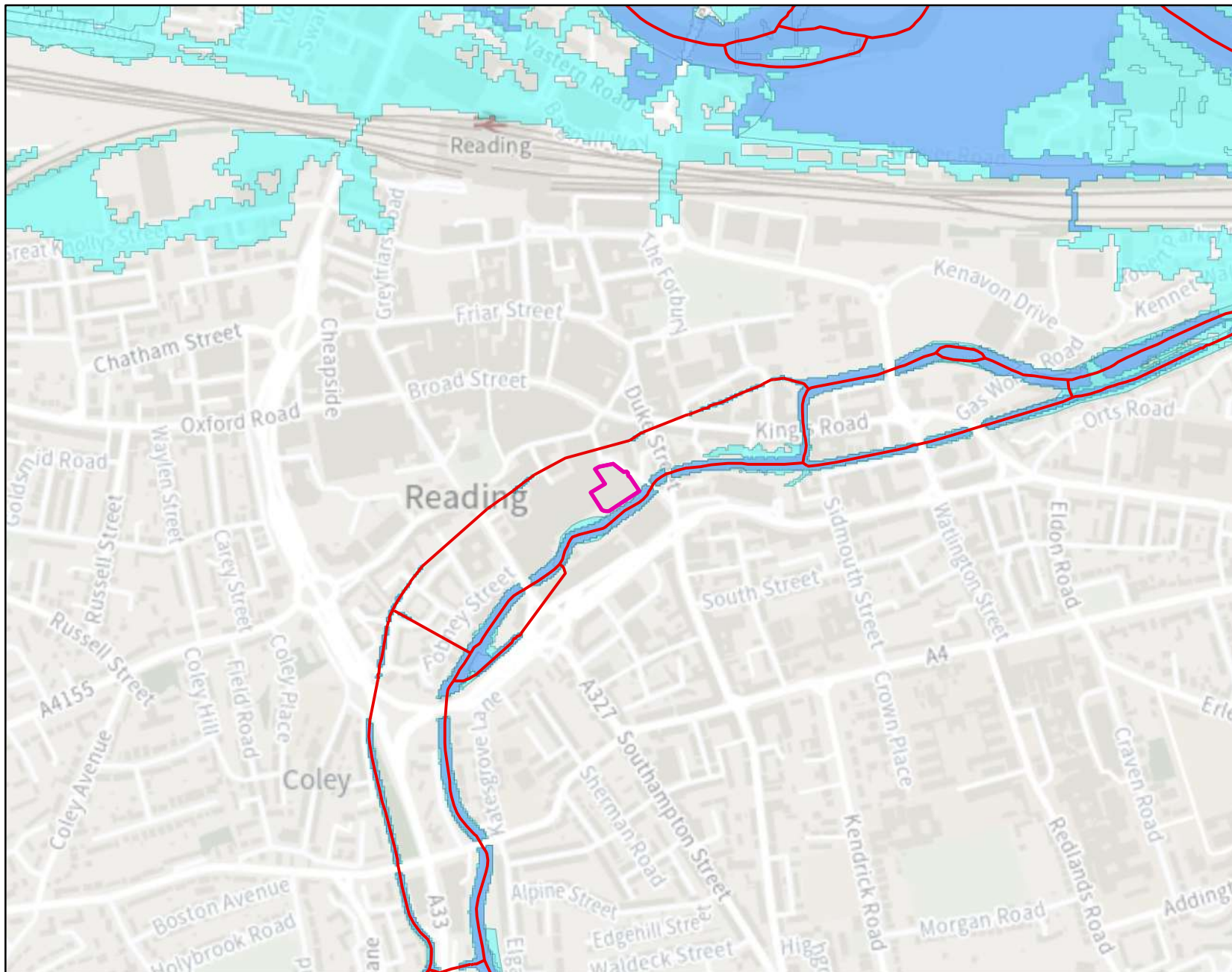
<https://www.gov.uk/guidance/flood-risk-assessment-local-planning-authorities>

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

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

Flood Map for Planning centred on The Oracle, RG1 2AT

Created on 07/07/2023 REF: THM315890



Kilometres

0 0.25 0.5

Legend

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

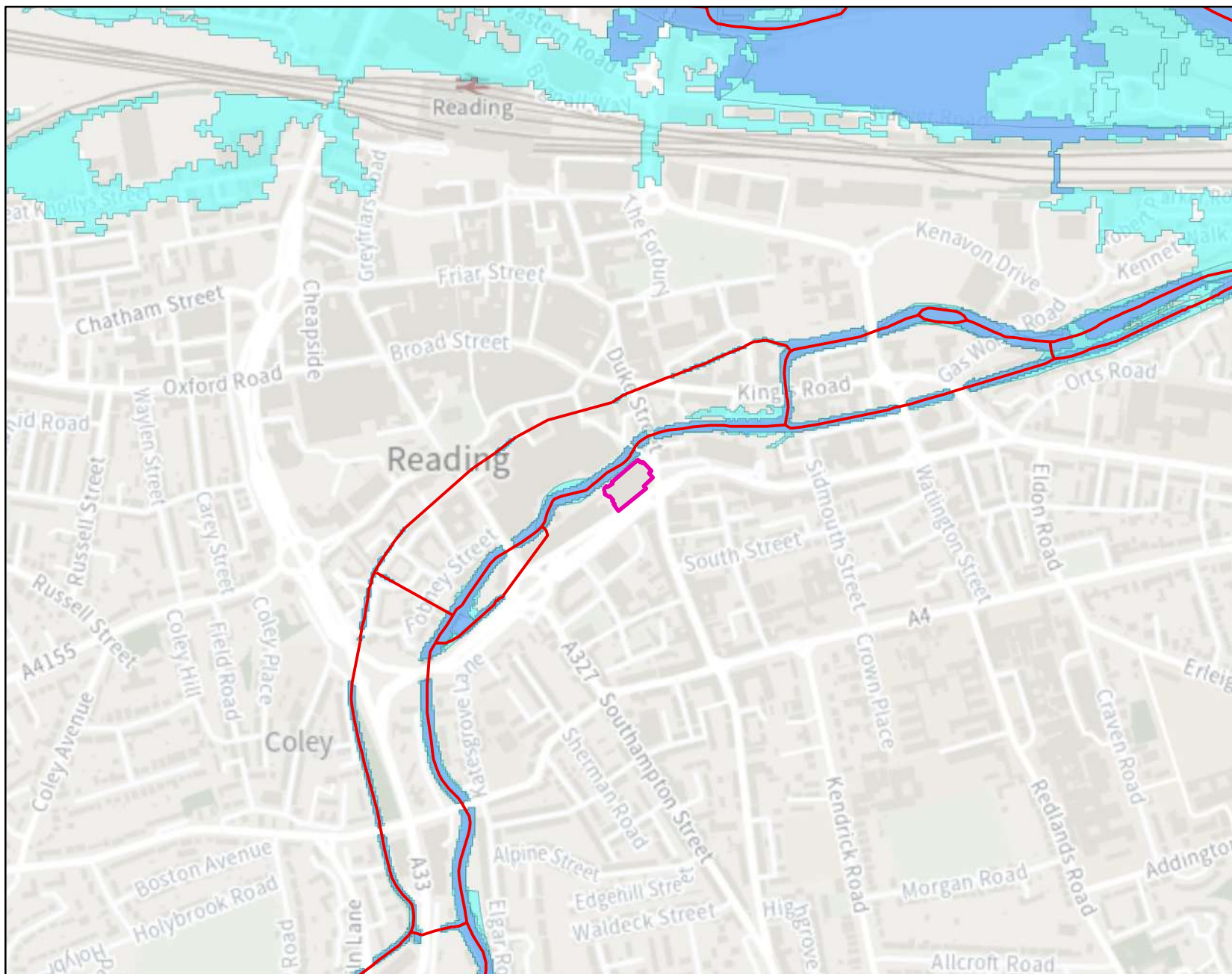
Flooding from rivers or sea without defences (Flood Zone 3) shows the area that could be affected by flooding:

- 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.

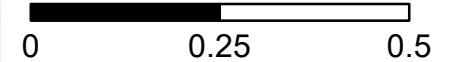
The Extent of an extreme flood (Flood Zone 2) shows the extent of an extreme flood from rivers or the sea with up to a 1 in 1000 chance of occurring each year.

Flood Map for Planning centred on The Oracle, RG1 2AG

Created on 07/07/2023 REF: THM315890



Kilometres



Legend

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

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.

Defence information

Defence Location: No defences on Main River

Description: This location is not currently protected by any formal defences and we do not currently have any flood alleviation works planned for the area. However we continue to maintain certain watercourses and the schedule of these can be found on our internet pages.

Model information

THM 315890

Model: Kennet (Tyle Mill to Thames Confluence) 2018

Description: The information provided is taken from the Kennet (Tyle Mill to Thames confluence) 2018. The study was carried out using 1D-2D modelling software (Flood modeller-Tuflow).

Model design runs:

1 in 2/ 50% AEP; 1 in 5 / 20% AEP; 1 in 20 / 5% AEP; 1 in 30/ 3.3% AEP; 1 in 75 / 1.3% AEP; 1 in 100 / 1% AEP; 1 in 100+15% / 1% + 15% AEP with climate change; 1 in 100+25% / 1% + 25% AEP with climate change; 1 in 100+35% / 1% + 35% AEP with climate change; 1 in 100+70% / 1% + 70% AEP with climate change; and 1 in 1000 / 0.1% AEP.

Mapped Outputs:

1 in 2/ 50% AEP; 1 in 5 / 20% AEP; 1 in 20 / 5% AEP; 1 in 30/ 3.3% AEP; 1 in 75 / 1.3% AEP; 1 in 100 / 1% AEP; 1 in 100+15% / 1% + 15% AEP with climate change; 1 in 100+25% / 1% + 25% AEP with climate change; 1 in 100+35% / 1% + 35% AEP with climate change; 1 in 100+70% / 1% + 70% AEP with climate change; and 1 in 1000 / 0.1% AEP.

Modelled in-channel flood flows and levels

THM 315890

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:

Node label	Model	Easting	Northing	Flood Levels (mAOD)										
				20% AEP	5% AEP	3.3% AEP	1% AEP	1% AEP (+10% increase in flows)	1% AEP (+15% increase in flows)	1% AEP (+20% increase in flows)	1% AEP (+25% increase in flows)	1% AEP (+35% increase in flows)	1% AEP (+70% increase in flows)	0.1% AEP
061 22 2018 001KENN3 1465.1	Kennet (Tyle Mill to Thames Confluence) 2018	471903	173315	36.75	36.91	36.95	37.06		37.19		37.27	37.33	37.55	37.36
061 22 2018 001KENN3 1612.2	Kennet (Tyle Mill to Thames Confluence) 2018	471767	173300	36.81	36.99	37.04	37.16		37.30		37.39	37.45	37.70	37.49
061 22 2018 001KENN3 1612.1	Kennet (Tyle Mill to Thames Confluence) 2018	471758	173295	36.83	37.01	37.06	37.19		37.35		37.45	37.51	37.79	37.55
061 22 2018 001KENN3 1650.2	Kennet (Tyle Mill to Thames Confluence) 2018	471736	173278	36.84	37.03	37.08	37.21		37.37		37.47	37.53	37.82	37.58
061 22 2018 001KENN3 1650.1	Kennet (Tyle Mill to Thames Confluence) 2018	471732	173271	36.84	37.03	37.08	37.22		37.38		37.48	37.54	37.82	37.59
061 22 2018 001KENN3 1750.1	Kennet (Tyle Mill to Thames Confluence) 2018	471655	173208	36.89	37.09	37.14	37.28		37.45		37.55	37.62	37.91	37.66
061 22 2018 001COUN 195C1.2	Kennet (Tyle Mill to Thames Confluence) 2018	471581	173169	36.92	37.13	37.18	37.33		37.51		37.61	37.68	37.98	37.73
061 22 2018 001KENN3 1953.2	Kennet (Tyle Mill to Thames Confluence) 2018	471522	173100	36.95	37.17	37.22	37.36		37.56		37.66	37.73	38.04	37.78
061 22 2018 001KENN3 1953.1	Kennet (Tyle Mill to Thames Confluence) 2018	471503	173092	36.98	37.21	37.27	37.43		37.61		37.72	37.79	38.10	37.84
061 22 2018 001COUN1 0203.2	Kennet (Tyle Mill to Thames Confluence) 2018	471501	173014	37.35	37.52	37.57	37.69		37.83		37.91	37.97	38.20	38.01

Node label	Model	Easting	Northing	Flood Flows (m3/s)										
				20% AEP	5% AEP	3.3% AEP	1% AEP	1% AEP (+10% increase in flows)	1% AEP (+15% increase in flows)	1% AEP (+20% increase in flows)	1% AEP (+25% increase in flows)	1% AEP (+35% increase in flows)	1% AEP (+70% increase in flows)	0.1% AEP
061 22 2018 001KENN3 1465.1	Kennet (Tyle Mill to Thames Confluence) 2018	471903	173315	51.72	66.35	70.31	81.17		94.44		102.54	107.87	131.93	111.53
061 22 2018 001KENN3 1612.2	Kennet (Tyle Mill to Thames Confluence) 2018	471767	173300	51.72	66.35	70.31	81.17		94.53		102.68	108.16	133.01	111.90
061 22 2018 001KENN3 1612.1	Kennet (Tyle Mill to Thames Confluence) 2018	471758	173295	51.72	66.36	70.31	81.17		94.53		102.65	108.17	133.01	111.91
061 22 2018 001KENN3 1650.2	Kennet (Tyle Mill to Thames Confluence) 2018	471736	173278	51.72	66.36	70.31	81.17		94.53		102.65	108.17	133.01	111.91
061 22 2018 001KENN3 1650.1	Kennet (Tyle Mill to Thames Confluence) 2018	471732	173271	51.73	66.37	70.34	81.21		94.55		102.66	108.17	133.03	111.92
061 22 2018 001KENN3 1750.1	Kennet (Tyle Mill to Thames Confluence) 2018	471655	173208	51.72	66.35	70.31	81.17		94.53		102.65	108.17	133.01	111.91
061 22 2018 001COUN 195C1.2	Kennet (Tyle Mill to Thames Confluence) 2018	471581	173169	51.72	66.35	70.31	81.17		94.53		102.65	108.17	133.01	111.91
061 22 2018 001KENN3 1953.2	Kennet (Tyle Mill to Thames Confluence) 2018	471522	173100	37.19	48.41	51.45	59.79		70.05		76.24	80.42	99.78	83.21
061 22 2018 001KENN3 1953.1	Kennet (Tyle Mill to Thames Confluence) 2018	471503	173092	37.19	48.41	51.45	59.79		70.05		76.23	80.40	99.78	83.21
061 22 2018 001COUN1 0203.2	Kennet (Tyle Mill to Thames Confluence) 2018	471501	173014	14.52	17.94	18.86	21.38		24.48		26.41	27.78	33.23	28.71

Note:

Due to changes in guidance on the allowances for climate change, the percentage increase in river flows above should no longer 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>

Modelled floodplain flood levels

THM 315890

The modelled flood levels for the closest most appropriate model grid cells for your site are provided below:

2D grid cell reference	Model	Easting	Northing	flood levels (mAOD)										
				20% AEP	5% AEP	3.3 AEP	1% AEP	1% AEP (+10% increase in flows)	1% AEP (+15% increase in flows)	1% AEP (+20% increase in flows)	1% AEP (+25% increase in flows)	1% AEP (+35% increase in flows)	1% AEP (+70% increase in flows)	0.1% AEP
Flood Point No 1	Kennet (Tyle Mill to Thames Confluence) 2018	471718	173272	No Data	37.03	37.08	37.22	No Data	37.38	No Data	37.48	37.54	37.82	37.59
Flood Point No 2	Kennet (Tyle Mill to Thames Confluence) 2018	471712	173264	No Data	37.04	37.09	37.23	No Data	37.23	No Data	37.49	37.55	37.84	37.60
Flood Point No 3	Kennet (Tyle Mill to Thames Confluence) 2018	471684	173243	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data
Flood Point No 4	Kennet (Tyle Mill to Thames Confluence) 2018	471653	173221	No Data	No Data	37.13	37.27	No Data	37.44	No Data	37.54	37.61	37.90	37.65

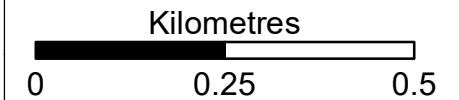
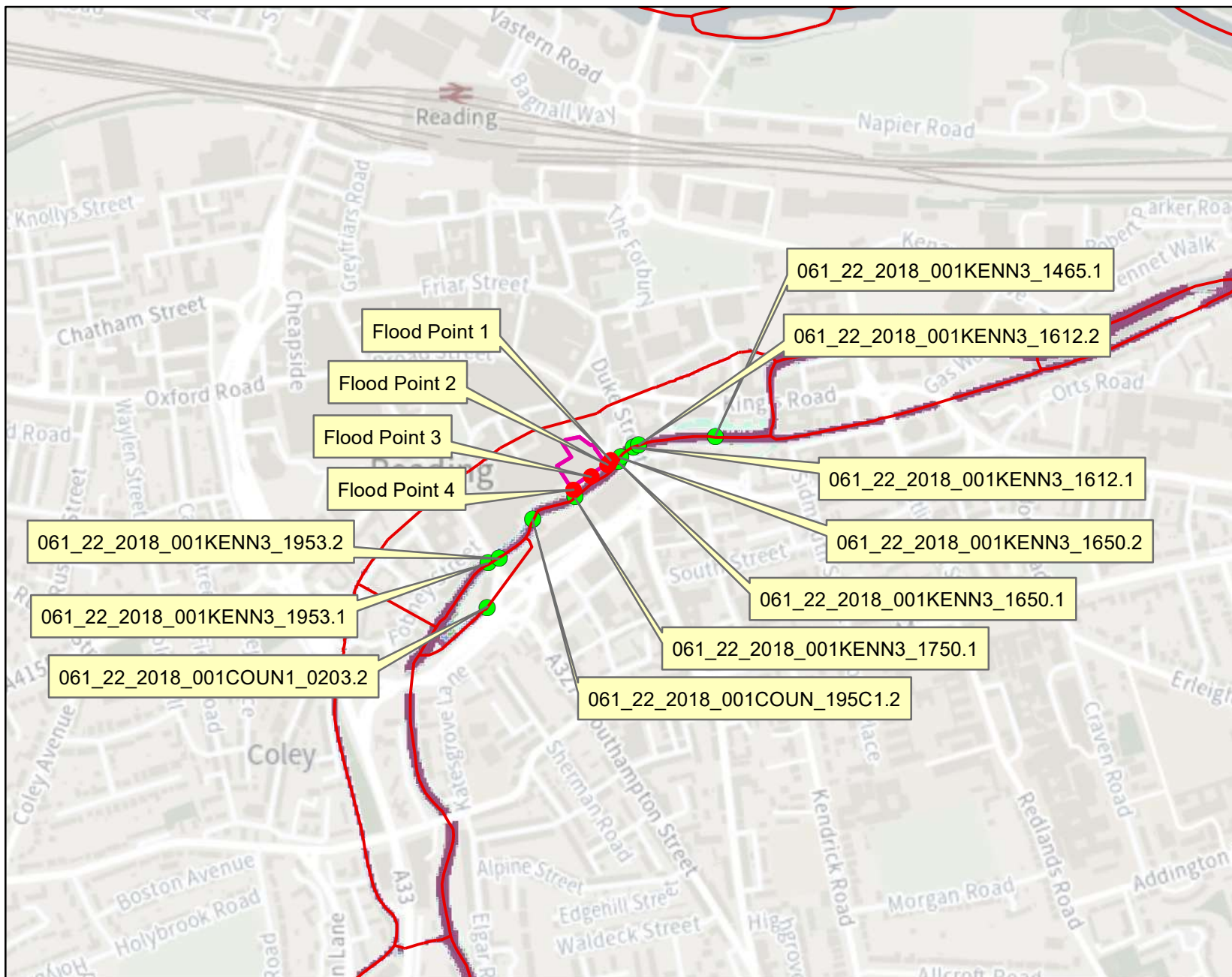
This flood model has represented the floodplain as a grid.
The flood water levels have been calculated for each grid cell.

Note:
Due to changes in guidance on the allowances for climate change, the percentage increase in river flows above 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>

Detailed FRA Map No 1 centred on The Oracle, RG1 2AT

Created on 07/07/2023 REF: THM315890



Legend

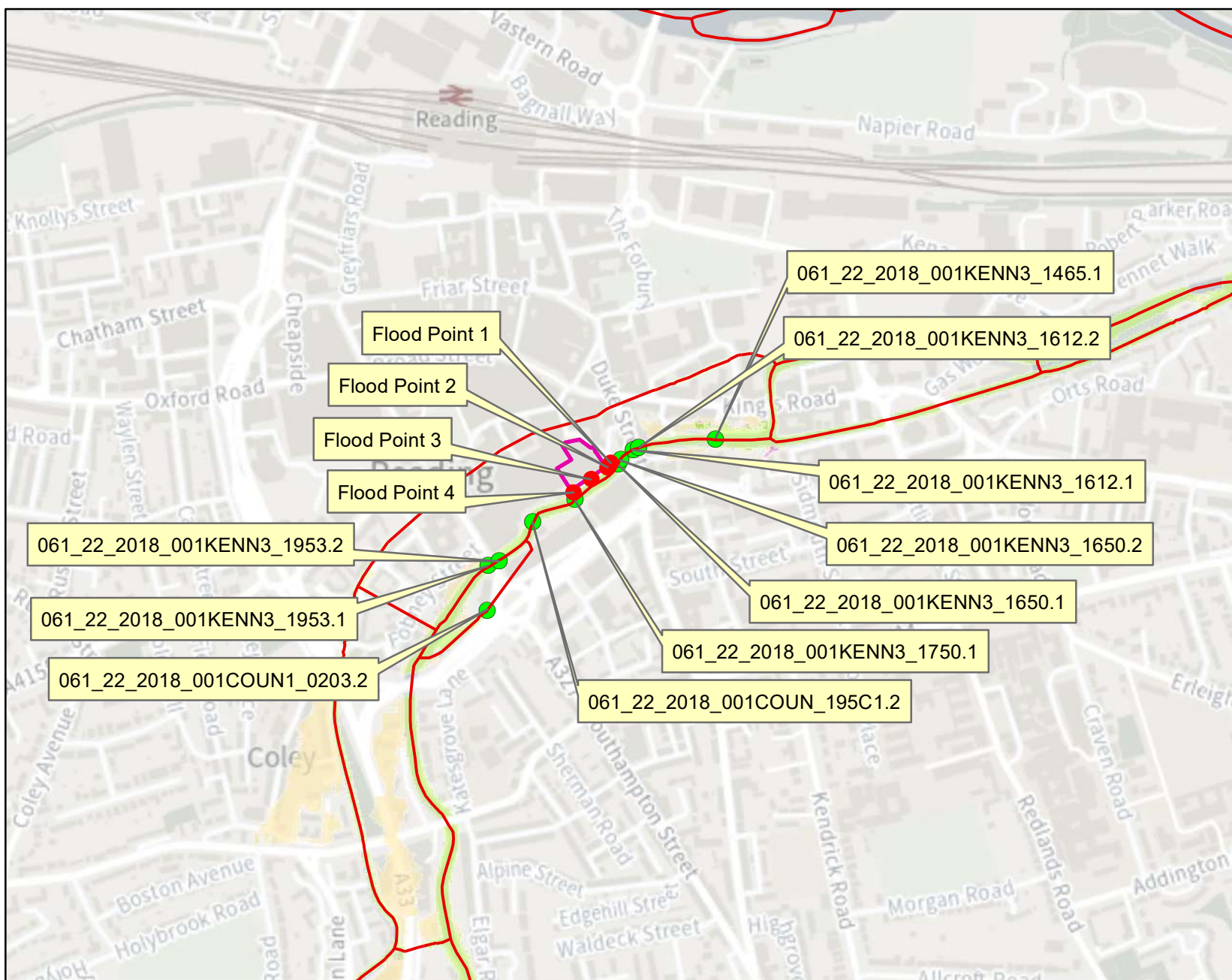
- Site
- Main River
- Model Nodes
- 20% AEP Flood Outline
- 5% AEP Flood Outline
- 3.3% AEP Flood Outline
- 1% AEP Flood Outline
- 0.1% AEP Flood Outline

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

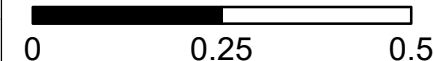
Where available climate change extents have been calculated with an additional flow added to an AEP event. An example of how this is written is 1%+20% AEP.

Detailed FRA Map No 2 centred on The Oracle, RG1 2AT

Created on 07/07/2023 REF: THM315890



Kilometres



Legend

- Site
- Main River
- Model Nodes
- 1%+15% CC AEP Flood Outline
- 1%+25% CC AEP Flood Outline
- 1%+35% CC AEP Flood Outline
- 1%+70% CC AEP Flood Outline

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

Where available climate change extents have been calculated with an additional flow added to an AEP event. An example of how this is written is 1%+20% AEP.

Modelled in-channel flood flows and levels

THM 315890

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:

Node label	Model	Easting	Northing	Flood Levels (mAOD)										
				20% AEP	5% AEP	3.3% AEP	1% AEP	1% AEP (+10% increase in flows)	1% AEP (+15% increase in flows)	1% AEP (+20% increase in flows)	1% AEP (+25% increase in flows)	1% AEP (+35% increase in flows)	1% AEP (+70% increase in flows)	0.1% AEP
061 22 2018 001KENN3 1465.1	Kennet (Tyle Mill to Thames Confluence) 2018	471903	173315	36.75	36.91	36.95	37.06		37.19		37.27	37.33	37.55	37.36
061 22 2018 001KENN3 1612.2	Kennet (Tyle Mill to Thames Confluence) 2018	471767	173300	36.81	36.99	37.04	37.16		37.30		37.39	37.45	37.70	37.49
061 22 2018 001KENN3 1612.1	Kennet (Tyle Mill to Thames Confluence) 2018	471758	173295	36.83	37.01	37.06	37.19		37.35		37.45	37.51	37.79	37.55
061 22 2018 001KENN3 1650.2	Kennet (Tyle Mill to Thames Confluence) 2018	471736	173278	36.84	37.03	37.08	37.21		37.37		37.47	37.53	37.82	37.58
061 22 2018 001KENN3 1650.1	Kennet (Tyle Mill to Thames Confluence) 2018	471732	173271	36.84	37.03	37.08	37.22		37.38		37.48	37.54	37.82	37.59
061 22 2018 001KENN3 1750.1	Kennet (Tyle Mill to Thames Confluence) 2018	471655	173208	36.89	37.09	37.14	37.28		37.45		37.55	37.62	37.91	37.66
061 22 2018 001COUN 195C1.2	Kennet (Tyle Mill to Thames Confluence) 2018	471581	173169	36.92	37.13	37.18	37.33		37.51		37.61	37.68	37.98	37.73
061 22 2018 001KENN3 1953.2	Kennet (Tyle Mill to Thames Confluence) 2018	471522	173100	36.95	37.17	37.22	37.36		37.56		37.66	37.73	38.04	37.78
061 22 2018 001KENN3 1953.1	Kennet (Tyle Mill to Thames Confluence) 2018	471503	173092	36.98	37.21	37.27	37.43		37.61		37.72	37.79	38.10	37.84
061 22 2018 001COUN1 0203.2	Kennet (Tyle Mill to Thames Confluence) 2018	471501	173014	37.35	37.52	37.57	37.69		37.83		37.91	37.97	38.20	38.01

Node label	Model	Easting	Northing	Flood Flows (m3/s)										
				20% AEP	5% AEP	3.3% AEP	1% AEP	1% AEP (+10% increase in flows)	1% AEP (+15% increase in flows)	1% AEP (+20% increase in flows)	1% AEP (+25% increase in flows)	1% AEP (+35% increase in flows)	1% AEP (+70% increase in flows)	0.1% AEP
061 22 2018 001KENN3 1465.1	Kennet (Tyle Mill to Thames Confluence) 2018	471903	173315	51.72	66.35	70.31	81.17		94.44		102.54	107.87	131.93	111.53
061 22 2018 001KENN3 1612.2	Kennet (Tyle Mill to Thames Confluence) 2018	471767	173300	51.72	66.35	70.31	81.17		94.53		102.68	108.16	133.01	111.90
061 22 2018 001KENN3 1612.1	Kennet (Tyle Mill to Thames Confluence) 2018	471758	173295	51.72	66.36	70.31	81.17		94.53		102.65	108.17	133.01	111.91
061 22 2018 001KENN3 1650.2	Kennet (Tyle Mill to Thames Confluence) 2018	471736	173278	51.72	66.36	70.31	81.17		94.53		102.65	108.17	133.01	111.91
061 22 2018 001KENN3 1650.1	Kennet (Tyle Mill to Thames Confluence) 2018	471732	173271	51.73	66.37	70.34	81.21		94.55		102.66	108.17	133.03	111.92
061 22 2018 001KENN3 1750.1	Kennet (Tyle Mill to Thames Confluence) 2018	471655	173208	51.72	66.35	70.31	81.17		94.53		102.65	108.17	133.01	111.91
061 22 2018 001COUN 195C1.2	Kennet (Tyle Mill to Thames Confluence) 2018	471581	173169	51.72	66.35	70.31	81.17		94.53		102.65	108.17	133.01	111.91
061 22 2018 001KENN3 1953.2	Kennet (Tyle Mill to Thames Confluence) 2018	471522	173100	37.19	48.41	51.45	59.79		70.05		76.24	80.42	99.78	83.21
061 22 2018 001KENN3 1953.1	Kennet (Tyle Mill to Thames Confluence) 2018	471503	173092	37.19	48.41	51.45	59.79		70.05		76.23	80.40	99.78	83.21
061 22 2018 001COUN1 0203.2	Kennet (Tyle Mill to Thames Confluence) 2018	471501	173014	14.52	17.94	18.86	21.38		24.48		26.41	27.78	33.23	28.71

Note:

Due to changes in guidance on the allowances for climate change, the percentage increase in river flows above should no longer 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>

Modelled floodplain flood levels

THM 315890

The modelled flood levels for the closest most appropriate model grid cells for your site are provided below:

2D grid cell reference	Model	Easting	Northing	flood levels (mAOD)										
				20% AEP	5% AEP	3.3 AEP	1% AEP	1% AEP (+10% increase in flows)	1% AEP (+15% increase in flows)	1% AEP (+20% increase in flows)	1% AEP (+25% increase in flows)	1% AEP (+35% increase in flows)	1% AEP (+70% increase in flows)	0.1% AEP
Flood Point No 1	Kennet (Tyle Mill to Thames Confluence) 2018	471718	173272	No Data	37.03	37.08	37.22	No Data	37.38	No Data	37.48	37.54	37.82	37.59
Flood Point No 2	Kennet (Tyle Mill to Thames Confluence) 2018	471712	173264	No Data	37.04	37.09	37.23	No Data	37.23	No Data	37.49	37.55	37.84	37.60
Flood Point No 3	Kennet (Tyle Mill to Thames Confluence) 2018	471684	173243	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data
Flood Point No 4	Kennet (Tyle Mill to Thames Confluence) 2018	471653	173221	No Data	No Data	37.13	37.27	No Data	37.44	No Data	37.54	37.61	37.90	37.65

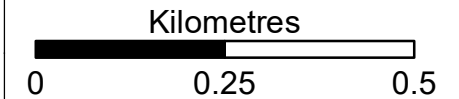
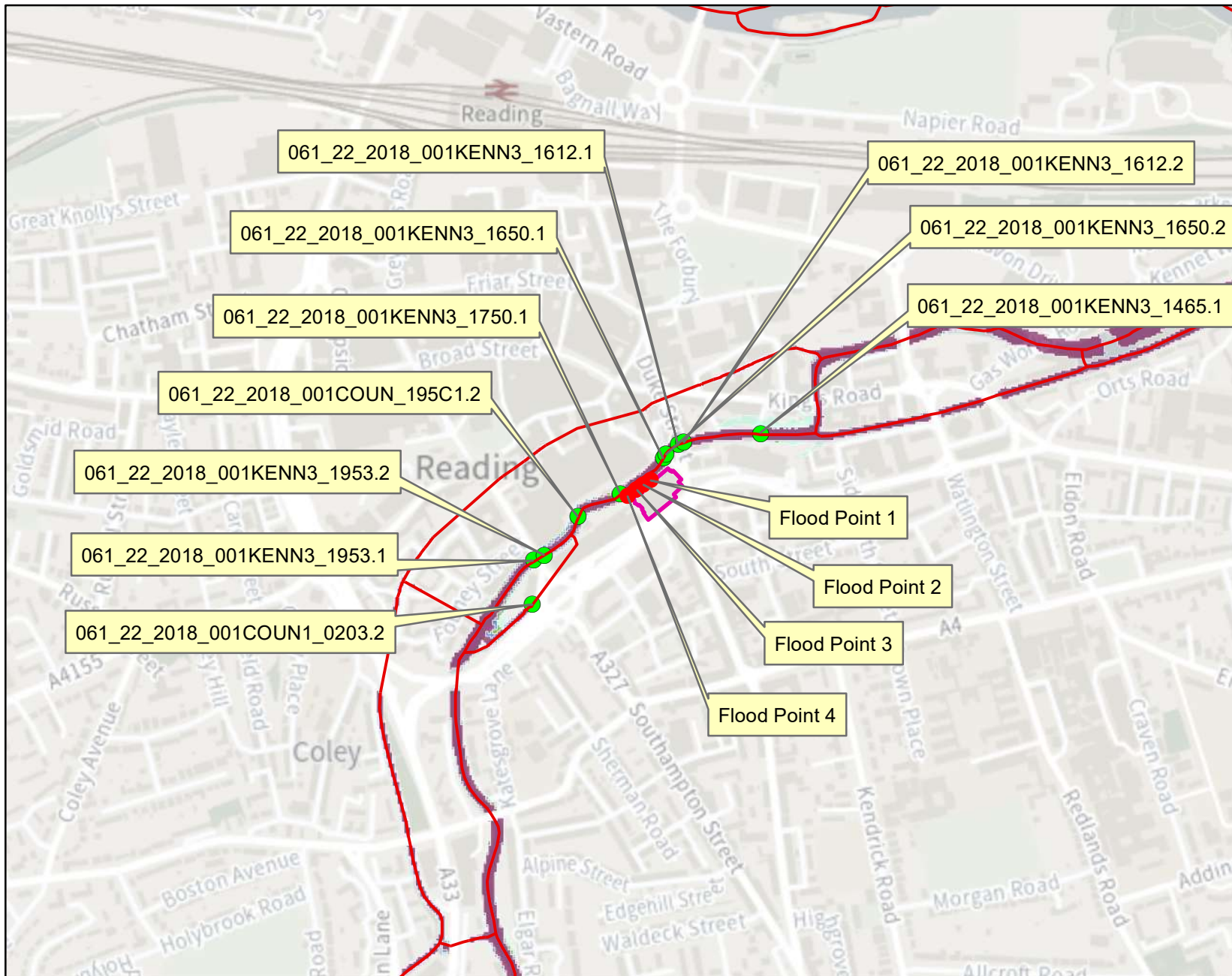
This flood model has represented the floodplain as a grid.
The flood water levels have been calculated for each grid cell.

Note:
Due to changes in guidance on the allowances for climate change, the percentage increase in river flows above 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>

Detailed FRA Map No 1 centred on The Oracle, RG1 2AG

Created on 07/07/2023 REF: THM315890



Legend

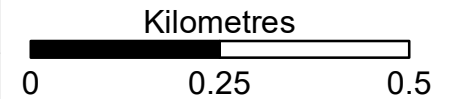
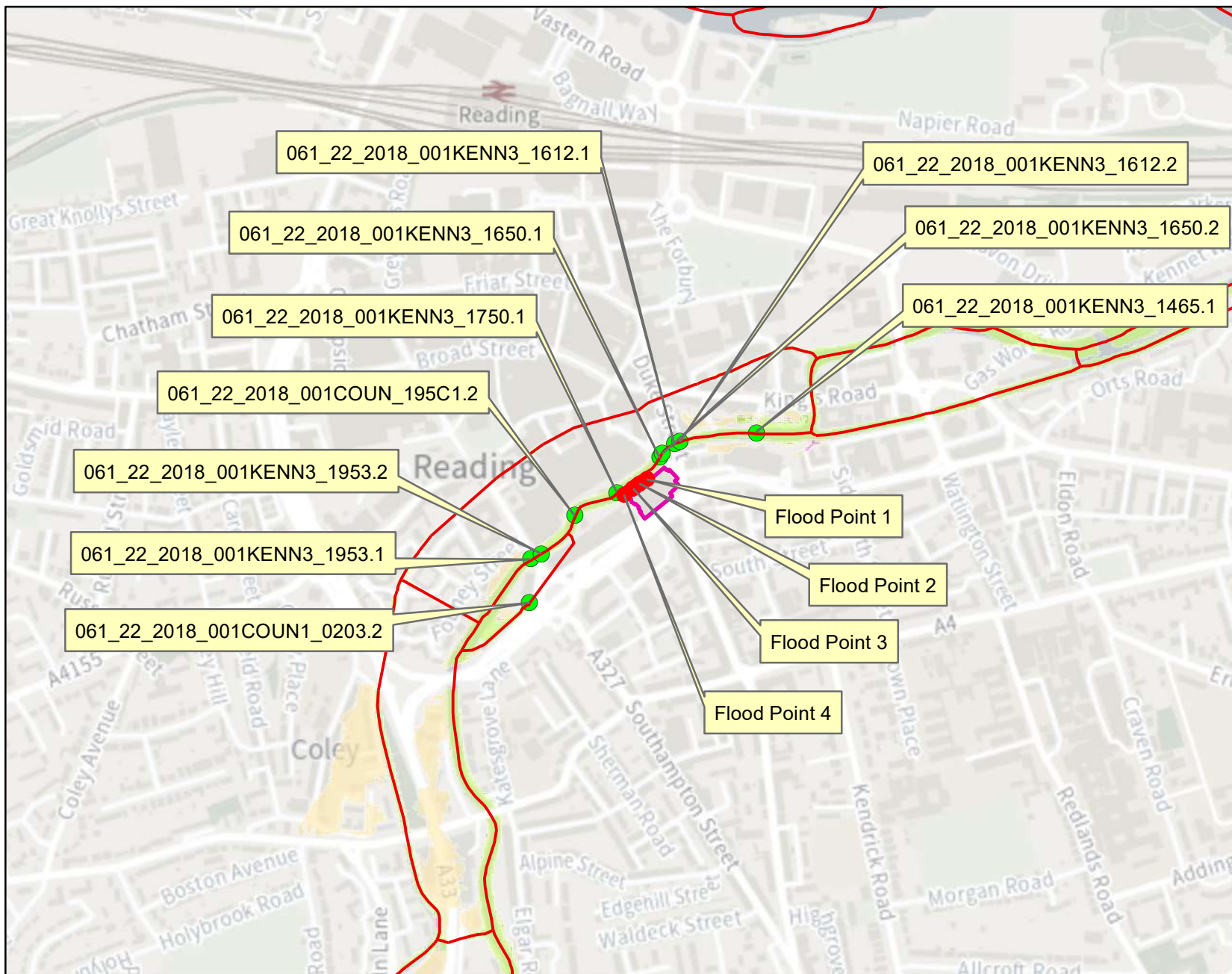
- Site
- Main River
- Model Nodes
- 20% AEP Flood Outline
- 5% AEP Flood Outline
- 3.3% AEP Flood Outline
- 1% AEP Flood Outline
- 0.1% AEP Flood Outline

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

Where available climate change extents have been calculated with an additional flow added to an AEP event. An example of how this is written is 1%+20% AEP.

Detailed FRA Map No 2 centred on The Oracle, RG1 2AG

Created on 07/07/2023 REF: THM315890



Legend

- Site
- Main River
- Model Nodes
- 1%+15% CC AEP Flood Outline
- 1%+25% CC AEP Flood Outline
- 1%+35% CC AEP Flood Outline
- 1%+70% CC AEP Flood Outline

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

Where available climate change extents have been calculated with an additional flow added to an AEP event. An example of how this is written is 1%+20% AEP.

Historic flood data

THM 315890

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:

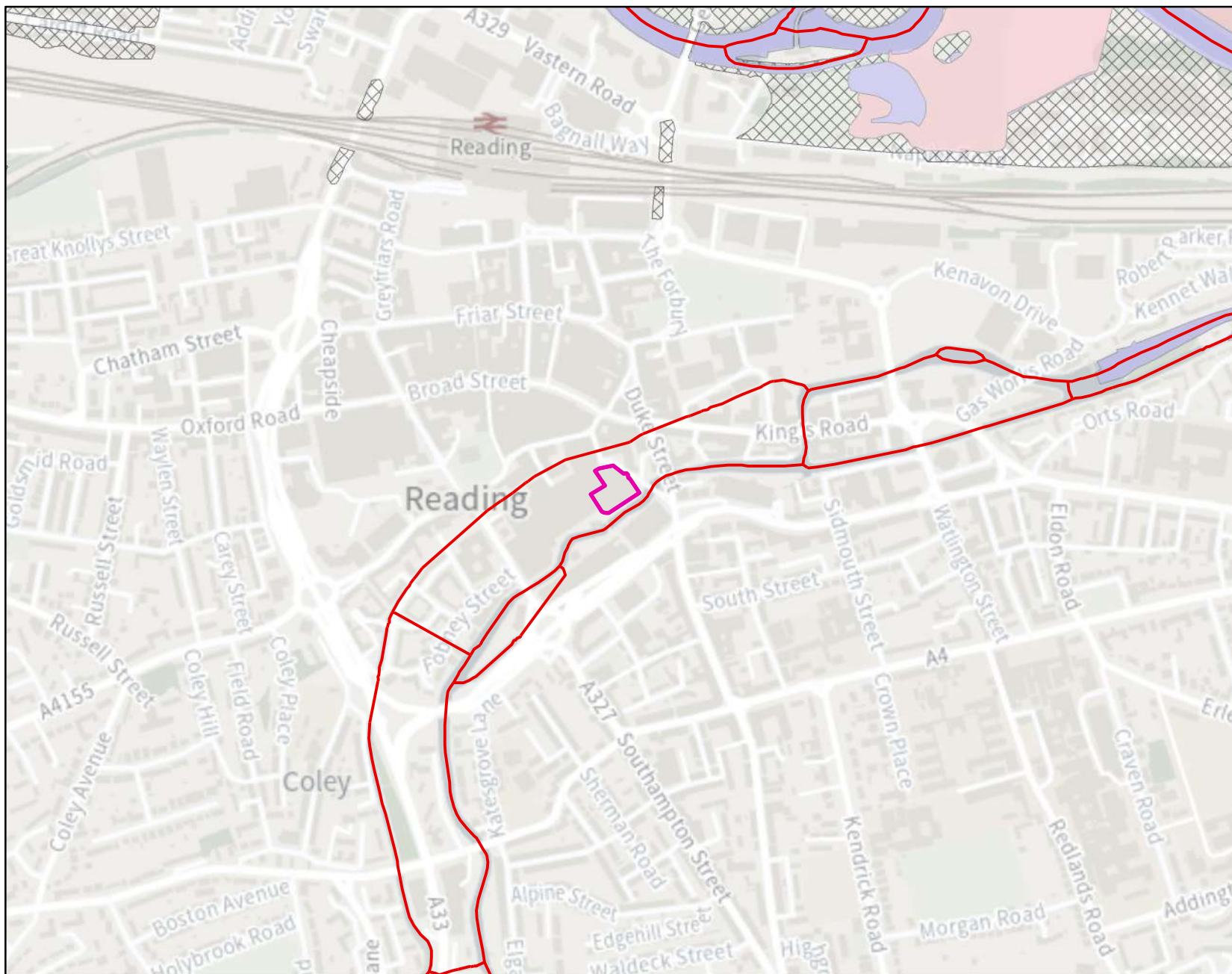
Flood Event Code	Flood Event Name	Start Date	End Date	Source of Flooding	Cause of Flooding
No Historical Information					

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.

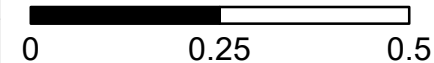
Start and End Dates shown above may represent a wider range where the exact dates are not available.

Historic Flood Map No 1 centred on The Oracle, RG1 2AT

Created on 07/07/2023 REF: THM315890



Kilometres



Legend

- Site
- Main River

year

- 1947
- 1974
- 1977

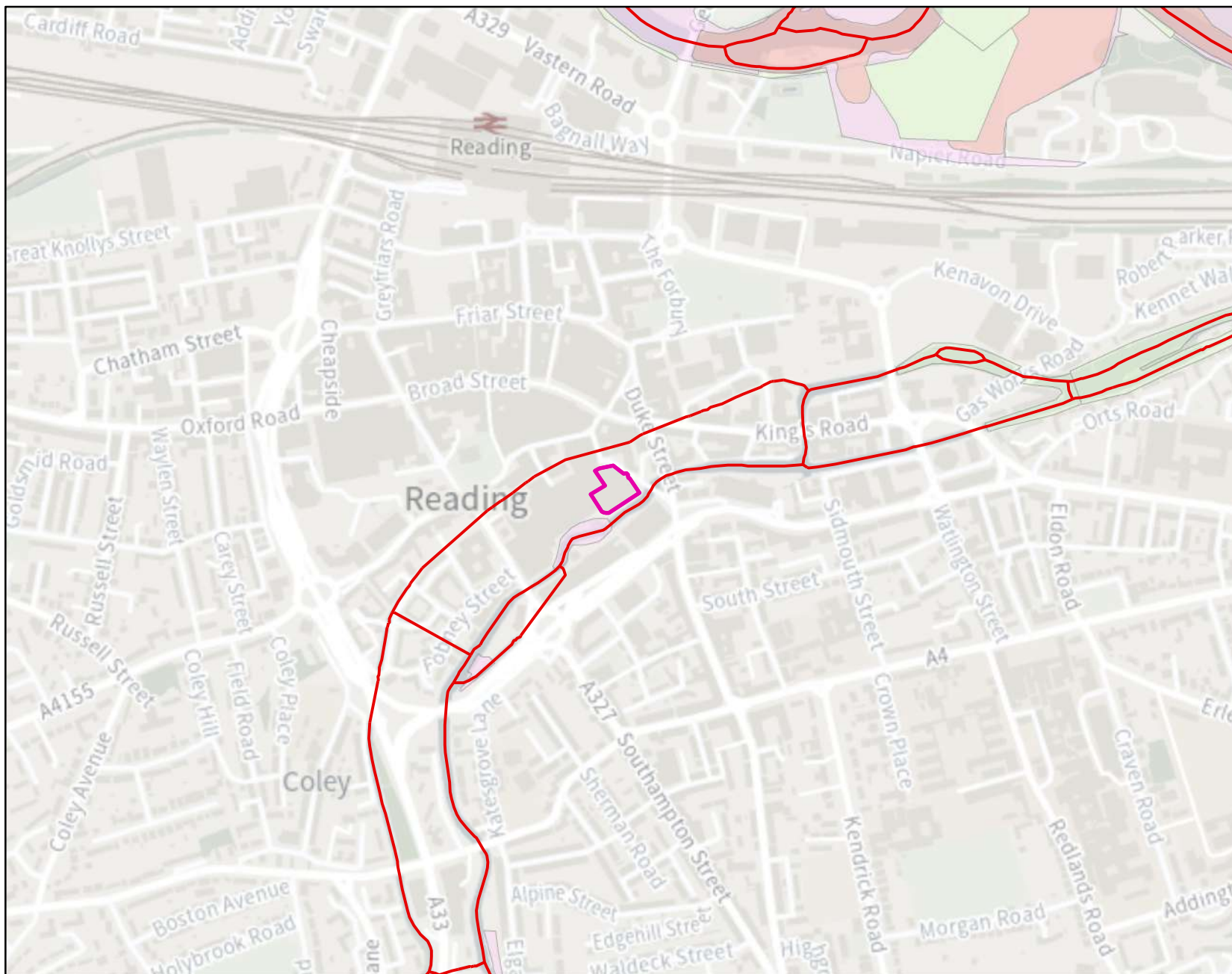
Flooding from rivers or sea without defences (Flood Zone 3) shows the area that could be affected by flooding:

- 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.

Historic Flood Map No 2 centred on The Oracle, RG1 2AT

Created on 07/07/2023 REF: THM315890



Kilometres

0 0.25 0.5

Legend

- Site
- Main River

year

- 2000
- 2002/3
- 2007

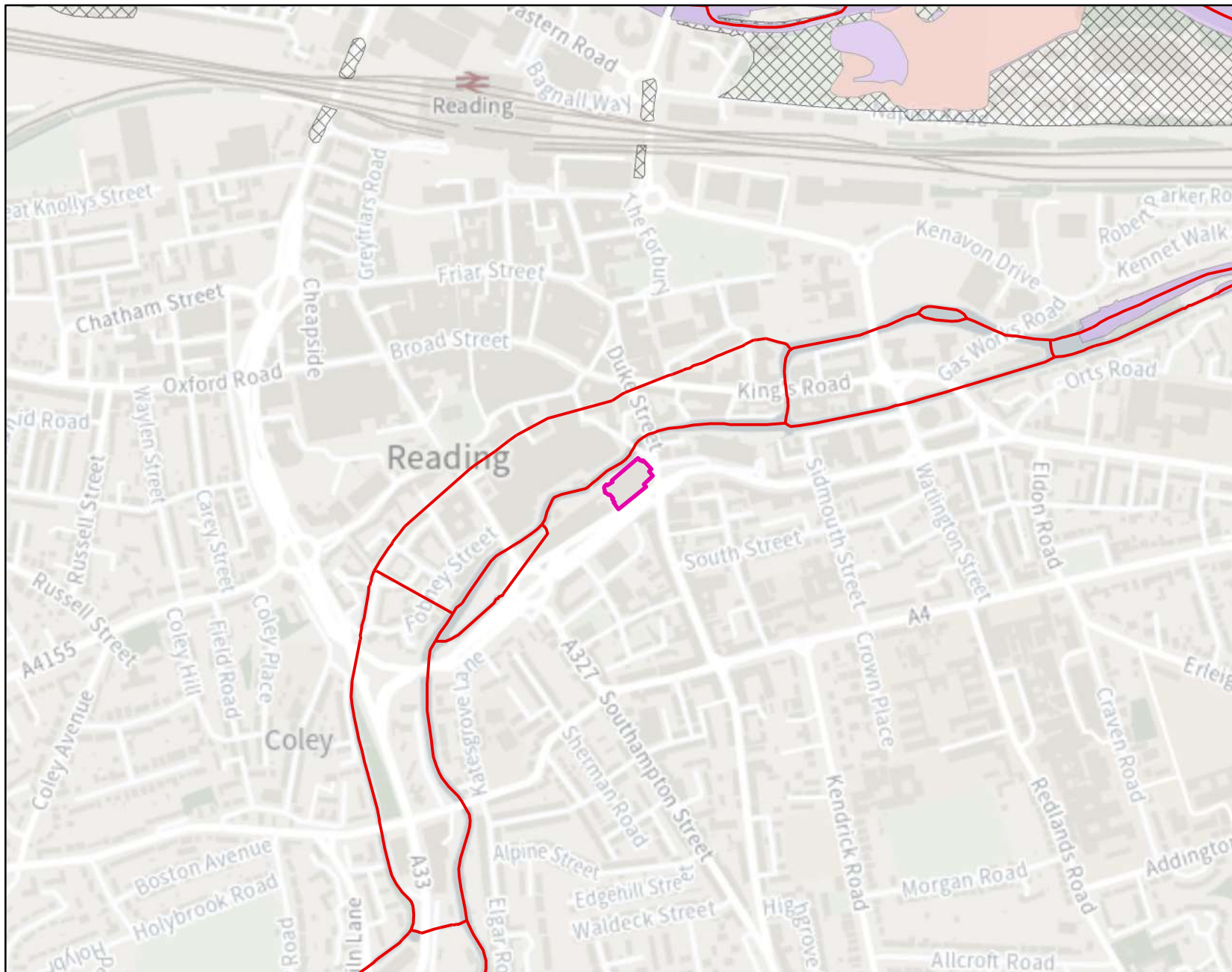
Flooding from rivers or sea without defences (Flood Zone 3) shows the area that could be affected by flooding:

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Historic Flood Map No 1 centred on The Oracle, RG1 2AG

Created on 07/07/2023 REF: THM315890



Kilometres

0 0.25 0.5

Legend

- Site
- Main River

year

- 1947
- 1974
- 1977

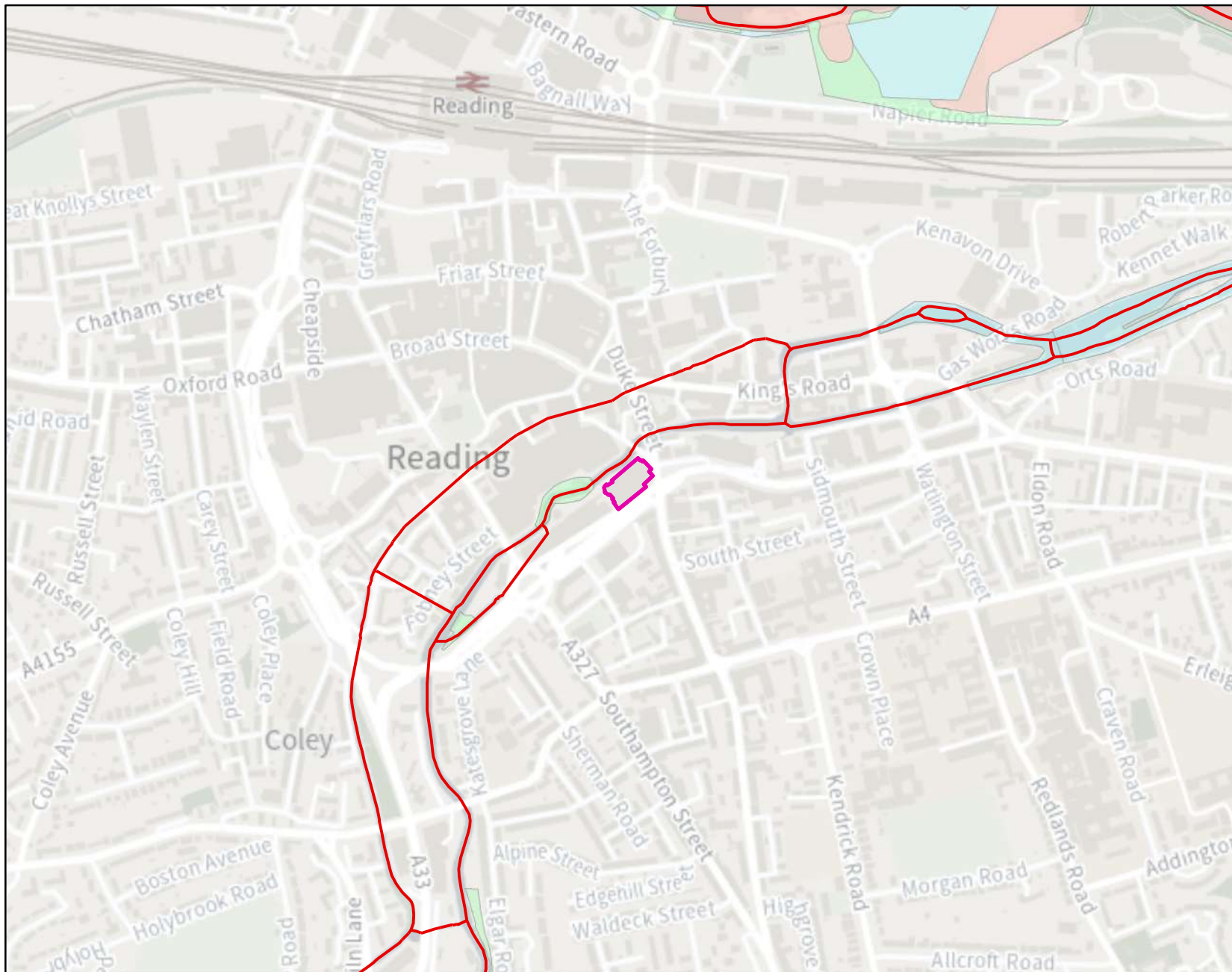
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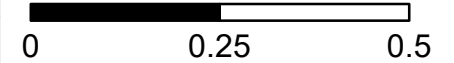
The Extent of an extreme flood (Flood Zone 2) shows the extent of an extreme flood from rivers or the sea with up to a 1 in 1000 chance of occurring each year.

Historic Flood Map No 2 centred on The Oracle, RG1 2AG

Created on 07/07/2023 REF: THM315890



Kilometres



Legend

- Site
- Main River

year

- 2000
- 2002/3
- 2007

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.

Appendix D Stantec Drawings

- Drawing 332110757/4000/001 Modelled Flood Extents

Plotted: 27.02.2024 20:24 PM By: Edey, Elizabeth
ORIGINAL SHEET - ISCA3
\\cbh-wf1-001\cbh-projects\332110757 - the oracle, reading\4000 - hydrology\cod\332110757-4000-001_p02

NOTES:

TOPOGRAPHIC SURVEY AND OUTLINE OF PROPOSED DEVELOPMENT PROVIDED BY
CALLISONRTKL-UK LTD (TOR-CRL-AA-00-DR-AR-9000/20.07.2023)

MODELLED FLOOD LEVELS TAKEN FROM ENVIRONMENT AGENCY (EA) 'KENNET (TYLE MILL TO THAMES
CONFLUENCE) 2018' HYDRAULIC MODEL, PROVIDED IN PRODUCT 4 PACKAGE OF DATA UNDER EA
REFERENCE THM 315890 (JULY 2023)

S2 FOR INFORMATION

Client/Project:
THE ORACLE LIMITED

PARTNERSHIP

Project No.:
332110757

Title
**THE ORACLE READING
YIELD HALL PLACE 1 AND 2**

**RIVER KENNET - MODELLED
FLOOD EXTENTS**

Revision: P02 Date: 27.02.2024 Drawing No. 332110757/4000/001

