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Mr and Mrs Fawsitt

REPLACEMENT BOAT HOUSE, BIRD PLACE, HENLEY-ON-THAMES

Flood Risk Assessment and
Surface Water Drainage Strategy

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1.0 INTRODUCTION

- 1.1 Create Consulting Engineers Ltd was instructed by Mr and Mrs Fawsitt to prepare a Flood Risk Assessment (FRA) and Sustainable Drainage Strategy (SuDS) in support of the proposed removal of existing conservatory; repair and reinstatement of curtilage-listed wall; construction of new boathouse and attached store; reinstatement of the historic slipway/wet dock and associated riverbank works.
- 1.2 The Site is 0.028 ha in size and is located in Henley-on-Thames, immediately to the east of the River Thames and south of Henley Bridge. The Site boundary is shown in Figure 1.1.
- 1.3 The Site lies within the jurisdiction of Wokingham Borough Council (WBC), which acts as both the Local Planning Authority (LPA) and the Lead Local Flood Authority (LLFA).
- 1.4 According to the Environment Agency's Flood Map for Planning, the Site is located within Flood Zone 3. Therefore, a submission of a Flood Risk Assessment (FRA) is required in support of the planning application. This report fulfils that requirement by assessing the Site's flood risk and setting out the proposed development's SuDS strategy too.

Objectives

- 1.5 The following objectives for this report are to:
 - Provide an FRA of the site, compliant with the guidelines set out in the National Planning Policy Framework (NPPF)¹ and associated Planning Practice Guidance (PPG)²;
 - Assess the risk and implications of flooding on the site including flooding from tidal, fluvial, groundwater, surface water runoff, and artificial sources.
 - Provide advice on the site layout and design that will ensure the safe operation of the site in any flood event.
 - To undertake surface water calculations for the Site in its current and post-development state with the most current hydrology available,
 - Provide advice and guidance on the management of surface water runoff at the site to ensure the risk of surface water flooding on the site and on nearby sites does not increase post development,
 - To develop a suitable outline SuDS scheme for the proposed development, and
 - Consider the potential future impacts of climate change over the lifetime of the proposed development.

¹ Ministry of Housing, Communities and Local Government, National Planning Practice Framework, February 2025

² Ministry of Housing, Communities and Local Government, Flood Risk and Coastal Change Planning Practise Guide: <https://www.gov.uk/guidance/flood-risk-and-coastal-change> [Accessed March 2026]

Planning Policy Requirements

National Policy

1.6 The National Planning Policy Framework (NPPF) is the overarching planning policy for England and sets out the government's planning policies for England and how these are expected to be applied by developers and how it should be assessed by Local Planning Authorities (LPA).

1.7 The NPPF requires that developments must consider flood risk and that:

Inappropriate development in areas at risk of flooding should be avoided by directing development away from areas at highest risk (whether existing or future). Where is necessary in such areas, the development should be made safe for its lifetime without increasing flood risk elsewhere.

1.8 The supporting documents to the NPPF are the Planning Practice Guidance (PPG) and recent case law³ states that the PPG has the same legal status as the NPPF. As such, at the planning stage, the developer must follow the NPPF and the PPG. The PPG on flood risk and coastal change sets out when an appropriate FRA must be undertaken to demonstrate how flood risk from all sources of flooding to the development itself and flood risk to others will be managed now and in the future.

1.9 The NPPF includes Government policy on development and surface water management (SuDS) stating that:

Applications which could affect drainage on or around the site should incorporate sustainable drainage systems to control flow rates and reduce volumes of runoff, and which are proportionate to the nature and scale of the proposal. These should provide multifunctional benefits wherever possible, through facilitating improvements in water quality and biodiversity, as well as benefits for amenity. Sustainable drainage systems provided as part of proposals for major development should:

- a) Take account of advice from the Lead Local Flood Authority;*
- b) Have appropriate proposed minimum operational standards; and*
- c) Have maintenance arrangements in place to ensure an acceptable standard of operation for the lifetime of the development.*

1.10 The NPPF and PPG states that an FRA and SuDS Assessment should be appropriate to the scale, nature and location of the development and should identify and assess the risk from all sources of flooding to and from the development and demonstrate how any flood risks will be managed over the lifetime of the development.

1.11 The NPPF and PPG requires that SuDS should be considered and included where practicable for new developments and follow the DEFRA National Standard for SuDS.⁴

1.12 The National Standards for SuDS are therefore a key reference document and should be used in the formulation of the surface water drainage strategy for a scheme of this nature.

³Judgement Ruling R (Mead and Redrow) v SoS LUHC [2024] EWHC 279 (Admin)

⁴ Department for Environment and Rural Affairs (DEFRA), 2025. National Standard for Sustainable drainage systems:

<https://www.gov.uk/government/publications/national-standards-for-sustainable-drainage-systems/national-standards-for-sustainable-drainage-systems-suds> [Accessed March 2026]

Local and County Council Policy

- 1.13 WBC act as LLFA for the area and are a statutory consultee for all major developments, as set out in the NPPF.

Development Plan

- 1.14 WBC's current Development Plan comprises the following key documents:
- Wokingham Core Strategy (2010)⁵
 - Wokingham Managing Development Delivery Local Plan (February 2014)⁶
- 1.15 These documents are supported by more detailed guidance provided within Supplementary Planning Documents (SPD). In relation to flood risk, the most relevant SPD for the submitted application is the Sustainable Design and Construction SPD⁷.
- 1.16 The policies within these documents that are relevant to the proposed development are outlined below.

Core Strategy

- 1.17 The WBC Core Strategy⁵ was adopted in January 2010. It sets out the policies that guide and control future development across the Borough, reflecting national, regional, and local planning guidance. Of particular relevance to this application is Policy CP1: Sustainable Development, which states that:

Planning permission will be granted for development proposals that:

3. *Limit any adverse effects on water quality (including ground water).*
9. *Avoid increasing (and where possible reduce) risks of or from all forms of flooding (including from groundwater).*

Wokingham Managing Development Delivery Local Plan

- 1.18 Relevant parts of Policy CC09⁶ are detailed below:
1. *All sources of flood risk, including historic flooding, must be taken into account at all stages and to the appropriate degree at all levels in the planning application process to avoid inappropriate development in areas at risk of flooding. Proposals must be consistent with the guidance in paragraphs 99-104 of the National Planning Policy Framework (NPPF); the Technical Guidance to the NPPF and demonstrate how they have used the Strategic Flood Risk Assessment (SFRA) to determine the suitability of the proposal.*
 2. *Development proposals in Flood Zones 2 or 3 must take into account the vulnerability of proposed development.*
 3. *Development must be guided to areas of lowest flood risk by applying the sequential approach taking into account flooding from all sources and shall ensure flood risk is not worsened for the application site and elsewhere, and ideally that betterment of existing conditions is achieved.*

⁵ Wokingham Core Strategy (2010): <https://www.wokingham.gov.uk/planning-policy/adopted-development-plan/local-plans> [Accessed March 2026]

⁶ Wokingham Managing Development Delivery Local Plan (2014): <https://www.wokingham.gov.uk/planning-policy/adopted-development-plan/local-plans> [Accessed March 2026]

⁷ Sustainable Design and Construction SPD: <https://www.wokingham.gov.uk/planning-policy/adopted-planning-guidance> [Accessed March 2026]

4. *In exceptional circumstances, new development in areas of flood risk will be supported where it can be demonstrated that:*
 - a) *The development provides wider sustainability benefits to the community that outweigh flood risk*
5. *Where required, suitable and appropriately detailed flood risk information will need to accompany a planning application. A Flood Risk Assessment (FRA) is required for:*
 - a) *All proposals in areas of known historic flooding from all sources*
 - b) *Where there is evidence of a risk from all sources of flooding identified in the Strategic Flood Risk Assessment*
 - c) *Those proposals set out in footnote 20 to paragraph 103 of the NPPF¹ (Core Document 55).*

1.19 Relevant parts of CC10 Drainage⁶ are detailed below:

1. *All development proposals must ensure surface water arising from the proposed development including taking into account climate change is managed in a sustainable manner. This must be demonstrated through:*
 - a) *A Flood Risk Assessment, or*
 - b) *Through a Surface Water Drainage Strategy.*
2. *All development proposals must:*
 - a) *Reproduce greenfield runoff characteristics and return run-off rates and volumes back to the original greenfield levels, for greenfield sites and for brownfield sites both run-off rates and volumes be reduced to as near greenfield as practicably possible.*
 - b) *Incorporate Sustainable Drainage Systems (SuDS), where practicable, which must be of an appropriate design to meet the long term needs of the development and which achieve wider social and environmental benefits*
 - c) *Provide clear details of proposed SuDS including the adoption arrangements and how they will be maintained to the satisfaction of the Council [as the Lead Local Flood Authority (LLFA)]*
 - d) *Not cause adverse impacts to the public sewerage networks*

1.20 The LLFA has produced a range of technical guidance documents, including a SuDS Strategy⁸, Preliminary Flood Risk Assessment⁹, and Level 1¹⁰ and 2¹¹ Strategic Flood Risk Assessment. Together, these documents set out guidance on development and flood risk, alongside the LLFA's consenting policy and associated protocols. WBC also provides further guidance within its Local Flood Risk Management Strategy (LFRMS)¹².

⁸ Wokingham Borough Council., 2017. *Sustainable Drainage Systems (SuDS)*. [Online]. Available at: <https://www.wokingham.gov.uk/sites/wokingham/files/2023-06/Sustainable%20drainage%20systems%20%28SuDS%29%20strategy.pdf> [Accessed March 2026].

⁹ Halrow Group Limited., June 2011 <https://www.wokingham.gov.uk/sites/wokingham/files/2023-07/Wokingham%20Borough%20Council%20Preliminary%20Flood%20Risk%20Assessment%202011.pdf> [Accessed March 2026].

¹⁰ JBA Consulting., 2023. Strategic Flood Risk Assessment Level 1. [Online]. Available at <https://www.wokingham.gov.uk/sites/wokingham/files/2024-05/WBC%20Level%201%20SFRA%202023%20-%20Main%20report.pdf> [Accessed March 2026]

¹¹ JBA Consulting., 2023. Strategic Flood Risk Assessment Level 2. [Online]. Available at: <https://www.walthamforest.gov.uk/planning-and-building-control/planning-policy/local-plan/evidence-base> [Accessed March 2026]

¹² Wokingham Borough Council., 2015. *Local Flood Risk Management Strategy*. [Online]. Available at: <https://www.wokingham.gov.uk/sites/wokingham/files/2023-06/Local%20Flood%20Risk%20Management%20Strategy%20April%202015%20%28PDF%20document%29.pdf> [Accessed March 2026].

- 1.21 This Flood Risk Assessment has been prepared to ensure that the proposed development is fully compliant with all relevant national, regional, and local flood risk and drainage policies.

Constraints and Limitations

- 1.22 The copyright of this report is vested in Create Consulting Engineers Ltd and the Clients, Mr and Mrs Fawsitt. The Client, or their appointed representatives, may copy the report for purposes in connection with the development described herein. It shall not be copied by any other party or used for any other purposes without the written consent of Create Consulting Engineers Ltd or the Client.
- 1.23 Create Consulting Engineers Ltd accepts no responsibility whatsoever to other parties to whom this report, or any part thereof, is made known. Any such other parties rely upon the report at their own risk.
- 1.24 The Flood Risk Assessment and outline SuDS strategy addresses the flood risk posed to and from the proposed development, the extent of which is shown by the Site boundary, as indicated on the attached drawings and SuDS drawing.
- 1.25 This report has been undertaken with the assumption that the Site will be developed by the above proposals without significant change. The conclusions resulting from this study are not necessarily indicative of future conditions or operating practices at or adjacent to the Site.
- 1.26 Create Consulting Engineers Ltd has endeavoured to assess all information provided to them during this appraisal. The report summarises information from several external sources and cannot offer any guarantees or warranties for the completeness or accuracy of the information relied upon. Information from third parties has not been verified by Create Consulting Engineers Ltd unless otherwise stated in this report.
- 1.27 The revised Construction (Design and Management) Regulations 2015¹³ (CDM Regulations) came into force in April 2015 to update certain duties on all parties involved in a construction project, including those promoting the development. One of the designer's responsibilities is to ensure that the clients, in this instance Mr and Mrs Fawsitt are made aware of their duties under the CDM Regulations. Further information on the CDM Regulations is provided in the client guide and is available online. It has been assumed for this assessment that the lead designer will be responsible for advising the Client.
- 1.28 The approach to this FRA and SuDS report follows the ethos of the CDM Regulation, in as much as during the assessment process the development is considered and any foreseeable associated health and safety flood risks are identified. It is then considered how these flood risks can be eliminated, or mitigations identified to reduce or control them. The outcome of this assessment process is presented in this report. While preparing this report no other noteworthy or unquiet health and safety risk have been identified.

¹³ Health and Safety Executive., 2015. *Construction (Design and Management) Regulations*. [Online]. Available at: <http://www.hse.gov.uk/pubns/indg411.pdf> [Accessed March 2026].

2.0 SOURCES OF INFORMATION

2.1 The information contained in this report is based on a review of existing information and consultation with interested parties.

2.2 Key reports and websites reviewed as part of this study are listed in Table 2.1 below.

Document/Website	Author/Publisher	Date
Flood Map for Planning – https://flood-map-for-planning.service.gov.uk/	GOV.UK	Accessed March 2026
Long Term Flood Risk Maps – https://flood-warning-information.service.gov.uk/long-term-flood-risk/map	GOV.UK	Accessed March 2026
BGS GeoIndex – Geology and borehole records – https://mapapps.bgs.ac.uk/geologyofbritain/home.html	British Geological Survey	Accessed March 2026
Core Strategy	Wokingham Borough Council	2010
Local Flood Risk Management Strategy	Wokingham Borough Council	April 2015
Strategic Flood Risk Assessment Level 1	JBA Consulting	August 2023
Strategic Flood Risk Assessment Level 2	JBA Consulting	August 2023
Preliminary Flood Risk Assessment	Halrow Group Limited	June 2011
Thames Water Asset Plans	Thames Water	March 2025
Thames Water Sewer Flooding History	Thames Water	March 2025
Topographic Survey – 87900_Bird Place Henley Bridge Henley-on-thames RG9 2LN-PRELIM	FourWall Surveys	April 2025
Drainage Layout (2537_CSD_ZZ_DR_S_00-91_T8)	Centre Space	April 2024
Plans –	Shack Group Ltd	March 2026
- Proposed Site and Roof Plan (SC013-PA-03) - Location Plan (SC013-PA-01) - Existing Site and Roof Plan (SC013-PA-02) - Proposed Site and Roof Plan (SC013-PA-03) - Proposed Plans and Elevations (SC013-PA-04) - Proposed Site Elevations (SC013-PA-06)		

Table 2.1: Key Information Sources

3.0 SITE SETTING AND PROPOSED SCHEME

Site Location and Description

- 3.1 The Site is located in Henley-on-Thames, to the east of the River Thames and immediately south of Henley Bridge and The Boathouse. This report pertains to the proposed removal of the existing conservatory, the construction of a new boathouse, and the restoration of the existing slipway (collectively referred to herein as “the Site”).
- 3.2 Bird Place (the wider site) consists of an estate containing a Grade II listed residential home called Bird Place, (Listing Reference: 1319073, designated 23 December 1983), together with associated grounds that include a swimming pool, conservatory (to be demolished and replaced by the boathouse within this planning application), and landscaped areas.
- 3.3 The Site lies at Ordnance Survey grid reference 476423E, 182569N as shown in Figure 1.1.
- 3.4 The Site extends to 0.02 ha and is currently occupied by a glass conservatory.
- 3.5 The surrounding area around the Site is predominantly residential, interspersed with open fields and a number of boathouse-type establishments reflecting the riverside setting.
- 3.6 The nearest watercourse is the River Thames, located on the western Site boundary (Figure 3.1). In addition, an inlet runs west to east to the south of the Site and connects directly to the River Thames.

The Proposed Scheme

- 3.7 The proposals for the Site comprise the removal of the existing conservatory; repair and reinstatement of curtilage-listed wall; construction of new boathouse and attached store/ workshop; reinstatement of the historic slipway/wet dock and associated riverbank works.
- 3.8 The Conservation Officer advised that new riverside structures should appear lightweight, transparent, and recessive, avoiding solid massing on the river edge. Through iterative design development and three-dimensional visual testing, a double-gable solution was selected as the preferred approach. This arrangement accommodates the required 5-metre-wide wet dock beneath a single retractable glazed door, visually breaks down the building mass, and provides a more articulated roofline in keeping with the varied forms of neighbouring riverside structures.
- 3.9 The footprint of the proposed workshop and store to the rear of the proposed boathouse is slightly less in area than the existing conservatory. The glazed area of the boathouse is designed to be allowed to flood, being positioned over a slipway of the river itself and as such will not remove land from the floodplain.
- 3.10 Access to the wider Site will continue to be taken from White Hill (A4130) as currently existing, both during and after development.
- 3.11 The proposed scheme is illustrated on the layout drawing appended to this report.

Site Levels

- 3.12 According to the topographical survey carried out by FourWall Surveys in April 2025, the existing ground levels at the greenhouse are approximately 31.93 mAOD and the levels to the east (where the proposed boathouse will be located) are approximately 31.63 mAOD to 31.01mAOD.
- 3.13 The full topographical survey is provided in the appendix to this report.

4.0 FLOOD RISK ASSESSMENT

- 4.1 This FRA has reviewed data from the EA¹⁴, and other LPA and LLFA published documents related to flood risk.
- 4.2 The assessment focuses on the proposed structures and not the wider site.

Flood History

- 4.3 According to Environment Agency (EA) records, the Site has experienced several flood events within the last two decades, notably in 1947, 1990, 1000, 2003, 2013/14, all of which were attributed to channel capacity exceedance.
- 4.4 Historic flood events across the wider Wokingham Borough, as summarised in Table 5.1 of the WBC Strategic Flood Risk Assessment (SFRA), include occurrences in March 1947, February 1990, December 2000, December 2003/2004, July 2007, 2008, 2009, January 2010, and 2015. Most of these incidents were caused by surface water flooding or local drainage issues rather than main river flooding. Importantly, none of these borough-wide historic events have been directly associated with the Site or its immediate surroundings.
- 4.5 Table 5.2 of the SFRA¹⁰ records flood incidents reported by the EA, which correspond with the events noted above, further confirming the EA's historic flood records.
- 4.6 No additional published information on flood risk at the Site has been identified.

Assessment of Flood Risk

- 4.7 The design flood event for the Site is the 1% Annual Exceedance Probability (AEP) event, with an allowance for climate change, in accordance with the National Planning Policy Framework (NPPF). Climate change allowances take into account the type of development, its expected lifespan, and the catchment in which it is located, as outlined in the GOV.UK document, 'Flood Risk Assessments: Climate Change Allowances'¹⁵.
- 4.8 The PPG requires that developments be assessed against the 1% AEP event plus the relevant climate change allowance, which is referred to as the design event. For fluvial and surface water flooding, the allowance is based on development type, longevity, and catchment; tidal flood risk uses a separate methodology.
- 4.9 For this Site, which comprises residential development with an expected lifespan of approximately 100 years, the relevant epoch for climate change allowance is the 2080s. The Site lies within the Thames and South Chilterns Management Catchment which has the following climate change allowances for the 2080's period:
- River Flow Allowance: 31% (central) and 43% (Higher)
 - Peak Rainfall Allowance: 40% (Upper End)

¹⁴ Environment Agency Product 4, Reference EIR2025/05568

¹⁵ GOV.UK., 2021. Climate change allowances. [Online]. Available at: <https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances>[Accessed March 2026].

Flood Risk from Tidal and Fluvial Sources

- 4.10 Flooding from tidal or fluvial (rivers) sources is shown within the Flood Map for Planning. The latest Flood Map for Planning¹⁶ is presented in Figure 4.1 and shows the Site is in Flood Zone 3.
- 4.11 For context within the Flood Map for Planning, Flood Zone 1 is land which has been assessed as susceptible to less than 0.1% AEP (Annual Exceedance Potential) risk of flooding from rivers or the sea in any given year. Flood Zone 2 comprises land assessed as having between a 1% (1 in 100 year) and 0.1% (1 in 1000 year) chance of flooding from rivers or between a 0.5% (1 in 200 year) and 0.1% chance of flooding from the sea in any one year. Flood Zone 3 is land which has a 1% or greater chance of river or a 0.5% or greater risk of flooding from the sea in any given year. These classes are often contextually referred to as 'High', 'Medium' and 'Low' flood risk respectively.
- 4.12 The interactive mapping from the WBC Strategic Flood Risk Assessment (SFRA) further confirms that the Site is located within indicative Flood Zone 3b.
- 4.13 The Site is not located in a tidal stretch of the River Thames, as it is upstream of the tidal lock at Teddington Local. The Site is not at risk of flooding from tidal sources.
- 4.14 Given the Site's location in the fluvial Flood Zone 3, the Environment Agency was contacted, and detailed hydraulic modelling for the area was requested and reviewed. The full analysis is presented below.

Fluvial Flood Risk – Thames (Sonning to Hurley) 2019 model.

- 4.15 The EA provided flood level data from the Thames (Sonning to Hurley) 2019 model as shown in Table 4.1 below. The design event assessed is the 1% Annual Exceedance Probability (AEP) event, incorporating an allowance of 31% climate change.

Flood Return Period (AEP)	Flood Level mAOD	Ground Level (mAOD)
3.3%	32.46	31.63
1%	32.79	
1% plus 35% climate change	33.30	
1% plus 70% climate change	33.80	
0.1%	33.42	

Table 4.1 Flood return period and associated flood levels as obtained from the Thames (Sonning to Hurley) 2019 model

- 4.16 Flood levels for the Site boundary for various return periods are presented in Table 4.1, with corresponding flood depths illustrated in Figures 4.2–4.4.

¹⁶ Environment Agency, 2021. *Flood Map for Planning (Rivers and Sea) – Flood Zone 2 and Flood Zone 3*. [Online]. Available at: <https://data.gov.uk/dataset/cf494c44-05cd-4060-a029-35937970c9c6/flood-map-for-planning-rivers-and-sea-flood-zone-2> [Accessed March 2026]

4.17 Based on ground levels from the appended topographical survey, the Site is generally flat, with an average level of approximately 31.63 mAOD. The ground levels correspond to the average flood depths across the Site as detailed below:

- 3.33% AEP event 0.83 m
- 1% AEP event 1.16 m
- 1% AEP + 35% CC event 1.67 m
- 0.1% AEP event 1.79 m

4.18 We have used the 1% AEP + 35% climate change event as a surrogate for the 1% AEP + 31% climate change. This is larger than the fluvial design event for the Site and ensures an accurate assessment is undertaken. **The design fluvial flood level for the Site is 33.30 m AOD with a flood depth of 1.67 m.**

4.19 This flood water level results in the majority of the site being affected by fluvial flooding in the design event.

4.20 The EA guidance recommends using the higher central climate change allowance when consulting peak river flow maps. For the relevant catchment, the central allowance is 31%, while the higher allowance is 43%. Given that this is a more vulnerable development located within Flood Zone 3, the available EA flood data has been assessed, an assessment will also be made for the higher allowance climate change.

4.21 By linear interpolation, the 1% AEP + 43% climate change (CC) event represents a flood depth of approximately 1.71 m. The difference between the 1% AEP + 35% CC event (1.67 m) and the 1% AEP + 43% CC event is therefore around 0.04 m, indicating only a marginal increase in flood level across this range.

4.22 The Site is at risk of fluvial flooding during the design flood event. However, as the proposed development comprises of a water-compatible boathouse which can tolerate periodic inundation without significant risk to property or safety.

4.23 With the incorporation of appropriate design and mitigation measures, the proposed development should be resilient to flooding and does not result in a loss of floodplain storage. These will be outlined later in the report.

4.24 The Site is at risk of fluvial flooding but the proposal has respected the real risk of flooding, and the development has been design to cope with flooding, make the development resilient to flooding. More details are outlined in the "design response to flood risk" in the concluding section of this chapter.

Flood Risk from Surface Water (Rainfall)

4.25 Flooding from surface water can occur during intense local rainfall events when floodwaters cannot infiltrate into the ground or discharge into natural or artificial drainage systems. As a result, the floodwater follows the topography of the local area. In an urban environment, the risk of flooding from surface water and overloaded sewers is closely related, and both are included in the relevant surface water flooding datasets. Flooding events are typically of short duration (unless there is a blockage in the drainage system) but can be severe.

- 4.26 The Risk of Flooding from Surface Water (RoFSW) mapping dataset¹⁷. This data assesses where surface water flooding may occur when the volume of rainwater exceeds the capacity of the existing drainage network (with a default loss rate of 18 mm/hr to model and replicate on-site drainage systems) or exceeds the infiltration capacity of the receiving soils, causing water to flow overland instead. The data includes information about flood extents and depths, produced using national-scale modelling, enhanced with locally produced modelling from some LLFAs.
- 4.27 The RoFSW includes a climate change representation based on the latest UK Climate Projections (UKCP18) from the MET Office, using the Representative Concentration Pathway (RCP) 8.5. The RoFSW shows a near-term epoch (2040–2060, the “2050s” epoch), with central allowances used to support short- and medium-term decisions informed by the highest flood likelihood projections.
- 4.28 The Site is not affected by the current scenario RoFSW Extent Map or the future-plus-climate-change scenario.
- 4.29 Even though the extent maps did not show a risk of flooding, the predicted flood depths maps were reviewed. These maps show incremental steps of 0.2 m, 0.3 m, 0.6 m, 0.9 m, and 1.2 m. This data uses the same ‘high,’ ‘medium,’ and ‘low’ risk categories as set out in the above extent mapping for each return period. The depth mapping shows the risk of a specific depth of flooding in either the current or future event.
- 4.30 We have reviewed these surface water depth maps, and the proposed developments are not subject to any surface water flooding in the depths maps in either the present-day event or the climate change event.
- 4.31 Overall, the risk of surface water flooding to the Site and the proposed development is considered to be very low.
- 4.32 It should be noted that flooding from surface water remains a residual risk due to the potential for rainfall to exceed the design standard of the proposed drainage system and the effects of climate change on the frequency and severity of rainfall events.

Flood Risk from Groundwater

- 4.33 Groundwater flooding occurs when groundwater rises through permeable strata to reach the surface.
- 4.34 The Site is shown to be underlain by a Principal bedrock aquifer according to online mapping provided by the Department of Farming, Agriculture and Rural Affairs (DEFRA) Magic Maps¹⁸. This is defined below:

‘Principal and secondary aquifers provide significant quantities of drinking water, and water for business needs. They may also support rivers, lakes and wetlands’.

- 4.35 The Site is shown to be underlain by a Secondary A superficial deposit, this is defined below:

‘Secondary A aquifers comprise permeable layers that can support local water supplies, and may form an important source of base flow to rivers’

¹⁷ Environment Agency., 2025. *Risk of Flooding from Surface Water Extent, Depths and Plus climate change* [Online]. Available at: <https://www.data.gov.uk/dataset/0d6falf4-0c82-4c91-8667-a549e8e3ca2d/risk-of-flooding-from-surface-water3> [Accessed January 2026]

¹⁸ Department for Environment and Rural Affairs (DEFRA) Magic Website., 2025. [Online]. *Environment Agency Bedrock Aquifer Designation Data*. Available at: <https://magic.defra.gov.uk/MagicMap.aspx> [Accessed January 2026].

- 4.36 The Site is located within a designated Total Catchment Groundwater Source Protection Zone¹⁹, as identified by the DEFRA Magic Maps.
- 4.37 British Geological Survey (BGS) mapping (1:50,000 scale)²⁰ identifies the bedrock geology at the Site as Holywell Nodular Chalk Formation and New Pit Chalk Formation (Undifferentiated) – Chalk (Figure 4.5). The Superficial deposits at the Site are Alluvium – Clay, Silt, Sand and Gravel (Figure 4.6).
- 4.38 A BGS borehole record (SU78SE138), located approximately 150 m northwest of the Site and within the same mapped geological units, recorded gravels to 6.80 m, underlain by chalk bedrock to the full depth of the borehole (10.50 m). Groundwater was recorded at approximately 3.50 m below ground level.
- 4.39 A second BGS borehole (SU78SE20), located 250 m east of the Site and mapped within the Kempton Park Gravel Member, recorded gravel to 6.20 m, underlain by chalk to the borehole depth of 6.70 m. Groundwater was recorded at approximately 2.90 m below ground level.
- 4.40 Interactive mapping from the WBC Strategic Flood Risk Assessment (SFRA) indicates that the Site is located within a zone of ≥75% EA Areas Susceptible to Groundwater Flooding.
- 4.41 It is assumed that groundwater levels at the Site are intrinsically linked to general water levels in the River Thames. This is because groundwater contributes to the baseflow of rivers and streams in the area and it is typical for groundwater levels to be similar to the water level in an adjacent watercourse.
- 4.42 As the Site is located adjacent to the watercourse, there is a potential risk that groundwater could emerge at the surface during periods of high-water levels in the river, or that areas outside the fluvial floodplain could become highly saturated due to elevated groundwater levels.
- 4.43 Should groundwater emerge at the surface, it is expected to either drain naturally towards the River Thames or be intercepted by the existing grassed areas within the estate. Given that the proposed development comprises a boathouse and storage area, which are water-compatible uses, any groundwater emergence is not anticipated to pose a significant risk to the development or its operation.
- 4.44 Dewatering may be required during construction, and the foundations of the boathouse workshop and storeroom should also be adequately waterproofed for groundwater.
- 4.45 Overall, the risk of groundwater flooding at the Site is considered to be low for both the Site and the proposed development, owing to the depth of recorded groundwater below existing ground levels.

Flood Risk from Public Sewers and Water Mains

- 4.46 Sewer flooding generally results in localised short-term flooding caused by intense rainfall events overloading the capacity of sewers. Flooding from sewers and highways is linked to the risk of flooding from surface water in urban areas, with the exact source of flooding often indistinguishable.

¹⁹ Department for Environment and Rural Affairs (DEFRA) Magic Website., 2025. [Online]. *Environment Agency Superficial Deposit Aquifer Designation Data*. Available at: <https://magic.defra.gov.uk/MagicMap.aspx> [Accessed January 2026].

²⁰ British Geological Survey (BGS) Onshore GeoIndex., 2025. *DiGMapGB-50 Bedrock Geology and Superficial Deposits*. [Online]. Available at: <https://mapapps.bgs.ac.uk/geologyofbritain/home.html> [Accessed January 2026].

- 4.47 Thames Water (TW) is the statutory (adoption) sewerage undertaker for the area and is responsible for the operation and maintenance of public sewers serving the Site. Sewer plans (Appendix A) indicate the presence of a surface water rising main in White Hill Road.
- 4.48 The Site is not served by TW for surface water or foul drainage. The Site has its own private network which the owner is responsible for maintaining.
- 4.49 A drainage layout of the wider Site (appended to this report) illustrates the existing private drainage network. It is assumed the foul network terminates in a septic tank or cess pool. Surface water from the main house is assumed to discharge to an existing outfall, which subsequently discharges into ditch which connects to the inlet via a culvert. The surface water ultimately discharges into the River Thames via the inlet.
- 4.50 Thames Water have also supplied an extract of their flood history records which shows no historical sewer flooding at or near the site.
- 4.51 Sewer flooding resulting from blockage of the private site or building drainage remains a residual risk, which is mitigated by the on-site drainage design and through regular inspection and maintenance of both public and private sewer networks.
- 4.52 Flooding from a water main is also a residual risk, as this should not cause flooding under standard operation. The main threat therefore will be from damage to existing main lines and newly constructed internal pipe work during the construction phase.
- 4.53 The Site and proposed development are therefore considered to be at low risk of sewer or water main flooding.

Flood Risk from Artificial Waterbodies

- 4.54 The Site is shown to be located within the GOV.UK long term flood reservoir risk map (Figure 4.7) which shows the Site to be at risk from flooding during a reservoir breach event²¹. This includes the dry weather breach (no rainfall) and wet weather event (when rainfall and fluvial flooding occur).
- 4.55 According to the GOV.UK dataset, the Site is potentially at risk from Farmoor Reservoir, located approximately 38.79 km northwest of the Site. While the distance implies the risk could be low, Farmoor Reservoir has a raised concrete embankment, which, in the unlikely event of a breach, could result in floodwaters reaching the Site following the low lying topography.
- 4.56 The Environment Agency is the enforcement authority for the Reservoirs Act 1975 in England, they ensure that reservoirs are inspected regularly, and that all essential safety work is carried out. All reservoirs must be inspected and supervised by reservoir panel engineers. There has been no loss of life in the UK from reservoir flooding since 1925.
- 4.57 The Site is therefore considered at direct risk of reservoir flooding and there are no further artificial waterbodies in the area that would constitute a significant risk of flooding to the Site.

²¹ Environment Agency, 2022. *Risk of Flooding from Reservoirs – Maximum Flood Extent (Web Mapping Service)*. [Online]. Available at: <https://environment.data.gov.uk/dataset/d81646cf-37e5-4e71-bbcf-b7d5b9ca3alc> [Accessed January 2026].

Design Response to Flood Risk

- 4.58 The FRA has confirmed that the Site is at risk of fluvial flooding during both the design flood event and smaller, more frequent events. Appropriate mitigation measures are required to minimise the potential for floodwater ingress into the proposed development and some of these were included in the design process of the proposed development.
- 4.59 The design fluvial flood levels provided by the Environment Agency indicate a peak flood level of 33.30 m AOD for the 1% AEP + 35% Climate Change (design) event.
- 4.60 The proposed boathouse occupies the footprint of a historic structure recorded on late 19th-century mapping. The design of the boathouse adopts a slim steel frame with fully glazed elevations and roof. This will be designed to flood during period of high flow in the river and be resilient to the flood water ingress. This will result in no loss of floodplain storage as the area occupied by the boathouse will be allowed to flood.
- 4.61 The attached workshop and store will be initially resistant to flooding but will also allow flood water to enter during extreme events. The workshop footprint is slightly less than the existing conservatory which it replaces resulting in no loss of floodplain storage compared to the existing scenario.
- 4.62 The boathouse and attached store are considered water-compatible uses.
- 4.63 The proposals have also been designed in consideration of the "Water Entry's strategy, outlines in GOV.UK and CIRIA Code of Practice for Property Flood Resilience. The Water Entry strategy allows floodwater to enter the structures in a controlled manner to ensure the structure remains safe. This is because it reduces hydrostatic pressure and the risk of structural damage created if flood water is prevented from entering a structure.
- 4.64 The Water Entry strategy is applied for flood depths exceeding 0.6 m or for structures which are not capable of withstanding the hydrostatic pressures from flood water at lower depths. Floodwater is permitted to enter the building in a controlled way, protecting structural elements from hydrostatic pressure.
- 4.65 The development can install temporary flood defences, for the storeroom, but these are typically limited to a height of 0.6 m above external ground level, resulting in higher depth water to entering a structure. the structure of the storeroom is also considered lightweight and therefore may not be suitable for preventing entry of floodwater above this level.
- 4.66 Further flood resilience measures will be incorporated to minimise damage during flooding events, in line with the CIRIA Code of Practice to ensure a speedy recovery after a flood event. The following flood protection and resilience measures are proposed:
- The lightweight steel frame and open/glazed elevations for the boathouse fully reduce mass and allow water to flow through the structure without obstruction.
 - Raised metal-clad store ensures storage and workshop areas remain above typical water levels while providing robust protection against occasional inundation.
 - Durable, flood resilient finishes for walls, floors and fittings to minimise damage from floodwater.
 - Large, glazed doors on the boathouse to allow for controlled water entry into the ground floor in deep events, reducing hydrostatic pressure on walls and floors.

- Non-return valves, cut-off valves and potentially positive pumps fitted to drainage and sewer connections in the store to prevent backflow.
- Secure, removable flood barriers may be deployed on sensitive openings where temporary exclusion is needed.
- Adequate drainage channels around the store perimeter to direct water away from entrances and sensitive areas.
- Flood Doors such as Floodguard Heritage Doors. These will use materials to ensure that the character of the property is maintained.
- Demountable flood barriers,
 - These can be placed on entrances and windows which may come into contact with flood water.
 - These will need to be installed prior to a flood event occurring. This requires the owner/occupier being observant and reactive to any flood warnings or weather warnings.
- All electrics taken up to first floor / eave level, if possible, with connections dropped down into the ground floor as required, or at very least raised up to above expected flood levels.
- Avoiding the use of MDF carpentry at ground level, use of water-resistant materials where possible to minimise damage from water entry.

- 4.67 The above flood protection measures have been reviewed and agreed in principle with the design team.
- 4.68 The homeowners should implement a household flood emergency plan to ensure the safety of all residents and visitors in the event of a flood. This plan should include clear instructions on actions to take during a flood to protect the boathouse. This should include removing items which could easily float away such as table and chairs, and the shutdown of utilities to the development e.g. electrics. All family members and regular household occupants should be familiar with the plan and able to respond efficiently during a flood event.
- 4.69 It is highly recommended that the household registers for flood warnings from the Environment Agency and monitors weather alerts from the MET Office to provide sufficient time to enact the emergency plan. Alerts from the Environment Agency should provide sufficient warning to allow residents to implement any flood defence devices that need to be installed prior to water reaching the property.
- 4.70 The implementation of these measures will ensure that the household can manage the risks associated with the design flood event. These precautions will also help to minimise internal flooding within the property, protecting the family and their home in accordance with guidance from the NPPF.

5.0 SURFACE WATER DRAINAGE AND FLOOD RISK FROM THE DEVELOPMENT

Existing Surface Water Drainage

- 5.1 Detailed runoff calculations have been undertaken for the site (Appendix C) and are shown in Table 5.1.
- 5.2 As the wider Site already contains an existing surface water drainage network, the proposed Sustainable Drainage System (SuDS) strategy focuses solely on the newly developed areas, specifically the proposed boathouse and store, covered in this planning application.
- 5.3 The Site redline boundary measures approximately 0.02 ha. The proposed boathouse development has a footprint of approximately 0.0122 ha, replacing the existing conservatory which measures approximately 0.0052 ha. As the conservatory area currently drains to ground and will be directly replaced by the boathouse footprint, there is no net loss of floodplain storage associated with this portion of the development. The additional area (approximately 0.007 ha) represents the overhanging section of the boathouse above the River Thames and will discharge directly to the river. On this basis, floodplain compensation is not required. Therefore, the runoff rates presented below are based on the existing conservatory footprint, as this represents the only portion of the proposed development contributing to ground drainage.

Rainfall Event	Brownfield Run-off Rates Old Conservatory (l/s)	Greenfield runoff rate Old Conservatory (l/s)
Q bar	-	0.1
Q 1 year	0.7	0.1
Q 30 year	1.71	0.1
Q 100 year	2.21	0.1

Table 5.1: Greenfield and Brownfield Runoff Rates from the Site for Various Rainfall Events

- 5.4 The WBC LLFA guidance recommends that surface water discharge from a brownfield site should, where possible, be restricted to the 1 in 1-year greenfield runoff rate. For the Site, this equates to 0.1 l/s for the 1-year event and 0.2 l/s for the 100-year event.
- 5.5 It is acknowledged industry wide that any proposed flow rate of 2.0 l/s or lower does not result in self-cleansing velocities being achieved and therefore an increased risk of blockages due to the small diameter of piping required to achieve rates lower than 2.0 l/s.
- 5.6 As described in Chapter 4, the Site is served by a private drainage network. For the purposes of this application, the discussion is limited to the proposed boathouse and attached store. Currently, any rainfall runoff that lands on the existing conservatory is assumed to infiltrate to the surrounding garden. Current surface water flows draining the wider Site (house) are assumed to discharge via an outfall into a ditch, ultimately connecting to the inlet located along the southern boundary of the wider Site. The topographical survey indicates the presence of gullies and manholes; however, details of all below-ground sections and their connection points are not fully known.

Climate Change Allowances

- 5.7 An allowance for climate change must be included within all SuDS strategies within the rainfall parameters. Climate change allowances for rainfall are based on the catchment the site is based within and the proposed lifespan for the development. The Site is within the Thames and South Chilterns Management Catchment: and residential development is deemed to have a 100-year lifetime.
- 5.8 The influence of climate change on rainfall intensity has been taken into account by the surface water drainage strategy with the inclusion of the following allowances:
- Rainfall uplift for 1 in 30 year event: 35 %
 - Rainfall uplift for 1 in 100 year event: 40%

Drainage Discharge Hierarchy

- 5.9 The discharge hierarchy should be considered which is stated in PPG as:

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

1. *Into the ground (infiltration);*
2. *To a surface water body;*
3. *To a surface water sewer, highway drain or another drainage system;*
4. *To a combined sewer."*

- 5.10 The proposed drainage strategy for the development ensures that surface water runoff is appropriately managed in accordance with the drainage hierarchy. Runoff from the boathouse roof will, in the first instance, drain directly into the River Thames, or, if this is not feasible, be collected via rainwater downpipes and allowed to infiltrate into surrounding informal rain gardens incorporated into the existing landscaping.

SuDS Drainage Principles

- 5.11 The SuDS hierarchy shown in Table 5.2 provides guidance on the how to manage surface water with the most sustainable being chosen first for implementation. The table also notes which SuDS devices are practicable and proposed to be included within the development. There should be a preference for green over grey features, in line with the SuDS hierarchy.

	SuDS Techniques	Practicable	Proposed	Site and Development Specific Notes
Most Sustainable	Rainwater Harvesting	Y	Proposed to include water butts where possible.	Rainwater Harvesting will be provided where possible in the form of water butts to be used for irrigation for landscaped areas.

	SuDS Techniques	Practicable	Proposed	Site and Development Specific Notes
Least Sustainable	Basins and Ponds. -Constructed wetlands -Balancing ponds -Detention basins -Retention ponds	N	N	Not suitable on the Site due to spatial constraints.
	Filter Strips and Swales	Y	N	Not proposed within this application due to proximity to the River Thames.
	Infiltration Devices -Soakaways -Infiltration trenches and basins - Rain Gardens	Y	Y	Infiltration methods are not considered suitable due to geology at the Site. Informal rain gardens are proposed to provide water quality treatment informal attenuation and amenity / biodiversity value.
	Permeable Surfaces -Gravelled areas -Permeable pavers	Y	Y	Proposed on the pathway connecting the house to the boathouse.
	Tanks Systems -Oversized pipes -Crated storage	N	N	Not proposed for the scheme.

Table 5.2: SuDS Techniques and Application to the Development

Proposed SuDS Strategy

- 5.12 Analysis has been undertaken to propose an outline SuDS strategy, in accordance with sustainable drainage principles.
- 5.13 It is proposed that surface water will be managed on site. Although a specific numerical allowance for climate change has not been included within the calculations, it is anticipated that the proposed system will have sufficient capacity to accommodate any additional flows arising as a result of climate change, given the available garden area and the overall impermeable-to-permeable ratio.
- 5.14 The proposed SuDS strategy is as follows:

- Runoff from the proposed boathouse roof will, in the first instance, discharge directly to the River Thames where the roof overhangs the river. For the landward portion of the roof, runoff will be conveyed via rainwater downpipes into surrounding informal rain gardens, where it will be allowed to infiltrate naturally into the ground. The rain gardens will be designed to accommodate a minimum of one-third of the runoff volume from this contributing area, with the remainder managed through natural dispersion within the garden. Permeable paving has also been proposed along the pathway connecting the boathouse to the main house.

5.15 The proposed SuDS solution has been designed sequentially to respect site constraints, including the existing drainage network and trees located within proximity to the proposed boathouse and attached store. The layout also minimises disturbance to existing landscaped and riverside areas. The proposed SuDS Strategy can be seen on Drawing: 3458_CCE_XX_Surface Water Drainage Strategy_DR_D 001A.

Surface Water Quality

5.16 Pollution control requirements are determined by the using the Simple Index Approach as detailed in the CIRIA SuDS Manual. The pollution indices for this Site as per table 26.2 of the CIRIA SuDS Manual can be seen below:

Land Use	Total Suspended Solids	Metals	Hydrocarbons
Other Roofs (typically commercial/ industrial roofs)	0.30	0.20	0.05

Table 5.3: Calculated SuDS pollution mitigation indexes for the Site

5.17 The water quality is effectively clean, as it is collected roof water from a residential setting. However, the SuDS indices do not cover the use of metal roofing materials in a residential setting. As such, a more polluted situation (commercial roof) was used for the assessment.

5.18 Bioretention, in the form of rain gardens is proposed to manage flows and provide water quality treatment. These will be designed and constructed with an appropriate depth of engineered substrate and planting media in accordance with the SuDS Manual (CIRIA C753) to ensure effective treatment, attenuation and infiltration where feasible. Permeable paving is also proposed to manage flows and provide water quality treatment.

5.19 Based on table 26.3 and 26.4 of the CIRIA SuDS Manual, this will provide treatment indices of:

SuDS Component	Total Suspended Solids	Metals	Hydrocarbons
Rain Garden underlain by a suitable substrate layer at least 300 mm in depth.	0.6	0.5	0.6
Permeable Paving	0.70	0.60	0.70

Table 5.4: Indicative SuDS mitigation indices

It can be seen from the tables above that the proposed treatment provides the required level of treatment for this Site prior to discharge.

- 5.20 It should be noted that SuDS components only deliver these indices if they follow design guidance with respect to hydraulics and treatment set out in the relevant technical component chapters of the CIRIA SuDS Manual.

Four Pillars of SuDS

- 5.21 For the purposes of this assessment, it must be demonstrated how the drainage strategy outlined above accords with the four pillars of SuDS. These require that surface water management addresses water quantity (flood risk), water quality (pollution control), amenity, and biodiversity.
- 5.22 The proposed drainage strategy incorporates informal rain gardens as the primary SuDS feature, which have been designed to address all four pillars. In terms of water quantity, the rain gardens provide attenuation and promote infiltration, reducing runoff rates and volumes. With respect to water quality, they facilitate natural filtration and treatment of runoff prior to discharge. The inclusion of rain gardens also enhances site amenity by providing attractive landscaped features, while contributing to biodiversity through the introduction of planting and habitat opportunities.
- 5.23 Overall, the use of rain gardens will reduce the rate and volume of surface water runoff, provide an appropriate level of treatment, and deliver wider amenity and ecological benefits in accordance with SuDS best practice.

Exceedance Flow Routes

- 5.24 For larger rainfall events exceeding the SuDS capacity, surface water flows will follow the local topography, consistent with the current site scenario. Excess runoff from the boathouse and attached store will be directed towards the proposed adjacent informal rain gardens, allowing infiltration where possible, and ultimately towards the River Thames. This ensures safe conveyance of water offsite while avoiding ponding near buildings.

Management and Maintenance of Drainage Assets

- 5.25 The SuDS Manual provides general guidance on maintenance requirements; however, these are generic recommendations. The management and maintenance of all drainage elements should be carried out in accordance with the guidance and specifications provided by the relevant manufacturers or suppliers.
- 5.26 Non-return valves should be maintained strictly according to manufacturer specifications to ensure ongoing functionality.
- 5.27 The freeholder will be responsible for the upkeep and management of the SuDS network. Management responsibilities may be subcontracted to a specialist company if required.
- 5.28 Further detail regarding the specific management and maintenance procedures will be developed during the detailed design stage. These procedures will follow the principles set out in Table 5.5, ensuring that all aspects of the SuDS system continue to operate effectively over its lifetime.

Maintenance Schedule	Required Actions	Typical Frequency
Permeable Paving inc. Dispersion Units – Site Owners/Management Company		
Regular Maintenance	Brushing and vacuuming (standard cosmetic sweep over whole surface)	Once a year, after autumn leaf fall, or reduced frequency as required, based on Site-specific observations of clogging or manufacturer's recommendations—pay particular attention to areas where water runs onto pervious surface from adjacent impermeable areas as this area is most likely to collect the most sediment
Occasional Maintenance	Stabilise and mow contributing and adjacent communal areas Removal of weeds or management using glyphosate applied directly into the weeds by an applicator rather than spraying	As required As required/once per year on less frequently used pavements
Remedial Actions	Remediate any landscaping which, through vegetation maintenance or soil slip, has been raised to within 50mm of the level of the paving Remedial work to any depressions, rutting and cracked or broken blocks considered detrimental to the structural performance or a hazard to users and replace lost jointing material Rehabilitation of surface and upper substructure by remedial sweeping	As required Every 10 to 15 years or as required (if infiltration performance is reduced due to significant clogging)
Monitoring	Initial inspection Inspect for evidence of poor operation and/or weed growth—if required, take remedial action Inspect silt accumulation rates and establish appropriate brushing frequencies Monitor inspection chambers	Monthly for three months after installation Three-monthly, 48h after large storms in first six months Annually
Bioretention Systems (Rain Gardens)		
Regular Inspections	Inspect infiltration surfaces for silting and ponding, record de-watering time of the facility and assess standing water levels in underdrain (if appropriate) to determine if maintenance is necessary	Quarterly
	Check operation of underdrains by inspection of flows after rain	Annually

Maintenance Schedule	Required Actions	Typical Frequency
Regular maintenance	Assess plants for disease infection, poor growth, invasive species etc and replace as necessary	Quarterly
	Inspect inlets and outlets for blockage	
	Remove litter and surface debris and weeds	Quarterly (or more frequently for tidiness or aesthetic reasons)
	Replace any plants, to maintain planting density	As Required
Occasional maintenance	Remove sediment, litter and debris build-up from around inlets or from forebays	Quarterly to biannually
	Infill any holes or scour in the filter medium, improve erosion protection if required	As Required
	Repair minor accumulations of silt by raking away surface mulch, scarifying surface of medium and replacing mulch	
Remedial actions	Remove and replace filter medium and vegetation above	As required but likely to be > 20 years
Other General: Site Owners/Management Company.		
Regular Maintenance	Inspect rainwater gutter channels, inlets and outlets for blockages and clear as required.	Monthly for first year then annually thereafter
	Inspect gully drains and channel drains.	Monthly for first year then annually thereafter
	Remove litter and debris. Carry out periodic mowing of grassed surface and inspect for silt accumulation to determine appropriate removal frequency.	Monthly or as required (and through growing season for swales)
Occasional Maintenance	Remove sediment from any affected articles including silt traps (most likely via jetting).	As required
Remedial Actions	Repair any damage arising from various inspections (by approved engineer where required)	As required
	Replacement of permeable surfacing, manhole components.	As required

Table 5.5: Outline SUDS Management and Maintenance Requirements

Flood Risk from the Development

- 5.29 For this application, any rainfall runoff that lands on the existing conservatory is assumed to infiltrate to the surrounding grassland. Current surface water flows draining the wider Site (house) are assumed to discharge via an outfall into a ditch, ultimately connecting to the inlet located along the southern boundary of the wider Site. The topographical survey indicates the presence of gullies and

manholes; however, details of all below-ground sections and their connection points are not fully known.

- 5.30 The proposed development comprises the new boathouse and the attached raised workshop/storeroom. No sleeping accommodation or internal kitchen facilities are proposed. The glazed section of the boathouse will run-off directly to the river over which it is suspended. The remaining roof areas, being the raised workshop and store area will replace an existing roof, being the current conservatory, and as such will not increase the volume of run-off to the surrounding area. SuDS, in the form of informal rain gardens, have been proposed to manage and mitigate any flows from the proposed scheme.
- 5.31 Overall, the proposed development is expected to reduce surface water runoff compared to existing conditions due to the proposed informal rain gardens, which will provide additional infiltration and storage.
- 5.32 As a result, the development will not increase peak flows to the local drainage network or neighbouring properties and may slightly reduce runoff volumes during normal and extreme rainfall events.
- 5.33 For rainfall events exceeding the 1% AEP plus climate change scenario, any exceedance flows will follow the local topography and overland flow paths toward the rain gardens or the River Thames, ensuring that the proposed and existing structures remain unaffected.
- 5.34 Optional additional SuDS measures, such as rainwater harvesting for watering landscaped areas, are recommended where feasible. These would provide minor additional attenuation and water reuse benefits but are not required for the proposed development due to the low intensity and nature of the use.

6.0 CONCLUSIONS AND RECOMMENDATIONS

- 6.1 The proposals comprise the construction of a boathouse and an store/workshop with the removal of the conservatory at the Site. The development is limited in scale and does not include sleeping accommodation or internal kitchen facilities. As such, the conventional runoff and occupancy-based flood risk considerations are partially lessened.
- 6.2 The Site lies within Flood Zone 3 and is at risk of fluvial flooding. Environment Agency (EA) data shows that, for the fluvial design event (1% AEP + 35% Climate Change), flood levels reach 33.30 m AOD.
- 6.3 The boathouse and store are designed as water-compatible structures. The raised store sits above the typical River Thames water level and flood protection measures will be included for the design event. The proposed development overall reduces surface water runoff compared with existing conditions.
- 6.4 A Water Entry strategy as outlined in government and CIRIA guidance will be applied for any flood depths affecting the boathouse or storeroom. Controlled water entry will reduce hydrostatic pressure and prevent structural damage. Measures may include:
- Use of flood-resilient construction materials, such as solid floors, external masonry or metal cladding, and damp-proof membranes;
 - Raising or waterproofing electrical and gas services above expected flood levels;
 - Avoidance of water-sensitive finishes in vulnerable areas, e.g., MDF;
 - Non-return valves or positive pumps on drainage, gas, water and sewer connections, with secured manholes;
 - Sealed or protected ventilation openings where necessary;
 - Deployment of demountable flood barriers or flood doors where appropriate.
- 6.5 It is recommended that site owners register for Environment Agency flood warnings to support household emergency planning.
- 6.6 Surface water from the development will be managed in accordance with sustainable drainage principles. Runoff from the boathouse roof will either drain directly to the River Thames or, where appropriate, via downpipes to the informal rain gardens. This approach complies with the drainage hierarchy and reduces peak flows to the existing network. Additional features, such as rainwater harvesting, are optional but could provide further attenuation and water reuse benefits.
- 6.7 The development is designed to reduce runoff compared with existing conditions, controlling flows from the boathouse, store, and minimising the risk of flooding elsewhere. Residual risks remain from extreme fluvial events or climate change, but these can be safely managed through the Water Entry strategy, overland exceedance flow routes, and appropriate emergency planning.
- 6.8 Overall, the proposed boathouse and raised store are water-compatible, resilient to flooding, and designed to limit impacts on the wider site. With the informal rain gardens, controlled water entry measures, and direct drainage to the River Thames, the development can be considered safe for site users and compliant with national and local planning policy, without increasing flood risk to third parties.

FIGURES

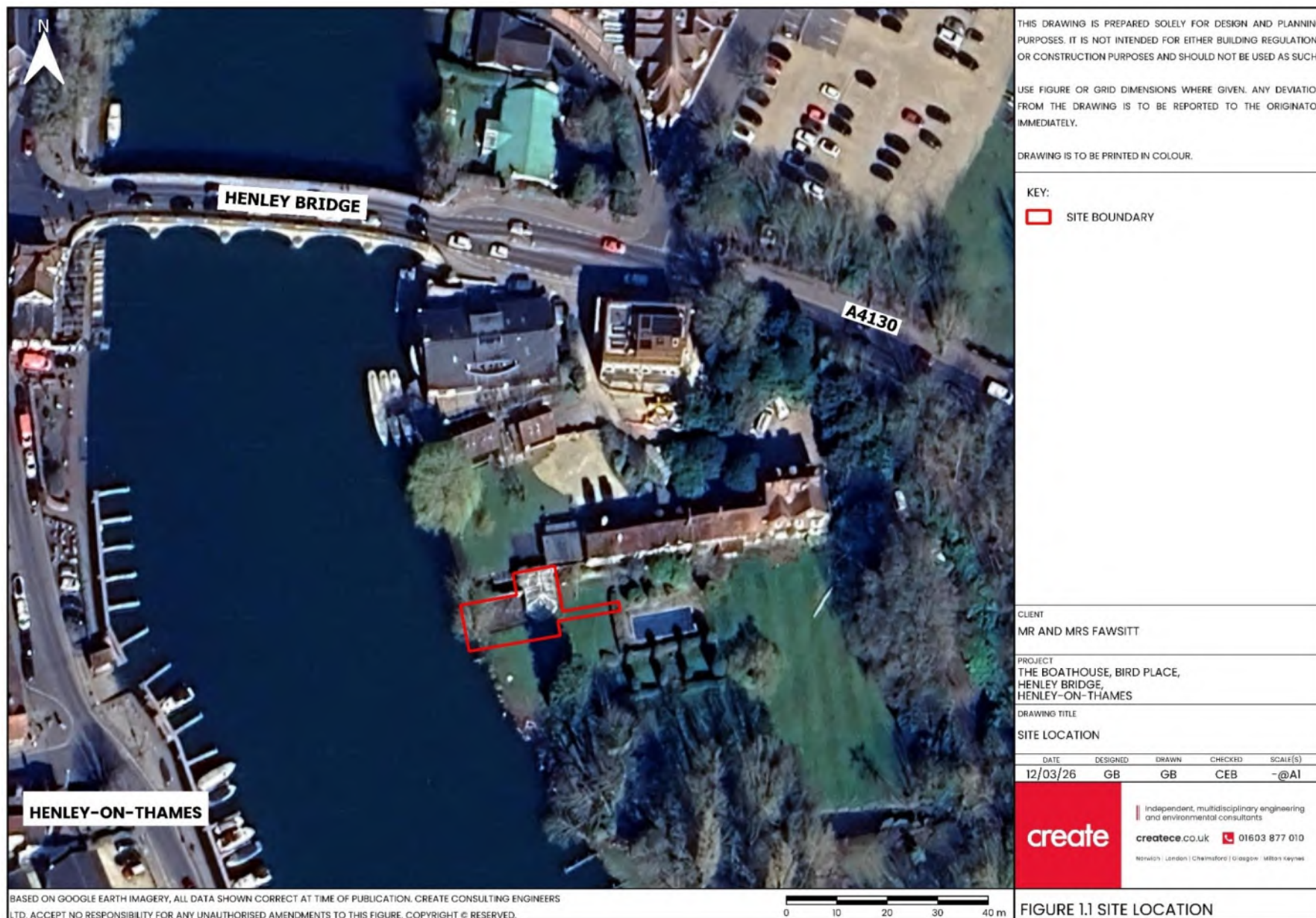


Figure 1.1: Site Location

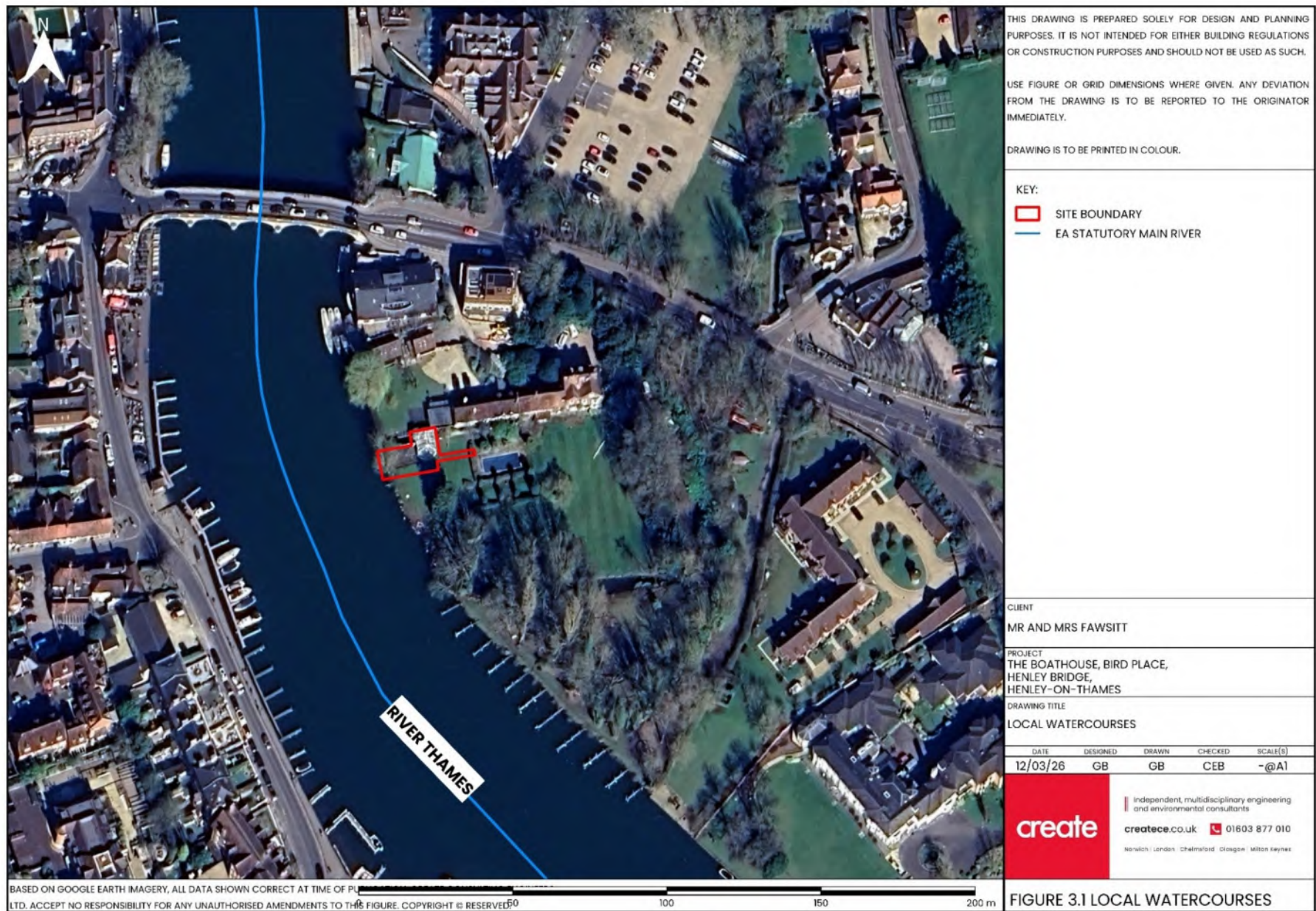


Figure 3.1: Local Watercourses.

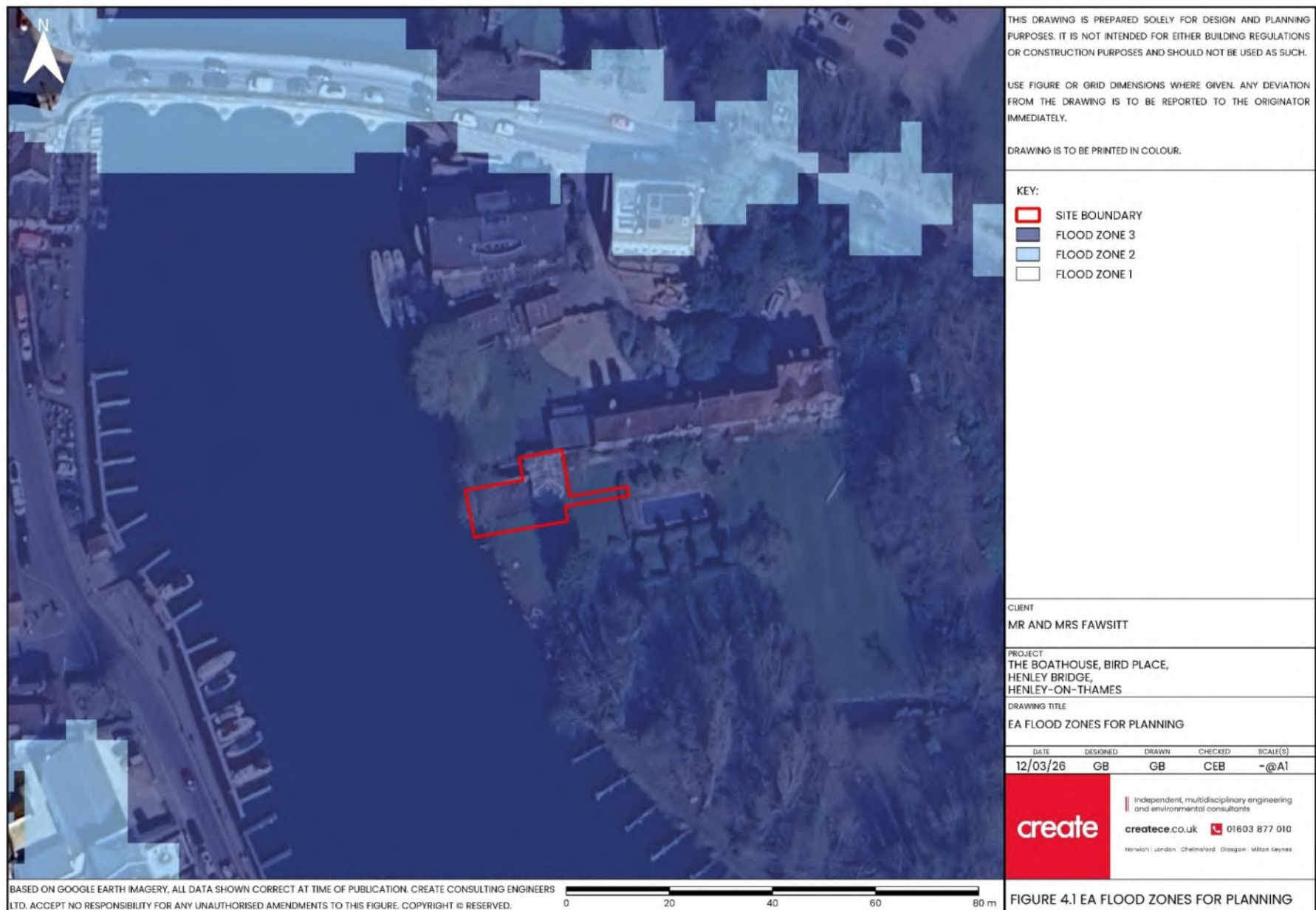


Figure 4.1: Flood Map for Planning and associated watercourses

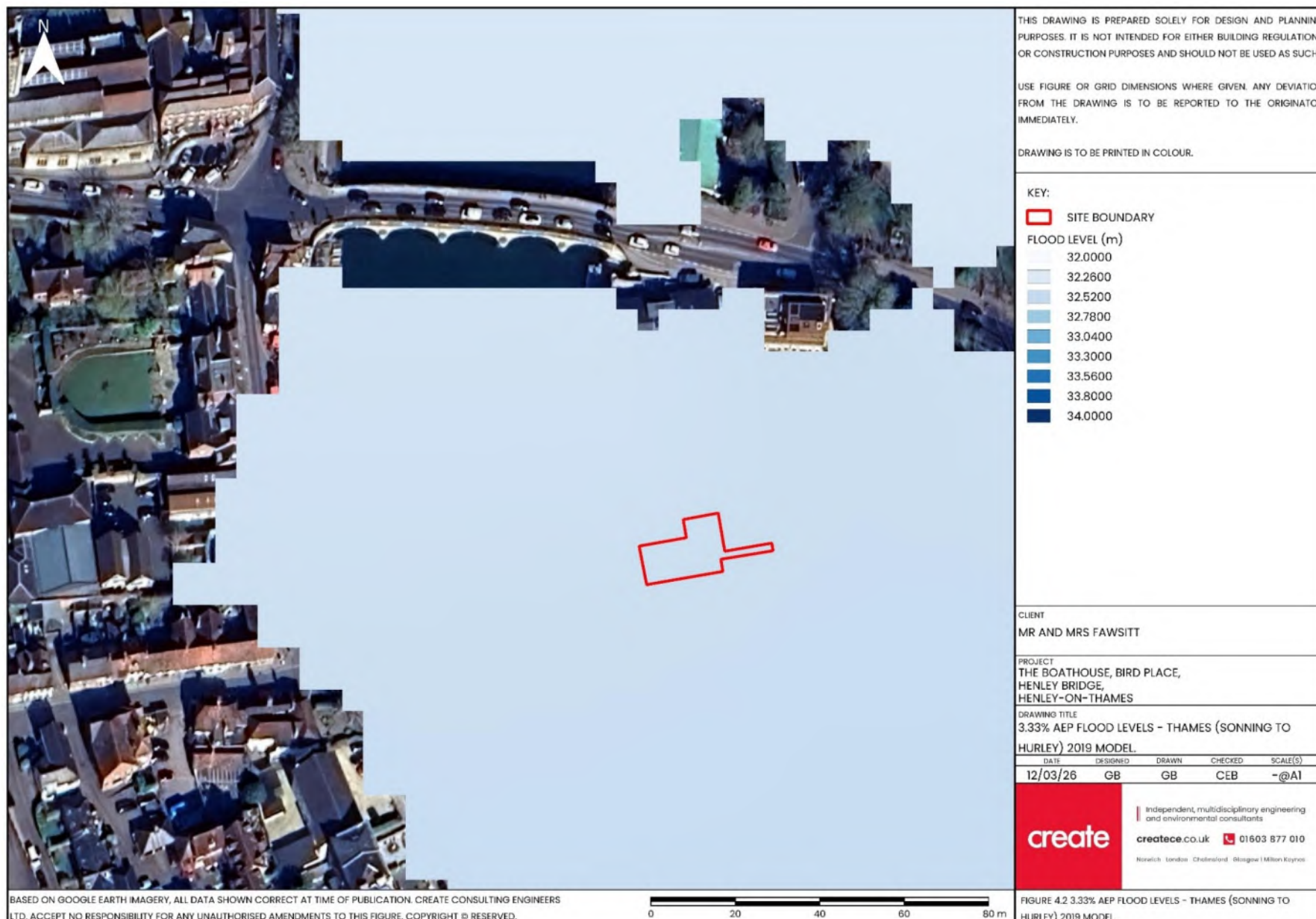


Figure 4.2: 3.33% AEP Flood Levels – Thames (Sonning to Hurley) 2019 model.

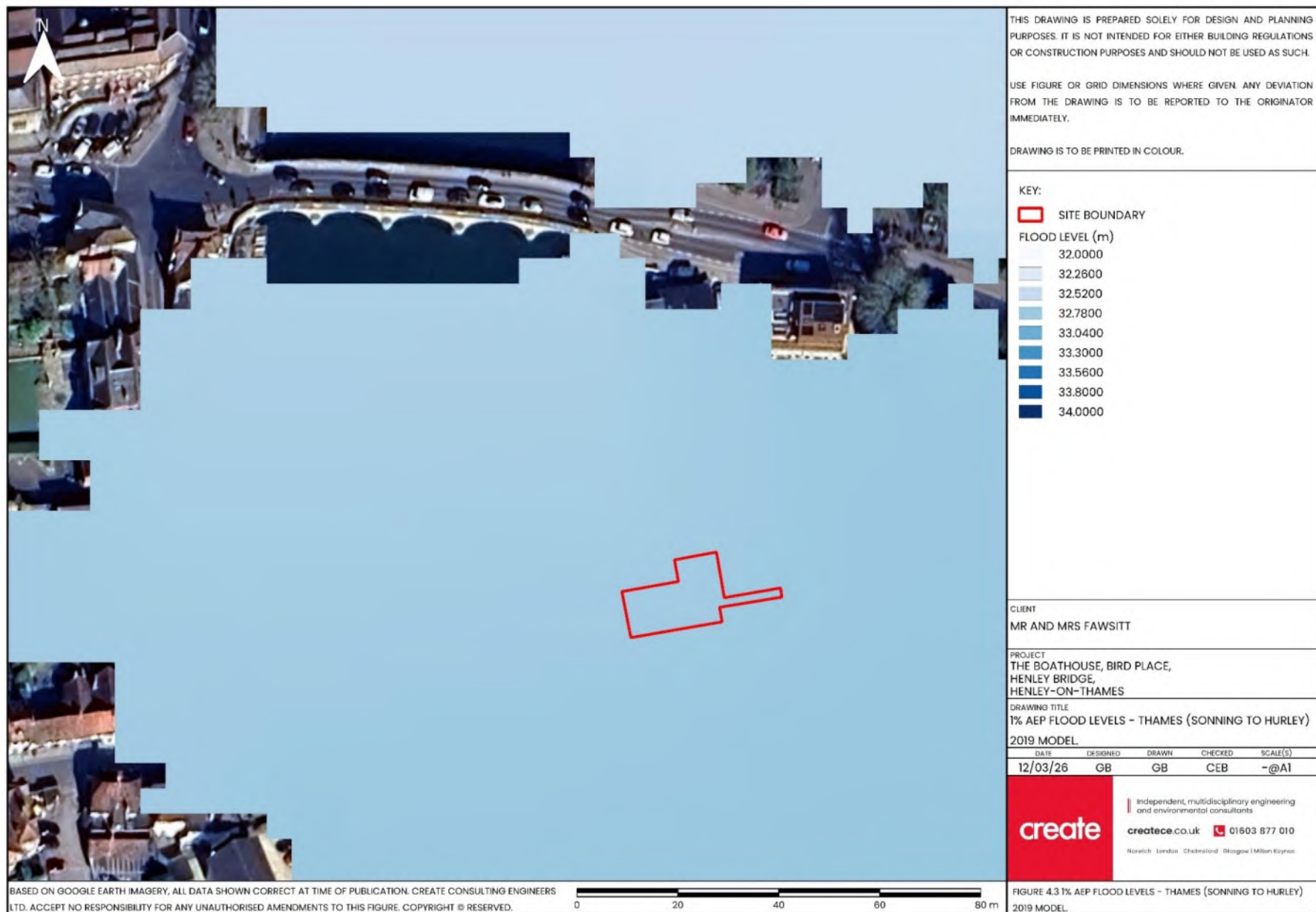


Figure 4.3: 1% AEP Flood Levels – Thames (Sonning to Hurley) 2019 model

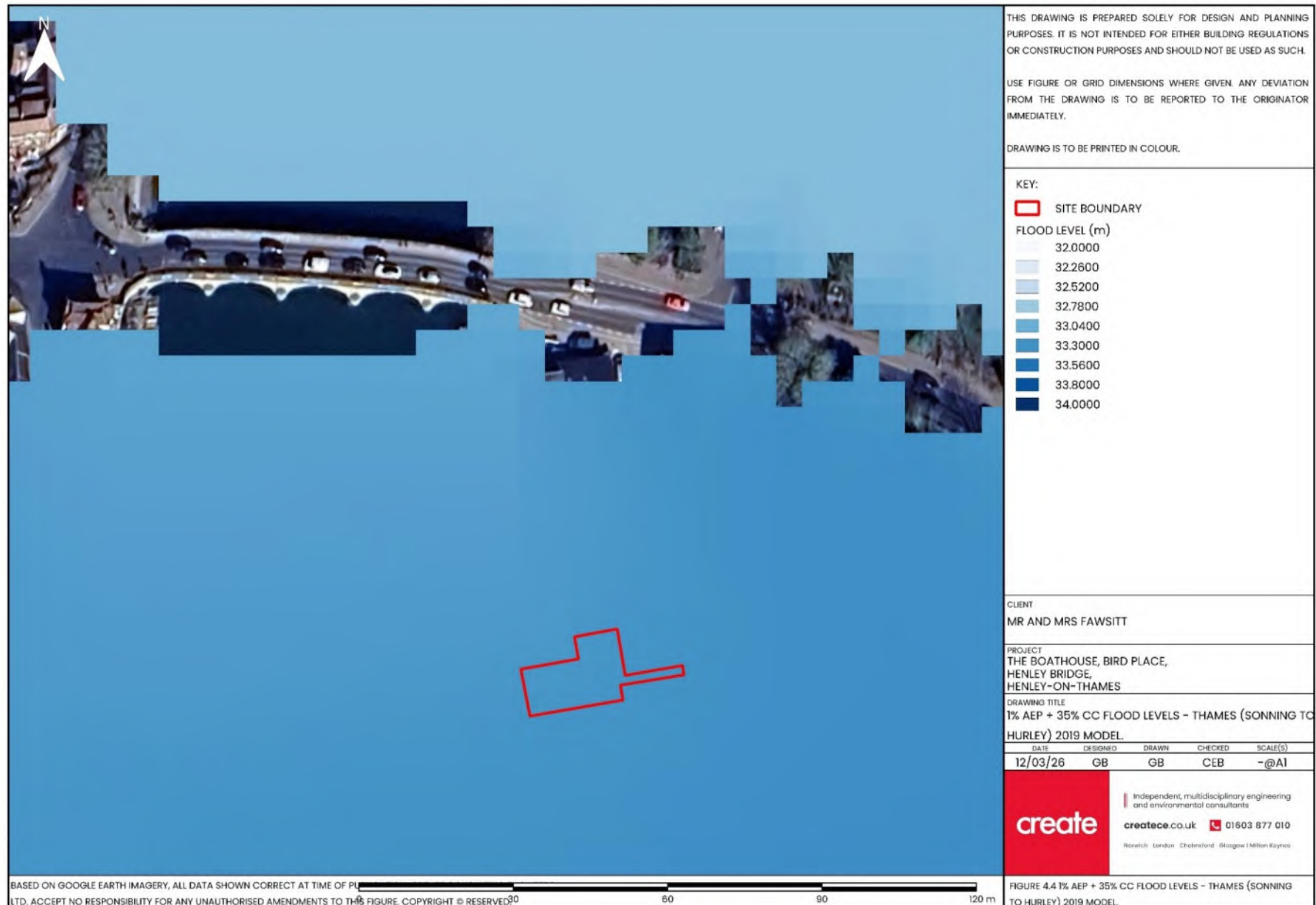


Figure 4.4: 1% AEP +35 CC Flood Levels – Thames (Sonning to Hurley) 2019 model



Figure 4.5: BGS Bedrock Geology



Figure 4.6: BGS Superficial Geology



Figure 4.7: EA Risk of Flooding from Reservoirs

APPENDIX A

Thames Water – Clean & Wastewater Plans

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Henley Bridge
Henley-on-thames
RG9 2LN

Your reference P25-3458

Our reference ALS/ALS Standard/2025_5132110

Search date 10 March 2025

Keeping you up-to-date

We have a new website and email address

Website URL: thameswater.co.uk/propertysearches

Email address: property.searches@thameswater.co.uk

Please do get in contact with us if you have any questions.



Thames Water Utilities Ltd
Property Searches,
Clearwater Court, Vastern Road, Reading RG1 8DB



property.searches@thameswater.co.uk
thameswater.co.uk/propertysearches



0800 009 4540

Search address supplied: Bird Place, Henley Bridge, Henley-on-thames, RG9 2LN

Dear Sir / Madam

An Asset Location Search is recommended when undertaking a site development. It is essential to obtain information on the size and location of clean water and sewerage assets to safeguard against expensive damage and allow cost-effective service design.

The following records were searched in compiling this report: - the map of public sewers & the map of waterworks. Thames Water Utilities Ltd (TWUL) holds all of these.

This search provides maps showing the position and size of Thames Water assets close to the proposed development and also manhole cover and invert levels, where available.

Please note that none of the charges made for this report relate to the provision of Ordnance Survey mapping information. The replies contained in this letter are given following inspection of the public service records available to this company. No responsibility can be accepted for any error or omission in the replies.

You should be aware that the information contained on these plans is current only on the day that the plans are issued. The plans should only be used for the duration of the work that is being carried out at the present time. Under no circumstances should this data be copied or transmitted to parties other than those for whom the current work is being carried out.

Thames Water do update these service plans on a regular basis and failure to observe the above conditions could lead to damage arising to new or diverted services at a later date.

Contact Us

If you have any further queries regarding this enquiry please feel free to contact a member of the team on 0800 009 4540, or use the contact details below:

Thames Water Utilities Ltd
Property Searches
Clearwater Court
Vastern Road
Reading
RG1 8DB

Email: property.searches@thameswater.co.uk

Web: thameswater.co.uk/propertysearches

Waste Water Services

Please provide a copy extract from the public sewer map.

Enclosed is a map showing the approximate lines of our sewers. Our plans do not show sewer connections from individual properties or any sewers not owned by Thames Water unless specifically annotated otherwise. Records such as "private" pipework are in some cases available from the Building Control Department of the relevant Local Authority. Where the Local Authority does not hold such plans it might be advisable to consult the property deeds for the site or contact neighbouring landowners. The public sewer map relates only to sewerage apparatus of Thames Water Utilities Ltd, it does not disclose details of cables and or communications equipment that may be running through or around such apparatus. The sewer level information contained in this response represents all of the level data available in our existing records. Should you require any further Information, please refer to the relevant section within the 'Further Contacts' page found later in this document.

For your guidance:

- The Company is not generally responsible for rivers, watercourses, ponds, culverts or highway drains. If any of these are shown on the copy extract they are shown for information only.
- Any private sewers or lateral drains which are indicated on the extract of the public sewer map as being subject to an agreement under Section 104 of the Water Industry Act 1991 are not an 'as constructed' record. It is recommended these details be checked with the developer.

Clean Water Services

Please provide a copy extract from the public water main map.

Enclosed is a map showing the approximate positions of our water mains and associated apparatus. Please note that records are not kept of the positions of individual domestic supplies.

For your information, there will be a pressure of at least 10m head at the outside stop valve. If you would like to know the static pressure, please contact our Customer



Centre on 0800 316 9800. The Customer Centre can also arrange for a full flow and pressure test to be carried out for a fee.

For your guidance:

- Assets other than vested water mains may be shown on the plan, for information only.
- If an extract of the public water main record is enclosed, this will show known public water mains in the vicinity of the property. It should be possible to estimate the likely length and route of any private water supply pipe connecting the property to the public water network.

Further contacts:

Waste Water queries

Should you require verification of the invert levels of public sewers, by site measurement, you will need to approach the relevant Thames Water Area Network Office for permission to lift the appropriate covers. This permission will usually involve you completing a TWOSA form. You can do this by emailing customer.feedback@thameswater.co.uk with the email subject header 'Enquiry – TWOSA', along with details of the request.

If you have any questions regarding sewer connections, budget estimates, diversions or building over issues please direct them to our service desk which can be contacted by writing to:

Developer Services (Waste Water)
Thames Water
Clearwater Court
Vastern Road
Reading
RG1 8DB

Tel: 0800 009 3921
Email: developer.services@thameswater.co.uk

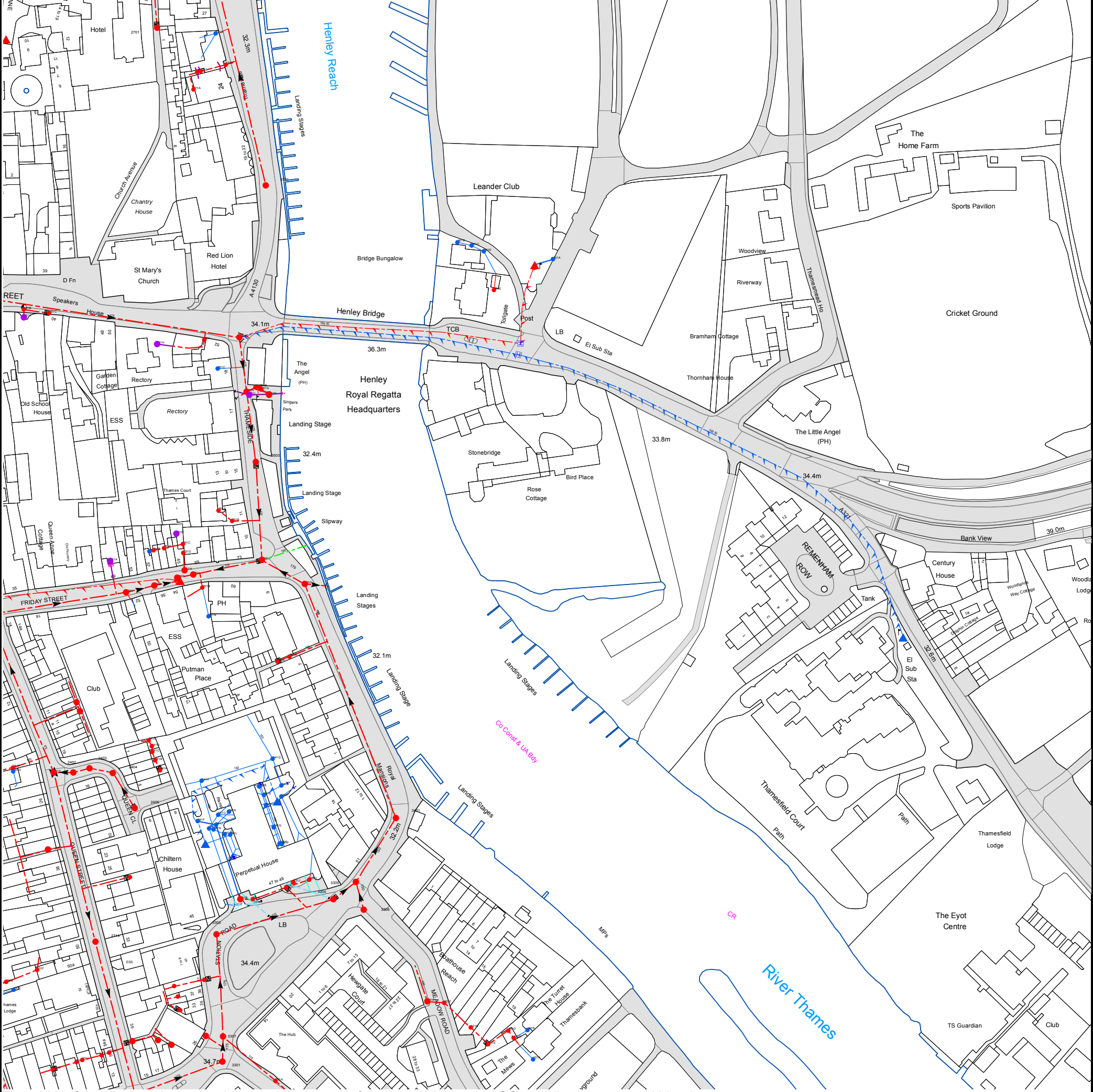
Clean Water queries

Should you require any advice concerning clean water connections, please contact:

Developer Services (Clean Water)
Thames Water
Clearwater Court
Vastern Road
Reading
RG1 8DB

Tel: 0800 009 3921
Email: developer.services@thameswater.co.uk

Asset Location Search Sewer Map - ALS/ALS Standard/2025 5132110



The width of the displayed area is 500 m and the centre of the map is located at OS coordinates 476455,182546
The position of the apparatus shown on this plan is given without obligation and warranty, and the accuracy cannot be guaranteed. Service pipes are not shown but their presence should be anticipated. No liability of any kind whatsoever is accepted by Thames Water for any error or omission. The actual position of mains and services must be verified and established on site before any works are undertaken.

Based on the Ordnance Survey Map (2024) with the Sanction of the controller of H.M. Stationery Office, License no. AC0000849556 Crown Copyright Reserved.

NB. Levels quoted in metres Ordnance Newlyn Datum. The value -9999.00 indicates that no survey information is available

Manhole Reference	Manhole Cover Level	Manhole Invert Level
261A	n/a	n/a
261C	n/a	n/a
261B	n/a	n/a
3503	32.43	31.06
361I	n/a	n/a
361D	31.97	29.4
361H	32.71	31.46
361G	n/a	n/a
361E	32.31	31.72
361F	32.42	31.8
361C	n/a	n/a
3601	34.1	31.72
3701	32.05	31.03
271A	n/a	n/a
271C	n/a	n/a
271B	n/a	n/a
371B	n/a	n/a
371A	n/a	n/a
2701	n/a	n/a
341A	n/a	n/a
2501	33.96	31.82
2502	32.6	29.16
3506	n/a	n/a
251I	n/a	n/a
251H	n/a	n/a
251A	n/a	n/a
3501	32.55	30.41
251G	n/a	n/a
251F	n/a	n/a
251B	n/a	n/a
251E	n/a	n/a
251C	n/a	n/a
251D	n/a	n/a
351B	n/a	n/a
351A	n/a	n/a
2411	n/a	n/a
2412	n/a	n/a
241P	n/a	n/a
241O	n/a	n/a
2408	n/a	n/a
2410	36.54	34.06
2402	36.48	34.58
2403	36.43	34.69
2404	36.41	34.76
2318	n/a	n/a
2405	36.45	34.97
241E	n/a	n/a
241D	n/a	n/a
241C	n/a	n/a
241B	n/a	n/a
241A	n/a	n/a
241F	34.14	33.2
241H	32.69	31.38
241G	n/a	31.53
341N	34.08	31.53
341J	34.07	33.09
341O	n/a	31.53
341M	32.17	31.56
341K	34.1	33.17
341L	32.17	31.31
341B	32.17	31.67
341E	32.17	31.03
341C	32.17	31.33
341Q	n/a	n/a
341G	32.17	31.47
3401	32.2	31.2
331K	n/a	n/a
431F	n/a	n/a
461B	n/a	n/a
421Q	n/a	n/a
461C	n/a	n/a
461D	n/a	n/a
431E	n/a	n/a
461E	n/a	n/a
431D	n/a	n/a
431C	n/a	n/a
431B	n/a	n/a
431A	n/a	n/a
461A	n/a	n/a
231E	n/a	n/a
231C	n/a	n/a
231F	n/a	n/a
231G	n/a	n/a
231J	n/a	n/a
231I	n/a	n/a
2314	35.92	33.6
231A	n/a	n/a
231H	n/a	n/a
2315	n/a	n/a
2304	n/a	n/a
2305	n/a	n/a

Manhole Reference	Manhole Cover Level	Manhole Invert Level
2310	n/a	n/a
2309	n/a	n/a
2308	n/a	n/a
2316	n/a	n/a
2317	n/a	n/a
3303	34.86	32.59
3301	34.61	32.96
3307	34.39	32.87
331F	n/a	n/a
331B	n/a	n/a
331C	n/a	n/a
331H	n/a	n/a
331A	n/a	n/a
3306	32.64	31.6
3304	32.91	31.4
331E	n/a	n/a
331I	n/a	n/a
331J	n/a	n/a
3305	32.73	31.33
331D	n/a	n/a
341F	32.17	31.35
341H	n/a	31.47
341P	n/a	31.53
341D	34.1	30.6
341R	n/a	n/a
3502	32.33	30.46
The position of the apparatus shown on this plan is given without obligation and warranty, and the accuracy cannot be guaranteed. Service pipes are not shown but their presence should be anticipated. No liability of any kind whatsoever is accepted by Thames Water for any error or omission. The actual position of mains and services must be verified and established on site before any works are undertaken.		



Asset Location Search - Sewer Key

Public Sewer Types (Operated and maintained by Thames Water)

	Foul Sewer: A sewer designed to convey waste water from domestic and industrial sources to a treatment works.
	Surface Water Sewer: A sewer designed to convey surface water (e.g. rain water from roofs, yards and car parks) to rivers or watercourses.
	Combined Sewer: A sewer designed to convey both waste water and surface water from domestic and industrial sources to a treatment works.
	Storm Sewer
	Sludge Sewer
	Foul Trunk Sewer
	Surface Trunk Sewer
	Combined Trunk Sewer
	Foul Rising Main
	Surface Water Rising Main
	Combined Rising Main
	Vacuum
	Thames Water Proposed
	Vent Pipe
	Gallery

Other Sewer Types (Not operated and maintained by Thames Water)

	Sewer		Culverted Watercourse
	Proposed		Decommissioned Sewer
	Content of this drainage network is currently unknown		Ownership of this drainage network is currently unknown

Notes:

- 1) All levels associated with the plans are to Ordnance Datum Newlyn.
- 2) All measurements on the plan are metric.
- 3) Arrows (on gravity fed sewers) or flecks (on rising mains) indicate the direction of flow.
- 4) Most private pipes are not shown on our plans, as in the past, this information has not been recorded.

Sewer Fittings

A feature in a sewer that does not affect the flow in the pipe. Example: a vent is a fitting as the function of a vent is to release excess gas.

	Air Valve		Meter
	Dam Chase		Vent
	Fitting		

Operational Controls

A feature in a sewer that changes or diverts the flow in the sewer. Example: A hydrobrake limits the flow passing downstream.

	Ancillary		Drop Pipe
	Control Valve		Weir

End Items

End symbols appear at the start or end of a sewer pipe. Examples: an Undefined End at the start of a sewer indicates that Thames Water has no knowledge of the position of the sewer upstream of that symbol. Outfall on a surface water sewer indicates that the pipe discharges into a stream or river.

	Inlet		Outfall
	Undefined End		

Other Symbols

Symbols used on maps which do not fall under other general categories.

	Change of Characteristic Indicator		Public / Private Pumping Station
	Invert Level		Summit

Areas

Lines denoting areas of underground surveys, etc.

	Agreement
	Chamber
	Operational Site

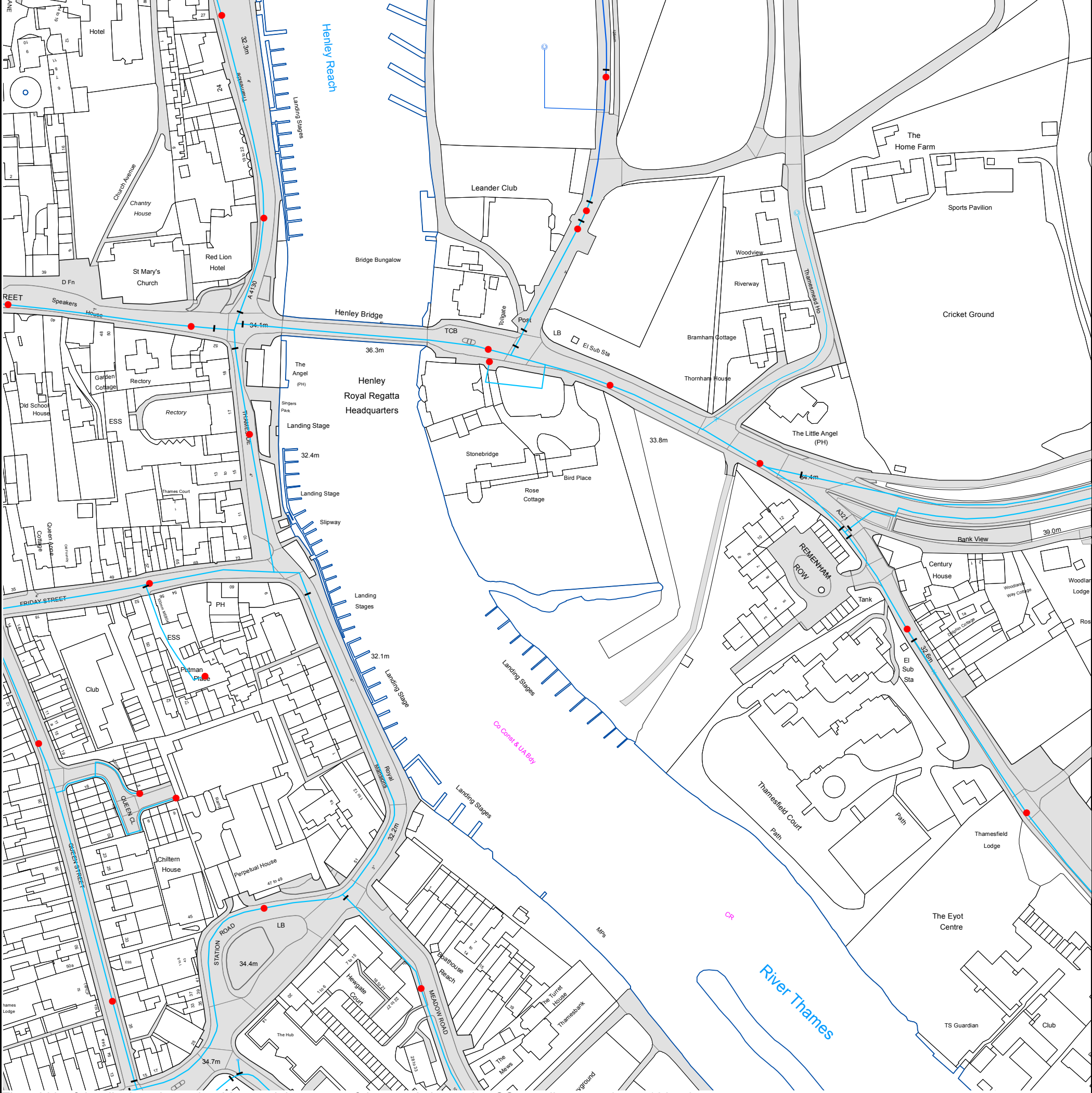
Ducts or Crossings

	Casement	Ducts may contain high voltage cables. Please check with Thames Water.
	Conduit Bridge	
	Subway	
	Tunnel	

5) 'na' or '0' on a manhole indicates that data is unavailable.

6) The text appearing alongside a sewer line indicates the internal diameter of the pipe in millimeters. Text next to a manhole indicates the manhole reference number and should not be taken as a measurement. If you are unsure about any text or symbology, please contact Property Searches on 0800 009 4540.

Asset Location Search Water Map - ALS/ALS Standard/2025_5132110



The width of the displayed area is 500 m and the centre of the map is located at OS coordinates 476455, 182546.
The position of the apparatus shown on this plan is given without obligation and warranty, and the accuracy cannot be guaranteed. Service pipes are not shown but their presence should be anticipated. No liability of any kind whatsoever is accepted by Thames Water for any error or omission. The actual position of mains and services must be verified and established on site before any works are undertaken.

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Asset Location Search - Water Key

Water Pipes (Operated & Maintained by Thames Water)

- 4"** **Distribution Main:** The most common pipe shown on water maps. With few exceptions, domestic connections are only made to distribution mains.
- 16"** **Trunk Main:** A main carrying water from a source of supply to a treatment plant or reservoir, or from one treatment plant or reservoir to another. Also a main transferring water in bulk to smaller water mains used for supplying individual customers.
- 3" SUPPLY** **Supply Main:** A supply main indicates that the water main is used as a supply for a single property or group of properties.
- 3" FIRE** **Fire Main:** Where a pipe is used as a fire supply, the word FIRE will be displayed along the pipe.
- 3" METERED** **Metered Pipe:** A metered main indicates that the pipe in question supplies water for a single property or group of properties and that quantity of water passing through the pipe is metered even though there may be no meter symbol shown.
- Transmission Tunnel:** A very large diameter water pipe. Most tunnels are buried very deep underground. These pipes are not expected to affect the structural integrity of buildings shown on the map provided.
- Proposed Main:** A main that is still in the planning stages or in the process of being laid. More details of the proposed main and its reference number are generally included near the main.

PIPE DIAMETER	DEPTH BELOW GROUND
Up to 300mm (12")	900mm (3')
300mm - 600mm (12" - 24")	1100mm (3' 8")
600mm and bigger (24" plus)	1200mm (4')

Valves

- General Purpose Valve
- Air Valve
- Pressure Control Valve
- Customer Valve

Hydrants

- Single Hydrant

Meters

- Meter

End Items

Symbol indicating what happens at the end of a water main.

- Blank Flange
- Capped End
- Emptying Pit
- Undefined End
- Manifold
- Customer Supply
- Fire Supply

Operational Sites

- Booster Station
- Other
- Other (Proposed)
- Pumping Station
- Service Reservoir
- Shaft Inspection
- Treatment Works
- Unknown
- Water Tower

Other Symbols

- Data Logger
- Casement:** Ducts may contain high voltage cables. Please check with Thames Water.

Other Water Pipes (Not Operated or Maintained by Thames Water)

- Other Water Company Main:** Occasionally other water company water pipes may overlap the border of our clean water coverage area. These mains are denoted in purple and in most cases have the owner of the pipe displayed along them.
- Private Main:** Indicates that the water main in question is not owned by Thames Water. These mains normally have text associated with them indicating the diameter and owner of the pipe.

APPENDIX B

Thames Water Sewer Flooding History

Sewer Flooding

History Enquiry



Property
Searches

Create Consulting Engineers Ltd

15 PRINCES STREET,

Search address supplied

Bird Place
Henley Bridge
Henley-on-thames
RG9 2LN

Your reference

P25-3458

Our reference

SFH/SFH Standard/2025_5132116

Received date

10 March 2025

Search date

10 March 2025



Thames Water Utilities Ltd
Property Searches, Clearwater Court, Vastern Road, Reading RG1 8DB



property.searches@thameswater.co.uk
thameswater.co.uk/propertysearches



0800 009 4540

Sewer Flooding

History Enquiry



Property
Searches

Search address supplied: Bird Place, Henley Bridge, Henley-on-thames, RG9 2LN

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

TWUL are responsible in respect of the following:-

- (i) any negligent or incorrect entry in the records searched;
- (ii) any negligent or incorrect interpretation of the records searched;
- (iii) and any negligent or incorrect recording of that interpretation in the search report
- (iv) compensation payments



Thames Water Utilities Ltd
Property Searches, Clearwater Court, Vastern Road, Reading RG1 8DB



property.searches@thameswater.co.uk
thameswater.co.uk/propertysearches



0800 009 4540

History of Sewer Flooding

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

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

For your guidance:

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



Thames Water Utilities Ltd
Property Searches, Clearwater Court, Vastern Road, Reading RG1 8DB



property.searches@thameswater.co.uk
thameswater.co.uk/propertysearches



0800 009 4540

APPENDIX C

Brownfield and Greenfield Runoff Rates

M5-60 : 20 mm
r : 0.45
Wallingford Method - maps

For different durations, From Table 1

Duration, D	Z1			
15 min	0.65	M5-15:	Z1 x M5-60	13.00 mm
30 min	0.82	M5-30:	Z1 x M5-60	16.40 mm
60 min	1	M5-60:	Z1 x M5-60	20.00 mm
6hr	1.51	M5-360:	Z1 x M5-60	30.20 mm

For different return intervals,

From Table 2*

		Z2	
Duration, D	M1	M30	M100
15 min	0.62	1.52	1.96
30 min	0.62	1.53	2.00
60 min	0.64	1.54	2.03
6 hr	0.68	1.51	1.97

Average point intensity, API = I/(D/60)

	D (min)	Calculation	I (mm)	API (mm/hr)
M 1-15	15	M5-15*Z2(M1)	8.06	32.24
M 1-30	30	M5-30*Z2(M1)	10.17	20.34
M 1-60	30	M5-360*Z2(M1)	12.80	25.60
M1-360	360	M5-360*Z2(M1)	20.54	3.42
M 30-15	15	M5-15*Z2(M30)	19.76	79.04
M 30-30	30	M5-30*Z2(M30)	25.09	50.18
M 30-60	60	M5-60*Z2(M30)	30.80	30.80
M30-360	360	M5-360*Z2(M30)	45.60	7.60
M 100-15	15	M5-15*Z2(M100)	25.48	101.92
M 100-30	30	M5-30*Z2(M100)	32.80	65.60
M100-60	60	M5-60*Z2(M100)	40.60	40.60
M100-360	360	M5-360*Z2(M100)	59.49	9.92

Peak Runoff

Q=2.78CiA Rational Method, SUDS Manual Section 4.3.3

where:

(1) C = Cv Cr

(2) i = API, defined above

(3) A = areas measured for subcatchments

therefore ,

Q=2.78CiA

Cv = 1

Cr = 1.3

C = 1.3

2.78*C= 3.614

**

constant value for design purposes

		Contributing Impermeable Area (ha)	
	i mm/hr	Site	Per hectare
		0.006	1
M 1-15	32.24	0.70	116.52
M 1-30	20.34	0.44	73.49

		Contributing Impermeable Area (ha)	
	i mm/hr	Site	Per hectare
		0.0089	1
M 30-60	30.80	0.67	181.36
M30-360	7.60	0.16	27.47

Table 1

Minutes r	Rainfall Duration D									
	5	10	15	30	1	2	4	6	10	24
0.12	0.22	0.34	0.45	0.67	1.00	1.48	2.17	2.75	3.70	6.00
0.15	0.25	0.38	0.48	0.69	1.00	1.42	2.02	2.46	3.32	4.90
0.18	0.27	0.41	0.51	0.71	1.00	1.36	1.86	2.25	2.86	4.30
0.21	0.29	0.43	0.54	0.73	1.00	1.33	1.77	2.12	2.62	3.60
0.24	0.31	0.46	0.56	0.75	1.00	1.30	1.71	2.00	2.40	3.35
0.27	0.33	0.48	0.58	0.76	1.00	1.27	1.64	1.88	2.24	3.10
0.30	0.34	0.49	0.59	0.77	1.00	1.25	1.57	1.78	2.12	2.84
0.33	0.35	0.50	0.61	0.78	1.00	1.23	1.53	1.73	2.04	2.60
0.36	0.36	0.51	0.62	0.79	1.00	1.22	1.48	1.67	1.90	2.42
0.39	0.37	0.52	0.63	0.80	1.00	1.21	1.46	1.62	1.82	2.28
0.42	0.38	0.53	0.64	0.81	1.00	1.20	1.42	1.57	1.74	2.16
0.45	0.39	0.54	0.65	0.82	1.00	1.19	1.38	1.51	1.68	2.03

Table 2 - England and Wales

M5 rainfall	Growth Factor Z2									
	M1	M2	M3	M4	M5	M10	M20	M50	M100	M30 interpolated
5.00	0.62	0.79	0.89	0.97	1.02	1.19	1.36	1.56	1.79	1.25
10.00	0.61	0.79	0.90	0.97	1.03	1.22	1.41	1.65	1.91	1.49
15.00	0.62	0.80	0.90	0.97	1.03	1.24	1.44	1.70	1.99	1.53
20.00	0.64	0.81	0.90	0.97	1.03	1.24	1.45	1.73	2.03	1.54
25.00	0.66	0.82	0.91	0.97	1.03	1.24	1.44	1.72	2.01	1.53
30.00	0.68	0.83	0.91	0.97	1.03	1.22	1.42	1.70	1.97	1.51
40.00	0.70	0.84	0.92	0.97	1.02	1.19	1.38	1.64	1.89	1.47
50.00	0.72	0.85	0.93	0.98	1.02	1.17	1.34	1.58	1.81	1.42
75.00	0.76	0.87	0.93	0.98	1.02	1.14	1.28	1.47	1.64	1.34
100.00	0.78	0.88	0.94	0.98	1.02	1.13	1.25	1.40	1.54	1.30
150.00	0.78	0.88	0.94	0.98	1.01	1.12	1.21	1.33	1.45	1.25
200.00	0.78	0.88	0.94	0.98	1.01	1.11	1.19	1.30	1.40	1.23

* The rainfall depths from cells E8-E11 are compared with the depths given in cells J29-J40 and Z2 interpolated accordingly for each return period

** Cv varies between 0.6 (rapidly draining soils) and 0.9

P25-3458, Bird Place, Henley Bridge, Henley-On-Thames
Brownfield Run-off Calculations - Impermeable Area Only

M 1-60	25.60	0.56	73.49
M1-360	3.42	0.07	12.37
M 30-15	79.04	1.71	285.65
M 30-30	50.18	1.09	181.36

M 100-15	101.92	2.21	368.34
M 100-30	65.60	1.42	237.08
M 100-60	40.60	0.88	237.08
M100-360	9.92	0.22	35.84

(heavy clay) with an average of 0.75 taken if ground
conditions not known.

This is an estimation of the greenfield runoff rates that are used to meet normal best practice criteria in line with Environment Agency guidance “Rainfall runoff management for developments”, SC030219 (2013), the SuDS Manual C753 (CIRIA, 2015) and the non-statutory standards for SuDS (Defra, 2015). This information on greenfield runoff rates may be the basis for setting consents for the drainage of surface water runoff from sites.

Project details

Date	18/03/2026
Calculated by	
Reference	
Model version	2.2.3

Location

Site name	Bird Place, Henley-on-Thames
Site location	Bird Place, Henley-on-Thames



Site easting (British National Grid)	476431
Site northing (British National Grid)	182567

Site details

Total site area (ha)	0.006	ha
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Greenfield runoff

Method

Method	FEH statistical (2025)
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FEH statistical (2025)

	<u>My value</u>	<u>Map value</u>
SAAR9120 (mm)	679	mm
BFIHOST19scaled	0.861	
QMed-QBar conversion	1.136	1.136
QMed (l/s)	0.01	l/s
QBar (FEH statistical 2025) (l/s)	0.01	l/s

Growth curve factors

	<u>My value</u>	<u>Map value</u>
Hydrological region	6	6
1 year growth factor	0.85	
2 year growth factor	0.88	
10 year growth factor	1.62	
30 year growth factor	2.3	
100 year growth factor	3.19	
200 year growth factor	3.74	

Results

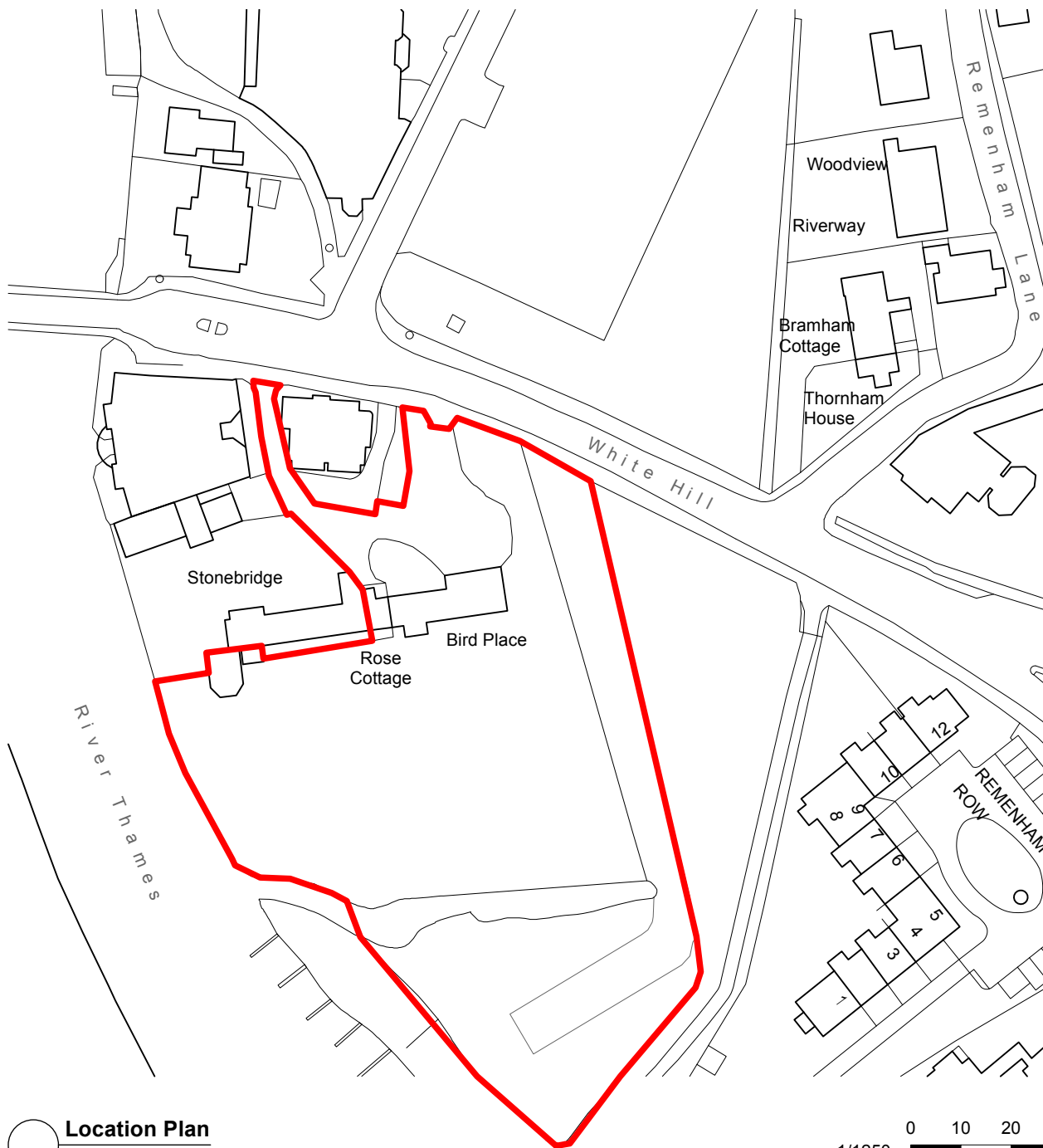
Method	FEH statistical (2025)	
Flow rate 1 year (l/s)	0.01	l/s
Flow rate 2 year (l/s)	0.01	l/s
Flow rate 10 years (l/s)	0.01	l/s
Flow rate 30 years (l/s)	0.01	l/s
Flow rate 100 years (l/s)	0.01	l/s
Flow rate 200 years (l/s)	0.01	l/s

Please note runoff estimation is subject to significant uncertainty. Results are therefore normally reported to only 1 decimal place. Where 2 decimal places are provided, this does not indicate accuracy to this level, it has been adopted to prevent ‘zero’ figures from being reported. Outputs less than 0.01 l/s are reported as 0.01 l/s.

Disclaimer

This report was produced using the Greenfield runoff rate estimation tool (2.2.3) developed by HR Wallingford and available at uksuds.com (<https://www.uksuds.com/>). The use of this tool is subject to the UK SuDS terms and conditions and licence agreement, which can both be found at uksuds.com/terms-conditions (<https://www.uksuds.com/terms-conditions>). The outputs from this tool have been used to estimate Greenfield runoff rates. The use of these results is the responsibility of the users of this tool. No liability will be accepted by HR Wallingford, the Environment Agency, Centre for Ecology and Hydrology, Wallingford Hydrosolutions or any other organisation for the use of these data in the design or operational characteristics of any drainage scheme.

PLANS



Location Plan
Scale 1:1250

1/1250 0 10 20 30 40 50 m



PL1 23/03/2026 Planning Application issue

Rev	Date	Note
Client Mr & Mrs Fawsitt Project Title Bird Place - Boat House & Outdoor Kitchen Project Address Henley Bridge, Henley-On-Thames RG9 2LN		
Drawing No.	Rev. No.	
PA-01	PL1	
Drawing Title	Location Plan	
Scale	1:1250 @ A4	
Drawn by: GG	Checked by: PS	Project ID: SC013
Shack Group Ltd West Witheridge Fourth House, Penn Road, Knotty Green HP9 2TW +44 (0) 1494 258 181 hello@shackgroup.com www.shackgroup.com		



Legend

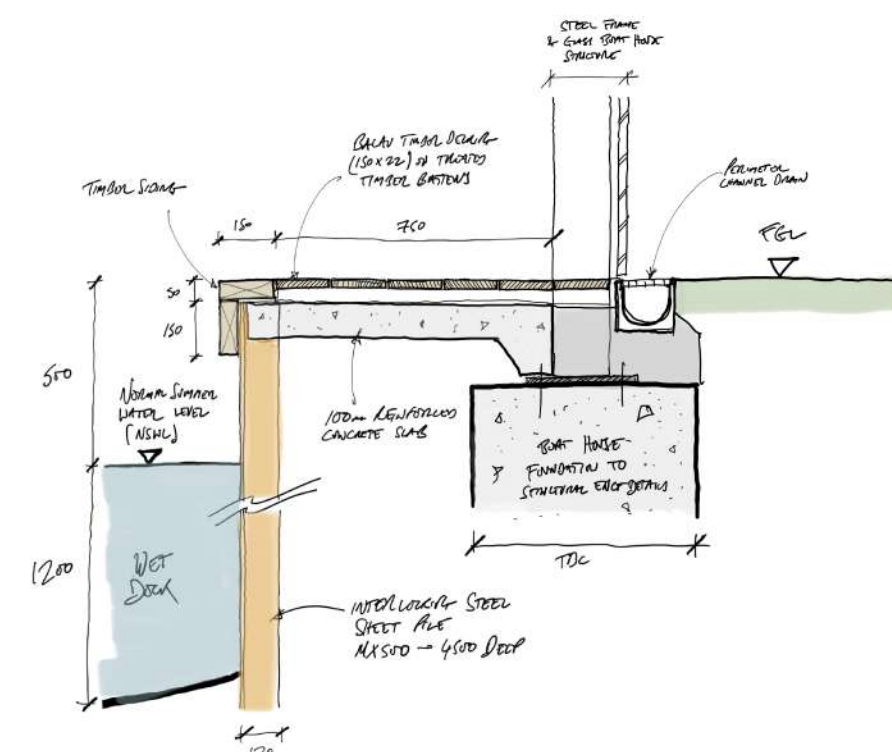
--- Boundary line

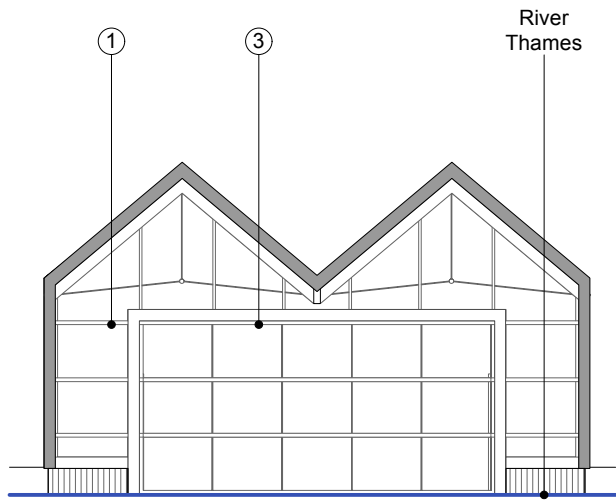
Existing tree/ vegetation



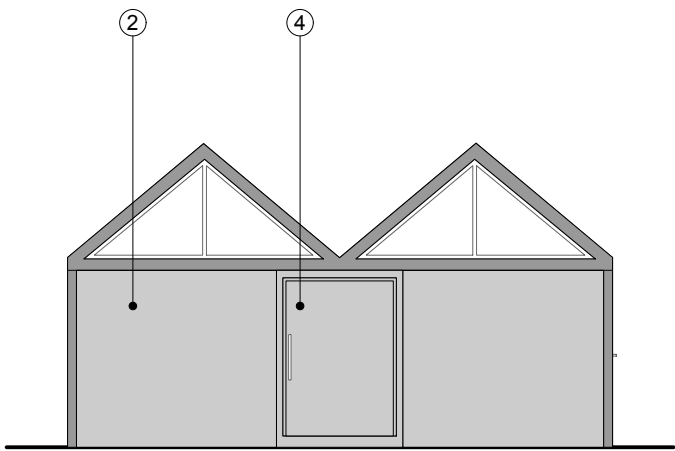
PL1 - 23/03/2026 Planning Application issue

Rev	Date	Note	Rev. No.
Client Mr & Mrs Fawcitt			
Project Title Bird Place - Boat House & Outdoor Kitchen			
Project Address Henley Bridge, Henley-On-Thames RG9 2LN			
Drawing No. PA-02		Rev. No. PL1	
Drawing Title Existing Site and Roof Plan			
Scale 1:200 @ A1			
Drawn by: GG Checked by: PS Project ID: SC013			
Shack Group Ltd West Wilberdridge Fourth House, Penn Road, Kingsley Green HP9 2TW +44 (0) 1494 258 181 hello@shackgroup.com www.shackgroup.com			

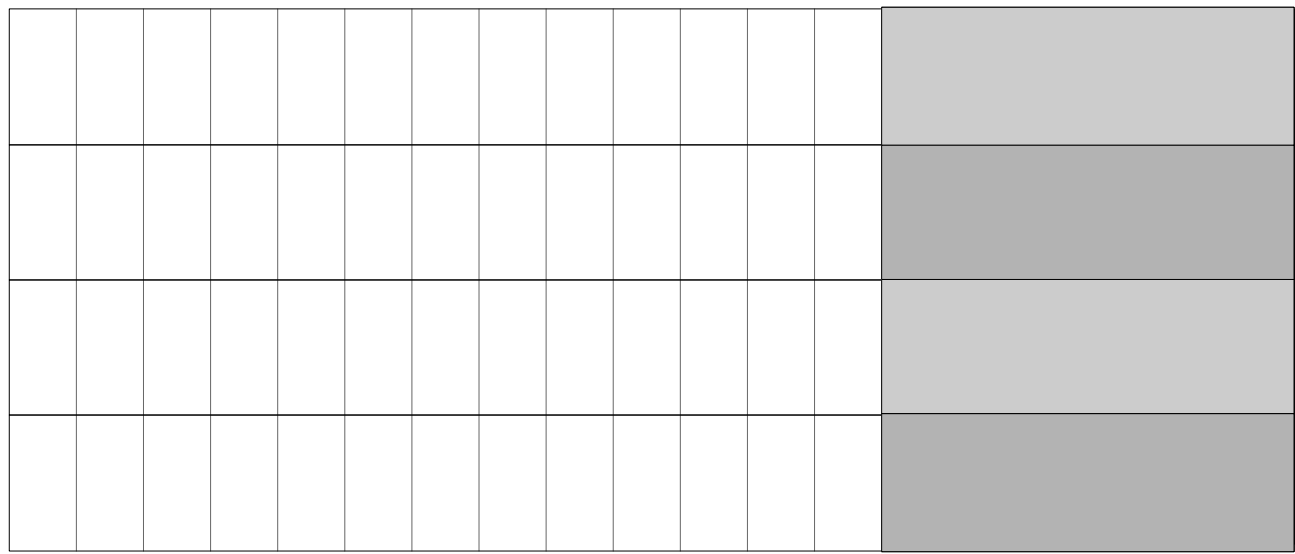
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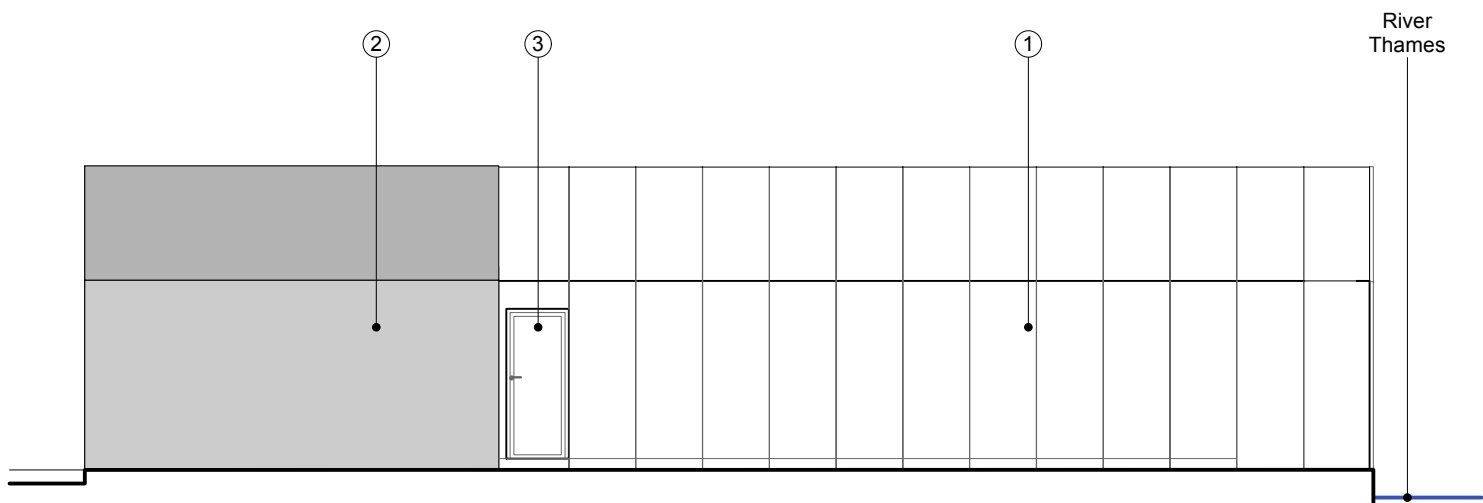
1 **Front Elevation - West**
Scale: 1:100



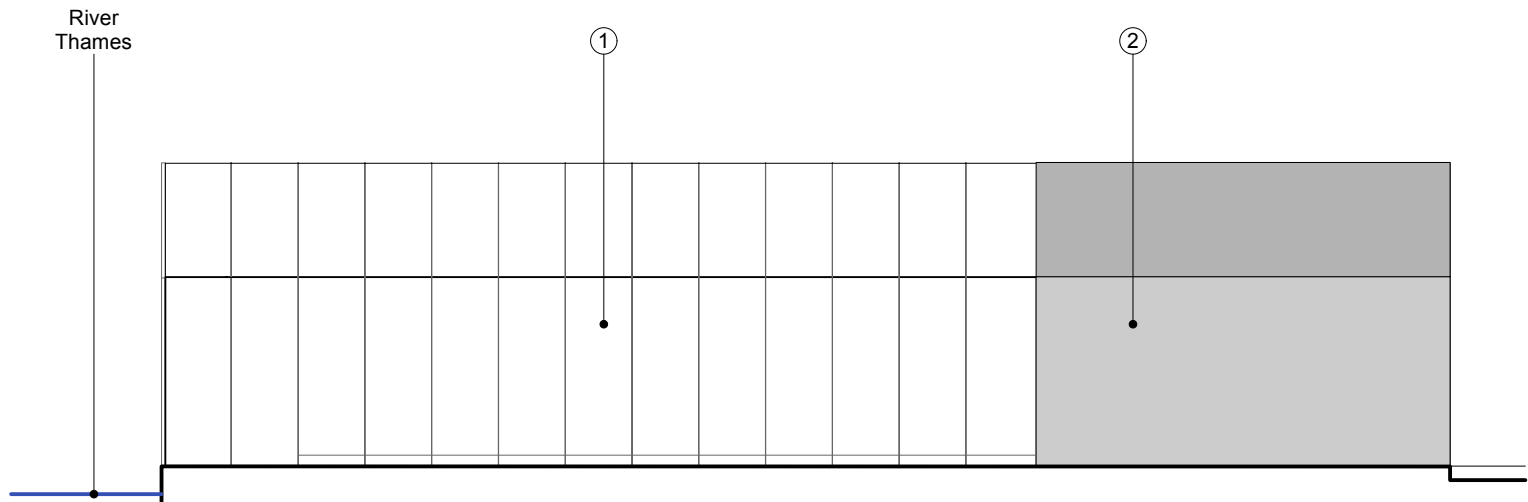
3 **Rear Elevation - East**
Scale: 1:100



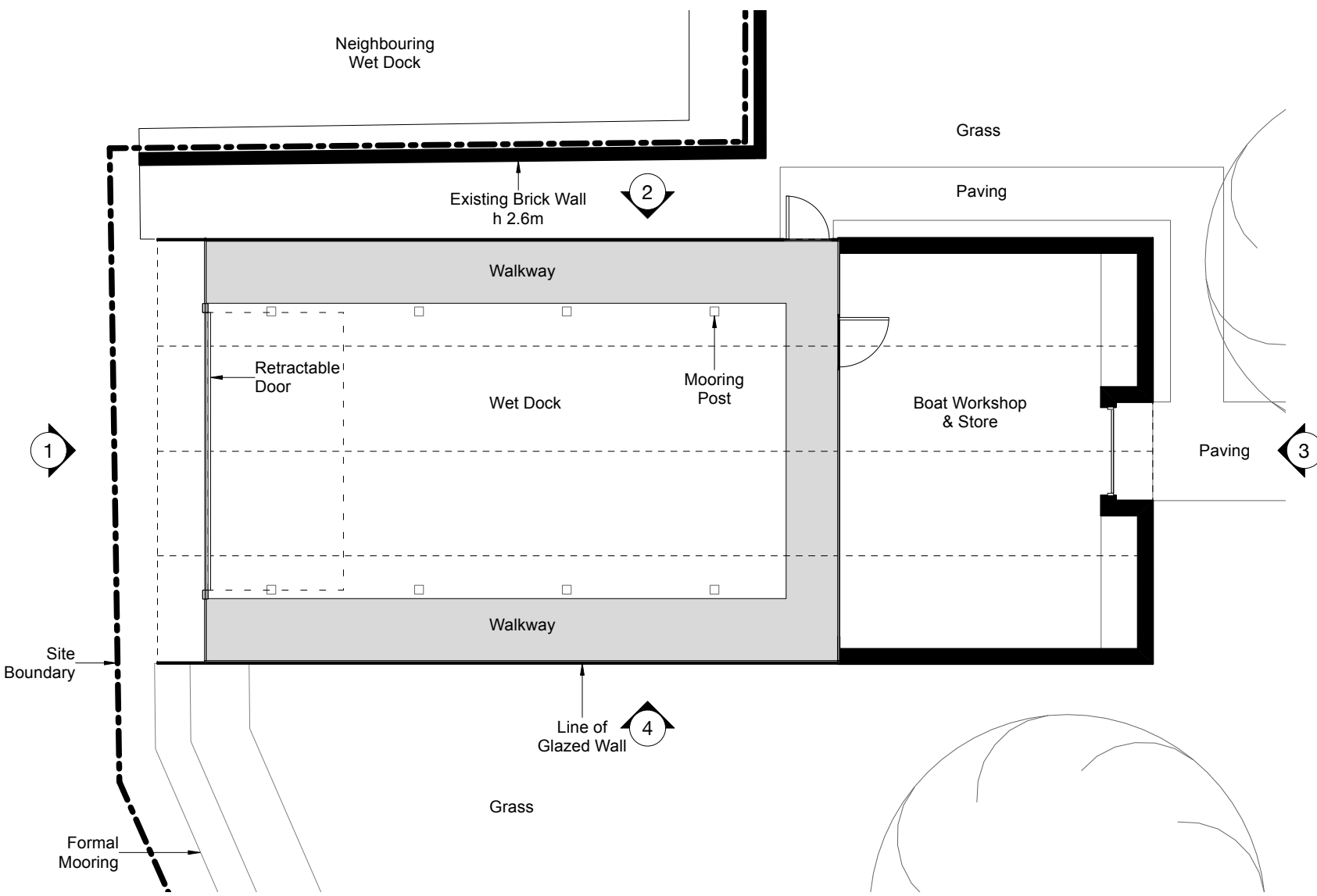
Proposed Roof Plan
Scale 1:100



2 **Side Elevation - North**
Scale: 1:100



4 **Side Elevation - South**
Scale: 1:100



Proposed Floor Plan
Scale 1:100

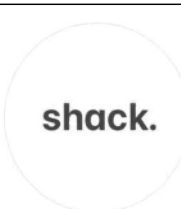
LEGEND

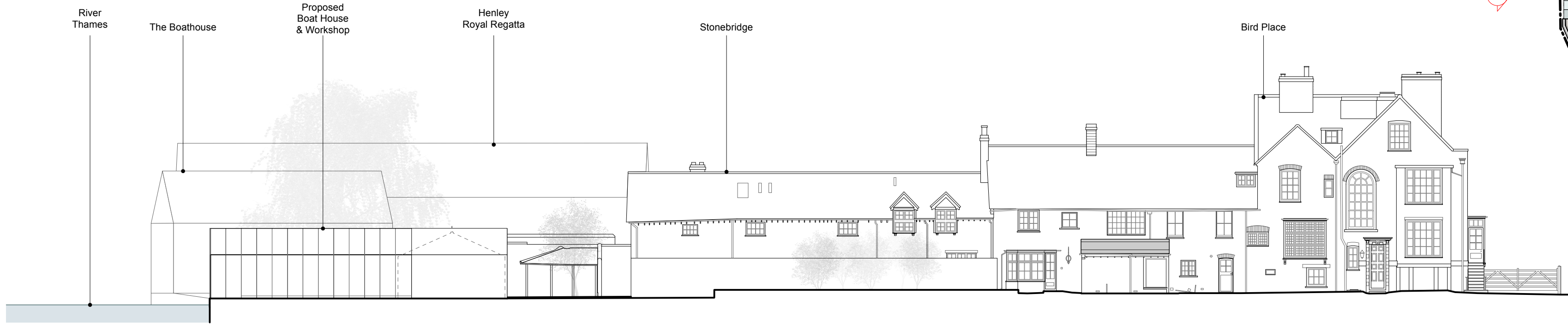
- 1 GLASS ROOF AND CLADDING
- 2 METAL ROOF AND CLADDING
- 3 GLASS DOOR
- 4 METAL CLAD DOOR

1/100 0 1 2 3 4 5 m

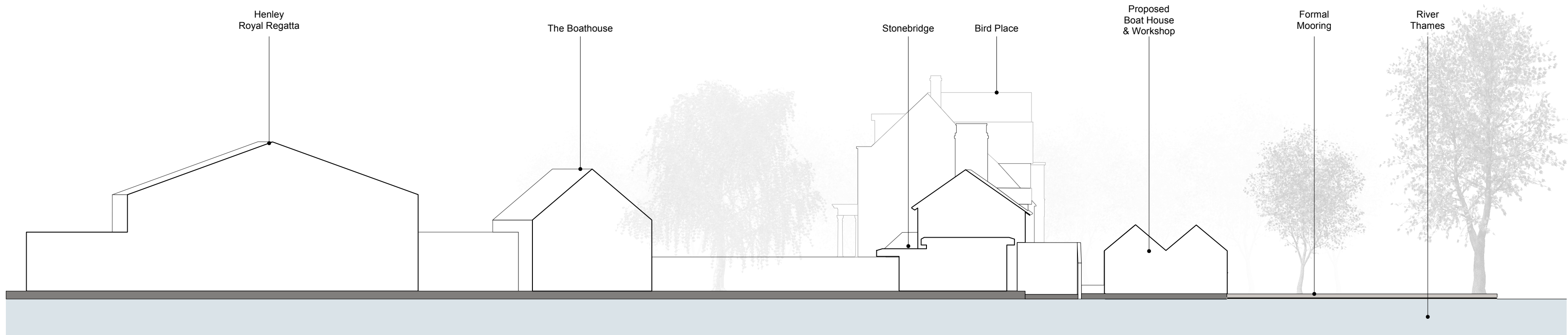


PL1 23/03/2026 Planning Application Issue

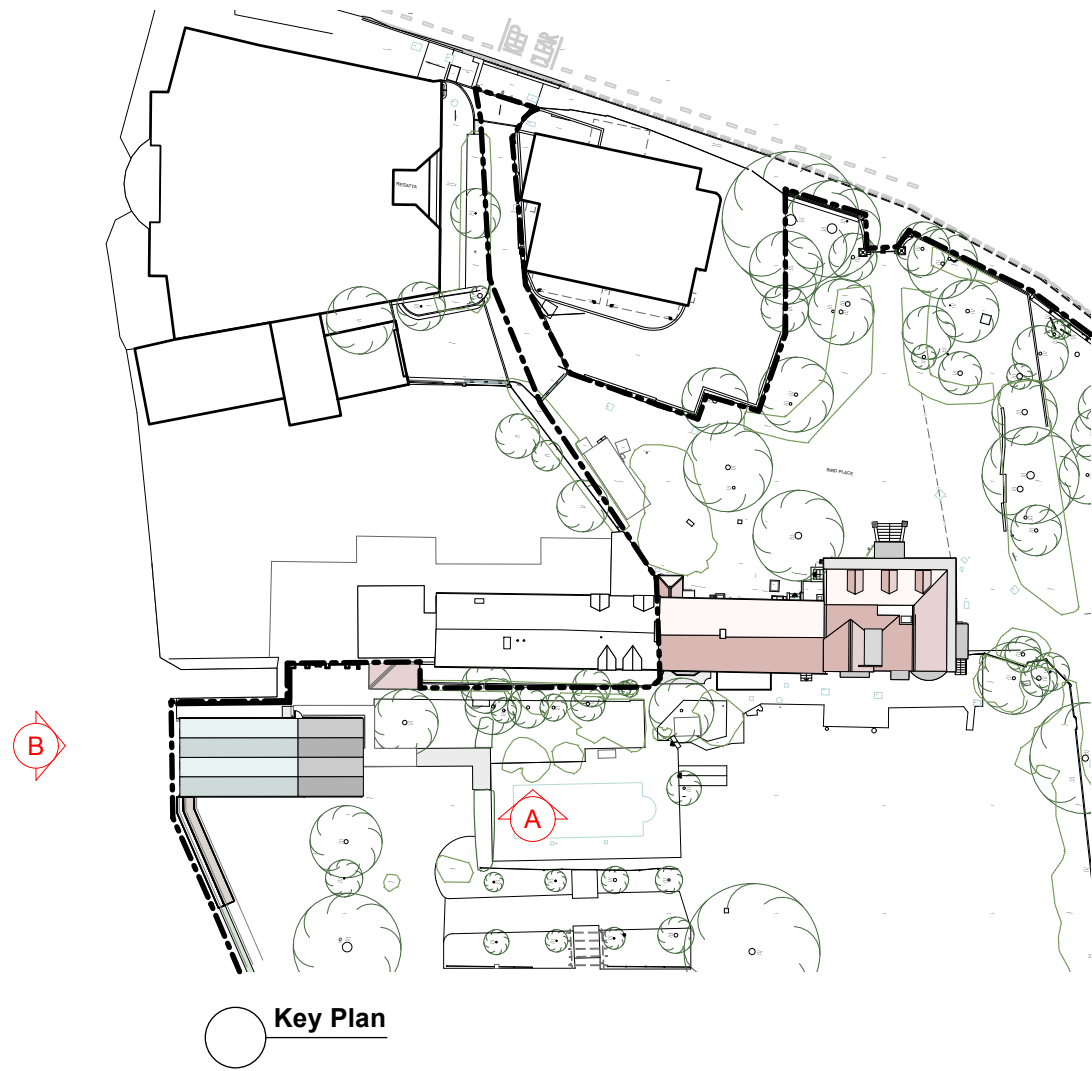
Rev	Date	Note
Client Mr & Mrs Fawsitt		
Project Title Bird Place - Boat House & Outdoor Kitchen		
Project Address Henley Bridge, Henley-On-Thames RG9 2LN		
Drawing No.	Rev. No.	
PA-04	PL1	
Drawing Title Proposed Plans and Elevations		
Scale 1:100 @ A2		
Drawn by: GG	Checked by: PS	Project ID: SC013
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Site Elevation A

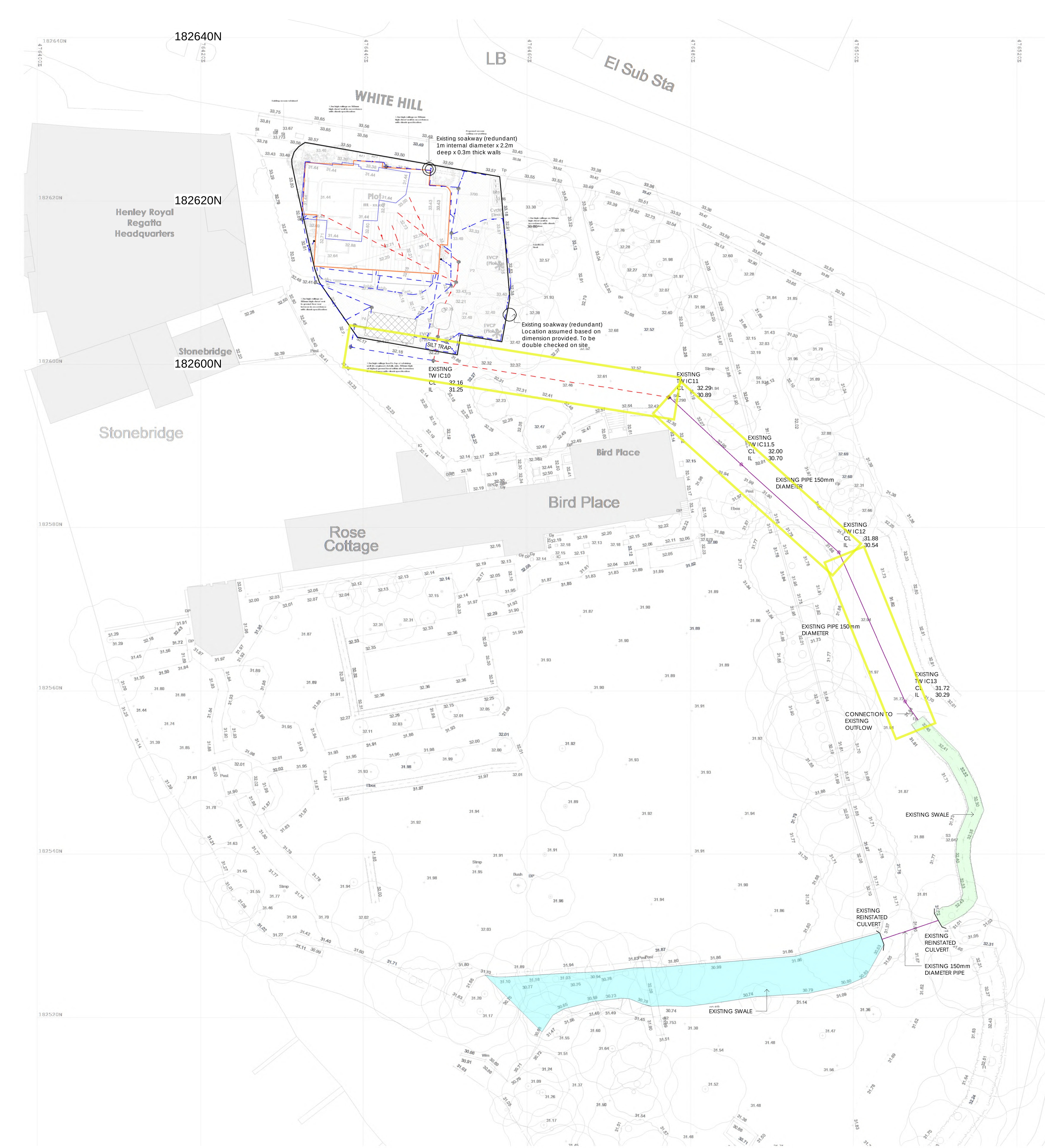


Site Elevation B



PL1 23/03/2026 Planning Application Issue

Rev	Date	Note
Client Mr & Mrs Fawsitt		
Project Title Bird Place - Boat House & Outdoor Kitchen		
Project Address Henley Bridge, Henley-On-Thames RG9 2LN		
Drawing No.	Rev. No.	
PA-06	PL1	
Drawing Title Proposed Site Elevations		
Scale 1:100 @ A2		
Drawn by: GG		Checked by: PS
		Project ID: SC013
Shack Cabins West Witheridge Fourth House, Penn Road, Knotty Green HP9 2TW +44 (0) 1494 258 181 hello@shackcabins.com www.shackcabins.com		

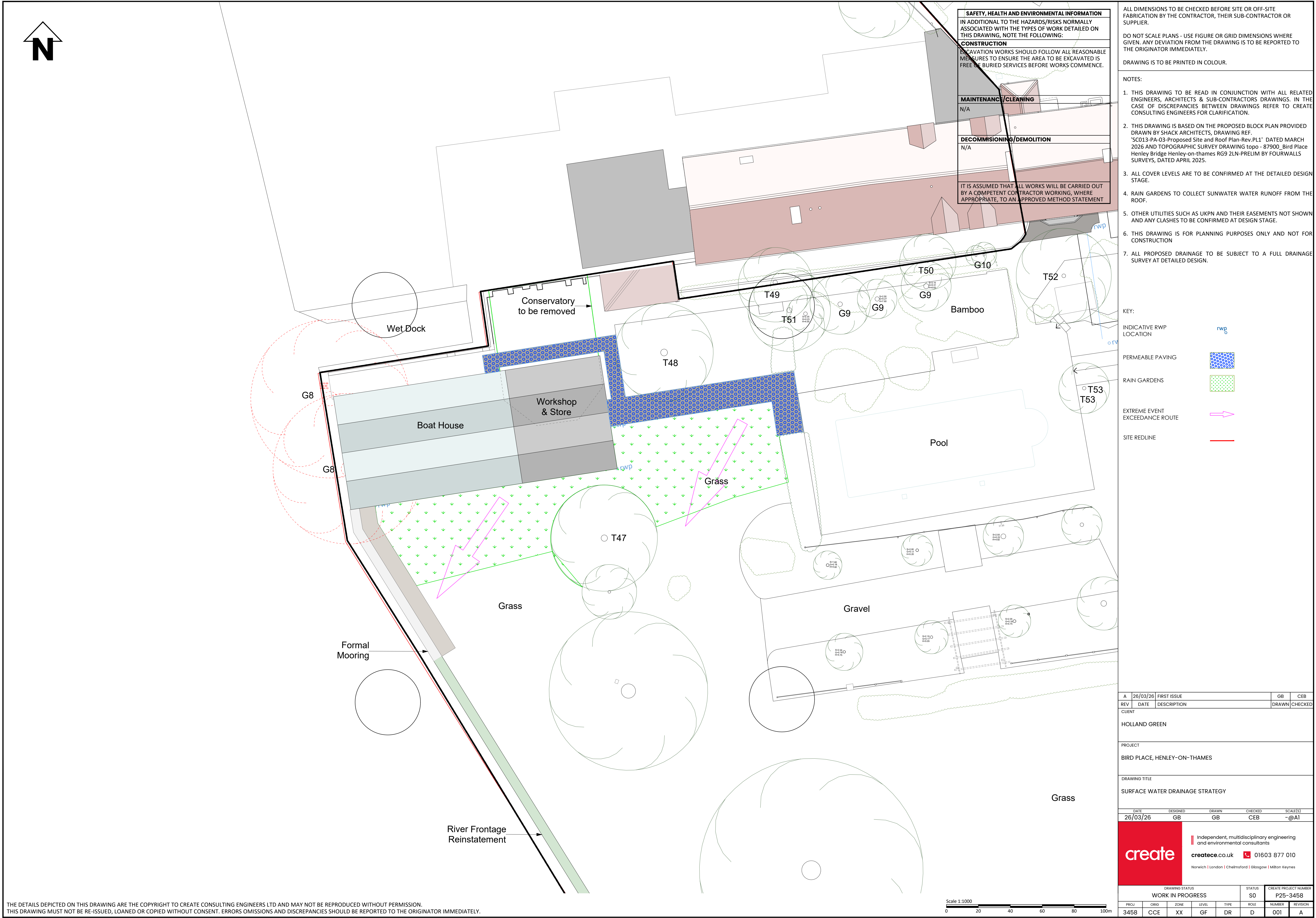
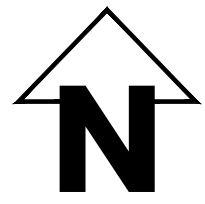


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Rev	Comments	By	Date
T1	Tender issue	JW	15/09/23
T2	Amended issue	AG	11/10/23
T3	Amended issue	AG	19/10/23
T4	Amended issue	AG	23/10/23
T5	Amended issue	AG	26/10/23
T6	Amended issue	AG	26/10/23
T7	Amended issue	AG	11/01/24
T8	Amended issue	AG	09/02/24

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Drawing Title						Drawn By AP
DRAINAGE LAYOUT - SHEET 2						Designed JW
						Checked JW
						Issue Date 09/02/24
						Scale 1 : 200
Project No.	Origin	Level	Type	Role	No.	Revision
2537	CSD	ZZ	DR	S	00-91	T 8



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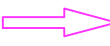
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KEY:

- INDICATIVE RWP LOCATION 
- PERMEABLE PAVING 
- RAIN GARDENS 
- EXTREME EVENT EXCEEDANCE ROUTE 
- SITE REDLINE 

A	26/03/26	FIRST ISSUE	GB	CEB
REV	DATE	DESCRIPTION	DRAWN	CHECKED

CLIENT
HOLLAND GREEN

PROJECT
BIRD PLACE, HENLEY-ON-THAMES

DRAWING TITLE
SURFACE WATER DRAINAGE STRATEGY

DATE	DESIGNED	DRAWN	CHECKED	SCALE(S)
26/03/26	GB	GB	CEB	-@A1



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WORK IN PROGRESS					S0		P25-3458	
PROJ	ORG	ZONE	LEVEL	TYPE	ROLE	NUMBER	REVISION	
3458	CCE	XX	GF	DR	D	001	A	

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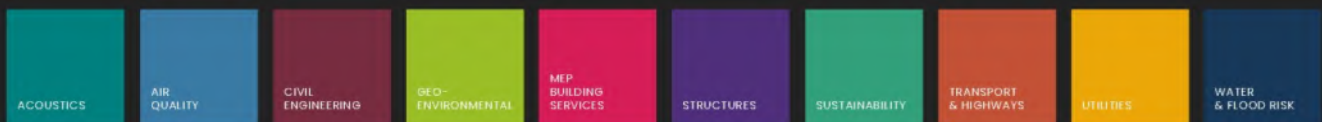


Mr and Mrs Fawsitt

REPLACEMENT BOAT HOUSE, BIRD PLACE, HENLEY-ON-THAMES

Flood Risk Assessment and Surface Water Drainage Strategy

The information contained within this report and any appendices or supporting information provided are to be treated as confidential.



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