

Billingbear Park Golf Course
Wokingham, RG40 5SJ

Flood Risk Assessment and Drainage Strategy

for

Billingbear Park Golf Course

20250350

December 2025

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Revision	Date of issue	Notes	Compiled By	Checked By
0	02/12/2025	Preliminary Issue	MK	TS
1	09/12/2025	Preliminary Issue	MK	TS

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1.0 Introduction

- 1.1 This Flood Risk Assessment (FRA) and Drainage Strategy (DS) report has been produced by Green Structural Engineering (GSE) on behalf of Billingbear Park Golf Course to support a planning application for the development proposals at the site Billingbear Park Golf Course, The Straight Mile, Wokingham, RG40 5SJ. Figure 1 below shows the location of the site.



Figure 1 – Site Location Plan

- 1.2 This FRA / DS had been prepared in accordance with the requirements of the National Planning Policy Framework (NPPF) and its planning practice guidance, national design standards, local surface water policies and nationally recognised SuDS Hierarchy, to demonstrate that the proposed development can be drained in an acceptable and sustainable manner and will not increase the risk of flooding to the site and surrounding area.
- 1.3 This report is not intended to provide the final details of the detailed drainage design for the proposed development. It rather provides essential information regarding the assessment of the potential risks of flooding from all sources and the design concepts and systematic approach used for the surface and foul water drainage strategy to meet the requirements of the relevant guidelines. The scope of this Report is as follows:
- (i) Identification of the potential risk of flooding at the site from all sources (i.e. fluvial, tidal, pluvial, groundwater and surface water);
 - (ii) To show that flood risk from the site associated with surface water (pluvial) can be satisfactorily managed so that the site and adjacent land/ properties will not be subject to unacceptable flood risk whilst considering the potential allowance for climate change over the anticipated lifespan of the development. Developments must be appropriately resilient to the potential impacts of climate change;
 - (iii) To demonstrate that there will be no increased risk of flooding off site or on adjacent land and nearby property elsewhere; and
 - (iv) To demonstrate that wastewater and surface water runoff from the proposed development has satisfactory and achievable sustainable disposal strategies.

2.0 Site Parameters

Site Description

- 2.1 The site is located within the Royal Borough of Windsor and Maidenhead, at the address Billingbear Park Golf Course, The Straight Mile, Wokingham, RG40 5SJ. The existing site is currently occupied by a golf course with associated outbuildings and car parking.

Site Topography

- 2.2 A topographical survey of the site was undertaken in June 2025 by CD Surveys Ltd. The survey shows that the site is generally flat in nature, with levels of approximately 42.15m AOD at the north of the site and rising to levels of approximately 43.00m AOD to the south of the site. A copy of the sites topographical survey is included in [Appendix A](#).

Site Geology

- 2.3 The British Geological Survey (BGS) indicates that the site sits on a sedimentary bedrock formation of London Clay, a mixture of clay, silt and sand. There were no superficial deposits recorded.
- 2.4 The nearest known historical borehole information to the site available on the BGS website is located directly to the north of the site along the M4, recorded in 1992. The borehole records show layers of Plateau Gravel and London Clay.
- 2.5 The various boreholes were struck to depths up to 30m, where one borehole recorded a water strike at 5.50m BGL and 18.00m BGL. Another borehole recorded a water strike at as shallow as 1.50m BGL.
- 2.6 Defra Magic maps have been reviewed and shows the site is located within a low groundwater vulnerability zone and not located in any aquifers. The site is however located within a source protection Zone III – Total Catchment.

Development Proposals

- 2.7 The proposed development will include the demolition of existing marquee to the rear of the clubhouse and replacement with new extension; construction of padel tennis and pickleball courts; construction of a compact driving range and the construction of a new building to provide simulator rooms. The proposed site plan is included in [Appendix B](#).

3.0 Planning Policy Context

National Planning Policy Framework and Planning Practice Guidance

- 3.1 The National Planning Policy Framework (NPPF), originally published in 2012, was reissued in February 2025. The NPPF includes policies on flood risk and minimising the effect of flooding. The NPPF requires local authorities to adopt proactive strategies to mitigate and adapt to climate change, taking account of flood risk, coastal change and water supply and demand considerations.
- 3.2 Section 14 of this document list when a Flood Risk Assessment is required:
- 3.3 All development within Flood Zones 2 (Medium Risk) and 3 (High Risk);
- 3.4 In Flood Zone 1 an assessment should accompany all proposals involving:
- Sites of 1ha or more;
 - Land identified by the Environment Agency as having critical drainage problems;
 - Land identified in a Strategic Flood Risk Assessment as being at increased flood risk in future; or
 - Land that may be subject to other sources of flooding, where its development would introduce a more vulnerable use.'
- 3.5 The NPPF goes on to state 'When determining any planning applications, local planning authorities should ensure that flood risk is not increased elsewhere. Where appropriate, applications should be supported by a site-specific flood risk assessment. Development should only be allowed in areas at risk of flooding where, in light of this assessment (and the sequential and exceptions tests, as applicable), it can be demonstrated that:
- a) *Within the site, the most vulnerable development is located in areas of lowest flood risk, unless there are overriding reasons to prefer a different location;*
 - b) *The development is appropriately flood resistant and resilient such that, in the event of a flood, it could be quickly brought back into use without significant refurbishment;*
 - c) *It incorporates sustainable drainage systems, unless there is clear evidence that this would be inappropriate;*
 - d) *Any residual risk can be safely managed; and*
 - e) *Safe access and escape routes are included, where appropriate, as part of an agreed emergency plan'.*
- 3.6 Within the context of a drainage strategy the most applicable requirements of National and Local Planning Policy are that development should not cause new, or exacerbate, existing flooding problems either on the proposal site, or elsewhere, and should incorporate Sustainable Drainage Systems (SuDS) in order to restrict or reduce surface water run-off.

3.7 Planning Practice Guidance has been issued to ensure the effective implementation of the planning policies set out in the NPPF on development in areas at risk of flooding. The guidance sets out an expectation that for major development SuDS will be provided unless demonstrated inappropriate but also that SuDS may not be practical for all development types and this will depend upon the nature of the proposed, development, its location and the existing flood risk. New development will, however, only be considered appropriate if priority has been given to sustainable drainage. The Planning Practice Guidance to the NPPF outlines the following drainage hierarchy to be considered when disposing of surface water, with the aim of discharging as high up the hierarchy as possible:

- To the ground (infiltration)
- To a surface water body
- To a surface water sewer, highway drain or other drainage system
- To a combined sewer

The Non-Statutory technical standards for sustainable drainage systems (2015)

3.8 In March, 2015, the Department for Environment, Food and Rural Affairs (DEFRA) published the Non-statutory technical standards for sustainable drainage systems; which are intended to be used in conjunction with the NPPF and the planning practice guidance. The Non-statutory technical standards for sustainable drainage systems provide guidance for developers to ensure that flood risk, from surface water, is managed appropriately so as not to lead to an increase in flood risk on and off site. This non-statutory guidance includes advisory standards on the peak flow rate, runoff volume and flood risk within the development. These standards also set out that that pumping would not normally be acceptable unless it is not reasonably practice to provide gravity drainage, that drainage systems should be structurally sound and that any damage from its construction must be minimised and rectified before the drainage system is considered completed.

Royal Borough of Windsor & Maidenhead – Local Plan (February 2022)

3.9 The local plan was adopted by the Royal Borough of Windsor & Maidenhead in February 2022 and *‘sets out a spatial strategy and policies for managing development and infrastructure to meet the environmental, social and economic opportunities and challenges facing the area up to 2033. The Plan not only looks at the scale and distribution of development, but also explains how the Council and its partners will deliver it in a sustainable manner that maintains and enhances the quality of the places that make up the Royal Borough of Windsor and Maidenhead.’*

3.10 Policy NR1 of this document relates to managing flood risk, stating:

1. *‘Flood zones are defined in the National Planning Practice Guidance and the Council’s Strategic Flood Risk Assessment (Level 1). Within designated Flood Zones 2 and 3 (and also in Flood Zone 1 on sites of 1 hectare or more in size and in other circumstances as set out in the NPPF) development proposals will only be supported where an appropriate flood risk assessment has been carried out and it has been demonstrated that development is located and designed to ensure that flood risk from all sources of flooding is acceptable in planning terms.*

2. *The sequential test is required for all development in areas at risk of flooding, except for proposed developments on sites allocated in this Plan or in a made Neighbourhood Plan which accord with the provisions of those Plans so far as material to the application. In applying this test, development proposals should show how they have had regard to:*

- a. *the availability of suitable alternative sites in areas of lower flood risk*
- b. *the vulnerability of the proposed use and the Flood Zone designation*
- c. *the present and future flood risk*
- d. *the scale of potential consequences*
- e. *site evacuation plan in the event of potential flooding.*

Only water compatible uses and essential infrastructure development will be supported in the area defined as functional floodplain. The exception test will still apply.

3. *The sequential approach should be followed by developers for all development so that the most vulnerable development is located in the lowest risk flood areas within a site, taking account of all sources of flood risk.*
4. *Development proposals should include an assessment of the impact of climate change using appropriate climate change allowances over the lifetime of the development so that future flood risk is taken into account.*
5. *In all cases, development should not itself, or cumulatively with other development, materially:*
 - a. *impede the flow of flood water*
 - b. *reduce the capacity of the floodplain to store water*
 - c. *increase the number of people, property or infrastructure at risk of flooding*
 - d. *cause new or exacerbate existing flooding problems, either on the proposal site or elsewhere.*
 - e. *reduce the waterway's viability as an ecological network or habitat for notable species of flora or fauna.*
6. *Development proposals should:*
 - a. *increase the storage capacity of the floodplain where possible*
 - b. *incorporate Sustainable Drainage Systems in order to restrict or reduce surface water runoff*
 - c. *reduce flood risk both within and beyond sites wherever practical*
 - d. *be constructed with adequate flood resilience and resistance measures suitable for the lifetime of the development*
 - e. *where appropriate, demonstrate safe access and egress and incorporate flood evacuation plans*

7. *The exception test will need to be applied in accordance with national policy and guidance in the NPPF and PPG, including on sites allocated in the development plan. This should demonstrate how flood risk would be managed on the site, including that the sustainability benefits of the site outweigh the flood risk and that the development will be safe for its lifetime, taking into account the vulnerability of its users and that it will not increase flood risk elsewhere. Where possible, development will reduce flood risk overall.*
8. *Development proposals will be required to incorporate appropriate comprehensive flood risk management measures as agreed with the Environment Agency or the Council as Local Lead Flood Authority*
9. *Development proposals near rivers (including culverted rivers) should retain or provide an undeveloped 8 metre buffer zone alongside main rivers and, where practicable and appropriate, ordinary watercourses. This buffer zone should be on both sides of the watercourse and be measured from the top of the river bank at the point at which the bank meets the level of the surrounding land.*
10. *Further development land associated with strategic flood relief measures will be safeguarded, including the proposed River Thames Scheme and the flood relief channel from Datchet to Wraysbury. Development should facilitate the improvement and integration of waterways in Maidenhead, including the completion of the Maidenhead Waterway Project.*

Policy Analysis

- 3.11 As can be seen from the planning policies and guidance, the main requirements are that developments should not result in additional flood risk to the site and surrounding area. The policies stipulate that more vulnerable use classes should be located outside areas of greater flood risk, and that developments should be flood resilient, residual risk should be managed correctly and safe access and egress will be needed.
- 3.12 The drainage hierarchy presented by all levels of policy documents, largely follow the same concept. In line with the NPPF the drainage hierarchy should be considered as following; re-use of water, infiltration to ground, rainwater attenuation in green infrastructure, rainwater discharge direct to a watercourse, controlled discharge to surface water sewers and finally controlled discharge to combined sewers.
- 3.13 The Local Plan sets an expectation that, wherever possible, SuDS features should be implemented to restrict or reduce surface water runoff.
- 3.14 There is an expectation that the Non-technical standards for sustainable drainage systems will be applied, alongside the more stringent expectations of the Local Plan in regard to the greenfield runoff rate and potential betterment. Both local and national planning policy and guidance indicate that, wherever possible, developments should aim for discharge of surface water at greenfield rates regardless of development type. The different levels of policy and guidance vary as to what should be achieved in the case of brownfield sites, or where discharge at greenfield rates is not practical.

4.0 Flood Risk

Fluvial/Tidal Flooding

4.1 The National Planning Policy Framework identify the Flood Zones as follows:

- Zone 1: 'Low Probability' This zone comprises land assessed as having a less than a 1 in 1000 annual probability of river or sea flooding (<0.1%) in any year.
- Zone 2: 'Medium Probability' – This zone comprises land assessed as having between a 1 in 100 and 1 in 1000 annual probability of river flooding (1% - 0.1%) or between a 1 in 200 and 1 in 1000 annual probability of sea flooding (0.5%-0.1%) in any year.
- Zone 3a: 'High Probability' – This zone comprises land assessed as having a 1 in 100 or greater annual probability of river flooding (>1%) or a 1 in 200 or greater annual probability of flooding from the sea (>0.5%) in any year.
- Zone 3b: 'The Functional Floodplain' – This zone comprises land where water has to flow or be stored in times of flood. SFRAs should identify this Flood Zone (land which would flood with an annual probability of 1 in 20 (5%) or greater in any year or is designed to flood in an extreme (0.1%) flood, or at another probability to be agreed between the LPA and the Environment Agency, including water conveyance routes).

4.2 Figure 2 below has been extracted from the EA's flood map for planning and shows the various flood zone extents in the area around the site.



Figure 2 – EA Flood Map for Planning

4.3 As can be seen the site is shown to be located within Flood Zones 2 and 3.

Surface Water Flooding

- 4.4 Figure 3 below has been derived from the EA flood maps and shows the risk of flooding from surface water to the site and surrounding area.



Figure 3 – EA Surface Water Flood Map

- 4.5 As can be seen, the site has a varying risk of surface water flooding from high to low. The surface water flood maps provided by the EA take into account topography and do not consider positive drainage system. Any areas of higher surface water flood risk can therefore not be assessed without detailed interrogation of the local drainage networks.
- 4.6 A Strategic Flood Risk Assessment (SFRA) was also undertaken by the Royal Borough of Windsor and Maidenhead (RBoWM) in June 2017. This document was produced to assess the risk of flooding to the Borough from a number of sources and provide key policies to the Borough in relation to drainage and flooding.
- 4.7 The SFRA states that: *“The Environment Agency has published mapping of surface water flood risk based on computational hydraulic modelling. In 2013 this map was updated and is referred to as the updated Flood Map for Surface Water (uFMfSW). The mapping provides flooding extents from surface water for three storm events; the 3.3% AEP, the 1% AEP and the 0.1% AEP. The mapping also provides information on the depth and velocity of flooding, as well as the hazard associated with the flood water.”*
- 4.8 Figure 4 below has been extracted from the RBoWM SFRA and shows the extent of surface water flooding within the vicinity of the site.

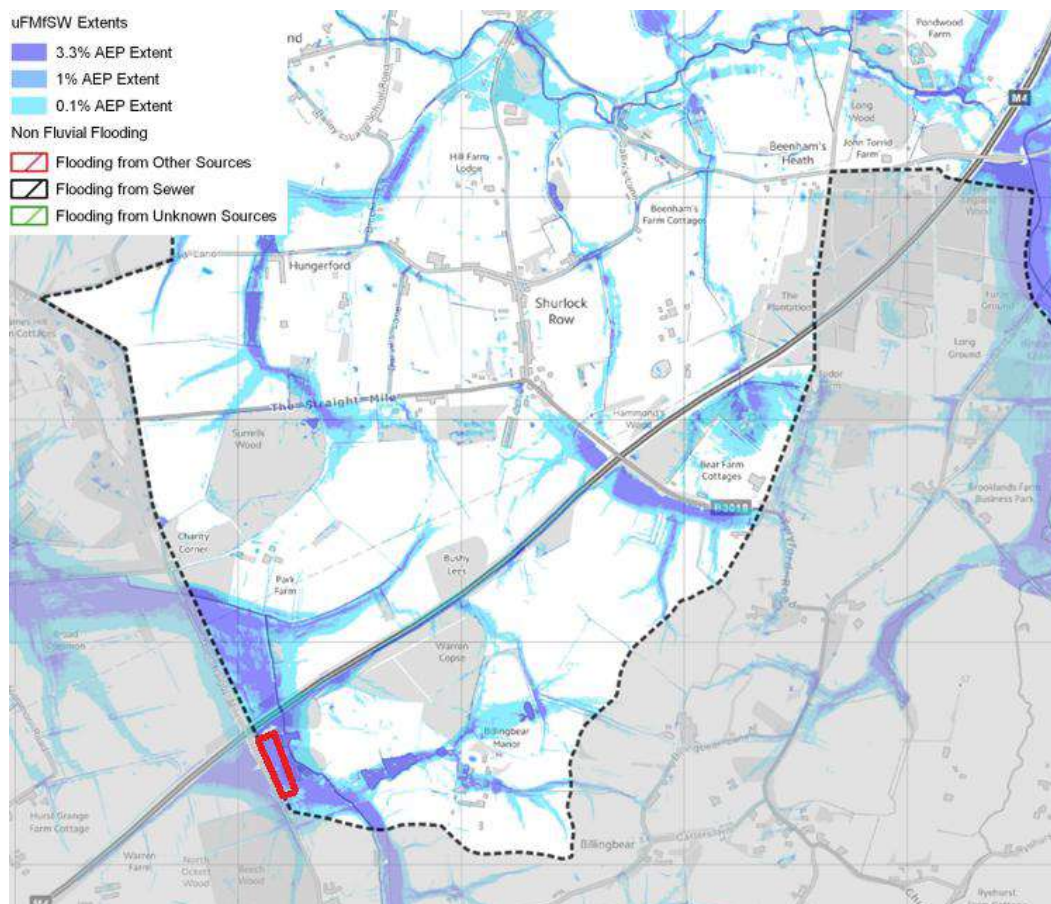


Figure 4 – RBoWM SFRA Local Sources Flood Map

- 4.9 According to the SFRA mapping, the application site has a relatively high risk of surface water flooding however as stated above and within the SFRA, the mapping contains assumptions especially with regards to drainage capacity. The flood maps should also not be used to identify if an individual property will flood but should be a consideration for the flood risk assessment. The development proposals will incorporate the use of SuDS and positive drainage to ensure there is no increase in surface water flood risk to the site and surrounding areas. Additionally, a flood compensation exercise has been undertaken, detailed in Section 5, that demonstrates there will be no flood storage volumes lost from the proposals, with minor relevening of the site in fact increasing flood storage volumes.

Groundwater Flooding

- 4.10 The SFRA states that 'There is a known risk of groundwater emergence along the River Thames due to the presence of 'Thames Gravels'. This is a term commonly used to describe the highly permeable superficial deposits beneath the historical floodplain of the River Thames. High water levels in the river result from high underlying groundwater levels in these superficial deposits. As a consequence, properties situated away from the direct influence of the river are also at risk of flooding due to high groundwater levels.'

- 4.11 *'The risk of groundwater flooding is highly variable and heavily dependent upon local conditions at any particular time. In an endeavour to provide an indication of areas throughout the country that may be at risk of groundwater flooding, the Environment Agency has produced strategic scale maps known as Areas Susceptible to Groundwater Flooding (AStGWF) to be used within the LLFAs Preliminary Flood Risk Assessment'*
- 4.12 Figure 5 below has been extracted from the RBoWM SFRA and shows the susceptibility of groundwater flooding within the borough.

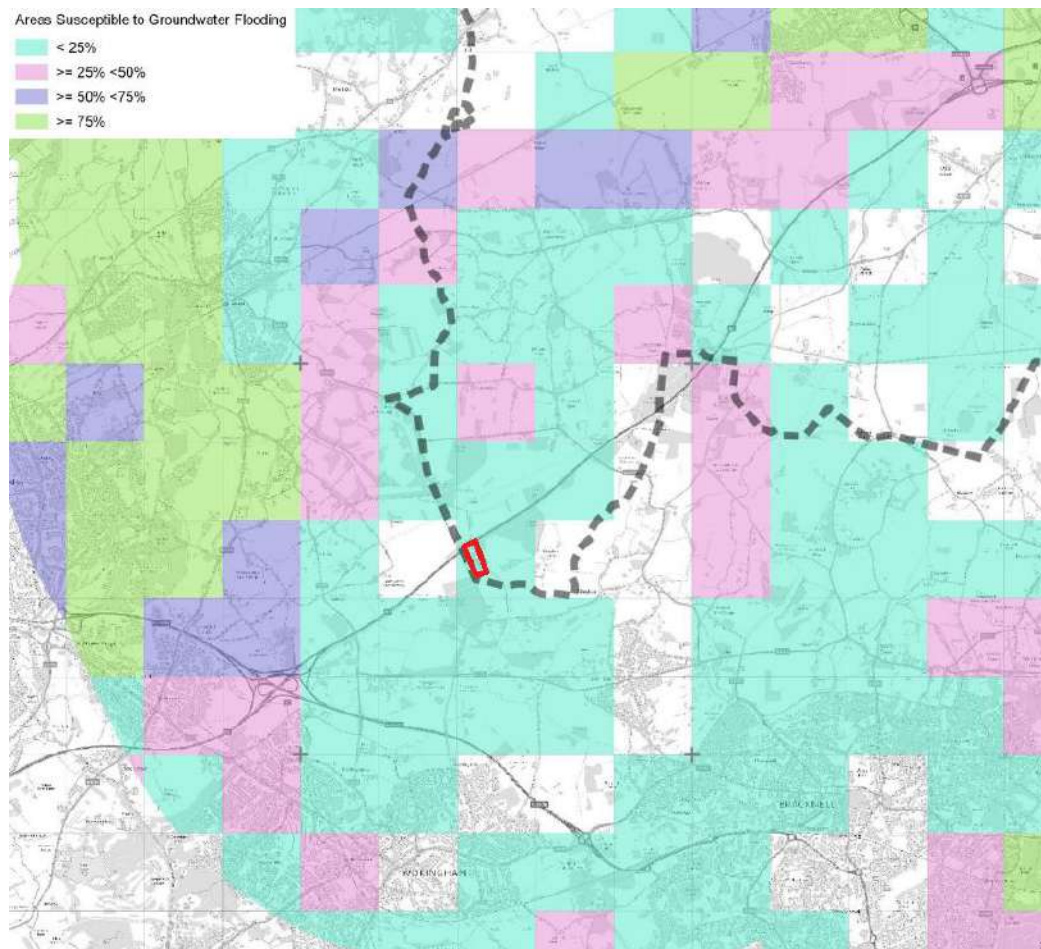


Figure 5 – RBoWM SFRA Susceptibility to Groundwater Flooding Map

- 4.13 As can be seen, the site is shown to be in the least susceptible category of less than 25% risk of groundwater flooding. Defra Magic Mapping shows that the site is not located within any aquifers and is located in a low groundwater vulnerability area. It is considered that the SFRA mapping is the most accurate representation of groundwater flooding and therefore the site is considered at very low risk.

Sewer Flooding

- 4.14 The RBoWM SFRA flood maps also include sewer flood events mapping based on incident recordings provided by Thames Water. The mapping in Figure 4 shows that the site's area has not been affected by sewer flooding incidents. Thames Water have not provided details on individual properties with sewer flooding incidents as this may no longer be an accurate representation of properties currently at risk.

Reservoir Flooding

- 4.15 The Environment Agency govern the Reservoir Act 1975 in England and Wales, where all reservoirs are regularly inspected by reservoir panel engineers, to ensure they are correctly maintained. The EA's further information on reservoir flood risk also states that 'Reservoir flooding is extremely unlikely to happen. There has been no loss of life in the UK from reservoir flooding since 1925'. The application site is not located near any reservoirs, and it is therefore considered that flood risk to the site from reservoirs is very unlikely.

Summary

- 4.16 As detailed throughout this section, on review, the sources of flooding that may affect the site vary from low to high, with the groundwater flooding, sewer flooding and reservoirs highly unlikely to affect the site whereas fluvial and surface water flooding are the highest risks. The surface water flood risk will be managed by incorporating SuDS and positive drainage being restricted as close to greenfield runoff rates as detailed further in this report, ensuring there is no increase in surface water flood risk from the proposals. The fluvial flood risk is detailed further in Section 5.

5.0 Detailed Fluvial/Tidal Flooding Assessment

Environment Agency Data Review

- 5.1 Detailed Product 4 flood information has been requested, however, the EA have responded to say they do not hold flood information for the application site, their response is included in [Appendix C](#). Separate Product 6 information has been provided by the EA, that doesn't provide flood information for the site, however, flood levels are provided immediately to the north of the site, the closest being approximately 100m to the north, the other side of the M4 highway. The location and flood levels are illustrated in Figure 6 below.

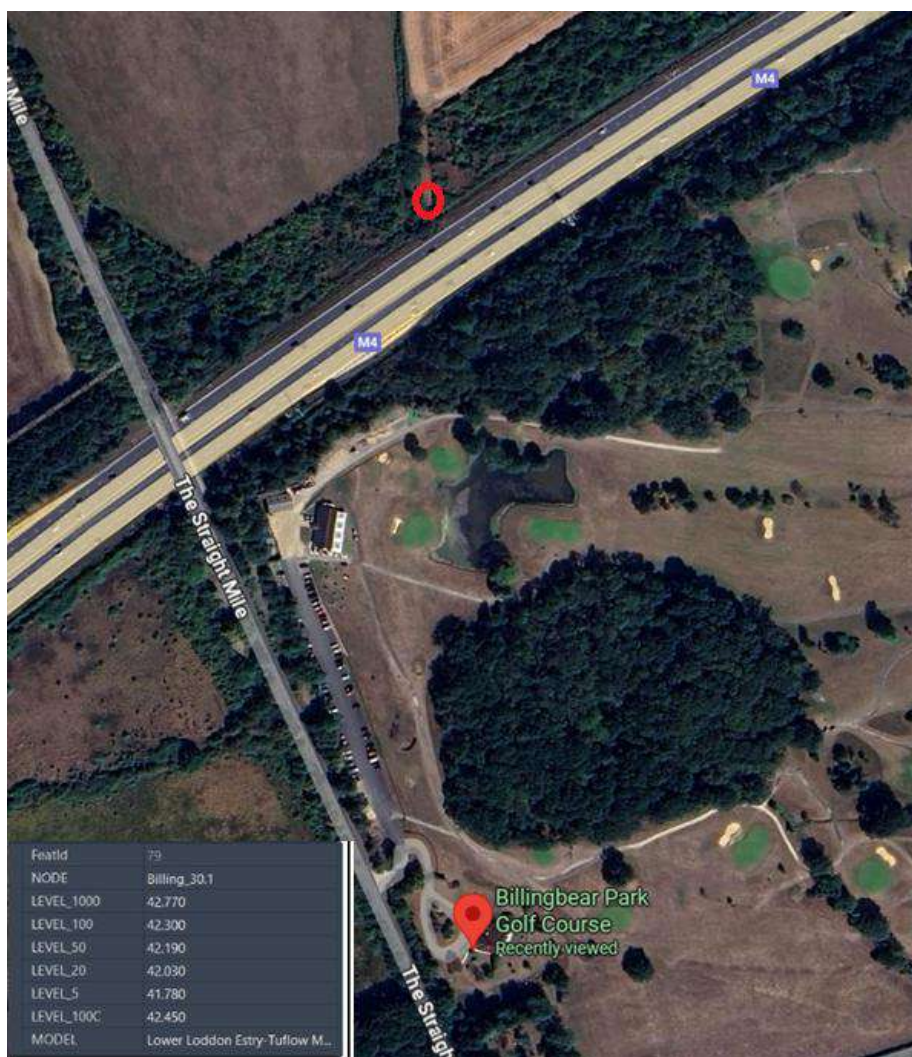


Figure 6 – Product 6 Flood Levels.

- 5.2 As can be seen, the 100-year plus climate change flood level, and therefore the Flood Zone 3 extent, is shown as 42.450m AOD.
- 5.3 Although this level is not within the site extent, it is the closest known level provided by the Environment Agency. This level has been assessed against the existing topographical survey, via 3d analysis, to estimate the Flood Zone 3 extent within the application boundary, with the findings illustrated in [Appendix D](#).

Flood Storage Volumes

- 5.4 The findings in [Appendix D](#) also highlight the flood depths and volumes from the Flood Zone 3 flood level, with the area within the application boundary shown to have a maximum flood depth of 0.69m. Table 1 below shows the existing flood volumes within the application boundary, taken in 0.1m increments, with the total flood volume also shown.

Flood Depth	Flood Volume (m ³)
0.00m - 0.10m	587.618
0.10m - 0.20m	399.276
0.20m - 0.30m	160.541
0.30m - 0.40m	35.256
0.40m - 0.50m	8.798
0.50m - 0.60m	3.477
0.60m - 0.69m	0.439
Total	1195.405

Table 1 – Existing Flood Volumes

- 5.5 The extension to the existing club house and the new simulator building will be located in areas that are currently shown to be in the Flood Zone 3 extent, meaning flood storage volumes will be lost on site, if these are not compensated for elsewhere within the application boundary.
- 5.6 A detailed external levels plan will be undertaken at detailed design stage, where the final proposed flood volumes will be confirmed, however, a conceptual assessment has been provided, with the findings shown in [Appendix E](#). As can be seen, any flood volumes lost along the simulator building and clubhouse extension area can be compensated for further south on site, within the padel court areas, with lowering these areas by a few hundred millimetres, to levels of around 42.300m AOD, flood volumes lost along the proposed building extents, can be pushed to external, less vulnerable areas. Table 2 below shows the flood depths and volumes that will be achieved with relevening in these areas.

Flood Depth	Flood Volume (m ³)
0.00m - 0.10m	618.875
0.10m - 0.20m	431.182
0.20m - 0.30m	181.975
0.30m - 0.40m	42.055
0.40m - 0.50m	9.044
0.50m - 0.60m	3.477
0.60m - 0.69m	0.439
Total	1287.047

Table 2 – Proposed Flood Volumes

- 5.7 Table 3 below shows the difference in flood storage volumes between the existing and proposed scenarios.

	Flood Volume (m ³)		
Flood Depth	Existing	Proposed	Difference
0.00m - 0.10m	587.618	618.875	31.257
0.10m - 0.20m	399.276	431.182	31.906
0.20m - 0.30m	160.541	181.975	21.434
0.30m - 0.40m	35.256	42.055	6.799
0.40m - 0.50m	8.798	9.044	0.246
0.50m - 0.60m	3.477	3.477	0
0.60m - 0.69m	0.439	0.439	0
Total	1195.405	1287.047	91.642

Table 3 – Existing and Proposed Flood Volumes

- 5.8 As can be seen, equal or increased flood storage volumes are achievable for all flood depths, with the proposed scenario offering an additional 91.642m³ of storage from existing.

Flood Mitigation

- 5.9 In addition to the increased flood storage volumes the proposed site relevelling will provide, the proposed simulator building will be raised 300mm above the closest known Flood Zone 3 level of 42.450m AOD, to a level of 42.750m AOD.

6.0 Existing Drainage

Public Sewers

- 6.1 Thames Water serves the surrounding area for the disposal of wastewater. Asset records have been obtained from Thames Water a copy of which is included in [Appendix F](#). The records show that no public sewers are present within the vicinity of the site.

Site Drainage

- 6.2 A partial drainage CCTV survey of the existing site was undertaken by JD Drains in November 2025, with some parts not surveyable due to standing water in the infrastructure. The survey shows that foul water generated on site drains to a pump chamber, that in turn discharges to a treatment plant, where the filtered surface water connects to an adjacent ditch along the western boundary. Surface water is shown to drain to the same ditch via 2 connections, a pumped connection, and an uncontrolled gravity feed. A copy of the drainage CCTV survey is included in [Appendix G](#).
- 6.3 The hardstanding areas to be developed, the club house, simulator building and courts, have a combined area of 2,180m². The greenfield runoff rates associated with this area are shown in Figure 7 below.

The screenshot shows the 'Rural Runoff Calculator' software interface. The 'ICP SUDS' section is active, displaying input fields for 'Return Period (Years)' (1), 'Area (ha)' (0.218), 'SAAR (mm)' (700), 'Soil' (0.300), and 'Growth Curve' (None). The 'Partly Urbanised Catchment (QBAR)' section shows 'Urban' (0.000) and 'Region' (Region 6). The 'Results' section shows 'QBAR rural (l/s)' (0.4) and 'QBAR urban (l/s)' (0.4). Below this is a 'Return Period Flood' table with columns for Region, QBAR (l/s), Q (1 yrs) (l/s), Q (10 yrs) (l/s), Q (30 yrs) (l/s), and Q (100 yrs) (l/s). The table lists regions 1 through 10, with Region 6/Region 7 highlighted in red. The 'Greenfield Volume' and 'Greenfield Volume (ReFH2)' are also listed.

Region	QBAR (l/s)	Q (1 yrs) (l/s)	Q (10 yrs) (l/s)	Q (30 yrs) (l/s)	Q (100 yrs) (l/s)
Region 1	0.4	0.3	0.3	0.8	1.0
Region 2	0.4	0.3	0.3	0.8	1.0
Region 3	0.4	0.3	0.3	0.7	0.8
Region 4	0.4	0.3	0.3	0.8	1.0
Region 5	0.4	0.3	0.3	1.0	1.4
Region 6/Region 7	0.4	0.3	0.3	0.9	1.3
Region 8	0.4	0.3	0.3	0.8	1.0
Region 9	0.4	0.3	0.3	0.7	0.9
Region 10	0.4	0.3	0.3	0.7	0.8

Figure 7 – Greenfield runoff rate

- 6.4 As can be seen the site is shown to have Greenfield runoff rates between 0.3l/s and 1.3l/s, depending on the return period.

7.0 SuDS Hierarchy

Table 4 has been produced and shows the SuDS Hierarchy in order along with comments specific to the development site and their suitability:

Discharge hierarchy	Viable	Comments
Rainwater use as a resource (for example rainwater harvesting), Blue and Green Roofs	Partially	Water butts will be utilised at rainwater downpipe locations on the simulator building for partial reuse. Overflow provisions will drain to the proposed surface water network.
Rainwater infiltration to ground at or close to source	No	The BGS shows the site sits on a bedrock formation of London Clay, a material unsuitable for infiltration due to its poor soakage potential. The use of infiltration as a means of surface water disposal is therefore not possible.
Rainwater discharge direct to a watercourse	Yes	Existing connection to ditch proposed to be reutilised.
Controlled rainwater discharge to a surface water sewer or drain.	N/A	Option available higher up the hierarchy.
Controlled rainwater discharge to a combined sewer	N/A	Option available higher up the hierarchy.

Table 4 – SuDS Hierarchy

8.0 Proposed Drainage

Surface Water Drainage

- 8.1 As detailed in Section 6, the site currently drains to an adjacent ditch via 2 outfalls, an uncontrolled gravity connection and a pumped discharge. Pumps can typically function at a minimum flow rate of 2l/s, any rates lower than this are typically not achievable due to maintenance issues that may cause flooding, contrary to the intent of the initiative. It is therefore proposed that all developed areas within the application boundary will be attenuated and restricted to a maximum flow rate of 2l/s, utilising the existing pump outfall. A survey of the existing ditch, and additional surveys of the existing drain runs will be undertaken at detailed design stage, to determine which runs can be reutilised, and if possible, the pump omitted in favour of a gravity outfall, however, the design principles on site will remain, as follows.
- 8.2 Surface water runoff from the proposed simulator building will drain via rainwater pipes to a series of water butts for partial rainwater reuse. The water butts will feature overflow provisions, that will drain to a pond within adjacent landscaped area. The pond will provide a storage volume of 30m³ and will be controlled via a 20mm orifice plate chamber, with mesh cage protection, and discharge at a maximum flow rate of 0.6l/s to the existing surface water pump.
- 8.3 The proposed courts will comprise of porous construction, where permeable paving will be used to allow runoff to enter the porous sub-base below. The sub-base will comprise of type 3 granular material, with 30% voids that will be attenuated, and conveyed via top half perforated pipes. The porous paving will have a total plan area of approximately 1,230m², and will have a sub-base depth of 300mm. The porous courts will be controlled via a 20mm orifice plate chamber, with mesh cage protection, and discharge at a maximum flow rate of 0.5l/s to the existing surface water pump.
- 8.4 The existing and proposed clubhouse extension will be routed to 2 raingarden facilities to the front of the building. Planting layers will sit above a 800mm deep sub-base layer of type 3 material and a plan area of 70m². The 2 raingardens will be linked underground via a continuation of the type 3 material, to enable the movement of water. The raingardens will be controlled via a 22mm orifice plate chamber, with mesh cage protection, and discharge at a maximum flow rate of 0.9l/s to the existing surface water pump.
- 8.5 The proposed surface water networks have been designed to accommodate all storm events, up to and including the 100-year event, including a 40% allowance for climate change, with the 3 sections of drainage discharging at a maximum combined flow rate of 2l/s.
- 8.6 A drainage strategy plan showing the indicative arrangement of the proposed foul and surface water network is included in [Appendix H](#). MicroDrainage was used to assist in the design of the proposed surface water drainage, a copy of the calculations is included in [Appendix I](#).

Four Pillars of SuDS

- 8.7 The Four Pillars of SuDS have been considered, and can be applied to the proposed surface water drainage proposals, as detailed below:

Water Quantity – The proposed pond, raingardens and porous paving will provide attenuation for gradual release.

Water Quality – The type 3 subbase of the raingardens and porous paving, and the planting within the pond will provide a natural cleaning medium, to filter out contaminants.

Amenity – Raingardens and ponds are considered aesthetically pleasing natural features, that will add amenity value to the development.

Biodiversity – Planting within the proposed raingardens and ponds will promote wildlife to the site.

Foul Water Drainage

- 8.8 A new network will be installed to serve the Foul water generated from the proposed simulator building. This will discharge to the existing pump chamber, that then drains to the existing treatment plant and ditch. The existing chamber will be assessed at detailed design stage for capacity and connectivity, which may require upgrading.

Water Quality

- 8.7 The CIRIA SuDS Manual has been reviewed for guidance on pollution mitigation indices. Table 26.2 of this document has been extracted below, indicating expected pollution hazards for different land uses, with the items applicable to the site highlighted.

TABLE 26.2 Pollution hazard indices for different land use classifications				
Land use	Pollution hazard level	Total suspended solids (TSS)	Metals	Hydro-carbons
Residential roofs	Very low	0.2	0.2	0.05
Other roofs (typically commercial/ industrial roofs)	Low	0.3	0.2 (up to 0.8 where there is potential for metals to leach from the roof)	0.05
Individual property driveways, residential car parks, low traffic roads (eg cul de sacs, homezones and general access roads) and non-residential car parking with infrequent change (eg schools, offices) ie < 300 traffic movements/day	Low	0.5	0.4	0.4
Commercial yard and delivery areas, non-residential car parking with frequent change (eg hospitals, retail), all roads except low traffic roads and trunk roads/motorways ¹	Medium	0.7	0.6	0.7
Sites with heavy pollution (eg haulage yards, lorry parks, highly frequented lorry approaches to industrial estates, waste sites), sites where chemicals and fuels (other than domestic fuel oil) are to be delivered, handled, stored, used or manufactured; industrial sites; trunk roads and motorways ¹	High	0.8 ²	0.8 ²	0.9 ²

8.8 As can be seen the proposed development is shown to have low hazard levels.

8.9 Table 26.3 below has also been extracted the CIRIA SuDS Manual and shows how certain pollution indices can be mitigated.

TABLE 26.3 Indicative SuDS mitigation indices for discharges to surface waters			
Type of SuDS component	Mitigation indices ¹		
	TSS	Metals	Hydrocarbons
Filter strip	0.4	0.4	0.5
Filter drain	0.4 ²	0.4	0.4
Swale	0.5	0.6	0.6
Bioretention system	0.8	0.8	0.8
Permeable pavement	0.7	0.6	0.7
Detention basin	0.5	0.5	0.6
Pond ⁴	0.7 ³	0.7	0.5
Wetland	0.8 ³	0.8	0.8
Proprietary treatment systems ^{5,6}	These must demonstrate that they can address each of the contaminant types to acceptable levels for frequent events up to approximately the 1 in 1 year return period event, for inflow concentrations relevant to the contributing drainage area.		

8.10 As can be seen the proposed pond, permeable paving and raingardens, that's drainage layer is consistent with permeable paving, will prove suitable for mitigating any contaminants generated from the site.

8.11 It is proposed that catchpit chambers will be installed upstream of tanks that will help filter out other potential contaminants.

9.0 SuDS Maintenance, Management & Construction

Maintenance & Management

It is recommended that catchpit sumps be monitored 3 monthly, and after periods of intense rainfall and cleared where required. Jetting of the pipework may be required on occasion, if and when a decrease in the performance of the drainage network has been identified. For the correct methods of maintenance on the various drainage features, refer to S.H.W., Volume 1, Series 500, Clauses 520, 521 and 526.

The following maintenance regime for ponds should be adopted to ensure efficient performance.

Maintenance Schedule	Required Actions	Typical Frequency
Regular Maintenance	Inspect and identify any areas that are not operating correctly. If required, take remedial action	Monthly for 3 months, then annually
	Remove debris from the catchment surface (where it may cause risks to performance)	Monthly
	Remove sediment from pre-treatment structures and/ or internal forebays	Annually, or as required
	System inspection after heavy storms	After every extreme storm event
Remedial actions	Repair/rehabilitate inlets, outlet, overflows and vents.	As required
Monitoring	Inspect/check all inlets, outlets, vents and overflows to ensure that they are in good condition and operating as designed	Annually

- 9.1 The following maintenance regime for permeable paving should be adopted to ensure efficient performance.

Maintenance Schedule	Required Action	Typical Frequency
Regular maintenance	Remove debris and leaves etc.	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 surfaces from adjacent impermeable areas as this area is most likely to collect the most sediment.
Occasional maintenance	Stabilise and mow contributing and adjacent areas	As required
	Removal of weeds	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 50 mm of the level of the paving	As required
	Remedial work to any depressions, rutting etc	As required
	Rehabilitation of surface and upper substructure	Every 10 to 15 years or as required (if infiltration performance is reduced due to significant clogging)
Monitoring	Inspect for evidence of poor operation and/or weed growth - if required, take remedial action.	Three-monthly, 48 hours after large storms in the first six months
	Inspect silt accumulation rates and establish appropriate frequencies for rehabilitation	Annually
	Monitor inspection chambers	Annually

- 9.2 The following maintenance regime for raingardens should be adopted to ensure efficient performance.

Maintenance Schedule	Required Actions	Typical Frequency
Regular Maintenance	Water new planting regularly in dry periods during establishment period (2-5 years)	Every 2 weeks in summer months as required
	Water established planting in prolonged dry periods	As required
	Check and clear water inlets and soil aeration vents	6 monthly
	Clear leaf debris from water inlet channels	Annually
	Remove grills (if used) and clean accessible water channels	Annually, or as required
	Inspect, check and clean filter media in trough systems	After every extreme storm event

- 9.3 It will be the duty of the site owner/management team to ensure that the proposed surface water drainage system is maintained correctly during the lifetime of the site, as per the regime listed above, to mitigate the risk of drainage failure that may lead to flooding. Yearly logs of maintenance should be carried out in accordance with the above Maintenance Plan.

Construction Works

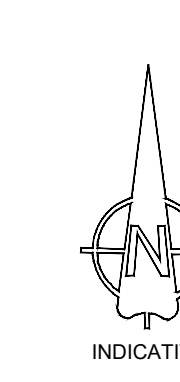
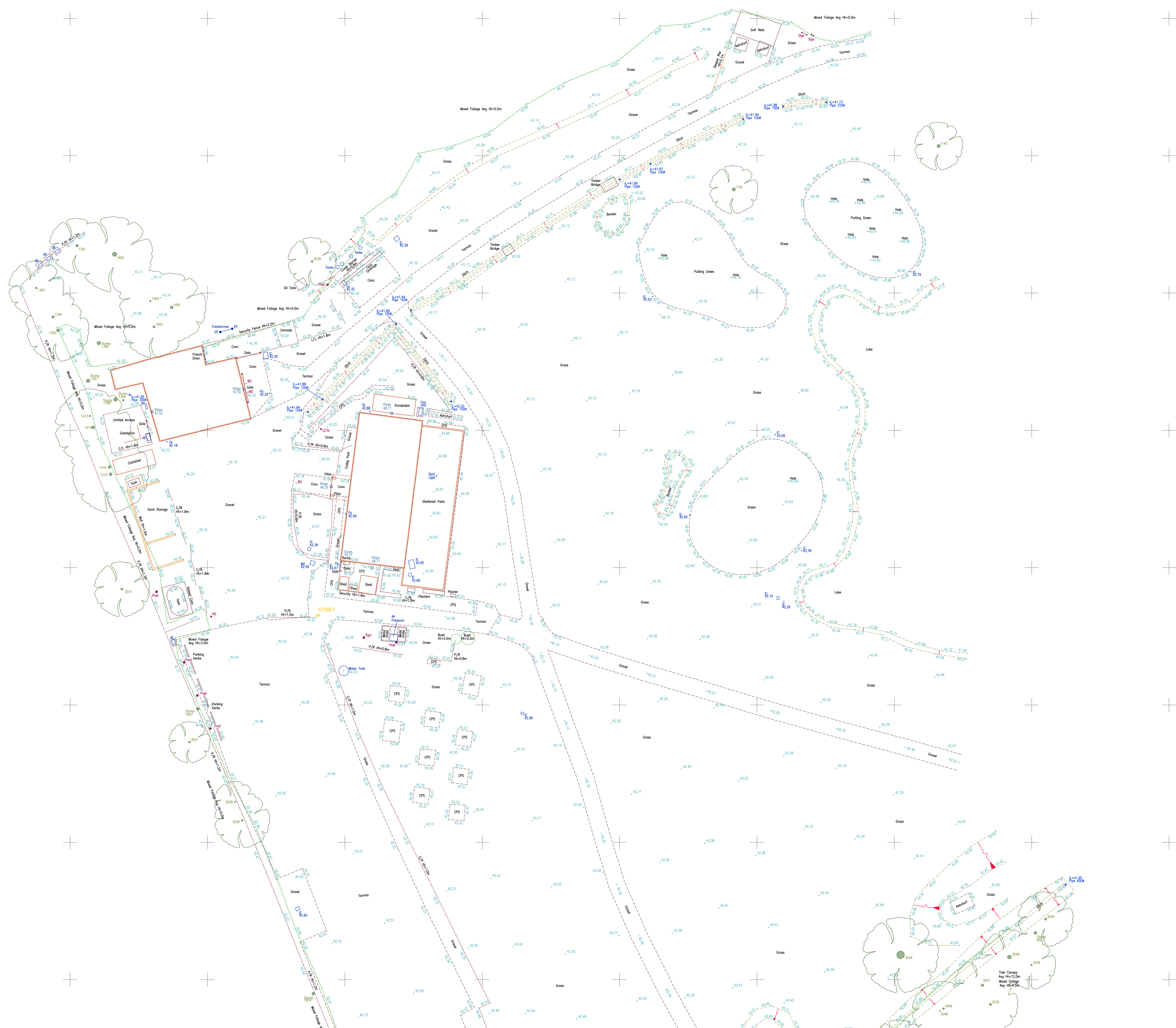
- 9.4 Listed below are some potential risks that may be encountered during the construction of the new drainage network, and how these risks can be mitigated.

Item	Potential Effects	Recommended Actions
Deep excavations required for installation of drainage	Excavations required for drainage installation may be subject to collapse, and/or workers/plant/material falling in.	Temporary support to be provided along excavations. Edge support required along excavations.
Protection of installed infrastructure during work suspensions	During work suspensions, excavations and installed drainage that are exposed may be subject to ingress of debris and other material, also presenting risk to site operators.	Contractor to utilise appropriate protection measures including but not limited to temporary pipe stoppers and trench covers.
Storage of construction materials and surplus materials.	Construction materials and surplus materials to be exported from site may be obstructive to working areas and access routes.	Designated areas to store materials away from working areas and pedestrian/vehicle access routes to be provided.
Perched groundwater	Perched groundwater encountered during the construction phase may impact on work proposals	Appropriate dewatering techniques to be utilised to mitigate the risk of groundwater effects.

10.0 Summary/Conclusion

- 10.1 This report has been produced to assess the risk of flooding and review the proposed drainage strategy for the proposed development at Billingbear Park Golf Course, The Straight Mile, Wokingham, RG40 5SJ. The proposed development includes an extension to the existing clubhouse, a number of new courts, and a new simulator building.
- 10.2 The site is located within Flood Zone 2 and 3, when assessing fluvial flooding. The risk of flooding from other sources varies from low to high, with mitigation measures and on-site provisions outlined within this report to reduce and manage the risks of flooding from other sources.
- 10.3 Although detailed flood information for the site is not available through the Environment Agency, flood levels adjacent to the site have been applied for assessment. It is proposed that the new building will be raised 300mm above the 100-year, plus climate change, flood level. Any flood storage volumes lost on site can be compensated for, as detailed in this report and appendices, by minor lowering of the existing levels along the proposed court extents.
- 10.4 The existing site is currently shown to discharge to a drainage ditch along the western boundary via a gravity and pumped connection. Further surveys will be undertaken at detailed design stage to assess if the pump can be omitted. It is proposed that the maximum discharge rate from the developed areas will not exceed 2l/s, the minimum rate a pump can function at.
- 10.5 The drainage is proposed as 3 separate networks to serve the simulator building, courts and clubhouse. The simulator building will be attenuated by a pond, with water butts proposed upstream of this for partial reuse. The padel courts will be served via porous paving, with granular sub-base and perforated pipes for conveyance. The clubhouse will drain to a raingarden, also with granular sub-base for attenuation. All 3 features will be controlled by orifice plate chambers, that will restrict the total outfall from all to 2l/s.
- 10.6 The surface water drainage network has been designed to cater for all flood events up to and including the 100-year storm, including a 40% allowance for climate change.
- 10.7 The drainage proposals will provide increased surface water attenuation, quality, amenity and biodiversity value from the existing scenario.
- 10.8 Foul water on site will reutilise the existing outfall arrangements of being pumped to a treatment plant for release to the adjacent ditch.
- 10.9 This report clearly demonstrates that the site can be drained sustainably, with consideration given to the four pillars of SuDS. Flood storage volumes will be increased from the existing scenario, reducing the risk of flooding to the surrounding area.

APPENDIX A – Topographical Survey



Notes:

Whilst every effort has been made to correctly identify species of trees on the site, we advise that an arborologist be consulted before any final decisions are made.

All information contained in this drawing (including digital data) should be checked and verified prior to any fabrication or construction.

Grid coordinates are based on an OS GNSS system on a plane grid with a scale factor of 1.0000.

[illegible]

Tree Schedule

Pin No	Spread	Depth	Height	Species
665	5.0	0.20	6.0	CHERRY
667	5.0	0.20	6.0	CHERRY
668	5.0	0.20	7.0	CHERRY
669	5.0	0.20	7.0	CHERRY
670	5.0	0.20	7.0	CHERRY
1142	7.0	0.50	11.0	TREE UNKNOWN
1143	7.0	0.50	11.0	TREE UNKNOWN
1381	8.0	0.30	12.0	OAK
1382	8.0	0.30	12.0	OAK
1383	8.0	0.30	13.0	OAK
1394	8.0	0.30	13.0	OAK
1395	8.0	0.40	16.0	OAK
1401	8.0	0.30	13.0	TREE UNKNOWN
1404	9.0	0.20	13.0	TREE UNKNOWN
1405	9.0	0.20	13.0	TREE UNKNOWN
1406	9.0	0.20	13.0	TREE UNKNOWN
1408	11.0	0.40	15.0	OAK
1409	11.0	0.40	15.0	OAK
1414	11.0	0.40	14.0	OAK
1415	11.0	0.40	14.0	OAK
1416	11.0	0.40	14.0	TREE UNKNOWN
1417	11.0	0.40	14.0	TREE UNKNOWN
1861	7.0	0.20	9.0	STYACONIA
1862	7.0	0.20	9.0	STYACONIA
1863	7.0	0.20	9.0	STYACONIA
1864	7.0	0.20	9.0	STYACONIA
1865	7.0	0.20	9.0	STYACONIA
1866	7.0	0.20	10.0	STYACONIA
1867	7.0	0.20	10.0	STYACONIA
1868	8.0	0.20	10.0	TREE UNKNOWN
1869	8.0	0.20	10.0	TREE UNKNOWN
1870	5.0	0.20	7.0	TREE UNKNOWN
1871	5.0	0.20	7.0	TREE UNKNOWN
1872	5.0	0.20	8.0	TREE UNKNOWN
1873	5.0	0.20	8.0	TREE UNKNOWN
3027	6.0	0.30	8.0	TREE UNKNOWN
3028	6.0	0.30	8.0	TREE UNKNOWN
3029	6.0	0.30	8.0	TREE UNKNOWN
3030	6.0	0.30	8.0	TREE UNKNOWN
3031	6.0	0.40	10.0	OAK
3032	6.0	0.30	10.0	TREE UNKNOWN
3033	6.0	0.30	10.0	TREE UNKNOWN
3034	8.0	0.30	10.0	TREE UNKNOWN
3035	8.0	0.30	10.0	TREE UNKNOWN
3036	7.0	0.20	13.0	OAK
3037	7.0	0.20	13.0	OAK
3044	11.0	1.10	14.0	OAK
3045	11.0	1.10	13.0	OAK
3046	8.0	0.60	13.0	OAK
3047	8.0	0.60	13.0	OAK
3048	8.0	0.30	13.0	OAK
3049	8.0	0.10	13.0	OAK
3050	8.0	0.10	13.0	OAK
3051	8.0	0.10	13.0	OAK
3052	8.0	0.10	13.0	OAK
3053	8.0	0.30	13.0	OAK
3054	8.0	0.30	13.0	OAK
3055	7.0	0.10	13.0	TREE UNKNOWN
3056	7.0	0.10	13.0	TREE UNKNOWN
3057	7.0	0.50	14.0	TREE UNKNOWN
3058	7.0	0.50	14.0	TREE UNKNOWN
3059	8.0	0.50	13.0	OAK
3060	8.0	0.50	13.0	OAK
3061	8.0	0.30	13.0	OAK
3062	8.0	0.30	13.0	OAK
3063	8.0	0.30	13.0	OAK
3064	6.0	0.10	9.0	OAK
3065	6.0	0.10	9.0	OAK
3066	8.0	0.40	13.0	OAK
3067	8.0	0.30	13.0	OAK
3068	8.0	0.30	13.0	OAK
3069	8.0	0.30	13.0	TREE UNKNOWN
3070	8.0	0.20	11.0	TREE UNKNOWN
3071	8.0	0.20	11.0	TREE UNKNOWN
3072	8.0	0.30	11.0	TREE UNKNOWN
3073	8.0	0.30	11.0	TREE UNKNOWN
3074	8.0	0.30	11.0	TREE UNKNOWN
3075	8.0	0.30	11.0	TREE UNKNOWN
3076	8.0	0.30	11.0	TREE UNKNOWN
3077	5.0	0.20	7.0	TREE UNKNOWN
3078	5.0	0.20	7.0	TREE UNKNOWN
3079	5.0	0.10	7.0	TREE UNKNOWN
3080	5.0	0.10	7.0	TREE UNKNOWN
3081	10.0	0.40	12.0	TREE UNKNOWN
3082	10.0	0.40	12.0	TREE UNKNOWN
3083	7.0	0.30	10.0	OAK
3084	7.0	0.30	10.0	TREE UNKNOWN
3085	8.0	0.30	12.0	OAK
3086	8.0	0.30	12.0	OAK
3087	8.0	0.30	12.0	OAK
3088	8.0	0.30	12.0	OAK
3089	8.0	0.30	12.0	OAK
3090	8.0	0.20	12.0	OAK
3091	8.0	0.20	12.0	OAK
3092	8.0	0.40	12.0	OAK
3093	8.0	0.40	12.0	OAK
3094	8.0	0.20	12.0	OAK
3095	8.0	0.20	12.0	OAK
3096	8.0	0.40	12.0	OAK
3097	8.0	0.40	12.0	OAK
3098	8.0	0.50	12.0	OAK
3099	8.0	0.50	12.0	OAK
3100	8.0	0.20	12.0	OAK
3101	8.0	0.20	12.0	OAK
3102	8.0	0.10	12.0	OAK
3103	8.0	0.30	12.0	OAK
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3105	8.0	0.30	12.0	OAK
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Rev. Suffix	Date	Initial	Revision Details						
Surveyor	EG	Verified By	EG	CAD Operator	CAD-GR	Approved By	APP	Date	dd/mm/yy
Levelling		GNSS		Datum		OSGB36			

Client

 Lewandowski Architects

Location	Billingbear Golf Club Wokingham
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Drawing Title
Topographical Survey
Sheet 1 of 2

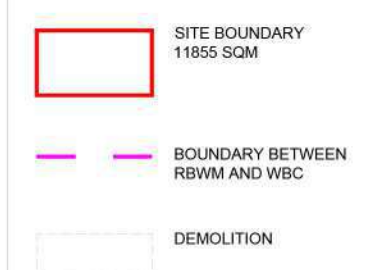
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Drawing Number	LA/2505048/1	Revision Suffix	
Scale	1:200m (A0)	Date	June 2025

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APPENDIX B – Proposed Site Plan



02	OCT 2025	ISSUED FOR PLANNING	AC
01	JUL 2025	ISSUED FOR PRE-APPLICATION 2	AC
00	FEB 2023	ISSUED FOR PRE-APPLICATION	AC

REV	DATE	DESCRIPTION	DRAWN
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CLIENT
BILLINGBEAR PARK GOLF COURSE

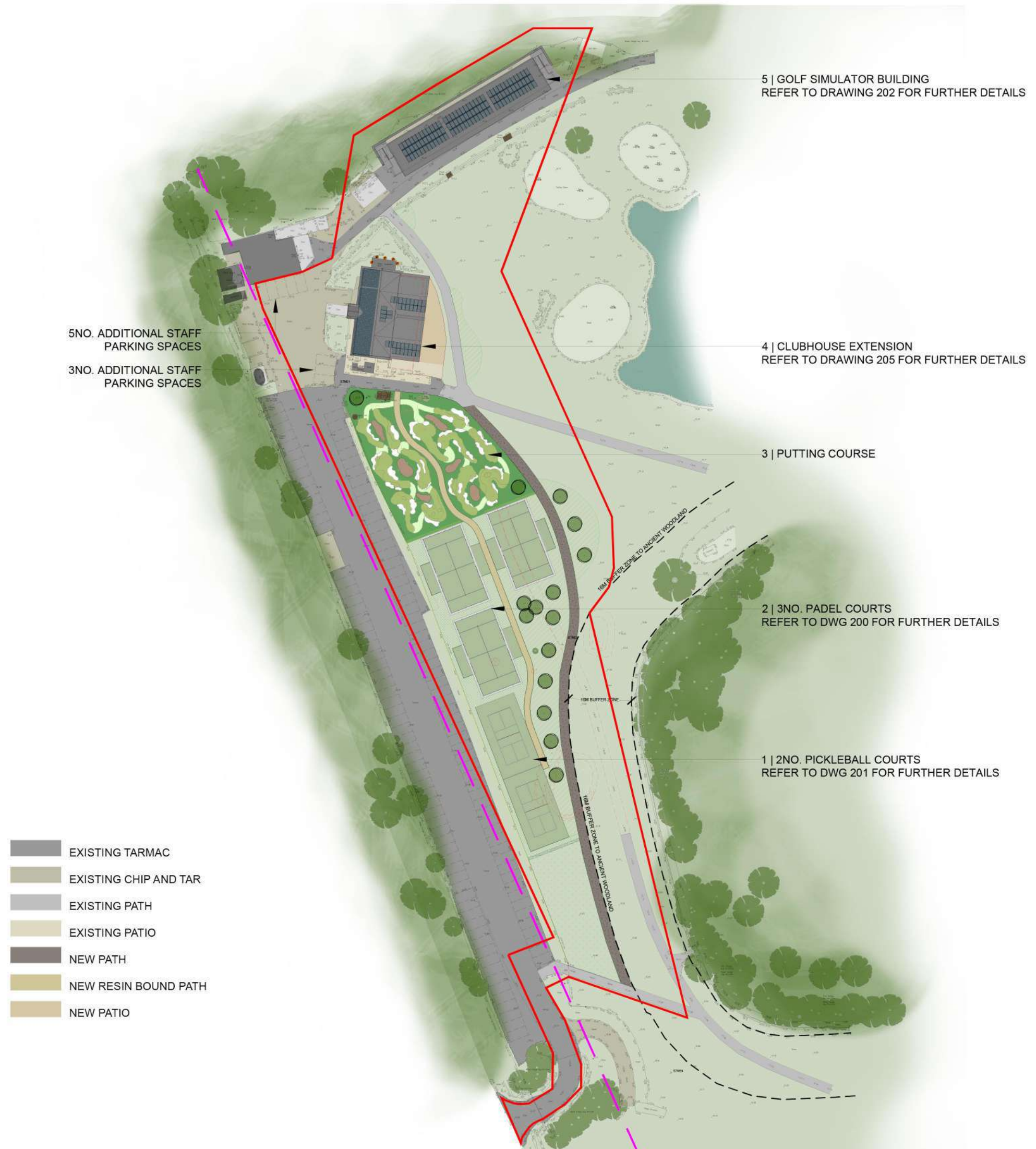
PROJECT
BILLINGBEAR PGC, THE STRAIGHT MIL
WOKINGHAM, RG40 5SJ

DRAWING TITLE
PROPOSED SITE PLAN

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FOR PLANNING			
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2664	PL	100	02
SCALE	DATE	DRAWN	CHECKED
1:1000@A3	FEB'25	AC	AC

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www.lewandowskiarchitects.com



APPENDIX C – Environment Agency Reponse

Mo Khan
mo.khan@gse ltd.co.uk

Our ref: EIR2025/35625

Date: 23 October 2025

Dear Mo

RE: Environmental Information Regulations: EIR2025/35625

Thank you for requesting a Product 4 through the 'getting flood risk information for planning tool' on the .gov website received on 8 October reference J55V4J4EN7V5 - RG40 5SJ.

Unfortunately, we do not have any detailed flood risk modelling in this location. Therefore, we are unable to provide modelled flood levels and extents for your site.

The Flood Map for Planning in this location is based on the New National Model (NNM) published in March 2025. The flood levels or depth data is not currently available for all of the locations identified as at risk. You may wish to contact our Sustainable Places team at Planning_THM@environment-agency.gov.uk to set up a chargeable agreement to discuss your planning proposal further with our local flood risk team. Alternatively, you could contact us again at a later date when we might be in a position to provide flood depth associated with our New National Flood Risk Assessment system.

You can access the new Flood Map for Planning service, published 25 March 2025, to view and export maps for your site at:

[Flood map for planning - GOV.UK](#)

You can find more information on the long term risk of flooding for this location on our website:

[Check the long term flood risk for an area in England - GOV.UK](#)

You can find the historic flood map for this location via the link below:

<https://data.gov.uk/dataset/historic-flood-map1>

You can find recorded flood outlines for this location via the link below:

<https://data.gov.uk/dataset/recorded-flood-outlines1>

You can find out the risk of flooding from surface water for this location via the link below:

[Risk of Flooding from Surface Water](#)

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

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

Please be aware that from 20th July 2021 the climate change allowances required in flood risk assessments have been updated. Please see

<https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances#contents> for more information.

I hope that we have correctly interpreted your request. Please refer to our Open Government Licence for the permitted use of the supplied data:

<http://www.nationalarchives.gov.uk/doc/open-government-licence/version/3/>

Please be aware that many of our datasets are now available online. Simply visit environment.data.gov.uk

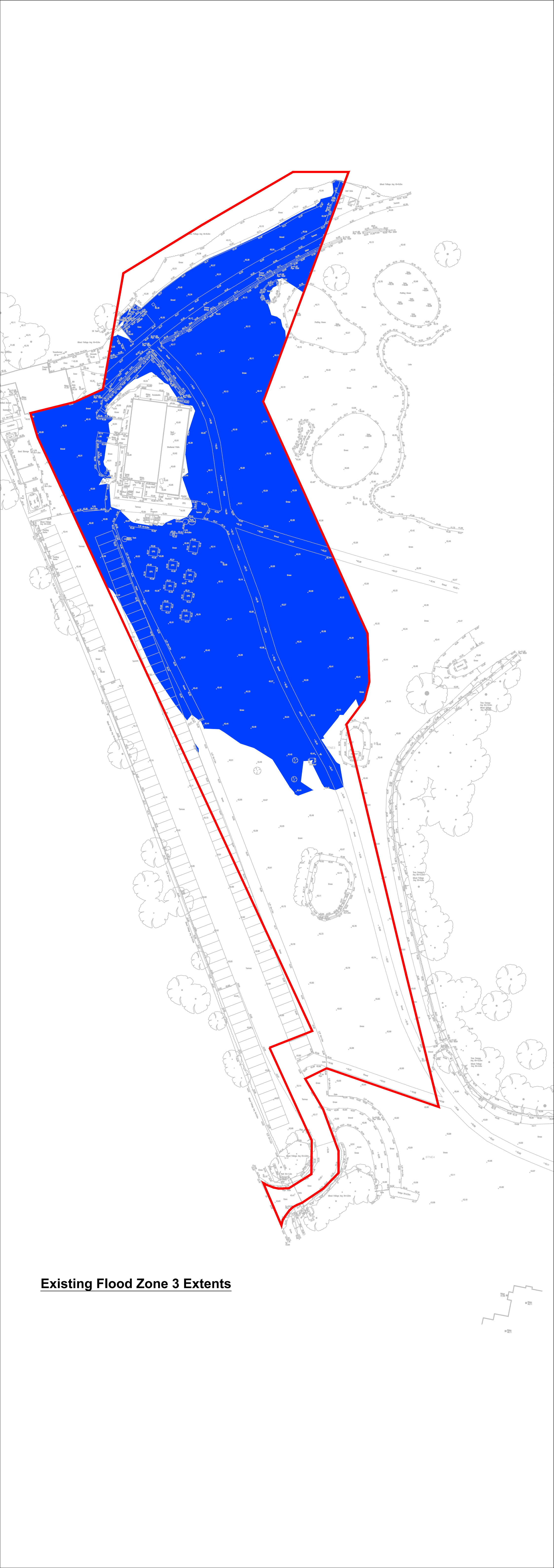
We respond to requests for recorded information that we hold under the Freedom of Information Act 2000 (FOIA) and the associated Environmental Information Regulations 2004 (EIR).

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

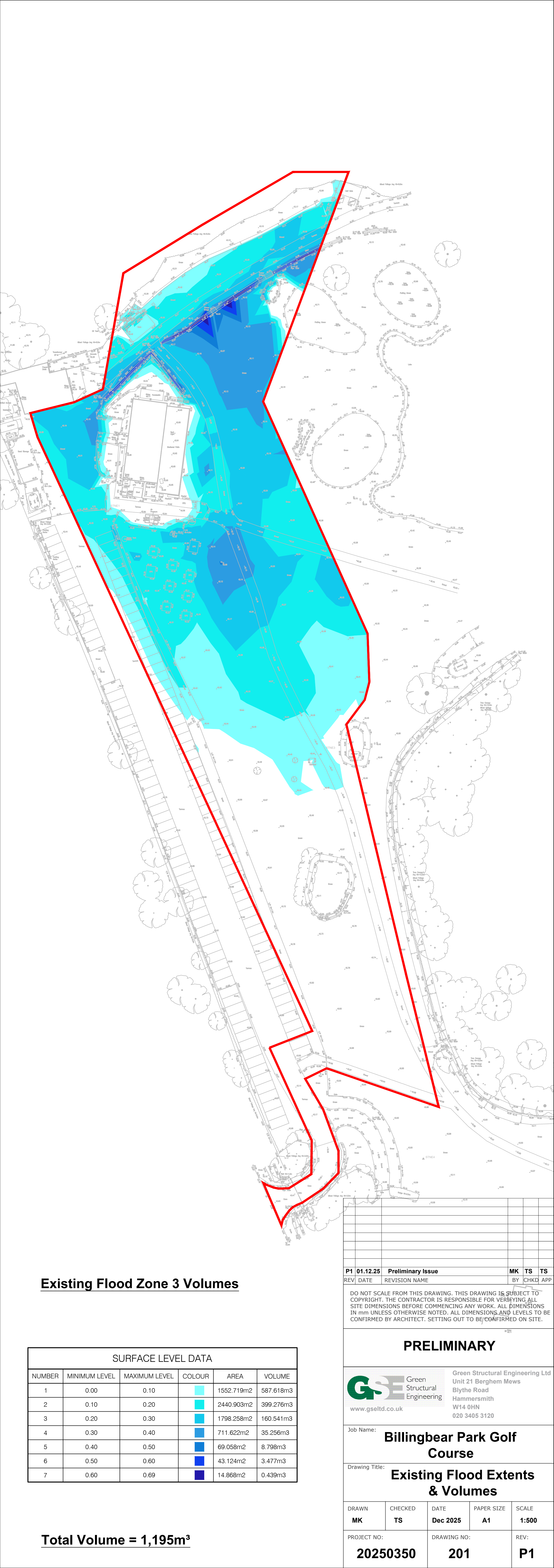
Kind Regards

Customers and Engagement Team – Thames Area

APPENDIX D – Existing Flood Extents and Volumes



Existing Flood Zone 3 Extents



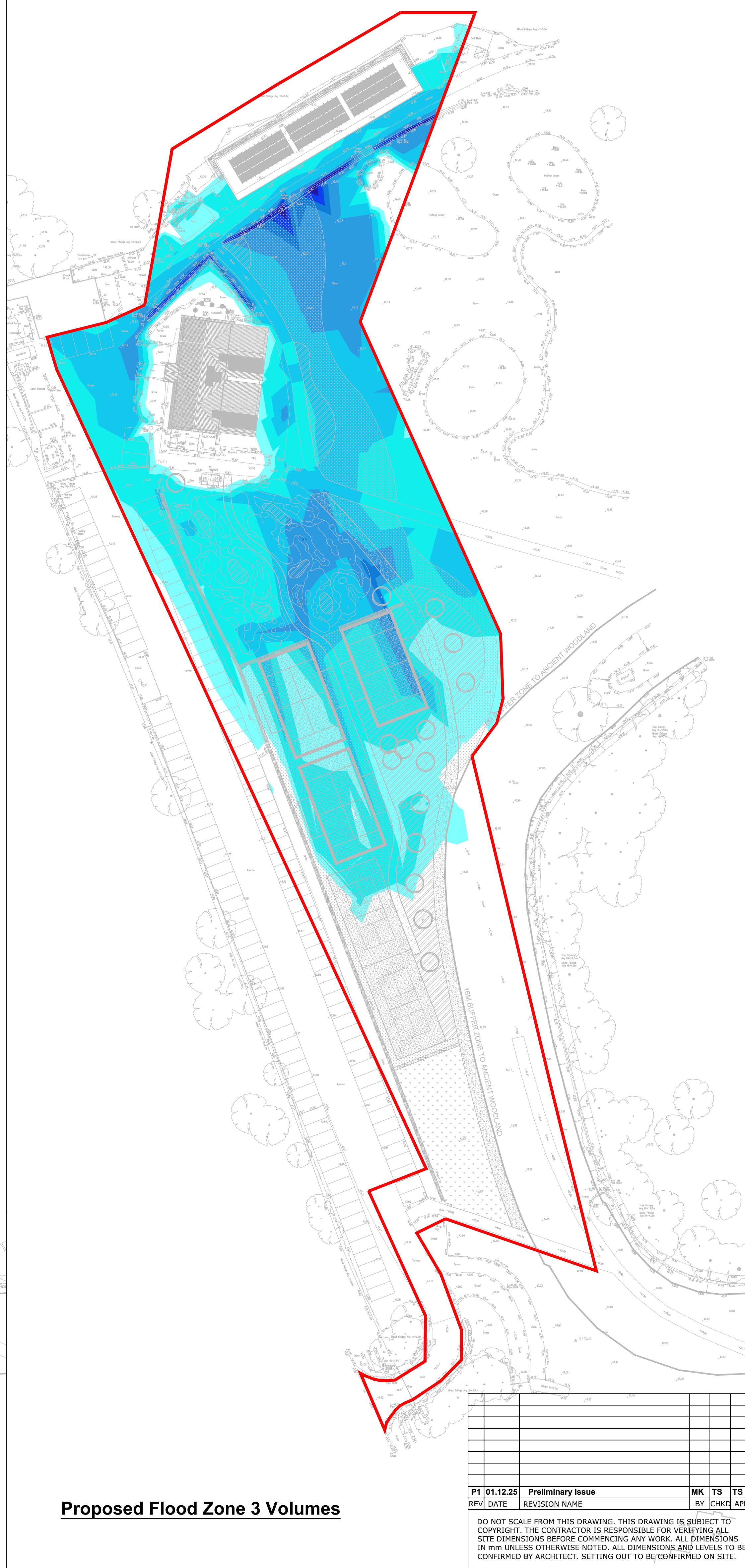
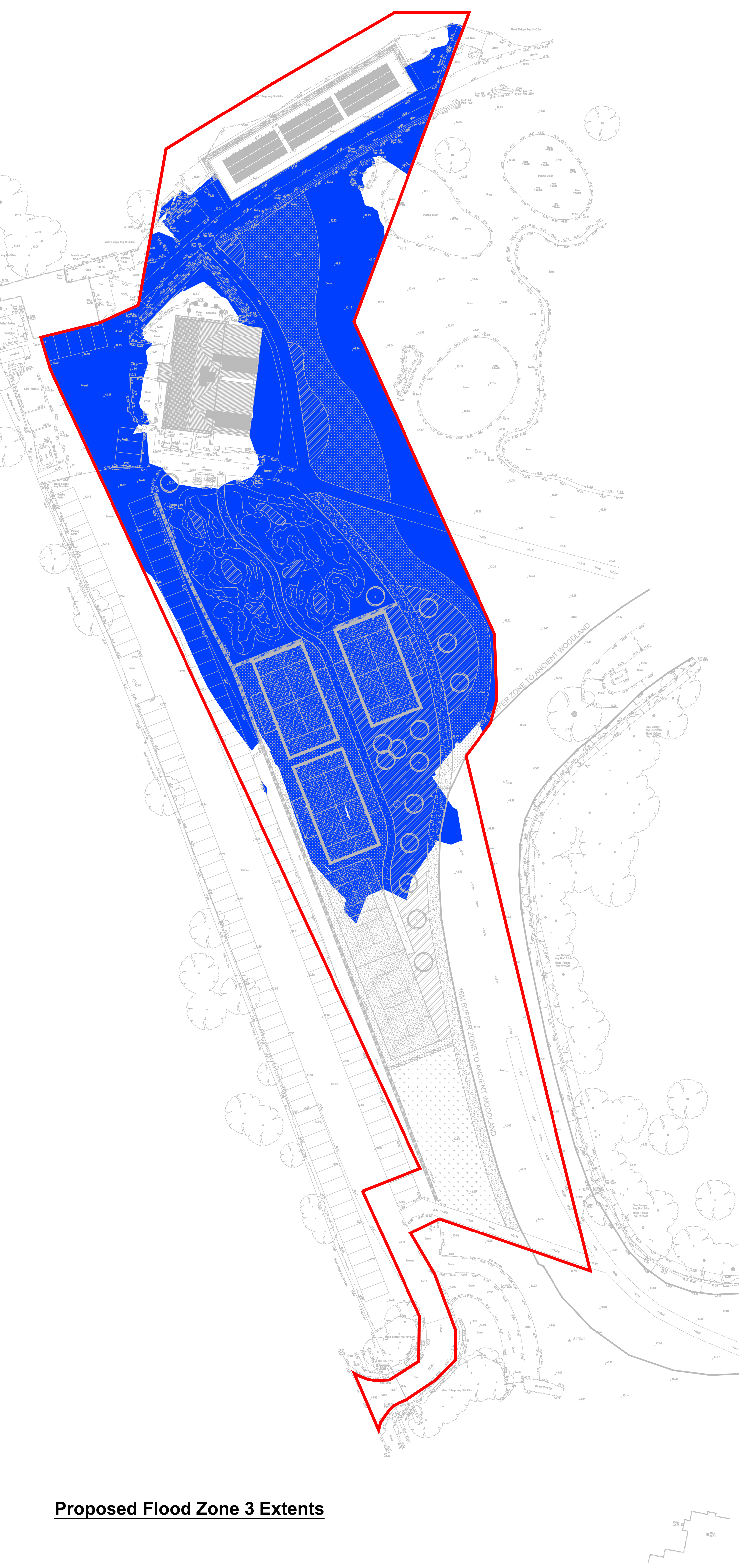
Existing Flood Zone 3 Volumes

SURFACE LEVEL DATA					
NUMBER	MINIMUM LEVEL	MAXIMUM LEVEL	COLOUR	AREA	VOLUME
1	0.00	0.10		1552.719m2	587.618m3
2	0.10	0.20		2440.903m2	399.276m3
3	0.20	0.30		1798.258m2	160.541m3
4	0.30	0.40		711.622m2	35.256m3
5	0.40	0.50		69.058m2	8.798m3
6	0.50	0.60		43.124m2	3.477m3
7	0.60	0.69		14.868m2	0.439m3

Total Volume = 1,195m³

P1 01.12.25 Preliminary Issue					MK	TS	TS
REV	DATE	REVISION NAME			BY	CHKD	APP
DO NOT SCALE FROM THIS DRAWING. THIS DRAWING IS SUBJECT TO COPYRIGHT. THE CONTRACTOR IS RESPONSIBLE FOR VERIFYING ALL SITE DIMENSIONS BEFORE COMMENCING ANY WORK. ALL DIMENSIONS IN mm UNLESS OTHERWISE NOTED. ALL DIMENSIONS AND LEVELS TO BE CONFIRMED BY ARCHITECT. SETTING OUT TO BE CONFIRMED ON SITE.							
PRELIMINARY							
		Green Structural Engineering Ltd Unit 21 Berghem Mews Blythe Road Hammersmith W14 0HN 020 3405 3120		Green Structural Engineering Ltd Unit 21 Berghem Mews Blythe Road Hammersmith W14 0HN 020 3405 3120			
Job Name: Billingbear Park Golf Course							
Drawing Title: Existing Flood Extents & Volumes							
DRAWN MK	CHECKED TS	DATE Dec 2025	PAPER SIZE A1	SCALE 1:500			
PROJECT NO: 20250350		DRAWING NO: 201		REV: P1			

APPENDIX E – Proposed Flood Extents and Volumes



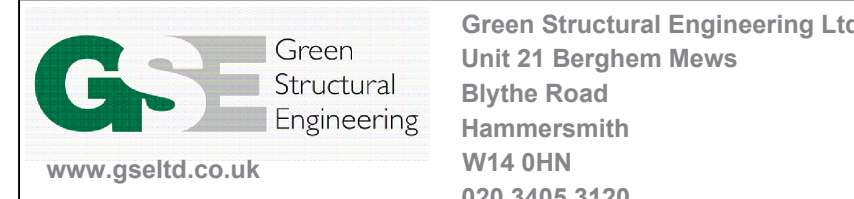
SURFACE LEVEL DATA					
NUMBER	MINIMUM LEVEL	MAXIMUM LEVEL	COLOR	AREA	VOLUME
1	0.00	0.10		1326.725m2	618.875m3
2	0.10	0.20		2601.863m2	431.182m3
3	0.20	0.30		1859.025m2	181.975m3
4	0.30	0.40		851.360m2	42.055m3
5	0.40	0.50		83.833m2	9.044m3
6	0.50	0.60		43.124m2	3.477m3
7	0.60	0.69		14.868m2	0.439m3

Total Volume = 1,288m³

[illegible]

DO NOT SCALE FROM THIS DRAWING. THIS DRAWING IS SUBJECT TO COPYRIGHT. THE CONTRACTOR IS RESPONSIBLE FOR VERIFYING ALL SITE DIMENSIONS BEFORE COMMENCING ANY WORK. ALL DIMENSIONS IN mm UNLESS OTHERWISE NOTED. ALL DIMENSIONS AND LEVELS TO BE CONFIRMED BY ARCHITECT. SETTING OUT TO BE CONFIRMED ON SITE.

PRELIMINARY



Job Name: **Billingbear Park Golf Course**

Drawing Title: **Proposed Flood
Extents & Volumes**

DRAWN MK	CHECKED TS	DATE Dec 2025	PAPER SIZE A1	SCALE 1:500
--------------------	----------------------	-------------------------	-------------------------	-----------------------

PROJECT NO:	DRAWING NO:	REV:
20250350	202	P1

APPENDIX F – Thames Water Sewer Records

GSE
21 BERGHEM MEWS,
LONDON
W14 0HN

Search address supplied Keepers Cottage
Billingbear Park Golf Course
The Straight Mile
Wokingham
RG40 5SJ

Your reference Billingbear

Our reference ALS/ALS Standard/2025_5238515

Search date 16 October 2025

Keeping you up-to-date

Notification of price changes

We're changing our report prices from 4th June 2025. The price will increase by 3.5% based on Retail Price Index (RPI).

Find our new prices on our website thameswater.co.uk/property-searches

Any Questions? We're happy to talk through the changes with you – give our Property Searches team a call on 0800 009 4540 .



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: Keepers Cottage, Billingbear Park Golf Course, The Straight Mile, Wokingham, RG40 5SJ

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.

The following quartiles have not been printed as they contain no assets:

SU8172SE
SU8172NE
SU8272SW
SU8272NW

Following examination of our statutory maps, Thames Water has been unable to find any record of public sewerage within this area. However, there may be other sewerage pipework within the area that is not owned by the company. You may be able to obtain records of such pipework from the building control department of your local authority, from property deeds or from neighbouring landowners.

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.

The following quartiles have not been printed as they contain no assets:

SU8172SE
SU8172NE
SU8272SW
SU8272NW

Asset Location Search



Property Searches

Following examination of our statutory maps, Thames Water has been unable to find any plans of water mains within this area. If you require a connection to the public water supply system, please write to:

Diversions	Thames Water	New Connections /
Business Centre	Brentford	Network Services
TW8 0EE	Tel: 0845 850 2777	Middlesex
developer.services@thameswater.co.uk		Email:

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

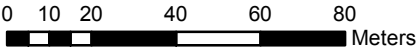
Tel: 0800 009 3921
Email: developer.services@thameswater.co.uk

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



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 before any works are undertaken. Crown copyright Reserved

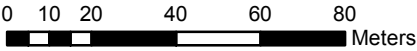
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Width: 500m
Printed By: SEswara1
Print Date: 16/10/2025
Map Centre: 481750,172250
Grid Reference: SU8172SE

Comments:

ALS/ALS Standard/2025_5238515

NB: Level quoted in metres Ordnance Newlyn Datum. The value -9999.00 indicates no Survey information is available.

REFERENCE	COVER LEVEL	INVERT LEVEL	REFERENCE	COVER LEVEL	INVERT LEVEL
-----------	-------------	--------------	-----------	-------------	--------------



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 before any works are undertaken. Crown copyright Reserved

Scale: 1:1789
Width: 500m
Printed By: SEswara1
Print Date: 16/10/2025
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Grid Reference: SU8272NW

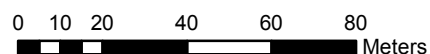
Comments:

ALS/ALS Standard/2025_5238515

NB: Level quoted in metres Ordnance Newlyn Datum. The value -9999.00 indicates no Survey information is available.

REFERENCE	COVER LEVEL	INVERT LEVEL	REFERENCE	COVER LEVEL	INVERT LEVEL
-----------	-------------	--------------	-----------	-------------	--------------

ALS/ALS Standard/2025_5238515



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Scale: 1:1789
Width: 500m
Printed By: SEswara1
Print Date: 16/10/2025
Map Centre: 481750,172750
Grid Reference: SU8172NE

Comments:

ALS/ALS Standard/2025_5238515

NB: Level quoted in metres Ordnance Newlyn Datum. The value -9999.00 indicates no Survey information is available.

REFERENCE	COVER LEVEL	INVERT LEVEL	REFERENCE	COVER LEVEL	INVERT LEVEL
-----------	-------------	--------------	-----------	-------------	--------------



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 before any works are undertaken. Crown copyright Reserved

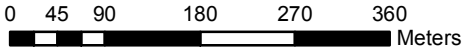
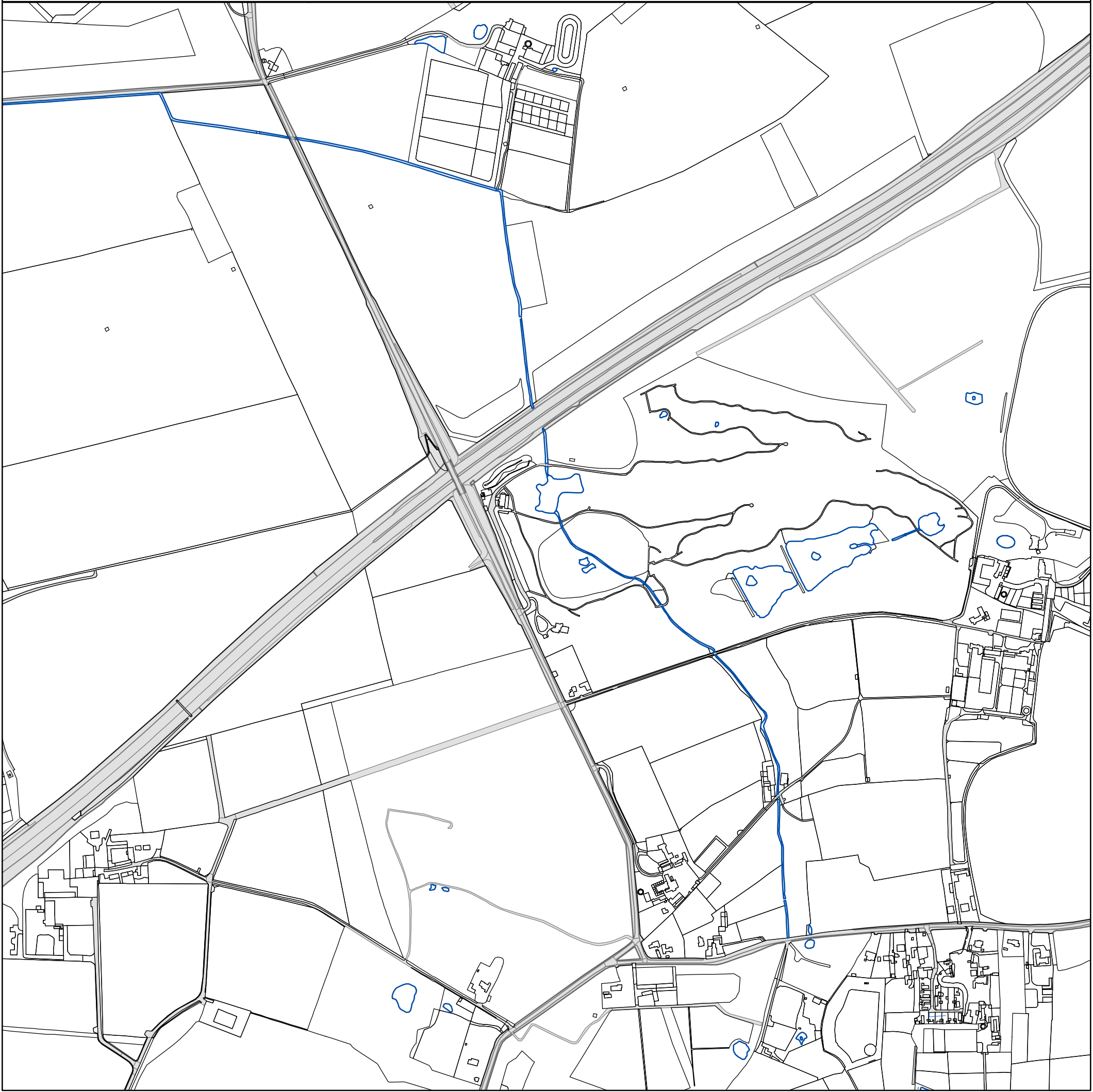
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Printed By: SEswara1
Print Date: 16/10/2025
Map Centre: 482250,172250
Grid Reference: SU8272SW

Comments:

ALS/ALS Standard/2025_5238515

NB: Level quoted in metres Ordnance Newlyn Datum. The value -9999.00 indicates no Survey information is available.

REFERENCE	COVER LEVEL	INVERT LEVEL	REFERENCE	COVER LEVEL	INVERT LEVEL
-----------	-------------	--------------	-----------	-------------	--------------



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 before any works are undertaken. Crown copyright Reserved

Scale: 1:7161
Width: 2000m
Printed By: SEswara1
Print Date: 16/10/2025
Map Centre: 482206,172466
Grid Reference: SU8272SW

Comments:

ALS/ALS Standard/2025_5238515

NB: Level quoted in metres Ordnance Newlyn Datum. The value -9999.00 indicates no Survey information is available.

REFERENCE	COVER LEVEL	INVERT LEVEL
961A		

REFERENCE	COVER LEVEL	INVERT LEVEL
-----------	-------------	--------------



ALS Sewer Map Key

Public Sewer Types (Operated & Maintained by Thames Water)

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

Notes:

- 1) All levels associated with the plans are to Ordnance Datum Newlyn.
- 2) All measurements on the plans are metric.
- 3) Arrows (on gravity fed sewers) or flecks (on rising mains) indicate direction of flow.
- 4) Most private pipes are not shown on our plans, as in the past, this information has not been recorded.
- 5) 'na' or '0' on a manhole level indicates that data is unavailable.

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
	Dam Chase
	Fitting
	Meter
	Vent Column

Operational Controls

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

	Control Valve
	Drop Pipe
	Ancillary
	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.

	Outfall
	Undefined End
	Inlet

Other Symbols

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

	Public/Private Pumping Station
	Change of characteristic indicator (C.O.C.I.)
	Invert Level
	Summit

Areas

Lines denoting areas of underground surveys, etc.

	Agreement
	Operational Site
	Chamber
	Tunnel
	Conduit Bridge

Other Sewer Types (Not Operated or Maintained by Thames Water)

	Foul Sewer		Surface Water Sewer
	Combined Sewer		Gully
	Culverted Watercourse		Proposed
			Abandoned Sewer

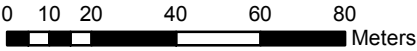
- 6) The text appearing alongside a sewer line indicates the internal diameter of the pipe in millimetres. Text next to a manhole indicates the manhole reference number and should not be taken as a measurement. If you are unsure about any text or symbology present on the plan, please contact a member of Property Insight on 0845 070 9148.



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Print Date: 16/10/2025
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Grid Reference: SU8272SW

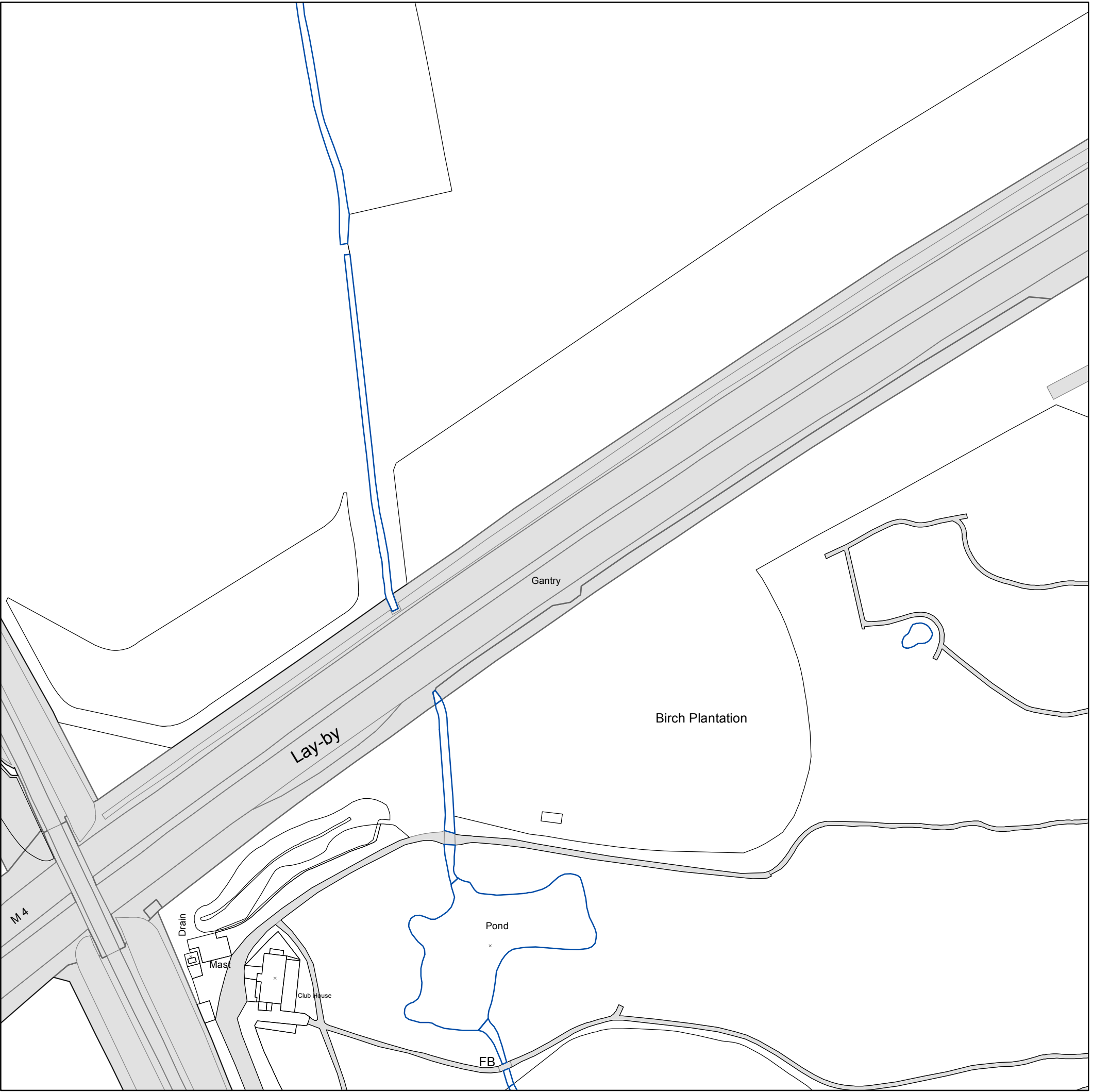
Comments:



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 before any works are undertaken. Crown copyright Reserved

Scale: 1:1789
Width: 500m
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Grid Reference: SU8172NE

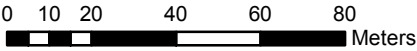
Comments:



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 before any works are undertaken. Crown copyright Reserved

Scale: 1:1789
Width: 500m
Printed By: SEswara1
Print Date: 16/10/2025
Map Centre: 482250,172750
Grid Reference: SU8272NW

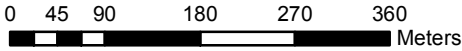
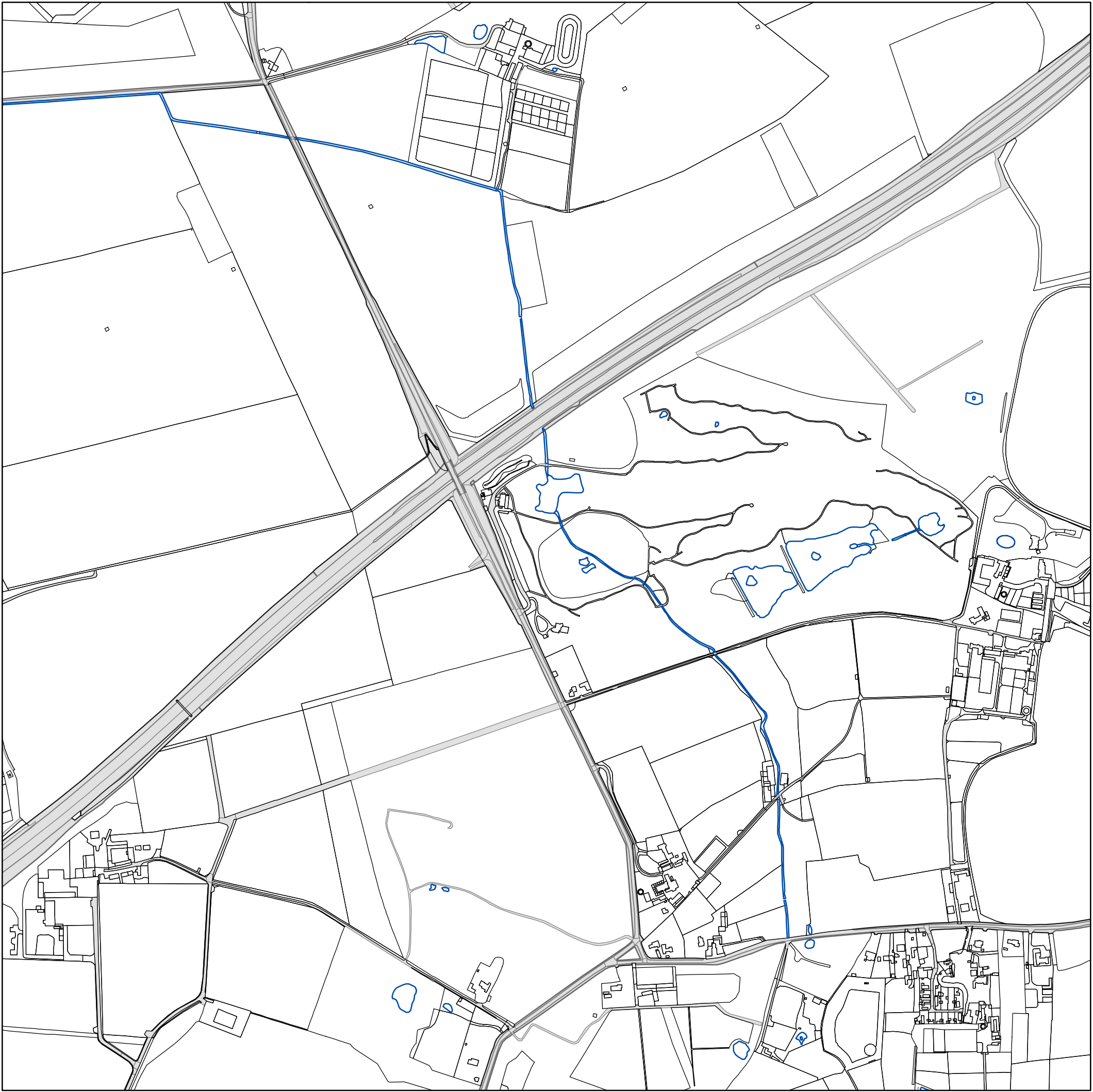
Comments:



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Scale: 1:1789
Width: 500m
Printed By: SEswara1
Print Date: 16/10/2025
Map Centre: 481750,172250
Grid Reference: SU8172SE

Comments:



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 before any works are undertaken. Crown copyright Reserved

Scale: 1:7161
Width: 2000m
Printed By: SEswara1
Print Date: 16/10/2025
Map Centre: 482206,172466
Grid Reference: SU8272SW

Comments:



ALS Water Map 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
--	-------------

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 G – Drainage CCTV Survey

JD Drains Ltd
26a Bramshill Yard
Arborfield
Reading
RG2 9PL

Site Address:
THE STRAIGHT MILE

Report Date:
26 November 2025



Job Number
CCTV-01400Surveyed by (Operator)
TROYBase Unit
UD2E6E371RDate
26/11/2025

Client Details:

BILLINGBEAR PARK GOLF COURSE
THE STRAIGHT MILE
WOKINGHAM
RG40 5SJ

Site Details:

THE STRAIGHT MILE

Contractor Details:

JD Drains Ltd
26a Bramshill Yard
Arborfield
Reading
RG2 9PL

Office Contact Number: 0118 380 0173

Purpose of Survey:

FULL CCTV OF STORM AND FOUL

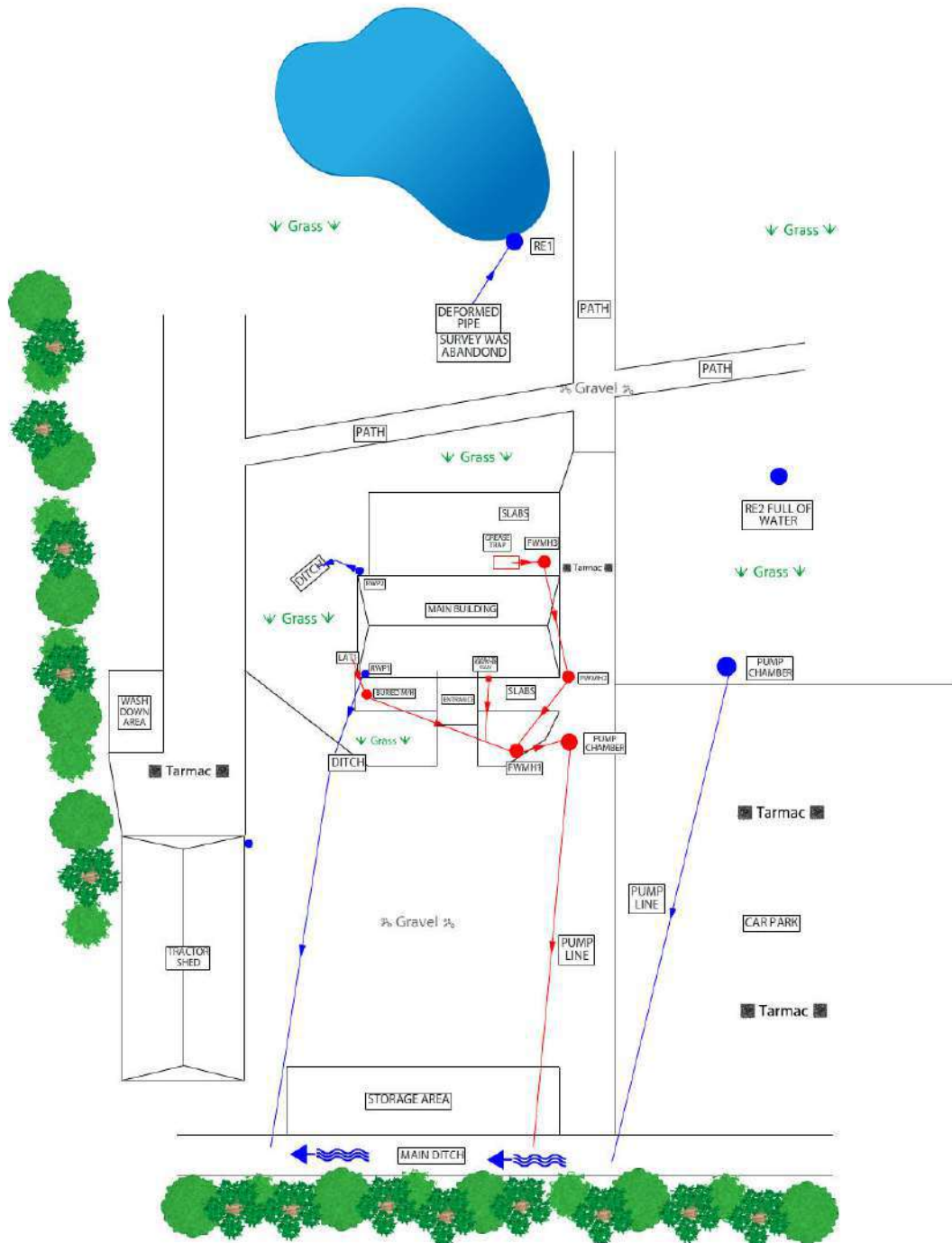
Job Number CCTV-01400	Surveyed by (Operator) TROY	Base Unit UD2E6E371R	Date 26/11/2025
---------------------------------	---------------------------------------	--------------------------------	---------------------------

Report Contents

Page 1	Cover Page
Page 2	Job Overview
Page 3	Contents Page
Page 4	Site Drawings
Page 5	Site Photos
Page 8	Job Summary
Page 10	Survey Run Sheet(Survey 1 - FWMH1 to PUMP CHAMBER)
Page 12	Survey Run Sheet(Survey 2 - FWMH1 to LAT1)
Page 15	Survey Run Sheet(Survey 3 - DITCH to RWP1)
Page 17	Survey Run Sheet(Survey 4 - FWMH2 to FWMH1)
Page 19	Survey Run Sheet(Survey 5 - FWMH2 to FWMH3)
Page 21	Survey Run Sheet(Survey 6 - FWMH3 to GREASE TRAP)
Page 23	Survey Run Sheet(Survey 7 - DITCH to RWP2)
Page 25	Survey Run Sheet(Survey 8 - RE1 to DITCH)
Page 28	Defect Summary
Page 29	Defect Summary
Page 31	Grade Defect Descriptions
Page 32	Terms and Conditions

Job Number CCTV-01400	Surveyed by (Operator) TROY	Base Unit UD2E6E371R	Date 26/11/2025
---------------------------------	---------------------------------------	--------------------------------	---------------------------

This sketch is not to scale and does not represent the exact routing of the drainage system



Job Number
CCTV-01400

Surveyed by (Operator)
TROY

Base Unit
UD2E6E371R

Date
17/10/2025



Manhole / Access Point: FWMH1 Internal



Manhole / Access Point: FWMH1 Location



Manhole / Access Point: PUMP CHAMBER Internal



Manhole / Access Point: PUMP CHAMBER Location



Manhole / Access Point: LAT1 Location



Manhole / Access Point: DITCH Location

Job Number CCTV-01400	Surveyed by (Operator) TROY	Base Unit UD2E6E371R	Date 17/10/2025
---------------------------------	---------------------------------------	--------------------------------	---------------------------



Manhole / Access Point: RWP1 Location



Manhole / Access Point: FWMH3 Location



Manhole / Access Point: FWMH3 Internal



Manhole / Access Point: FWMH2 Location



Manhole / Access Point: GREASE TRAP Location



Manhole / Access Point: FWMH2 Internal

Job Number
CCTV-01400

Surveyed by (Operator)
TROY

Base Unit
UD2E6E371R

Date
17/10/2025



Manhole / Access Point: RE1 Location



Property: Front Elevation



Access problems: BURIED FOUL M/H ON THE CORNER OF THE BUILDING



Access problems: RE2 FULL OF WATER

Job Number CCTV-01400	Surveyed by (Operator) TROY	Base Unit UD2E6E371R	Date 26/11/2025
---------------------------------	---------------------------------------	--------------------------------	---------------------------

Job Information

Total Distance Surveyed: **54.17 meters**
 Engineer: **TROY**
 Number of Surveys: **8**
 Number of Surveys grade 4 or above: **0**

Section 1 Overview (17/10/2025)

Manholes: **FWMH1 to PUMP CHAMBER**
 Pipe Length: **1.87 metres**
 Structural Grade: **0**
 Service Grade: **0**
 Material: **Polyethylene**
 Pipe Size: **100mm**
 Use: **Foul**

NO DEFECTS FOUND PIPE IN GOOD CONDITION

Section 2 Overview (17/10/2025)

Manholes: **FWMH1 to LAT1**
 Pipe Length: **22.45 metres**
 Structural Grade: **0**
 Service Grade: **3**
 Material: **Polyethylene**
 Pipe Size: **100mm**
 Use: **Foul**

SCALE BUILD UP CAUSING THE CAMERA TO STOP AND MULTIPLE BENDS ALSO THERE IS A BURIED CHAMBER ON THE CORNER OF THE BUILDING.

Section 3 Overview (17/10/2025)

Manholes: **DITCH to RWP1**
 Pipe Length: **5.06 metres**
 Structural Grade: **0**
 Service Grade: **0**
 Material: **Polyethylene**
 Pipe Size: **100mm**
 Use: **Surface water**

NO DEFECTS DRAIN RUN IN GOOD CONDITION

Section 4 Overview (17/10/2025)

Manholes: **FWMH2 to FWMH1**
 Pipe Length: **4.65 metres**
 Structural Grade: **0**
 Service Grade: **0**
 Material: **Polyethylene**
 Pipe Size: **100mm**
 Use: **Foul**

NO DEFECTS FOUND DRAIN IN GOOD CONDITION

Section 5 Overview (17/10/2025)

Manholes: **FWMH2 to FWMH3**
 Pipe Length: **10.06 metres**
 Structural Grade: **0**
 Service Grade: **0**
 Material: **Polyethylene**
 Pipe Size: **100mm**
 Use: **Foul**

NO DEFECTS FOUND DRAIN PIPE IN GOOD CONDITION

Job Number CCTV-01400	Surveyed by (Operator) TROY	Base Unit UD2E6E371R	Date 26/11/2025
---------------------------------	---------------------------------------	--------------------------------	---------------------------

Section 6 Overview (17/10/2025)

Manholes: **FWMH3 to GREASE TRAP**
 Pipe Length: **0.61 metres**
 Structural Grade: **0**
 Service Grade: **0**
 Material: **Polyethylene**
 Pipe Size: **100mm**
 Use: **Foul**

NO DEFECTS FOUND

Section 7 Overview (17/10/2025)

Manholes: **DITCH to RWP2**
 Pipe Length: **1.25 metres**
 Structural Grade: **0**
 Service Grade: **4**
 Material: **Polyethylene**
 Pipe Size: **100mm**
 Use: **Surface water**

THIS RUN NEEDS CLEANING THEN RE-SURVEY

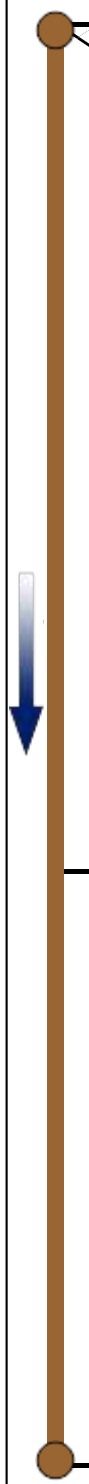
Section 8 Overview (01/01/2012)

Manholes: **RE1 to DITCH**
 Pipe Length: **8.22 metres**
 Structural Grade: **0**
 Service Grade: **0**
 Material: **Polyethylene**
 Pipe Size: **100mm**
 Use: **Surface water**

Surveyed by (Operator) TROY	Job Number CCTV-01400	Pipe Length Reference(PLR) FWMH1 X	Date 17/10/2025	Pre Cleaned Flushed through to enable survey
Weather Dry	Customer Present	Service Grade/Structural Grade 0/0	Base Unit UD2E6E371R	Section Number 1
Road THE STRAIGHT MILE Place Location		Division District Location Details		
Purpose Routine inspection of condition Duty Foul Catchment		Shape/Size 100mm Material Polyethylene Category U	Start Node FWMH1 End Node PUMP CHAMBER Total length 1.87 metres	

 Scale **1:0.10**
 Direction **Downstream**

Start Node Ref:FWMH1 | I/L :mm | Depth: 0770mm

Position	Code	Description	Photo	Type/Grade
0.00	MH	Start node type, manhole, reference FWMH1	13348045	Comment / 0
0.00	WL	Water level 0% height/diameter	13348050	Comment / 0
				
1.10	LL	Line of drain/sewer deviates left half	13348055	Comment / 0
1.87	OCF	Finish node type, other special chamber, reference number PUMP CHAMBER	13348065	Comment / 0

End Node Ref:PUMP CHAMBER | I/L :mm | Depth: 2500mm

Job Number CCTV-01400	Surveyed by (Operator) TROY	Base Unit UD2E6E371R	Date 17/10/2025
 Start node type, manhole, reference FWMH1		 Water level 0% height/diameter	
 From: FWMH1 / To: PUMP CHAMBER Size: 100 Line of drain/sewer deviates left half		 From: FWMH1 / To: PUMP CHAMBER Size: 100 Finish node type, other special chamber, reference number PUMP CHAMBER	

Surveyed by (Operator) TROY	Job Number CCTV-01400	Pipe Length Reference(PLR) LAT1 X	Date 17/10/2025	Pre Cleaned Flushed through to enable survey
Weather Dry	Customer Present	Service Grade/Structural Grade 3/0	Base Unit UD2E6E371R	Section Number 2
Road THE STRAIGHT MILE Place Location		Division District Location Details		
Purpose Routine inspection of condition Duty Foul Catchment		Shape/Size 100mm Material Polyethylene Category U	Start Node FWMH1 End Node LAT1 Total length 22.45 metres	

 Scale **1:1.18**
 Direction **Upstream**

Start Node Ref:FWMH1 | I/L :mm | Depth: 0770mm

Position	Code	Description	Photo	Type/Grade
0.00	MH	Start node type, manhole, reference FWMH1	13348592	Comment / 0
0.00	WL	Water level 5% height/diameter	13348593	Comment / 0
4.84	JN	Junction at 3 o'clock, diameter 100mm - Remark: FOUL GULLY FROM THE BAR AREA	13348594	Comment / 0
5.49	DEZ	Other attached deposits at 6 o'clock. 10% cross-sectional area loss - Remark: SCALE BUILD UP	13348595	Service / 3
11.97	WL	Water level 10% height/diameter - Remark: CAUSED BY SCALE BUILD UP	13348596	Comment / 0
20.65	LR	Line of drain/sewer deviates right half	13348597	Comment / 0
21.08	REM	THIS IS A BURIED MANHOLE CHAMBER	13348599	Comment / 0
21.37	LR	Line of drain/sewer deviates right half	13348600	Comment / 0
22.45	REM	UNABLE TO PUSH ANY FURTHER DUE TO MULTIPLE BENDS AND SCALE BUILD UP	13348602	Comment / 0
22.45	SA	Survey Abandoned - Remark: UNABLE TO PUSH ANY FURTHER DUE TO SCALE BUILD UP AND MULTIPLE BENDS	13348604	Comment / 0

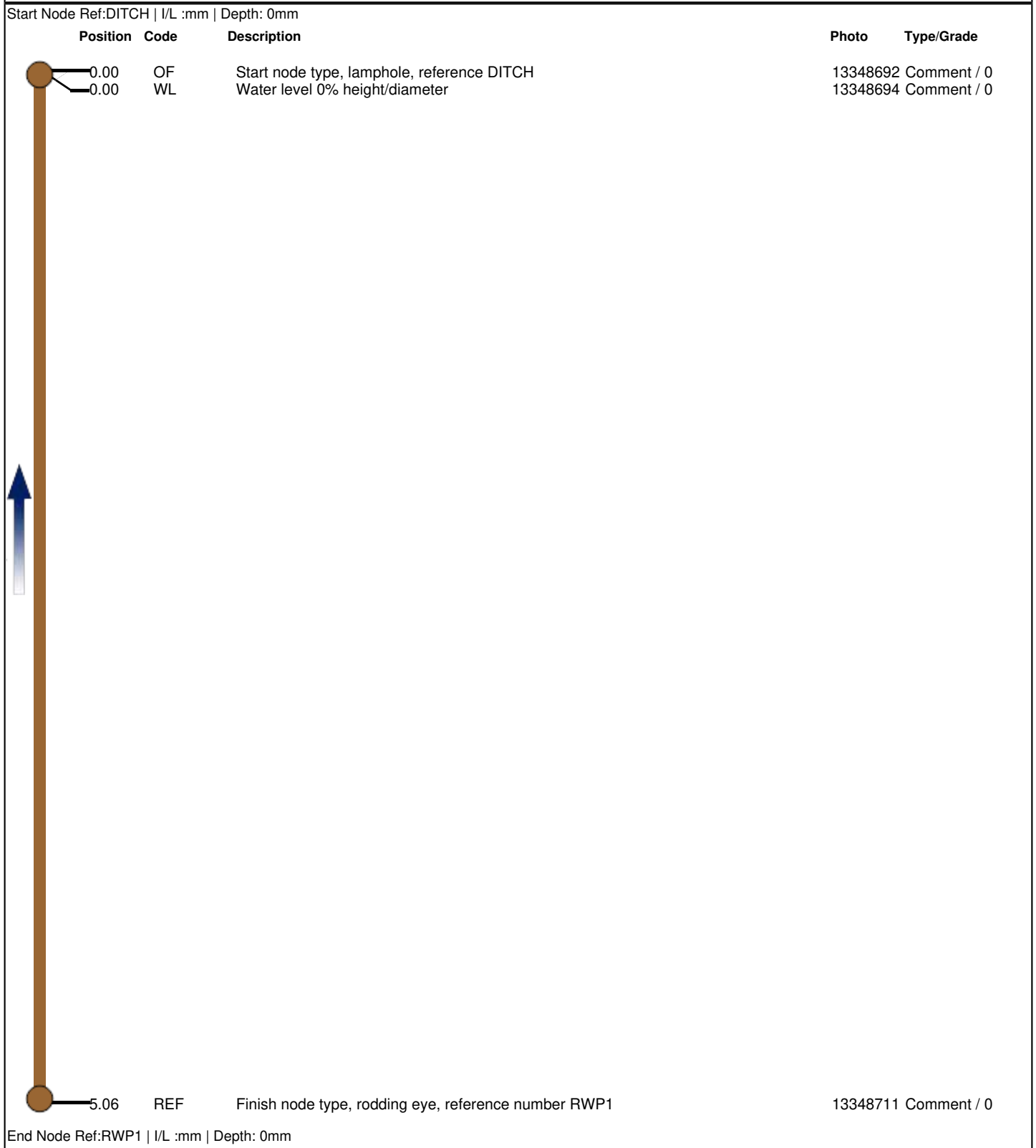
End Node Ref:LAT1 | I/L :mm | Depth: 0760mm

Job Number CCTV-01400	Surveyed by (Operator) TROY	Base Unit UD2E6E371R	Date 17/10/2025
 0.00 M Start node type, manhole, reference FWMH1		 0.00 M Water level 5% height/diameter	
 From: FWMH1 / To: LAT1 Size: 100 4.84 M Junction at 3 o'clock, diameter 100mm - Remark: FOUL GULLY FROM THE BAR AREA		 From: FWMH1 / To: LAT1 Size: 100 5.49 M Other attached deposits at 6 o'clock. 10% cross-sectional area loss - Remark: SCALE BUILD UP	
 From: FWMH1 / To: LAT1 Size: 100 11.97 M Water level 10% height/diameter - Remark: CAUSED BY SCALE BUILD UP		 From: FWMH1 / To: LAT1 Size: 100 20.65 M Line of drain/sewer deviates right half	

Job Number CCTV-01400	Surveyed by (Operator) TROY	Base Unit UD2E6E371R	Date 17/10/2025
From: FWMH1 / To: LAT1 Size: 100  21.08 M THIS IS A BURIED MANHOLE CHAMBER			
From: FWMH1 / To: LAT1 Size: 100  21.38 M Line of drain/sewer deviates right half			
From: FWMH1 / To: LAT1 Size: 100  22.45 M UNABLE TO PUSH ANY FURTHER DUE TO MULTIPLE BENDS AND SCALE BUILD UP			
From: FWMH1 / To: LAT1 Size: 100  22.45 M Survey Abandoned - Remark: UNABLE TO PUSH ANY FURTHER DUE TO SCALE BUILD UP AND MULTIPLE BENDS			

Surveyed by (Operator) TROY	Job Number CCTV-01400	Pipe Length Reference(PLR) RWP1 X	Date 17/10/2025	Pre Cleaned Flushed through to enable survey
Weather Dry	Customer Present	Service Grade/Structural Grade 0/0	Base Unit UD2E6E371R	Section Number 3
Road THE STRAIGHT MILE Place Location		Division District Location Details		
Purpose Routine inspection of condition Duty Surface water Catchment		Shape/Size 100mm Material Polyethylene Category U	Start Node DITCH End Node RWP1 Total length 5.06 metres	

Scale **1:0.27**
 Direction **Upstream**



Job Number CCTV-01400	Surveyed by (Operator) TROY	Base Unit UD2E6E371R	Date 17/10/2025
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Start node type, lamphole, reference DITCH



Water level 0% height/diameter



Finish node type, rodding eye, reference number RWP1

Surveyed by (Operator) TROY	Job Number CCTV-01400	Pipe Length Reference(PLR) FWMH2 X	Date 17/10/2025	Pre Cleaned Flushed through to enable survey
Weather Dry	Customer Present	Service Grade/Structural Grade 0/0	Base Unit UD2E6E371R	Section Number 4
Road THE STRAIGHT MILE Place Location		Division District Location Details		
Purpose Routine inspection of condition Duty Foul Catchment		Shape/Size 100mm Material Polyethylene Category U		Start Node FWMH2 End Node FWMH1 Total length 4.65 metres
Scale 1:0.24 Direction Downstream				

Start Node Ref:FWMH2 | I/L :mm | Depth: 0500mm

Position	Code	Description	Photo	Type/Grade
0.00	MH	Start node type, manhole, reference FWMH2	13349077	Comment / 0
0.00	WL	Water level 0% height/diameter	13349078	Comment / 0
				
4.65	MHF	Finish node type, manhole, reference number FWMH1	13349079	Comment / 0

End Node Ref:FWMH1 | I/L :mm | Depth: 0770mm

Job Number CCTV-01400	Surveyed by (Operator) TROY	Base Unit UD2E6E371R	Date 17/10/2025
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Start node type, manhole, reference FWMH2



Water level 0% height/diameter



Finish node type, manhole, reference number FWMH1

Surveyed by (Operator) TROY	Job Number CCTV-01400	Pipe Length Reference(PLR) FWMH3 X	Date 17/10/2025	Pre Cleaned Flushed through to enable survey
Weather Dry	Customer Present	Service Grade/Structural Grade 0/0	Base Unit UD2E6E371R	Section Number 5
Road THE STRAIGHT MILE Place Location		Division District Location Details		
Purpose Routine inspection of condition Duty Foul Catchment		Shape/Size 100mm Material Polyethylene Category U	Start Node FWMH2 End Node FWMH3 Total length 10.06 metres	

Scale **1:0.53**
 Direction **Upstream**

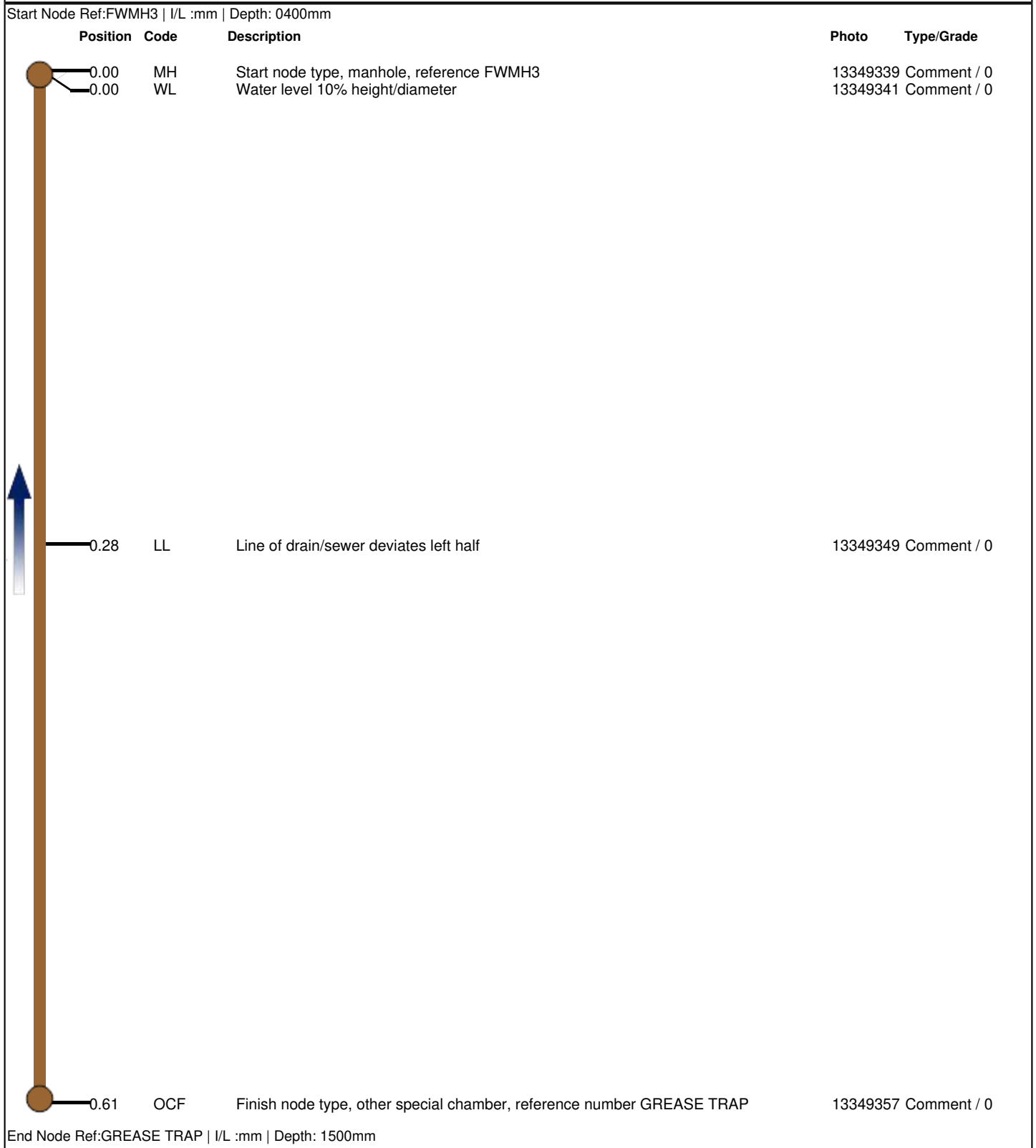
Start Node Ref:FWMH2 | I/L :mm | Depth: 0500mm

Position	Code	Description	Photo	Type/Grade
0.00	MH	Start node type, manhole, reference FWMH2	13349114	Comment / 0
0.00	WL	Water level 0% height/diameter	13349115	Comment / 0
9.63	LL	Line of drain/sewer deviates left half	13349116	Comment / 0
10.06	MHF	Finish node type, manhole, reference number FWMH3	13349117	Comment / 0

End Node Ref:FWMH3 | I/L :mm | Depth: 0mm

Job Number CCTV-01400	Surveyed by (Operator) TROY	Base Unit UD2E6E371R	Date 17/10/2025
 0.00 M Start node type, manhole, reference FWMH2			
 0.00 M Water level 0% height/diameter			
 From: FWMH2 / To: FWMH3 Size: 100 9.63 M Line of drain/sewer deviates left half			
 From: FWMH2 / To: FWMH3 Size: 100 10.06 M Finish node type, manhole, reference number FWMH3			

Surveyed by (Operator) TROY	Job Number CCTV-01400	Pipe Length Reference(PLR) GREASE TRAX	Date 17/10/2025	Pre Cleaned Flushed through to enable survey
Weather Dry	Customer Present	Service Grade/Structural Grade 0/0	Base Unit UD2E6E371R	Section Number 6
Road THE STRAIGHT MILE Place Location		Division District Location Details		
Purpose Routine inspection of condition Duty Foul Catchment		Shape/Size 100mm Material Polyethylene Category U	Start Node FWMH3 End Node GREASE TRAP Total length 0.61 metres	
Scale 1:0.03 Direction Upstream				

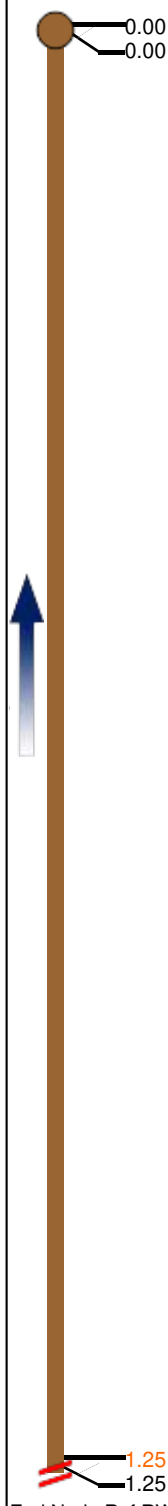


Job Number CCTV-01400	Surveyed by (Operator) TROY	Base Unit UD2E6E371R	Date 17/10/2025
 0.00 M Start node type, manhole, reference FWMH3			
 0.00 M Water level 10% height/diameter			
 From: FWMH3 / To: GREASE TRAP Size: 100 0.28 M Line of drain/sewer deviates left half			
 From: FWMH3 / To: GREASE TRAP Size: 100 0.61 M Finish node type, other special chamber, reference number GREASE TRAP			

Surveyed by (Operator) TROY	Job Number CCTV-01400	Pipe Length Reference(PLR) RWP2 X	Date 17/10/2025	Pre Cleaned Flushed through to enable survey
Weather Dry	Customer Present	Service Grade/Structural Grade 4/0	Base Unit UD2E6E371R	Section Number 7
Road THE STRAIGHT MILE Place Location		Division District Location Details		
Purpose Routine inspection of condition Duty Surface water Catchment		Shape/Size 100mm Material Polyethylene Category U	Start Node DITCH End Node RWP2 Total length 1.25 metres	

Scale **1:0.07**
 Direction **Upstream**

Start Node Ref:DITCH | I/L :mm | Depth: 0mm

Position	Code	Description	Photo	Type/Grade
0.00	OF	Start node type, lamphole, reference DITCH	13356201	Comment / 0
0.00	WL	Water level 0% height/diameter	13356203	Comment / 0
				
1.25	DEX	Other settled deposits 75% cross-sectional area loss - Remark: SILT BUILD UP	13356204	Service / 4
1.25	SA	Survey Abandoned - Remark: UNABLE TO PUSH ANY FURTHER	13359593	Comment / 0

End Node Ref:RWP2 | I/L :mm | Depth: 0mm

Job Number CCTV-01400	Surveyed by (Operator) TROY	Base Unit UD2E6E371R	Date 17/10/2025
 0.00 M Start node type, lamphole, reference DITCH		 0.00 M Water level 0% height/diameter	
From: DITCH / To: RWP2 Size: 100  1.25 M Other settled deposits 75% cross-sectional area loss - Remark: SILT BUILD UP		From: DITCH / To: RWP2 Size: 100  1.25 M Survey Abandoned - Remark: UNABLE TO PUSH ANY FURTHER	

Surveyed by (Operator) TROY	Job Number CCTV-01400	Pipe Length Reference(PLR) DITCH X	Date 01/01/2012	Pre Cleaned Flushed through to enable survey
Weather Light Rain	Customer Present	Service Grade/Structural Grade 0/0	Base Unit UD2E6E371R	Section Number 8
Road THE STRAIGHT MILE Place Location		Division District Location Details		
Purpose Routine inspection of condition Duty Surface water Catchment		Shape/Size 100mm Material Polyethylene Category U	Start Node RE1 End Node DITCH Total length 8.22 metres	

 Scale **1:0.43**
 Direction **Upstream**

Start Node Ref:RE1 | I/L :mm | Depth: 0500mm

Position	Code	Description	Photo	Type/Grade
0.00	OF	Start node type, lamphole, reference RE1	13482267	Comment / 0
0.00	WL	Water level 5% height/diameter	13482268	Comment / 0
				
3.96	SCC	Shape of drain/sewer changes to 75mm	13482269	Comment / 0
6.55	WL (S01)	Water level 60% height/diameter, Start	13482454	Comment / 0
7.93	CXZ	Defective connection, other - Remark: PIPE HAS DEFORMED	13482455	Comment / 0
8.22	WL (F01)	Water level 60% height/diameter, Finished	13482456	Comment / 0
8.22	SA	Survey Abandoned - Remark: LOSS OF VISION AND UNABLE TO PASS DEFORMED PIPE	13482457	Comment / 0

End Node Ref:DITCH | I/L :mm | Depth: 0mm

Job Number CCTV-01400	Surveyed by (Operator) TROY	Base Unit UD2E6E371R	Date 01/01/2012
 0.00 M			
Start node type, lamphole, reference RE1 Water level 5% height/diameter			
 From: RE1 / To: DITCH Size: 100 3.96 M			
Shape of drain/sewer changes to 75mm			
 From: RE1 / To: DITCH Size: 75 6.55 M			
Water level 60% height/diameter, Start			
 From: RE1 / To: DITCH Size: 75 7.95 M			
Defective connection, other - Remark: PIPE HAS DEFORMED			
 From: RE1 / To: DITCH Size: 75 8.28 M			
Water level 60% height/diameter, Finished			

Job Number CCTV-01400	Surveyed by (Operator) TROY	Base Unit UD2E6E371R	Date 01/01/2012
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Survey Abandoned - Remark: LOSS OF VISION AND UNABLE TO PASS DEFORMED PIPE

Job Number CCTV-01400	Surveyed by (Operator) TROY	Base Unit UD2E6E371R	Date 26/11/2025
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STRUCTURAL DEFECTS

Grade 3; Best practice suggests consideration to be given to repair in the medium term.

Grade 4; Best practice suggests consideration to be given to repair to avoid potential collapse.

Grade 5; Best practice suggests this pipe is at risk of collapse at any time; urgent consideration should be given to repair to avoid collapse.

Structural Defects			
Section	PLR	Grade	Fault Description
No Structural Defects at Grade 3, 4 or 5 found on this survey.			

SERVICE / OPERATIONAL DEFECTS

Grade 3; Best practice suggests consideration to be given to maintenance activities in the medium term.

Grade 4; Best practice suggests consideration to be given to maintenance to avoid potential blockage.

Grade 5; Best practice suggests this pipe is at risk of backing up / causing flooding.

Service Defects			
Section	PLR	Grade	Fault Description
2	LAT1 X	3	Other attached deposits at 6 o'clock. 10% cross-sectional area loss - Remark: SCALE BUILD UP
7	RWP2 X	4	Other settled deposits 75% cross-sectional area loss - Remark: SILT BUILD UP

ABANDONED SURVEYS

Camera no access		
Section	PLR	Fault Description
2	LAT1 X	Survey Abandoned - Remark: UNABLE TO PUSH ANY FURTHER DUE TO SCALE BUILD UP AND MULTIPLE BENDS
7	RWP2 X	Survey Abandoned - Remark: UNABLE TO PUSH ANY FURTHER
8	DITCH X	Survey Abandoned - Remark: LOSS OF VISION AND UNABLE TO PASS DEFORMED PIPE

INFORMATION

These summaries are based on the SRM grading from the WRC

Structural Defects (SRM 4)

Job Number CCTV-01400				Surveyed by (Operator) TROY			Base Unit UD2E6E371R			Date 26/11/2025			
No.	PLR	Dir.	Use	Shape/Size	Date	Mat.	Total Length	Inspection Length	Cat.	Peak Score	Grade	Mean Score	Total Score
1	FWMH1 X	D	F	Circular/100	17/10/2025	Polyethylene	1.87 metres	1.87	U	0	1	0	0
2	LAT1 X	U	F	Circular/100	17/10/2025	Polyethylene	22.45 metres	22.45	U	0	1	0	0
3	RWP1 X	U	S	Circular/100	17/10/2025	Polyethylene	5.06 metres	5.06	U	0	1	0	0
4	FWMH2 X	D	F	Circular/100	17/10/2025	Polyethylene	4.65 metres	4.65	U	0	1	0	0
5	FWMH3 X	U	F	Circular/100	17/10/2025	Polyethylene	10.06 metres	10.06	U	0	1	0	0
6	GREASE TRAX	U	F	Circular/100	17/10/2025	Polyethylene	0.61 metres	0.61	U	0	1	0	0
7	RWP2 X	U	S	Circular/100	17/10/2025	Polyethylene	1.25 metres	1.25	U	0	1	0	0
8	DITCH X	U	S	Circular/100	01/01/2012	Polyethylene	8.22 metres	8.22	U	0	1	0	0

Service Defects (SRM 4)

Job Number CCTV-01400				Surveyed by (Operator) TROY			Base Unit UD2E6E371R			Date 26/11/2025			
No.	PLR	Dir.	Use	Shape/Size	Date	Mat.	Total Length	Inspection Length	Cat.	Peak Score	Grade	Mean Score	Total Score
1	FWMH1 X	D	F	Circular/100	17/10/2025	Polyethylene	1.87 metres	1.87	U	0	1	0	0
2	LAT1 X	U	F	Circular/100	17/10/2025	Polyethylene	22.45 metres	22.45	U	2	3	0.09	2
3	RWP1 X	U	S	Circular/100	17/10/2025	Polyethylene	5.06 metres	5.06	U	0	1	0	0
4	FWMH2 X	D	F	Circular/100	17/10/2025	Polyethylene	4.65 metres	4.65	U	0	1	0	0
5	FWMH3 X	U	F	Circular/100	17/10/2025	Polyethylene	10.06 metres	10.06	U	0	1	0	0
6	GREASE TRAX	U	F	Circular/100	17/10/2025	Polyethylene	0.61 metres	0.61	U	0	1	0	0
7	RWP2 X	U	S	Circular/100	17/10/2025	Polyethylene	1.25 metres	1.25	U	8	4	6.40	8
8	DITCH X	U	S	Circular/100	01/01/2012	Polyethylene	8.22 metres	8.22	U	0	1	0	0

Job Number CCTV-01400	Surveyed by (Operator) TROY	Base Unit UD2E6E371R	Date 26/11/2025
1: Occurences without damage. For example, laterals, joints,etc. NO DEFECTS WERE DETECTED.			
2: Constructional deficiencies or occurences with insignificant influence to tightness, hydraulic or static pressure or pipe: Eg. wide joints, badly torched intakes, minor deformation of plastic pipes, minor erosions etc. REHABILITATION CAN BE SCHEDULED LONG-TERM.			
3: Constructional deficiencies diminishing static, hydraulic and tightness: Eg. untorched intakes, cracks, minor drainage obstructions such as calcite build ups, protruding laterals, minor damages to pipe wall, individual root penetrations, corroded pipe walls etc. REHABILITATION IS NECESSARY MEDIUM-TERM WITHIN 3 TO 5 YEARS.			
4: Constructional damages with insufficient static safety, hydraulic or tightness: Eg. axial/radial pipe bursts, pipe deformations, visually noticeable infiltration/exfiltration, cavities, in pipe-wall, severe protruding, laterals severe root penetrations, severe corrosion of pipe wall etc. REHABILITATION PROCEDURE IS URGENT AND HAS TO BE COMPLETED WITHIN 1 TO 2 YEARS. NECESSITY FOR EMERGENCY OPERATIONS HAS TO BE EXAMINED.			
5: Pipe is already or will shortly be impermeable: Eg. collapsed pipe, deeply rooted pipe or other drainage obstructions. Pipe loses water or danger of backwater in basements etc. REHABILITATION IS URGENT AND SHORT-TERM. IN ORDER TO PREVENT FURTHER DAMAGE, NECESSARY TEMPORARY SPOT REPAIR HAS TO BE CONDUCTED ON EMERGENCY LEVEL.			

Inspection report JD Drains Ltd

JD Drains Ltd has made every concerted attempt to produce a qualitative survey, outlining all the significant observations and where applicable, their appropriate remedial actions. However, we cannot accept any liability for any misinterpretation by third parties of the information contained herein. The conditions of the drains observed in this report are that of the day(s) of the survey only.

A CCTV survey alone should not be a guarantee of water tightness. The views expressed in this report are based entirely upon a visual examination of the drainage, supported by information obtained from a drainage CCTV inspection and or a water pressure test. The jointing systems of all below ground drainage pipes are always constructed around the outside of pipes, so are not usually visible on CCTV recordings, hence, a detailed knowledge of past and present drainage construction techniques is usually used to draw conclusions about the integrity of the pipe joints, from the conditions on their inside surfaces.

The drawing contained within or accompanying this report are not a scaled drawing and is for reference purposes only. Unless stated otherwise, all invert depths are measured at the downstream end of the inspection chamber or manhole, vertically from the bottom of the channel to the top of the manhole cover. An approximate pipe diameter of all surveyed pipe runs is given from visual inspection above ground. The exact diameter of the internal pipe wall can only be provided where safe access into the chamber is available and therefore the pipe diameter should always be checked before any remedial works are undertaken as a result of this inspection report. JD Drains Ltd will not be held liable for any failed repairs due to any information contained within this report that maybe inaccurate.

The clock reference system is used to indicate where observations are being made, relative to the absolute position of the invert (bottom) of the pipe. That is to say that the soffit (top) of the pipe is at 12 o'clock, the invert of the pipe is 6 o'clock, the right-hand edge is 3 o'clock and the left-hand edge is at 9 o'clock. Where observations are made between points of the clock face, they are done so in a clockwise direction i.e. from 3 to 9 o'clock is the bottom half of the pipe.

Any quotations for clearing of a petrol interceptor or other pits allows for a maximum capacity of 2000 gallons. Larger interceptors or pits will incur an extra charge.

Any quotations for remedial works included within this report will remain valid for a minimum of 90 days from the date of the survey.

The 'master' copy of the recording for this report will be kept at JD Drains Ltd for a period of 24 months from the date of the survey, and further copies maybe available to purchase on request. After this time, the master copy may be destroyed.

Commercial
Drainage Services

Residential
Drainage Services

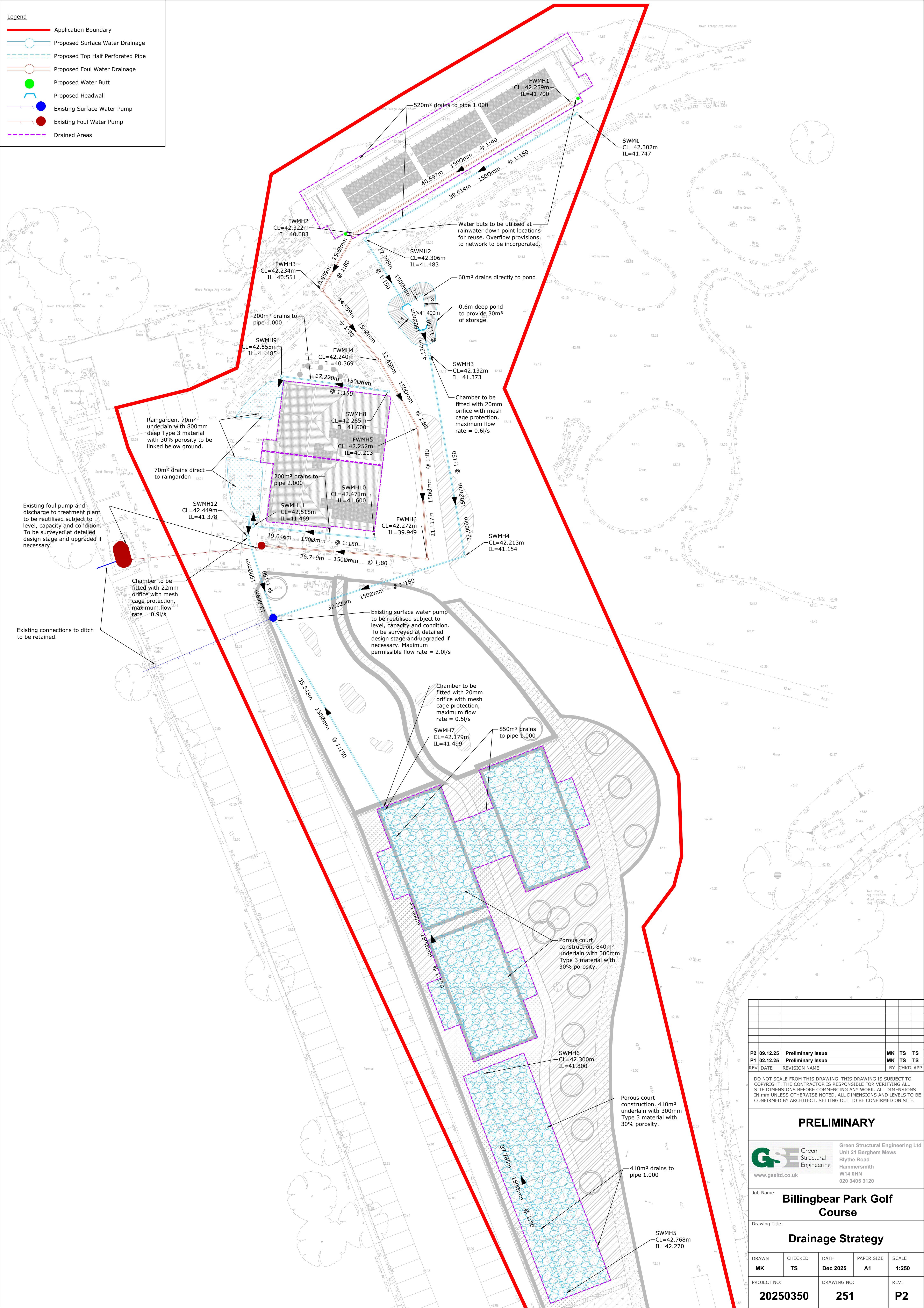
Registered office:
60-64 New Road, Basingstoke, RG21 7PW

VAT Number: 247 8644 70
Company Registration Number: 10305095



26a Bramshill Yard, Arborfield, Reading, RG2 9PL
0118 380 0173 :: info@jddrains.co.uk :: www.jddrains.co.uk

APPENDIX H – Drainage Strategy Plan



P2	09.12.25	Preliminary Issue				MK	TS	TS	
P1	02.12.25	Preliminary Issue				MK	TS	TS	
REV	DATE	REVISION NAME				BY	CHKD	APP	

DO NOT SCALE FROM THIS DRAWING. THIS DRAWING IS SUBJECT TO COPYRIGHT. THE CONTRACTOR IS RESPONSIBLE FOR VERIFYING ALL SITE DIMENSIONS BEFORE COMMENCING ANY WORK. ALL DIMENSIONS IN mm UNLESS OTHERWISE NOTED. ALL DIMENSIONS AND LEVELS TO BE CONFIRMED BY ARCHITECT. SETTING OUT TO BE CONFIRMED ON SITE.

PRELIMINARY



Green
Structural
Engineering

Green Structural Engineering Ltd
Unit 21 Berghem Mews
Blythe Road
Hammersmith
W14 0HN
020 3405 3120

Job Name:

Billingbear Park Golf Course

Drawing Title:

Drainage Strategy

DRAWN	CHECKED	DATE	PAPER SIZE	SCALE
MK	TS	Dec 2025	A1	1:250

PROJECT NO:

20250350

DRAWING NO:

251

REV:

P2

APPENDIX I – MicroDrainage Calculations

STORM SEWER DESIGN by the Modified Rational Method

Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
1.000	39.614	0.264	150.1	0.052	5.00	0.0	0.600	o	150	Pipe/Conduit	
1.001	12.395	0.083	149.3	0.006	0.00	0.0	0.600	o	150	Pipe/Conduit	
1.002	4.214	0.027	156.1	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	
1.003	32.906	0.219	150.3	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	
1.004	32.329	0.216	149.7	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
1.000	48.15	5.81	41.747	0.052	0.0	0.0	0.0	0.82	14.5	6.8
1.001	47.20	6.06	41.483	0.058	0.0	0.0	0.0	0.82	14.5	7.4
1.002	46.88	6.15	41.400	0.058	0.0	0.0	0.0	0.80	14.2	7.4
1.003	44.59	6.82	41.373	0.058	0.0	0.0	0.0	0.82	14.4	7.4
1.004	42.58	7.48	41.154	0.058	0.0	0.0	0.0	0.82	14.5	7.4

Manhole Schedules for Storm

MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam.,L*W (mm)	PN	Pipe Out Invert Level (m)	Diameter (mm)	PN	Pipes In Invert Level (m)	Diameter (mm)	Backdrop (mm)
SWMH1	42.302	0.555	Open Manhole	450	1.000	41.747	150				
SWMH2	42.306	0.823	Open Manhole	450	1.001	41.483	150	1.000	41.483	150	
Pond	42.132	0.732	Junction		1.002	41.400	150	1.001	41.400	150	
SWMH3	42.132	0.759	Open Manhole	450	1.003	41.373	150	1.002	41.373	150	
5	42.213	1.059	Open Manhole	450	1.004	41.154	150	1.003	41.154	150	
	42.217	1.279	Open Manhole	0		OUTFALL		1.004	40.938	150	

No coordinates have been specified, layout information cannot be produced.

PIPELINE SCHEDULES for Storm

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
1.000	o	150	SWMH1	42.302	41.747	0.405	Open Manhole	450
1.001	o	150	SWMH2	42.306	41.483	0.673	Open Manhole	450
1.002	o	150	Pond	42.132	41.400	0.582	Junction	
1.003	o	150	SWMH3	42.132	41.373	0.609	Open Manhole	450
1.004	o	150	5	42.213	41.154	0.909	Open Manhole	450

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
1.000	39.614	150.1	SWMH2	42.306	41.483	0.673	Open Manhole	450
1.001	12.395	149.3	Pond	42.132	41.400	0.582	Junction	
1.002	4.214	156.1	SWMH3	42.132	41.373	0.609	Open Manhole	450
1.003	32.906	150.3	5	42.213	41.154	0.909	Open Manhole	450
1.004	32.329	149.7		42.217	40.938	1.129	Open Manhole	0

Simulation Criteria for Storm

Volumetric Runoff Coeff 0.750 Additional Flow - % of Total Flow 0.000
 Areal Reduction Factor 1.000 MADD Factor * 10m³/ha Storage 2.000
 Hot Start (mins) 0 Inlet Coeffiecient 0.800
 Hot Start Level (mm) 0 Flow per Person per Day (l/per/day) 0.000
 Manhole Headloss Coeff (Global) 0.500 Run Time (mins) 60
 Foul Sewage per hectare (l/s) 0.000 Output Interval (mins) 1

Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0
 Number of Online Controls 1 Number of Storage Structures 1 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model	FSR	Profile Type	Summer
Return Period (years)	1	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	18.800	Storm Duration (mins)	30
Ratio R	0.400		

Green Structural Engineers		Page 4
Unit , Quayside Lodge William Morris Way, Fulham London, SW6 2UZ	Billingbear Park Golf Course Pond Network	
Date 09/12/2025 11:52	Designed by TS	
File POND NETWORK.MDX	Checked by TS	
Innovyze	Network 2020.1	

Online Controls for Storm

Orifice Manhole: SWMH3, DS/PN: 1.003, Volume (m³): 0.2

Diameter (m) 0.020 Discharge Coefficient 0.600 Invert Level (m) 41.373

Storage Structures for Storm

Tank or Pond Manhole: Pond, DS/PN: 1.002

Invert Level (m) 41.400

Depth (m) Area (m²)		Depth (m) Area (m²)	
0.000	50.0	0.600	50.0

STORM SEWER DESIGN by the Modified Rational Method

Network Design Table for Storm

« - Indicates pipe capacity < flow

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
1.000	37.785	0.470	80.4	0.041	5.00	0.0	0.600	o	150	Pipe/Conduit	
1.001	45.088	0.301	149.8	0.085	0.00	0.0	0.600	o	150	Pipe/Conduit	
1.002	35.843	0.239	150.0	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
1.000	49.12	5.56	42.270	0.041	0.0	0.0	0.0	1.12	19.8	5.5
1.001	45.71	6.48	41.800	0.126	0.0	0.0	0.0	0.82	14.5«	15.6
1.002	43.37	7.21	41.499	0.126	0.0	0.0	0.0	0.82	14.5«	15.6

Manhole Schedules for Storm

MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam.,L*W (mm)	PN	Pipe Out Invert Level (m)	Diameter (mm)	PN	Pipes In Invert Level (m)	Diameter (mm)	Backdrop (mm)
SWMH5	42.768	0.498	Open Manhole	450	1.000	42.270	150				
SWMH6	42.300	0.500	Open Manhole	450	1.001	41.800	150	1.000	41.800	150	
SWMH7	42.179	0.680	Open Manhole	450	1.002	41.499	150	1.001	41.499	150	
	42.217	0.957	Open Manhole	0		OUTFALL		1.002	41.260	150	

No coordinates have been specified, layout information cannot be produced.

PIPELINE SCHEDULES for Storm

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
1.000	o	150	SWMH5	42.768	42.270	0.348	Open Manhole	450
1.001	o	150	SWMH6	42.300	41.800	0.350	Open Manhole	450
1.002	o	150	SWMH7	42.179	41.499	0.530	Open Manhole	450

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
1.000	37.785	80.4	SWMH6	42.300	41.800	0.350	Open Manhole	450
1.001	45.088	149.8	SWMH7	42.179	41.499	0.530	Open Manhole	450
1.002	35.843	150.0		42.217	41.260	0.807	Open Manhole	0

Simulation Criteria for Storm

Volumetric Runoff Coeff 0.750 Additional Flow - % of Total Flow 0.000
 Areal Reduction Factor 1.000 MADD Factor * 10m³/ha Storage 2.000
 Hot Start (mins) 0 Inlet Coeffiecient 0.800
 Hot Start Level (mm) 0 Flow per Person per Day (l/per/day) 0.000
 Manhole Headloss Coeff (Global) 0.500 Run Time (mins) 60
 Foul Sewage per hectare (l/s) 0.000 Output Interval (mins) 1

Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0
 Number of Online Controls 1 Number of Storage Structures 2 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model	FSR	Profile Type	Summer
Return Period (years)	1	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	18.800	Storm Duration (mins)	30
Ratio R	0.400		

Green Structural Engineers		Page 4
Unit , Quayside Lodge William Morris Way, Fulham London, SW6 2UZ	Billingbear Park Golf Course Courts Network	
Date 01/12/2025 09:43	Designed by TS	
File Courts Network.MDX	Checked by TS	
Innovyze	Network 2020.1	

Online Controls for Storm

Orifice Manhole: SWMH7, DS/PN: 1.002, Volume (m³): 0.9

Diameter (m) 0.020 Discharge Coefficient 0.600 Invert Level (m) 41.499

Storage Structures for Storm

Porous Car Park Manhole: SWMH6, DS/PN: 1.001

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	41.0
Membrane Percolation (mm/hr)	1000	Length (m)	10.0
Max Percolation (l/s)	113.9	Slope (1:X)	0.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	41.800	Cap Volume Depth (m)	0.300

Porous Car Park Manhole: SWMH7, DS/PN: 1.002

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	42.0
Membrane Percolation (mm/hr)	1000	Length (m)	20.0
Max Percolation (l/s)	233.3	Slope (1:X)	0.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	41.499	Cap Volume Depth (m)	0.300

Summary of Critical Results by Maximum Level (Rank 1) for Storm

Simulation Criteria

Areal Reduction Factor 1.000
Hot Start (mins) 0
Hot Start Level (mm) 0
Manhole Headloss Coeff (Global) 0.500
Foul Sewage per hectare (l/s) 0.000

Additional Flow - % of Total Flow 0.000
MADD Factor * 10m³/ha Storage 2.000
Inlet Coeffiecient 0.800
Flow per Person per Day (l/per/day) 0.000

Number of Input Hydrographs 0
Number of Offline Controls 0
Number of Time/Area Diagrams 0
Number of Online Controls 1
Number of Storage Structures 2
Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model
Region England and Wales

FSR M5-60 (mm) 18.800
Ratio R 0.400

Cv (Summer) 0.750
Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 300.0

Analysis Timestep 2.5 Second Increment (Extended)

DTS Status OFF

DVD Status ON

Inertia Status ON

Profile(s) Summer and Winter

Duration(s) (mins) 15, 30, 60, 120, 240, 360, 480, 960, 1440

Return Period(s) (years) 1, 30, 100

Climate Change (%) 0, 0, 40

WARNING: Half Drain Time has not been calculated as the structure is too full.

									Water	Surcharged	Flooded
	US/MH		Return	Climate	First (X)	First (Y)	First (Z)	Overflow	Level	Depth	Volume
PN	Name	Storm	Period	Change	Surcharge	Flood	Overflow	Act.	(m)	(m)	(m³)
1.000	SWMH5	15 Winter	100	+40%	100/15 Summer				42.570	0.150	0.000
1.001	SWMH6	60 Winter	100	+40%	100/15 Summer				42.020	0.070	0.000
1.002	SWMH7	1440 Winter	100	+40%	30/360 Winter				41.902	0.253	0.000

		Half Drain		Pipe			
PN	US/MH Name	Flow / Cap.	Overflow (l/s)	Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	SWMH5	1.13			21.6	FLOOD RISK	
1.001	SWMH6	1.12		27	15.8	FLOOD RISK	
1.002	SWMH7	0.04			0.5	FLOOD RISK	

Manhole Schedules for Storm

MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam.,L*W (mm)	PN	Pipe Out Invert Level (m)	Diameter (mm)	Pipes In PN	Invert Level (m)	Diameter (mm)	Backdrop (mm)
SWMH8	42.265	0.665	Open Manhole	450	1.000	41.600	150				
SWMH9	42.555	1.070	Open Manhole	450	1.001	41.485	150	1.000	41.485	150	
SWMH10	42.471	0.871	Open Manhole	450	2.000	41.600	150				
SWMH10	42.518	1.049	Open Manhole	450	2.001	41.469	150	2.000	41.469	150	
Raingarden	42.449	1.049	Junction		1.002	41.400	150	1.001	41.477	150	77
								2.001	41.457	150	57
SWMH11	42.499	1.121	Open Manhole	450	1.003	41.378	150	1.002	41.378	150	
	42.217	0.930	Open Manhole	0		OUTFALL		1.003	41.287	150	

No coordinates have been specified, layout information cannot be produced.

PIPELINE SCHEDULES for Storm

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
1.000	o	150	SWMH8	42.265	41.600	0.515	Open Manhole	450
1.001	o	150	SWMH9	42.555	41.485	0.920	Open Manhole	450
2.000	o	150	SWMH10	42.471	41.600	0.721	Open Manhole	450
2.001	o	150	SWMH10	42.518	41.469	0.899	Open Manhole	450
1.002	o	150	Raingarden	42.449	41.400	0.899	Junction	
1.003	o	150	SWMH11	42.499	41.378	0.971	Open Manhole	450

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
1.000	17.270	150.2	SWMH9	42.555	41.485	0.920	Open Manhole	450
1.001	1.134	141.8	Raingarden	42.449	41.477	0.822	Junction	
2.000	19.646	150.0	SWMH10	42.518	41.469	0.899	Open Manhole	450
2.001	1.769	147.4	Raingarden	42.449	41.457	0.842	Junction	
1.002	3.261	148.2	SWMH11	42.499	41.378	0.971	Open Manhole	450
1.003	13.669	150.2		42.217	41.287	0.780	Open Manhole	0

Simulation Criteria for Storm

Volumetric Runoff Coeff 0.750 Additional Flow - % of Total Flow 0.000
 Areal Reduction Factor 1.000 MADD Factor * 10m³/ha Storage 2.000
 Hot Start (mins) 0 Inlet Coeffiecient 0.800
 Hot Start Level (mm) 0 Flow per Person per Day (l/per/day) 0.000
 Manhole Headloss Coeff (Global) 0.500 Run Time (mins) 60
 Foul Sewage per hectare (l/s) 0.000 Output Interval (mins) 1

Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0
 Number of Online Controls 1 Number of Storage Structures 1 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model	FSR	Profile Type	Summer
Return Period (years)	1	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	18.800	Storm Duration (mins)	30
Ratio R	0.400		

Green Structural Engineers		Page 3
Unit , Quayside Lodge William Morris Way, Fulham London, SW6 2UZ	Billingbear Park Golf Course Raingarden Network	
Date 01/12/2025 10:09	Designed by TS	
File Raingarden Network.MDX	Checked by TS	
Innovyze	Network 2020.1	

Online Controls for Storm

Orifice Manhole: SWMH11, DS/PN: 1.003, Volume (m³): 0.2

Diameter (m) 0.022 Discharge Coefficient 0.600 Invert Level (m) 41.378

Green Structural Engineers		Page 4
Unit , Quayside Lodge William Morris Way, Fulham London, SW6 2UZ	Billingbear Park Golf Course Raingarden Network	
Date 01/12/2025 10:09	Designed by TS	
File Raingarden Network.MDX	Checked by TS	
Innovyze	Network 2020.1	

Storage Structures for Storm

Porous Car Park Manhole: Raingarden, DS/PN: 1.002

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	10.0
Membrane Percolation (mm/hr)	1000	Length (m)	7.0
Max Percolation (l/s)	19.4	Slope (1:X)	0.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	41.400	Cap Volume Depth (m)	0.800

Summary of Critical Results by Maximum Level (Rank 1) for Storm

Simulation Criteria

Areal Reduction Factor 1.000 Additional Flow - % of Total Flow 0.000
 Hot Start (mins) 0 MADD Factor * 10m³/ha Storage 2.000
 Hot Start Level (mm) 0 Inlet Coeffiecient 0.800
 Manhole Headloss Coeff (Global) 0.500 Flow per Person per Day (l/per/day) 0.000
 Foul Sewage per hectare (l/s) 0.000

Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0
 Number of Online Controls 1 Number of Storage Structures 1 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR M5-60 (mm) 18.800 Cv (Summer) 0.750
 Region England and Wales Ratio R 0.400 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 300.0
 Analysis Timestep 2.5 Second Increment (Extended)
 DTS Status OFF
 DVD Status ON
 Inertia Status ON

Profile(s) Summer and Winter
 Duration(s) (mins) 15, 30, 60, 120, 240, 360, 480, 960, 1440
 Return Period(s) (years) 1, 30, 100
 Climate Change (%) 0, 0, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water	Surcharged	Flooded
									Level (m)	Depth (m)	Volume (m³)
1.000	SWMH8	240 Winter	100	+40%	30/60 Winter				42.263	0.513	0.000
1.001	SWMH9	240 Winter	100	+40%	30/15 Summer				42.269	0.634	0.000
2.000	SWMH10	240 Winter	100	+40%	30/60 Winter				42.277	0.527	0.000
2.001	SWMH10	240 Winter	100	+40%	30/15 Summer				42.273	0.654	0.000
1.002	Raingarden	480 Winter	100	+40%	1/60 Winter				42.200	0.650	0.000
1.003	SWMH11	360 Winter	100	+40%	1/30 Summer				42.405	0.877	0.000

PN	US/MH Name	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level
							Exceeded
1.000	SWMH8	0.15			2.1	FLOOD RISK	
1.001	SWMH9	0.26			2.8	FLOOD RISK	
2.000	SWMH10	0.16			2.1	FLOOD RISK	
2.001	SWMH10	0.19			2.1	FLOOD RISK	
1.002	Raingarden	0.15		313	1.6	FLOOD RISK*	
1.003	SWMH11	0.07			0.9	FLOOD RISK	