CATALYST BICESTER - PHASE 4,

WENDLEBURY ROAD, BICESTER

Flood Risk Assessment
& Drainage Strategy

Issue 2

May 2024

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J O H N S O N

H A Y E S

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Client – Albion Land (Three) Ltd
Project Ref – S1502

DOCUMENT ISSUE RECORD

Document Number	BJH-CATALYST-FRA-PH4-V2
BJH Reference	S1502-FRA-V2

Revision	Date of Issue	Author	Checked	Approved
Issue 1	23.04.24	James Griffiths BEng, MSc, GMICE	William Bailey CEng MICE IStructE	William Bailey CEng MICE IStructE
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Issue 2	09.05.24	James Griffiths BEng, MSc, GMICE	William Bailey CEng MICE IStructE	William Bailey CEng MICE IStructE
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(i) The date on which this assessment was undertaken, and
(ii) The date on which the final report is delivered

EXECUTIVE SUMMARY

Background

Bailey Johnson Hayes Limited has been commissioned by Albion Land (Three) Limited to prepare a Flood Risk Assessment (FRA) and Drainage Strategy in support of a Full Planning Application for Phase 4, Catalyst Bicester, Wendlebury Road, Bicester. This Flood Risk Assessment has been prepared in accordance with the guidelines set out in the National Planning Policy Framework and regional/local policy and guidance for the whole site. Associated highway drainage alterations and improvement works on Wendlebury Road / A41 are outside the scope of this report.

Site Location and Description

The Site is located approximately 2.0km south-west of Bicester Town Centre and is directly adjacent to the A41 (Oxford Road) and Charles Shouler Way to the North. The Site forms part of the wider Catalyst Bicester development, formerly known as Bicester Gateway. Neighbouring Holiday Inn Express and David Lloyd Raquet Club adjacent have been fully developed and are fully operational. Units 1-6 of the high tech commercial business park have been completed and are now close to full occupation. Units 7-8 are currently being constructed and are nearing completion for occupation by the end of 2024. Units 9-12 are expected to begin construction circa 2025 for occupation in 2026.

Proposed Development

Full planning permission is sought for employment development (Use Classes E(g)i and/or E(g)ii and/or E(g)iii), and associated infrastructure, access (including diverted public right of way), parking, and landscaping. Phase 4 proposals currently consist of 3No. of employment Units 13-15 in a similar style to previous phases.

Ground Conditions

The BGS Geological Survey Map (1:50,000) indicates the Site is underlain by Kellaways Sand Member overlain with Superficial deposits of River Terrace Deposits. Groundwater is expected at depths of between 0.8m – 2.9m bgl. The Site has not been previously developed and no contamination is expected as described in Section 2.9.

Flood Zone

The Environment Agency mapping shows that the whole site is within Flood Zone 1 which is shown to be at less than 0.1% chance of flooding in any year, otherwise known as having a 1:1000-year chance. There are no recorded instances of the flooding from nearby rivers or watercourses affecting the site.

Fluvial Flooding

The risk from Fluvial flooding is Low as described in Section 3.2.

Groundwater Flooding

The risk from Groundwater flooding is Low as described in Section 3.3.

Canal Flooding

The risk from Canal flooding is Negligible as described in Section 3.4.

Reservoir & Waterbody Flooding

The risk from Reservoir and Waterbody flooding is Low as described in Section 3.5.

Sewer Flooding

The risk from Sewer flooding is Low as described in Section 3.6.

Surface Water Flooding

The risk from Surface Water flooding is currently Medium as described in Section 3.7. (Mitigated to Low risk).

Flood Risk to the Wider Catchment

The flood risk to the wider catchment flooding is Low as described in Section 3.8.

Proposed Flood Mitigation

The mitigation proposals included are; Raising thresholds/building levels outside of design flood levels, providing safe access and egress around the development, directing overland flows towards areas of low risk, implementation of SuDS (on-site storage) to manage runoff, installation of pollution prevention features to prevent contamination, tree planting to increase absorption of water, management and maintenance to ensure correct operation of all drainage systems and management of residual risks. These measures ensure flood risk will not be increased off-site.

Discharge Hierarchy

Currently the majority of the Site is informally drained by the watercourse on the eastern boundary. Low infiltration is expected, therefore discharge to the existing watercourse - 2nd step of the discharge hierarchy - is acceptable. The current Greenfield Q_{BAR} flows from the site are 6.2 litres / second which is to be used for drainage design.

SuDS Assessment

The following SuDS features have been considered and adopted for the site;

- Permeable Paving systems – Appropriate utilising Type B/C system only (Partial/No Infiltration).
- Geocellular Attenuation Tanks – Appropriate with suitable structural & hydraulic design.
- Petrol Interceptors – Appropriate to treat areas at elevated risk such as delivery yards.

The following SuDS features have been considered but not selected or appropriate for the site;

- Infiltration / Soakaway type features – Not appropriate due to low permeability.
- Rainwater Harvesting systems - Appropriate but not efficient due to low water demand.
- Green Roof - Not appropriate as difficult to maintain and PV's & Roof lights cover majority roof's.
- Swales & Attenuation Basins – Not appropriate due to sensitive Archaeology at depth.
- Filter drains/strips – Appropriate but not recommended near areas of road with HGV's.

Surface Water Drainage Summary

Outflows for the positively drained sub-catchments are limited to the Greenfield Q_{BAR} discharge rate of 6.2 l/s for all storm events up to the 1 in 100-year + 40% climate change allowance return period. Each sub-catchment has its own separate drainage system with a pro-rata discharge rate. The total attenuation storage provided is 1739 m^3 which is spread across the Site. Yards are to drain to heavy duty line drains or kerb drains before passing through a by-pass petrol interceptor. Roofs are to be drained by gutters flowing into external rainwater pipes or internal siphons before discharge into the wider system. Car parking is to be drained via permeable block paving. All flows are restricted for final discharge into the watercourse. The maximum design water level does not exceed 600mm freeboard of FFL's.

Water Quality Summary

It has been demonstrated that the proposals are to provide a new SuDS compliant design to manage and enhance the quality of water discharged from the Site. Runoff from Medium risk areas such as parking and delivery yards will be significantly treated with permeable paving and petrol interceptors to an acceptable level before discharge into the nearby watercourse. Gutter guards, silt traps and catchpits will provide additional levels of treatment.

Attenuation Volume Storage Calculations

The results of preliminary sizing gave an indication that for an impermeable area of 2.15 hectares, outflowing at a single rate of 6.2 l/s, 1642m^3 of total volume storage would be required for the Site. This was then followed up with detailed calculations to ensure that no flooding occurs in the 1 in 30 year event and that no flooding occurs to buildings in the 1 in 100-year + 40% event. Modelling was undertaken for each separate sub-catchment. Results concluded that only a very small amount of flooding is predicted in the worst case and overall the scheme is compliant.

Foul Drainage Summary

Thames Water records confirm there are no existing foul water sewers or pumping stations on the site or in close proximity to the site. The offices to the new buildings are to be provided with toilet, shower and hand wash facilities. There are also small kitchenettes provided to the offices all of which discharge to the main foul drainage system. The preferable discharge point for the Site is to connect into the existing private drainage system on the wider Catalyst Bicester development. The daily average flow's expected from Phase 4 are 59,310 litres per day. This equates to a figure of 0.755 l/sec average flow and maximum peak flow of 4.5 l/sec.

Conclusions/Recommendations

The risks of flooding have been fully assessed and are found to generally be low. Flood mitigation measures should be implemented so that the future risks to users of the site will continue to be low. Residual risks are to be managed through proper management and maintenance of the Site. It is recommended that the SW & FW drainage design be constructed as per the provided plans/details appended. This will ensure minimal flooding is created on the site during the 30-year event and flooding is contained on site safely during the 100-year + 40% event. External levels should be constructed as per the plans provided so that buildings remain protected from flooding and overland flows can be directed to areas of the lowest risk.

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1 INTRODUCTION

PURPOSE

1.1 This Flood Risk Assessment (FRA) has been produced on behalf of Albion Land (Three) Limited to accompany a full planning application for the previously un-development site known as Catalyst Bicester Phase 4, Wendlebury Road, Bicester, Oxfordshire, UK.

1.2 This FRA has been prepared to review the development proposals, provide a full assessment of Flood related matters and a sustainable drainage proposal for both surface and foul water drainage.

1.3 This report has been carried out in compliance with the policy's set out in the latest National Planning Policy Framework (NPPF), associated National Planning Practice Guidance (NPPG) and Regional / Local Guidance.

Table 1-1 – Site Summary

Site Name	Catalyst Bicester - Phase 4 (Bicester Gateway - Phase 1B)
Location	Land off Wendlebury Road, Bicester, Oxfordshire, UK
NGR (approx.)	457240, 221025
Development Type	Full planning permission is sort for employment development (Use Classes E(g)i and/or E(g)ii and/or E(g)iii), and associated infrastructure, access (including diverted public right of way), parking, and landscaping. Phase 4 proposals currently consist of 3No. of employment Units 13-15 in a similar style to previous phases.
NFFP Vulnerability	Less Vulnerable
EA Flood Zone	Flood Zone 1
EA Office	North Thames – Banbury
LPA	Cherwell District Council
LLFA	Oxfordshire County Council

PLANNING BACKGROUND

1.4 The Site has the benefit of outline planning permission application No.: 16/02586/OUT for proposed new business park ("Bicester Gateway") comprising up to 14,972 sq m (Gross External Area) of B1 employment based buildings, plus a hotel (up to 149 bedrooms), with associated infrastructure, car parking and marketing boards. Phase 1A which comprises the hotel site has now been completed. Albion Land (Three) Limited, who are the developers of the adjacent Catalyst Bicester scheme have now agreed to acquire the Site which represents "Phase 4" of Catalyst Bicester (Policy Bicester 10).

SITE LOCATION & DESCRIPTION

1.5 The application Site, previously known as Bicester Gateway "Phase 1B" and now known as Catalyst Bicester "Phase 4" is referred to as the "Site" from here forth. The Site forms part of an existing grassed field which historically appears to be used for agricultural purposes. The site currently is accessed by a single field gate from Wendlebury Road. Site location is shown from the OS Mapping extract presented in **Figure 1-1**.

1.6 The Site is located approximately 2.0km south-west of Bicester Town Centre and is directly adjacent to the A41 (Oxford Road) and Charles Shouler Way to the North. The village of Chesterton is located approximately 1.2km north-west and Wendlebury village is located approximately 1.8km to the south-west of the Site. Given the Site has not been previously developed, by definition, it is described as a Greenfield site.

1.7 The Site boundary occupies an area of approximately 3.0 Ha (7.41 Acres). However, the wider Catalyst Site ownership extends an additional 16.7 Ha (41.27 Acres). The Site area assessed in this report is outlined below in Red and the wider site in Blue.

1.8 A topographical survey of the Site was undertaken in early 2024. An overview of the topography, indicates the site is generally flat, with levels observed on average around 65.0m AOD. The site has an existing Thames Water Rising Main that crosses part of the southern portion of the Site. The Site is generally encapsulated by hedgerows and trees to most of the perimeter of varying heights and maturity.

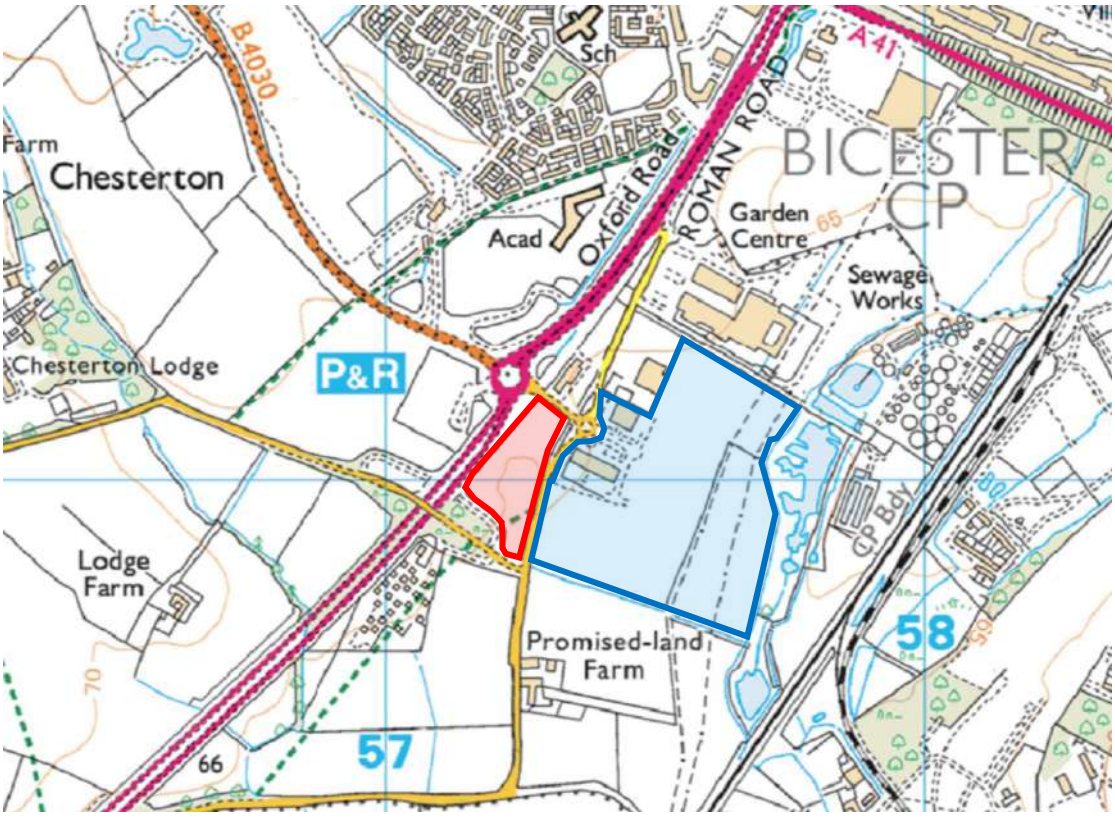


Figure 1-1 – Site Location Plan

PROPOSED DEVELOPMENT

1.9 The application seeks full planning permission for development of the site which comprises erection of 3No. employment units at ground floor with ancillary office space at first and second floor level. Externally, each of the units are to be served by delivery yards with 2No. level access doors each. There is also car parking, cycle parking, estate roads and soft landscaping proposed. Details of the existing & proposed Site Plan are presented in **Appendix A**.

1.10 In order to access the development, upgrades to highway infrastructure are proposed outside of site ownership boundary. The existing small field access is to be closed and a section of Wendlebury Road widened with new bellmouth provided in order to allow HGV's to safely track in and out of the Site. As part of Policy Bicester 10 and S106 agreements relating to outline planning permission, improvements are proposed to footpath / shared use facilities for cyclists adjacent to the A41, improving connectivity in & out of Bicester. Drainage and flood risk off-site are outside the scope of this report.

1.11 In and around the application Site, opportunities have been identified to protect and enhance the surrounding existing ditches, hedgerows, trees and landscaping in order to enhance biodiversity. New planting is proposed where appropriate to soften the appearance of the development and to provide benefits for the surrounding area.

1.12 The proposed development is currently intended to be completed in one single phase. An expected date for start of construction has been assumed as spring 2025 for completion in early 2026. The design life of the development will be 50 years, therefore the site will be assessed on the 2070s epoch EA climate change allowances.

SOURCES OF DATA

1.13 This report is based on the following sources of information:

(i) Existing & Proposed Site Layout Plans;
(ii) Topographical Survey Data;
(iii) Ordnance Survey Mapping Data;
(iv) Strategic Flood Risk Assessments (SFRA);
(v) Environment Agency Flood Maps;
(vi) Sewerage Undertaker Asset Location Plans;
(vii) Standing Advise for Flood Risk Assessments;
(viii) Previous Site Specific Flood Risk Assessments;
(ix) Highway Drainage Records;
(x) Geotechnical Reports;
(xi) Site Observations

Note: This list could be updated in future issues of this report.

2 HYDROLOGY, GEOLOGY AND DRAINAGE

TOPOGRAPHY

2.1 The Topographical Survey Plan drawing reference; 33239 Rev 1 which was undertaken in January 2024, can be found presented in **Appendix B**.

Land generally slopes from a high point on the western boundary parallel to the A41 at a maximum level of 65.4m AOD to a notional low point of 64.6m AOD on the eastern boundary adjacent to Wendlebury Road. The Site is therefore described as fairly flat with average falls across the site of circa 1 in 200. On the western, southern and eastern boundaries of the site is are existing ditches which vary in depth of between 0.8 – 2.0m deep. Invert levels at the outlet from the Site are recorded at circa 63.2m AOD.

Charles Shouler way is located north of the Site and connects to the A41 at a maximum level of 66.8m AOD. The road is cambered, extending in a south-easterly direction towards the new Catalyst Bicester roundabout for approximately 120m to a level of 65.6m AOD. Charles Shouler way therefore exhibits longitudinal falls of circa 1 in 100.

Wendlebury Road is located on the eastern boundary of the Site and connects to an unnamed road to the south, crossing over the A41 bridge to Chesterton. Wendlebury Road is generally cambered and remains relatively flat for 200m parallel to the Site with levels varying between 65.25 – 65.50m AOD. It then bending towards the new Catalyst Bicester roundabout, rising for 40m at 1 in 100 falls to a peak of 65.90m before dropping back to the new roundabout for another 50m at 1 in 100 falls to a level of 65.40m AOD.

To the south west of the site is a disused slipway, approximately 150m in length, which connects the unnamed road at a level of 67.50m to the A41 at a level of 65.80m. Generally the road falls for 100m to a low point of 65.30m exhibiting 1 in 40 falls, then rises again at 1 in 100 falls for 50m to the A41. The site has an existing public right of way (PRoW) which connects to the disused slipway to Wendlebury Road.

2.2 An approximate breakdown of existing land use & surface types are listed in **Table 2-1**.

Table 2-1 – Existing Land Use Schedule

Component	Area (ha)	Share (%)
Existing Buildings	0.0	0%
Hardstanding, Car Parks and Footpaths	0.0	0%
Undeveloped Areas, Soft Landscaping & Trees	3.0	81.7%
Off-site Highway Land required for alterations	0.67	18.3%
Total (Full Application Works)	**3.67**	**100%**

HYDROLOGY

Flood Risk

2.3 Based upon the EA Flood Map for Planning presented in **Appendix C**, the existing Site is shown to lie wholly within Flood Zone 1. It is however located in close proximity to extensive areas of land located in Flood Zones 2 & 3 to the south-east which forms part of the Catalyst Bicester development, Bicester Garden Centre and Promised Land Farm.

The proposed development identifies the development for potential general industry, storage and distribution and high technology office for Use Classes B1/B2/B8. Based on the use class the site is considered 'Less Vulnerable'. Table 3 of the NPPF Technical Guide confirms that all development is appropriate in Flood Zone 1.

Sequential Test and Sequential Approach

2.4 According to the NPPF the Sequential Test gives preference to locating new development in areas at lowest risk of flooding (i.e. Flood Zone 1). Development should not be allocated or permitted if there are reasonably available sites appropriate for the proposed development in areas with a lower probability of flooding.

The Sequential Test requires developers to:

"…..demonstrate that there are no reasonably available sites in areas with a lower probability of flooding that would be appropriate to the type of development or land use proposed."

Whilst the responsibility for undertaking the Sequential Test falls to the Local Planning Authority, the nature of the proposals ('Less Vulnerable' use in Flood Zone 1) clearly satisfies the requirements of the Sequential Test, as set out in the NPPF.

Exception Test

2.5 The Exception Test need not be applied in this instance; however, this FRA will seek to demonstrate that the proposed development is 'safe' in flood risk terms and poses no detrimental impact to off-site areas.

Main Rivers

2.6 The nearest main River is the Langford Brook located 500m south-east of the Site and has a net catchment area of 55.2 km^2. The Langford Brook rises near Stratton Audley to the north of Bicester, flowing in a south-westerly direction, before discharge into the larger Oxon Ray River near the village of Merton. The Langford Brook receives further flows from the Town Brook, which merges near the centre of Bicester and increases the total catchment drained by the Langford Brook to approximately 75 km^2.

The Site is located within the Thames River Basin District. The Site is within the Cherwell and Ray management catchment which is split into two operational catchments of which the site is located within the Oxon Ray. The Langford Brook is one of eleven main rivers.

Ordinary Watercourses

2.7 The topographical survey has identified two ordinary watercourses located on the eastern and western/southern boundaries within the Site. These watercourses generally flow in a south-westerly direction and converge in the southern corner of the Site, discharging to an existing culvert under Wendlebury Road. The existing drainage regime is identified on the OS Mapping extract presented below on **Figure 2-1**.

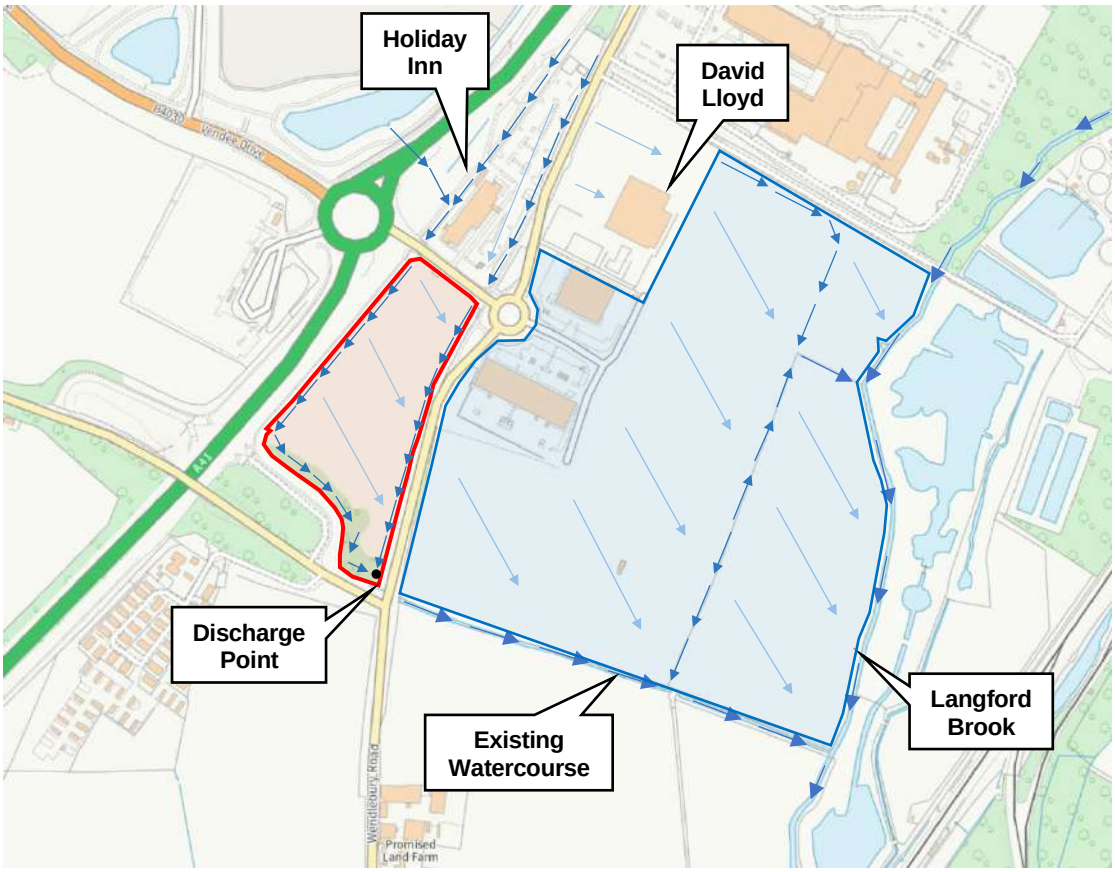


Figure 2-1 – Existing Drainage Regime

Existing Drainage Regime

2.8 Overland flows on the Site are mainly generated during periods of heavy rainfall due to the flatness of the site. In these events, runoff is directed slowly in a south-easterly direction, finding its way into the watercourse on the western boundary. The majority of rainfall events are less than 5mm. Runoff normally remains on-site as standing water until it eventually either evaporates or enters a local watercourse in a sub-terrain fashion.

Both watercourses are known to take runoff from upstream sources such as the A41, Charles Shouler Way, Wendlebury Road and neighbouring developments such as the Holiday Inn site and recent housing developments to the north. All flows are then directed into the existing watercourse between Promised Land Farm and the wider Catalyst site. Flows are conveyed for approximately 425mm south-east before final discharge into the Langford Brook.

GEOLOGY

2.9 The BGS Geological Survey Map (1:50,000) indicates the Site is underlain by Kellaways Sand Member overlain with Superficial deposits of River Terrace Deposits. Groundwater is expected at depths of between 0.8m – 2.9m bgl. The Site has not been previously developed and no contamination is expected. There are no site-specific intrusive ground investigations or groundwater monitoring currently available for this site.

Geotechnical reports from the neighbouring Holiday Inn Express, David Lloyd and wider Catalyst Bicester development have been referenced for the purposes of understanding the local ground characteristics. A site-specific ground investigation is to be completed post-planning to verify the geotechnical parameters, groundwater levels and infiltration potential. Testing for the presence of sulphates and unexpected contamination will also be conducted. In summary, the expected local ground geology is summarised below;

Table 2-2 – Summary of Local Geology

Strata	Epoch	Depth Encountered (m blg)		Typical Thickness (m)	Typical Description
		Top	Bottom		
MG/TS	Anthropocene	GL	0.20 – 0.40	0.30	MG: Grass over soft-to-soft dark brown sandy SILT TS: Grass over soft dark brown sandy silty CLAY to sandy clayey SILT
RTD	Holocene	0.20 – 0.40	1.50 – 2.20	1.70	Soft to firm becoming very soft to firm orangish brown to bluish grey silty sandy CLAY to bright yellowish brown and orangish brown clayey gravelly SAND to clayey sandy GRAVEL.
KLC	Middle Jurassic	1.50 – 2.20	4.79 – 5.00	2.90	Weak to medium strong to strong dark grey coarse grained fossiliferous LIMESTONE with occasional pockets to layers of very soft dark grey sandy gravelly CLAY.
CB	Middle Jurassic	4.79 – 5.00	5.80 – 6.35	1.10	Weak to medium strong light grey fine grained calcareous MUDSTONE to weak to medium strong to hard light grey and dark grey coarse grained fossiliferous LIMESTONE
FMB	Middle Jurassic	5.80 – 6.35	19.20 – 20.35	Not proven	Undefined sequence of soft to very stiff dark grey to black to dark greenish grey and green mottled orange silty to gravelly CLAY to clayey sandy SILT to very weak to strong and hard light grey to dark greenish grey to off-white fine to coarse grained fossiliferous LIMESTONE, calcareous MUDSTONE and thinly laminated SILTSTONE, often recovered as clayey sandy GRAVEL.

Detailed intrusive investigations undertaken on the wider Catalyst Bicester site provide results similar to the expected geology outlined above. Topsoil / Made Ground is encountered at typical thickness of approximately 0.3m. This is underlain by River Terrace Deposits at typical thickness of 1.7m. This underlain by a significant band of Kellaways Clay member of a thickness up to 2.9m. Finally the site sits on a bed of Cornbrash Formation and Forest Marble Formation to depth.

Founding structure and drainage is likely to be bearing on River Terrace deposits which contain a mix of Sands, Clays and Gravel. This strata generally provides a good level of structural bearing capacity for the use of pad and strip foundations on the site. Infiltration testing using the BRE 365 soakaway method has been undertaken locally off-site. Tests conducted within River Terrace deposits generally indicate permeability of these horizons and underlaying superficial/bedrock layers is expected to be poor.

HYDROGEOLOGY

2.10 Mapping provided by the Environment Agency (EA) indicates that the site is not underlain by any designated Groundwater Source Protection Zones. There are no known groundwater abstractions within 500m of the site.

EXISTING DRAINAGE

2.11 The local water supplier and wastewater undertaker in the area is Thames Water. Information available on the assets located on site is presented in **Appendix D** within the Thames Water asset location search. The search confirms there are no surface water sewers, foul water sewers or pumping stations on the site or in close proximity to the site.

There is however an existing 150mm internal diameter foul water rising main which passes through the southern corner of the site, continuing under Wendlebury road and the wider Catalyst Bicester Site before discharge at the sewage treatment works. The nearest sewage treatment works is Bicester STW which is 0.9km to the east of the Site.

The asset location plan also reveals that there are existing water mains within the Site. Generally, mains are located on the eastern boundary parallel to Wendlebury Road in the verge. Near the centre of the eastern boundary there are 2No. of connection points which project into the site for a small distance.

2.12 The Site does not currently have any specific existing formal surface water or foul water drainage infrastructure. Information available on off-site formal drainage systems which discharge upstream of on-site watercourses is presented in **Appendix E**.

The A41 was upgraded with new roundabout junction and Charles Shouler Way link road connecting to Wendlebury Road circa 2010. A number of kerb drains and gully connections were added which discharge into various on-site watercourses. Additional flows come from upstream balancing ponds adjacent to the A41 which serves the housing developments to the north of the Site. Wendlebury Road was further upgraded in 2022 for the wider Catalyst Bicester development. A number of gully's were added conveying runoff into an attenuation basin before discharging to nearby watercourses.

The Holiday Inn Express development was completed in 2019 and was constructed with a SuDS approved drainage scheme. Runoff from car park is drained through permeable paving. Roof drainage is conveyed into the permeable stone car park before flows from the site are restricted to 4.6 l/s up to the 1 in 100 year + 30% return period. Final discharge of runoff is to the existing watercourse on the eastern boundary.

3 FLOOD RISK ASSESSMENT

FLOOD RISK OVERVIEW

3.1 Previously two Flood Risk Assessments have been undertaken for this Site. The first in July 2016 by Hamill Davis for the previous Bicester Gateway Phase 1A /1B outline application and reserved matters application in June 2022 by Baynham Meikle. Reference to the previous assessments will be made to identify any inconsistencies.

The expectation is that Flood Risk has not significantly changed in the last 8 years and that the conclusions will be broadly in line with each of the reports. Any changes in Flood Risk will be noted and potential mitigation is identified in Section 4. **Table 3-1** summarises the potential risks from each source of flooding.

Table 3-1 – Pre-Mitigation Sources of Flood Risk

Flood Source	Potential Risk				Description
	High	Medium	Low	None	
Fluvial/River/Sea			X		Located within Environment Agency River Flood Zone 1.
Groundwater			X		No recorded history of Groundwater flooding.
Canals				X	None present on or adjacent to site.
Reservoirs & Waterbodies			X		None present on or adjacent to site. When combined with River flooding could pose a minor risk to the site.
Sewers			X		No existing Thames Water sewers or pump stations located on the Site. Existing rising main minor risk.
Surface Water Runoff / Flows		X			The Site is low-lying compared to surrounding highways around the perimeter. The Site exhibits some risk of up to 900mm of flooding in the north-east corner of the Site.
Effect of development on wider catchment			X		Small increase in the % of impermeable surfaces. All runoff directed to watercourse. No effect on other sites.

FLUVIAL FLOOD RISK (RIVER / WATERCOURSES / SEA)

3.2 According to the Environment Agency Flood Map for Planning found in **Appendix C** the site is located entirely within Flood Zone 1. The Environment Agency describes areas deemed to be in Flood Zone 1 as shown to be at less than 0.1% chance of flooding in any year. The Site is not located in the vicinity of the coast and is therefore not at risk of flooding due to tidal flows.

An extract of the Rivers/Seas flood map is presented in **Figure 3-1.** It is known that the maximum water level from an extreme 1 in 1000-year flooding event is up to 64.2m AOD. Generally most of the levels within the Site and associated access from the Site are significantly above this level with an average Site Level of 65.0m AOD. The surrounding highway network including; Wendlebury Road, Charles Shouler Way and A41 are greater than 65.50m AOD. Therefore, as the site is not located adjacent to any river there is no risk of flooding from fluvial flows.

There does remain a small risk to the flows through the arched culvert under Wendlebury Road becoming impaired in a flooding event. The culvert has an invert level of 63.2m AOD and a soffit level of 64.8m AOD. Generally flows would still be able to dissipate in this event and are conveyed downstream onto the adjacent fields without flooding the Site. Overall flood risk from this source is considered **Low**.

Figure 3-1 – Extract of River/Seas Flood Map

FLOOD RISK FROM GROUNDWATER

3.3 Flooding from groundwater can happen when the level of water within the rock or soil underground rises. Flooding from groundwater is most common in areas where the underlying bed rock is chalk, but it can also happen in locations with sand and gravel such as in river valleys. From nearby site investigations, groundwater was encountered at depths of between 0.8m – 2.9m bgl. Groundwater flooding is not known to be an issue historically on this Site. Overall flood risk from this source is considered **Low**.

FLOOD RISK FROM CANALS

3.4 The nearest canal is the Oxford Canal which runs adjacent to the River Cherwell approximately 8km west of the site. Due to the local topography and distance away from the Site. Overall flood risk from this source is considered **Negligible**.

FLOOD RISK FROM RESERVOIRS AND WATERBODIES

3.5 Using the Environment Agency's online map for 'Flood Risk from Reservoirs – Flood Extents' it shows that the Site is not within reservoir flooding extents. When combined with River Flooding there is a low risk of flooding to the A41 but not to the site itself. Overall flood risk from this source is considered **Low**.

FLOOD RISK FROM SEWERS

3.6 The local water supplier and wastewater undertaker in the area is Thames Water. Asset location plans confirm there are no surface water sewers, foul water sewers or pumping stations on the site or in close proximity to the site. There is however an existing water main & foul rising main on the site but Thames Water record plans indicates that the existing mains do not pose a significant risk to the site. An extract of the wastewater asset location plan shown the foul rising main is shown in **Figure 3-2**. Overall flood risk from this source is considered **Low**.

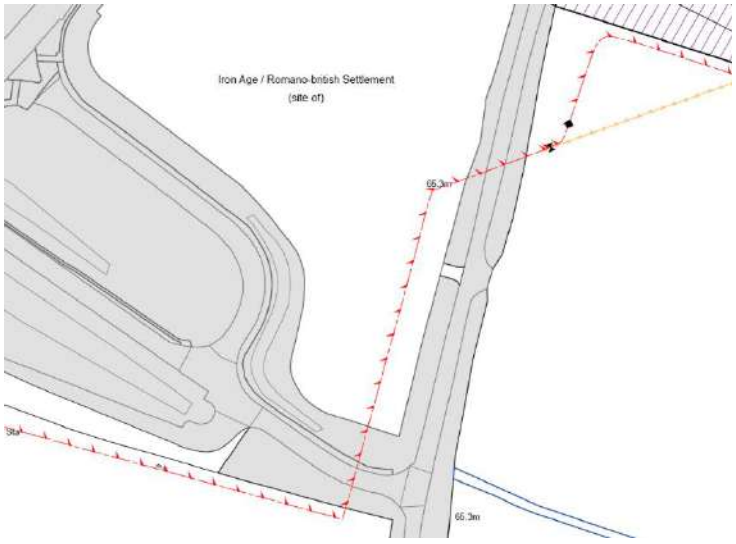


Figure 3-2 – Extract of Thames Water Asset Plan

FLOOD RISK FROM SURFACE WATER

3.7 Risk of flooding from surface water has been assessed using the Environment Agency mapping as shown in **Figure 3-3**. This identifies flood potential which could occur when rainwater does not drain away through the normal drainage systems, discharge into rivers or soak into the ground. This can be problematic when water stands on the ground rather than flowing away. Surface water flooding is generally indicated at the low-point of local land forms such as watercourses.

Figure 3-2 – Extract of Surface Water Flood Map

The Site exhibits little or no risk of surface water flooding on the western boundary. Where the site slopes down towards the eastern boundary generally a medium risk of flooding is exhibited due to the low lying nature of the Site, compare to the elevated highway around the development. In the north-eastern corner a small area of high risk is shown close to Charles Shoulder way. The surrounding highway network is not at risk of surface water flooding.

While the chance of surface flooding is only exhibited in the combined extreme failure and rainfall scenario, the depth of flooding could be significant of between 300mm and 900mm. Flows however are expected to be very low. This would therefore pose a moderate hazard. Overall flood risk from this source is considered **Medium**.

FLOOD RISK TO THE WIDER CATCHMENT

3.8 From the Flood Mapping it can be seen that the wider catchment all currently drains naturally into the Langford Brook. Given the Sites modest size of 0.03 km^2 compared to the total catchment area of 75 km^2 then the size has very little effect on flows downstream. Overall flood risk from this source is considered **Low**.

4 FLOOD RISK MITIGATION

4.1 This section of the FRA & Drainage Assessment provides an overview of the potential mitigation measures available to address flood risk issues at the development site. The measures listed below are suggested items which could reduce flood risk but are not limited to just these measures. Further measures may come to light later as different stages of the project proceed and flood risk changes over time.

RAISED THRESOLDS

4.2 One method of reducing surface water flood risk is to raise the floor level of buildings and thresholds to above predicted water levels. Generally, car parking and utility areas should be located at lower levels so that failure of storm water systems can store water first. It is current good practice that thresholds to buildings are located at a minimum freeboard of 300 - 600mm above the 100-year + climate change (CC) design water level in all storm water and river flooding events.

SAFE ACCESS AND EGRESS

4.3 Access roads must remain operational during times of flood. This is to allow occupants of buildings to be able to escape and for maintenance vehicles to access the site. As part of a potential evacuation procedure, alternative locations where cars & HGV's can be parked during a flood event should be identified.

OVERLAND FLOWS

4.4 The drainage system must be designed to accommodate overland flow from failure of the on-site drainage system and adjacent land if this is likely to be intercepted or affected by the development. All development must clearly identify surface water from adjacent land has been considered appropriately and mitigation measures employed to prevent flood risk to the proposed development.

IMPLEMENTATION OF SUDS

4.5 Within true SuDS, rainwater is dealt with close to where it falls (at source), allowing as much water as possible to either evaporate or soak into the ground. The majority of SuDS components provide larger storage volumes than traditional drainage systems. Therefore, these systems will only become overloaded by events occurring over a longer duration, which generally means that "failure" results in less impact.

Flood risk is managed by SuDS reducing the volume, frequency, and flow rate of surface water runoff during extreme events. Exceedance can be managed, with components and schemes "failing gracefully" and in many circumstances they can be visually monitored. The benefits of SuDS on flooding include; better flood water management, easier to maintain, groundwater recharge, treating wastewater and biodiversity and ecology gain.

POLLUTION PREVENTION

4.6 Developments involving commerical processes which involve the use of potentially polluting substances (fuels, chemicals etc) should be designed in a way that these substances will not enter the water environment during a flood, preferably though designing the development such that these chemicals are stored and used outside the flood zone risk. The use of certain devices or finishes to car parks and delivery yards is recommended to mitigate the risk of accidental spillage which damages water quality.

TREE PLANTING

4.7 Trees reduce flood risk from the top to bottom. Rain droplets that land on leaves evaporate straight into the air- so less water reaches the ground. Leaves intercept rainfall, slowing the rate that water flows into rivers and reducing the risk it'll burst its banks.
The roots of a tree are also important. They create small drainage paths in the soil as they grow, so when it rains water flows into those instead of flowing straight into the river.

The roots also act as a net to hold the soil in place and stop it washing into a river. That can be a problem because the more soil on a riverbed, the less space for water, which means the river is more likely to flood in heavy rainfall. In addition, allocating space for trees and soft landscaping reduces the impermeable area on the site, therefore reducing runoff volume and surface water flooding potential.

MANAGEMENT AND MAINTENANCE

4.8 One of the biggest causes of flooding is incorrect management and maintenance of drainage features and infrastructure. Effective and sustainable surface water runoff management should be considered from the outset and integrated throughout the development. The proposals will still need to consider, and make a commitment to, the requirements outlined by Oxfordshire County Council SuDS guidance.

RESIDUAL RISK AND EXCEEDANCE

4.9 Residual risk is the risk that remains after mitigation actions have been taken. As well as the consideration of the hydraulic modelled events undertaken in the drainage assessment, there should be a qualitative examination of what would happen if any part of the system fails, demonstrate that flood water will have flow routes through the site without endangering property and where possible maintaining emergency access/egress.

Flows upstream should be assessed and further mitigation proposed if necessary. The effects of off-site floodings should be considered so that the Site is not vulnerable to failure of drainage systems outside its control.

5 SURFACE WATER DRAINAGE STRATEGY

5.1 This Drainage Strategy has been composed in accordance with national policy including the NPPF and Non-technical standards for drainage. Due regard is also given to local policy's set out in the Cherwell Local Plan adopted July 2015 and the guidance provided in the OCC local standards and guidance for surface water drainage on major development in Oxfordshire dated 2021.

STRATEGIC AIMS & OBJECTIVES (SWM)

5.2 The first stage of the SuDS design process is setting of the strategic surface water management (SWM) objectives for the development. Consultation with relevant stakeholders such as Cherwell District Council, Oxfordshire County Council, Sewage undertakers and local residents has been established to inform the design. An assessment should be made of the types of SuDS features suitable for the site.

Policy ESD 6: Sustainable Flood Risk Management

- All development will seek to avoid, reduce or mitigate flood risk by undertaking a Site Specific Flood Risk Assessment for all developments over 1ha in Flood Zone 1 and all developments in Flood Zones 2, 3a and 3b, development sites located in an area known to experienced flooding or site located within 9m of any watercourses.

- Opportunities will be sought to restore natural river flows, watercourse flows and floodplains, increasing their amenity and biodiversity value.

- A sequential approach should be taken to located vulnerable developments in areas at lower risk of flooding. Development should only be permitted in areas of flood risk when there are no reasonably available sites in the area of lower risk.

Policy ESD 7: Sustainable Drainage Systems (SuDS)

- All development will be required to use sustainable drainage systems (SuDS) for the management of surface water runoff.

- Where site specific FRA's are required in association with development proposals, they should be used to determine how SuDS can be used on particular sites and to design appropriate systems.

- In considering SuDS solutions, the need to protect ground water quality must be considered, especially where infiltration techniques are proposed.

- Where possible, SuDS should seek to reduce flood risk, reduce pollution and provide landscape and wildlife benefits. Water quality must be maintained and enhanced.

- Proposals must include an agreement on the future management, maintenance and replacement of the SuDS features.

SUDS MANAGEMENT TRAIN

5.3 The SuDS management train has been adopted in the design process as follows:

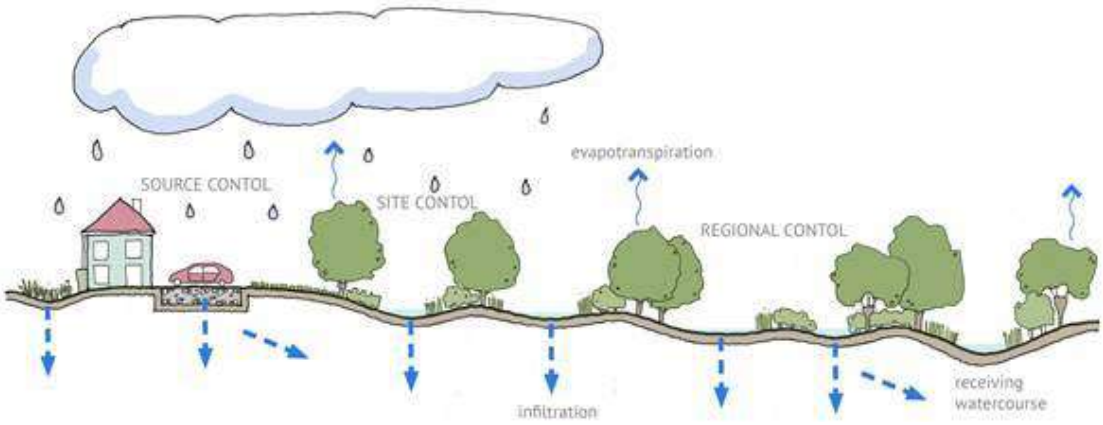


Figure 5-1 – Susdrain SUDS Management Train

1) Prevention - Prevention of runoff by good site design, reduction of impermeable areas and good housekeeping measures for reducing pollution.

2) Source Control - Dealing with water where and when it falls at source. By dealing with runoff at source the volume of water and the potential amount of contamination is less, which requires smaller SuDS components further downstream (e.g., infiltration techniques).

3) Site Control - The management train concept promotes division of the area to be drained into sub-catchments with different drainage characteristics and appropriate SuDS features (e.g., soakaways, swales, basins)

4) Regional Control - Management of runoff for the region with consideration of the whole hydrological cycle (e.g., balancing ponds, wetlands).

ASSESSMENT OF POTENTIAL SUDS FEATURES

5.4.1 The Site is to be used predominantly for general employment use with the benefit of a modest amount of offices at first and second floor**. Rainwater Harvesting Systems** have been considered possible on this site but not practical due to the buildings relatively low water demand and significant increase in maintenance costs. A system could be retrospectively installed by a future end user as part of fit-out works if required.

5.4.2 The height to the roof ridge is close to 15m in most cases. **Green Roofs** are deemed to present an unacceptable risk to those maintaining the SuDS feature for this site. Access to the roof is to be provided for emergency roof maintenance only.

5.4.3 It is desirable on all sites in the UK, in the first instance that SuDS infiltration systems are considered, to reduce impermeable hard standing and treat run-off at source. Unfortunately, due to underlying geological strata of river terrace deposits and Kellaways clay this site is assessed to have 'low' permeability potential. Therefore, the use of infiltration systems such as **Soakaways or Infiltration Basins** are not appropriate.

5.4.4 **Attenuation Basin** type features have been considered for this site in order to provide a vegetated dry depression for the conveyance and storage of surface water. The site is located in an area of archaeological significance and constructing deep attenuation basins are not considered economical due to the high cost in excavating on this site.

5.4.5 **Swale** type features have been considered for this site in order to provide a swallow vegetated channel for the conveyance and storage of surface water. Given that the site is to be regularly trafficked by HGV's, road side swales could be provided similar to modern residential estates. However, these systems rely on over the edge runoff which is not considered practical on this Site, without significant risk of damage to swales.

5.4.6 **Permeable Paving** systems have been considered for this site in order to reduce impermeable area. Permeable paving is not considered appropriate in yards which regularly traffic HGV's however, there is an opportunity in car park areas. Where there is no infiltration a 'Type C' system is to be utilised. This system is lined with a membrane placed above formation level. In order to drain the permeable area, underdrain perforated pipes in stone trenches are to be provided in order to drain the sub-grade layer(s).

5.4.7 **Geocellular Attenuation Tanks** are appropriate for this site as they can help provide storage up to the 100-year + climate change events and drain permeable surfaces above. Care will need to been taken to provide appropriate cover over the tank to prevent long term damage and failure. Access points are needed to ensure tanks can be maintained over its design life. Tanks are to be located an appropriate distance away from building foundations. The tanks are to be wrapped with a geotextile fleece and impermeable membrane in order to prevent silting of the system and reduction of storage volume.

5.4.8 **Line Drains, Kerb Drains and Gully's** with **Silt Traps** are appropriate in the delivery yards and estate roads to meet the load requirements of HGV's. These features should be designed to be easily maintained to keep them free of silt and other potential contaminates over the design life. As only light contamination is expected, a Class 1 By-pass **Petrol Interceptor** should be provided to treat flows generated in the delivery yards. Water quality should be enhanced to acceptable levels before discharge from the Site. See future paragraphs for more information on water quality.

5.4.9 The use of **Filter Strips** or **Filter Drains** is considered suitable for the site but was not selected for this site due to the likelihood of HGV's regularly trafficking the estate road and delivery yards. Often these systems require runoff to be directed over the edge of a surface but for safety upstand kerb's are to be provided throughout the development to prevent over running vehicles damaging soft landscaping.

DRAINAGE HIERACHY & POINTS OF DISCHARGE

5.5 The second stage of the SuDS design process is conceptual design. The key outcome of this stage is to identify potential SuDS components and linkages, in developing management trains for each area of the site. This step has two elements:

- Developing an understanding of the existing features on site that could influence SuDS design such as, topography, discharge points, flow routes etc…
- Developing an understanding of relevant features of the proposed development that could influence SuDS design criteria and design options.

Proposed Discharge Hierarchy

5.5.1 All sites must manage surface water via the following hierarchy:

When managing rainfall, the SuDS network should be designed to match natural drainage routes, infiltration rates and discharge rates as far as possible. In addition to this, with concern over climate change and increasing risk of water scarcity, re-use of rainwater wherever possible should be utilised. Therefore, all surface water run off must aim to be discharged as high up the following hierarchy as possible:

- Firstly, to infiltration/soakaway
- Secondly, to a watercourse or highway ditch (with permission)
- Thirdly, to a surface water sewer or highway drain (with permission)
- Lastly, to a combined sewer (with permission)

5.5.2 From the Geological information available the Site is expected to have a low permeability and therefore infiltration and soakaway type features are not considered for this Site.

5.5.3 The Site has the benefit of watercourses to the majority of the Site boundaries. The owner of the Site will be a riparian owner of the ordinary watercourses, such as a ditches and culverts running adjacent to the boundary of their land. Where the watercourse forms the boundary of the land the owner will have normally have rights to discharge surface water into these watercourses unless they are solely used for highway purposes.

Currently the majority of Site is informally drained by the watercourse on the eastern boundary and therefore this would constitute an acceptable discharge location as described within the second step of the discharge hierarchy.

Points of Discharge

5.5.4 The development should look to drain each individual building with associated car parking into sub-catchments so that 3No. new formal connections are made via headwalls into the existing watercourse. This way the risk of flooding is spread and mitigated by having multiple outlets and points of discharge rather than one discharge point for the whole Site.

Sub-Catchments & Areas

5.5.5 The Site has been split into three defined sub-catchments with the following areas assessed for greenfield runoff and proposed discharge flows;

- Unit 13 – Total Catchment Area = 1.0 hectares
- Unit 14 – Total Catchment Area = 0.65 hectares - Total Area = 2.5 hectares
- Unit 15 – Total Catchment Area = 0.85 hectares

Current Greenfield Runoff and Discharge Flows

5.5.6 An assessment of greenfield flows from the sub-catchments outlined above has been carried out using the HR Wallingford greenfield runoff estimation tool (Institute of Hydrology IoH124 method). Given that permeability throughout the Site is proven to be poor and levels on the site are relatively flat, the default SOIL class of 1 is not appropriate and therefore a conservative SOIL class of 3 has been provided.

The ownership Site is 3.0 hectares in area, of which 0.5 hectares are considered significant open space (area of existing watercourses), therefore discounted from the total Site area. When Q_{BAR} < 2.0 l/s/ha limiting discharge rates are set at 2.0 l/s/ha. Calculations are presented in **Appendix F** and are summarised in **Table 5-1** below:

Table 5-1 – Greenfield runoff rates for the Site

Sub-Catchment	Return Period (Years)	Peak Flow (Q)	
		(l/sec)	(l/sec/ha)
Unit 13	Q_{BAR}	2.5	2.5
	1 in 1 year	2.1	2.1
	1 in 30 year	5.7	5.7
	1 in 100 year	7.9	7.9
Unit 14	Q_{BAR}	1.6	2.5
	1 in 1 year	1.4	2.1
	1 in 30 year	3.7	5.7
	1 in 100 year	5.2	7.9
Unit 15	Q_{BAR}	2.1	2.5
	1 in 1 year	1.8	2.1
	1 in 30 year	4.9	5.7
	1 in 100 year	6.8	7.9

5.5.7 The proposed maximum discharge rates for each sub-catchment are as follows;

- Unit 13 – Limited to single Q_{BAR} rate = **2.5 litres / sec**
- Unit 14 – Limited to single Q_{BAR} rate = **1.6 litres / sec - Total = 6.2 litres / sec**
- Unit 15 – Limited to single Q_{BAR} rate = **2.1 litres / sec**

SURFACE WATER DRAINAGE PROPOSALS

5.6 The Surface Water drainage strategy has been prepared based on the latest Site Layout and in line with Oxfordshire County Council's (LLFA) guidance for Surface Water Drainage, together with national guidance and industry best practice. The scheme is summarised below based on this and explanation is provided on, SuDS selection, impermeable areas, outlet details, outflow rates, storage volumes and overland flows.

The proposed external works, levels, SW drainage plans and typical details are presented by Bailey Johnson Hayes in **Appendix G**. The Site is expected to be constructed in a single phase and therefore phasing is not mitigated in this report.

Figure 5-2 – Extract of Drainage Scheme

SuDS Selection

5.6.1 Based on the SuDS assessment done in the previous section, the following features have been selected as the most appropriate for this Site;

- Permeable Paving
- Petrol Interceptors
- Geocellular Tanks
- Catchpits, Gullies and Line Drains
- Hydro-brake Flows control device
- Tree Pits

Non-Technical Drainage Summary

5.6.2 Outflows for the positively drained sub-catchments are limited to the Greenfield Q_{BAR} discharge rate of 6.2 l/s for all storm events up to the 1 in 100-year + 40% climate change allowance return period. Each sub-catchment has its own separate drainage system with a pro-rata discharge rate. All features are designed for no flooding in the 1 in 30-year event and no flooding to buildings in the 1 in 100-year + 40% climate change event. The total attenuation storage provided is 1739 m^3 which is spread across the Site.

Sub-catchment - Unit 13

The delivery yard to Unit 13 is to be drained via a heavy duty line drain. Discharge from the yard is directed through a by-pass petrol interceptor before flowing into the main system. Runoff from the building is to be directed to roof gutters before flowing into either external rainwater pipes or internal siphons, discharging into the main system. The car park to the front of the building is constructed from permeable block paving. Additional depth of stone is provided under the car park to provide the required attenuation volume for the whole sub-catchment. All runoff is directed towards the car park and discharged at a controlled rate into the existing watercourse on the eastern boundary.

Sub-catchment - Unit 14

The delivery yard to Unit 14 is to be drained via a heavy duty line drain. Discharge from the yard is directed through a by-pass petrol interceptor before flowing into the main system. The estate road between Unit 13/14 is drained via kerb drains into this catchment. Runoff from the building is to be directed to roof gutters before flowing into either external rainwater pipes or internal siphons, discharging into the main system. The car park to the side/back of the building is constructed from permeable block paving. Additional depth of stone and Geocellular storage tank is provided under the car park to provide the required attenuation volume for the whole sub-catchment. All runoff is directed towards the car park and discharged at a controlled rate into the existing watercourse on the eastern boundary.

Sub-catchment - Unit 15

The delivery yard to Unit 15 is to be drained via a kerb drains at the bottom of the yard. Discharge from the yard/access road is directed through a by-pass petrol interceptor before flowing into the main system. Runoff from the building is to be directed to roof gutters before flowing into either external rainwater pipes or internal siphons, discharging into the main system. There is car parking to the front and both sides of the building which is constructed from permeable block paving. Additional depth of stone and Geocellular storage tank is provided under the car park to provide the required attenuation volume for the whole sub-catchment. All runoff is directed towards the front car park and discharged at a controlled rate into the existing watercourse on the eastern boundary.

Impermeable Areas

5.6.3 A breakdown of proposed land use & surface types are listed in **Table 5-2**. The total impermeable area used for drainage design is 2.15 hectares. An allowance of 10% for urban creep has not been included as this site has no residential dwellings and the majority of the Site is being developed. Undeveloped watercourse areas are to drain as per existing arrangements with vegetation remaining in-situ where possible.

Table 5-2 – Proposed Land Use Schedule

Component	Area (ha)	Share (%)
Proposed Building Roof's	0.68	18.5%
Proposed Yards, Roads, Car Parks and Footpaths	1.47	40%
Proposed Soft Landscaping / Watercourses	0.85	23.2%
Highway Land (A41/Wendlebury Road)	0.67	18.3%
Total	**3.67**	**100%**

Outlet Details

5.6.4 The whole Site is to discharge to the existing watercourse on the eastern boundary. The watercourse is 2m deep, approximately 1m flat at the bottom, has 1 in 1 banks and longitudinal falls of circa 1 in 300. Open channel flows when the watercourse has approximately 200mm depth of water would achieve a discharge capacity of over 1000 l/s of capacity. Greenfield flows from the Site are very small and therefore for, as all discharge from the site are limited to 6.2 litres / second then there is satisfactory capacity.

Designing for Exceedance / Residual Risk

5.6.5 A detailed plan showing the extents, depths and location of flooding in the 1 in 100-year + 40% can be found in **Appendix G**. Essentially, if the drainage system was to fail, runoff in the form of overland flows would travel in a very similar manor to the historic undeveloped Site. Flows are directed to lower lying land and watercourses where runoff can be stored or discharge off-site. The buildings and access roads are located at high points to reduce the risk and car parks at low points.

Maintenance and Management

5.6.6 During construction stage the contractor will provide a surface water management plan and be responsible for all drainage until handover. When the development is complete it will become part of the wider existing Catalyst Bicester appointed management company with existing maintenance regimes extended to cover the additional requirements. All SW drainage on site is to remain private and currently not seeking adoption. Specific

requirements for maintenance regimes of SuDS features is outlined in the SuDS Maintenance and Management plan complied by Bailey Johnson Hayes Limited.

WATER QUALITY ASSESSMENT

5.7 A Water Quality Assessment (WQA) has been undertaken below to assess the potential hazards from the site and the appropriateness of the SuDS features considered. The 'Simple Index Approach' from The SuDS Manual is used as follows:

Step 1 – Define Pollution Hazard Indices

5.7.1 An assessment has been undertaken in **Table 5-3** to define the potential level of hazard from different drained surfaces within the proposed development.

Table 5-3 – Pollution Hazard indices for different drained areas

Land use	Pollution hazard level	Total suspended solids (TSS)	Metals	Hydro-carbons
Typical Employment Roof	Low	0.3	0.3	0.05
General circulation space & Non-residential car parking e.g. offices	Medium	0.5	0.4	0.4
Commercial Yard and delivery area with parking, Main access roads.	Medium	0.7	0.6	0.7

Note: The indices range from 0 (no pollution hazard) to 1 (high pollution hazard).

Step 2 – Determine SuDS Pollution Mitigation Indices

5.7.2 To deliver adequate treatment, the selected SuDS components should have a total pollution mitigation index (for each contaminant type) that equals or exceeds the pollution hazard index (for each contaminant type):

Total SuDS mitigation index ≥ *Pollution Hazard Index*
(for each contaminant type) (for each contaminant type)

The SuDS features specified in the design will generally have an impermeable liner to prevent discharge into the ground. 'In England and Wales, where the principal destination of the runoff is to a surface water, but small amounts of infiltration may occur from unlined components, then groundwater indices should be used for the main surface water discharge.' An assessment of groundwater is not required in this report.

Table 5-4 – Indicative SuDS mitigation indices for discharges to surface waters

Type of SuDS Component	Total suspended solids (TSS)	Metals	Hydro-carbons
Permeable Pavement	0.7	0.6	0.7
Proprietary treatment systems	To be assessed on the individual merit for compliance with individual contributing drainage areas up to the 1 in 1-year return period.		

Step 3 – Conclusions and Recommendations

5.7.3 Roof water drainage flows account for 22.5% of the proposed on-site area. In low flow situations, runoff directly discharges to the watercourse but mobilisation of contamination is very low. In higher flows, runoff backs up into the permeable paving system for greater treatment. Generally, low contamination is expected from the roof surfaces and therefore water quality can be enhanced through the use of gutter guards, silt traps and catchpits to remove any potential contamination. Proper maintenance of the roof and the drainage system will also be essential to ensure flows are treated adequately.

5.7.4 Permeable paving has been specified within all car parking areas for users of the site. This accounts for 22.5% of the proposed on-site area. Estate roads runoff is also directed towards permeable paving where possible. The pollution hazard level for car parking and estate roads is generally considered medium but provision has been made in order to treat runoff to a higher standard.

0.5 / 0.4 / 0.4 – General circulation & Car Parking (Low-Medium Hazard)
0.7 / 0.6 / 0.7 – Permeable Block Paving System

All mitigation indices > pollution indices therefore **OK**.

5.7.5 Surface water generated by delivery yards and main estate roads accounts for 20% of the proposed on-site area. Runoff generated in these areas would not be adequately treated by system alone. As a result, a by-pass petrol interceptor has been specified to process runoff to acceptable EA standard levels. This approach is considered adequate to treat runoff, subject to implementation of a certified petrol interceptors.

0.7 / 0.6 / 0.7 – Delivery Yards & Access Roads – (Medium Hazard)
0.8 / 0.6 / 0.9 – Typical values for by-pass petrol interceptor.

All mitigation indices > pollution indices therefore **OK**.

5.7.6 It has been demonstrated that the proposals are to provide a new SuDS compliant design. Runoff from 'medium' hazard areas such as parking and delivery yards will be significantly treated with permeable paving and petrol interceptors to an acceptable level before discharge into the nearby watercourse. Overall the residual risk of contamination to the surrounding area is considered low and therefore compliant with the latest guidance and best practice. This assessment is reliant on proper construction and maintenance.

ATTENUATION STORAGE VOLUMES

5.8 Preliminary sizing of attenuation storage features was initially undertaken using the HR Wallingford surface water storage requirements tool. These results were used to inform design at concept stage. The results of this exercise gave an indication that an impermeable area of 2.15 hectares, outflowing at a single rate of 6.2 l/s, would require around 1642m^3 of total volume storage to attenuate the re-developed Site.

Full Hydraulic Modelling

5.8.1 The full drainage systems has been hydraulically modelled and analysed using MicroDrainage software. Calculations have been completed for the 2, 30, 100 and 100-year + climate change return periods. A summary of the inputs, critical results and maximum water levels for each return period are presented in **Appendix H**.

The latest climate change allowances for the 2070s Epoch (50 year design life) indicates a maximum allowance of 40%. In line with the current best practice, all calculations undertaken for sizing of drainage attenuation features has been undertaken using the latest FEH datasets for rainfall for critical storms up to 60 mins. FSR rainfall is to be used if the critical storm is less than 60 mins to get accurate results.

A coefficient of runoff (C_v) for both summer and winter storms has been selected as 0.9 which represents 90% of the impermeable area contributing to the drainage system. This is normal practice as a small amount runoff is expected to be intercepted or evaporate. An allowance of 0.3 from proposed landscape contribution has been included.

Unit 13 Sub-Catchment Results

5.8.2 Calculations have been undertaken to ensure that no flooding occurs in the 1 in 30 year event and that no flooding occurs to buildings in the 1 in 100-year + 40% event. The worst case storm in the 2-year return period is the 480 min storm. The maximum water level in the system was 64.606m (206mm deep). Very few of the pipes were surcharged and no flooding was predicted, therefore the results for all 2-year storms are acceptable.

The worst case storm in the 30-year return period is the 600 min storm. The maximum water level in the system was 64.710m (310mm deep). Most pipes were surcharged but no flooding was predicted, therefore the results for all 30-year storms are acceptable.

The worst case storm in the 100-year return period is the 720 min storm. The maximum water level in the system was 64.829m (429mm deep). All pipes were surcharged but no flooding was predicted, therefore the results for all 100-year storms are acceptable.

The worst case storm in the 100-year + 40% return period is the 960 min storm. The maximum water level in the system was 65.053m (653mm deep). All pipes were surcharged and 5m^3 of flooding was predicted. This would not cause a danger to the building and would pond in the yard until the storm subsided. Therefore, overall, we would consider the results of the hydraulic modelling as satisfactory and compliant.

Unit 14 Sub-Catchment Results

5.8.3 Calculations have been undertaken to ensure that no flooding occurs in the 1 in 30 year event and that no flooding occurs to buildings in the 1 in 100-year + 40% event.

The worst case storm in the 2-year return period is the 720 min storm. The maximum water level in the system was 64.491m (391mm deep). Very few pipes were surcharged and no flooding was predicted, therefore the results for all 2-year storms are acceptable.

The worst case storm in the 30-year return period is the 960 min storm. The maximum water level in the system was 64.738m (638mm deep). Some pipes were surcharged but no flooding was predicted, therefore the results for all 30-year storms are acceptable.

The worst case storm in the 100-year return period is the 960 min storm. The maximum water level in the system was 64.894m (794mm deep). All pipes were surcharged but no flooding was predicted, therefore the results for all 100-year storms are acceptable.

The worst case storm in the 100-year + 40% return period is the 1440 min storm. The maximum water level in the system was 65.200m (1100mm deep). All pipes were surcharged but no flooding was predicted, therefore the results for all 100-year storms are acceptable. Therefore, overall, we would consider the results of the hydraulic modelling as satisfactory and compliant.

Unit 15 Sub-Catchment Results

5.8.4 Calculations have been undertaken to ensure that no flooding occurs in the 1 in 30 year event and that no flooding occurs to buildings in the 1 in 100-year + 40% event.

The worst case storm in the 2-year return period is the 600 min storm. The maximum water level in the system was 64.570m (470mm deep). Very few pipes were surcharged and no flooding was predicted, therefore the results for all 2-year storms are acceptable.

The worst case storm in the 30-year return period is the 960 min storm. The maximum water level in the system was 64.819m (719mm deep). Some pipes were surcharged but no flooding was predicted, therefore the results for all 30-year storms are acceptable.

The worst case storm in the 100-year return period is the 960 min storm. The maximum water level in the system was 64.982m (882mm deep). All pipes were surcharged but no flooding was predicted, therefore the results for all 100-year storms are acceptable.

The worst case storm in the 100-year + 40% return period is the 1440 min storm. The maximum water level in the system was 65.375m (1100mm deep). All pipes were surcharged but no flooding was predicted, therefore the results for all 100-year storms are acceptable. Therefore, overall, we would consider the results of the hydraulic modelling as satisfactory and compliant.

6 FOUL WATER DRAINAGE STRATEGY

Existing Drainage

6.1 Thames Water records confirm there are no existing foul water sewers or pumping stations on the site or in close proximity to the site.

Proposed FW Drainage

6.2 The offices to the new buildings are to be provided with toilet, shower and hand wash facilities. There are also small kitchenettes provided to the offices. All domestic foul flows generated by the buildings are to discharge into SVP's, then into the main foul drainage system. The bin store/condenser areas are to have foul drainage connections in line with Building Regulation Part H requirements. A new private network of on-site gravity private domestic foul is to be provided as presented on the foul drainage layout in **Appendix G**.

Preferred Discharge Point

6.3 The Site has the benefit of previous planning approval for pumped discharge into the new adopted Thames Water pump station located on the Holiday Inn Express site. This then pumps discharge for both Sites to an adopted Thames Water 600mm diameter sewer on A41, Oxford Road. Maximum flows from the hotel site are estimated at 14 l/sec and flows of 10 l/sec from this Site which forms the basis of the 24 l/sec current pump rate.

The preferable discharge point for the Site is to connect into the existing private drainage system on the wider Catalyst Bicester development. A new gravity connection can be provided passing across Wendlebury Road and under the flood compensation area adjacent to Units 1-3. This will take the form of a 150mm pipe at 1 in 120 falls connecting into existing manhole F3 which flows down to an existing private pump station.

The existing system already has Thames Water approval for 30 litres per second flow rate from a dual submissible pump station, 210m^3 offline storage tanks and 160mm outside diameter rising main which currently discharges to adopted Thames Water 600mm diameter sewer on to the A41, Oxford Road.

We have undertaken design checks and there appears to be sufficient capacity in the private pump station to take flows from Units 13-15. A pre-planning capacity check will be made to Thames Water shortly after planning submission to confirm there is capacity in the wider network.

Estimated Flows

6.5 An estimation of the foul flows across the whole of the wider Catalyst Bicester development, including Phase 4, was undertaken which can be found in **Appendix J.** The daily average flow's expected from Phase 4 are 59,310 litres per day. This equates to a figure of 0.755 l/sec average flow and maximum peak flow of **4.5 l/sec**.

7 CONCLUSIONS AND RECOMMENDATIONS

Flood Zone

The Environment Agency mapping shows that the whole site is within Flood Zone 1 which is shown to be at less than 0.1% chance of flooding in any year, otherwise known as having a 1:1000-year chance. There is no record of flooding on this Site.

Sources of Flood Risk

The risk from Fluvial flooding is Low as described in Section 3.2. The risk from Groundwater flooding is Low as described in Section 3.3. The risk from Canal flooding is Negligible as described in Section 3.4. The risk from Reservoir and Waterbody flooding is Low as described in Section 3.5. The risk from Sewer flooding is Low as described in Section 3.6. The risk from Surface Water flooding is Medium as described in Section 3.7. The flood risk to the wider catchment flooding is Low as described in Section 3.8.

Proposed Flood Mitigation

Potential mitigation measures include; Raising thresholds and building levels outside of design flood levels, providing safe access and egress around the development, directing overland flows towards areas of low risk, implementation of SuDS to manage runoff at sources thus reducing flood volume, installation of pollution prevention features to prevent contamination at discharge locations, tree planting to increase biodiversity and absorption of water, management and maintenance to ensure correct operation of all drainage systems and managing residual risks post development.

Discharge Hierarchy

Currently, the majority of the Site is informally drained by the watercourse on the eastern boundary. Infiltration potential is low so discharge to a watercourse as described within the 2nd step of the discharge hierarchy is acceptable. The current Greenfield Q_{BAR} flows from the site are 6.2 litres / second which is to be used for drainage design.

Proposed SuDS Features

The following SuDS features have been considered for the site; Rainwater Harvesting systems, Green Roofs, Infiltration / Soakaway type features, Swales & Attenuation Basins, Permeable Paving systems, Geocellular Attenuation Tanks, Filter drains/strips and Petrol Interceptors. The proposed SuDS features are listed below;

- Permeable Paving
- Petrol Interceptors
- Geocellular Tanks
- Catchpits, Gullies and Line Drains
- Hydro-brake Flows control device
- Tree Pits

Surface Water Drainage Strategy

Outflows for the positively drained sub-catchments are limited to the Greenfield QBAR discharge rate of 6.2 l/s for all storm events up to the 1 in 100-year + 40% climate change allowance return period. Each sub-catchment has its own separate drainage system with a pro-rata discharge rate. The total attenuation storage provided is 1739m^3 which is spread across the Site.

Yards are to drain to heavy duty line drains or kerb drains before passing through a by-pass petrol interceptor. Roofs are to be drained by gutters flowing into external rainwater pipes or internal siphons before discharge into the wider system. Car parking is to be drained via permeable block paving. All flows are restricted for final discharge into the watercourse. The maximum water level does not exceed 600mm freeboard of FFL's.

It has been demonstrated that the proposals are to provide a new SuDS compliant design to manage and enhance the quality of water discharged from the Site. Runoff from Medium risk areas such as parking and delivery yards will be significantly treated with permeable paving and petrol interceptors to an acceptable level before discharge into the nearby watercourse. Gutter guards, silt traps and catchpits will provide additional levels of treatment.

Foul Drainage Strategy

Thames Water records confirm there are no existing foul water sewers or pumping stations on the site or in close proximity to the site. The offices to the new buildings are to be provided with toilet, shower and hand wash facilities. There are also small kitchenettes provided to the offices all of which discharge to the main foul drainage system. The preferable discharge point for the Site is to connect into the existing private drainage system on the wider Catalyst Bicester development. The daily average flow's expected from Phase 4 are 59,310 litres per day. This equates to a figure of 0.755 l/sec average flow and maximum peak flow of 4.5 l/sec.

Recommendations

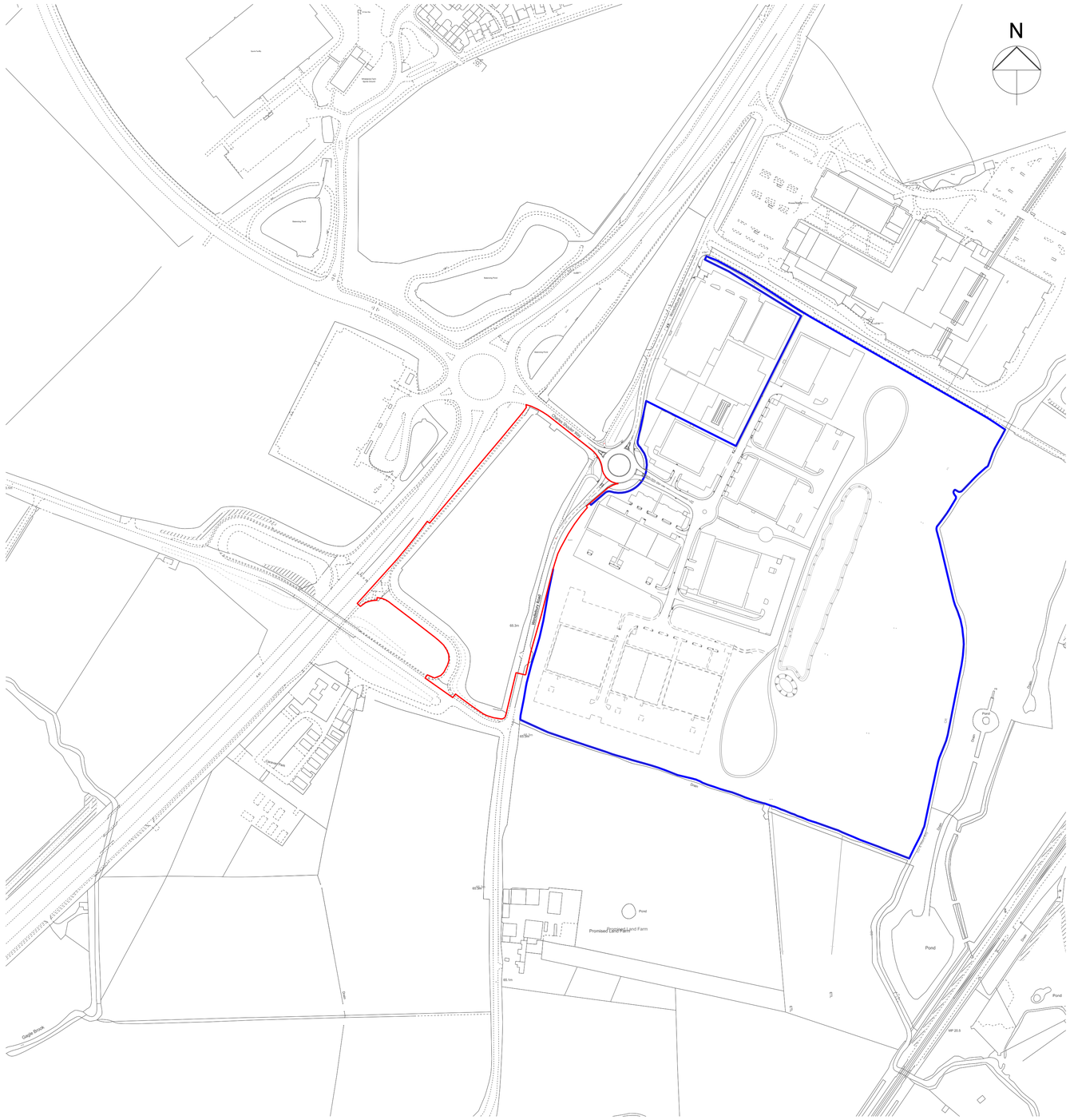
The risks of flooding have been fully assessed and are found to generally be low. Flood mitigation measures should be implemented so that the future risks to users of the site will continue to be low. Residual risks are to be managed through proper management and maintenance of the Site.

It is recommended that the SW & FW drainage design be constructed as per the provided plans/details appended. This will ensure minimal flooding is created on the site during the 30-year event and flooding is contained on site safely during the 100-year + 40% event. External levels should be constructed as per the plans provided so that buildings remain protected from flooding and overland flows can be directed to areas of the lowest risk.

APPENDIX A

Existing & Proposed Site Plans

By Cornish Architects (May 24)



NOTES

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C A Cornish & Associates Ltd Licence no LIG0908.

Subject to Statutory Approvals.

KEY

- Planning Boundary
- Other land within ownership

Rev	Description	Chk	Date

27 Greville Street
London EC1N 8SU

tel +44(0)20 7400 2120

enquiries@cornisharchitects.com
www.cornisharchitects.com

RIBA Chartered Practice

cornisharchitects

Project Title.

CATALYST PHASE 4

Drawing Title.

SITE LOCATION PLAN

Drawing Status.

TOWN PLANNING

Scale.

0 20 metres 200

Drawn By.	Scale.	Date.	Chk'd By.
J B	1:2500 @ A1	11/04/2024	S M

ALBION LAND

Drawing No.	Rev.
23022 - TP - 001	-

NOTES

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Subject to Statutory Approvals.

KEY

Planning Boundary

Unit 13

Unit 14

Unit 15

Unit 1

First Floor Offices

Unit 2

First Floor Offices

Unit 3

First Floor Offices

Charles Shouler Way

Wendlebury Road

Permissive Path

PROW Diversion

Connection to Existing PROW

SS

ED Bdy

27 Greville Street
London EC1N 8SU

tel +44(0)20 7400 2120

enquiries@cornisharchitects.com
www.cornisharchitects.com

RIBA Chartered Practice

cornisharchitects

Rev	Description	Chk	Date

Project Title.

CATALYST PHASE 4

Drawing Title.

PROPOSED SITE PLAN

Drawing Status.

TOWN PLANNING

Scale. 0 5 metres 40

Drawn By.	Scale.	Date.	Chk'd By.
J B	1:500 @ A1	11/04/2024	S M

ALBION LAND

Drawing No. 23022 - TP - 002 Rev. -

APPENDIX B

Topographical Survey

By MK Surveys (January 24)

Notes:

1. GRID AND LEVELS BASED ON ORDNANCE DATUM, DERIVED FROM THE NATIONAL GNSS NETWORK. LOCAL SCALE FACTOR 0.99964 APPLIED.
2. TREE AND HEDGE SPECIES HAVE BEEN IDENTIFIED AS ACCURATELY AS POSSIBLE BUT SHOULD BE CROSS CHECKED IN CRITICAL AREAS.

Coordinate Table

Station	Description	Easting	Northing	Level
J1	Road Nail	457190.890	220874.294	67.475
J2	Road Nail	457098.725	220938.204	73.047
J3	Road Nail	457207.530	220897.901	67.041
J4	Road Nail	457194.428	220922.182	65.991
J5	Road Nail	457147.775	220960.265	65.326
J6	Road Nail	457130.891	220979.301	65.788
J7	Road Nail	457174.839	221030.264	65.704
J9	Road Nail	457210.810	221072.314	65.724
J10	Road Nail	457254.208	221124.181	65.682
J11	Road Nail	457278.645	221158.032	66.219
S1	Road Nail	457341.636	221277.353	66.433
S2	Road Nail	457401.390	221328.535	67.077
S3	Road Nail	457357.705	221253.086	66.308
S4	Road Nail	457317.315	221206.211	65.863
S5	Road Nail	457283.259	221178.375	66.645
S6	Road Nail	457250.746	221222.493	66.607
S10	Road Nail	457328.045	221140.868	66.104
S11	Road Nail	457392.084	221095.185	65.339
S12	Road Nail	457326.166	221059.793	65.880
S13	Peg & Nail	457294.201	220988.856	65.494
S14	Road Nail	457281.810	220904.339	65.206
S15	Road Nail	457252.236	220827.126	65.355

TOPOGRAPHICAL KEY

SURVEY STATION (5)
BANKING (TOP / BOTTOM)
HEDGE SPREADS
WOODLAND CANOPY
ARROW ON STEPS / RAMPS INDICATES DIRECTION UPWARDS
TREES (SPREAD & GIRTH SHOWN TO SCALE)
GATE
KERB CHANNEL
ROAD UNKERBED
FOOTPATH
CHANGE IN SURFACE
FENCE
WALL
OVERHEAD ELECTRIC
OVERHEAD TELECOM
FOUL SEWER
SURFACE SEWER
P-TRAP
BACK DROP (EXTERNAL)
BACK DROP (INTERNAL)
BUILDING
OPEN SIDED BUILDING
OVERHANG / CANOPY
GLASSHOUSE
CONTOUR (25.50)
SPOT LEVEL (+ 127.13)
SONAR LEVEL (○ 127.13)
BORE HOLE (BH)
TRIAL HOLE (TH)

GENERAL ABBREVIATIONS

AIR CONDITIONING UNIT	ACU
AIR VALVE	AV
AVERAGE	Av.
BACK DROP	BD
BASE LEVEL	BL
BELISHA BEACON	BB
BOLLARD	BO
BOLLARD LIGHT	BOL
BRICK	BK
BUS STOP	BS
CABLE RISER	CR
CABLE TV COVER	CATV
CABLES TO GROUND	CTG
CATCH PIT	CP
CONTROL BOX	CB
COVER LEVEL	CL
CROSSING CONTROL BUTTON	CCB
DAMP PROOF COURSE	DPC
DRAINAGE CHANNEL	DCH
DROP KERB	DK
ELECTRICITY POLE	EP
EARTH ROD	ER
FIRE HYDRANT	FH
FLOOR LEVEL	FL
FOOTPATH	FP
FOUL WATER	FW
GAS RISER	GR
GAS VALVE	GV
GULLY	GY
HARD BED	HB
INSPECTION COVER	IC
INVERT LEVEL	IL
KERB OUTLET	KO
LAMP POST	LP
MANHOLE	MH
MARKER POST	MK
METER	MT
NO PIPES VISIBLE	NPV
ORDNANCE SURVEY BENCH MARK	OSBM
P-TRAP	PT
POST	PO
POST BOX	P.BOX
RODDING EYE	RE
ROAD SIGN	RS
RAIN WATER PIPE	RWP
RETAINING WALL	RW
SOFT BED	SB
STOP COCK	SC
STREET NAME PLATE	SNP
STOP VALVE	SV
SOIL PIPE	SP
SOIL VENT PIPE	SVP
SURFACE WATER	SW
TACTILE PAVING	TAC
TELECOM POLE	TP
TELECOM INSPECTION COVER	TEL
TELEPHONE CALL BOX	TCB
TICKET MACHINE	TM
TOP OF WALL	TOW
TRAFFIC LIGHT	TL
TRAFFIC LIGHT COVER	TLC
THRESHOLD LEVEL	THL
UNABLE TO LOCATE	UTL
UNABLE TO RAISE	UTR
UNABLE TO SURVEY	UTS
VENT PIPE	VP
WATER LEVEL	WL
WATER METER	WM
WASH OUT	WO
WATER RISER	WR
WATER TAP	WT

FENCE ABBREVIATIONS

BARBED WIRE FENCE	B/W	IRON RAILINGS	I/R
CLOSE BOARDED FENCE	C/B	LARCH LAP FENCE	L/L
CONCRETE PANEL FENCE	CPL	POST AND RAIL FENCE	P/R
CORRUGATED IRON FENCE	C/I	POST AND WIRE FENCE	P/W
CHAIN LINK FENCE	C/L	WIRE MESH FENCE	W/M
CHESTNUT PALING	CNP		

Revision	Description	Surv. by	Check. by	Appr. by	Date
1	South west corner of site updated	SB	JS	JS	31/1/2024

0m 5 10 15 20 25 30 35 40 45 50 55

Topographical Survey

Client: ALBION LAND

Bicester Gateway
Charles Shouler Way
Bicester
Oxfordshire

Scale:	Sheet Size:	Sheet Number:	Date:
1:500	A0	1	November 2023

Project Number:	Rev:	Surveyed by:	Checked by:	Approved by:
33239	1	SB/JB	AS	JS

mksurveys
www.mksurveys.com www.surveys4bim.co.uk
Head Office: Milton Keynes t: 01908 565561 e: mail@mksurveys.co.uk

APPENDIX C

Flood Map for Planning

By Environment Agency (April 24)

Flood map for planning

Your reference	Location (easting/northing)	Created
Catalyst 4	**457244/220999**	**5 Apr 2024 15:46**

Your selected location is in flood zone 1, an area with a low probability of flooding.

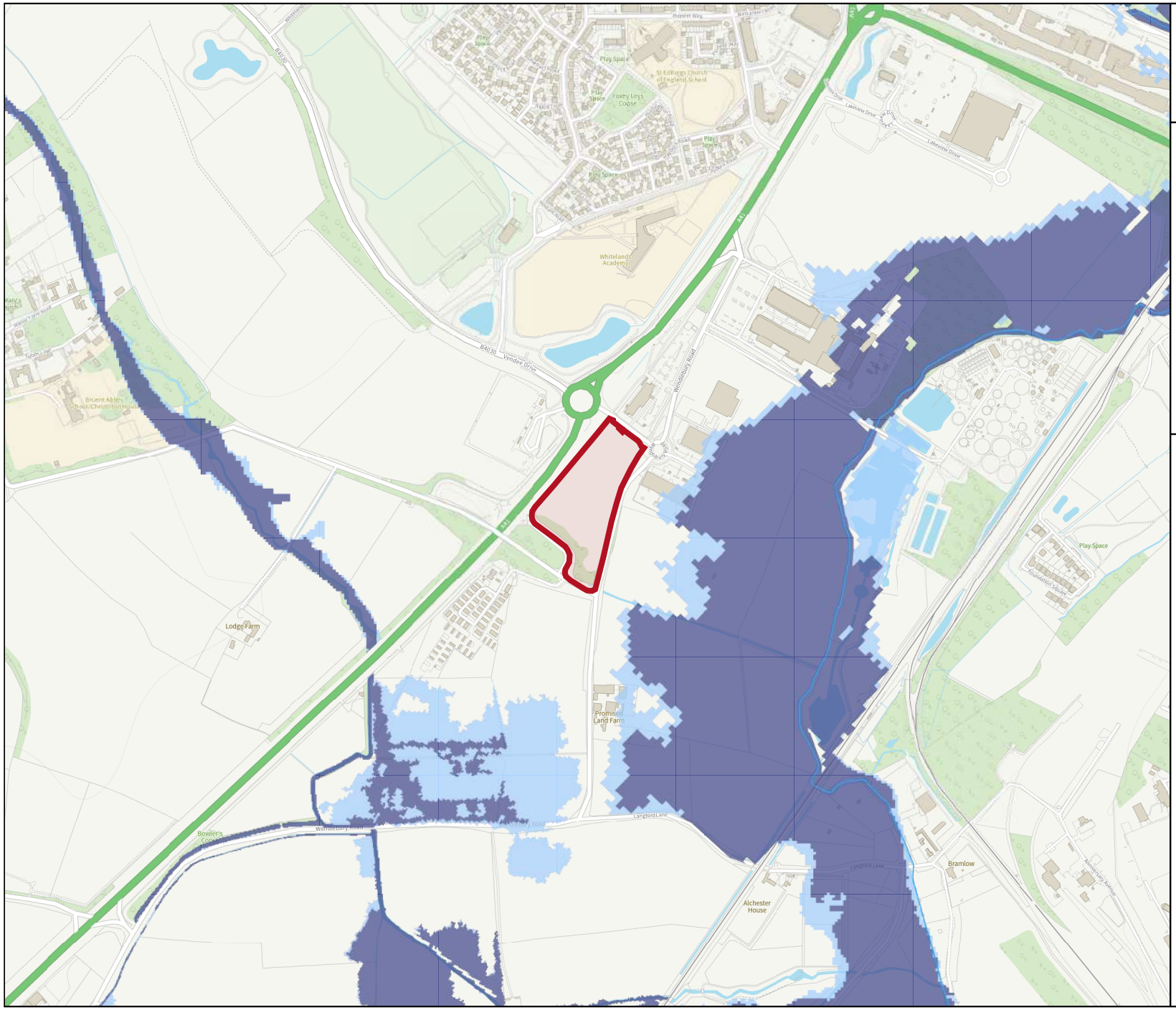
You will need to do a flood risk assessment if your site is **any of the following:**

- bigger that 1 hectare (ha)
- In an area with critical drainage problems as notified by the Environment Agency
- identified as being at increased flood risk in future by the local authority's strategic flood risk assessment
- at risk from other sources of flooding (such as surface water or reservoirs) and its development would increase the vulnerability of its use (such as constructing an office on an undeveloped site or converting a shop to a dwelling)

Notes

The flood map for planning shows river and sea flooding data only. It doesn't include other sources of flooding. It is for use in development planning and flood risk assessments.

This information relates to the selected location and is not specific to any property within it. The map is updated regularly and is correct at the time of printing.



Environment Agency

Flood map for planning

Your reference
Catalyst 4

Location (easting/northing)
457244/220999

Scale
1:10000

Created
5 Apr 2024 15:46

- Selected area
- Flood zone 3
- Flood zone 2
- Flood zone 1
- Flood defence
- Main river
- Water storage area

0 100 200 300m

APPENDIX D

Asset Location Search

By Thames Water (January 24)

Waste Water Services

Please provide a copy extract from the public sewer map.

The following quartiles have been printed as they fall within Thames' sewerage area:

SP5721SW
SP5720NW

Enclosed is a map showing the approximate lines of our sewers. Our plans do not show sewer connections from individual properties or any sewers not owned by Thames Water unless specifically annotated otherwise. Records such as "private" pipework are in some cases available from the Building Control Department of the relevant Local Authority.

Where the Local Authority does not hold such plans it might be advisable to consult the property deeds for the site or contact neighbouring landowners.

This report relates only to sewerage apparatus of Thames Water Utilities Ltd, it does not disclose details of cables and or communications equipment that may be running through or around such apparatus.

The sewer level information contained in this response represents all of the level data available in our existing records. Should you require any further Information, please refer to the relevant section within the 'Further Contacts' page found later in this document.

For your guidance:

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

Clean Water Services

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

The following quartiles have been printed as they fall within Thames' water area:

SP5721SW
SP5720NW

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

For your information, there will be a pressure of at least 10m head at the outside stop valve. If you would like to know the static pressure, please contact our Customer Centre on 0800 316 9800. The Customer Centre can also arrange for a full flow and pressure test to be carried out for a fee.

For your guidance:

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

Payment for this Search

A charge will be added to your suppliers account.

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. For further information please contact our Customer Centre on Tel: 0845 920 0800. Alternatively, a survey can be arranged, for a fee, through our Customer Centre on the above number.

If you have any questions regarding sewer connections, budget estimates, diversions, building over issues or any other questions regarding operational 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

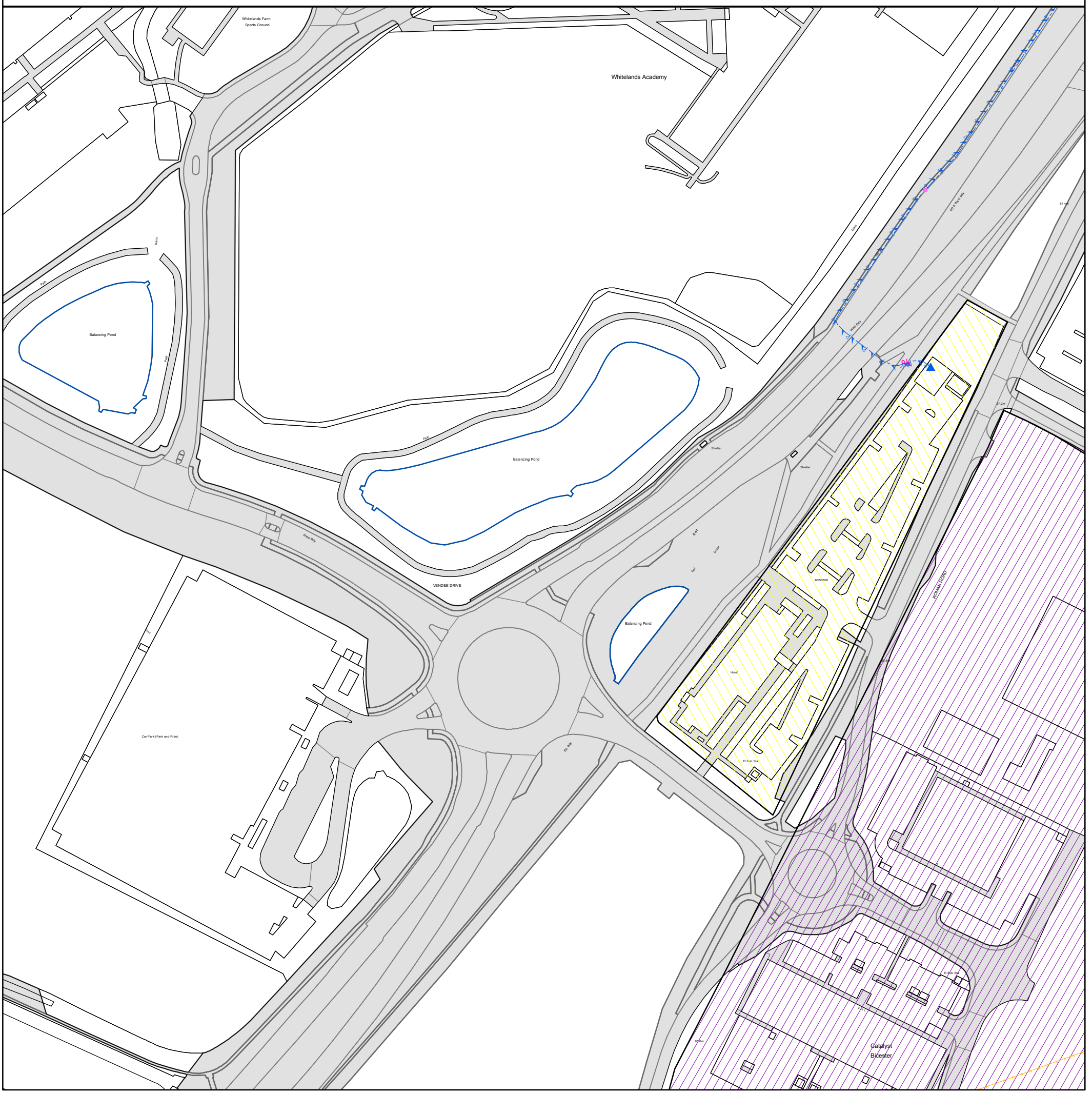
Should you require any advice concerning clean water operational issues or clean water connections, please contact:

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

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

Based on the Ordnance Survey Map with the sanction of the Controller of H.M Stationary Office License Number 10019345

ALS/ALS Standard/2023_4924782



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:	ASuji
Print Date:	15/12/2023
Map Centre:	457250,221250
Grid Reference:	SP5721SW

Comments:

ALS/ALS Standard/2023_4924782

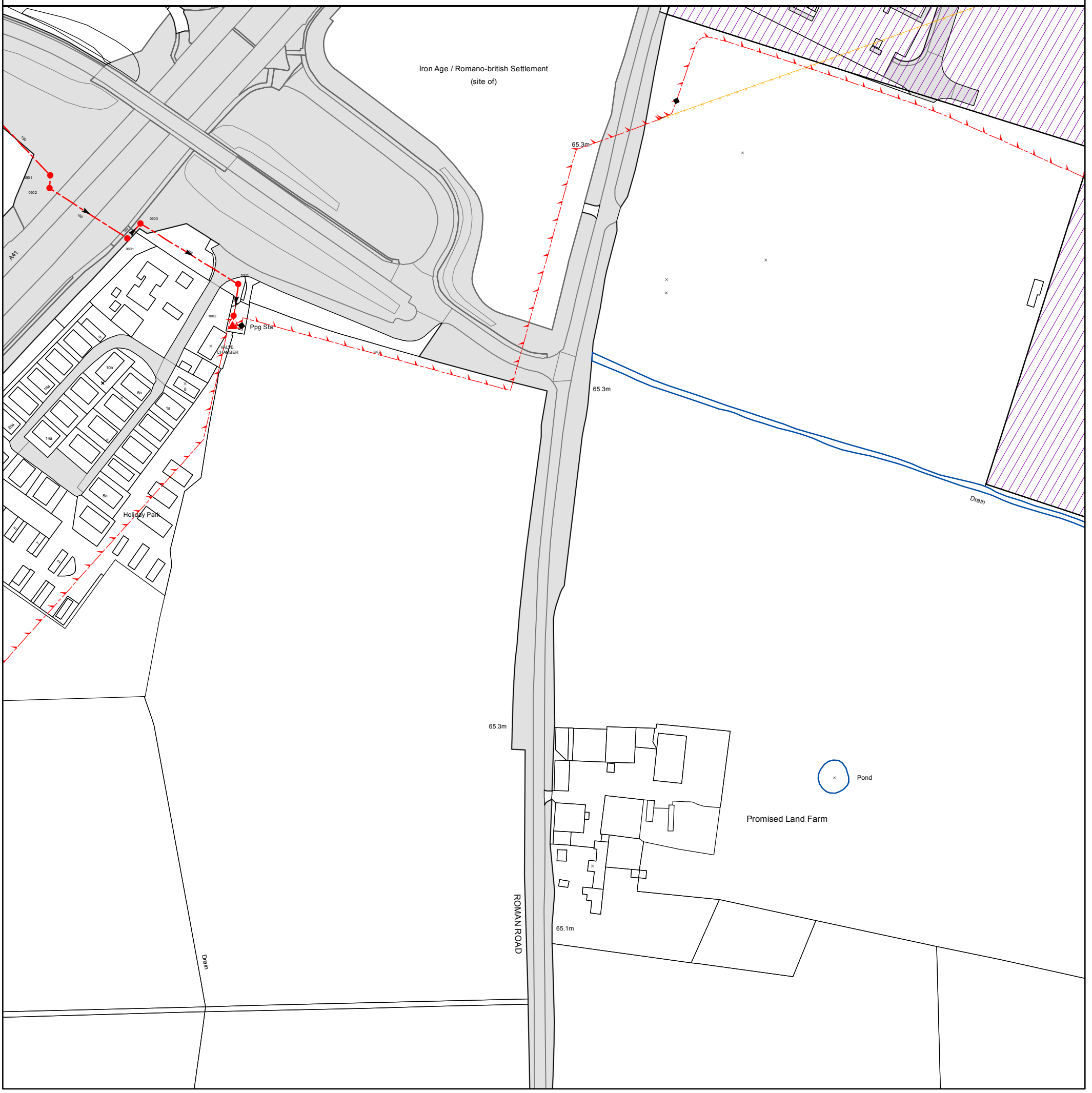
NB: Level quoted in metres Ordnance Newlyn Datum. The value -9999.00 indicates no Survey information is available.

REFERENCE	COVER LEVEL	INVERT LEVEL

REFERENCE	COVER LEVEL	INVERT LEVEL

Based on the Ordnance Survey Map with the sanction of the Controller of H.M Stationary Office License Number 10019345

ALS/ALS Standard/2023_4924782



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Width:	500m
Printed By:	ASuji
Print Date:	19/12/2023
Map Centre:	457250,220750
Grid Reference:	SP5720NW

Comments:

ALS/ALS Standard/2023_4924782

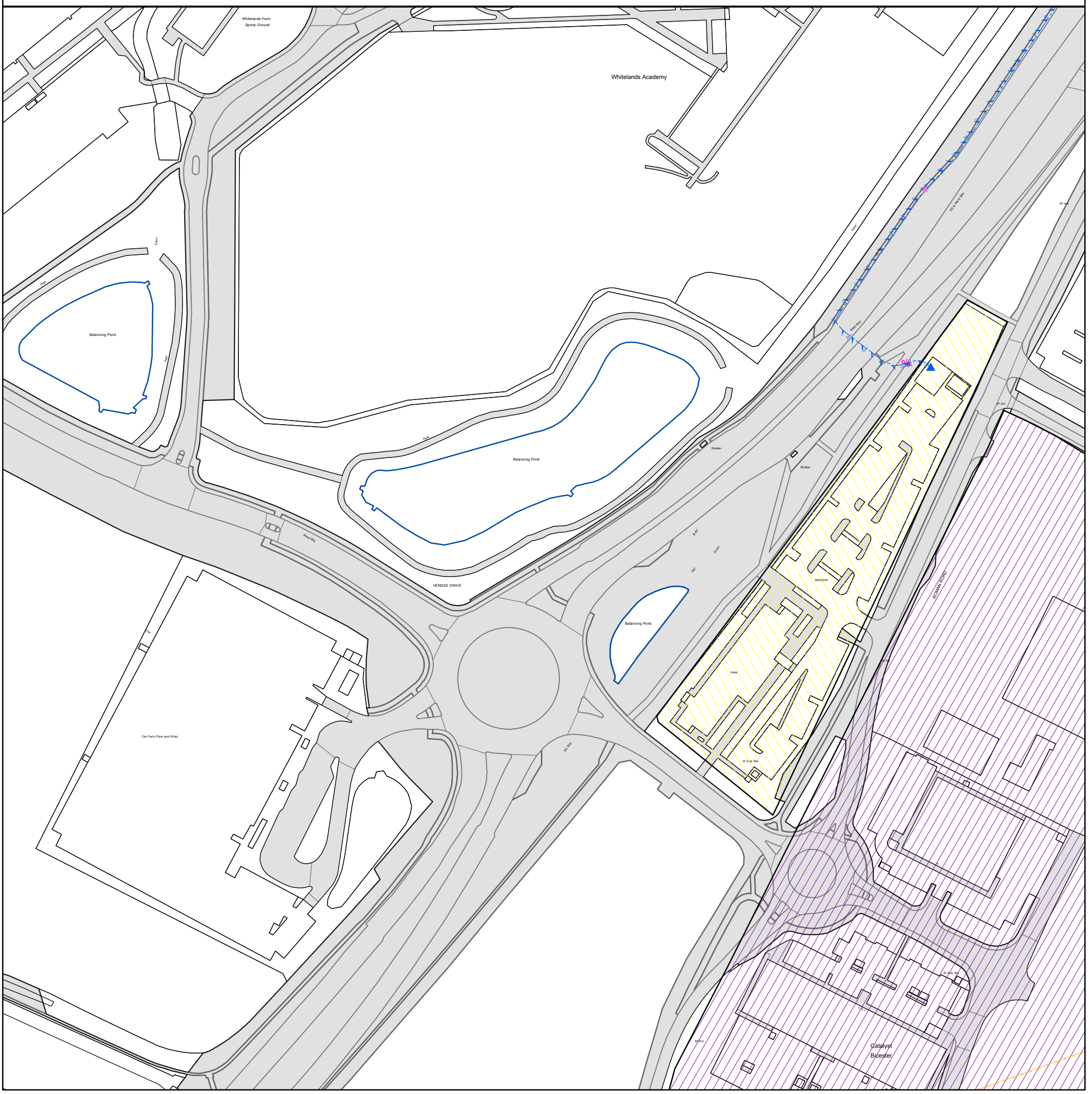
NB: Level quoted in metres Ordnance Newlyn Datum. The value -9999.00 indicates no Survey information is available.

REFERENCE	COVER LEVEL	INVERT LEVEL
0902		
0801		
1801		

REFERENCE	COVER LEVEL	INVERT LEVEL
0901		
1802		
0903		

Based on the Ordnance Survey Map with the sanction of the Controller of H.M Stationary Office License Number 10019345

ALS/ALS Standard/2023_4924782



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:	ASuji
Print Date:	19/12/2023
Map Centre:	457250,221250
Grid Reference:	SP5721SW

Comments:

ALS/ALS Standard/2023_4924782

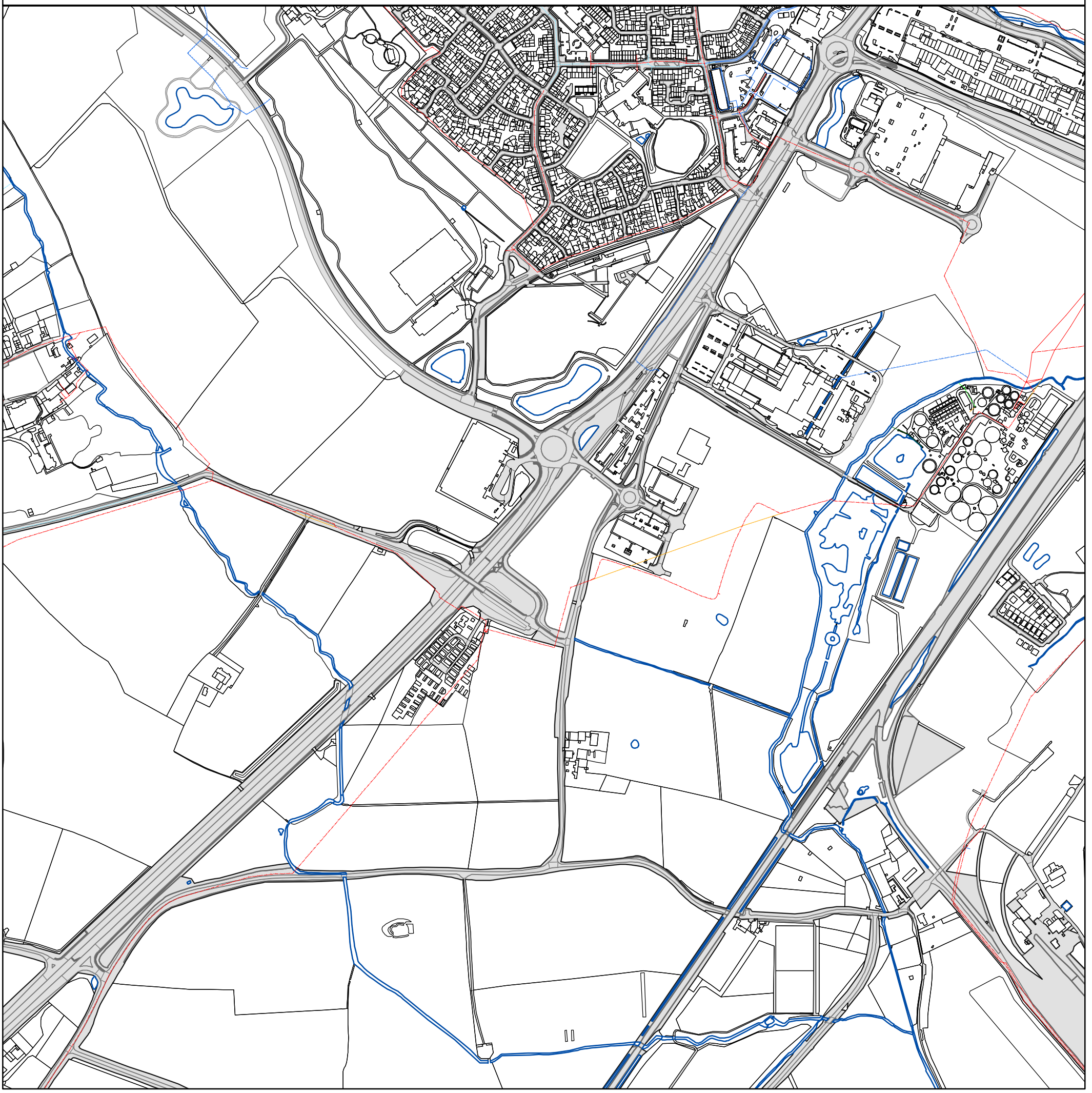
NB: Level quoted in metres Ordnance Newlyn Datum. The value -9999.00 indicates no Survey information is available.

REFERENCE	COVER LEVEL	INVERT LEVEL

REFERENCE	COVER LEVEL	INVERT LEVEL

Based on the Ordnance Survey Map with the sanction of the Controller of H.M Stationary Office License Number 10019345

ALS/ALS Standard/2023_4924782



0 45 90 180 270 360
Meters

Scale:	1:7161
Width:	2000m
Printed By:	ASuji
Print Date:	18/12/2023
Map Centre:	457215,221008
Grid Reference:	SP5721SW

Comments:

Asset Location Search - Sewer Key

Public Sewer Types (Operated and maintained by Thames Water)

Foul Sewer: A sewer designed to convey waste water from domestic and industrial sources to a treatment works.

Surface Water Sewer: A sewer designed to convey surface water (e.g. rain water from roofs, yards and car parks) to rivers or watercourses.

Combined Sewer: A sewer designed to convey both waste water and surface water from domestic and industrial sources to a treatment works.

- Storm Sewer
- Sludge Sewer
- Foul Trunk Sewer
- Surface Trunk Sewer
- Combined Trunk Sewer
- Foul Rising Main
- Surface Water Rising Main
- Combined Rising Main
- Vacuum
- Thames Water Proposed
- Vent Pipe
- Gallery

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

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

Sewer Fittings

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

- Air Valve
- Meter
- Dam Chase
- Vent
- Fitting

Operational Controls

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

- Ancillary
- Drop Pipe
- Control Valve
- Weir

End Items

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

- Inlet
- Outfall
- Undefined End

Other Symbols

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

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

Areas

Lines denoting areas of underground surveys, etc.

- Agreement
- Chamber
- Operational Site

Ducts or Crossings

- Casement

Ducts may contain high voltage cables. Please check with Thames Water.

- Conduit Bridge
- Subway
- Tunnel

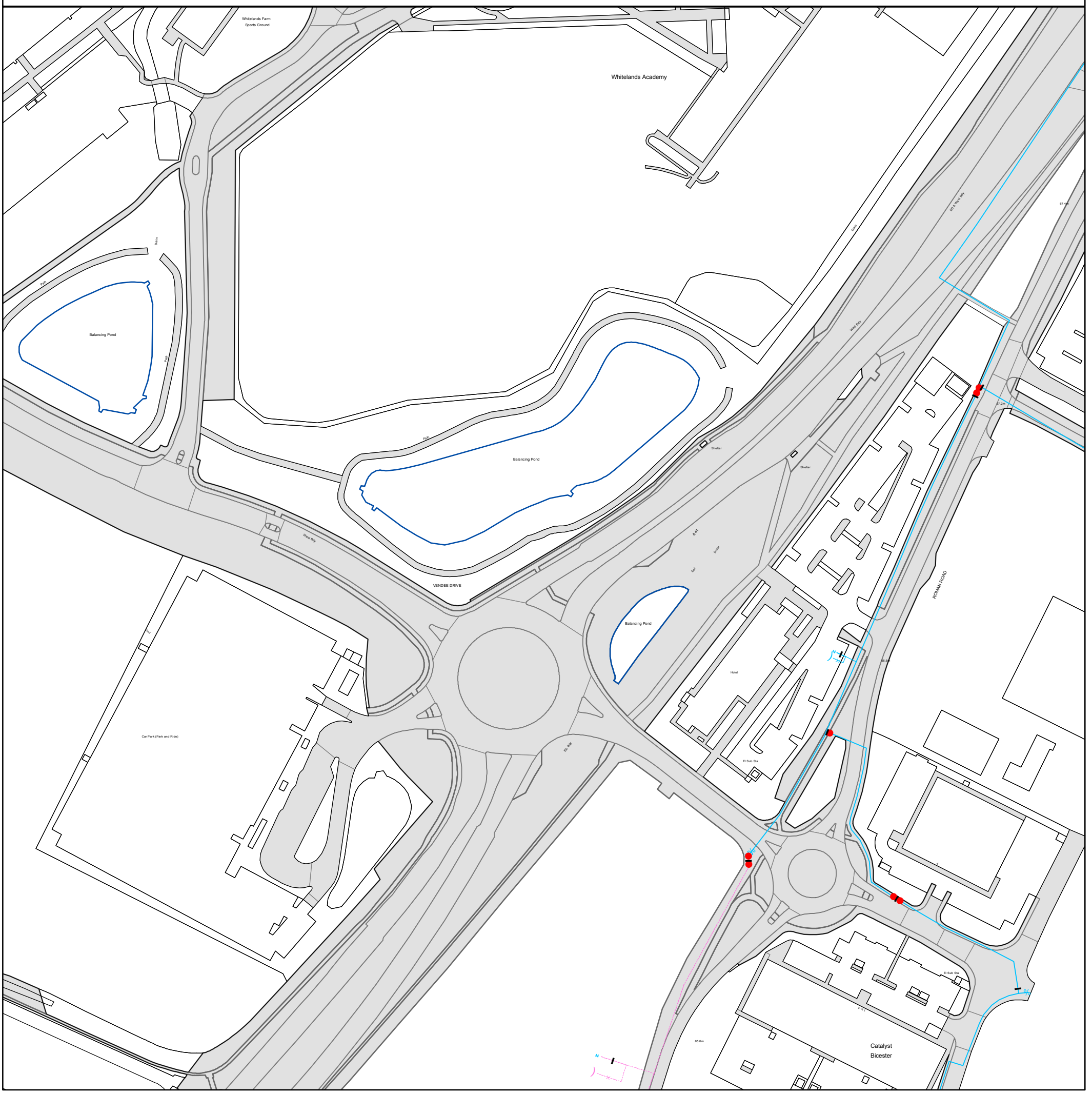
Notes:

1) All levels associated with the plans are to Ordnance Datum Newlyn.
2) All measurements on the plan are metric.
3) Arrows (on gravity fed sewers) or flecks (on rising mains) indicate the direction of flow.
4) Most private pipes are not shown on our plans, as in the past, this information has not been recorded.
5) 'na' or '0' on a manhole indicates that data is unavailable.
6) The text appearing alongside a sewer line indicates the internal diameter of the pipe in millimeters. Text next to a manhole indicates the manhole reference number and should not be taken as a measurement.

If you are unsure about any text or symbology, please contact Property Searches on 0800 009 4540.

Based on the Ordnance Survey Map with the sanction of the Controller of H.M Stationary Office License Number 10019345

ALS/ALS Standard/2023_4924782



0 10 20 40 60 80 Meters

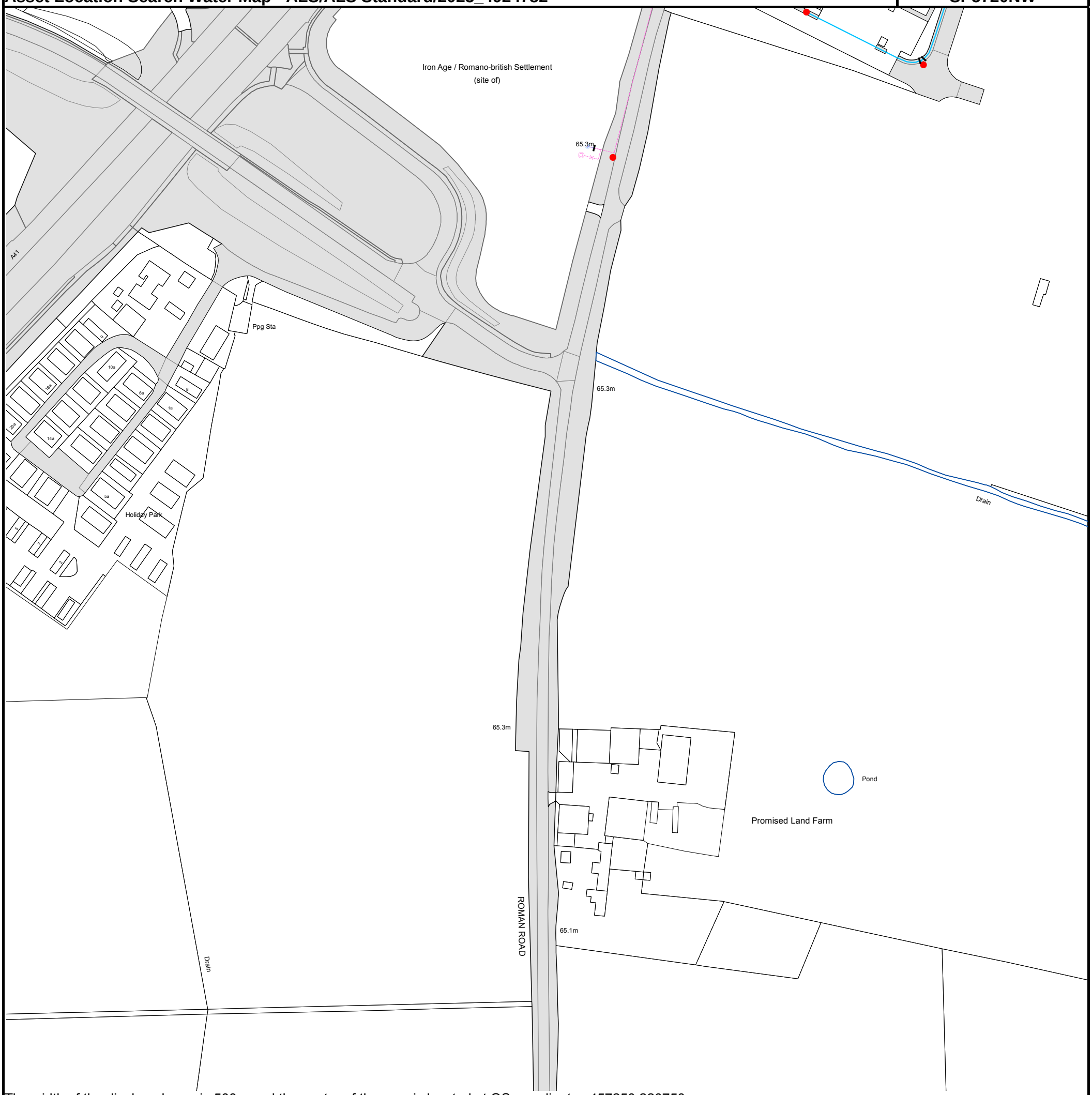
The position of the apparatus shown on this plan is given without obligation and warranty, and the accuracy cannot be guaranteed. Service pipes are not shown but their presence should be anticipated. No liability of any kind whatsoever is accepted by Thames Water for any error or omission. The actual position of mains and services must be verified before any works are undertaken. Crown copyright Reserved

Scale:	1:1789
Width:	500m
Printed By:	ASuji
Print Date:	19/12/2023
Map Centre:	457250,221250
Grid Reference:	SP5721SW

Comments:

Asset Location Search Water Map - ALS/ALS Standard/2023_4924782

SP5720NW

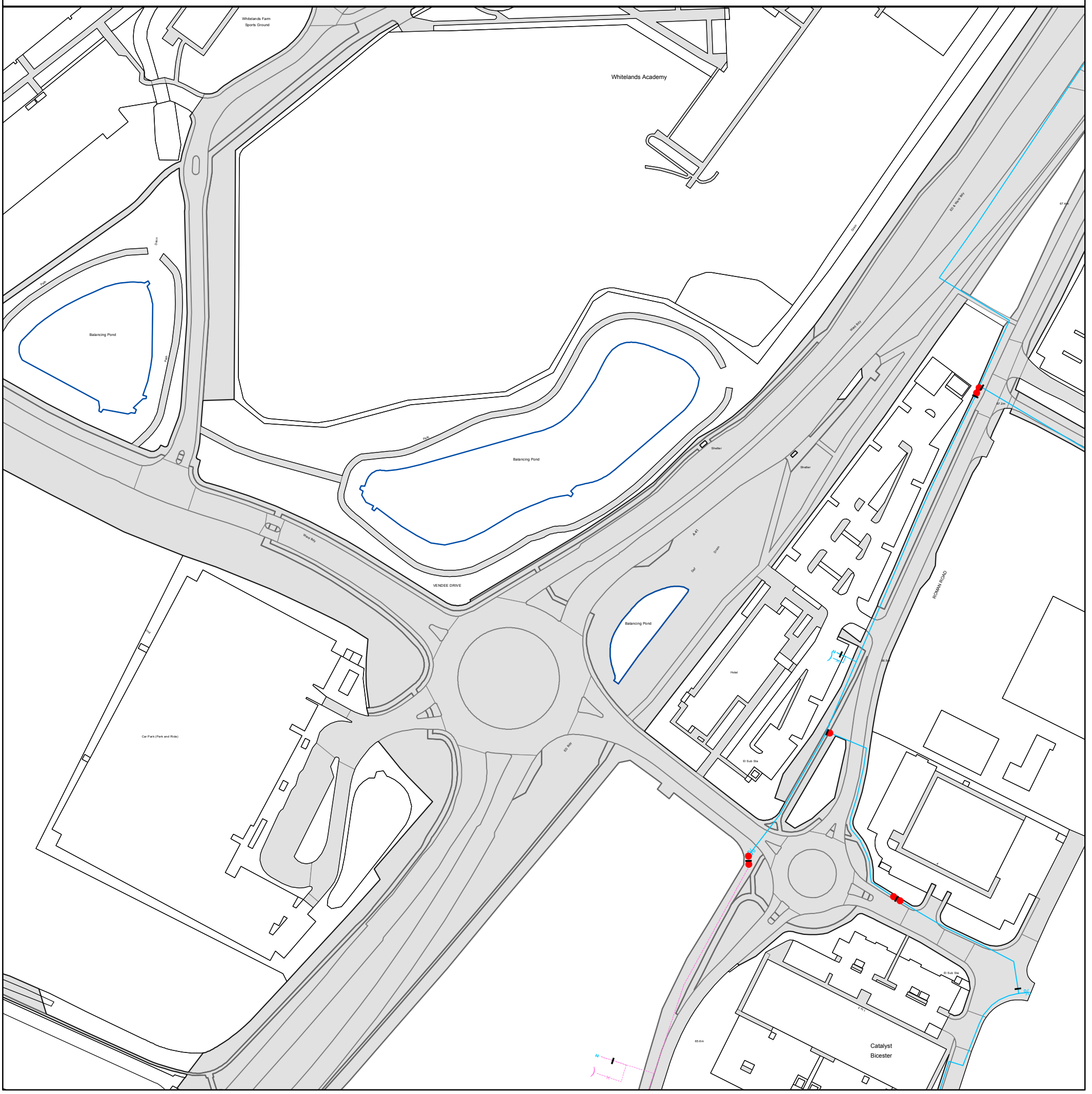


The width of the displayed area is 500m and the centre of the map is located at OS coordinates 457250,220750

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

Based on the Ordnance Survey Map with the sanction of the Controller of H.M Stationary Office License Number 10019345

ALS/ALS Standard/2023_4924782



0 10 20 40 60 80 Meters

Scale:	1:1789
Width:	500m
Printed By:	ASuji
Print Date:	15/12/2023
Map Centre:	457250,221250
Grid Reference:	SP5721SW

Comments:

Asset Location Search - Water Key

Water Pipes (Operated & Maintained by Thames Water)

Distribution Main: The most common pipe shown on water maps. With few exceptions, domestic connections are only made to distribution mains.

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.

Supply Main: A supply main indicates that the water main is used as a supply for a single property or group of properties.

Fire Main: Where a pipe is used as a fire supply, the word FIRE will be displayed along the pipe.

Metered Pipe: A metered main indicates that the pipe in question supplies water for a single property or group of properties and that quantity of water passing through the pipe is metered even though there may be no meter symbol shown.

Transmission Tunnel: A very large diameter water pipe. Most tunnels are buried very deep underground. These pipes are not expected to affect the structural integrity of buildings shown on the map provided.

Proposed Main: A main that is still in the planning stages or in the process of being laid. More details of the proposed main and its reference number are generally included near the main.

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

Valves

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

Hydrants

- Single Hydrant

Meters

- Meter

End Items

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

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

Operational Sites

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

Other Symbols

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

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

Other Water Company Main: Occasionally other water company water pipes may overlap the border of our clean water coverage area. These mains are denoted in purple and in most cases have the owner of the pipe displayed along them.

Private Main: Indicates that the water main in question is not owned by Thames Water. These mains normally have text associated with them indicating the diameter and owner of the pipe.

Payment Terms and Conditions

All sales are made in accordance with Thames Water Utilities Limited (TWUL) standard terms and conditions unless previously agreed in writing.

1. All goods remain in the property of Thames Water Utilities Ltd until full payment is received.
2. Provision of service will be in accordance with all legal requirements and published TWUL policies.
3. All invoices are strictly due for payment within 14 days of the date of the invoice. Any other terms must be accepted/agreed in writing prior to provision of goods or service or will be held to be invalid.
4. Penalty interest may be invoked by TWUL in the event of unjustifiable payment delay. Interest charges will be in line with UK Statute Law 'The Late Payment of Commercial Debts (Interest) Act 1998'.
5. Interest will be charged in line with current Court Interest Charges, if legal action is taken.
6. A charge may be made at the discretion of the company for increased administration costs.

A copy of Thames Water's standard terms and conditions are available from the Commercial Billing Team (cashoperations@thameswater.co.uk).

We publish several Codes of Practice including a guaranteed standards scheme. You can obtain copies of these leaflets by calling us on 0800 316 9800.

If you are unhappy with our service, you can speak to your original goods or customer service provider. If you are still not satisfied with the outcome provided, we will refer the matter to a Senior Manager for resolution who will provide you with a response.

If you are still dissatisfied with our final response, and in certain circumstances such as you are buying a residential property or commercial property within certain parameters, The Property Ombudsman will investigate your case and give an independent view. The Ombudsman can award compensation of up to £25,000 to you if he finds that you have suffered actual financial loss and/or aggravation, distress, or inconvenience because of your search not keeping to the Code. Further information can be obtained by visiting www.tpos.co.uk or by sending an email to admin@tpos.co.uk.

If the Goods or Services covered by this invoice falls under the regulation of the 1991 Water Industry Act, and you remain dissatisfied you can refer your complaint to Consumer Council for Water on 0300 034 2222 or write to them at Consumer Council for Water, 1st Floor, Victoria Square House, Victoria Square, Birmingham, B2 4AJ.

Ways to pay your bill

Credit Card	**BACS Payment**	**Telephone Banking**
Please Call **0800 009 4540** quoting your invoice number starting CBA or ADS	Account number **90478703** Sort code **60-00-01** A remittance advice must be sent to: **Thames Water Utilities Ltd., PO Box 3189, Slough SL1 4WW.** or email **ps.billing@thameswater.co.uk**	By calling your bank and quoting: Account number **90478703** Sort code **60-00-01** and your invoice number

APPENDIX E

A41 & Holiday Inn Drainage Layouts

By WSP (October 08 / September 18)