Merton College

Land west of Yarnton, Oxfordshire

Flood Risk Assessment and Drainage Strategy

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1 Executive Summary

1.1.1 PJA has been commissioned by Merton College to prepare a Flood Risk Assessment (FRA) and Drainage Strategy to support an outline planning application for a new residential-led development of up to 540 dwellings, a care home, a community home-working hub, amenity space for William Fletcher Primary School with associated green open space and infrastructure at *Land west of Yarnton*, Oxfordshire.

Table 1-1: Executive Summary Table

Overview	
Site Location	OS Parcel 3673, Adjoining and West of 161 Rutten Lane Yarnton OX5 1LT
Development Proposal	The erection of up to 540 dwellings (Class C3), up to 9,000sqm GEA of elderly/extra care residential floorspace (Class C2), a Community Home-Working Hub (up to 200sqm)(Class E), alongside the creation of two locally equipped areas for play, one NEAP, up to 1.8 hectares of playing pitches and amenity space for the William Fletcher Primary School, two vehicular access points, green infrastructure, areas of public open space, two community woodland areas, a local nature reserve, footpaths, tree planting, restoration of historic hedgerow, and associated works. All matters are reserved, save for the principal access points.
Environment Agency Flood Zone(s)	Flood Zone 1
Vulnerability Classifications(s)	More Vulnerable – Residential development & elderly / extra care space Less Vulnerable – Working from Home Community Hub Water compatible - Amenity space and green infrastructure
Fluvial Flood Risk	Very Low Risk
Tidal Flood Risk	Very Low Risk
Surface Water Flood Risk	High Risk in localised areas (Low Risk with proposed Mitigation)
Groundwater Flood Risk	Low Risk
Sewer Flood Risk	Low Risk
Artificial Flood Risk	Low Risk
Surface Water Drainage	Proposed surface water flows will be attenuated to the existing QBar greenfield rate up to the 1 in 100 year plus 40% climate change event and discharged to the existing on Site ditch network. Further topographical measures are proposed to intercept flows which enter the Site from third-party land to provide a betterment to the flood risk of the existing community in Yarnton.
Foul Water Drainage	Proposed foul flow will discharge to the existing Thames Water network surrounding the Site.

2 Introduction

2.1 Terms of Reference

2.1.1 PJA were commissioned by Merton College to prepare a Flood Risk Assessment (FRA) and Drainage Strategy for a proposed residential-led development (the Proposed Development) at Land west of Yarnton, Oxfordshire, (the Site or Application Site).

2.1.2 A Flood Risk Assessment and Drainage Strategy, prepared by WSP, dated October 2021 was previously submitted to support the outline planning application (21/03522/OUT). However, this FRA and Drainage Strategy supersedes the previously submitted documents.

2.2 Scope of works

Flood Risk Assessment (FRA)

2.2.1 This FRA provides information on the nature of identified potential flood risk at the Site and follows government guidance with regards to development and flood risk largely in line with the National Planning Policy Framework (NPPF) and the supporting Planning Practice Guidance (PPG).

Drainage Strategy

2.2.2 The surface water drainage strategy aims to sustainably manage surface water from the Site and has been developed largely in accordance with current sustainable development best practices and the specific requirements of Oxfordshire County Council as the Lead Local Flood Authority (LLFA).

2.2.3 A high-level foul water drainage strategy has also been developed for the proposed development Site.

2.3 Information Sources

2.3.1 This report comprises a review of readily available public information and other relevant information obtained from the following sources:

- Environment Agency;
- British Geological Survey (BGS);
- Cranfield Soil and Agrifood Institute Soilscapes;
- DEFRA Magic Mapping;
- Thames Water;
- Oxfordshire County Council; and
- Cherwell District Council.

3 Site Details

3.1 Site Description

3.1.1 The majority of the Application Site, which is the focus of this FRA, is greenfield (undeveloped) in nature and is currently used primarily for agriculture. Yarnton Medical Practice, located east of the Site off Rutten Lane, is also identified within the existing Site boundary. The Site forms part of the Cherwell District Council Local Plan Allocation for unmet housing needs (reference PR9 'Land West of Yarnton').

3.1.2 The Site is bound to the east by the A44 Woodstock Road and the existing village of Yarnton and to the north of the Site is the existing village of Begbroke. To the west of the Site is Begbroke Woods and agricultural land. Additional agricultural land lies to the south.

3.1.3 The Site's OS national grid reference is 447231 , 212966. A Site location plan is available in Figure 3-1.

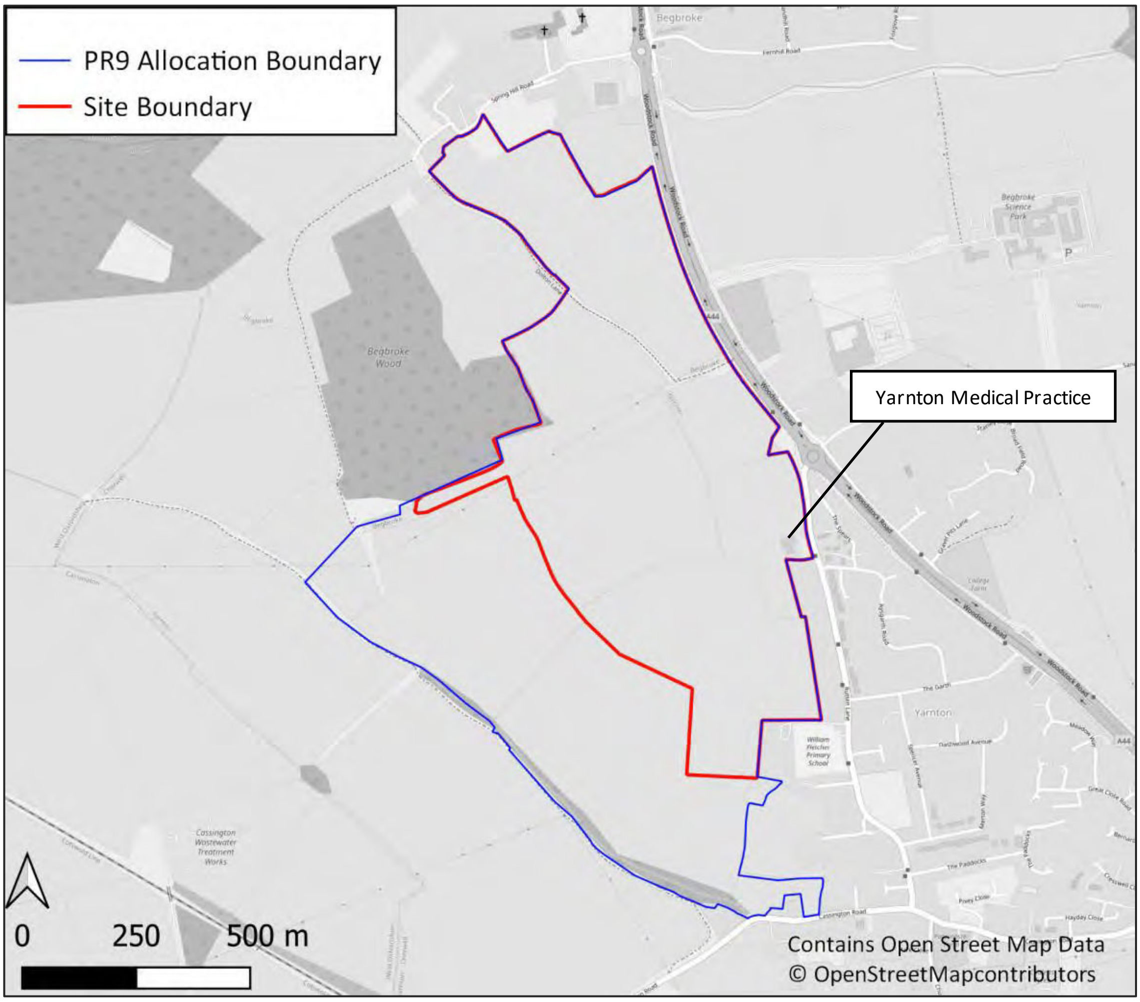


Figure 3-1 - Site Location Plan

Table 3-1: Summary of Site

Site Address	OS Parcel 3673 Adjoining and West Of 161 Rutten Lane Yarnton OX5 1LT
Existing Land use	Agriculture and Yarnton Medical Practice
Proposed Development Type	Up to 540 residential dwellings, 9,000m^2 of elderly / extra care space, community work-from-home hub, amenity space for William Fletcher Primary School
Site Area	52.9ha
OS Co-ordinates	447231 , 212966
County	Oxfordshire
Local Planning Authority	Cherwell District Council
Lead Local Flood Authority	Oxfordshire County Council
Local Water Authority	Thames Water

3.2 Site Topography

3.2.1 The Site is largely greenfield (undeveloped) in nature and comprises agricultural fields with Yarnton Medical Practice is also located in the centre of the east of the Site.

3.2.2 From a review of the detailed Site topographic survey, produced by MK Surveys and dated September 2018 (Appendix A), the Site's topography generally falls from west to east. Levels generally fall from approximately 85mAOD along the western boundary to approximately 70mAOD along the eastern boundary with Woodstock Road, with a low point of approximately 65.6mAOD in the east of the Site where the existing Yarnton Medical Practice is located.

3.2.3 An extract of the publicly available 1m DTM LiDAR data is contained in Figure 3-2, providing a visualisation of the topography of the Site.

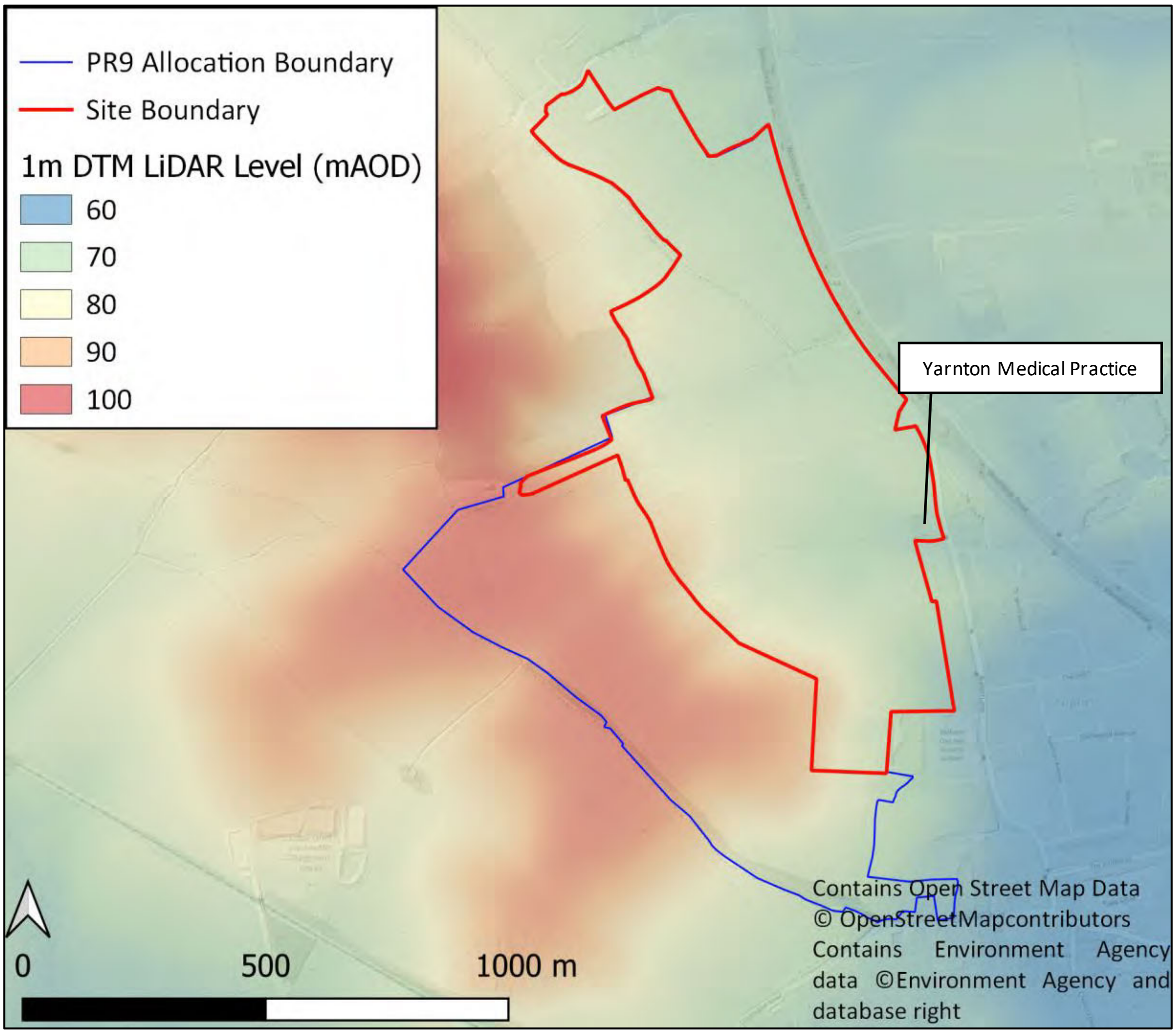


Figure 3-2 – 1m DTM LiDAR Levels

3.3 Ground Conditions

British Geological Survey Mapping

3.3.1 The British Geological Survey (BGS) Geology of Britain viewer[1] was consulted to identify the published geological records. This identified that the majority of the Aplication Site is recorded to be underlain by mudstone of the Oxford Clay Formation and West Walton Formation (Undifferentiated), with the northern extent of the Site underlain by interbedded sandstone, siltstone of the Kellaways Sand Member and mudstone of the Kellaways Clay Member.

3.3.2 A pocket of overlying superficial sand and gravel deposits of the Hanborough Gravel Member are identified at the far western extent of the Site and a small pocket of sand and gravel of the Summertown – Radley Sand and Gravel Member is located in the far north of the Site. Published geological records suggest that Made Ground is not indicated to be present at the Site.

3.3.3 An extract of the BGS mapping is contained in Figure 3-3.

[1]British Geological Survey. Geology of Britain Viewer. https://www.bgs.ac.uk/discoveringGeology/geologyOfBritain/viewer.html

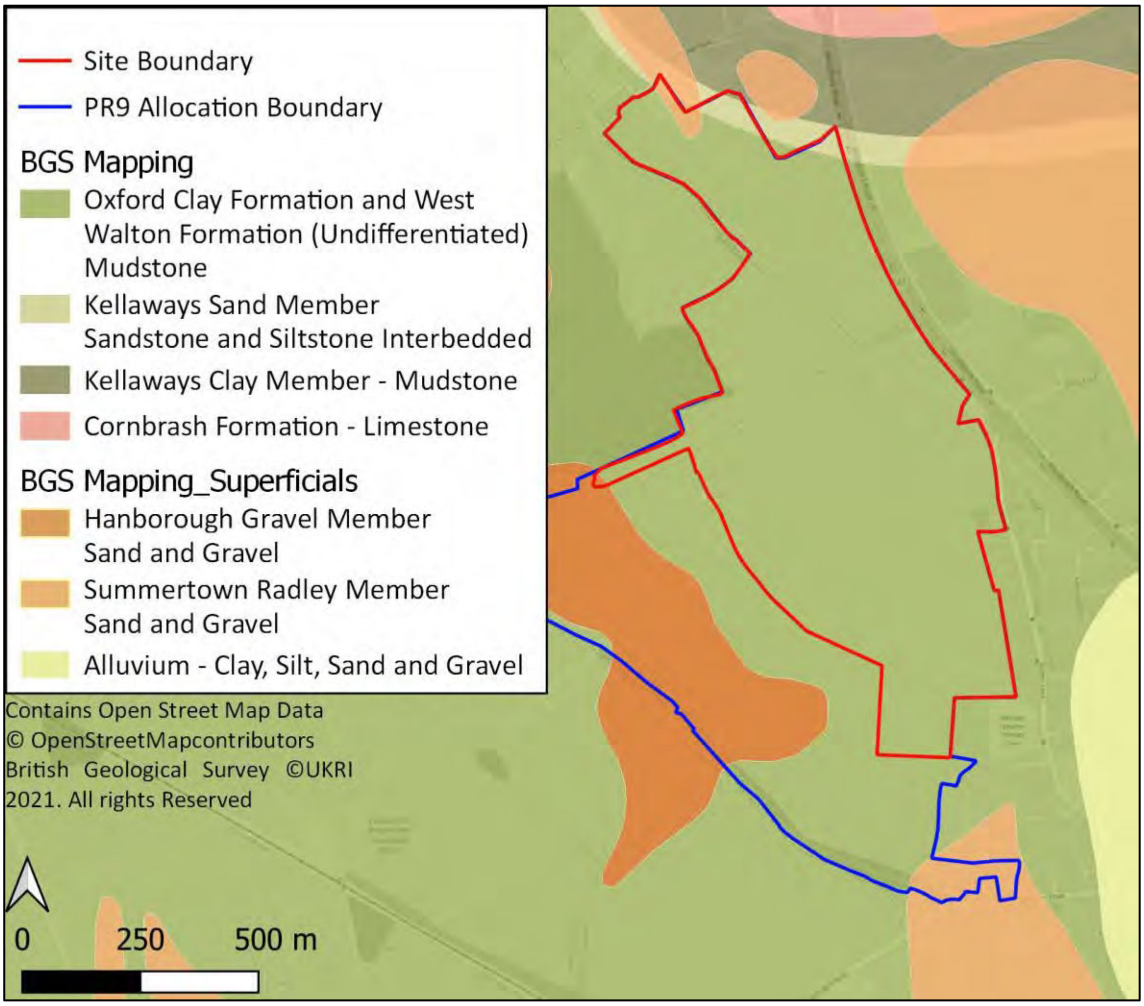


Figure 3-3 – BGS Geology Mapping

Cranfield University Soilscape Viewer

3.3.4 The Cranfield University Soilscape viewer[2] describes the soils for the majority of the Site as '*Slowly permeable seasonally wet slightly acid but base-rich loamy and clayey soils*' with a band of soils described as '*freely draining slightly acid but base-rich soils*' bisecting the Site.

Hydrogeology

3.3.5 The DEFRA MAGIC Aquifer Designation Map (Bedrock) identifies that the bedrock underlying the majority of the Site is classified by the Environment Agency as Unproductive Strata, however the thin band of Kellaways Sand Member bedrock bisecting the north of the Site is classified as a Secondary A Aquifer. This is defined as " *permeable layers that can support local water supplies, and may form an important source of base flow to rivers*".

[2]Cranfield Soil and Agrifood Institute. Soilscape Viewer. http://www.landis.org.uk/soilscapes/

3.3.6 From a review of the publicly available DEFRA MAGIC Mapping Aquifer Designation Map (Superficial Drift) the majority of the Site is not underlain by a Superficial Aquifer, however the pockets of superficial deposits in the far western and northern extents of the Site shown on Figure 3-3, are classified by the Environment Agency as a Secondary A aquifer.

3.3.7 It is also identified that the Application Site is not located in a groundwater Source Protection Zone.

3.3.8 During a meeting of the 17th May 2022, the members of Yarnton Flood Defence Group expressed concerns about potential groundwater which emerges from 'Spring Hill' west of the Site and therefore this has been further reviewed below.

3.3.9 The pocket of sand and gravel of the Hanborough Gravel Member, classified as a Secondary A Aquifer, which extends to the west from the western Site boundary coincides with an area of high ground at an elevation of between approximately 95m and 100mAOD. The northern extent of the high ground is noted to be called '*Spring Hill*', and freely available historical maps show a well present in this location which is consistent with the local presence of water-bearing sand and gravel.

3.3.10 Also shown on historical maps is a possible spring adjacent to the western Site boundary in proximity to Spring Hill, and further east within the Site, although these features are not labelled. The mudstone bedrock underlying the Hanborough Gravel Member is likely to act as an aquitard, limiting infiltration, and together with the fall in elevation to the east across the western site boundary this is likely to result in the natural water table reaching the surface locally, forming a spring.

3.3.11 Given the marginal overlap of these identified aquifers in the Site, located within areas of proposed green infrastructure, these are not considered a risk or constraint. However, there is the potential for groundwater within the superficial sand and gravel to the west of the Site to issue at the surface within the Site as a result of the underlying lower permeability bedrock and the prevailing topography. Flood risk from this source is further discussed in Section 5.6.

Site-Specific Ground Investigation

3.3.12 WSP as part of their previous work, subsequent to the previous FRA submission, commissioned infiltration testing in accordance with BRE Digest 365 Soakaway Design Guidance. This was undertaken by Ian Farmer Associates on the 19th November 2021 at four locations across the Application Site, as identified in Figure 3-4.

3.3.1 The trial pits were dug to depths of between 2.2m and 2.35mbgl and identified *Made Ground described as sandy, gravelly silt or clay with flint, sandstone and possible asphalt and coal, underlain by natural ground comprising sandy gravelly clay*. Groundwater was not identified in any of the trial pits.

3.3.2 The full infiltration report is available in Appendix L and demonstrates that infiltration is not a feasible method of disposing surface water from any locations across the Site, with all falling head tests failing to produce a positive infiltration result.

3.3.3 As such, publicly available geology data coupled with on-Site investigations demonstrate that the Site is not conducive for an infiltration-led drainage strategy for surface water flows.

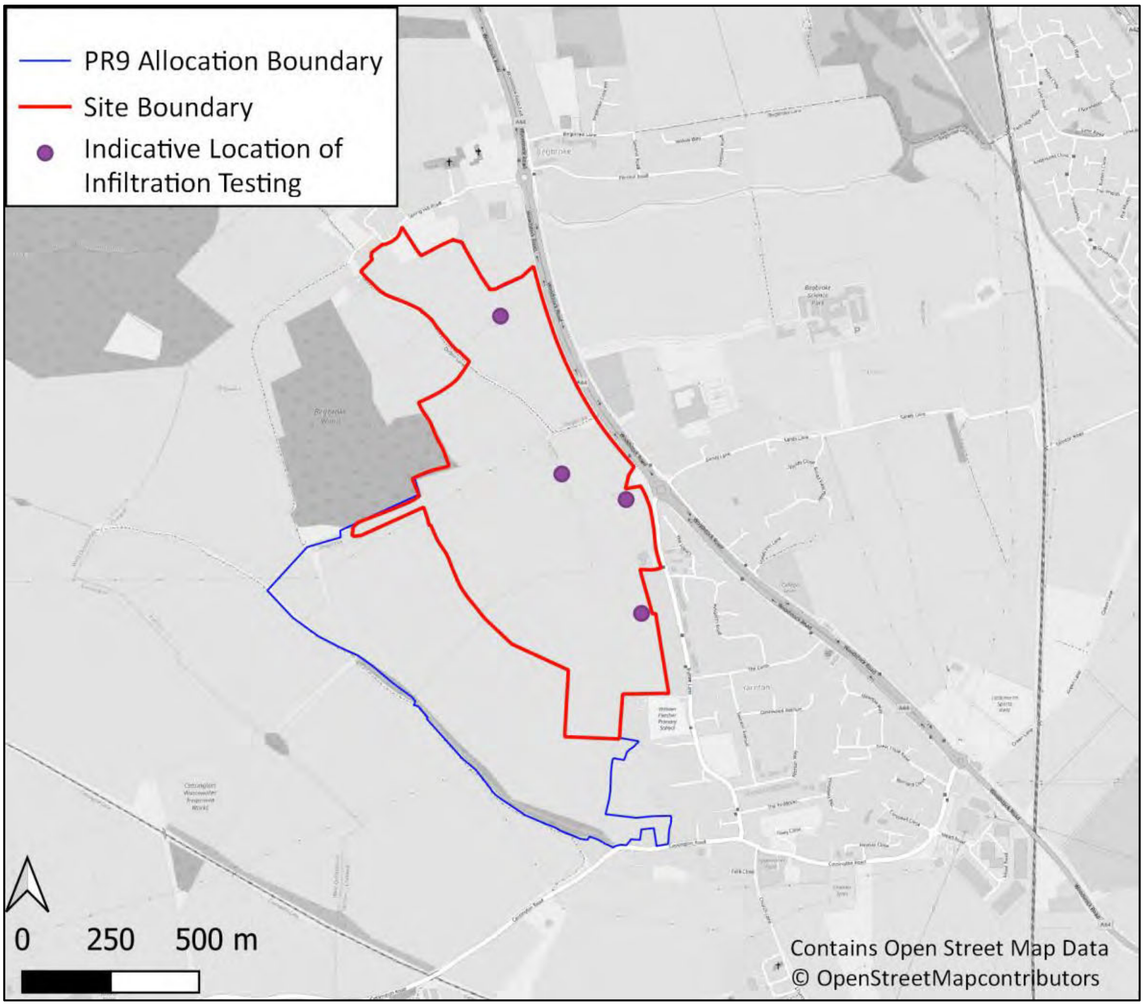


Figure 3-4 – Indicative Locations of Infiltration Testing

3.4 Existing Drainage Assets

3.4.1 The Site is currently largely greenfield and it is therefore understood that there are no public surface or foul water sewers currently serving the Site.

3.4.2 However, from a review of the existing Thames Water sewer asset mapping, it can be identified that there is a sludge rising main and a foul water rising main bisecting the Application Site crossing from Cassington Sewage Treatment Works towards Oxford Garden and Shopping Village across the A44 Woodstock Road to the east of the site. It is expected that these strategic rising mains will either be diverted through the proposed road network within the Site or, diverted to the out skirts of the Site, taking easements into consideration.

3.4.3 There are also a small number of existing Thames Water foul and combined sewers present serving the existing residential development immediately east of the Site. The existing Thames Water sewer asset mapping is available in Appendix E.

3.4.4 Surface water at the Site currently drains via a number of small ditch courses which generally flow from west to east in accordance with the existing Site topography. Uncontrolled surface water currently leaves the Site at three locations via culvert outfalls to join the downstream drainage network. Once these outfalls are surcharged, surface water flows in an uncontrolled manner along the road network.

3.4.5 The three outfalls have been identified from within the Site (northern, central and southern), as shown in Figure 3-5. A fourth surface water ditch was identified adjacent to the southern extent of the Site. This ditch appears to originate just outside the Application Site boundary

3.4.6 A CCTV survey has been undertaken on each outfall, undertaken by MK Surveys during August 2021. This CCTV survey is contained in Appendix C.

3.4.7 A further CCTV Investigation was completed on the 21st and 22nd of March 2022 by Premium Environmental Services to determine the downstream network beyond the Central and Southern outfall discharge locations of the existing sewer and ditch network through Yarnton, which is also contained in Appendix C.

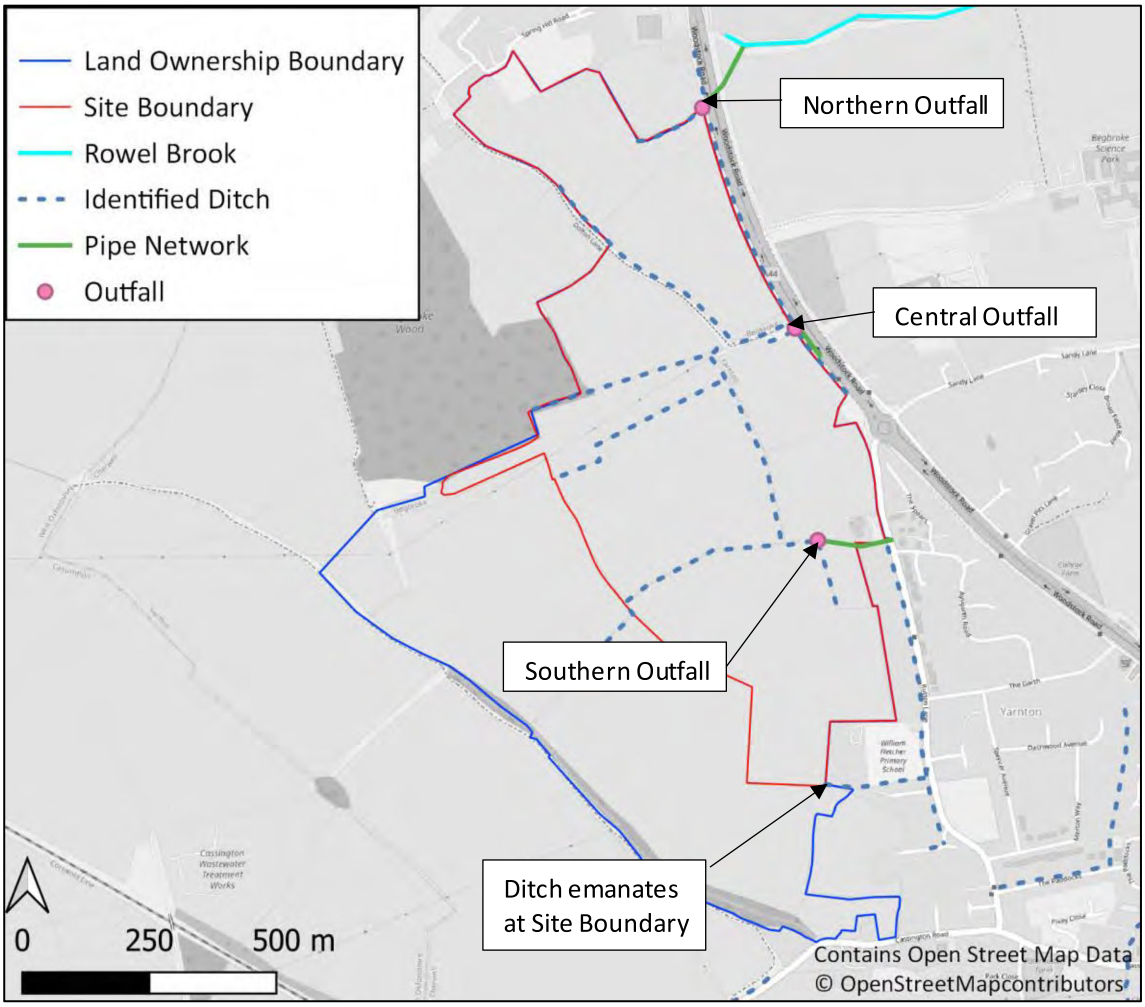


Figure 3-5 – Identified Existing Surface Water Network

3.4.8 PJA undertook several Site visits whilst preparing this report including:

- 20th December 2021 – Site walkover and meeting with Yarnton Flood Defence Group
- 11th January 2022 – Site walkover to review existing ditch network and downstream drainage
- 16th February 2022 – Site walkover with Nagina Bawar (Oxfordshire County Council Lead Local Flood Authority)
- 17th May 2022 – Walkover with Yarnton Flood Defence Group to understand exact location of pipework in Merton College Land south of Site

3.4.9 The following information has been identified for each outfall following Site visits coupled with the CCTV survey reports.

Northern Outfall

3.4.10 The northern outfall headwall is located at the north-east corner of the Site and discharges water from a heavily overgrown ditch and shallow pond network within the Site. The existing overgrown nature of the headwall is identified in Figure 3-6.

Figure 3-6 – Northern Outfall

3.4.11 As confirmed by the CCTV Survey (Appendix C), the outfall is a 450mm diameter pipe which was surveyed to its outfall with the Rowel Brook.

Central Outfall

3.4.12 The central outfall headwall is located along the eastern boundary of the Site with the A44 Woodstock Road. It currently takes land drainage from the Site and discharges to a drainage network within the A44, as noted within the CCTV Survey Report. The headwall is identified in Figure 3-7.

3.4.13 As confirmed through the CCTV Survey Report, this outfall is a 300mm diameter sewer run which leaves the Site downstream of the headwall inlet.

Figure 3-7 - Central Outfall

Southern Outfall

3.4.14 The southern outfall headwall is located approximately 75m west of the Site boundary. From this headwall to beyond the Site boundary, the ditch is culverted. The pipe network downstream of the headwall is 300mm in diameter and flows through the garden of 161 Rutten Lane before discharging to a 525mm diameter sewer network in Rutten Lane, as confirmed via the CCTV Survey Report. This network then discharges southwards down Rutten Lane.

3.4.15 A photo of the southern headwall, which also shows that the existing trash screen has been removed is available in Figure 3-8.

Figure 3-8 – Southern Outfall

3.4.16 An existing drainage plan which identifies the features as described above, is contained in Appendix D. Thames Water sewer asset mapping which identifies the locations of the rising mains and surrounding public sewer network is contained in Appendix E.

3.5 Site Proposals

3.5.1 The Site has been allocated in Cherwell District Councils Local Plan 2011-2031 (Part 1) Partial Review – Oxfords Unmet Housing Need (reference PR9 'Land West of Yarnton).

3.5.2 Merton College is seeking outline planning permission under planning reference 21/03522/OUT for: *The erection of up to 540 dwellings (Class C3), up to 9,000sqm GEA of elderly/extra care residential floorspace (Class C2), a Community Home Work Hub (up to 200sqm)(Class E), alongside the creation of two locally equipped areas for play, one NEAP, up to 1.8 hectares of playing pitches and amenity space for the William Fletcher Primary School, two vehicular access points, green infrastructure, areas of public open space, two community woodland areas, a local nature reserve, footpaths, tree planting, restoration of historic hedgerow, and associated works. All matters are reserved, save for the principal access points.*

3.5.3 A Flood Risk Assessment and Drainage Strategy, prepared by WSP, dated October 2021 has previously been submitted to support the outline planning application (21/03522/OUT), however, this current document supersedes the previously submitted documents.

3.5.4 The Land Use Parameter Plan, (Define December 2022) is available in Appendix A and an extract is shown in Figure 3-9.

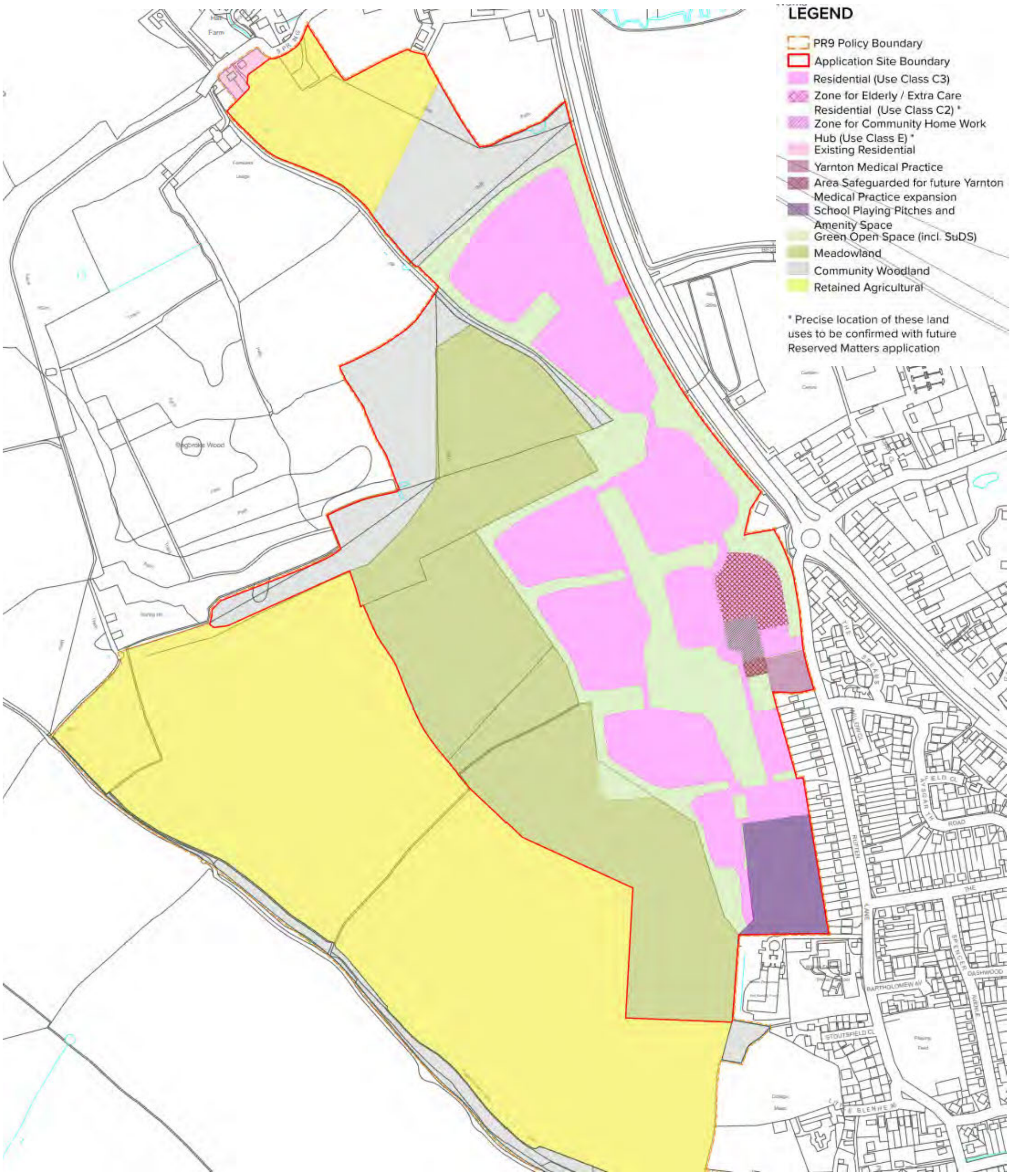


Figure 3-9 – Extract of Land Use Parameter Plan, Define (December 2022)

4 Planning Context

4.1 National Planning Policy Framework

4.1.1 The revised National Planning Policy Framework (NPPF) was published by the Ministry of Housing, Communities and Local Government in July 2018 and was updated in 2022. The NPPF's Planning Practice Guidance (PPG) supports the Framework and is an online resource that is frequently updated.

4.1.2 The primary policy requirement is to identify the flood zones and vulnerability classification relevant to the proposed development, based on an assessment of current and future conditions.

4.1.3 Further to this, paragraph 169 of the NPPF sets out that major development should incorporate sustainable drainage systems unless there is clear evidence that this would be inappropriate. The systems used should:

1 take account of advice from the lead local flood authority;
2 have appropriate proposed minimum operational standards;
3 have maintenance arrangements in place to ensure an acceptable standard of operation for the lifetime of the development; and
4 where possible, provide multifunctional benefits.

4.2 Local Policy

The Cherwell Local Plan 2011 - 2031 (Part1) Partial Review – Oxford's Unmet Housing Need

4.2.1 The Cherwell Local Plan 2011 - 2031 (Part1) Partial Review – Oxford's Unmet Housing Need was adopted in September 2020 and includes Policy PR9 in relation to the Site. The following key policy points form part of Policy PR9:

14. The application shall be supported by a Flood Risk Assessment informed by a suitable ground investigation and having regard to guidance contained within the Council's Level 2 Strategic Flood Risk Assessment. A surface water management framework shall be prepared to maintain run off rates to greenfield run off rates and volumes, with use of Sustainable Drainage Systems in accordance with adopted Policy ESD7, taking into account recommendations contained in the Council's Level 1 and Level 2 SFRAs.

15. The application should demonstrate that Thames Water and the Environment Agency have been consulted regarding wastewater treatment capacity and agreement has been reached in principle that foul drainage from the site will be accepted into the drainage network.

4.2.2 4.2.2 To comply with Policy PR9 and meets the requirements of key policy points 14 and 15, a Flood Risk Assessment is contained within Section 5, a proposed surface water drainage strategy is contained in Section 6 and a foul water drainage strategy is contained within 7 which describes consultation with Thames Water.

Adopted Cherwell Local Plan 2011-2031

4.2.3 The Cherwell District Council Local Plan 2011-2031 Part 1 (incorporating Policy Bicester 13 re-adopted on 19 December 2016) contains Policy ESD 6 in relation to Sustainable Flood Risk Management. This contains the following key points:

- Building over or culverting of watercourses should be avoided and the removal of existing culverts will be encouraged;
- Site specific flood risk assessments will be required to accompany development proposals within Flood Zone 1 over 1ha in size;
- Flood risk assessments should assess all sources of flood risk and demonstrate there will be no increase in surface water discharge rates or volumes during storm events up to and including the 1 in 100 year storm event with an allowance for climate change (the design storm event); and
- Development should be safe and remain operational (where necessary) and proposals should demonstrate that surface water will be managed effectively on site and that the development will not increase flood risk elsewhere, including sewer flooding.

4.2.4 Furthermore, Policy ESD 7 relates to Sustainable Drainage Systems (SuDS) and identifies that SuDS should protect groundwater quality, reduce flood risk, reduce pollution and provide wildlife and landscape benefits.

4.2.5 As such, this flood risk assessment reviews flood risk from all known sources in Section 5 and provides a sustainable drainage strategy in Section 6.

Cherwell Level 1 Strategic Flood Risk Assessment Update

4.2.6 The Cherwell Level 1 Strategic Flood Risk Assessment (SFRA) Update was produced by AECOM and published in May 2017. This has identified five reported incidents of flooding within the area of Yarnton, including:

- July 2007 - where levels hit 91.09mAOD at the Spiceball Park Gauging Station on the River Cherwell and there were reports of property flooding in Yarnton.
- January 2008 –where levels hit 89.56mAOD at the Spiceball Park Gauging Station on the River Cherwell and there were reports of property flooding in Yarnton.
- October to December 2012 – Reports of property and highway flooding with sandbags and flood boards used at multiple locations across the district including Yarnton.

- January to March 2013 – Reports of highway flooding and flood boards used at multiple locations across the district including Yarnton.
- January to February 2014 – Reports of road closures, sandbags distributed and flood boards used at multiple locations across the district including Yarnton.

4.2.7 Yarnton is not specifically mentioned in other areas of the Level 1 SFRA which provides a more generalised review of flood risk at a District Level.

4.2.8 As such, flood risk is reviewed on a Site-specific scale within Section 5 of this FRA.

Cherwell Level 2 Strategic Flood Risk Assessment

4.2.9 The Cherwell Level 2 Strategic Flood Risk Assessment (SFRA) was produced by AECOM and published in May 2017. The Site is identified within this document as "*Land to West of A44/Rutten Lane, North of Cassington Road (ID 51)*" and covers the Land Ownership Boundary.

4.2.10 A number of sewer drainage related historical flood incidents are identified south of the Site in the vicinity of the junction of Rutten Lane and Cassington Road, the document states:

"The Thames Water DG5 register identifies 20-25 recorded incidents of foul sewer flooding within the post code area covering the eastern half of the site between 2006 and 2016, and 0-5 recorded in the post code area covering the western half".

4.2.11 In relation to surface water flood risk, it notes that according to publicly available surface water flood risk mapping, the majority of the Site is at very low surface water flood risk, with high risk areas in the vicinity of existing land drains and runoff conveying along the A44 in the north east of the site, however previous flooding here has not been reported.

4.2.12 As such, flood risk is reviewed on a Site-specific scale within Section 5 of this FRA.

4.3 Consultation

Oxfordshire County Council Lead Local Flood Authority (LLFA)

4.3.1 A Site walkover was undertaken with Nagina Bawar (Oxfordshire County Council Lead Local Flood Authority) on the 16th February 2022 to provide Site context.

4.3.2 Following this, a Scoping Note was prepared and is included in Appendix N. This Scoping Note confirmed that an updated FRA, ES Chapter and hydraulic modelling would be undertaken to supersede the previously submitted documentation in relation to flood risk and surface water drainage.

4.3.3 Following the LLFA review of this Scoping Note, correspondence was received from Nagina Bawar on the 23rd February 2022 stating *"I have read the attached and agree with scoping as discussed on site – all from LLFA side. Look forward to reviewing the updated FRA and design documents when these are ready".*

4.3.4 On the 11th May 2022, a Microsoft Teams Meeting was held with Nagina Bawar to provide an update on the progress of the hydraulic modelling and surface water drainage design for the Site. Throughout this meeting, no issues were raised with regards to the approach being proposed for the management of surface water drainage and flood risk. Following this discussion, a surface water drainage strategy parameters plan is contained in Appendix F to aid in the review of the surface water drainage proposals.

Cherwell District Council Land Drainage Team

4.3.1 Tony Brummel, Drainage Officer at Cherwell District Council, provided a formal consultation response to the original submitted planning application on the 29th October 2021, which raised six key points. Whilst no objection was raised, further details on the six points raised are tabulated in Table 4-1.

Table 4-1: Cherwell District Council Land Drainage Formal Planning Comments

Comment	Cherwell District Council Comment Summary	PJA Response Summary
1	General comment that previously noted drainage comments have been taken on board.	Noted
2	Surface water discharge should be reduced further than usually required.	Surface water from the Site is being attenuated to the QBar greenfield discharge rate up to the 1 in 100 year plus 40% climate change event. Furthermore, additional cut-off ditches and cut-off basins will be provided which are proposed to further reduce downstream flood depths and volumes and have been assessed through hydraulic modelling.
3	Land drainage and cut-off drains should be revised to include further detail as it comes forward.	Cut-off ditches and cut-off basins will be provided which are proposed to further reduce downstream flow rates and volumes. As additional detailed design comes forward, modelling can be updated to continue to demonstrate the function of these proposed feature and the level of protection they provide.
4	Outfall B discharges to drainage in Aysgarth Road and not the Rowell Brook	CCTV survey has been undertaken on the three existing outfall from the Site prior to the resubmission of this FRA. This confirms that the central outfall from the Site (Outfall B) does discharge via the drainage system in Aysgarth Road and not the Rowell Brook. Survey of this is available in Appendix C. Discharge from the Site via this outfall will be limited to QBar up to the 1 in 100 year plus 40% climate change event.
5	Future Maintenance	Given the outline nature of the application, some typical maintenance information has been provided. However, until the final housebuilder / developer information is confirmed the final adoption information will not be available. This could be provided under a relevant pre-occupation condition if required.
6	Foul Drainage	Foul drainage will be agreed with Thames Water as the Site is bought forward to ensure that adequate points of connection and infrastructure are available.

Environment Agency

4.3.2 A formal response to the previous FRA (completed by WSP, dated October 2021) submitted to support the outline planning application was received from the Environment Agency on the 10th January 2022. This confirmed that the Environment Agency has no objection to the planning application and no additional comments were provided.

Thames Water

4.3.1 A pre-development enquiry was submitted to Thames Water on the 25th February 2022 and a response was received on 4th March 2022 based on one proposed pumped connection from the Site to Thames Water's Foul Manhole 0701 in the A44 Woodstock Road. The response confirmed that Thames Water will undertake a detailed sewer modelling assessment to determine the proposed foul connection point's current capacity (Thames Water Manhole 0701) and any downstream upgrades which may be required.

4.3.2 Thames Water have confirmed that they will undertake this work once planning permission has been secured.

4.3.3 The foul drainage strategy has since been developed to utilise two points of connection:

(1) A pumped connection into the existing Thames Water Manhole 0701
(2) A gravity connection into the existing Thames Water manhole in the junction of Aysgarth Road and Rutten Lane.

4.3.1 An additional pre-development enquiry was submitted to Thames Water on 23rd May 2022 to reflect the refined foul strategy, with a response received on the 10th June 2022 which confirmed that sewer modelling would still be required to confirm the capacity and any upgrades in the required across the network to accommodate the Proposed Development.

4.3.2 A summary of the latest consultation responses from the statutory consultees is included in Table 4-2.

Table 4-2: Summary of Consultation

Source	Date Response Received	Comments
Environment Agency	10th January 2022	Response to submitted planning application identifying no objection to the proposals.
Oxfordshire Lead Local Flood Authority (LLFA)	16th February 2022	Site walkover was undertaken with Nagina Bawar to understand the LLFA's concerns in relation to flood risk and surface water drainage, following which a Scoping Note (Appendix N) was issued to confirm understanding.
Oxfordshire Lead Local Flood Authority	23rd February 2022 and 11th May 2022	Nagina Bawar email confirmed *"I have read the attached and agree with scoping as discussed on site – all from LLFA side. Look forward to reviewing the updated FRA and design documents when these are ready".* The results of the hydraulic modelling and surface water drainage strategy were presented to Nagina Bawar during a virtual meeting and no issues were raised.
Thames Water	4th March 2022 and 10th June 2022	Confirmed a foul connections will require detailed hydraulic modelling following planning approval to determine downstream reinforcement requirements.
Cherwell District Council Drainage Team	24th February 2022	Meeting was held with Tony Brummel, Cherwell District Council, who confirmed that he has no objection to the drainage principles that were detailed within the meeting and welcomed the CCTV survey works being undertaken in Yarnton.

4.3.3 All correspondence received is available within Appendix M.

Yarnton Flood Defence Group

4.3.4 A Site walkover was undertaken with Yarnton Flood Defence Group on the 20th December 2021 and an additional meeting was held on the 17th May 2022.

4.3.5 Through these meetings, anecdotal information was provided on historical flooding downstream of the Site. The representatives also provided additional information on the functioning of the existing drainage network through Yarnton and raised concerns about the potential impacts of the Proposed Development on flood risk.

Further Consultation Responses

4.3.6 Additional planning consultation comments in response to the originally submitted planning application and the supporting WSP FRA have been received from Begbroke Parish Council and Yarnton Flood Defence Group, further responses to these comments are contained in Appendix M.

5 Assessment of Flood Risk

5.1.1 The flood risk to and from the Site has been assessed based on a review of publicly available information (e.g. Environment Agency flood data) and additional analysis. A summary of the flood risk at the Site is provided in Table 5-1 and discussed in more detail in the chapters below.

Table 5-1: Potential Sources of Flood Risk

Source of Flooding	On Site Presence
Fluvial	×
Tidal	×
Surface Water	✓ *(section 5.4)*
Reservoirs	×
Groundwater	×
Sewers	×

5.2 Historical Flooding

5.2.1 The Environment Agency historic flood outline mapping identifies that the Site lies outside the maximum extent of any historical flooding recorded by the Environment Agency.

5.2.2 The Cherwell District Council Level 1 SFRA (2017) identifies the following recorded flood incidents in Yarnton:

- July 2007 - where levels hit 91.09mAOD at the Spiceball Park Gauging Station on the River Cherwell and there were reports of property flooding in Yarnton;
- January 2008 –where levels hit 89.56mAOD at the Spiceball Park Gauging Station on the River Cherwell and there were reports of property flooding in Yarnton;
- October to December 2012 – Reports of property and highway flooding with sandbags and flood boards used at multiple locations across the district including Yarnton;
- January to March 2013 – Reports of highway flooding and flood boards used at multiple locations across the district including Yarnton; and
- January to February 2014 – Reports of road closures, sandbags distributed and flood boards used at multiple locations across the district including Yarnton.

5.2.3 Further to this, a number of historical records of flooding associated with drainage issues were identified south of the Site at the junction with Cassington Road and Rutten Lane.

5.2.4 Yarnton Flood Defence Group was formed following historical flood events and has objected to the proposed development citing the potential for the adverse impact to flood risk downstream of the Site within the village and the Site hydrological connection with flood risk from the River Thames corridor.

5.2.5 A Site walkover was undertaken with the group on the 20th December 2021 and a further meeting was held on the 17th May 2022 where they provided key information about the existing drainage network within the village and identified areas which have historically experienced flooding. The organisation and its concerns have been further considered in the update to the FRA and the surface water drainage strategy described in Section 6 of this report.

5.3 Fluvial

5.3.1 The Environment Agency, through the publicly available *Flood Map for Planning*, categorises potential fluvial flood risk into Flood Zones, assuming no flood defences, which provides the basis for the assessment of flood risk and development suitability under the NPPF.

5.3.2 The Application Site is identified in the publicly available *Flood Map for Planning* as located wholly within Flood Zone 1, demonstrating that the fluvial flood risk is considered to have a <0.1% Annual Exceedance Probability (AEP).

5.3.3 An extract of the Flood Map for Planning is contained in Figure 5-1.

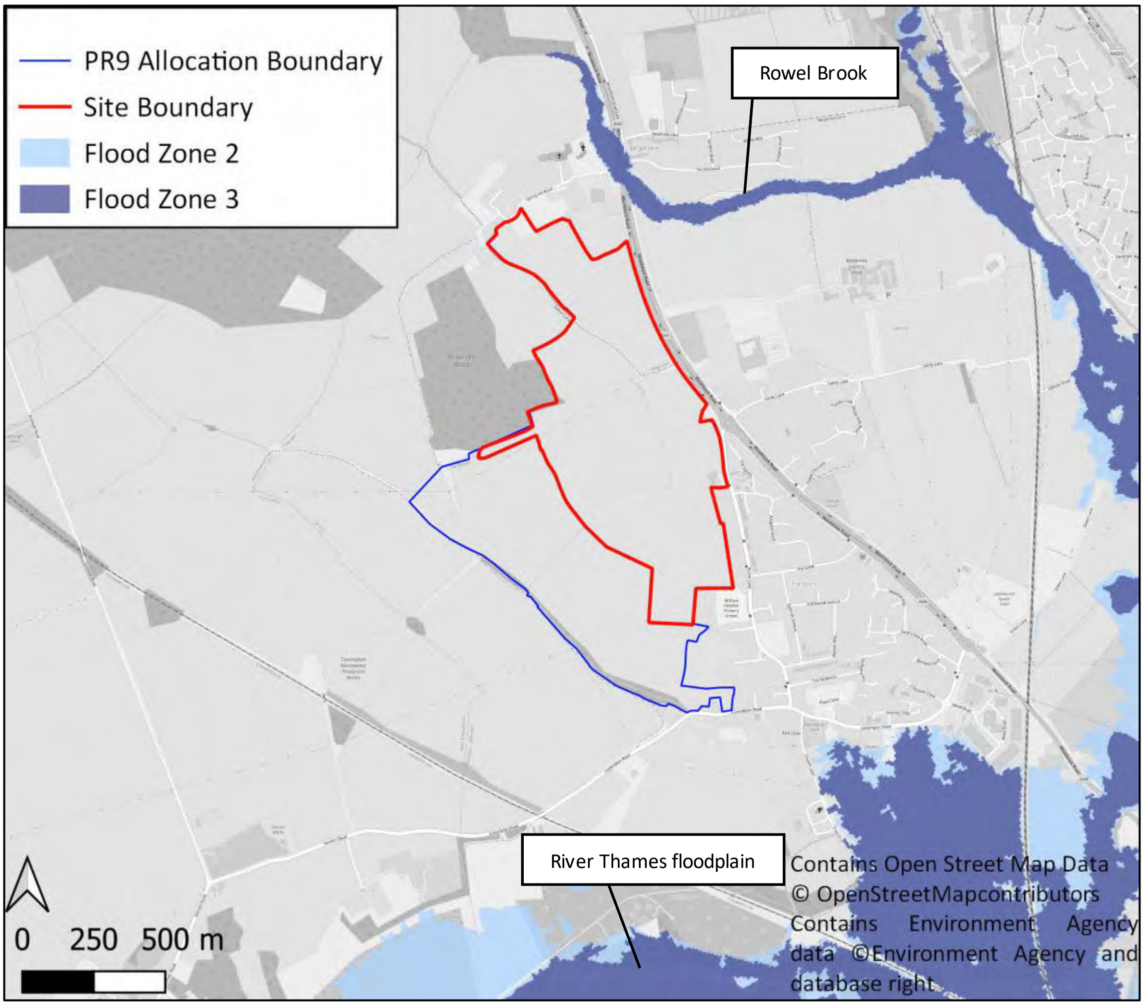


Figure 5-1 - Flood Map for Planning Extract

5.3.4 Yarnton Flood Defence group raised concerns that the River Thames floodplain to the south of the Site may be exacerbated by surface water runoff from the Proposed Development.

5.3.5 The proposed sustainable surface water drainage strategy detailed in Section 6, demonstrates that surface water discharge from the Site will be limited to the existing greenfield discharge rate. As such, flood risk downstream, including the Thames floodplain, will not be exacerbated as a result of the proposed development at the Site.

Vulnerability Classification

5.3.6 Annex 3 of the NPPF, reprinted in Table 5-2 summaries the flood risk vulnerability classification for different types of development. The proposed residential and care home components at the Site are classified as *More Vulnerable* development, with the proposed working-from-home community hub classified as *Less Vulnerable* development and amenity open space is classified as *water-compatible development*.

Table 5-2: Vulnerability Classification (Annex 3 NPPF Extract)

Class	Description
More Vulnerable	• Hospitals • **Residential institutions such as residential care homes**, children's homes, social services homes, prisons and hostels. • **Buildings used for dwelling houses**, student halls of residence, drinking establishments, nightclubs and hotels. • Non–residential uses for health services, nurseries and educational establishments. • Landfill* and Sites used for waste management facilities for hazardous waste. • Sites used for holiday or short-let caravans and camping, subject to a specific warning and evacuation plan.
Less Vulnerable	• Police, ambulance and fire stations which are not required to be operational during flooding. • **Buildings used for shops; financial, professional and other services; restaurants, cafes and hot food takeaways; offices; general industry, storage and distribution; non-residential institutions not included in the 'more vulnerable' class; and assembly and leisure.** • Land and buildings used for agriculture and forestry. • Waste treatment (except landfill* and hazardous waste facilities). • Minerals working and processing (except for sand and gravel working). • Water treatment works which do not need to remain operational during times of flood. • Sewage treatment works, if adequate measures to control pollution and manage sewage during flooding events are in place.
Water Compatible	• Flood control infrastructure. Ministry of Defence installations. • Water transmission infrastructure and pumping stations. Sewage transmission infrastructure and pumping stations. • Sand and gravel working. • Navigation facilities, docks, marinas and wharves. • Ship building, repairing and dismantling, dockside fish processing and refrigeration and compatible activities requiring a waterside location. • Water-based recreation (excluding sleeping accommodation). Lifeguard and coastguard stations. • **Amenity open space, nature conservation and biodiversity, outdoor sports and recreation and essential facilities such as changing rooms.** • Essential ancillary sleeping or residential accommodation for staff required by uses in this category, subject to a specific warning and evacuation plan
Source: NPPF Annex 3	

Sequential and Exception Test Requirements

5.3.7 In accordance with Flood Risk & Coastal Change Planning Practice Guidance (PPG) Table 2, more vulnerable, less vulnerable and water compatible development is appropriate within Flood Zone 1 as shown in Table 5-3. Given this, the proposed development meets the requirements of the Sequential Test and there is no requirement to apply the Exception Test.

Table 5-3: Flood risk Vulnerability and Flood Zone 'Incompatibility' (Flood Risk & Coastal Change PPG Table 2)

	Essential Infrastructure	Highly Vulnerable	More Vulnerable	Less Vulnerable	Water compatible
Zone 1	✓	✓	✓	✓	✓
Zone 2	✓	Exception Test required	✓	✓	✓
Zone 3a	Exception Test required †	X	Exception Test required	✓	✓
Zone 3b	Exception Test required*	X	X	X	✓*

5.3.8 Therefore, flood risk from fluvial sources is considered to be **very low**.

5.4 Surface Water

5.4.1 The Long-Term Flood Risk Information, *Flood Risk from Surface Water Map* identifies the majority of the Site to be at a very low risk from surface water flooding, however, there are a number of key surface water flow routes which originate upstream of the Site and bisect the Site before being conveyed downstream through the drainage network in Yarnton village centre. Surface water ponding is also identified against the A44 Woodstock Road along the eastern border of the Site.

5.4.2 An extract of this mapping is provided in Figure 5-2.

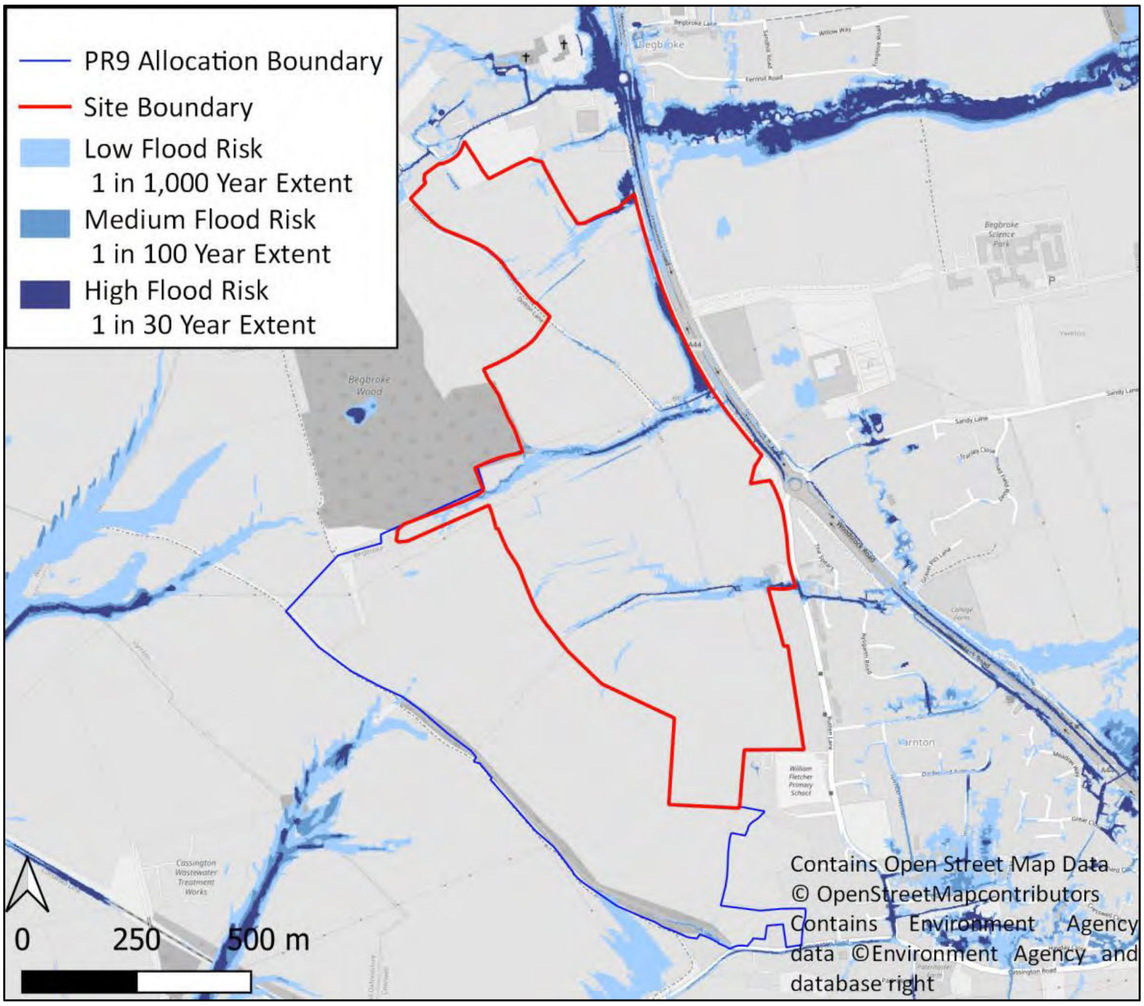


Figure 5-2 – Long-Term Flood Risk; Surface Water Flood Risk Map Extract

5.4.3 This mapping has been generated at a national scale to provide the first publicly available generation of surface water flood risk mapping. The two previous generations were primarily developed for use by the regulator prior to the approach and risk rating being refined. For example, the first did not include any allowance for sewers, whilst the second incorporated a national loss coefficient.

5.4.4 Although this generation of national surface water mapping incorporates local estimates of the sewer infiltration loss, generally at a LLFA scale, along with various other refinements in runoff estimation, it does not allow for local improvements to the underlying Digital Terrain Model (DTM). This means that local features such as the adjoining highways and surface water drainage features such as culverts or small watercourses are not accurately represented. These local features and assets are typically critical to the surface water drainage on a Site specific level.

5.4.5 To provide a refinement to the national surface water mapping suitable for a site-specific assessment, detailed 1D-2D hydraulic modelling was prepared and is described in the Section below.

Hydraulic Modelling

Baseline Model- Model Schematisation

5.4.6 A linked 1D-2D hydraulic model was developed for the Site within the ESTRY-TUFLOW software version 2020-01-AB-iDP-w64.

5.4.7 The following data has been used to build the hydraulic model used to develop the baseline model used to represent the current flood risk mechanisms both on and downstream of the Site:

- Topographic survey, undertaken by MK Surveys in September 2018.
- 1m DTM LiDAR Data (data.gov)
- CCTV surveys undertaken by MK Surveys (August 2021) and Premium Environmental Services (March 2022).
- Model inflow hydrology, as prepared by Hydrogreen (included in Appendix D).

5.4.8 Figure 5-3 shows the extent of the 1D and 2D model domains and the location of the modelled 2D point inflows for the baseline model. The existing culverted outfalls from the Site were represented within 1D domain using information from the topographic survey and CCTV surveys. The 2D domain used the topographic data supplemented by LiDAR and was represented at a 2m grid size.

5.4.9 The small area of the north of the Site which is within the Site boundary but not within the 2D model extent falls outside the hydrological catchment that contributes to the development area.

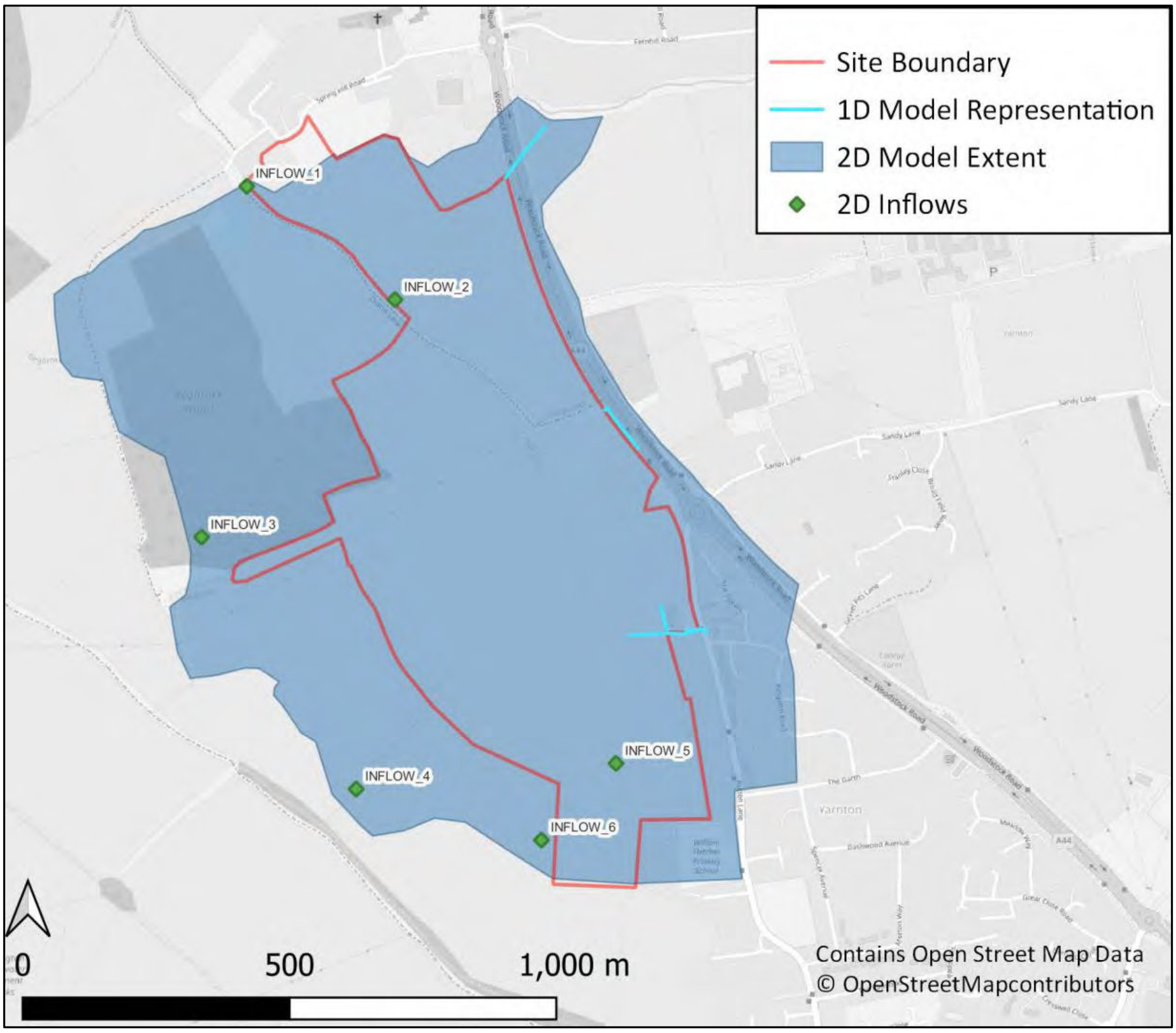


Figure 5-3: Baseline Model schematic

Baseline Model - Hydrological Inflows **-**

5.4.1 Hydrological inflows for a the 1 in 20 year, 1 in 100 year and 1 in 1000 year return periods were prepared by *Hydrogreen* for the downstream extent of the ditches following the latest best practise approach. The hydrology inflows (in the form of 4 main inflows and 2 additional hydrology point calculations from the parcels to the south) were then applied at the upstream extent of the model as shown in Figure 5-3. The full methodology for the hydrology estimation is provided in Appendix R.

5.4.2 In line with the climate change allowances recommended by the Environment Agency, the impact of climate change on the peak rainfall intensities in urban drainage designs should be assessed by increasing them by 20% and 40% (central and upper end respectively) when designing for the ‘2080s’ scenario (2070 to 2115).

5.4.3 The 1 in 100-year flows have therefore been scaled up by 40% to enable a representation of climate change.

5.4.4 The downstream model boundary was represented as a normal head (HQ) downstream boundary with average slope of 1 in 50 in the 2D based on general topographical slope of the area.

Baseline Model- Mannings Roughness

5.4.5 Manning's 'n' values have been used to represent hydraulic roughness, culverts and floodplain of the model. Manning's n values are considered to be a conveyance factor rather than simply a roughness coefficient, and in the context of channels, take account of channel meanders (sinuosity), contraction and expansion such as changes in cross sectional area between sections, bed material effects and obstacles, as well as the vegetation coverage.

5.4.6 Different polygons were digitalised for the different land uses in the floodplain. The roughness values contained in Table 5-4 were utilised based on the identified land use.

Table 5-4 – Mannings N Values Applied

Land Use	Mannings n Value
Urban / Buildings	0.1
Natural Surfaces	0.05
Roads	0.035

5.4.7 A Manning's n value of 0.02 has been utilised for culverts and networks.

Baseline Model Results

5.4.8 Large scale images of the modelled maximum depths during the design events for the baseline model scenario are included in Appendix O.

5.4.9 Figure 5-4 shows the modelled maximum water depths for the baseline (existing) conditions in the 1 in 20-year modelled event. This demonstrates the overland flow routes and ditch courses across the Site, Which are also reflected in the national mapping of surface water flood risk discussed in 5.4.1.

5.4.10 Figure 5-5 show a more location specific figure of the maximum depths downstream of the Site along the junction of the A44 Woodstock Road with Sandy Lane and the area around Aysgarth Road. These flood extents suggest that the central and southern outfalls or manholes immediately downstream from the site may surcharged during the 1 in 20 year event during the baseline scenario resulting in shallow surface water flows along the road network which impact on properties along Aysgarth Road.

5.4.11 Note that the mapped flood extents represent flows from the Site only and do not include surface water flows generated to the east of the Site.

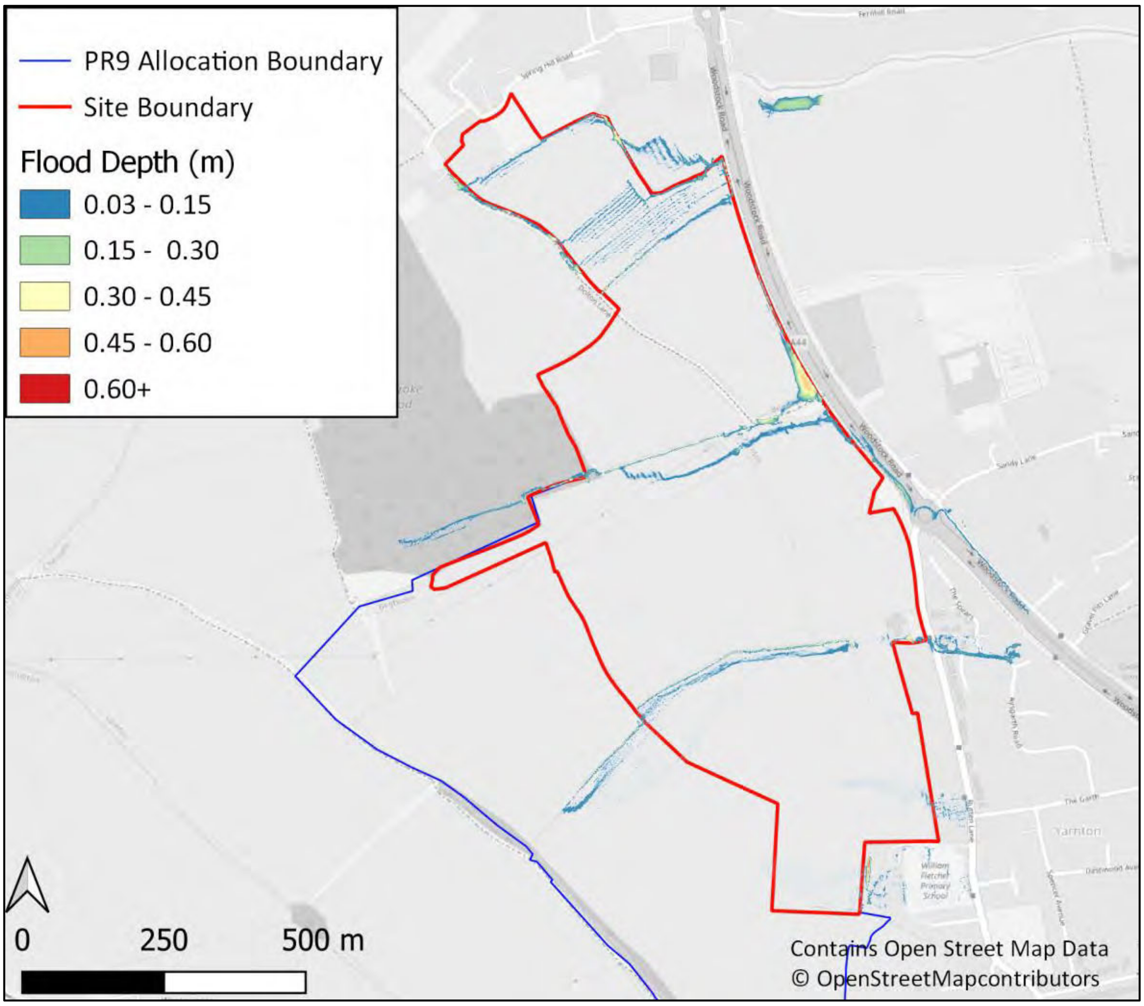


Figure 5-4: Modelled 1 in 20-year Baseline Flood Depths

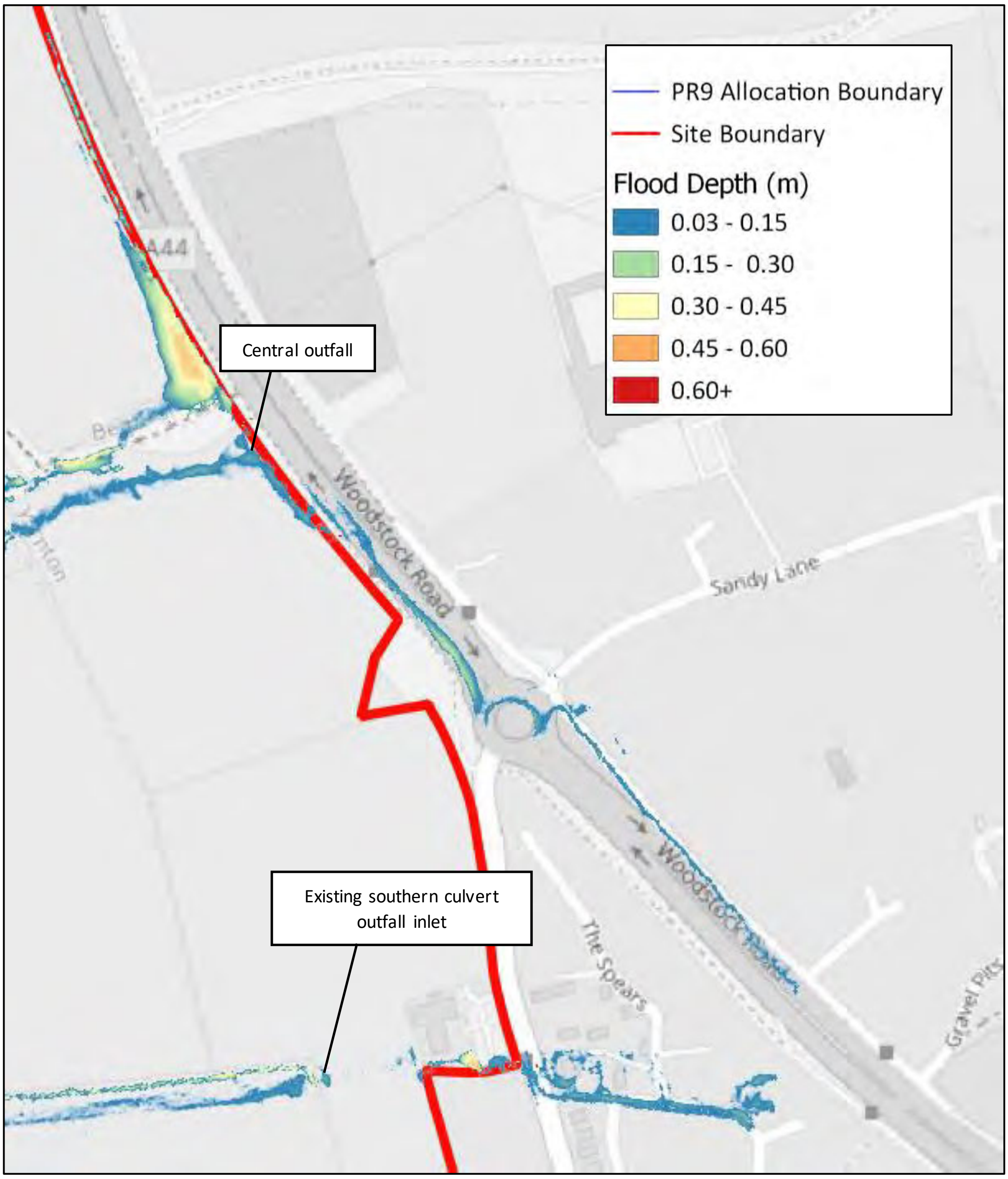


Figure 5-5: Modelled 1 in 20-year Baseline Flood Depths – Woodstock Road

5.4.12 Figure 5-6 shows the modelled maximum water depths for the baseline (existing) conditions in the 1 in 100 year modelled event. This demonstrates the overland flow routes and ditch courses across the Site, Which are also reflected in the national mapping of surface water flood risk discussed in 5.4.1. The impacts of the ridge and furrow features can be seen to the north of the Site.

5.4.13 Figure 5-7 show a more location specific figure of the maximum depths within Yarnton village. The 1 in 100 year event for the baseline scenario results in further flooding along the junction of the A44 Woodstock Road with Sandy Lane and the area and properties around Aysgarth Road. The modelled overland runoff from the Site to the west of Rutten Lane around William Fletcher Primary School appears to have the potential to cause shallow flooding to the rear gardens and properties along Rutten Lane and the parking area of the Yarnton Residential and Nursing Home.

5.4.14 Note that the mapped flood extents represent flows from the Site only and do not include surface water flows generated to the east of the Site.

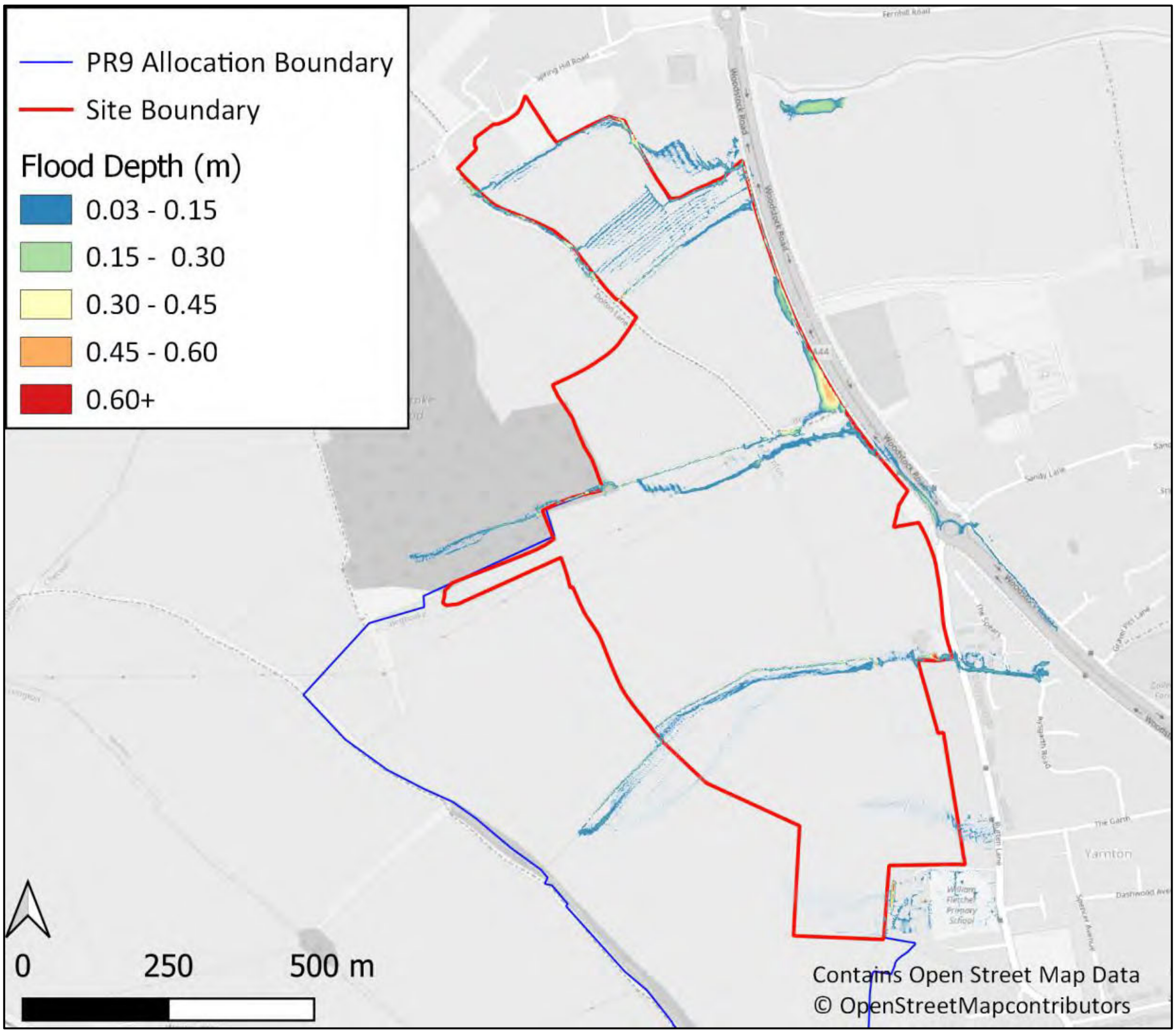


Figure 5-6: Modelled 1 in 100 year Baseline Flood Depths

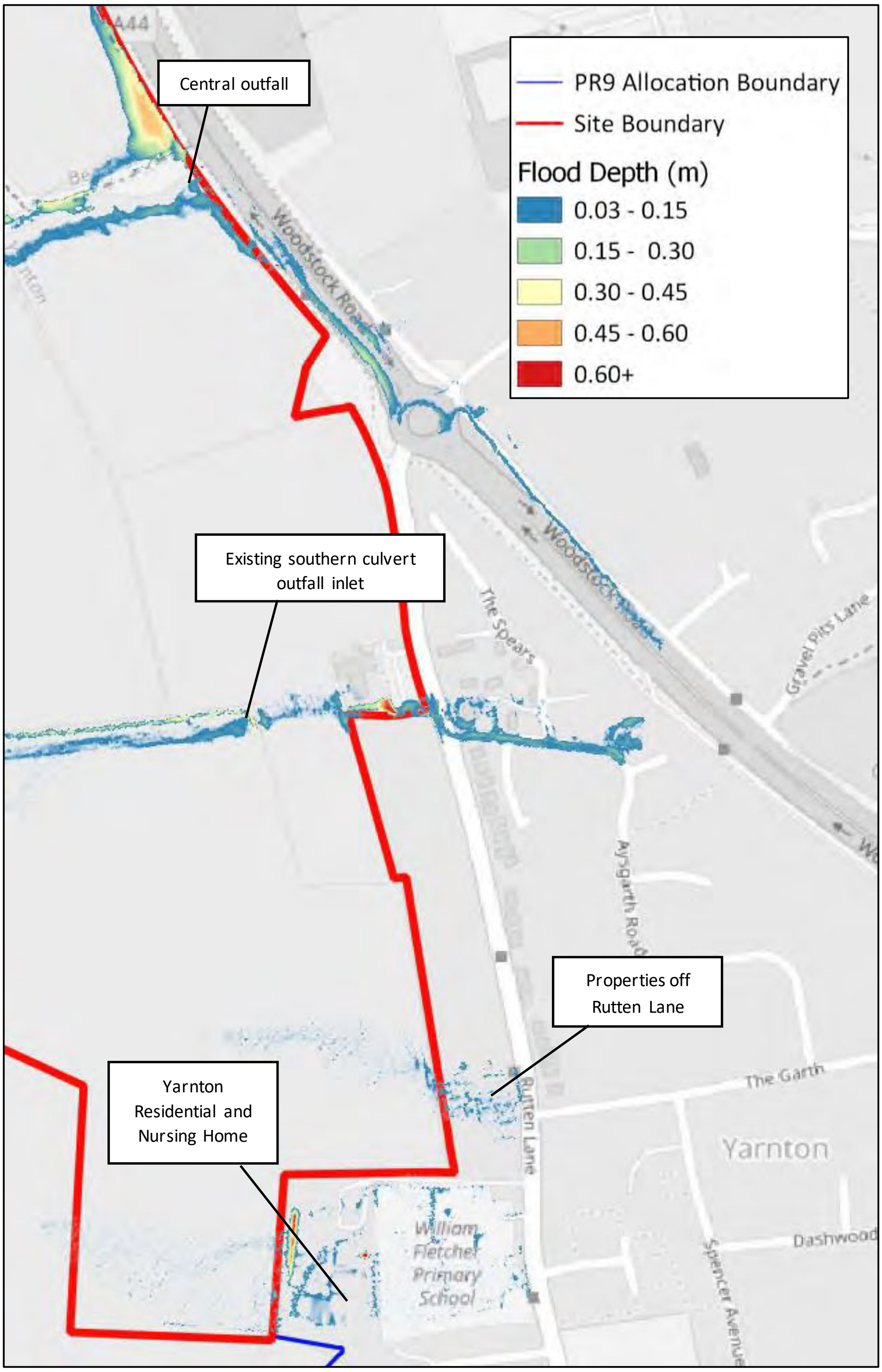


Figure 5-7: Modelled 1 in 100 year Baseline Flood Depths – Yarnton Village

5.4.15 Figure 5-8 shows the modelled maximum water depths for the baseline (existing) conditions in the 1 in 100 year plus climate change (40%) modelled event. This demonstrates the overland flow routes and ditch courses across the Site, Which are also reflected in the national mapping of surface water flood risk discussed in 5.4.1. The impacts of the ridge and furrow features can be seen to the north of the Site.

5.4.16 Figure 5-9 shows more location specific figures of the maximum depths within Yarnton village. The flood extents and depths are slightly greater than that shown in the baseline 1 in 100 year event to the west of Rutten Lane and around the Central and southern outfalls.

5.4.17 In addition there is mapped surface water flooding during this event on Woodstock Road where it appears the northern outfall is modelled to surcharge.

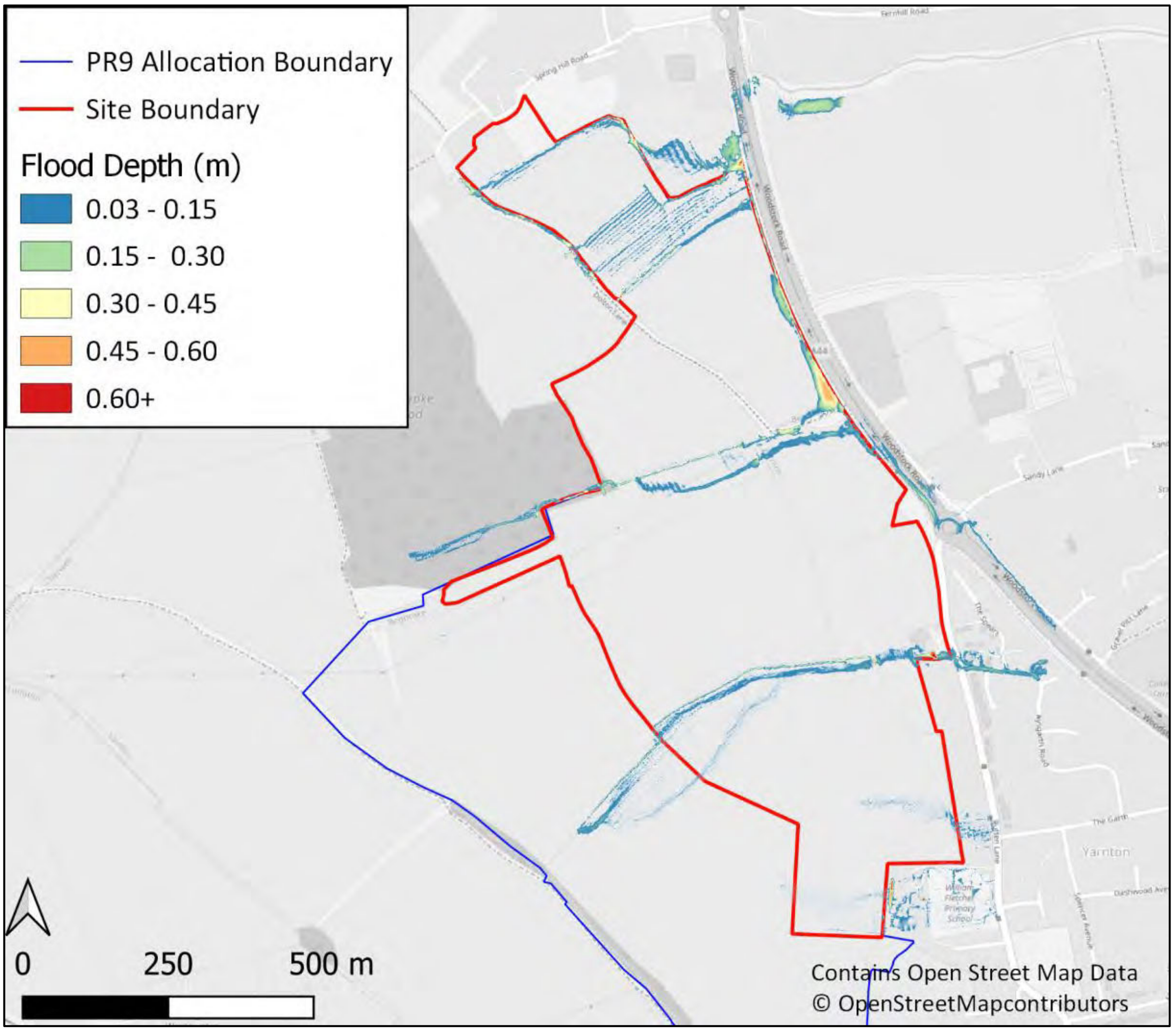
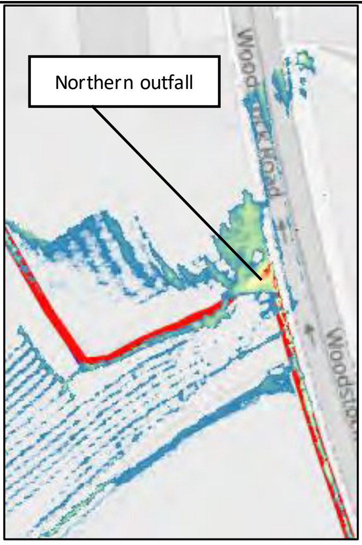
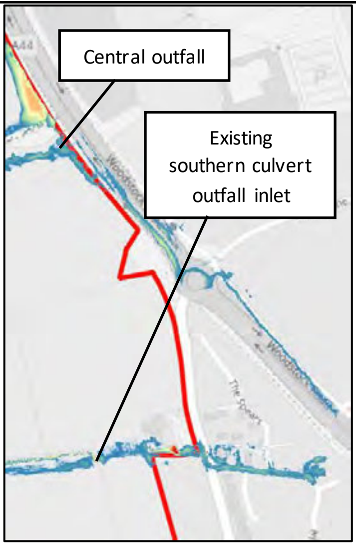


Figure 5-8: Modelled 100-year plus 40% Climate Change Baseline Flood Depths



Woodstock Road- Northern outfall



Woodstock Road- Central and southern outfall

Rutten Lane and William Fletcher Primary School

Figure 5-9: Modelled 100-year plus 40% Climate Change Baseline Flood Depths – Localised Areas with Yarnton Village

5.4.18 Figure 5-10 shows the modelled maximum water depths for the baseline (existing) conditions in the 1 in 1000 year modelled event. This demonstrates the overland flow routes and ditch courses across the Site, Which are also reflected in the national mapping of surface water flood risk discussed in 5.4.1. The impacts of the ridge and furrow features can be seen to the north of the Site.

5.4.19 The flood extents and depths are slightly greater than that shown in the baseline 1 in 100 year plus climate change event to the west of Rutten Lane and around the northern, Central and southern outfalls.

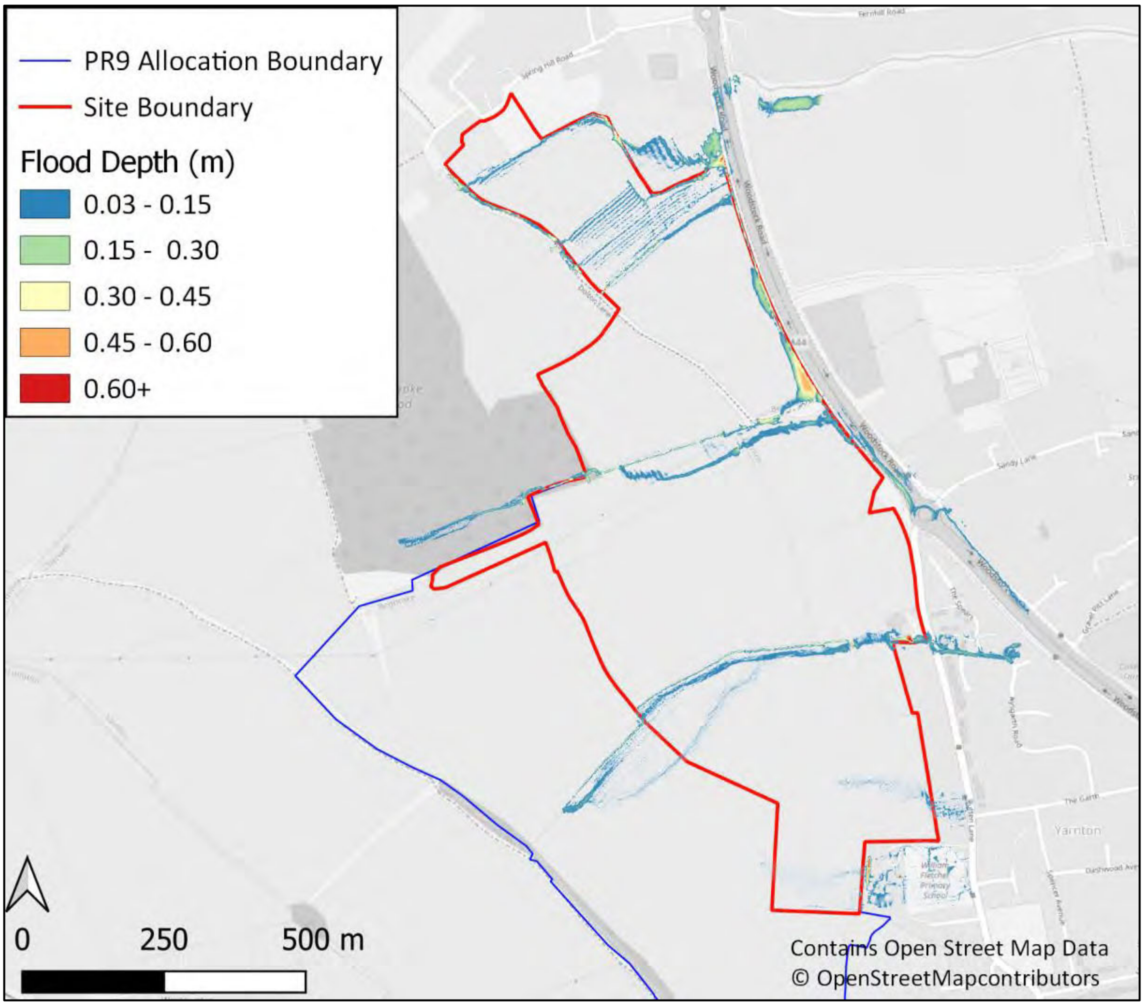


Figure 5-10: Modelled 1 in 1,000 year Baseline Flood Depths

Post-Development Model

5.4.20 After reviewing the baseline hydraulic modelling results, the baseline model was updated to represent the post-development (proposed) scenario. A comparison of the baseline and post-developed model results allowed an assessment of the potential surface water flood risk impact downstream of the Site as a result of the proposed development.

5.4.21 The post-development hydraulic model has a representation of the proposed surface water drainage strategy. In addition there have been further proposed topographical changes to provide a flood risk betterment to the downstream community. The changes to the schematic for the posed developed model scenario when compared to the baseline are:

- The 6x model inflow hydrographs from the baseline model scenario were recalculated for the post-developed scenario with flows generated within the developable areas shown in Figure 5-3 during the 1 in 100 year plus climate change event excluded. The flows generated above the 1 in 100 year plus climate change event in the developable areas during the 1 in 1000 year design event were determined and applied to the inflows during the 1 in 1000 year post-developed model scenario.

- The Causeway Flow outputs described in Section 6 represent the discharge hydrographs from the proposed surface water drainage strategy within the developable areas of the development. Discharge of surface water from the developable areas are limited to the QBAR Greenfield Runoff rate for all events up to and including the 1 in 100 year plus climate change event. These hydrographs representing the surface water drainage strategy discharge were applied as point inflows within the post-developed model.
- The proposed topography and levels were applied to the post-developed model scenario including key attenuation features described in Section 6 of the report and cut of ditches proposed to intercept overland flows from land to the west in the upstream catchment. The surface water attenuation features were represented within the model as fully utilised at their maximum attenuated water level.

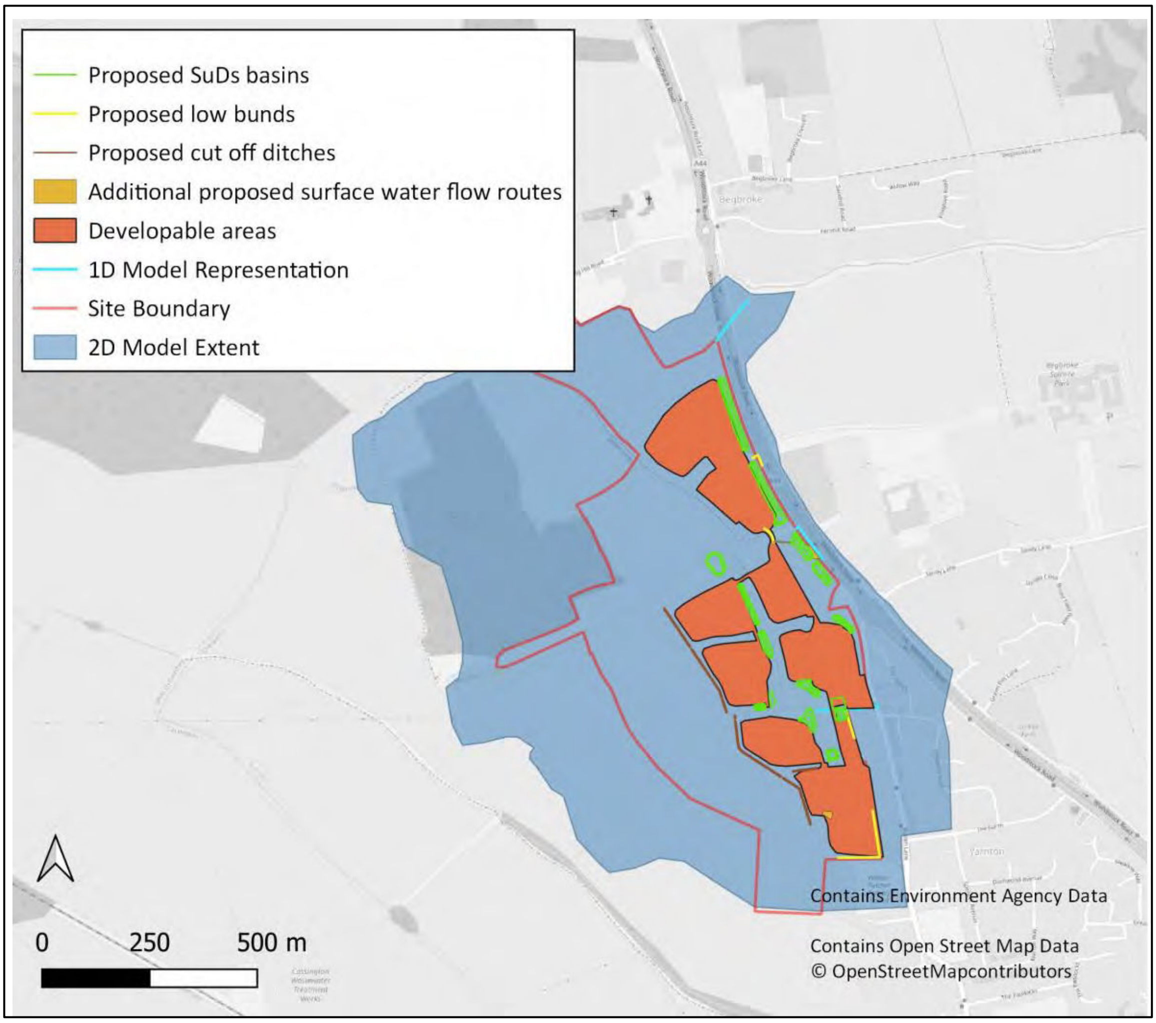


Figure 5-11: Proposed Developable Areas, Attenuation Features and Cut-Off Ditches

Post -Development Model Results

5.4.22 Figure 5-12 to Figure 5-15 shows the modelled maximum water depths for the post-developed model scenario for all design events. Larger scale mapping is included within Appendix P.

5.4.23 The results demonstrates that all parts of the proposed built development are largely free during all of the modelled design events. Access and egress remains flood-free and operational for all design events. The flood risk downstream within the village is reduced as a result of the proposed surface water drainage strategy and the additional proposed features including cut-off ditches and bunds.

5.4.24 Note that the mapped flood extents represent flows from the Site only and do not include surface water flows generated to the east of the Site.

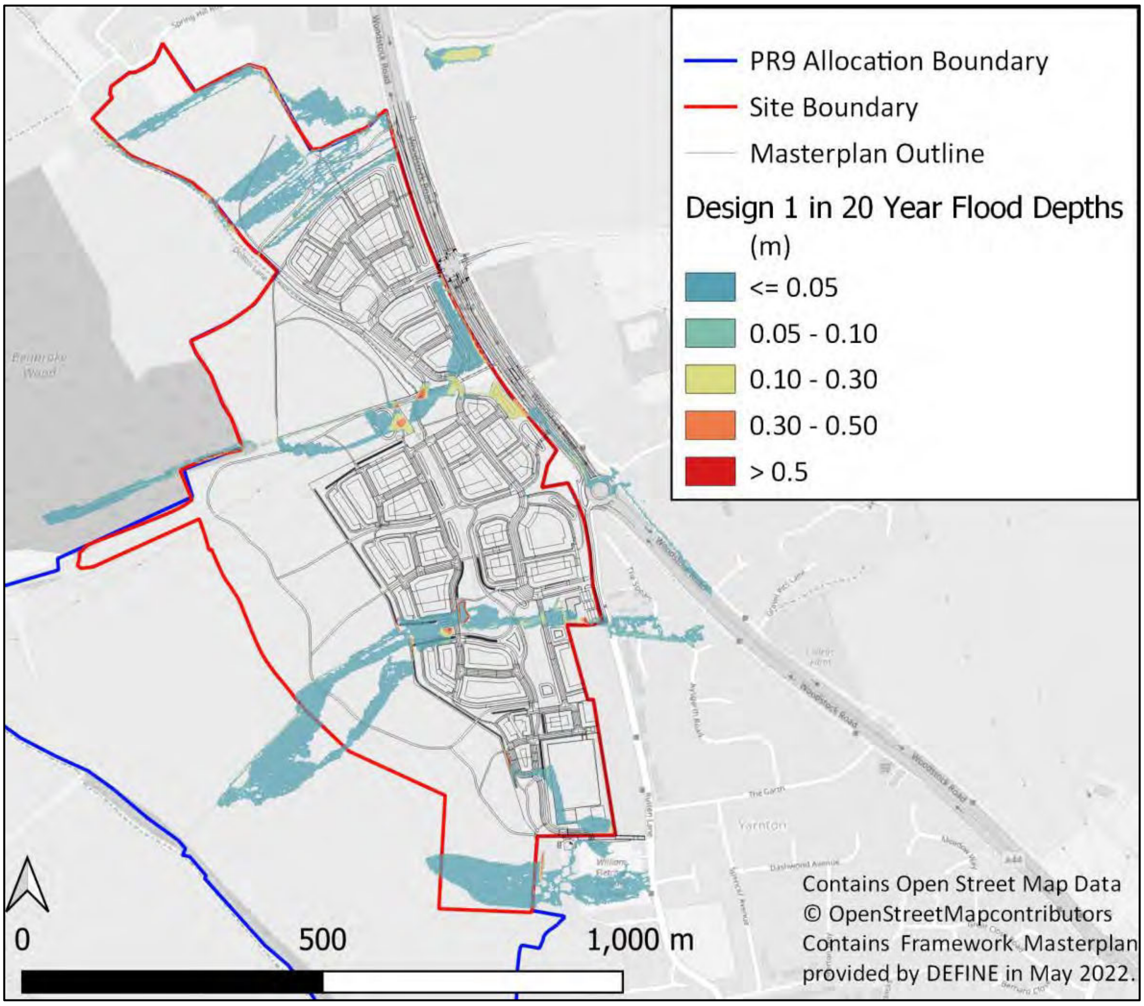


Figure 5-12: Modelled 1 in 20-year post-developed Flood Depths

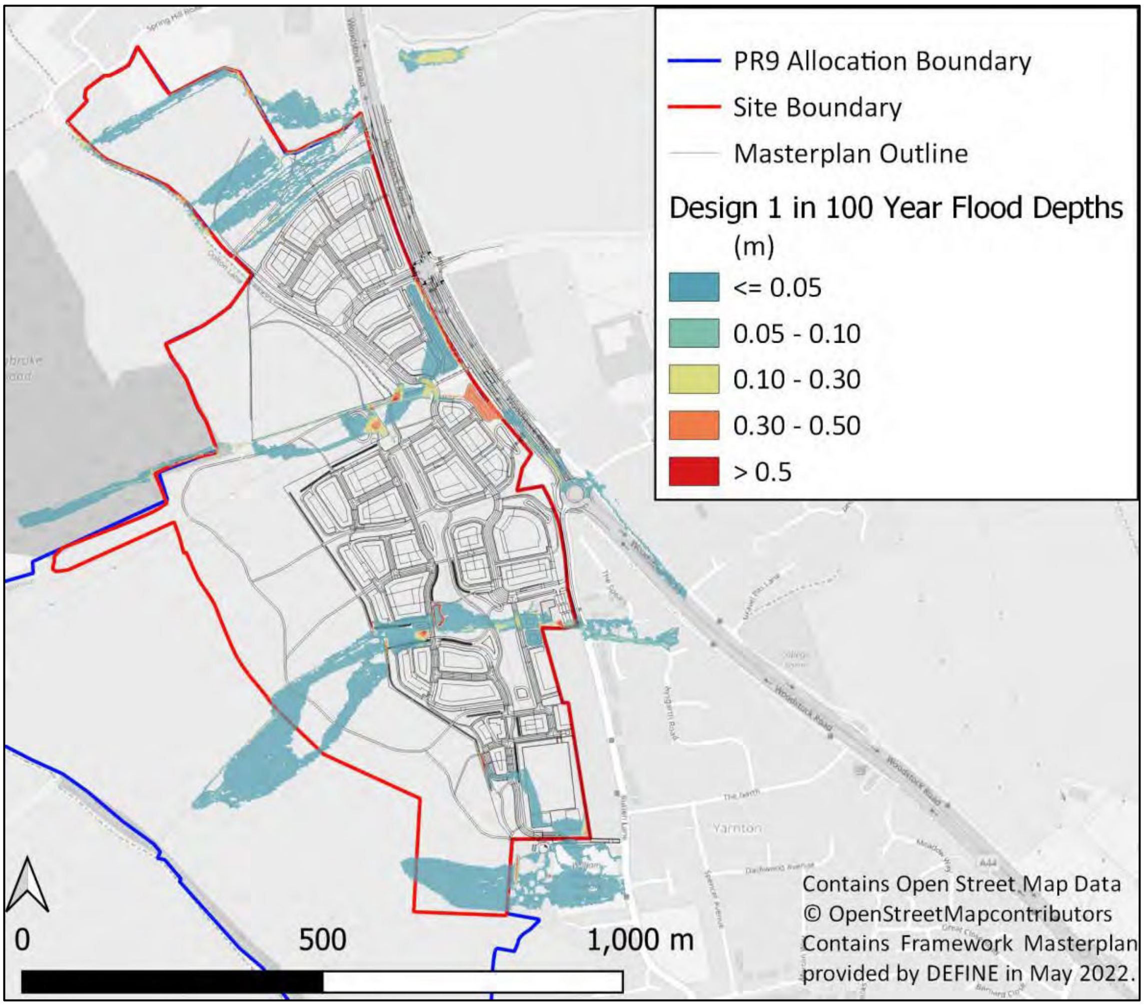


Figure 5-13: Modelled 1 in 100 year post-developed Flood Depths

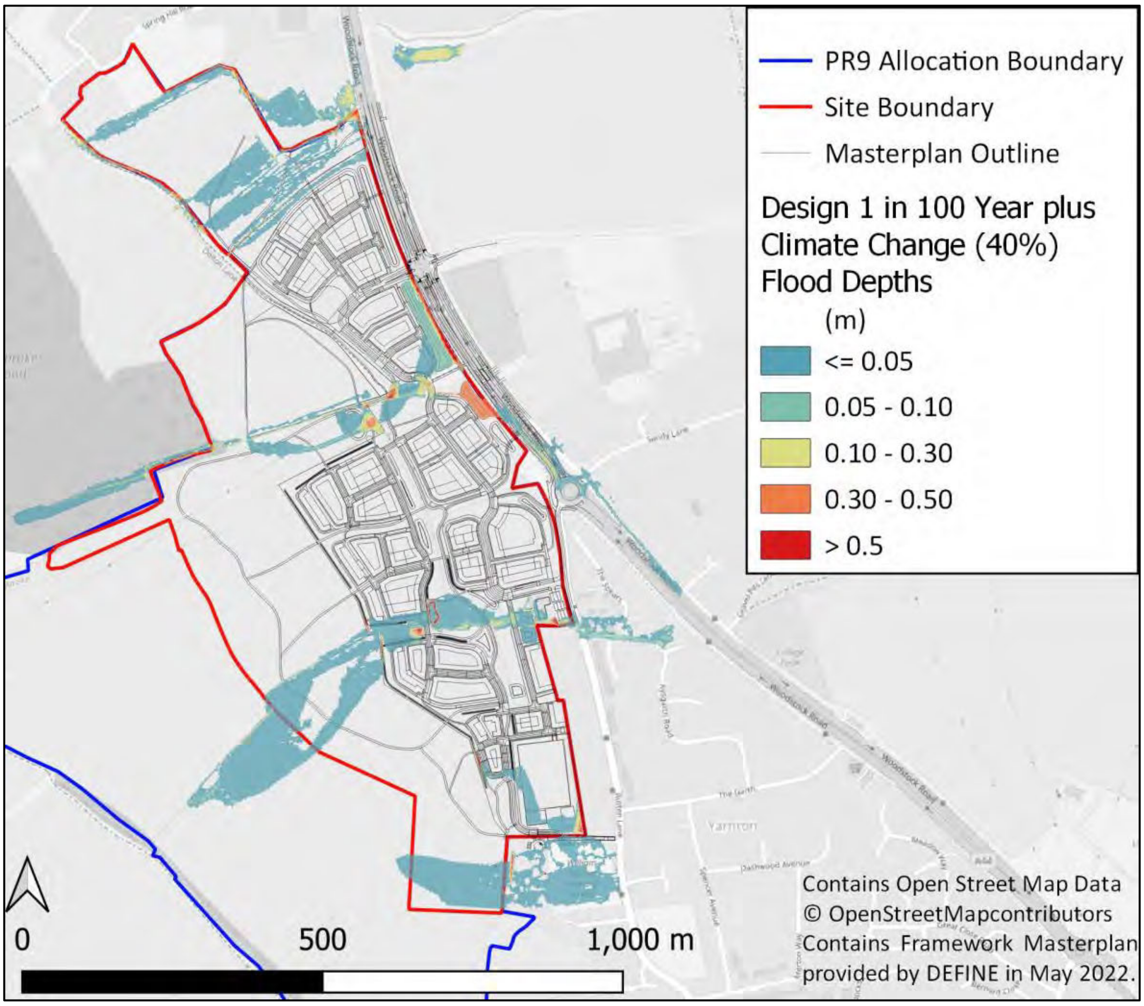


Figure 5-14: Modelled 100-year plus 40% Climate Change Post-developed Flood Depths

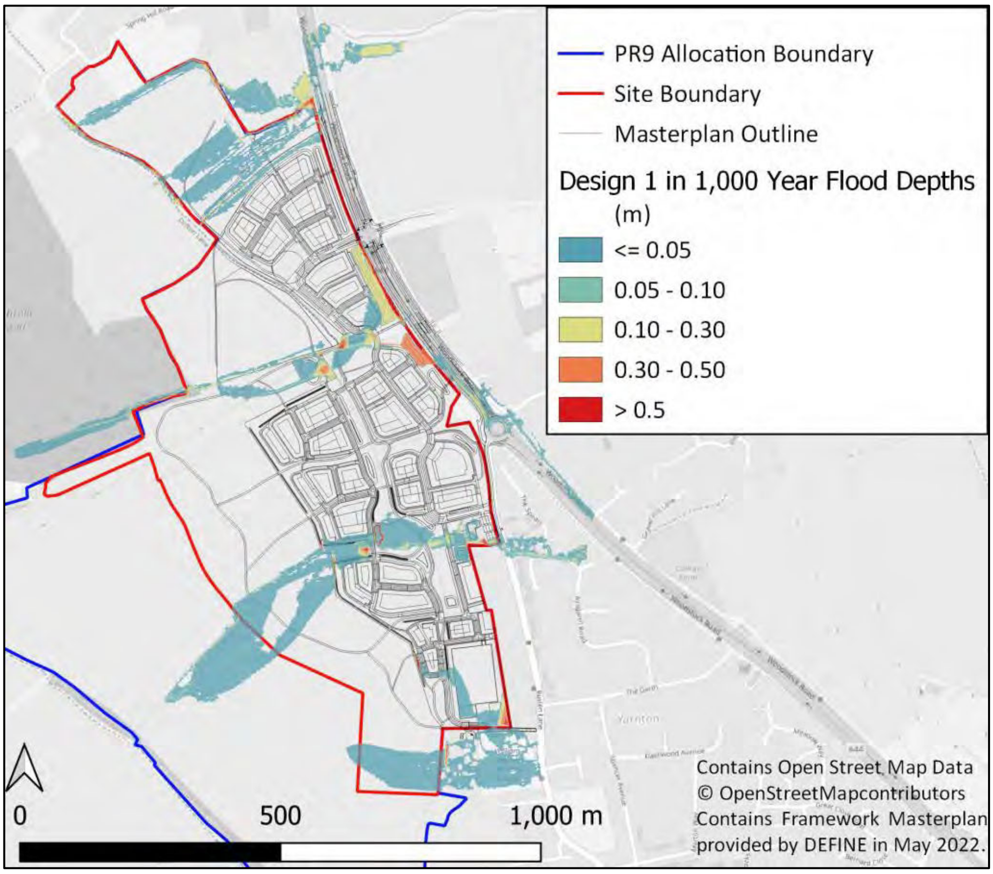
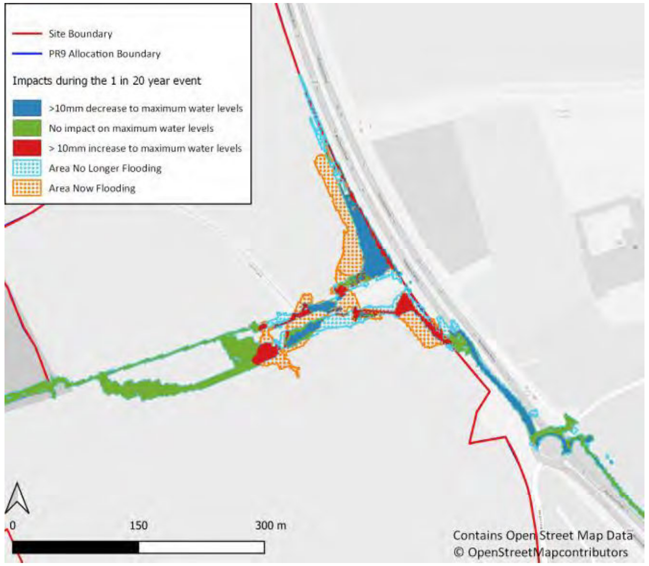


Figure 5-15: Modelled 1 in 1,000 year Post-developed Flood Depths

Third party impacts assessment

5.4.25 Paragraph 167 of the NPPF requires that any new development does not adversely impact the flood risk of third parties. Therefore, a comparison of the maximum modelled depths for the baseline and post-developed model scenario for each design event has been undertaken. Full scale comparison maps of the whole Site are included in Appendix Q, and location specific mapping is shown in Figure 5-16 to Figure 5-18.

5.4.26 The figures below and those in Appendix Q demonstrates that there are no adverse flood risk impacts to third parties as a result of the Proposed Development during all the design events modelled. In all events a betterment of reduced modelled flood depths and extents are shown within various locations in Yarnton village, particularly around the central outfall and Rutten Lane. The Proposed Development uses topographical features and sustainable surface water management to provide a flood risk betterment to the community of Yarnton.

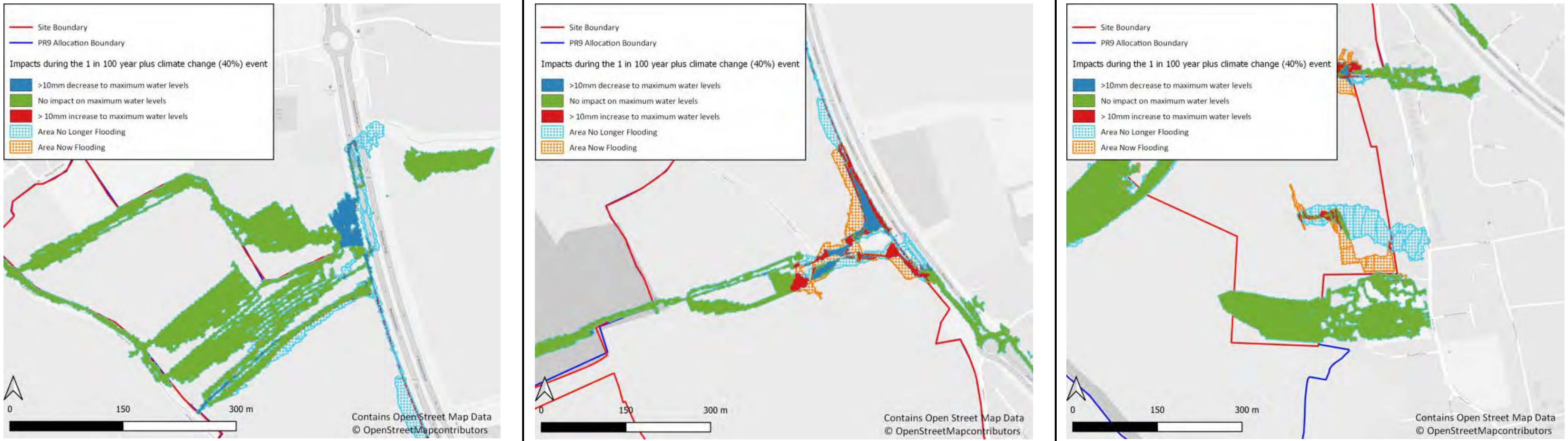


Woodstock Road- Central outfall

Woodstock Road- Southern outfall

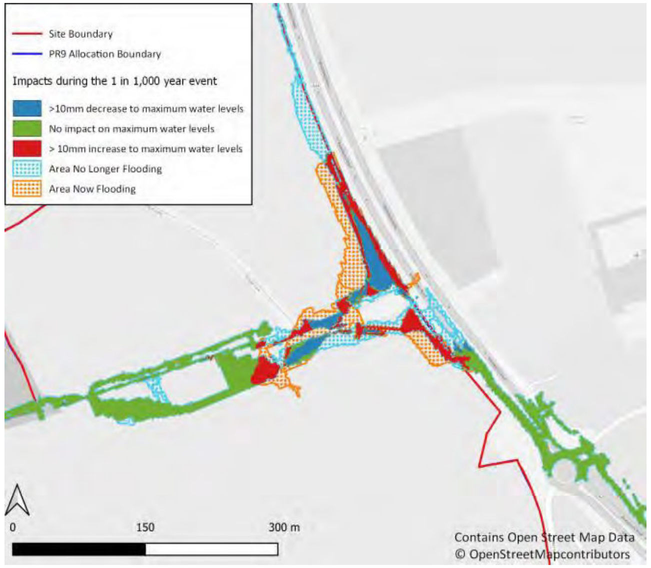
Rutten Lane and William Fletcher Primary School

Figure 5-16: Flood Risk Impacts of the Proposed Development During the 1 in 20 Year Event

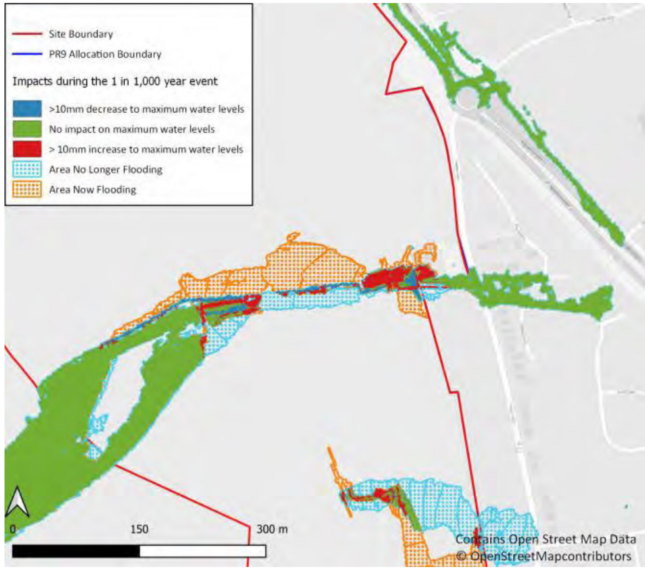


Woodstock Road- Northern outfall | Woodstock Road- Central outfall | Rutten Lane and William Fletcher Primary School

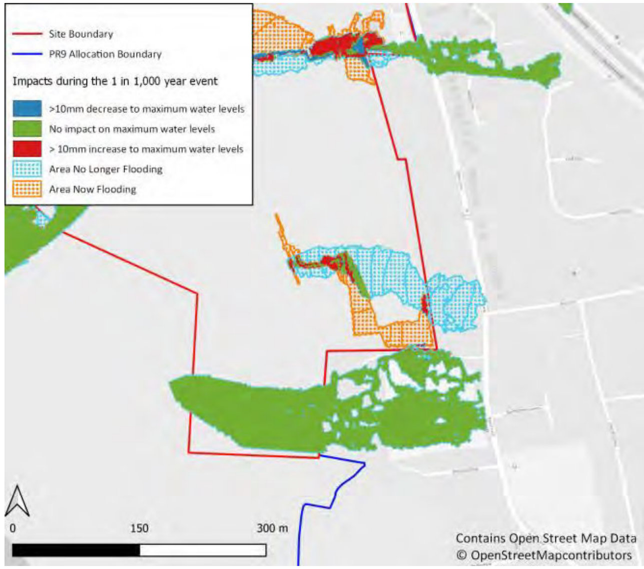
Figure 5-17: Flood Risk Impacts of the Proposed Development During the 1 in 100 Year Plus Climate Change (40%) Event



Woodstock Road- Central outfall



Woodstock Road- Central outfall



Rutten Lane and William Fletcher Primary School

Figure 5-18: Flood Risk Impacts of the Proposed Development During the 1 in 1,000 Year Event

5.4.27 The surface water flood risk hydraulic modelling demonstrates that the Site is safe during the critical 1 in 100 year storm event with a 40% allowance for climate change when accounting for both the on-site generated flows and also flows from the catchment upstream of the Site.

5.4.28 As such the managed nature of the surface water within the Proposed Development, limiting surface water flows to the QBar greenfield runoff rate up to the 1 in 100 year plus 40% climate change event, is demonstrated to reduce the likelihood of flooding downstream within the village.

5.4.29 Consideration to the potential impact of climate change has been given in the Proposed Development, in particular with regard to locating built development outside of the maximum flood extents in climate change scenarios and exceedance flow routing.

5.4.30 As part of the final Site design, measures will be implemented to ensure there is a reduced surface water flood risk on- and off-Site and to ensure that exceedance flows will be directed away for property.

5.4.31 Given this, flood risk from surface water sources may be considered to be high in some areas of the existing Site and in the areas downstream of the Site during the baseline conditions. However, this risk will be reduced to **low** when proposed mitigation measures and surface water attenuation through the Proposed Development is introduced.

5.5 Tidal

5.5.1 Given the in-land location of the Site, flood risk from this source is considered **very low.**

5.6 Groundwater

5.6.1 Groundwater flooding is typically caused by high groundwater levels. It occurs where excess water emerges at the ground surface via springs or within manmade structures such as basements. The risk of groundwater flooding depends on the nature of the geological strata underlying the Site, as well as on the local topography.

5.6.2 Cherwell District Council's Level 1 Strategic Flood Risk Assessment (SFRA) was produced by AECOM and published in May 2017. This confirms "*The underlying superficial geology of the area is predominately clay, particularly in the north. This can result in flash runoff and a rapid response of fluvial networks to rainfall events. This area of the Cherwell District is therefore likely to present a low risk of groundwater flooding*".

5.6.3 The Level 2 SFRA, also produced by AECOM dated May 2017 reviews flood risk to the Site in more detail and states:

"The EA's Areas Susceptible to Groundwater Flooding (AStGWF) map…illustrates that the north western half of the site lies within 1 km grid squares of which <25% of their area is considered to be susceptible to groundwater emergence and the south eastern half lies within 1 km grid squares of which 25-50% of their area is considered to be susceptible to groundwater emergence".

5.6.4 Ground investigation in the form of infiltration testing was undertaken during November 2021 at four locations across the Site as identified in Figure 3-4.

5.6.5 All four trial pits were dug to a depth of over 2.2m and identified an underlying strata of Made Ground above Clay. Groundwater was not identified in any of the trial pits. The logs for these trial pits are contained in the Infiltration Test Report, available in Appendix L.

5.6.6 Further to this, during a meeting of the 17th May 2022, the members of Yarnton Flood Defence Group expressed concerns regarding groundwater which emerge from 'Spring Hill' west of the Site, where the overlying superficial sand and gravel deposits of the Hanborough Gravel Member are identified above the clay bedrock. When it cannot permeate through the clay bedrock form the overlying sands and gravels, it will flow overground with the existing topography towards the Site, akin to a surface water flow route.

5.6.7 Any groundwater flow which emerges upstream of the Site will therefore be captured within the proposed 'cut-off features' within the proposed development.

5.6.8 Given this, flood risk from groundwater may be considered to be **low**.

5.7 Sewer

5.7.1 As set out in Section 3, the existing Site is largely greenfield and it is therefore understood that there are no public surface or foul water sewers currently serving the Site.

5.7.2 However, from a review of the existing Thames Water sewer asset mapping, it can be identified that there is a sludge rising main and a foul water rising main bisecting the Site crossing from Cassington Sewage Treatment Works towards Oxford Garden and Shopping Village across the A44 Woodstock Road to the east of the site. It is expected that these strategic rising mains will either be diverted through the proposed road network within the Site, diverted to the out skirts of the Site or accommodated suitably within the masterplan, taking easements into consideration.

5.7.3 There are also a small number of existing Thames Water foul and combined sewers present serving the existing residential development immediately east of the Site. The existing Thames Water sewer asset mapping is available in Appendix E.

5.7.4 The Level 2 SFRA, produced by AECOM dated May 2017 reviews flood risk to the Site and states:

"The Thames Water (TW) DG5 register… identifies 20-25 recorded incidents of foul sewer flooding within the post code area covering the eastern half of the site between 2006 and 2016, and 0-5 recorded in the post code area covering the western half."

5.7.5 Further to this, during Site walkovers and meetings with Yarnton Flood Defence Group held on the 20th December 2021 and 17th May 2022, it was further confirmed that properties downstream of the Site had experienced foul flooding from the existing sewer network in the village.

5.7.6 The Proposed Development will incorporate a new sewer network to manage foul and surface water flows in separate systems and there is no evidence of flooding from the rising mains within the Site boundary. As such, the Site may be considered to be at **low risk** of sewer flooding.

5.7.7 Given this, the Proposed Development will limit surface water flows to the existing QBar greenfield discharge rate to ensure surface water flows from the Site do not exacerbate foul flood risk offsite. Furthermore, active liaison with Thames Water will also ensure that adequate network upgrades are put in place to ensure that any proposed new connection from the development does not exacerbate flood risk on the downstream network.

5.8 Reservoir Failure

5.8.1 The publicly available Long-Term Flood Risk, Information, Flood Risk from Reservoirs Mapping identifies that the Site lies outside the maximum extent of flooding from reservoirs.

5.8.2 Given this, flood risk from reservoirs may be considered to be **very low**.

5.9 Canal

5.9.1 Flooding from canals is a much less common occurrence than fluvial flooding due to the managed nature of water levels within the artificial waterways.

5.9.2 The nearest canal to the Site is the Oxford Canal, which lies approximately 1.4km east of the Site.

5.9.3 Given the distance from the Site and topography between the Site and the canal, flood risk from canals may be considered to be **low**.

6 Surface Water Drainage Strategy

6.1.1 A Surface Water Drainage Strategy outlining the means of surface water management and disposal from the proposed development Site has been produced largely in line with the latest guidance as follows:

- CIRIA C753 "The SuDS Manual", November 2015;
- CIRIA document C522 Sustainable Drainage Systems – design manual for England and Wales;
- CIRIA document C635 Designing for exceedance in urban drainage;
- Rainfall Runoff Management for Developments – SC030219 (Environment Agency, 2013);
- Environment Agency's pollution prevention guidelines (PPGs);
- Sewerage Sector Guidance – Design & Construction Guidance v2 (Water UK, March 2020); and
- Oxfordshire County Council – Local Standards and Guidance for Surface Water Drainage on Major Development in Oxfordshire V1.2 2021.

6.1.2 The proposed Surface Water Drainage Strategy aims to sustainably manage surface water runoff without increasing flood risk on- or off-Site, nor adversely impacting on water quality through the use of Sustainable Drainage Systems (SuDS).

6.1.3 SuDS aim to mimic the natural processes of surface water drainage by allowing water to flow along natural flow routes ensuring that runoff rates and volumes during storm events are not increased above the Greenfield values. SuDS also aim to provide water treatment, biodiversity and amenity benefits within Blue and Green corridors.

6.1.4 There are typically three design storm events which should be considered when designing the SuDS system and managing flows and volumes:

- 1 in 1 year storm event, on sloping Sites without basements, where surcharging above soffits of any surface water drainage pipework is not permitted;
- 1 in 30 year storm event, where surface water flooding of the site does not occur at this frequency; and
- 1 in 100 year storm event with allowances for future climate change, where runoff from the site should be controlled to the greenfield rate using SuDS attenuation features to manage flows and volumes within the extents of the development Site.

6.1.5 Further to this, dedicated overland flow routes should be identified through the development to convey any exceedance flows in events greater than the 1 in 100-year plus climate change event or in the event of system failure.

6.2 Existing Surface Water Drainage Features

6.2.1 The Site is currently predominantly greenfield land used for agriculture which is identified to drain through a series of ditches which convey surface water runoff throughout the Site. No existing adopted Thames Water sewer assets which serve the Site have been identified. However, a number of rising mains have been identified crossing the Site. Details on the existing drainage features, including the Site outfalls are in Section 3.4 of this report.

6.2.2 An existing drainage features plan has been contained in Appendix D.

6.3 Discharge Hierarchy

6.3.1 In accordance with SuDS guidance, surface water should be sustainably managed in accordance with the discharge hierarchy; collect for re-use; infiltrate to ground; discharge to watercourse; discharge to surface water sewer, highway drain or another drainage system; and lastly discharge to a combined sewer.

Table 6-1 – Drainage Hierarchy

Discharge Location	Suitability	Comments
Collect for Re-Use	✓ / ×	Water butts and rainwater harvesting systems can collect rainwater for non-potable uses e.g. within gardens and other non-potable uses. The potential to incorporate rainwater harvesting and re-use measures may be assessed during the detailed design stage.
Infiltration	×	Infiltration testing was undertaken in accordance with BRE Digest 365 Soakaway Design Guidance. This demonstrated that infiltration is not a viable means to manage surface water from the Site. The infiltration testing report is available in Appendix L.
Watercourse	✓	There are a number of existing land drains / ditches present within the Site. The proposed surface water drainage strategy will discharge into the existing ditches, where practicable, on Site. These ditches connect to three identified outfalls, one of which discharge ultimately into the Rowel Brook to the north-east of the Site and two others which discharge into the existing drainage network within the Village of Yarnton.
Surface Water Sewer	✓ / ×	There are no public surface water sewers serving the Site, but there are existing Thames Water sewers serving existing residential development east of the Site which could be utilised, should the need arise.
Combined Sewer	✓ / ×	There are no public combined sewers within the Site, but there are existing Thames Water sewers serving existing residential development east of the Site which could be utilised, should the need arise.

6.3.2 Following discussions with Yarnton Flood Defence Group on the 17th May 2022, the potential to direct surface water flows from the proposed development away from the village of Yarnton, and against the natural run-off flow paths on the Site, was explored. The representatives of the Flood Defence Group identified a potential pipe connection to discharge surface water flows into the development thus bypassing the village. The location of this pipe is in the vicinity of Cassington Road and the Cotswold Line railway line is indicated in Figure 6-1 and shown in the photograph in Figure 6-2.

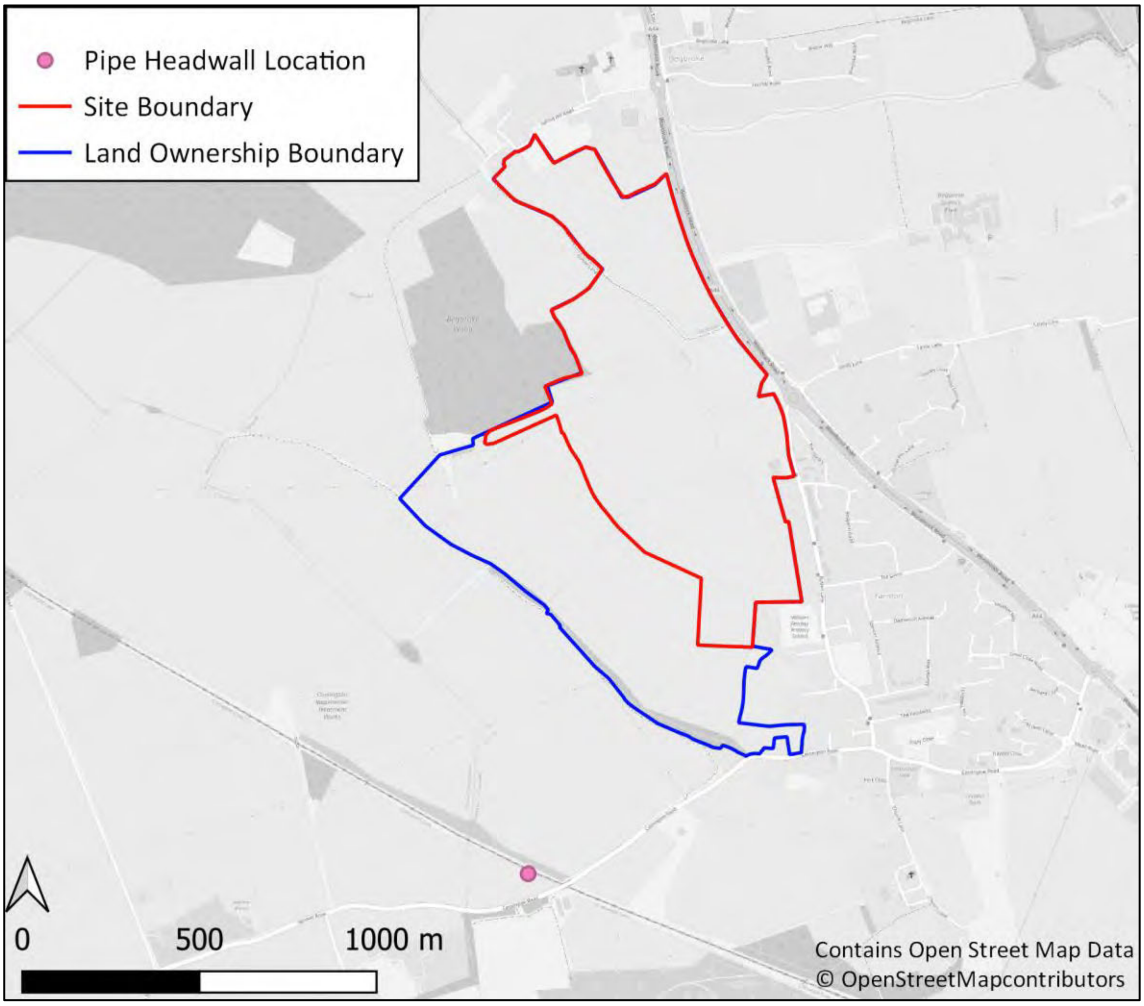


Figure 6-1 – Indicative Location of Pipe Identified by Yarnton Flood Defence Group

Figure 6-2 – Identified Pipe Location

6.3.3 This pipe location was reviewed in accordance with the topography (as identified in the publicly available 1m DTM LiDAR data) to understand whether any of the proposed development Site drainage could be routed to this location. Spot levels showing a range of elevations within the Site and the location of the pipe connection suggested is shown in Figure 6-3.

6.3.4 From a review of Site levels and the outfall details, the existing Site topography is not conducive to a gravity led surface water discharge from the Site with an outfall at self cleansing velocity unfeasible.

6.3.5 Furthermore, the principles of sustainable surface water management discourages the transfer of flows out of catchment.

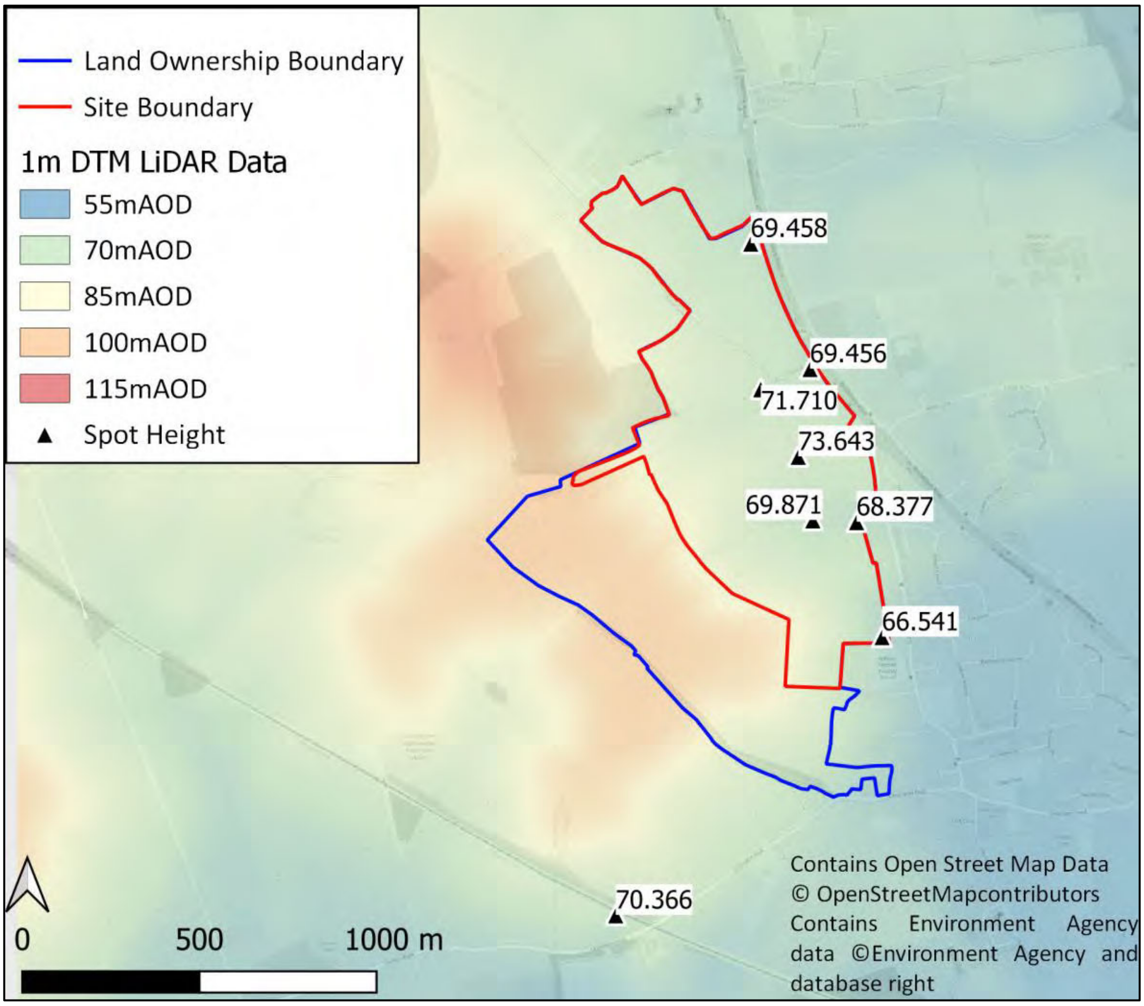


Figure 6-3 – Spot Height Data (1m DTM LiDAR)

6.3.6 In accordance with the above discharge hierarchy and levels appraisal, it is therefore proposed to discharge surface water runoff to the existing ditches within the Site boundary.

6.4 Pre-Development Surface Water Run-Off Rates

6.4.1 Greenfield run-off rates for the Site have been calculated utilising the MicroDrainage IoH124 runoff calculator, the results which are contained in Appendix I and are shown in Table 6-2.

Table 6-2: Greenfield Runoff Rates

Event	50ha	1ha
1 in 1 Year	167.8	3.36
QBar	197.4	3.95
1 in 30 Year	447.7	8.95
1 in 100 Year	629.8	12.60

6.4.2 Following previous comments from the LLFA outlined in Appendix M, the underlying Site geology has been reviewed in relation to rainfall run off. Given the underlying Site geology shown within the publicly available BGS Mapping and Site conditions, as set out in 3.3, and the results of the infiltration testing, a Soil Class of 0.45 is identified as acceptable.

6.4.3 Based on Site topography, the Site has been split into 16 sub-catchments, illustrated on the Indicative Catchment Plan contained in Appendix F. The greenfield runoff estimate from each catchment have been provided in Table 6-3. In accordance with Oxfordshire County Council local guidance, the Site should limit discharge to no greater than the QBar greenfield discharge rate. Where the QBar rate falls below 2.0l/s, it has been rounded up to 2.0l/s to minimise the risk of blockage.

Table 6-3: Proposed Discharge Rates

Catchment	Proposed Developable Area [ha]	Proposed Discharge Rate (QBar or 2) [l/s]
A	3.2	19.4
B	1.7	
C	1.0	10.7
D	1.2	
E	0.5	
F	0.8	6.7
G	0.8	
H	0.8	2.0
I	0.4	3.2
J	1.3	4.2
K	0.8	3.2
L	1.0	4.0
M	1.6	6.2
N	0.6	2.4
Highway Catchment	0.08	2.0
Pitch Drainage	0.95	2.0
TOTAL	**17.03**	**64.0**

6.4.4 As previously noted, infiltration testing has been undertaken on Site, the results of which are contained in Appendix L. This testing demonstrates that soakaways will not be a viable method of surface water discharge on the Site and as such, has not been proposed within the drainage calculations.

6.5 Climate Change Impact

6.5.1 In line with the climate change allowances recommended by the Environment Agency in their February 2016 guidance, updated May 2022, the impact of climate change on the peak rainfall intensities in urban drainage designs should be assessed by Management Catchment and increased accordingly.

6.5.2 The peak rainfall intensity allowances for the Gloucestershire and the Vale Management Catchment has therefore been reviewed, as detailed for the 1% annual exceedance rainfall event in Table 6-4.

Table 6-4 – Peak Rainfall Allowances for the Gloucestershire and the Vale Management Catchment

	Central Allowances	Upper End Allowances
2050s	20%	40%
2070s	25%	40%

6.5.3 The Proposed Development and the associated surface water drainage scheme has been designed to sustainably manage the run-off from the critical 1 in 100 year storm event with a 40% allowance for climate change.

6.5.4 Consideration to the potential impact of climate change has been given in the Proposed Development, in particular with regard to locating built development outside of the maximum flood extents in climate change scenarios and exceedance flow routing.

6.6 Proposed Surface Water Drainage Strategy

6.6.1 The proposed Surface Water Drainage Strategy is shown on the Indicative Surface Water Drainage Strategy drawing (Ref. 06058-0101), included in Appendix F.

6.6.2 In accordance with the drainage hierarchy, as indicated previously, the Site is not expected to be suitable for soakaway drainage through infiltration and therefore discharge is proposed at greenfield QBar rates to ensure that it will have a negligible impact on downstream flood risk.

6.6.3 The discharge locations have been split between the existing ditches which are present on Site in line with the natural topographic catchments.

6.6.4 The proposed Surface Water Drainage Strategy implements SuDS in the form of basins and conveyance features. A summary of the selection of SuDS features has been provided in Table 6-4.

Table 6-5: Summary of SuDS Feature Selection

Feature	Description	Selection
Green Roofs	Green roofs are systems which cover a building's roof with vegetation. They are laid over a drainage layer, with other layers providing protection, waterproofing and insulation.	× Due to the primarily proposed residential nature of the development, green roofs have not been proposed at this stage however, may be considered for the Working Hub at a later design stage.
Filter Strips	These are wide, gently sloping areas of grass or other dense vegetation that treat runoff from adjacent impermeable areas.	✓ / × Filter strips may be utilised across the Site depending on the final Site masterplan.
Pervious Surfaces	Pervious surfaces allow rainwater to infiltrate through the surface into an underlying storage layer, where water is stored before infiltration to the ground, reuse, or release to surface water.	✓ / × Permeable paving for driveways and communal parking areas may be considered at a later design stage.
Swales	Swales are broad, shallow channels covered by grass or other suitable vegetation. They are designed to convey and/or store runoff, and can infiltrate the water into the ground (if ground conditions allow).	✓ Swales or other SuDS conveyance features are incorporated within the surface water drainage strategy to convey water to the proposed attenuation basins.
Infiltration Basins	Infiltration basins are depressions in the surface that are designed to store runoff and infiltrate the water to the ground. They may also be landscaped to provide aesthetic and amenity value.	× Infiltration basins have not been proposed following infiltration testing undertaken on Site.
Basins / Ponds	Basins are usually dry for a larger period of time outside storm events. They provide temporary storage for storm runoff. Wet ponds are basins that have a permanent pool of water for water quality treatment. Basins or pond features may provide amenity and wildlife benefits.	✓ Attenuation basins have been proposed for use on Site. The exact wet / dry nature will be confirmed during the next phase of design with one proposed to have a permanently wetted area.
Underground Attenuation	Underground attenuation structures are typically formed using crates which provide a high void space for attenuation and water quantity control.	× Underground attenuation is not proposed for use within this Site.
Bio-retention / raingardens	Bioretention systems are areas of vegetation into which rainwater and runoff can be directed. These are particularly effective at providing water quality improvements.	✓ / × Bioretention and rain gardens may be considered at a later design stage.

6.6.5 Water butts may be made available for all households to provide an opportunity for water re-use. However, as the attenuation capacity for the water butts cannot be guaranteed during a rainfall event, these have not been accounted for within drainage strategy attenuation calculations.

6.6.1 To ensure maximum peak discharge is maintained at greenfield runoff rates, on-Site attenuation will be required. The required storage volume for the attenuation of the 1 in 100 year event plus 40% climate change event has been calculated for each land parcel and discharge location, assuming a proportion of impermeable surfacing based on the illustrative masterplan. The estimated contributing areas and proposed attenuation basins are shown together with their required capacity on the Indicative Surface Water Drainage Strategy drawing in Appendix F.

6.6.2 A summary table for the proposed attenuation is provided in Table 6-6 which also identifies that the impermeable area proportion for each development parcel has been assumed as 60%, due to the proposed residential end use of the Site.

Table 6-6: SuDS Summary

Assumed Catchment	Proposed Discharge Rate (l/s)	Proposed Impermeable Area [ha]	Proposed Attenuation Volume Required [m³]
A	19.4	1.92	1,210
B		1.02	850
C	10.7	0.6	610
D		0.72	400
E		0.3	180
F	6.7	0.48	630
G		0.48	210
H	2.0	0.24	150
I	3.2	0.78	590
J	4.2	0.60	400
K	3.2	0.48	320
L	4.0	0.60	360
M	6.2	1.02	620
N	2.4	0.36	220
Pitch Drainage	2.0	0.95	850
Highway Drainage	2.0	0.08	40
TOTAL	**64.0**	**10.63**	**7,620**

6.6.3 The proposed attenuation basins have been mostly designed as dry features at this stage. However, Basin K has been identified to have a permanently wetted pool below the existing drainage invert level, full details of this will be available at the detailed design stage. The proposed attenuation features are located at the natural low points of the proposed Site and sized to provide the required attenuation and treatment.

6.6.4 The basins and ponds will aim to provide multiple functions as amenity and biodiversity assets, which may include additional proposed permanent wet features, particularly if such features are required to improve the Biodiversity Net Gain (BNG) scoring of the development and to provide a carbon store.

6.6.5 Other measures that could reduce the carbon footprint of the development and the associated methods of assessment, and include:

- Reduced surface water pumping, wastewater pumping/treatment, leading to reduced energy use and associated carbon emissions;
- Embodied carbon (avoided) as a result of reduced consumption (e.g. due to rainwater harvesting); and
- Cooling/shading of buildings, leading to reduced energy use and associated carbon emissions.[3]

6.6.6 It should be noted that for the remaining attenuation basins, if permanent wet features are required, then this will most likely increase the footprint of the attenuation features. The exact nature of these will be determined at the next stage of design.

6.6.7 Vortex flow controls, such as a Hydrobrakes, will restrict the rate of discharge downstream to the existing greenfield QBar run-off rate at the proposed discharge points.

6.6.8 The proposed SuDS features have been sized in Causeway Flow to ensure that the proposed system will be capable of conveying run-off from the design storm event without flooding. The surface water drainage system will be designed to convey the run-off from the critical 1 in 100 year (+40% climate change allowance) storm event without flooding of the development. Refer to Appendix J for the Causeway Flow calculations.

6.6.9 The drainage strategy is based upon the site masterplanning details at the time of production. Changes to the site development profile, impermeable area proportions across the site or other such aspects of the scheme will result in the need to revise the calculations.

6.7 Development Creep

6.7.1 Over the lifetime of a development, it is possible that the overall impermeable area within the Site could increase by as much as 10% through the house buyers undertaking activities such as property extensions and introducing paved gardens.

6.7.2 Table 6-7 identifies the potential increase in impermeable area as a result of urban creep over the lifetime of the development.

6.7.3 Causeway flow calculations which include a 10% uplift in impermeable area to account for development creep are available in Appendix J.

[3] https://www.susdrain.org/delivering-suds/using-suds/benefits-of-suds/Carbon-reduction-and-sequestration

6.7.4 The surface water drainage system can be demonstrated to convey the run-off from the critical 1 in 100 year (+40% climate change allowance) storm event including a 10% allowance for development creep without flooding of the development.

Table 6-7 - Development Creep Assessment

Catchment	Impermeable Area (ha)	10% Creep (ha)	Total Impermeable Area with Development Creep (ha)	Attenuation Required with Development Creep (m^3)
A	1.92	0.19	2.11	1,360
B	1.02	0.10	1.12	950
C	0.60	0.06	0.66	670
D	0.72	0.07	0.79	440
E	0.30	0.03	0.33	210
F	0.48	0.05	0.98	710
G	0.48	0.05	0.98	240
H	0.24	0.02	0.26	170
I	0.78	0.08	0.86	670
J	0.60	0.06	0.66	450
K	0.48	0.05	0.53	350
L	0.60	0.06	0.66	410
M	1.02	0.10	1.12	690
N	0.36	0.04	0.76	250
Pitch Drainage	0.95	0.10	1.05	50
Highway Catchment	0.08	0.80	0.88	960
TOTAL	**10.63**	**1.06**	**11.69**	**8,850**

6.8 Water Quality

Principles of Water Quality Assessment

6.8.1 The general principles to mitigate against adverse impacts on water quality in the receiving water environment is described in the CIRIA C753 "The SuDS Manual" (2015). This document recommends the following steps to determine the required water quality management for discharges to surface waters and groundwaters based on the risk posed:

1 Interception: Prevent runoff and associated pollutants from the Site to receiving surface waters for the majority of small rainfall events (e.g. <5mm rainfall events);
2 Determine the pollution hazard level associated with the given type of development;
3 Select a risk assessment approach based on receiving water environment and the pollution hazard level; and
4 Undertake a detailed risk assessment for each outfall or discharge point taking into account the pollution hazard level, the status of the receiving water environment and effectiveness of the proposed SuDS techniques.

6.8.2 The extent of the treatment required will depend on the water quality status of receiving watercourses, land use, the level of pollution prevention in the catchment and for groundwater, the natural protection afforded by underlying soil layers. The pollution hazard level of the development type should be identified.

Interception and source control

6.8.3 The principles of the SuDS Management Train should be incorporated into the proposed surface water drainage schemes for new development, to reduce the risk of pollutants entering watercourses via run-off from roofs and paved areas.

6.8.4 To protect biodiversity and amenity assets, polluted surface water run-off should not be discharged directly into permanent ponds but treated through an appropriate treatment train. Where possible, interception SuDS and storage should be included as part of the treatment train to manage pollutants at source. Later stages of treatment in the train should incrementally reduce the level of pollution in run-off before discharge to the receiving water body.

6.8.5 interception SuDS and storage components can reduce pollution in run-off through filtering out pollutants or reducing flow rates to encourage deposition of any contaminants. Suitable source control interception SuDS components could include:

- permeable paving;
- filter drains;
- swales;
- attenuation basins;
- wetlands; and
- proprietary treatment systems.

Existing Water Quality of the Proposed Receiving Watercourses

6.8.6 The Site falls within the Environment Agency's Thames River Basin which covers over 16,200km^2. It encompasses all of Greater London and extends from north Oxfordshire southwards to Surrey and from Gloucestershire in the west to the Thames Estuary and parts of Kent in the east [4].

6.8.7 The Thames River Basin has been divided into twenty management catchments. The Site is within the *Gloucestershire and the Vale Management Catchment*, in which the Site falls into the *Ock Operational Catchment*.

6.8.8 From review of available mapping, the Site contributes to the *Thames (Evenlode to Thame) Water Body.*

6.8.9 The waterbody is not identified as artificial or heavily modified and has a 'Moderate' ecological status and a 'Fail' chemical status in the 2019 cycle data [5].

6.8.10 The reasons for not achieving 'good' status include:

- Sewage discharge (continuous from Water Industry);
- Poor nutrient management (agriculture and rural land management); and
- Non-native invasive species (North American Signal Crayfish).

6.8.11 As such the Environment Agency will be seeking improvements to the water quality of the local watercourse system to achieve a status of Good by 2027.

6.9 Water Quality Assessment

6.9.1 The Proposed Development will utilise SuDS Management Trains across each network to ensure treatment of run-off and removal of pollutants prior to discharge.

6.9.2 This is likely to include a mixture of components across the Site, specified according to the opportunities/constraints presented by:

- the likely pollution hazard of the run-off;
- the available surface space; and
- the proposed ground levels/falls across areas of hardstanding.

6.9.3 Treatment components within each SuDS Management Train may include:

- permeable pavement (for car parking areas);
- channel drains;
- catchpits;

[4] https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/718342/Thames_RBD_Part_1_river_basin_management_plan.pdf
[5] https://environment.data.gov.uk/catchment-planning/WaterBody/GB106039030334

- trapped gullies;
- attenuation basins incorporating pre-treatment (such as a sediment forebay) and low flow channels;
- bioretention areas in greenspace around the Site;
- swales and linear wetlands;
- filter drains bordering paved areas such as roads and yards; and
- proprietary treatment systems (such as downstream defenders).

6.9.4 The arrangement and composition of each management train will be confirmed at the detailed design stage.

6.9.5 The proposed uses at the Site will comprise residential roofs, individual driveways and access roads. Roofs are classified as a 'very low' pollution risk in Table 26.2 of CIRIA C753 The SuDS Manual and require removal of gross solids and sediments only. Residential car parks, access roads, driveways and non-residential car parking with infrequent change (e.g. schools) are shown to present a 'low' pollution hazard level.

6.9.6 Low pollution hazard levels require the application of a 'simple index approach' to a water quality risk assessment for discharges to surface and ground waters.

6.9.7 The "pollution hazard indices" for a low pollution hazard Site are given in Table 6-8 below.

Table 6-8 - Pollution Hazard Indices for a Low Pollution Hazard Site

Total Suspended Solids (TSS)	Metals	Hydrocarbons
0.5	0.4	0.4

6.9.8 The surface water drainage system should provide a sufficient level of water quality treatment to prevent pollution of the receiving waterbodies. During the water treatment design event (5mm rainfall across the entire Site) no runoff should leave the Site.

6.9.9 Table 6-9 provides the indicative SuDS mitigation indices for the proposed SuDS features for the Site. It demonstrates that the mitigation index for the proposed attenuation basins, ponds and swales are greater than the "*pollution hazard index*" for each pollutant type. Therefore, the strategy is deemed to comply with the water quality requirements of the SuDS standards.

Table 6-9 - Indicative SuDS Mitigation Indices

SuDS component	Mitigation Indices		
	Total Suspended Solids (TSS)	Metals	Hydrocarbons
Detention basins	0.5	0.5	0.6
Ponds	0.7	0.7	0.5
Swales	0.5	0.6	0.6

6.10 Designing for Exceedance

6.10.1 During a rainfall event with a return period well in excess of that for which the surface water drainage system was designed (in this case a 1 in 100 year plus 40% climate change allowance), or in the event of a blockage, the capacity or conveyance of the surface water drainage system may be exceeded, resulting in localised flooding in the areas affected. This is considered to be a residual risk.

6.10.2 However, the layout and landscaping of the proposed development should be designed and will be developed to ensure that exceedance flood flow paths are routed away from vulnerable development and towards landscaped areas, areas of open attenuation or surrounding green infrastructure.

6.10.3 In line with Building Regulations the finished floor levels of the properties will be set at least 150mm above the surrounding ground levels to prevent surface water ingress through doorways. The location of buildings in ground depressions will be avoided to prevent water ponding around dwellings.

6.10.4 Minor modifications to topography, the profile of the access road, footpath or kerb and strategically placed green infrastructure will be developed to ensure that exceedance flood flows are managed and there is little or no risk of property flooding or unacceptable ponding within the highway.

6.10.5 An Exceedance Flow Route Plan has been provided, contained in Appendix H.

7 Foul Water Drainage Strategy

7.1.1 Thames Water are the statutory water authority in the area; their asset mapping identifies that there are a number of foul and combined sewers present serving the existing residential development immediately east of the Site, as well as a number of rising mains crossing the Site. This mapping is included in Appendix E.

7.1.2 Thames Water have been consulted through a pre-development enquiry to provide comments on the development proposals and opportunities for foul water drainage. The pre-development enquiry was submitted to Thames Water on the 25th February 2022 and a response was received on 4th March 2022 based on a single pumped connection to the Thames Water foul Manhole 0701 in the A44 Woodstock Road.

7.1.3 Thames Water's response is included in Appendix K. This has confirmed that the Thames Water will undertake a detailed sewer modelling assessment to determine the proposed foul connection point's current capacity (Thames Water Manhole 0701) and any downstream upgrades which may be required.

7.1.4 Thames Water have confirmed that they will undertake this work once planning permission has been secured. Further to this, the foul drainage strategy was developed to utilise two points of connection:

(1) A pumped connection into the existing Thames Water Manhole 0701
(2) A gravity connection into the existing Thames Water manhole in the junction of Aysgarth Road and Rutten Lane.

7.1.5 As the masterplan developed, a refined foul water drainage strategy has been proposed which utilises both a pumped discharge connection to manhole 0701 in the A44 and a gravity connection to an existing manhole in Rutten Lane. This is illustrated on the foul drainage strategy plan available in Appendix G.

7.1.6 An additional pre-development enquiry was submitted to Thames Water on 23rd May 2022 to reflect the refined foul strategy, with a response received on the 10th June 2022 which confirmed that sewer modelling would still be required to confirm the capacity and any upgrades in the required across the network to accommodate the Proposed Development.

8 Adoption & Management

8.1 Surface Water Drainage System

8.1.1 Responsibility for the maintenance of the main surface water drainage networks and SuDS features may be offered to Thames Water for adoption under S104 of the Water Industry Act 1991. To meet the requirements for adoption, the proposed infrastructure must be designed and constructed according to Sewerage Sector Guidance – Design & Construction Guidance v2 (Water UK, March 2020).

8.1.2 Alternatively, it is common for SuDS features to be operated and maintained by a third-party private maintenance company. Should this be necessary, a third-party management company would be established to maintain the features in perpetuity and an adoption agreement between the final Site developer and Maintenance Company would be largely based upon the CIRIA ICoP MA2 SuDS Maintenance Framework Agreement.

8.1.3 Drainage serving new roads to be offered for adoption by the Local Highway Authority will become highway drains, adopted as part of Section 38 agreements (Highways Act 1980).

8.1.4 A typical maintenance schedule of the attenuation basins, swales and flow control devices proposed on Site are shown in the below tables.

Table 8-1 – Flow Control Indicative Maintenance Schedule

FRQUENCY	ACTION
Monthly	• Inspect and identify any areas that are not operating correctly. If required, take remedial action (for three months following installation)
Six Monthly	• Inspect and identified ant area that are not operating correctly. If required, take remedial actions. • Remove sediment from any pre-treatment structures.
Annually	• N/A
Following All Significant Storm Events	• Inspect and carry out essential recovery works to return the feature to full working order.

Table 8-2 – Attenuation Basin Indicative Maintenance Schedule

FRQUENCY	ACTION
Monthly	• Litter and debris removal • Mow grasses (where required to promote lateral runoff inflow) and remove resultant clippings (during growing season only) • Remove nuisance and invasive vegetation (for 12 months following installation) • Inspect / check all inlets, outlets, surface and overflows (where required) to ensure that they are in good condition, free from blockages and operating as designed. Take action where required.
Six Monthly	• Remove nuisance and invasive vegetation
Annually	• Remove all dead growth prior to the start of growing season • Re-seed areas of poor vegetation growth. Alter plant types to better suit conditions, where required • Inspect and document the presence of wildlife • Remove sediment from inlets, outlets and forebay • Manage wetland plants, where required
As Required	• Prune and trim trees and remove cuttings • Remove sediment from forebay, when 50% full and from micropools if volume reduced by more than 25% • Repair erosion or other damage by re-turfing or reseeding • Re-level uneven surfaces and re-instate design levels (typically once every 60 month period) • Remove and dispose of oils or petrol residues using safe standard practices
Following All Significant Storm Events	• Inspect and carry out essential recovery works to return feature to full working order

Table 8-3 – Headwall Indicative Maintenance Schedule

FRQUENCY	ACTION
Monthly	• Inspect surface structures removing obstructions and silt as necessary • Check there is no physical damage • Trim vegetation 1m minimum. Surrounding structure and keep hard aprons free from silt and debris
As Required	• Check topsoil levels are 20mm above edges of baskets and chambers to avoid mower damage • Unpack stone in basket features and unblock or repair and repack stone as design detail as necessary • Remove and dispose of oils or petrol residues using safe standard practices
Following All Significant Storm Events	• Inspect and carry out essential recovery works to return feature to full working order

Table 8-4 – Swale Indicative Maintenance Schedule

FRQUENCY	ACTION
Monthly	• Litter and debris removal • Mow grasses (where required to promote lateral runoff inflow) and remove resultant clippings (during growing season only) • Remove nuisance and invasive vegetation (for 12 months following installation) • Inspect / check all inlets, outlets, surface and overflows (where required) to ensure that they are in good condition, free from blockages and operating as designed. Take action where required.
Six Monthly	• Remove nuisance and invasive vegetation
Annually	• Check for poor vegetation growth due to lack of sunlight or dropping of leaf litter, and cut back adjacent vegetation where required • Re-seed areas of poor vegetation growth. Alter plant types to better suit conditions, where required • Inspect and document the presence of wildlife
As Required	• Repair erosion or other damage by re-turfing, reseeding or replacing filter materials. • Re-level uneven surfaces and re-instate design levels (typically once every 60 month period) • Remove and replace top 300 – 500mm of gravel, clean and replace where required (typically every 60 month period) • Remove and dispose of oils or petrol residues using safe standard practices
Following All Significant Storm Events	• Inspect and carry out essential recovery works to return feature to full working order

8.1.5 The proposed maintenance regimes for the features and devices should be largely in accordance with The SuDS Manual (CIRIA C753) and other best practice guidelines and in accordance with manufacturer's recommendations. This will ensure the design performance, structural integrity and appearance, where applicable, of each feature is maintained throughout its lifetime.

8.1.6 Further details will be provided on the maintenance requirements of the proposed SuDS components across the development as the detailed design is developed. The details of the party responsible for maintenance of each feature will be confirmed prior to occupation of the proposed development.

8.2 Foul Water Drainage System

8.2.1 It is anticipated that the proposed foul sewer network may be offered to Thames Water for adoption under Section 104 of the Water Industry Act 1991. To meet the requirements for adoption, the proposed infrastructure must be designed and constructed according to Sewerage Sector Guidance – Design & Construction Guidance v2 (Water UK, March 2020).

9 Conclusion & Recommendations

9.1 Conclusion

9.1.1 PJA has been commissioned by Merton College to prepare a Flood Risk Assessment and Drainage Strategy for the proposed residential-led development at the allocated Site '*Land West of Yarnton, Oxfordshire*'.

9.1.2 An FRA and Drainage Strategy prepared by WSP was previously submitted to support the outline planning application (21/03522/OUT). However, this FRA and Drainage Strategy supersedes the previously submitted documents.

9.1.3 This Flood Risk Assessment has been undertaken in accordance with current national and local food risk policy requirements. This report assesses the existing and future flood risk at the Site, including an assessment of the potential effects of the Proposed Development on flood risk, both on- and off-Site.

9.1.4 The assessment concludes that the Site is considered at either very low or low risk of flooding from the sources assessed (fluvial, tidal, reservoirs, canals, groundwater and sewers).

9.1.5 Surface water flood risk is predominantly very low across the Site but is considered high in localised areas associated with existing overland flow routes and ditch courses. Site-specific hydraulic modelling has been undertaken to demonstrate than with the proposed mitigation, including cut-off ditches and bunds and surface water management strategy, surface water flood risk both to and from the Site can be reduced to low.

9.1.6 A Surface Water Drainage Strategy has been prepared to demonstrate that a sustainable drainage solution can be provided for the Proposed Development. The Surface Water Drainage Strategy has been designed largely in accordance with current sustainable development best practice and meets the requirements of Oxfordshire County Council as the LLFA.

9.1.7 The proposed surface water drainage systems aims to mimic the hydrological regime of the existing Site by discharging run-off to the existing ditches present on-Site. Discharge from each proposed catchment will be controlled to the equivalent greenfield QBar rate by vortex flow control devices. Attenuation storage will be provided in the form of open SuDS features such as attenuation basins, ponds and swales. Water butts may be used to store water for re-use within feasible locations but these have not been included within attenuation calculations as the capacity availability cannot be guaranteed.

9.1.8 In addition to the NPPF, the proposed surface water drainage strategy complies with local policy and Site-specific requirements.

9.1.9 The managed nature of the surface water within the Proposed Development Site and the further proposed measures assessed within the hydraulic modelling demonstrates that the likelihood and consequences of flooding downstream within the village will be reduced as a result.

9.1.10 The hydraulic modelling also demonstrates that safe access and egress will be available to and from the Site for events up to and including the 1 in 100 year plus climate change (40%) rainfall events.

9.1.11 SuDS Management Trains will provide suitable treatment of run-off by removing pollutants prior to discharge.

9.1.12 Foul flows from the Proposed Development will discharge via two connections - a pumped and a gravity new connection to the existing Thames Water foul network present to the east of the Site. A pre-developer enquiry response has been received from Thames Water which confirms the acceptability of the pumped connection but also identified that modelling of the sewer network to understand any required downstream reinforcements or upgrades will be undertaken following confirmation of planning approval.

9.1.13 The responsibility for the operation and maintenance of each SuDS feature will be confirmed prior to the commencement of construction. The SuDS used on Site should be maintained in accordance with manufacturer's recommendations and current best practice and guidelines to ensure routine operation.

9.1.14 This report demonstrates that the Proposed Development may be undertaken in a sustainable manner without increasing the flood risk either at the Site or to any third-party land in line with NPPF and local policy requirements.

Appendix A Proposed Masterplan

LEGEND

Placemaking

- PR9 Policy Map Boundary
- Application Site Boundary
- Residential Area (16.06Ha incl. Care & Work Hub)
- School Playing Pitches & Amenity Space (1.73Ha)
- Existing Yarnton Medical Practice (0.32Ha)
- Area Safeguarded for future Yarnton Medical Practice expansion (0.07Ha)
- Rural Edge
- Green Edge
- Urban Edge
- Community Home Work Hub
- Indicative Location for Care Home

Movement

- Site Vehicular Access
- Public Footpath
- Public Bridleway
- Proposed New Public Footpath
- Primary Road
- Secondary Road
- Tertiary Road

Green and Blue Infrastructure

- Green Belt
- Ancient Woodland
- Retained Hedgerow / Trees
- Veteran Trees
- Existing Tree Root Protection Area
- Retained Ditches
- Proposed Community Woodland
- Proposed Reinstated Hedgerow & Copse
- Proposed Swale/Infiltration
- Drainage Attenuation
- Green Open Space
- Meadowland
- Food Productive Landscapes (incl. Allotments)
- Retained Agricultural Land
- Local Nature Reserve (Indicative location)
- Equipped Area for Play (2 x LEAPs & 1 x NEAP)

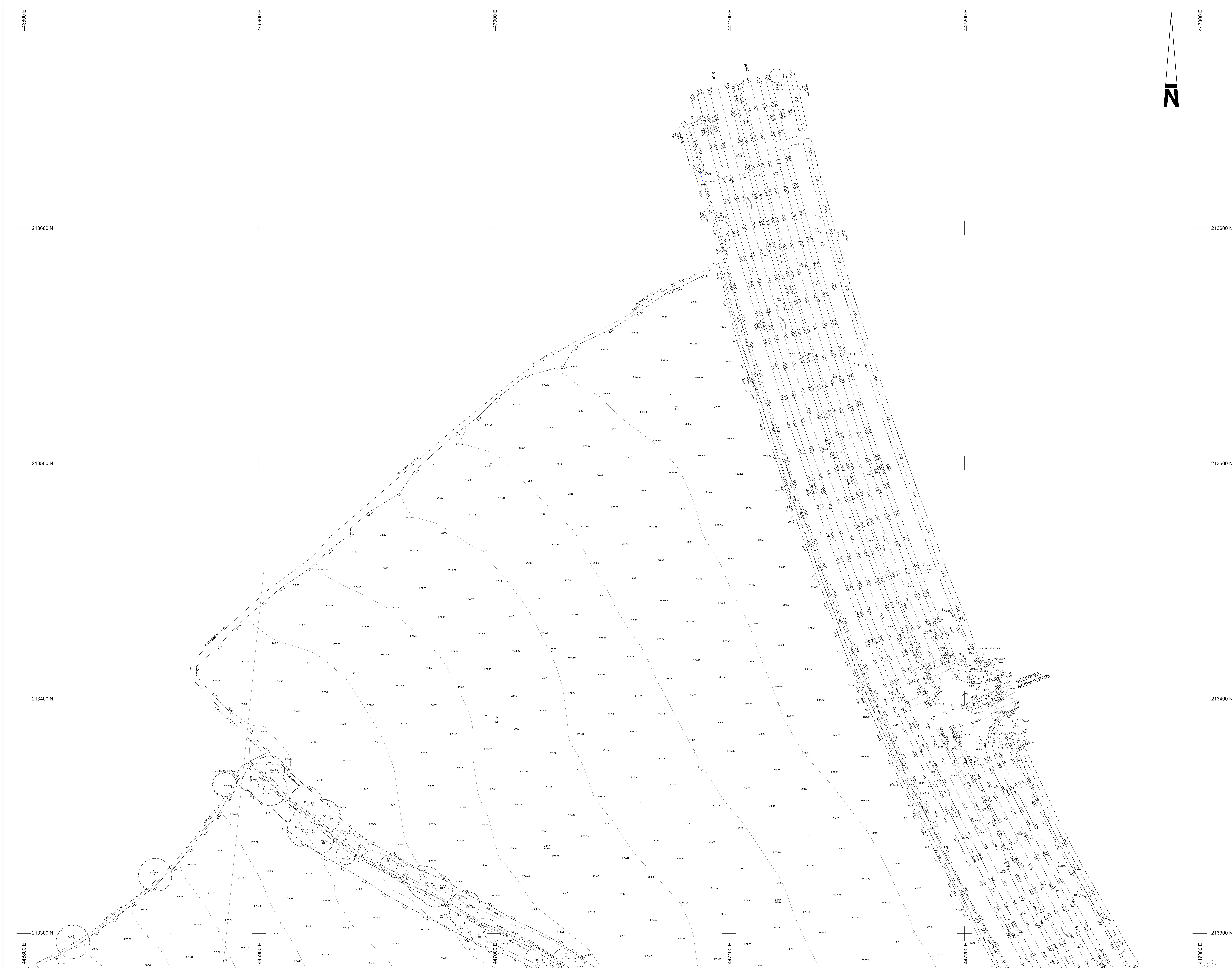
PR8

- PR8 Policy Boundary
- Residential
- Land Reserved for Employment
- Primary School Use
- Secondary School Use
- Existing Begbroke Science Park
- Existing Green Space
- Local Nature Reserve

NOTES:
The information shown on the framework Plan is generally indicative however they do show the intentions for any future development.

Rev	Description	Date
	R	Rev
	DE234_12	Drg No
	Merton College	Client
	Yarnton, Oxfordshire	Project
	PR9 Indicative Framework Plan	Title
	1:2500 @A1	Scale

Appendix B Topographic Survey



Notes:

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2. TREE AND HEDGE SPECIES HAVE BEEN IDENTIFIED AS ACCURATELY AS POSSIBLE BUT SHOULD BE CROSS CHECKED IN CRITICAL AREAS.

Coordinate Table

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S2	Road Nail	447521.377	212439.233	63.284
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S6	Road Nail	447412.015	213077.533	68.751
S124	Road Nail	447148.017	213546.028	68.503
T1	Road Nail	447201.771	213409.095	68.864
T2	Road Nail	447262.039	213227.527	69.849
T3	Peg	447198.159	213193.333	70.712
T4	Peg	447001.087	213391.593	73.067
T5	Peg	447086.175	213159.087	72.621
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T7	Peg	447299.707	212847.915	69.975
T8	Peg	447403.930	212665.681	72.118
T9	Peg	447295.009	212496.459	76.773
T10	Peg	447219.487	212293.652	79.689
T11	Peg	447142.267	212209.322	80.249
T12	Peg	446985.569	212357.116	93.242
T13	Peg	446959.233	212458.674	94.174
T14	Peg	447029.695	212576.137	82.796
T15	Peg	447116.391	212875.569	74.506
T16	Peg	447132.070	213018.705	74.509
T17	Peg	447122.199	213114.130	72.077

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
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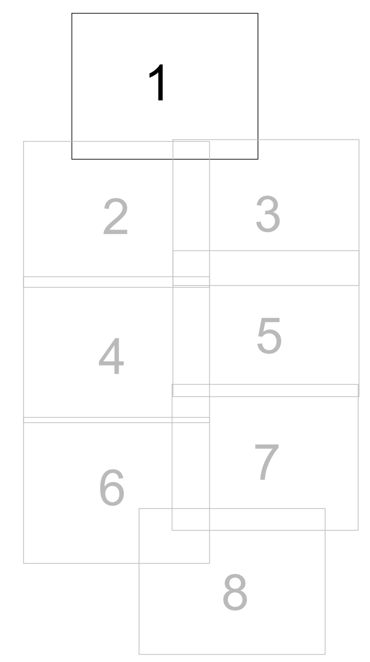

Revision	Description	Surv. by	Appr. by	Date

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MERTON COLLEGE OXFORD

Land off A44 Begbroke Oxfordshire

Topographical Survey

Scale	Sheet Size:	Sheet Number:	Date:
1:500	A0	1	September 2018
Project Number: 25913	Rev: -	Surveyed By: TC/EP	Approved By: AJ / ??

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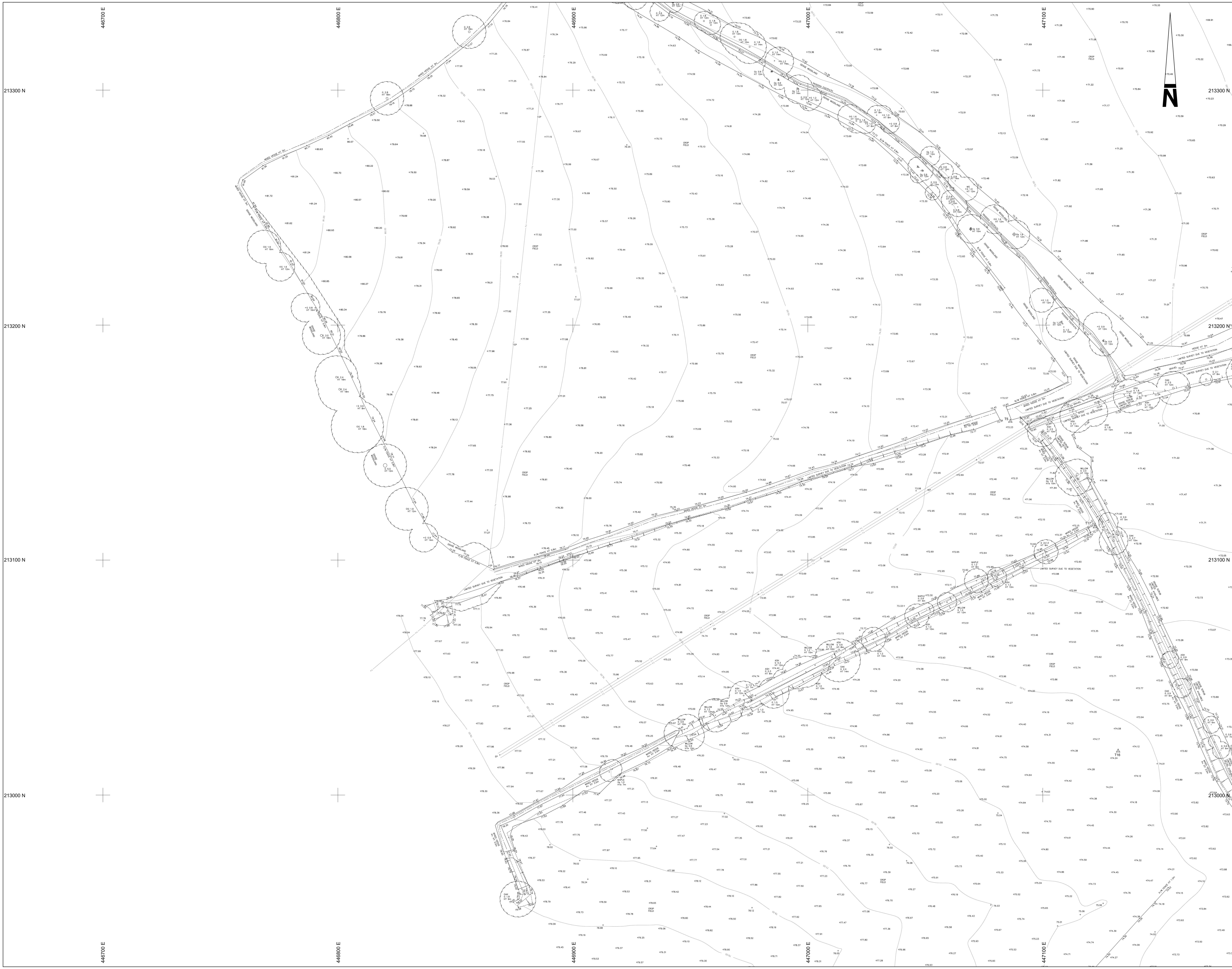

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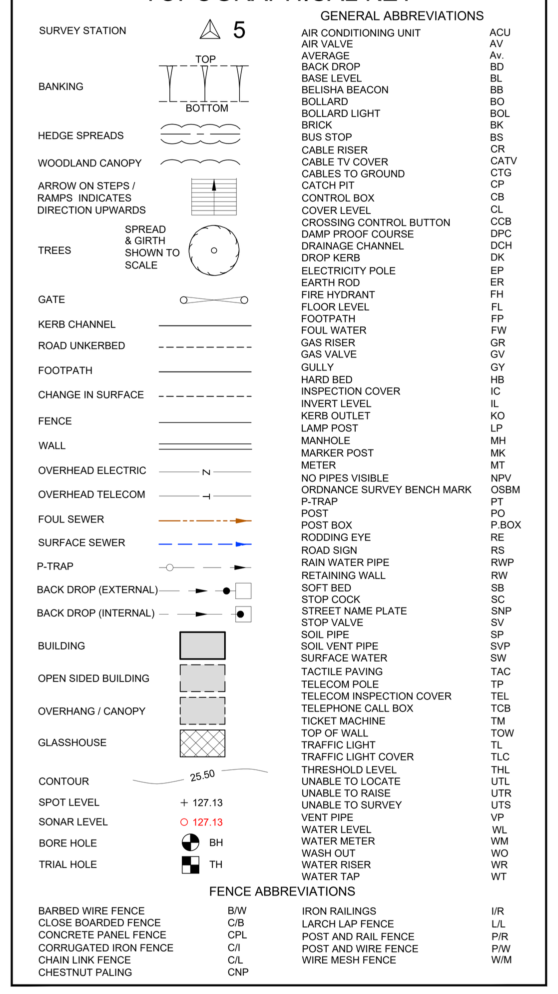

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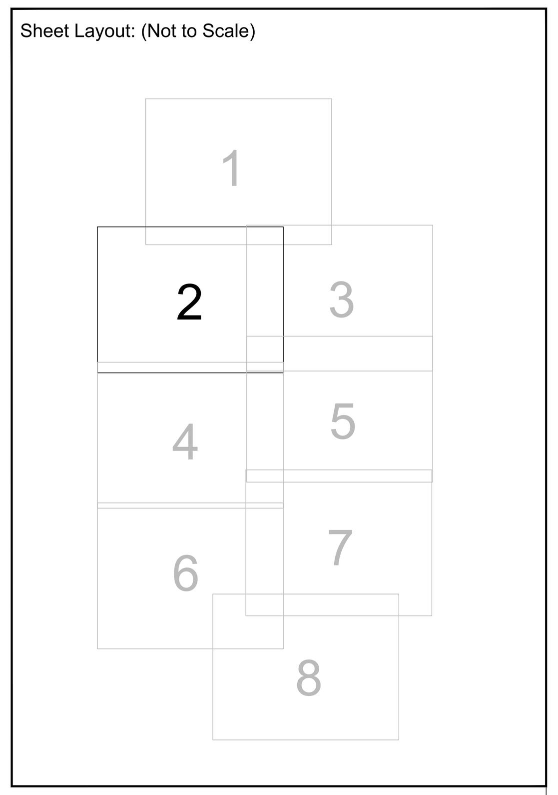

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OVERHEAD TELECOM
FOUL SEWER
SURFACE SEWER
P-TRAP
BACK DROP (EXTERNAL)
BACK DROP (INTERNAL)
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OPEN SIDED BUILDING
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BRICK	BK
BUS STOP	BS
CABLE RISER	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

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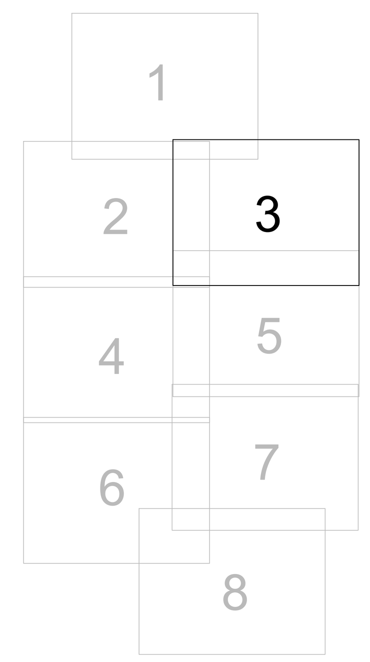

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MERTON COLLEGE OXFORD

Land off A44
Begbroke
Oxfordshire

Topographical Survey

Scale	Sheet Size:	Sheet Number:	Date:
1:500	A0	3	September 2018

Project Number:	Rev:	Surveyed By:	Approved By:
25913	-	TC/EP	AJ / ??

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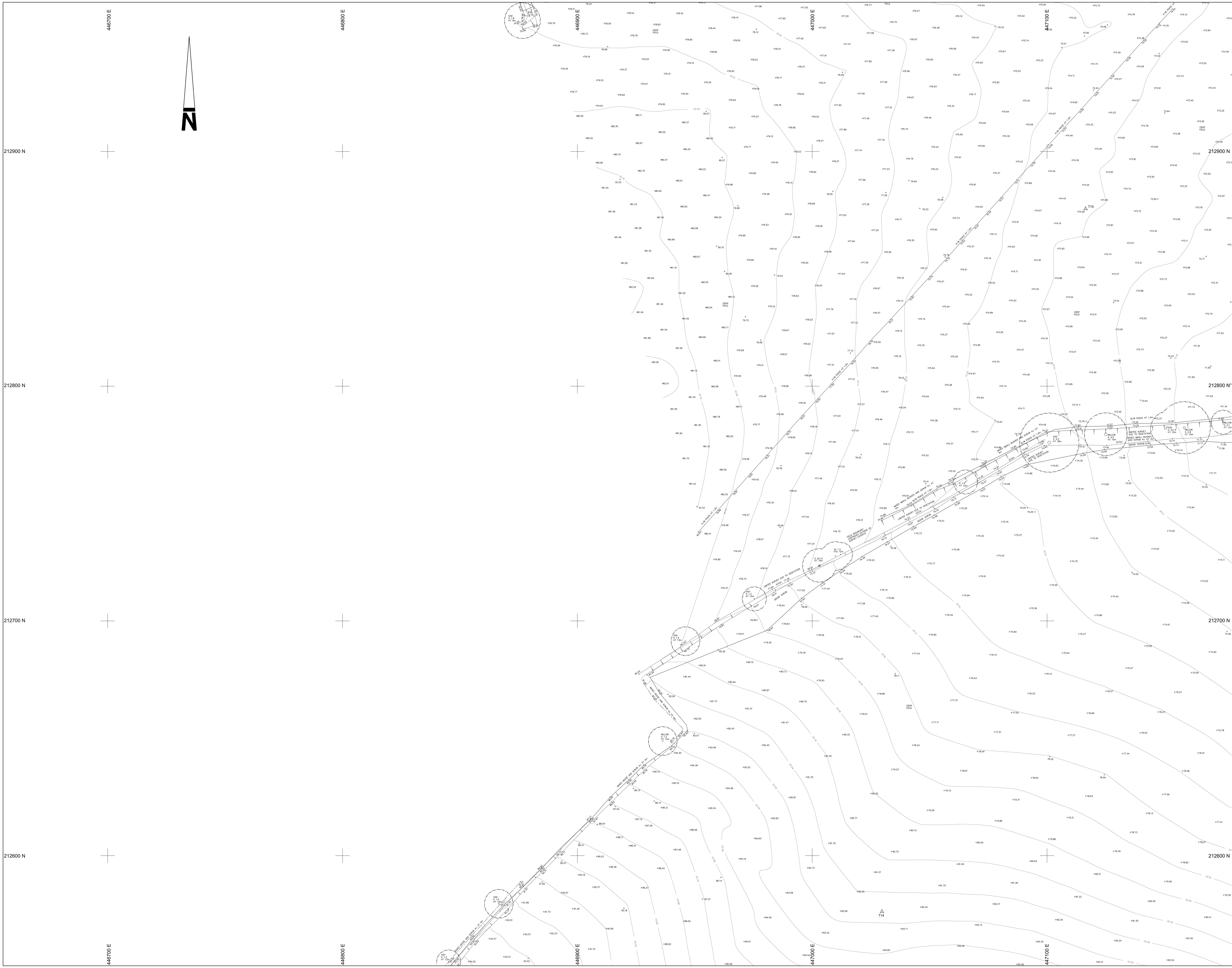

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T16	Peg	447132.070	213018.705	74.509
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TOPOGRAPHICAL KEY

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)
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BUILDING
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CONTOUR — 25.50
SPOT LEVEL — + 127.13
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BORE HOLE — BH
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GENERAL ABBREVIATIONS

AIR CONDITIONING UNIT	ACU
AIR VALVE	AV
AVERAGE	Av.
BACK DROP	BD
BASE LEVEL	BL
BELISHA BEACON	BB
BOLLARD	BO
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BRICK	BK
BUS STOP	BS
CABLE RISER	CR
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COVER LEVEL	CL
CROSSING CONTROL BUTTON	CCB
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DRAINAGE CHANNEL	DCH
DROP KERB	DK
ELECTRICITY POLE	EP
EARTH ROD	ER
FIRE HYDRANT	FH
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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
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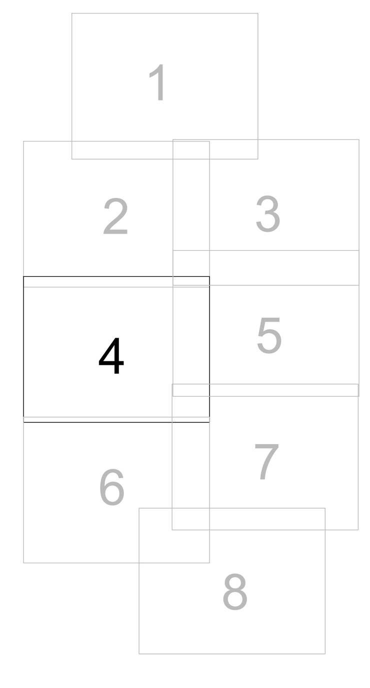

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TOPOGRAPHICAL KEY

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HEDGE SPREADS
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ARROW ON STEPS / RAMPS INDICATES DIRECTION UPWARDS
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GATE
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ROAD UNKERBED
FOOTPATH
CHANGE IN SURFACE
FENCE
WALL
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OVERHEAD TELECOM
FOUL SEWER
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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
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SURFACE WATER	SW
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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
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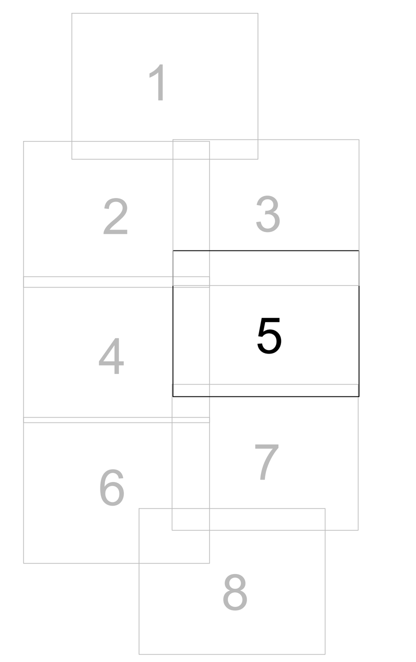

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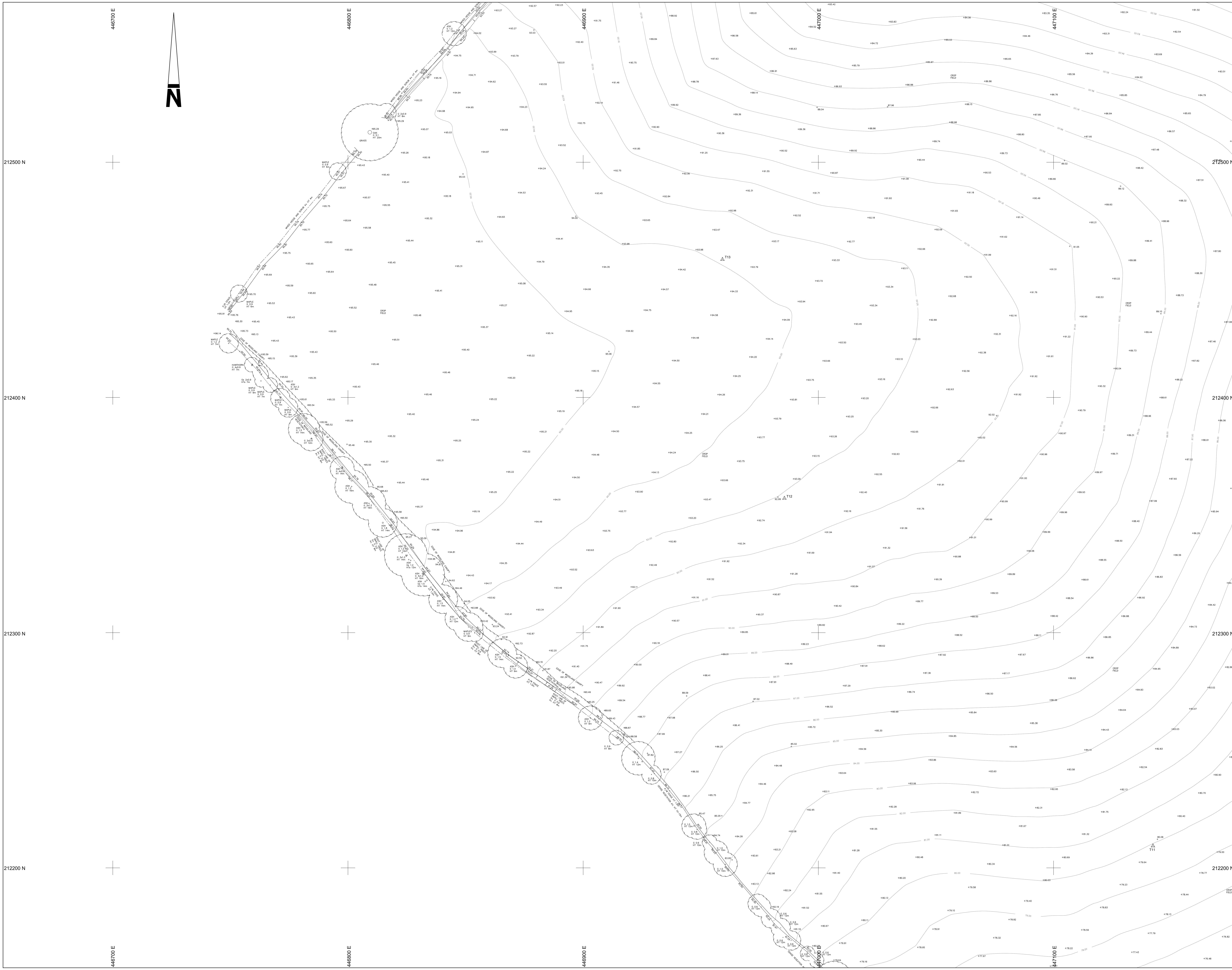

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FENCE
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OVERHEAD TELECOM
FOUL SEWER
SURFACE SEWER
P-TRAP
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INSPECTION COVER	IC
INVERT LEVEL	IL
KERB OUTLET	KO
LAMP POST	LP
MANHOLE	MH
MARKER POST	MK
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RODDING EYE	RE
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RAIN WATER PIPE	RWP
RETAINING WALL	RW
SOFT BED	SB
STOP COCK	SC
STREET NAME PLATE	SNP
STOP VALVE	SV
SOIL PIPE	SP
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TELEPHONE CALL BOX	TCB
TICKET MACHINE	TM
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TRAFFIC LIGHT	TL
TRAFFIC LIGHT COVER	TLC
THRESHOLD LEVEL	THL
UNABLE TO LOCATE	UTL
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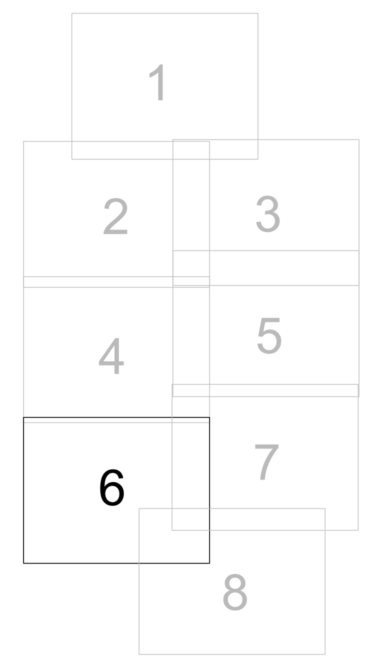

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TRAFFIC LIGHT COVER	TLC
THRESHOLD LEVEL	THL
UNABLE TO LOCATE	UTL
UNABLE TO RAISE	UTR
UNABLE TO SURVEY	UTS
VENT PIPE	VP
WATER LEVEL	WL
WATER METER	WM
WASH OUT	WO
WATER RISER	WR
WATER TAP	WT

FENCE ABBREVIATIONS

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

Sheet Layout: (Not to Scale)

1 2 3 4 5 6 7 8

Revision	Description	Surv. by	Appr. by	Date

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

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MERTON COLLEGE OXFORD

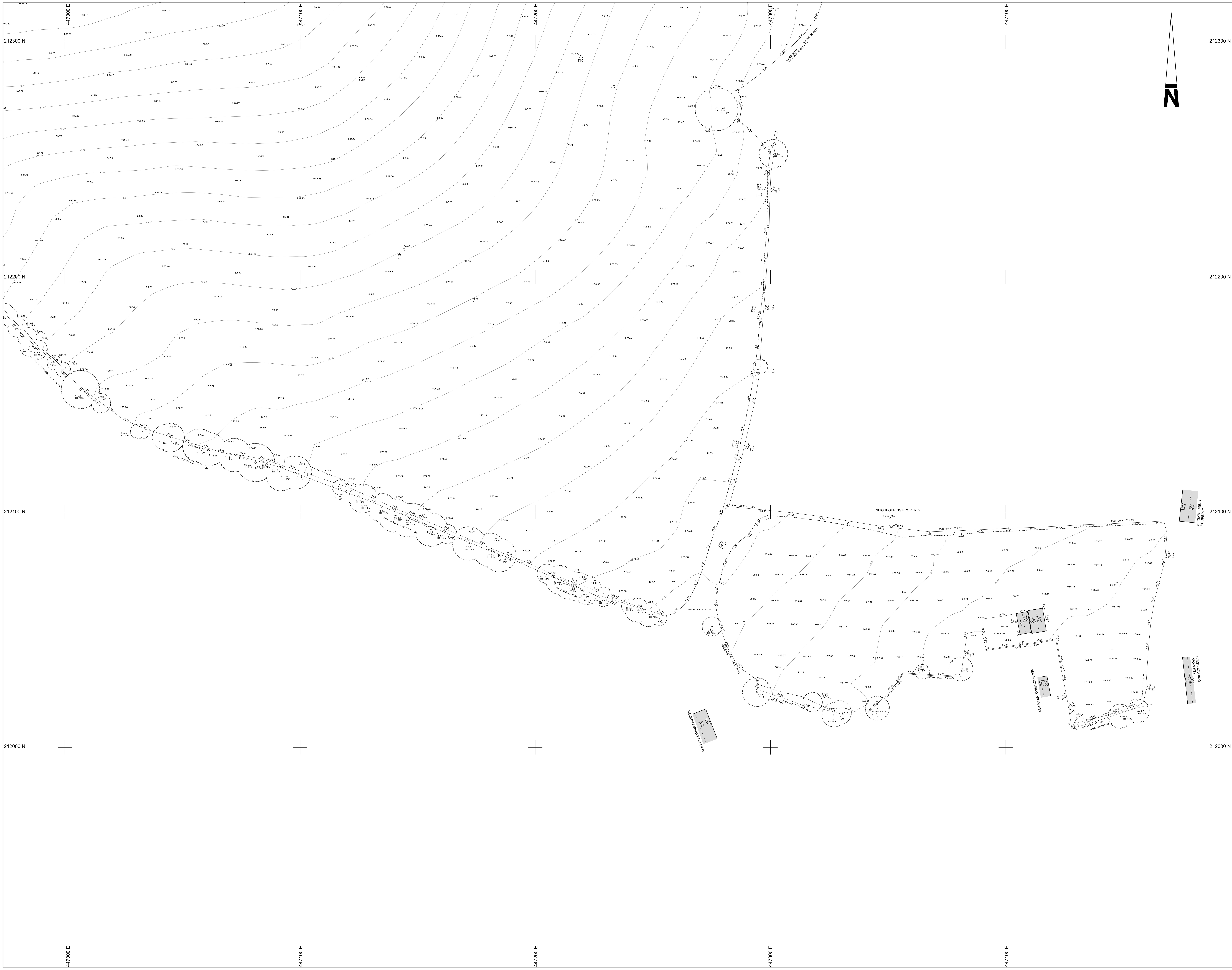
Land off A44 Begbroke Oxfordshire

Topographical Survey

Scale	Sheet Size:	Sheet Number:	Date:
1:500	A0	7	September 2018

Project Number:	Rev:	Surveyed By:	Approved By:
25913	-	TC/EP	AJ / ??

DRAFT



Notes:

1. GRID AND LEVELS BASED ON ORDNANCE DATUM, DERIVED FROM THE NATIONAL GNSS NETWORK. LOCAL SCALE FACTOR (0.999628) 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
S1	Road Nail	447450.455	212437.642	66.226
S2	Road Nail	447521.377	212439.233	63.284
S3	Road Nail	447510.756	212546.841	64.546
S4	Road Nail	447478.392	212671.564	68.805
S5	Road Nail	447422.608	212891.804	70.357
S6	Road Nail	447412.015	213077.533	68.751
S124	Road Nail	447148.017	213546.028	68.503
T1	Road Nail	447201.771	213409.095	68.864
T2	Road Nail	447262.039	213227.527	69.849
T3	Peg	447198.159	213193.333	70.712
T4	Peg	447001.087	213391.593	73.067
T5	Peg	447086.175	213159.087	72.621
T6	Peg	447309.047	213006.617	73.193
T7	Peg	447299.707	212847.915	69.975
T8	Peg	447403.930	212665.681	72.118
T9	Peg	447295.009	212496.459	76.773
T10	Peg	447219.487	212293.652	79.689
T11	Peg	447142.267	212209.322	80.249
T12	Peg	446985.569	212357.116	93.242
T13	Peg	446959.233	212458.674	94.174
T14	Peg	447029.695	212576.137	82.796
T15	Peg	447116.391	212875.569	74.506
T16	Peg	447132.070	213018.705	74.509
T17	Peg	447122.199	213114.130	72.077

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

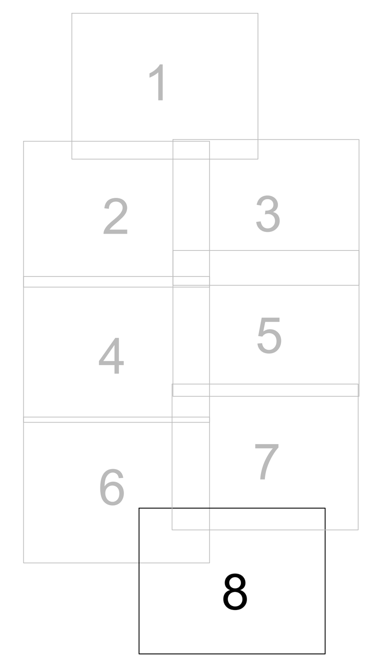
GENERAL ABBREVIATIONS

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		

Sheet Layout: (Not to Scale)



Revision	Description	Surv. by	Appr. by	Date

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

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MERTON COLLEGE OXFORD

Land off A44 Begbroke Oxfordshire

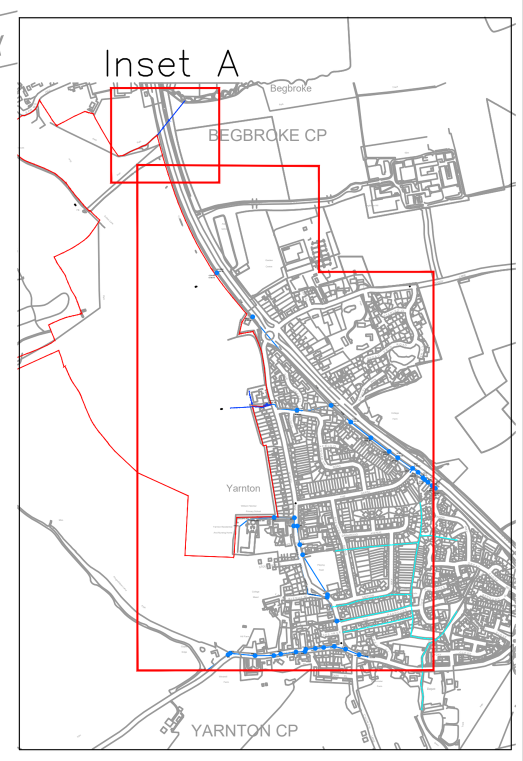
Topographical Survey

Scale	Sheet Size:	Sheet Number:	Date:
1:500	A0	8	September 2018

Project Number:	Rev:	Surveyed By:	Approved By:
25913	-	TC/EP	AJ / ??

DRAFT

Appendix C CCTV Survey Reports



Key Plan

NOTES

These drawings have been produced with reference to the CDM Regulations 2015. Please note that these are pre-construction phase drawings and should be subject to further design risk management as required in accordance with Regulation 9

1. This Drawing is not to be reproduced in any part or form without the consent of PJA Civil Engineering Ltd. All copyright reserved.
2. All dimensions are in meters unless otherwise stated.
3. All levels are in meters above ordance datum.
4. Drawing should be read in conjunction with all other relevant scheme drawings.
5. Drawing Includes:
   - 5.1. OS Mapping provided by DEFINE in January 2022.
   - 5.2. Drainage Information taken from :Premium Environmental Services ,Yarnton, Oxfordshire,Drainage Investigation Report March 2022

Key

- Site Boundary
- Premium Environmental services Surface Water
- MK Surveys Surface water
- Indicative Location of EA main river

REV	DATE	REVISION NOTE	BY
P02	16.05.2022	Key plan added	DSF
P01	29.04.22	First Issue	JP

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Exeter ▫ London ▫ Reading
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CLIENT
Merton College

PROJECT
Land West of Yarnton

DRAWING TITLE
Surface Water Drainage CCTV Survey

DRAWING ISSUE STATUS
PLANNING

PJA JOB No.	SUB-CODE	DRAWING NO.	REVISION
06058 -	-	0509 -	P02

Revision Letter : P - Prelim / A - Approval / T - Tender / C - Construction

BIM DRAWING REFERENCE
06058-DI-A-22-0509-P01

SCALE	DRAWN	REVIEWED	DATE
A1@2000	JP	DW	29.04.22

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Project

Project Name:	30219 R1 CCTV
Project Description:	CCTV Survey - Woodstock Road, Yarnton
Project Number:	30219
Project Status:	Complete
Project Date:	02/08/2021
Inspection Standard:	MSCC5 Sewers & Drainage GB (SRM5 Scoring)

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Table of Contents

Project Name	Project Number	Project Date
30219 R1 CCTV	30219	02/08/2021

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Section: 2; MH4 > MH5 (MH4X) 3
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Project Information

Project Name	Project Number	Project Date
30219 R1 CCTV	30219	02/08/2021

Client

Company: Touchstone Housing Association
Contact: Nigel Hawkey

Site

Street: Woodstock Road
Town or City: Yarnton
County: Oxfordshire
Post Code: OX5 1PU

Contractor

Company: MK Surveys
Contact: Matthew Wingrove
Department: CCTV Department
Street: 1 Potters Lane, Kiln Farm
Town or City: Milton Keynes
County: Buckinghamshire
Post Code: MK11 3HE
Phone: 01908 565561
Mobile: 07737738986
Email: matt.wingrove@mksurveys.co.uk

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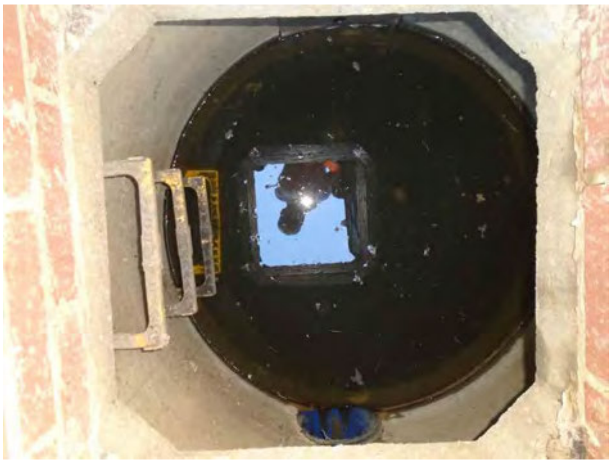
Project Pictures

Project Name	Project Number	Project Date
30219 R1 CCTV	30219	02/08/2021


Inlet1


Inlet2


MH1


MH2


MH3


MH4

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Project Pictures

Project Name	Project Number	Project Date
30219 R1 CCTV	30219	02/08/2021


MH5


MH6


MH7


Inlet100


MH100


MH101

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Section Inspection - 02/08/2021 - Inlet2X

Section	Inspection	Date	Time	Client`s Job Ref	Weather	Pre Cleaned	PLR
1	1	02/08/21	10:17	Not Specified	No Rain Or Snow	No	INLET2X
Operator		**Vehicle**		**Camera**	**Preset Length**	**Legal Status**	**Alternative ID**
ACH		PO18 WLD		Proteus2	Not Specified	Not Specified	Not Specified

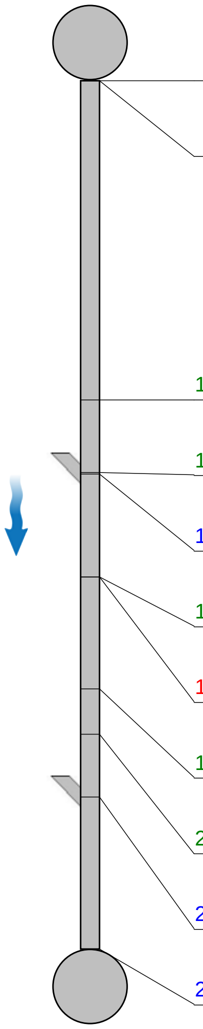
Town or Village:	Yarnton	**Inspection Direction:**	Downstream	**Upstream Node:**	INLET2
Road:	Woodstock Road	**Inspected Length:**	28.26 m	**Upstream Pipe Depth:**	
Location:		**Total Length:**	28.26 m	**Downstream Node:**	MH4
Surface Type:		**Joint Length:**	0.00 m	**Downstream Pipe Depth:**	

Use:	Surface water	**Pipe Shape:**	Circular
Type of Pipe:	Gravity drain/sewer	**Dia/Height:**	450 mm
Year Constructed:		**Material:**	Concrete
Flow Control:	No flow control	**Lining Type:**	No Lining
Inspection Purpose:	Sample condition survey	**Lining Material:**	No Lining

Comments:
Recommendations:

Scale: 1:246

Depth: m
Inlet2



MH4
Depth: m

Position [m]	Code	Observation	MPEG	Photo	Grade
0.00	MH	Start node type, manhole, reference number: Inlet2: Downstream	00:00:00		
0.00	WL	Water level, 5% of the vertical dimension	00:00:00		
10.39	DEEJ	Attached deposits, encrustation at joint from 7 o'clock to 8 o'clock, 5% cross-sectional area loss	00:00:46		3
12.76	LR	Line deviates right: Slight	00:00:55		
12.81	CN	Connection other than junction at 2 o'clock, diameter: 150mm	00:00:56		
16.16	LL	Line deviates left: Slight	00:01:10		
16.16	HJ	Hole in drain or sewer at joint from 1 o'clock to 4 o'clock	00:01:19	1-1-7A	5
19.79	LR	Line deviates right: Slight	00:01:37		
21.26	LR	Line deviates right: Slight	00:01:43		
23.32	CN	Connection other than junction at 1 o'clock, diameter: 150mm	00:01:50		
28.26	CPF	Finish node type, catchpit, reference number: MH4	00:02:11		

Construction Features					Miscellaneous Features				
Structural Defects					Service & Operational Observations				
STR No. Def	**STR Peak**	**STR Mean**	**STR Total**	**STR Grade**	**SER No. Def**	**SER Peak**	**SER Mean**	**SER Total**	**SER Grade**
1	165.0	7.1	165.0	5.0	1	2.0	0.1	2.0	3.0

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Section Pictures - 02/08/2021 - Inlet2X

Section	Inspection Direction	PLR	Client`s Job Ref	Contractor`s Job Ref
1	Downstream	INLET2X		30219 R1

1-1-7A, 00:01:19, 16.16 m
Hole in drain or sewer at joint from 1 o'clock to 4 o'clock

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Section Inspection - 02/08/2021 - MH4X

Section	Inspection	Date	Time	Client`s Job Ref	Weather	Pre Cleaned	PLR
2	3	02/08/21	10:41	Not Specified	No Rain Or Snow	No	MH4X

Operator	Vehicle	Camera	Preset Length	Legal Status	Alternative ID
ACH	PO18 WLD	Proteus2	Not Specified	Not Specified	Not Specified

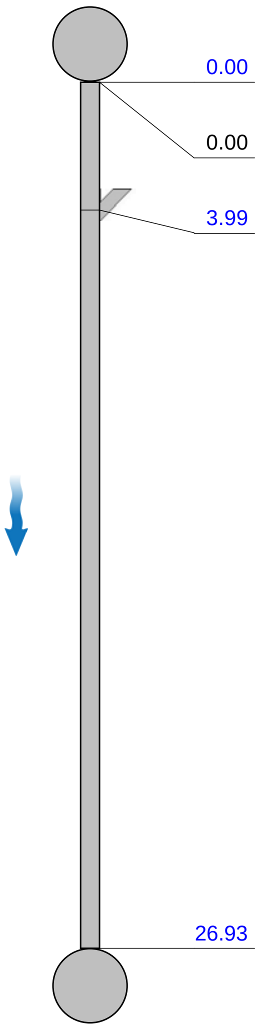
Town or Village:	Yarnton	**Inspection Direction:**	Downstream	**Upstream Node:**	MH4
Road:	Woodstock Road	**Inspected Length:**	26.93 m	**Upstream Pipe Depth:**	
Location:		**Total Length:**	26.93 m	**Downstream Node:**	MH5
Surface Type:		**Joint Length:**	0.00 m	**Downstream Pipe Depth:**	

Use:	Surface water	**Pipe Shape:**	Circular
Type of Pipe:	Gravity drain/sewer	**Dia/Height:**	450 mm
Year Constructed:		**Material:**	Concrete
Flow Control:	No flow control	**Lining Type:**	No Lining
Inspection Purpose:	Sample condition survey	**Lining Material:**	No Lining

Comments:
Recommendations:

Scale: 1:235

Depth: m
MH4



Position [m]	Code	Observation	MPEG	Photo	Grade
0.00	MH	Start node type, manhole, reference number: MH4: Run X	00:00:00		
0.00	WL	Water level, 5% of the vertical dimension	00:00:00		
3.99	CN	Connection other than junction at 9 o'clock, diameter: 150mm	00:00:22		
26.93	MHF	Finish node type, manhole, reference number: MH5	00:01:58		

MH5
Depth: m

Construction Features					Miscellaneous Features				
Structural Defects					Service & Operational Observations				
STR No. Def	**STR Peak**	**STR Mean**	**STR Total**	**STR Grade**	**SER No. Def**	**SER Peak**	**SER Mean**	**SER Total**	**SER Grade**
0	0.0	0.0	0.0	1.0	0	0.0	0.0	0.0	1.0

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Section Inspection - 02/08/2021 - MH5X

Section	Inspection	Date	Time	Client`s Job Ref	Weather	Pre Cleaned	PLR
3	4	02/08/21	10:53	Not Specified	No Rain Or Snow	No	MH5X

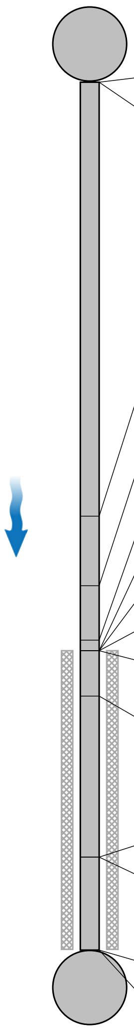
Operator	Vehicle	Camera	Preset Length	Legal Status	Alternative ID
ACH	PO18 WLD	Proteus2	Not Specified	Not Specified	Not Specified

Town or Village:	Yarnton	**Inspection Direction:**	Downstream	**Upstream Node:**	MH5
Road:	Woodstock Road	**Inspected Length:**	76.84 m	**Upstream Pipe Depth:**	
Location:		**Total Length:**	76.84 m	**Downstream Node:**	OUTFALL2
Surface Type:		**Joint Length:**	0.00 m	**Downstream Pipe Depth:**	

Use:	Surface water	**Pipe Shape:**	Circular
Type of Pipe:	Gravity drain/sewer	**Dia/Height:**	600 mm
Year Constructed:		**Material:**	Concrete
Flow Control:	No flow control	**Lining Type:**	No Lining
Inspection Purpose:	Sample condition survey	**Lining Material:**	No Lining

Comments:
Recommendations:

Depth: m
MH5



Outfall2
Depth: m

Scale: 1:669 Position [m]		Code	Observation	MPEG	Photo	Grade
0.00		CP	Start node type, catchpit, reference number: MH5: Run X	00:00:00		
0.00		WL	Water level, 5% of the vertical dimension	00:00:00		
38.41		HJ	Hole in drain or sewer at joint from 12 o'clock to 2 o'clock	00:02:39	3-4-3A	4
44.58		MCPVC	Pipe material changes to polyvinyl chloride at this point	00:03:04		
49.41		LL	Line deviates left: Slight	00:04:02		
50.37		LR	Line deviates right: Slight	00:04:06		
50.37		MCCO	Pipe material changes to concrete at this point	00:04:06		
50.37	S01	DES	Settled deposits, fine, 10% cross-sectional area loss, start	00:04:06		
50.37		WL	Water level, 10% of the vertical dimension	00:04:06		
54.38		RPL	Point repair, localised lining from 10 o'clock to 1 o'clock	00:04:24		
68.61		LR	Line deviates right: Slight	00:05:32		
68.61		WL	Water level, 30% of the vertical dimension	00:05:32		
76.84	F01	DES	Settled deposits, fine, 10% cross-sectional area loss, finish	00:06:18		3
76.84		OFF	Finish node type, outfall, reference number: Outfall2	00:06:18		

Construction Features					Miscellaneous Features				
Structural Defects					Service & Operational Observations				
STR No. Def	**STR Peak**	**STR Mean**	**STR Total**	**STR Grade**	**SER No. Def**	**SER Peak**	**SER Mean**	**SER Total**	**SER Grade**
1	80.0	1.0	80.0	4.0	1	2.0	0.7	54.0	3.0

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Section Pictures - 02/08/2021 - MH5X

Section	Inspection Direction	PLR	Client`s Job Ref	Contractor`s Job Ref
3	Downstream	MH5X		30219 R1

3-4-3A, 00:02:39, 38.41 m
Hole in drain or sewer at joint from 12 o'clock to 2 o'clock

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Section Inspection - 02/08/2021 - Inlet1X

Section	Inspection	Date	Time	Client`s Job Ref	Weather	Pre Cleaned	PLR
4	2	02/08/21	10:29	Not Specified	No Rain Or Snow	No	INLET1X

Operator	Vehicle	Camera	Preset Length	Legal Status	Alternative ID
ACH	PO18 WLD	Proteus2	Not Specified	Not Specified	Not Specified

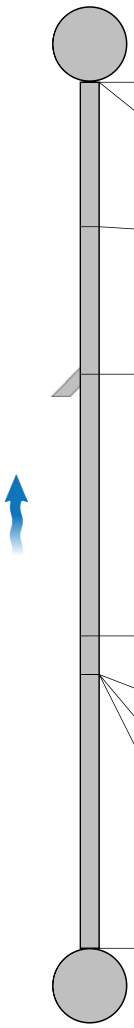
Town or Village:	Yarnton	**Inspection Direction:**	Upstream	**Upstream Node:**	INLET1
Road:	Woodstock Road	**Inspected Length:**	18.21 m	**Upstream Pipe Depth:**	
Location:		**Total Length:**	18.21 m	**Downstream Node:**	MH2
Surface Type:		**Joint Length:**	0.00 m	**Downstream Pipe Depth:**	

Use:	Surface water	**Pipe Shape:**	Circular
Type of Pipe:	Gravity drain/sewer	**Dia/Height:**	225 mm
Year Constructed:		**Material:**	Polyvinyl chloride
Flow Control:	No flow control	**Lining Type:**	No Lining
Inspection Purpose:	Sample condition survey	**Lining Material:**	No Lining

Comments:
Recommendations:

Scale: 1:159

Depth: m
MH2



Position [m]	Code	Observation	MPEG	Photo	Grade
0.00	CP	Start node type, catchpit, reference number: MH2: Run A	00:00:00		
0.00	WL	Water level, 5% of the vertical dimension	00:00:00		
3.04	WL	Water level, 0% of the vertical dimension	00:00:25		
6.14	JN	Junction at 3 o'clock, diameter: 150mm	00:00:43		
11.64	WL	Water level, 5% of the vertical dimension	00:01:17		
12.46	LR	Line deviates right: Slight	00:01:22		
12.46	LU	Line deviates up	00:01:22		
12.46	WL	Water level, 0% of the vertical dimension	00:01:22		
18.21	OCF	Finish node type, other special chamber, reference number: Inlet1: Inlet	00:02:08		

Inlet1
Depth: m

Construction Features					Miscellaneous Features				
Structural Defects					Service & Operational Observations				
STR No. Def	**STR Peak**	**STR Mean**	**STR Total**	**STR Grade**	**SER No. Def**	**SER Peak**	**SER Mean**	**SER Total**	**SER Grade**
0	0.0	0.0	0.0	1.0	0	0.0	0.0	0.0	1.0

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Section Inspection - 02/08/2021 - Inlet3X

Section	Inspection	Date	Time	Client`s Job Ref	Weather	Pre Cleaned	PLR
5	5	02/08/21	11:14	Not Specified	No Rain Or Snow	No	INLET3X

Operator	Vehicle	Camera	Preset Length	Legal Status	Alternative ID
ACH	PO18 WLD	Proteus2	Not Specified	Not Specified	Not Specified

Town or Village:	Yarnton	**Inspection Direction:**	Upstream	**Upstream Node:**	INLET3
Road:	Woodstock Road	**Inspected Length:**	4.11 m	**Upstream Pipe Depth:**	
Location:		**Total Length:**	4.11 m	**Downstream Node:**	MH6
Surface Type:		**Joint Length:**	0.00 m	**Downstream Pipe Depth:**	

Use:	Surface water	**Pipe Shape:**	Circular
Type of Pipe:	Gravity drain/sewer	**Dia/Height:**	300 mm
Year Constructed:		**Material:**	Vitrified clay
Flow Control:	No flow control	**Lining Type:**	No Lining
Inspection Purpose:	Sample condition survey	**Lining Material:**	No Lining

Comments:
Recommendations:

Scale: 1:50

Depth: m
MH6

Position [m]	Code	Observation	MPEG	Photo	Grade
0.00	MH	Start node type, manhole, reference number: MH6: Run A	00:00:00		
0.00	WL	Water level, 0% of the vertical dimension	00:00:00		
0.00	HJ	Hole in drain or sewer at joint from 9 o'clock to 11 o'clock	00:00:03	5-5-3A	4
1.46	RFJ	Roots, fine at joint	00:00:12		2
4.11	OBX	Other obstacles, other object in invert from 12 o'clock to 12 o'clock, 100% cross-sectional area loss: Ditch needs regrading	00:00:36	5-5-5A	5
4.11	OCF	Finish node type, other special chamber, reference number: Inlet3: Inlet	00:00:37		

Inlet3
Depth: m

Construction Features					Miscellaneous Features				
Structural Defects					Service & Operational Observations				
STR No. Def	**STR Peak**	**STR Mean**	**STR Total**	**STR Grade**	**SER No. Def**	**SER Peak**	**SER Mean**	**SER Total**	**SER Grade**
1	80.0	19.5	80.0	4.0	2	10.0	2.7	11.0	5.0

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Section Pictures - 02/08/2021 - Inlet3X

Section	Inspection Direction	PLR	Client`s Job Ref	Contractor`s Job Ref
5	Upstream	INLET3X		30219 R1

5-5-3A, 00:00:03, 0.00 m
Hole in drain or sewer at joint from 9 o'clock to 11 o'clock

5-5-5A, 00:00:36, 4.11 m
Other obstacles, other object in invert from 12 o'clock to 12 o'clock, 100% cross-sectional area loss, Ditch needs regrading

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Section Inspection - 02/08/2021 - MH6X

Section	Inspection	Date	Time	Client`s Job Ref	Weather	Pre Cleaned	PLR
6	6	02/08/21	11:26	Not Specified	No Rain Or Snow	No	MH6X

Operator	Vehicle	Camera	Preset Length	Legal Status	Alternative ID
ACH	PO18 WLD	Proteus2	Not Specified	Not Specified	Not Specified

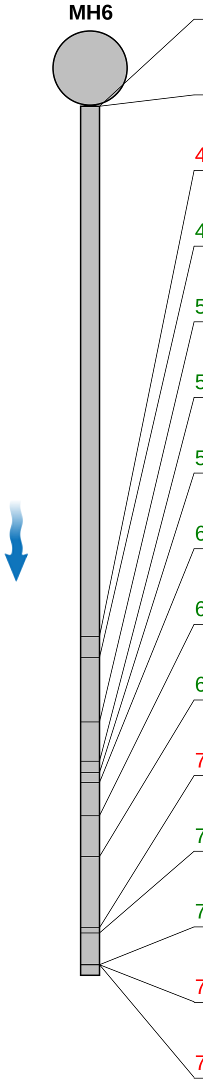
Town or Village:	Yarnton	**Inspection Direction:**	Downstream	**Upstream Node:**	MH6
Road:	Woodstock Road	**Inspected Length:**	93.32 m	**Upstream Pipe Depth:**	
Location:		**Total Length:**	93.32 m	**Downstream Node:**	MH7
Surface Type:		**Joint Length:**	0.00 m	**Downstream Pipe Depth:**	

Use:	Surface water	**Pipe Shape:**	Circular
Type of Pipe:	Gravity drain/sewer	**Dia/Height:**	300 mm
Year Constructed:		**Material:**	Vitrified clay
Flow Control:	No flow control	**Lining Type:**	No Lining
Inspection Purpose:	Sample condition survey	**Lining Material:**	No Lining

Comments:
Recommendations:

Scale: 1:671

Depth: m
MH6



Position [m]	Code	Observation	MPEG	Photo	Grade
0.00	CP	Start node type, catchpit, reference number: MH6: Run X	00:00:00		
0.00	WL	Water level, 0% of the vertical dimension	00:00:00		
47.06	CCJ	Crack, circumferential at joint from 1 o'clock to 2 o'clock	00:03:22		2 / 2
48.95	RFJ	Roots, fine at joint	00:03:30		2
54.63	LL	Line deviates left: Slight	00:03:54		
58.12	RFJ	Roots, fine at joint	00:04:09		2
59.17	RMJ	Roots, mass at joint, 5% cross-sectional area loss	00:04:14		3
60.02	RMJ	Roots, mass at joint, 5% cross-sectional area loss	00:04:18		3
63.00	RFJ	Roots, fine at joint	00:04:33		2
66.57	RFJ	Roots, fine at joint	00:04:53		2
72.89	JDM	Joint displaced, medium	00:05:27	6-6-11A	1 / 3
73.40	LR	Line deviates right: Slight	00:05:29		
76.21	OBM	Other obstacles, pipe material in invert from 6 o'clock to 8 o'clock, 10% cross-sectional area loss	00:05:42		5
76.21	HJ	Hole in drain or sewer at joint from 11 o'clock to 1 o'clock	00:05:42	6-6-14A	4
76.21	FCJ	Fracture, circumferential at joint from 7 o'clock to 11 o'clock	00:05:42		3 / 2

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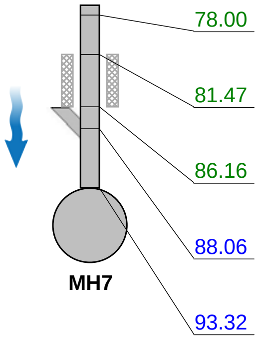
Section Inspection - 02/08/2021 - MH6X

Section	Inspection	Date	Time	Client`s Job Ref	Weather	Pre Cleaned	PLR
6	6	02/08/21	11:26	Not Specified	No Rain Or Snow	No	MH6X

Operator	Vehicle	Camera	Preset Length	Legal Status	Alternative ID
ACH	PO18 WLD	Proteus2	Not Specified	Not Specified	Not Specified

Scale: 1:671



Position [m]		Code	Observation	MPEG	Photo	Grade
78.00		RFJ	Roots, fine at joint	00:06:03		2
81.47	S01	RF	Roots, fine, start	00:06:22		
86.16	F01	RF	Roots, fine, finish	00:06:44		2
88.06		CN	Connection other than junction at 2 o'clock, diameter: 150mm	00:06:54		
93.32		MHF	Finish node type, manhole, reference number: MH7	00:07:21		

Depth: m

Construction Features					Miscellaneous Features				
Structural Defects					Service & Operational Observations				
STR No. Def	**STR Peak**	**STR Mean**	**STR Total**	**STR Grade**	**SER No. Def**	**SER Peak**	**SER Mean**	**SER Total**	**SER Grade**
4	120.0	1.5	131.0	4.0	12	11.0	0.4	32.0	5.0

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Section Pictures - 02/08/2021 - MH6X

Section	Inspection Direction	PLR	Client`s Job Ref	Contractor`s Job Ref
6	Downstream	MH6X		30219 R1

6-6-11A, 00:05:27, 72.89 m
Joint displaced, medium

6-6-14A, 00:05:42, 76.21 m
Hole in drain or sewer at joint from 11 o'clock to 1 o'clock

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Section Inspection - 02/08/2021 - MH3X

Section	Inspection	Date	Time	Client`s Job Ref	Weather	Pre Cleaned	PLR
7	7	02/08/21	11:57	Not Specified	No Rain Or Snow	No	MH3X

Operator	Vehicle	Camera	Preset Length	Legal Status	Alternative ID
ACH	PO18 WLD	Proteus2	Not Specified	Not Specified	Not Specified

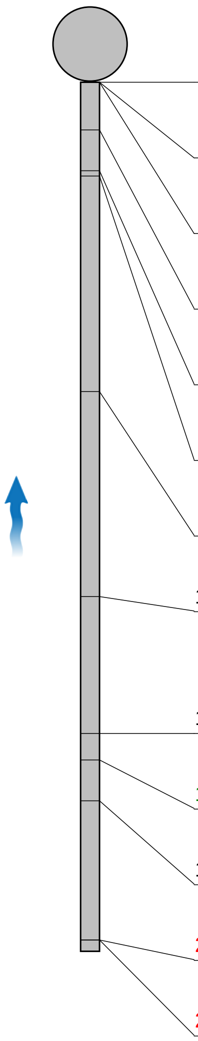
Town or Village:	Yarnton	**Inspection Direction:**	Upstream	**Upstream Node:**	MH3
Road:	Woodstock Road	**Inspected Length:**	20.61 m	**Upstream Pipe Depth:**	
Location:		**Total Length:**	20.61 m	**Downstream Node:**	OUTLET1
Surface Type:		**Joint Length:**	0.00 m	**Downstream Pipe Depth:**	

Use:	Surface water	**Pipe Shape:**	Circular
Type of Pipe:	Gravity drain/sewer	**Dia/Height:**	150 mm
Year Constructed:		**Material:**	Polyvinyl chloride
Flow Control:	No flow control	**Lining Type:**	No Lining
Inspection Purpose:	Sample condition survey	**Lining Material:**	No Lining

Comments:
Recommendations:

Scale: 1:177

Depth: m
Outlet1



Position [m]	Code	Observation	MPEG	Photo	Grade
0.00	OC	Start node type, other special chamber, reference number: Outlet1: Upstream	00:00:00		
0.00	WL	Water level, 5% of the vertical dimension	00:00:00		
0.00	REM	General remark: Filter drain. Multiple kinks and deviations along line	00:00:00		
1.13	LR	Line deviates right	00:00:15		
2.08	WL	Water level, 10% of the vertical dimension	00:00:22		
2.20	WL	Water level, 25% of the vertical dimension	00:00:29		
7.24	WL	Water level, 5% of the vertical dimension	00:01:04		
12.05	WL	Water level, 20% of the vertical dimension	00:01:33		
15.24	WL	Water level, 5% of the vertical dimension	00:01:52		
15.87	RFJ	Roots, fine at joint	00:01:56		2
16.82	WL	Water level, 40% of the vertical dimension	00:02:03		
20.08	D	Deformed sewer or drain, 20%	00:02:28	7-7-12A	3 / 4
20.08	FM	Fractures, multiple from 12 o'clock to 12 o'clock	00:02:28	7-7-13A	4 / 2

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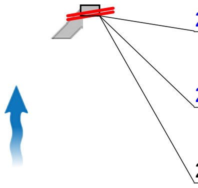
Section Inspection - 02/08/2021 - MH3X

Section	Inspection	Date	Time	Client`s Job Ref	Weather	Pre Cleaned	PLR
7	7	02/08/21	11:57	Not Specified	No Rain Or Snow	No	MH3X

Operator	Vehicle	Camera	Preset Length	Legal Status	Alternative ID
ACH	PO18 WLD	Proteus2	Not Specified	Not Specified	Not Specified



Scale: 1:177	Position [m]	Code	Observation	MPEG	Photo	Grade
	20.61	JN	Junction at 3 o'clock, diameter: 150mm	00:03:14		
	20.61	MCVC	Pipe material changes to vitrified clay at this point	00:03:15		
	20.61	SA	Survey abandoned: Unable to continue, unable to pass deformation in pipe	00:03:15	7-7-16A	

Construction Features					Miscellaneous Features				
Structural Defects					Service & Operational Observations				
STR No. Def	STR Peak	STR Mean	STR Total	STR Grade	SER No. Def	SER Peak	SER Mean	SER Total	SER Grade
2	120.0	5.8	120.0	4.0	3	6.0	0.3	7.0	4.0

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Section Pictures - 02/08/2021 - MH3X

Section	Inspection Direction	PLR	Client`s Job Ref	Contractor`s Job Ref
7	Upstream	MH3X		30219 R1

7-7-12A, 00:02:28, 20.08 m
Deformed sewer or drain, 20%

7-7-13A, 00:02:28, 20.08 m
Fractures, multiple from 12 o'clock to 12 o'clock

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Section Pictures - 02/08/2021 - MH3X

Section	Inspection Direction	PLR	Client`s Job Ref	Contractor`s Job Ref
7	Upstream	MH3X		30219 R1

7-7-16A, 00:03:15, 20.61 m
Survey abandoned, Unable to continue, unable to pass deformation in pipe

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Section Inspection - 13/10/2021 - Inlet100X

Section	Inspection	Date	Time	Client`s Job Ref	Weather	Pre Cleaned	PLR
8	8	13/10/21	15:34	Not Specified	No Rain Or Snow	No	INLET100X

Operator	Vehicle	Camera	Preset Length	Legal Status	Alternative ID
ACH	PO18 WLD	Proteus2	Not Specified	Not Specified	Not Specified

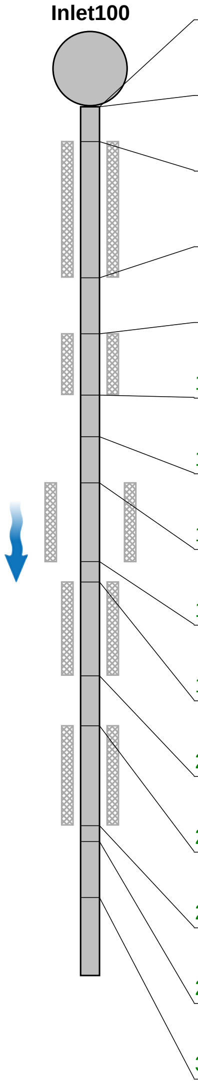
Town or Village:	Yarnton	**Inspection Direction:**	Downstream	**Upstream Node:**	INLET100
Road:	Woodstock Road	**Inspected Length:**	104.58 m	**Upstream Pipe Depth:**	
Location:		**Total Length:**	104.58 m	**Downstream Node:**	MH103
Surface Type:		**Joint Length:**	0.00 m	**Downstream Pipe Depth:**	

Use:	Surface water	**Pipe Shape:**	Circular
Type of Pipe:	Gravity drain/sewer	**Dia/Height:**	300 mm
Year Constructed:		**Material:**	Concrete
Flow Control:	No flow control	**Lining Type:**	No Lining
Inspection Purpose:	Sample condition survey	**Lining Material:**	No Lining

Comments:
Recommendations:

Scale: **1:299**

Depth: m
Inlet100



Position [m]		Code	Observation	MPEG	Photo	Grade
0.00		MH	Start node type, manhole, reference number: Inlet100: Run X	00:00:00		
0.00		WL	Water level, 5% of the vertical dimension	00:00:03		
1.40	S01	LR	Line deviates right, start: Sweeping	00:00:14		
6.77	F01	LR	Line deviates right, finish: Sweeping	00:00:51		
8.98	S02	LL	Line deviates left, start: Sweeping	00:01:10		
11.40	F02	LL	Line deviates left, finish: Sweeping	00:01:30		
13.06		LR	Line deviates right: Slight	00:01:40		
14.87	S03	LL	Line deviates left, start: Sweeping	00:01:54		
17.98	F03	LL	Line deviates left, finish: Sweeping	00:02:29		
18.80	S04	LR	Line deviates right, start: Sweeping	00:02:35		
22.50	F04	LR	Line deviates right, finish: Sweeping	00:02:58		
24.47	S05	LL	Line deviates left, start: Sweeping	00:03:10		
28.41	F05	LL	Line deviates left, finish: Sweeping	00:03:33		
29.06		LR	Line deviates right: Slight	00:03:37		
31.26		LL	Line deviates left: Slight	00:03:48		

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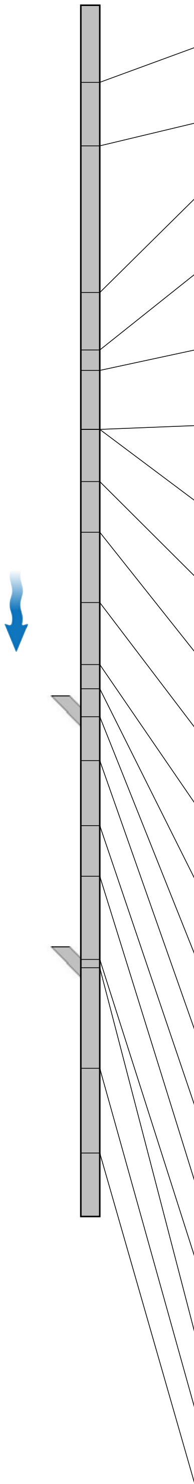
Section Inspection - 13/10/2021 - Inlet100X

Section	Inspection	Date	Time	Client`s Job Ref	Weather	Pre Cleaned	PLR
8	8	13/10/21	15:34	Not Specified	No Rain Or Snow	No	INLET100X

Operator	Vehicle	Camera	Preset Length	Legal Status	Alternative ID
ACH	PO18 WLD	Proteus2	Not Specified	Not Specified	Not Specified

Scale: 1:299



Position [m]	Code	Observation	MPEG	Photo	Grade
37.40	LR	Line deviates right: Slight	00:04:19		
39.92	LL	Line deviates left: Slight	00:04:32		
45.70	LR	Line deviates right: Slight	00:05:01		
47.97	WL	Water level, 10% of the vertical dimension	00:05:12		
48.79	LL	Line deviates left: Slight	00:05:15		
51.12	LL	Line deviates left: Slight	00:05:29		
51.12	WL	Water level, 5% of the vertical dimension	00:05:29		
53.18	LR	Line deviates right: Slight	00:05:42		
55.18	LR	Line deviates right: Slight	00:05:56		
57.97	LL	Line deviates left: Slight	00:06:08		
60.41	LD	Line deviates down	00:06:19		
61.37	WL	Water level, 50% of the vertical dimension	00:06:24		
62.48	CXI	Connection defective, connecting pipe is intruding at 3 o'clock, diameter: 100mm, intrusion: 15%	00:06:28		3
64.21	REM	General remark: Line levels out	00:06:35		
66.79	DEE	Attached deposits, encrustation from 5 o'clock to 7 o'clock, 10% cross-sectional area loss	00:06:49		3
68.79	RFJ	Roots, fine at joint	00:06:59		2
72.07	LR	Line deviates right: Slight	00:07:15		
72.42	CXI	Connection defective, connecting pipe is intruding at 2 o'clock, diameter: 100mm, intrusion: 10%	00:07:17		3
76.37	LR	Line deviates right: Slight	00:07:39		
79.73	LL	Line deviates left: Slight	00:07:56		

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Section Inspection - 13/10/2021 - Inlet100X

Section	Inspection	Date	Time	Client`s Job Ref	Weather	Pre Cleaned	PLR
8	8	13/10/21	15:34	Not Specified	No Rain Or Snow	No	INLET100X

Operator	Vehicle	Camera	Preset Length	Legal Status	Alternative ID
ACH	PO18 WLD	Proteus2	Not Specified	Not Specified	Not Specified

Scale: 1:299

Position [m]	Code	Observation	MPEG	Photo	Grade
84.74	LR	Line deviates right: Slight	00:08:27		
91.99	LR	Line deviates right: Slight	00:09:06		
96.83	LL	Line deviates left: Slight	00:09:32		
101.24	LL	Line deviates left: Slight	00:09:52		
104.58	CPF	Finish node type, catchpit, reference number: MH103	00:10:16		

MH103
Depth: m

Construction Features					Miscellaneous Features				
Structural Defects					Service & Operational Observations				
STR No. Def	STR Peak	STR Mean	STR Total	STR Grade	SER No. Def	SER Peak	SER Mean	SER Total	SER Grade
0	0.0	0.0	0.0	1.0	4	2.0	0.1	7.0	3.0

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Section Inspection - 13/10/2021 - MH102X

Section	Inspection	Date	Time	Client`s Job Ref	Weather	Pre Cleaned	PLR
9	9	13/10/21	16:02	Not Specified	No Rain Or Snow	No	MH102X
Operator		**Vehicle**		**Camera**	**Preset Length**	**Legal Status**	**Alternative ID**
ACH		PO18 WLD		Proteus2	Not Specified	Not Specified	Not Specified

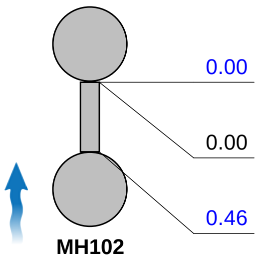
Town or Village:	Yarnton	**Inspection Direction:**	Upstream	**Upstream Node:**	MH102
Road:	Woodstock Road	**Inspected Length:**	0.46 m	**Upstream Pipe Depth:**	
Location:		**Total Length:**	0.46 m	**Downstream Node:**	MH100
Surface Type:		**Joint Length:**	0.00 m	**Downstream Pipe Depth:**	

Use:	Surface water	**Pipe Shape:**	Circular
Type of Pipe:	Gravity drain/sewer	**Dia/Height:**	450 mm
Year Constructed:		**Material:**	Concrete
Flow Control:	No flow control	**Lining Type:**	No Lining
Inspection Purpose:	Sample condition survey	**Lining Material:**	No Lining

Comments:
Recommendations:

Scale: 1:50

Depth: m
MH100



MH102
Depth: m

Position [m]	Code	Observation	MPEG	Photo	Grade
0.00	CP	Start node type, catchpit, reference number: MH100: Run B	00:00:00		
0.00	WL	Water level, 5% of the vertical dimension	00:00:00		
0.46	MHF	Finish node type, manhole, reference number: MH102: Buried	00:00:09		

Construction Features					Miscellaneous Features				
Structural Defects					Service & Operational Observations				
STR No. Def	**STR Peak**	**STR Mean**	**STR Total**	**STR Grade**	**SER No. Def**	**SER Peak**	**SER Mean**	**SER Total**	**SER Grade**
0	0.0	0.0	0.0	1.0	0	0.0	0.0	0.0	1.0

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Section Inspection - 13/10/2021 - MH103X

Section	Inspection	Date	Time	Client`s Job Ref	Weather	Pre Cleaned	PLR
10	10	13/10/21	16:04	Not Specified	No Rain Or Snow	No	MH103X

Operator	Vehicle	Camera	Preset Length	Legal Status	Alternative ID
ACH	PO18 WLD	Proteus2	Not Specified	Not Specified	Not Specified

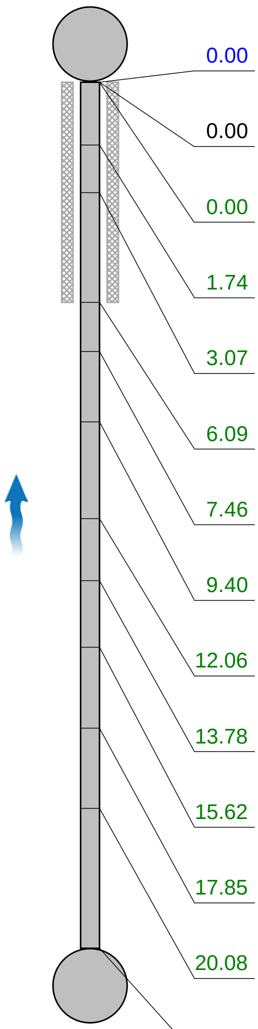
Town or Village:	Yarnton	**Inspection Direction:**	Upstream	**Upstream Node:**	MH103
Road:	Woodstock Road	**Inspected Length:**	23.94 m	**Upstream Pipe Depth:**	
Location:		**Total Length:**	23.94 m	**Downstream Node:**	MH102
Surface Type:		**Joint Length:**	0.00 m	**Downstream Pipe Depth:**	

Use:	Surface water	**Pipe Shape:**	Circular
Type of Pipe:	Gravity drain/sewer	**Dia/Height:**	300 mm
Year Constructed:		**Material:**	Concrete
Flow Control:	No flow control	**Lining Type:**	No Lining
Inspection Purpose:	Sample condition survey	**Lining Material:**	No Lining

Comments:
Recommendations:

Scale: 1:209

Depth: m
MH102



MH103
Depth: m

Position [m]		Code	Observation	MPEG	Photo	Grade
0.00		MH	Start node type, manhole, reference number: MH102: Run A	00:00:00		
0.00		WL	Water level, 10% of the vertical dimension	00:00:00		
0.00	S01	RM	Roots, mass, 10% cross-sectional area loss, start	00:00:00		
1.74		LR	Line deviates right: Slight	00:00:16		
3.07		LR	Line deviates right: Slight	00:00:24		
6.09	F01	RM	Roots, mass, 10% cross-sectional area loss, finish	00:01:13		3
7.46		RF	Roots, fine	00:01:20		2
9.40		LL	Line deviates left: Slight	00:01:29		
12.06		LR	Line deviates right: Slight	00:01:41		
13.78		LL	Line deviates left: Slight	00:01:49		
15.62		LL	Line deviates left: Slight	00:01:57		
17.85		LR	Line deviates right: Slight	00:02:07		
20.08		LR	Line deviates right: Slight	00:02:17		
23.94		CPF	Finish node type, catchpit, reference number: MH103	00:02:38		

Construction Features					Miscellaneous Features				
Structural Defects					Service & Operational Observations				
STR No. Def	**STR Peak**	**STR Mean**	**STR Total**	**STR Grade**	**SER No. Def**	**SER Peak**	**SER Mean**	**SER Total**	**SER Grade**
0	0.0	0.0	0.0	1.0	2	4.0	1.4	29.0	3.0

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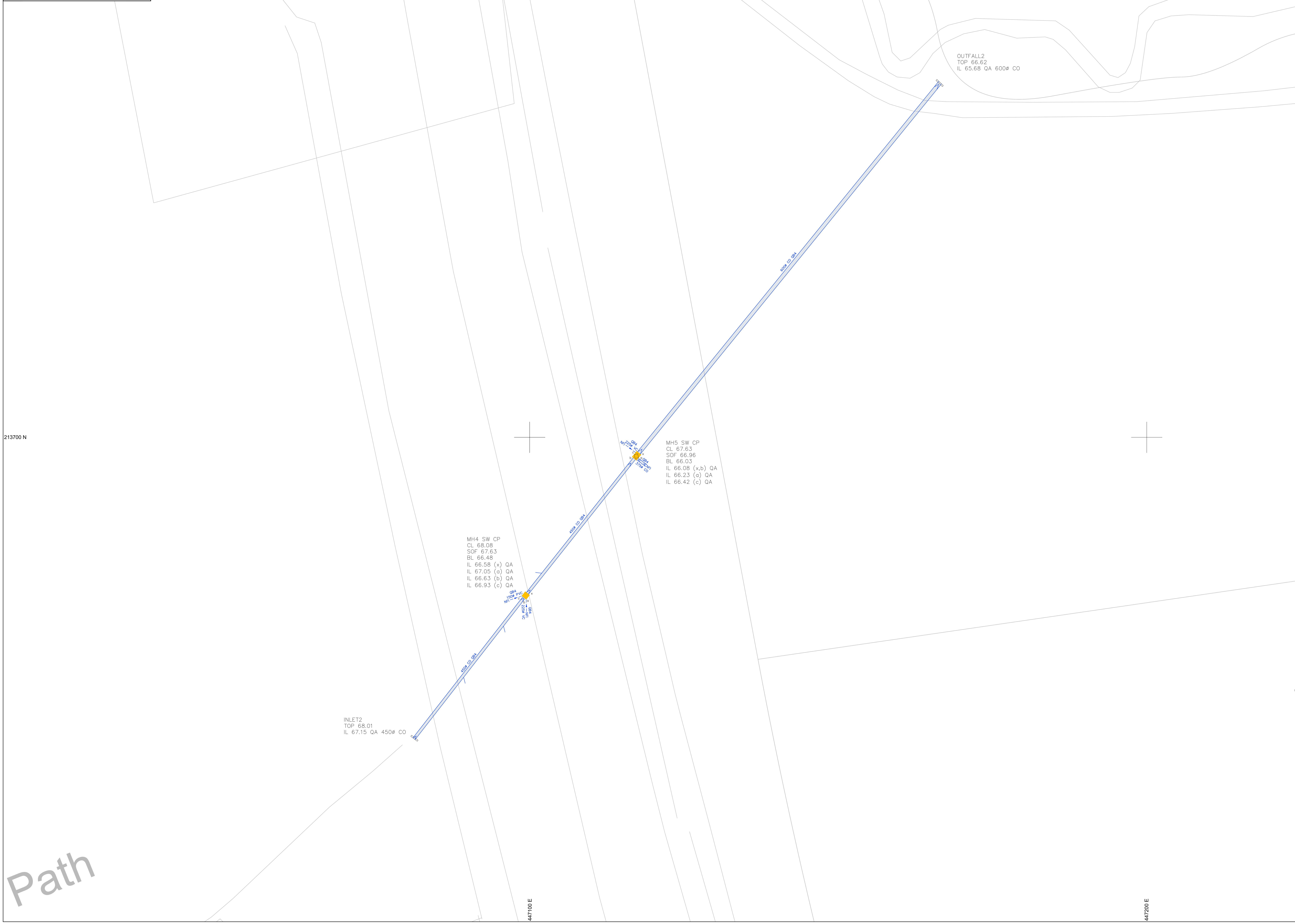

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SHEET LAYOUT (not to scale):

1

2

3

N

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0m 2 4 6 8 10 12 14 16 18 20 22

Drainage and CCTV Survey

Merton College

Land off Woodstock Road
Yarnton
Oxfordshire

Scale:	Sheet Size:	Sheet Number:	Date:
1:200	A0	1	July 2021

Project Number:	Rev:	Surveyed by:	Checked by:	Approved by:
30219	1	ACH	MPW	MPW

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

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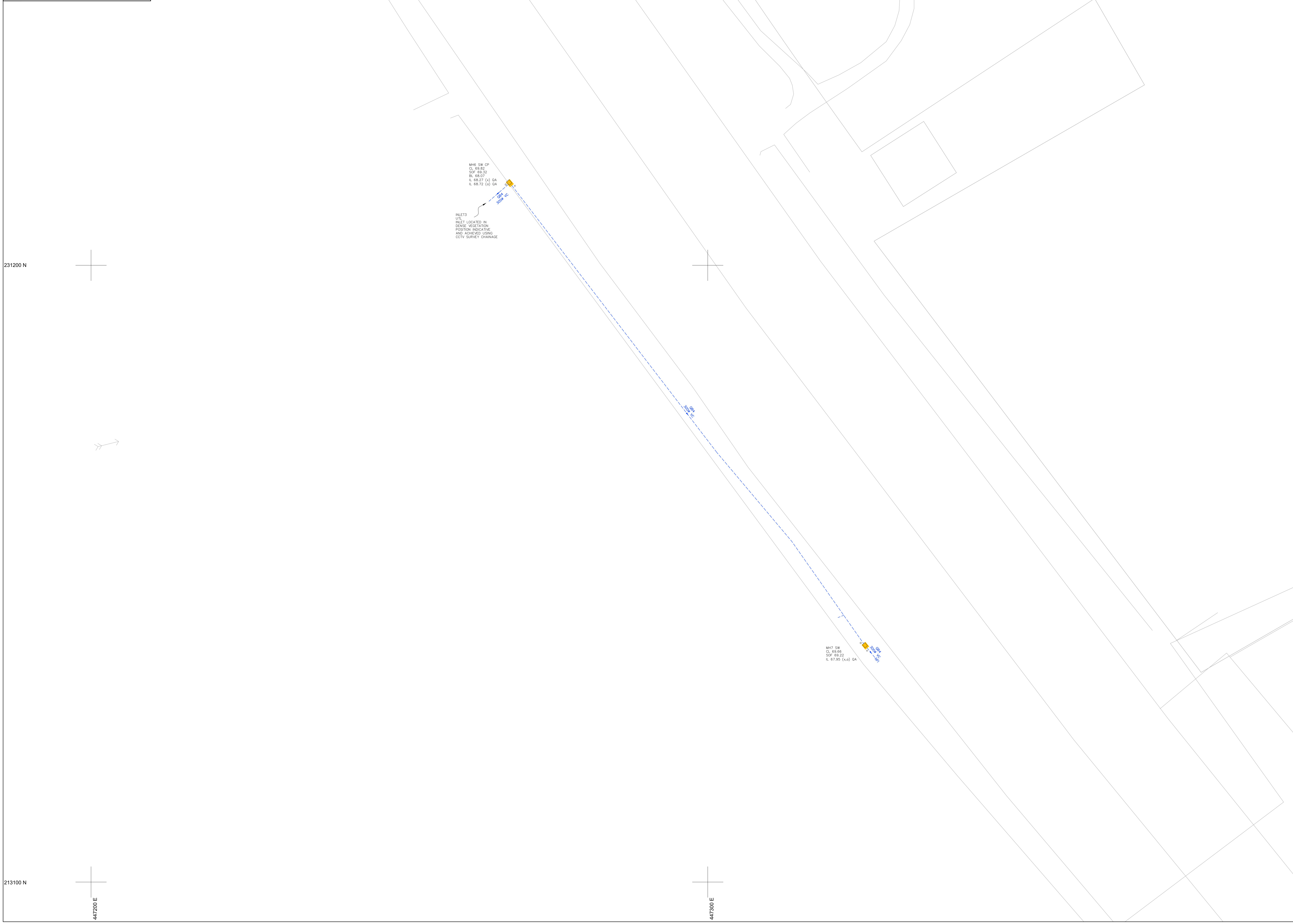

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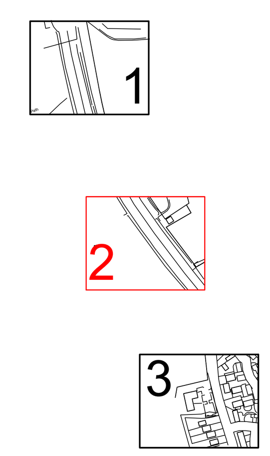

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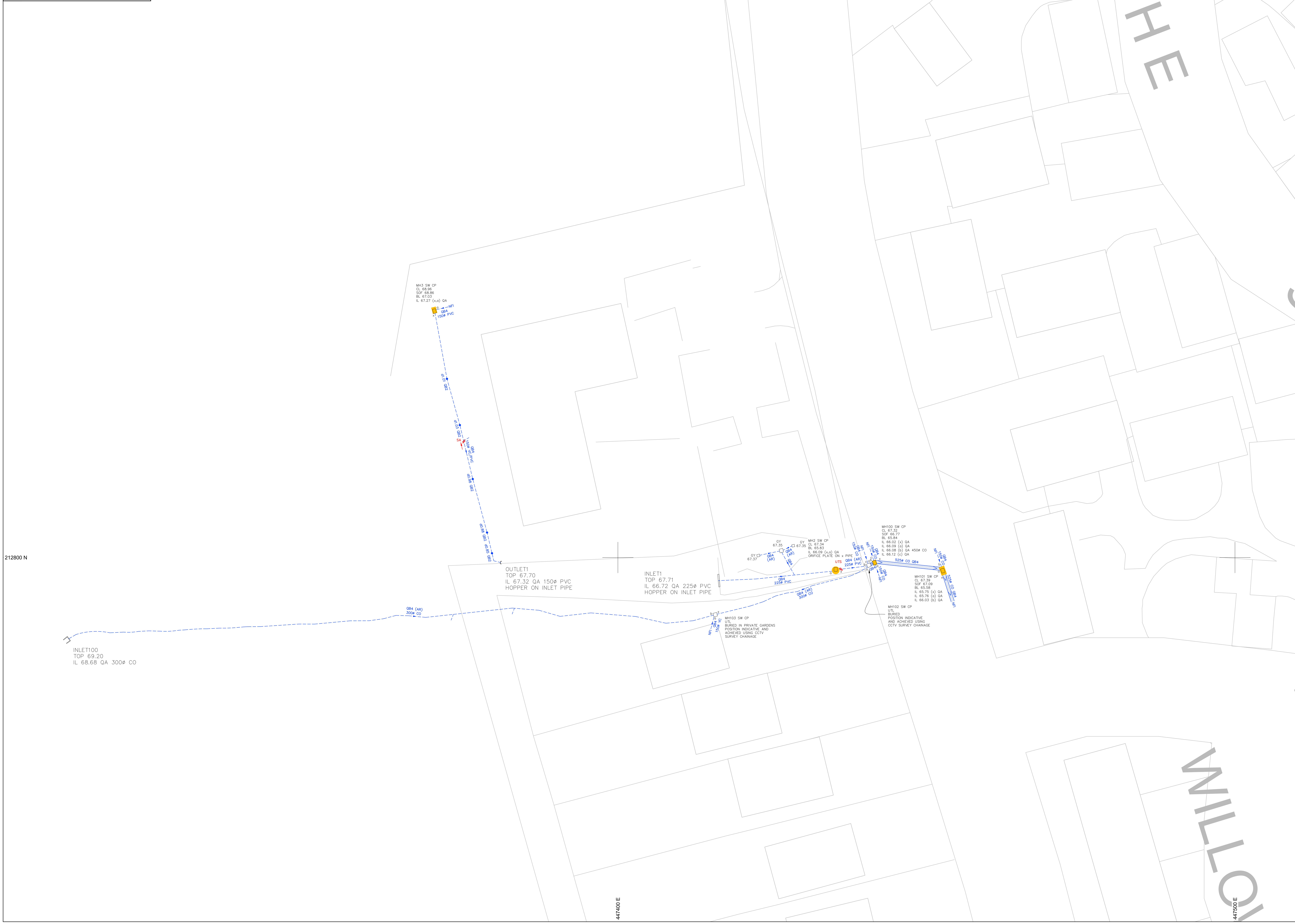

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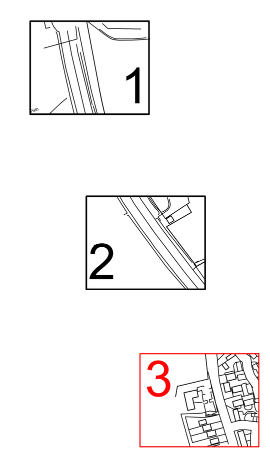

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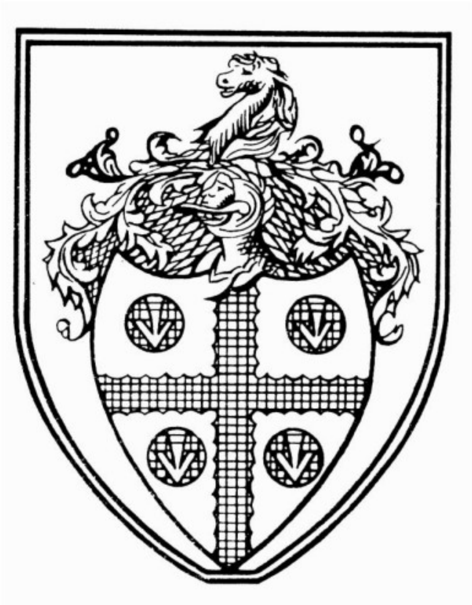
Premium Environmental Services

YARNTON

OXFORDSHIRE



DRAINAGE INVESTIGATION REPORT

MARCH 2022

www.premium-es.co.uk

The Workshop Business Centre, Main Street, Pinvin, Worcestershire. WR10 2ES Tel. 01386 555895

Yarnton,Oxfordsihre

The survey was undertaken to confirm the routes taken by various storm drainage. Along with this we also surveyed some foul manholes to the north of the main survey site. The survey was split into 4 main

The results are included in the report as follows:

“Southern Outfall”- Woodstock Road Outfall Headwall.

Section carried on Downstream from original survey of culvert adjacent to the medical centre to the highway drainage run on Woodstock road. CCTV/MH/Connectivety details were recorded on this section.

“Central Outfall”- Woodstock Road Drainage MH S105.

Section covered the Downstream length of storm drainage from the infall headwall to its connection point with the storm run from the Southern Outfall(at MH S105).Connectivety/MH details were recorded on this run.

“Cassington Road”- Culverted Storm Drainage Route.

Section involved the dye tracing of the storm route from the infall at the western edge of the site to the outfall at the eastern end of the culvert at the outfall ditch.

Rutten Lane “Residential Home” – Outfall Ditch at The Paddocks

Section involved proving the storm drainage connectivity route from the infall in the grounds of the old peoples home to its outfall headwall in the ditch to the north side of The Paddocks. Route was sounded/dye tested to establish the route.

As a couple of small extras 2 Storm headwalls were CCTV’d in Rutten Lane outside the school and we surveyed 2 Foul manholes north of the main site on Woodstock Road.

DRAINAGE RUN FROM SOUTHERN OUTFALL MH SW01- WRHW1

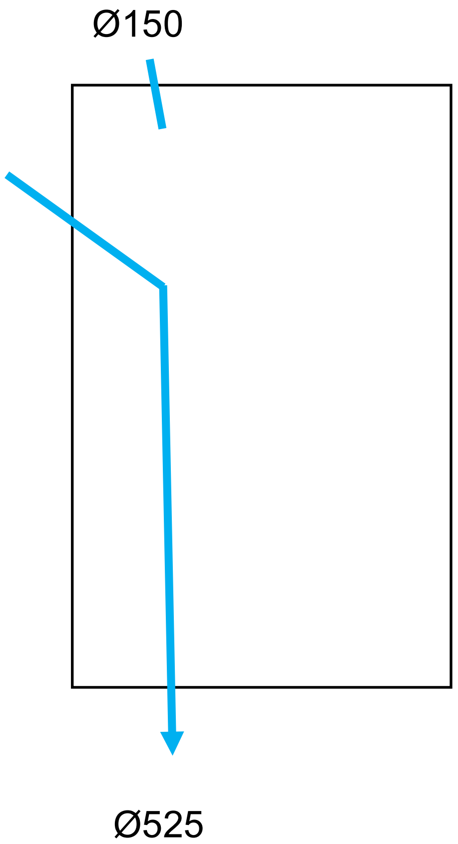
MANHOLE RUN FROM "SOUTHERN OUTFALL"

MH SW01 – WRHW1

MH SW01

CL=67.36m IL=65.76m

LAYOUT



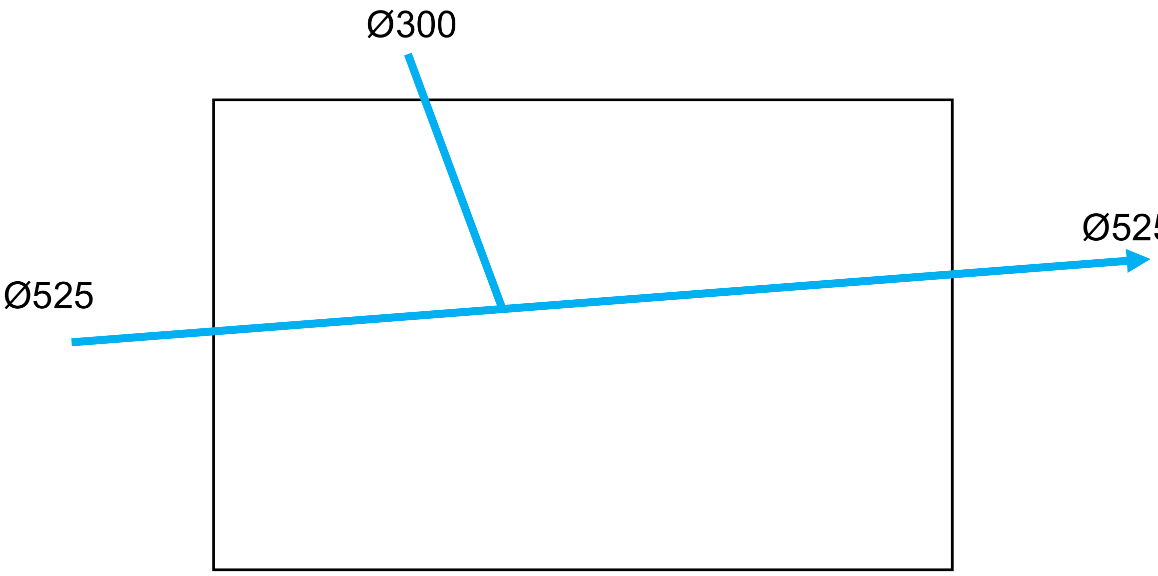
MH S103A BURIED

MH S103 BURIED

MH S102

CL=65.77m IL=64.82m

LAYOUT

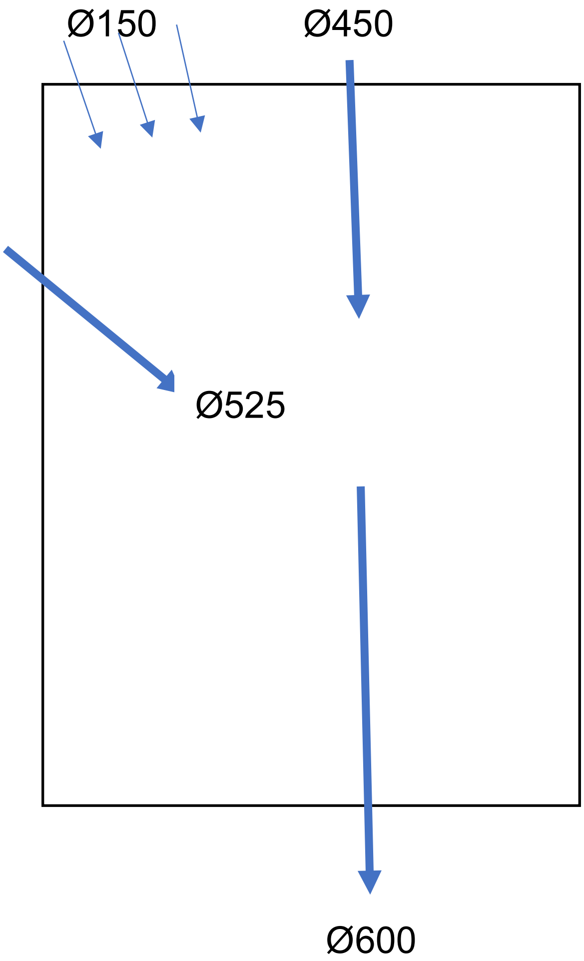


MH S104 NO ACCESS

MHS104A BURIED IN PRIVATE GARDEN

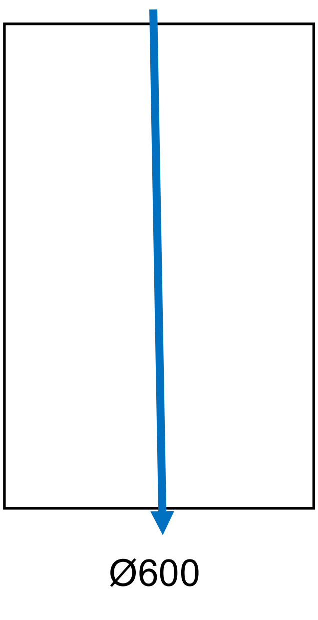
MH S105

CL=64.23m IL=62.45m



MH S106

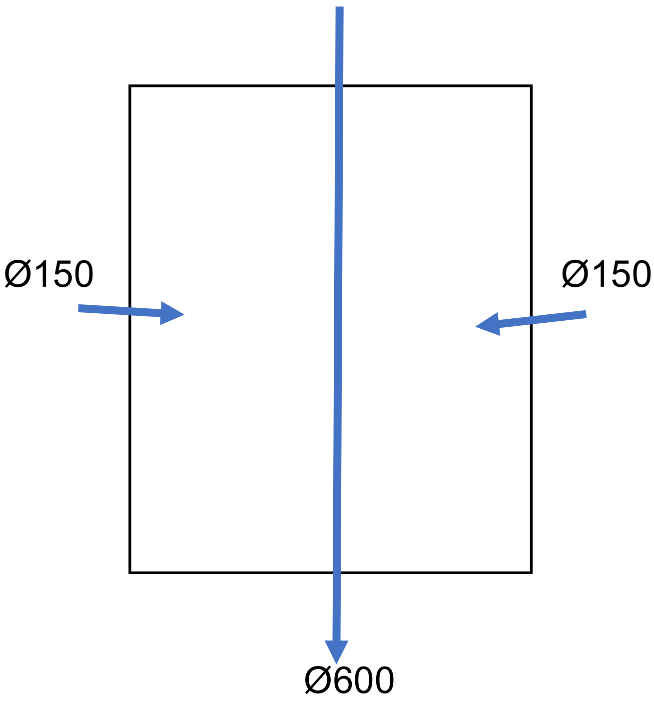
CL=63.42m IL=61.61m



MH S107 BURIED

MH S108

CL=62.20m IL=60.85m

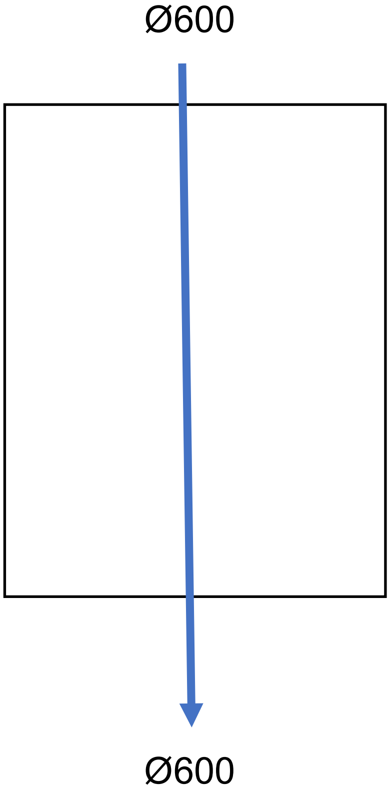


S108

MH S108A BURIED

MH S109

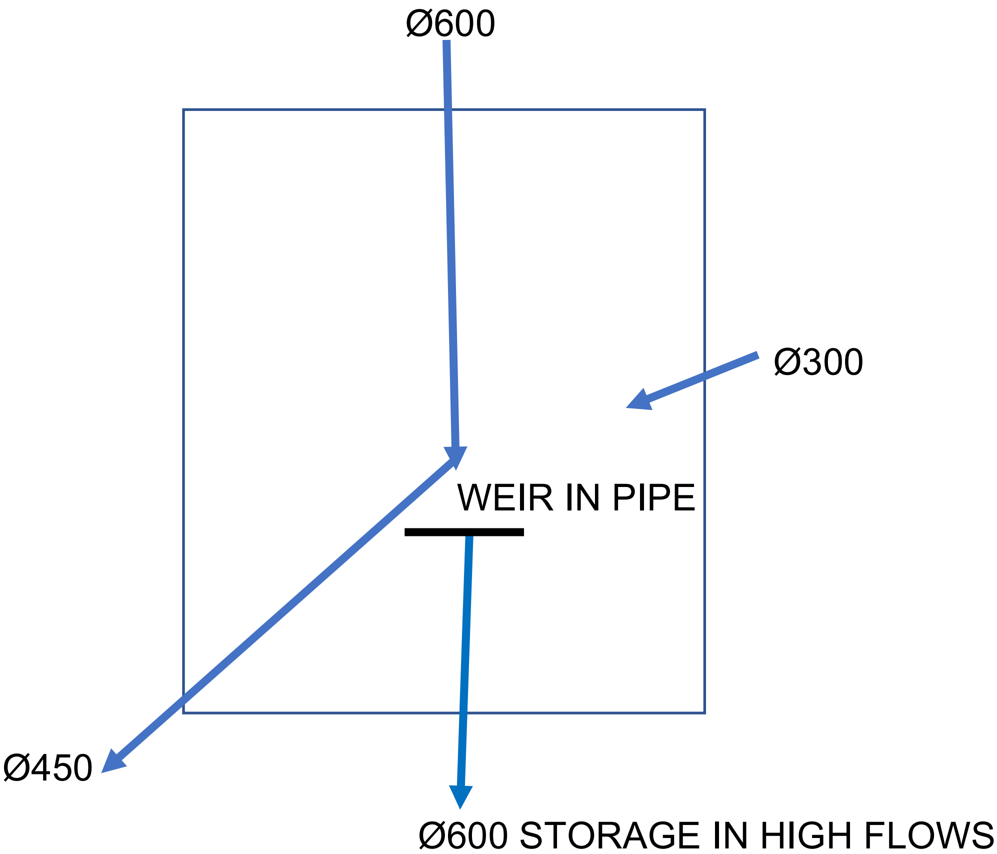
CL=61.56m IL=60.59m



MH S110

CL=61.40m IL=60.55m

LAYOUT



S110 PHOTOS

TOP VIEW

OUTGOING X PIPE

X & Y PIPE

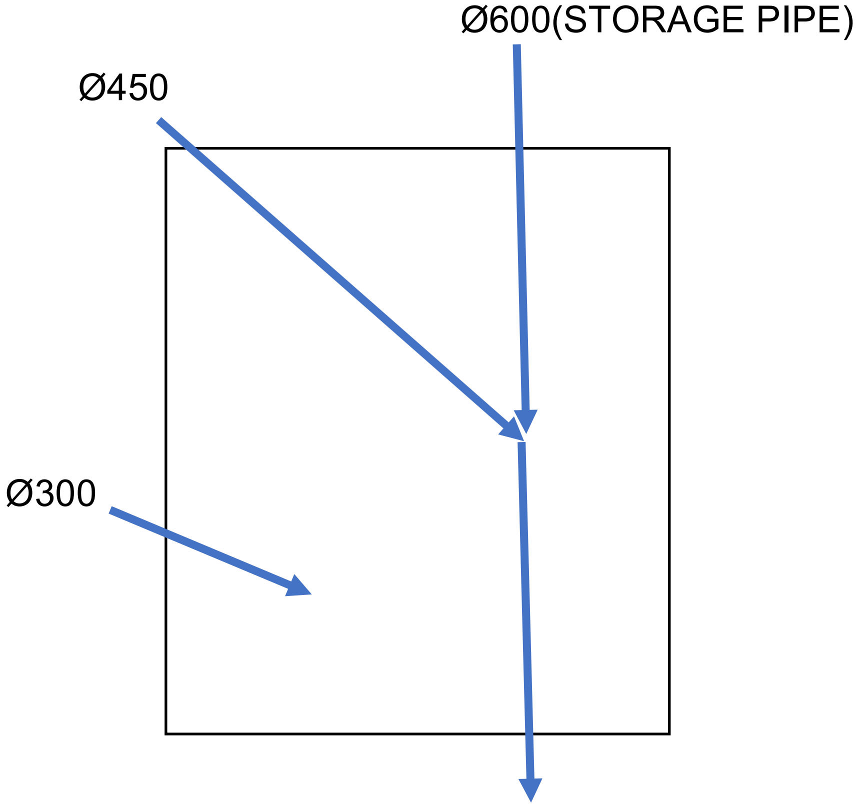
Y PIPE PARTIAL WEIR

STORAGE PIPE HIGH FLOWS

MH S111

CL=61.30m IL=60.30m

LAYOUT



PHOTOS

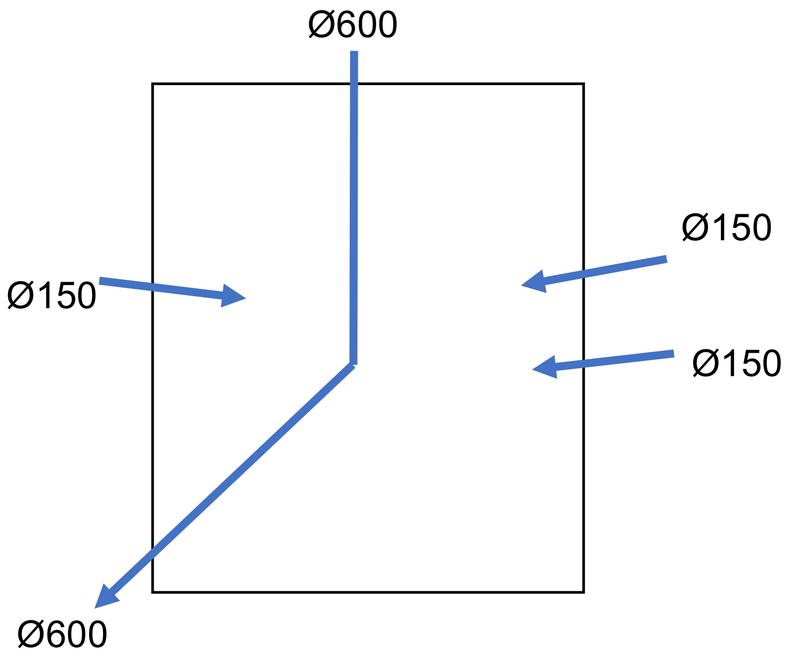
X & A PIPES

B & C PIPES

MH S112

CL=61.26m IL=60.23m

LAYOUT



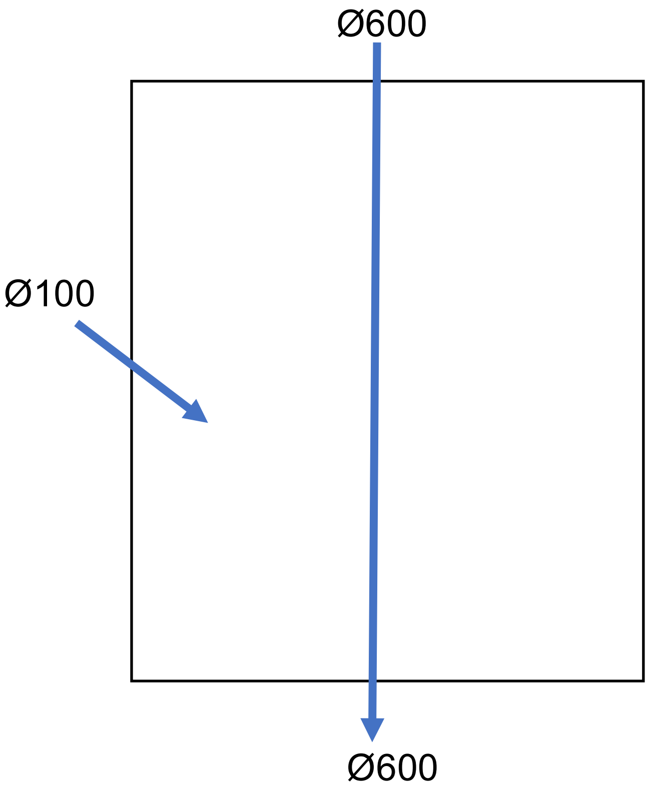
TOP SHOT

X PIPE

MH S113

CL=61.37m IL=60.21m

LAYOUT

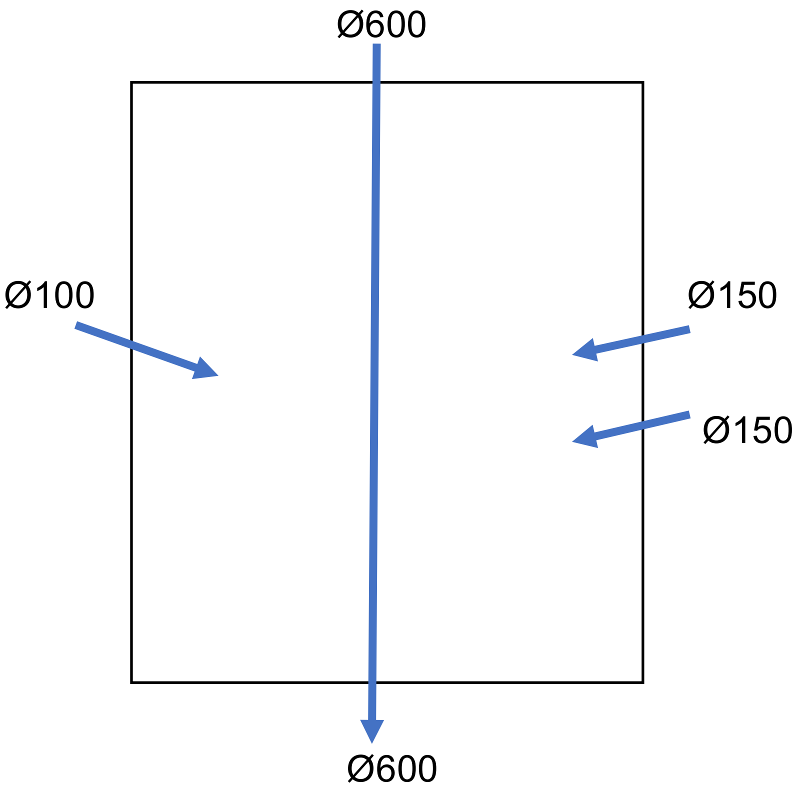


TOP SHOT

MH S114

CL=61.34m IL=60.20m

LAYOUT



TOP SHOT

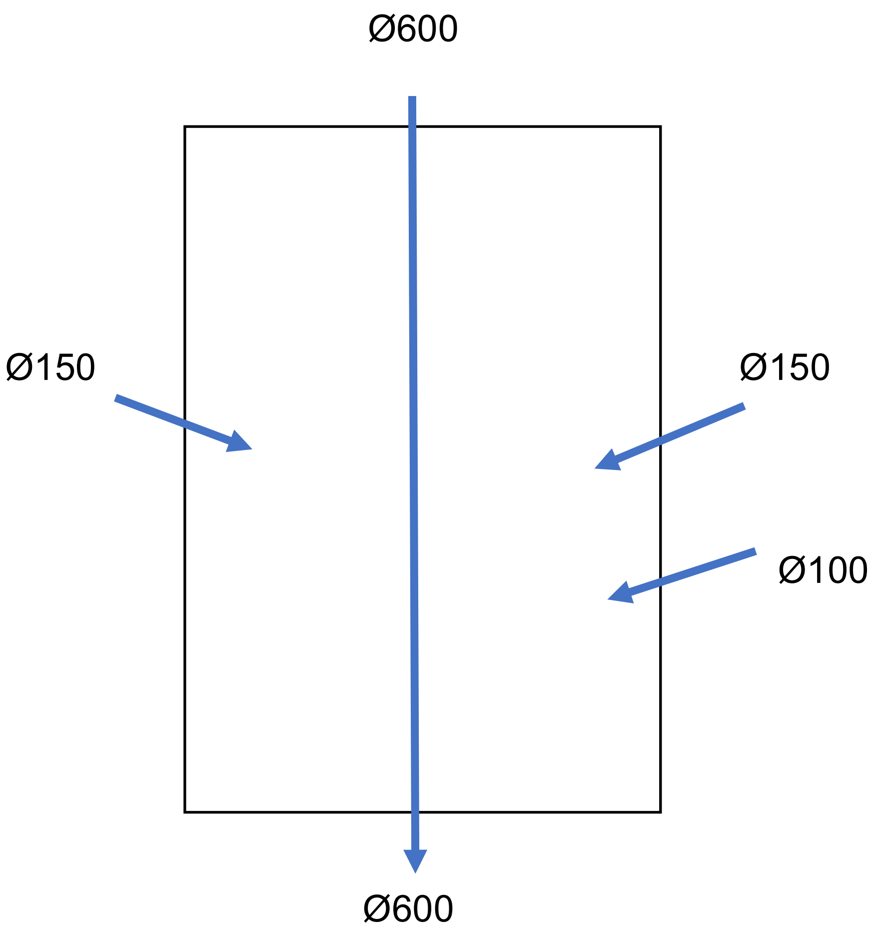
MH S115 (NOT RAISED DUE TO TRAFFIC)

CL=61.14m

MH S116

CL=61.22m IL=60.18m

LAYOUT



TOP SHOT

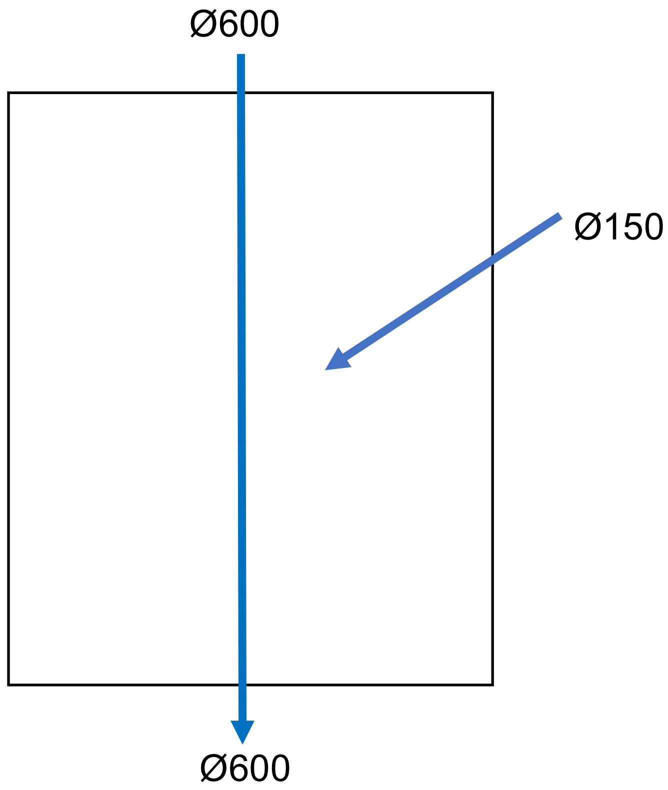
MH S117 (NOT RAISED DUE TO TRAFFIC)

CL=61.18m

MH S118

CL=61.17m IL=60.15m

LAYOUT

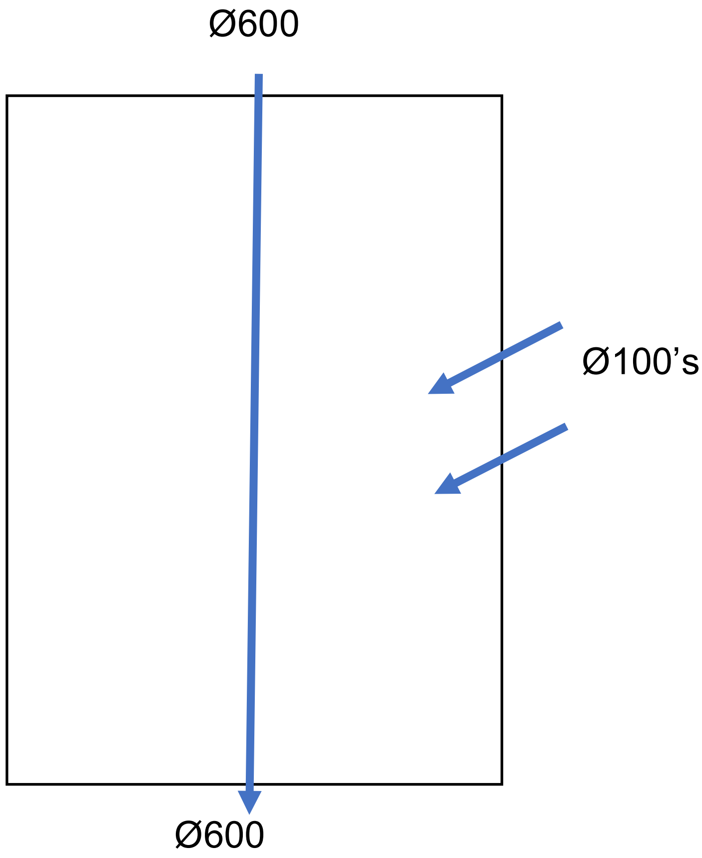


TOP SHOT

MH S119

CL=61.15m IL=60.14M

LAYOUT



TOP SHOT

WRHW1

T.O.W=61.15m PIPE IL IN DITCH=60.12m

HEADWALL LOCATION

DITCH

OUTFALL PIPE

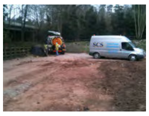
CCTV SURVEY INFORMATION

Project

Project Name: Yarnton

Project Date: 21/03/2022

Inspection Standard: MSCC4 Sewers & Drainage GB (SRM4 Scoring)



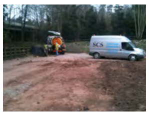
PES

Project Information

Project Name	Project Number	Project Date
Yarnton		21/03/2022

Contractor

Company: PES
Contact: Kim Randall
Department: CCTV
Phone: 01368 555895
Mobile: 07891 927593



PES

Section Profile

Project Name	Project Number	Project Date
Yarnton		21/03/2022

Circular, 100 mm

Section	Upstream Node	Downstream Node	Date	Road	Pipe Material	Total Length	Inspected Length
14	MH	O/F 1	22/03/2022	Rutten Lane	Polypropylene	9.20 m	9.20 m

Total: 1 Inspection x Circular 100 mm = 9.20 m Total Length and 9.20 m Inspected Length

Circular, 450 mm

Section	Upstream Node	Downstream Node	Date	Road	Pipe Material	Total Length	Inspected Length
4	S104A	S105	21/03/2022	Woodstock Road	Concrete	6.70 m	6.70 m

Total: 1 Inspection x Circular 450 mm = 6.70 m Total Length and 6.70 m Inspected Length

Circular, 525 mm

Section	Upstream Node	Downstream Node	Date	Road	Pipe Material	Total Length	Inspected Length
1	S103	S102	21/03/2022	The Spears	Concrete	25.60 m	25.60 m
3	S102	S104	21/03/2022	The Spears	Concrete	28.40 m	28.40 m
13	SW01	S103A	22/03/2022	Rutten Lane	Concrete	20.50 m	20.50 m

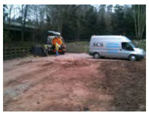
Total: 3 Inspections x Circular 525 mm = 74.50 m Total Length and 74.50 m Inspected Length

Circular, 600 mm

Section	Upstream Node	Downstream Node	Date	Road	Pipe Material	Total Length	Inspected Length
5	S105	S106	21/03/2022	Woodstock Road	Concrete	73.20 m	73.20 m
6	S106	S107	21/03/2022	Woodstock Road	Concrete	31.30 m	31.30 m
7	S107	S108	21/03/2022	Woodstock Road	Concrete	55.90 m	55.90 m
8	S108A	S109	22/03/2022	Woodstock Road	Concrete	16.80 m	16.80 m
9	S108	S108A	22/03/2022	Woodstock Road	Concrete	55.00 m	55.00 m
10	S109	S110	22/03/2022	Woodstock Road	Concrete	32.20 m	32.20 m
11	S110	S111	22/03/2022	Woodstock Road	Concrete	56.80 m	56.80 m

Total: 7 Inspections x Circular 600 mm = 321.20 m Total Length and 321.20 m Inspected Length

Total: 12 Inspections = 411.60 m Total Length and 411.60 m Inspected Length



PES

Section Inspection - 21/03/2022 - S103X

Section	Inspection	Date	Client`s Job Ref	Weather	Pre Cleaned	PLR
1	1	21/03/22	Not Specified	No Rain Or Snow	Not Specified	S103X
Operator		**Vehicle**	**Camera**	**Preset Length**	**Legal Status**	**Alternative ID**
Not Specified			Ipek	Not Specified	Not Specified	Not Specified

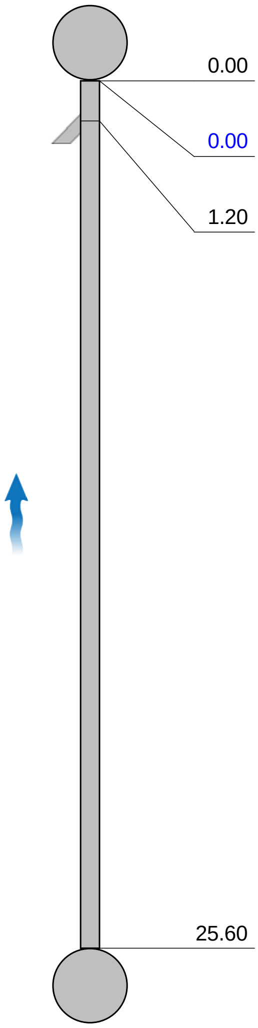
Town or Village:	Yarnton	**Inspection Direction:**	Upstream	**Upstream Node:**	S103
Road:	The Spears	**Inspected Length:**	25.60 m	**Upstream Pipe Depth:**	
Location:		**Total Length:**	25.60 m	**Downstream Node:**	S102
Surface Type:		**Joint Length:**	2.50 m	**Downstream Pipe Depth:**	

Use:	Surface water	**Pipe Shape:**	Circular
Type of Pipe:		**Dia/Height:**	525 mm
Year Constructed:		**Pipe Material:**	Concrete
Flow Control:	No flow control	**Lining Type:**	No Lining
Inspection Purpose:		**Lining Material:**	No Lining

Comments:
Recommendations:

Scale: **1:223**

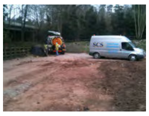
Depth: m
S102



Position [m]	Code	Observation	MPEG	Photo	Grade
0.00	MH	Start node type, manhole, reference number: S102	00:00:00		
0.00	WL	Water level, 5% of the vertical dimension	00:00:00		
1.20	CN	Connection other than junction at 2 o'clock, diameter: 150mm	00:00:00		
25.60	MHF	Finish node type, manhole, reference number: S103	00:03:00	SW01X_1 daf7d2d-e 341-4fef-9	

S103
Depth: m

Construction Features					Miscellaneous Features				
Structural Defects					Service & Operational Observations				
STR No. Def	**STR Peak**	**STR Mean**	**STR Total**	**STR Grade**	**SER No. Def**	**SER Peak**	**SER Mean**	**SER Total**	**SER Grade**
0	0.0	0.0	0.0	1.0	0	0.0	0.0	0.0	1.0

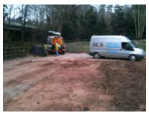


PES

Section Pictures - 21/03/2022 - S103X

Section	Inspection Direction	PLR	Client`s Job Ref	Contractor`s Job Ref
1	Upstream	S103X		

SW01X_1daf7d2d-e341-4fef-9bbc-c5e4f1719279_20220321_093808_107.jpg, 00:03:00, 25.60 m
Finish node type, manhole, reference number: S103



PES

Section Inspection - 21/03/2022 - S103AX

Section	Inspection	Date	Time	Client`s Job Ref	Weather	Pre Cleaned	PLR
2	1	21/03/22	9:38	Not Specified	No Rain Or Snow	Not Specified	S103AX
Operator		**Vehicle**		**Camera**	**Preset Length**	**Legal Status**	**Alternative ID**
Not Specified		Not Specified		Not Specified	Not Specified	Not Specified	Not Specified

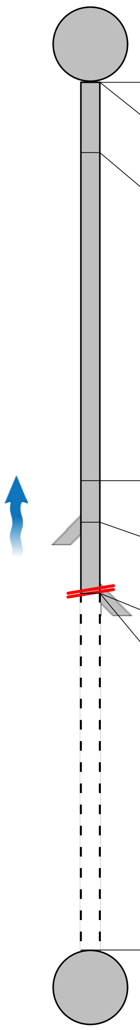
Town or Village:	Yarnton	**Inspection Direction:**	Upstream	**Upstream Node:**	S103A
Road:	The Spears	**Inspected Length:**	15.90 m	**Upstream Pipe Depth:**	
Location:		**Total Length:**	27.00 m	**Downstream Node:**	S103
Surface Type:		**Joint Length:**	2.50 m	**Downstream Pipe Depth:**	

Use:	Surface water	**Pipe Shape:**	Circular
Type of Pipe:		**Dia/Height:**	525 mm
Year Constructed:		**Pipe Material:**	Concrete
Flow Control:	No flow control	**Lining Type:**	No Lining
Inspection Purpose:		**Lining Material:**	No Lining

Comments:
Recommendations:

Scale: 1:235

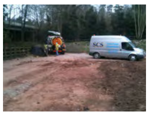
Depth: m
S103



S103A
Depth: m

Position [m]	Code	Observation	MPEG	Photo	Grade
0.00	WL	Water level, 5% of the vertical dimension	00:00:00		
0.00	MH	Start node type, manhole, reference number: S103	00:03:24		
2.20	FLJ	Fracture, longitudinal at joint at 12 o'clock	00:00:39	SW01X_3 9b2e9aa-0 937-4783-	3
12.40	RFJ	Roots, fine at joint	00:03:18		2
13.70	CN	Connection other than junction at 3 o'clock, diameter: 150mm	00:03:37	SW01X_5 8001230-d 6e8-457e-	
15.90	CXI	Connection defective, connecting pipe is intruding at 9 o'clock, diameter: 300mm, intrusion: 35%	00:04:46	SW01X_0 77cb51c-3 cbf-4494-b	4
15.90	SA	Survey abandoned: Intruding Connection	00:04:58		
27.00		End of pipe			

Construction Features					Miscellaneous Features				
Structural Defects					Service & Operational Observations				
STR No. Def	**STR Peak**	**STR Mean**	**STR Total**	**STR Grade**	**SER No. Def**	**SER Peak**	**SER Mean**	**SER Total**	**SER Grade**
1	40.0	2.5	40.0	3.0	2	5.0	0.4	6.0	4.0



PES

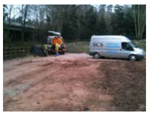
Section Pictures - 21/03/2022 - S103AX

Section	Inspection Direction	PLR	Client`s Job Ref	Contractor`s Job Ref
2	Upstream	S103AX		

SW01X_39b2e9aa-0937-4783-ac8b-ef18bf9d43b7_20220321_094052_987.jpg, 00:00:39, 2.20 m
Fracture, longitudinal at joint at 12 o'clock

SW01X_58001230-d6e8-457e-8dd3-c85f2592b01c_20220321_094555_583.jpg, 00:03:37, 13.70 m
Connection other than junction at 3 o'clock, diameter: 150mm

SW01X_077cb51c-3cbf-4494-be3a-f472d2487bc4_20220321_094704_421.jpg, 00:04:46, 15.90 m
Connection defective, connecting pipe is intruding at 9 o'clock, diameter: 300mm, intrusion: 35%



PES

Section Inspection - 21/03/2022 - S102X

Section	Inspection	Date	Time	Client`s Job Ref	Weather	Pre Cleaned	PLR
3	1	21/03/22	10:16	Not Specified	No Rain Or Snow	Not Specified	S102X

Operator	Vehicle	Camera	Preset Length	Legal Status	Alternative ID
Not Specified	Not Specified	Not Specified	Not Specified	Not Specified	Not Specified

Town or Village:	Yarnton	**Inspection Direction:**	Downstream	**Upstream Node:**	S102
Road:	The Spears	**Inspected Length:**	28.40 m	**Upstream Pipe Depth:**	
Location:		**Total Length:**	28.40 m	**Downstream Node:**	S104
Surface Type:		**Joint Length:**	2.50 m	**Downstream Pipe Depth:**	

Use:	Surface water	**Pipe Shape:**	Circular
Type of Pipe:		**Dia/Height:**	525 mm
Year Constructed:		**Pipe Material:**	Concrete
Flow Control:	No flow control	**Lining Type:**	No Lining
Inspection Purpose:		**Lining Material:**	No Lining

Comments:
Recommendations:

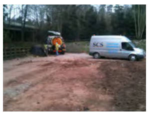
Scale: 1:247

Depth: m
S102

Position [m]	Code	Observation	MPEG	Photo	Grade
0.00	MH	Start node type, manhole, reference number: S102	00:00:00		
0.00	WL	Water level, 10% of the vertical dimension	00:00:00		
3.30	CN	Connection other than junction at 2 o'clock, diameter: 150mm	00:00:31		
18.50	CN	Connection other than junction at 2 o'clock, diameter: 150mm	00:02:43		
28.40	MHF	Finish node type, manhole, reference number: S104	00:04:31	S102X_85 67ec22-cb 6f-4bcc-ab	

S104
Depth: m

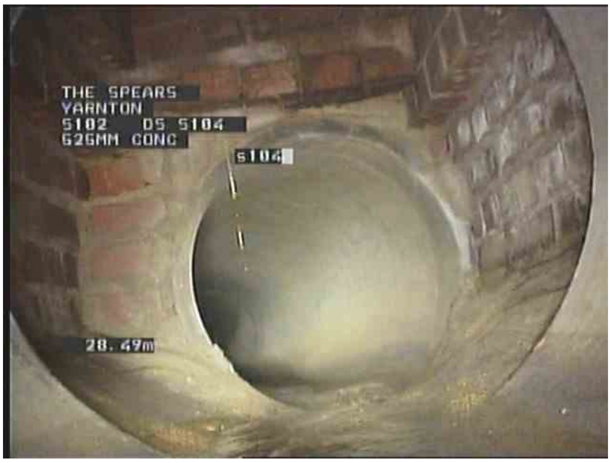
Construction Features					Miscellaneous Features				
Structural Defects					Service & Operational Observations				
STR No. Def	**STR Peak**	**STR Mean**	**STR Total**	**STR Grade**	**SER No. Def**	**SER Peak**	**SER Mean**	**SER Total**	**SER Grade**
0	0.0	0.0	0.0	1.0	0	0.0	0.0	0.0	1.0



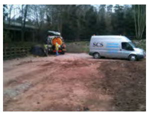
PES

Section Pictures - 21/03/2022 - S102X

Section	Inspection Direction	PLR	Client`s Job Ref	Contractor`s Job Ref
3	Downstream	S102X		



S102X_8567ec22-cb6f-4bcc-abc0-9d14d5968f6d_20220323_182526_925.jpg, 00:04:31, 28.40 m
Finish node type, manhole, reference number: S104



PES

Section Inspection - 21/03/2022 - S104AX

Section	Inspection	Date	Client`s Job Ref	Weather	Pre Cleaned	PLR
4	1	21/03/22	Not Specified	No Rain Or Snow	Not Specified	S104AX
Operator		**Vehicle**	**Camera**	**Preset Length**	**Legal Status**	**Alternative ID**
Not Specified		Not Specified	Not Specified	Not Specified	Not Specified	Not Specified

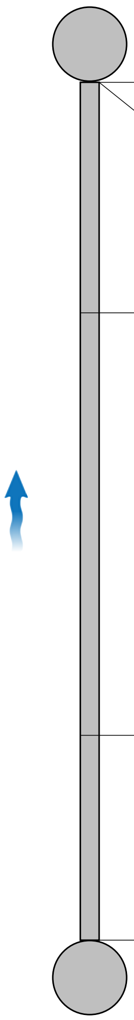
Town or Village:	Yarnton	**Inspection Direction:**	Upstream	**Upstream Node:**	S104A
Road:	Woodstock Road	**Inspected Length:**	6.70 m	**Upstream Pipe Depth:**	
Location:		**Total Length:**	6.70 m	**Downstream Node:**	S105
Surface Type:		**Joint Length:**	2.50 m	**Downstream Pipe Depth:**	

Use:	Surface water	**Pipe Shape:**	Circular
Type of Pipe:		**Dia/Height:**	450 mm
Year Constructed:		**Pipe Material:**	Concrete
Flow Control:	No flow control	**Lining Type:**	No Lining
Inspection Purpose:		**Lining Material:**	No Lining

Comments:
Recommendations:

Scale: 1:59

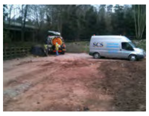
Depth: m
S105



Position [m]	Code	Observation	MPEG	Photo	Grade
0.00	WL	Water level, 5% of the vertical dimension	00:00:00		
0.00	MH	Start node type, manhole, reference number: S105	00:04:34		
1.80	RMJ	Roots, mass at joint, 20% cross-sectional area loss	00:00:37	S104X_90f 3f3f2-ba83 -46cc-aad9	3
5.10	RM	Roots, mass, 30% cross-sectional area loss	00:01:08	S104X_cd 8b743e-53 71-4e5d-b	5
6.70	MHF	Finish node type, manhole, reference number: S104A	00:02:25	S104X_5fc 59358-d48 6-482b-93	

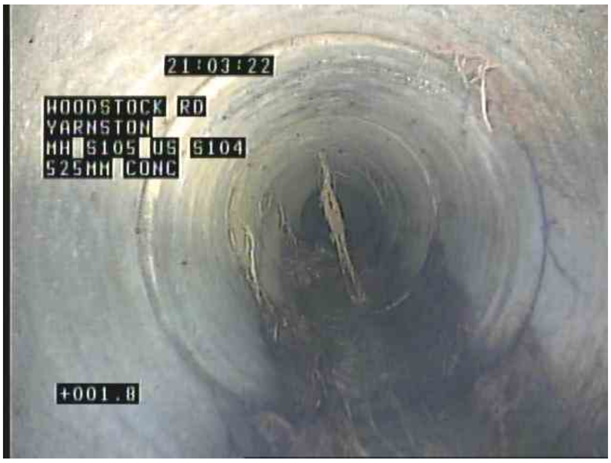
S104A
Depth: m

Construction Features					Miscellaneous Features				
Structural Defects					Service & Operational Observations				
STR No. Def	**STR Peak**	**STR Mean**	**STR Total**	**STR Grade**	**SER No. Def**	**SER Peak**	**SER Mean**	**SER Total**	**SER Grade**
0	0.0	0.0	0.0	1.0	2	10.0	0.0	14.0	5.0



Section Pictures - 21/03/2022 - S104AX

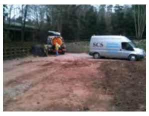
Section	Inspection Direction	PLR	Client`s Job Ref	Contractor`s Job Ref
4	Upstream	S104AX		



S104X_90f3f3f2-ba83-46cc-aad9-238d5be3e7ce_20220321_143615_923.jpg, 00:00:37, 1.80 m
Roots, mass at joint, 20% cross-sectional area loss

S104X_cd8b743e-5371-4e5d-b625-12f8b3478400_20220321_143656_999.jpg, 00:01:08, 5.10 m
Roots, mass, 30% cross-sectional area loss

S104X_5fc59358-d486-482b-9317-4392d0a09e23_20220321_143921_086.jpg, 00:02:25, 6.70 m
Finish node type, manhole, reference number: S104A



PES

Section Inspection - 21/03/2022 - S105X

Section	Inspection	Date	Time	Client`s Job Ref	Weather	Pre Cleaned	PLR
5	1	21/03/22	14:43	Not Specified	No Rain Or Snow	Not Specified	S105X

Operator	Vehicle	Camera	Preset Length	Legal Status	Alternative ID
Not Specified	Not Specified	Not Specified	Not Specified	Not Specified	Not Specified

Town or Village:	Yarnton	**Inspection Direction:**	Downstream	**Upstream Node:**	S105
Road:	Woodstock Road	**Inspected Length:**	73.20 m	**Upstream Pipe Depth:**	
Location:		**Total Length:**	73.20 m	**Downstream Node:**	S106
Surface Type:		**Joint Length:**	2.50 m	**Downstream Pipe Depth:**	

Use:	Surface water	**Pipe Shape:**	Circular
Type of Pipe:		**Dia/Height:**	600 mm
Year Constructed:		**Pipe Material:**	Concrete
Flow Control:	No flow control	**Lining Type:**	No Lining
Inspection Purpose:		**Lining Material:**	No Lining

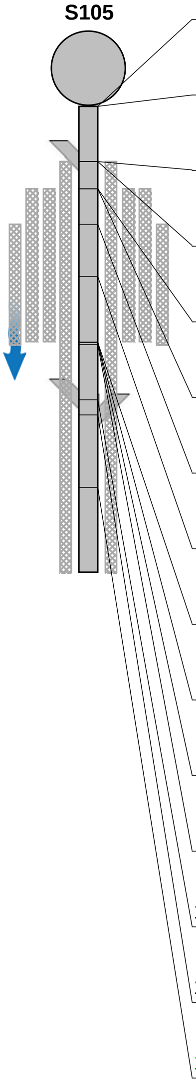
Comments:

Recommendations:

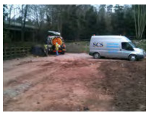
Scale: 1:301

Depth: m

S105



Position [m]		Code	Observation	MPEG	Photo	Grade
0.00		WL	Water level, 10% of the vertical dimension	00:00:00		
0.00		MH	Start node type, manhole, reference number: S105	00:02:32		
2.20	S01	RFJ	Roots, fine at joint, start	00:00:25	S105X_4f486602-2171-48c4-842	
2.20		CN	Connection other than junction at 3 o'clock, diameter: 150mm	00:00:30		
3.30	S02	FL	Fracture, longitudinal at 9 o'clock, start	00:00:51		
3.30	S03	FL	Fracture, longitudinal at 3 o'clock, start	00:00:53	S105X_7c2a3b25-479a-44f3-a9	
4.70	S04	FL	Fracture, longitudinal at 12 o'clock, start	00:01:37		
6.80		GP	General photograph taken at this point	00:02:03	S105X_dd94f242-0194-44aa-8	
9.40	F02	FL	Fracture, longitudinal at 9 o'clock, finish	00:02:26		
9.40	F03	FL	Fracture, longitudinal at 3 o'clock, finish	00:02:28		
9.40		FL	Fracture, longitudinal at 12 o'clock	00:02:30		
9.50	F04	FL	Fracture, longitudinal at 12 o'clock, finish	00:02:51		
11.70		CN	Connection other than junction at 2 o'clock, diameter: 150mm	00:02:47		
12.30		CN	Connection other than junction at 9 o'clock, diameter: 150mm	00:02:49		
15.20		DEEJ	Attached deposits, encrustation at joint from 2 o'clock to 6 o'clock, 5% cross-sectional area loss	00:03:14		



PES

Section Inspection - 21/03/2022 - S105X

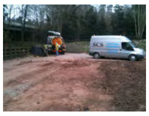
Section	Inspection	Date	Time	Client`s Job Ref	Weather	Pre Cleaned	PLR
5	1	21/03/22	14:43	Not Specified	No Rain Or Snow	Not Specified	S105X

Operator	Vehicle	Camera	Preset Length	Legal Status	Alternative ID
Not Specified	Not Specified	Not Specified	Not Specified	Not Specified	Not Specified

Scale: 1:301	Position [m]		Code	Observation	MPEG	Photo	Grade
	21.90		GP	General photograph taken at this point	00:04:05	S105X_9fd8458e-b45c-4deb-948	
	32.70		RM	Roots, mass, 25% cross-sectional area loss	00:05:18	S105X_7a6642be-7673-49a4-a	
	39.40	F01	RFJ	Roots, fine at joint, finish	00:07:02		
	42.30		CN	Connection other than junction at 3 o'clock, diameter: 150mm	00:07:22		
	43.40		CN	Connection other than junction at 9 o'clock, diameter: 150mm	00:07:33		
	51.90		RTJ	Roots, tap at joint	00:08:23	S105X_4fddaf56-8a2f-4b3e-bc25	
	54.40		RTJ	Roots, tap at joint	00:08:53	S105X_5ac20535-cb85-47c2-a3	
	60.70		WL	Water level, 30% of the vertical dimension	00:09:37		
	63.50	S05	RMJ	Roots, mass at joint, 25% cross-sectional area loss, start	00:10:05		
	73.20	F05	RMJ	Roots, mass at joint, 25% cross-sectional area loss, finish	00:11:14	S105X_f3496807-55d8-4d35-83	

S106
Depth: m

Construction Features					Miscellaneous Features				
Structural Defects					Service & Operational Observations				
STR No. Def	STR Peak	STR Mean	STR Total	STR Grade	SER No. Def	SER Peak	SER Mean	SER Total	SER Grade
0	0.0	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0



PES

Section Pictures - 21/03/2022 - S105X

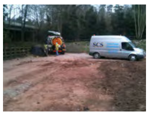
Section	Inspection Direction	PLR	Client`s Job Ref	Contractor`s Job Ref
5	Downstream	S105X		

S105X_4f486602-2171-48c4-8421-33b798eb27e8_20220321_144527_039.jpg, 00:00:25, 2.20 m
Roots, fine at joint, start

S105X_7c2a3b25-479a-44f3-a9e2-14533cd6ca52_20220321_144628_753.jpg, 00:00:53, 3.30 m
Fracture, longitudinal at 3 o'clock, start

S105X_dd94f242-0194-44aa-899c-957281a83da1_20220321_144759_109.jpg, 00:02:03, 6.80 m
General photograph taken at this point

S105X_9fd8458e-b45c-4deb-9484-43aecd8ee1ec_20220321_145136_636.jpg, 00:04:05, 21.90 m
General photograph taken at this point



PES

Section Pictures - 21/03/2022 - S105X

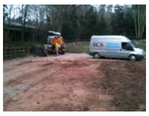
Section	Inspection Direction	PLR	Client`s Job Ref	Contractor`s Job Ref
5	Downstream	S105X		

S105X_7a6642be-7673-49a4-a5a7-748438c4f286_20220321_145310_169.jpg, 00:05:18, 32.70 m
Roots, mass, 25% cross-sectional area loss

S105X_4fddaf56-8a2f-4b3e-bc25-57f363f186bb_20220321_145729_085.jpg, 00:08:23, 51.90 m
Roots, tap at joint

S105X_5ac20535-cb85-47c2-a3b0-b4a8958f0da3_20220321_145802_006.jpg, 00:08:53, 54.40 m
Roots, tap at joint

S105X_f3496807-55d8-4d35-83ec-fccd09424329_20220321_150116_702.jpg, 00:11:14, 73.20 m
Roots, mass at joint, 25% cross-sectional area loss, finish



PES

Section Inspection - 21/03/2022 - S106X

Section	Inspection	Date	Time	Client`s Job Ref	Weather	Pre Cleaned	PLR
6	1	21/03/22	15:02	Not Specified	No Rain Or Snow	Not Specified	S106X

Operator	Vehicle	Camera	Preset Length	Legal Status	Alternative ID
Not Specified	Not Specified	Not Specified	Not Specified	Not Specified	Not Specified

Town or Village:	Yarnton	**Inspection Direction:**	Downstream	**Upstream Node:**	S106
Road:	Woodstock Road	**Inspected Length:**	31.30 m	**Upstream Pipe Depth:**	
Location:		**Total Length:**	31.30 m	**Downstream Node:**	S107
Surface Type:		**Joint Length:**	2.50 m	**Downstream Pipe Depth:**	

Use:	Surface water	**Pipe Shape:**	Circular
Type of Pipe:		**Dia/Height:**	600 mm
Year Constructed:		**Pipe Material:**	Concrete
Flow Control:	No flow control	**Lining Type:**	No Lining
Inspection Purpose:		**Lining Material:**	No Lining

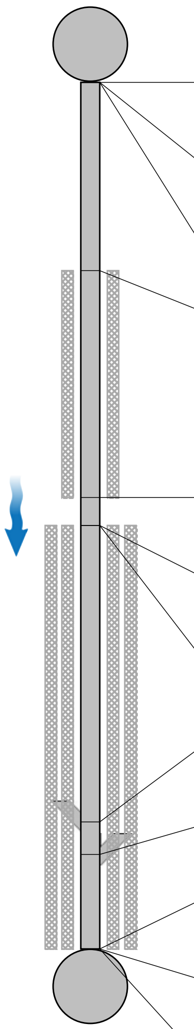
Comments:

Recommendations:

Scale: 1:273

Depth: m

S106



Position [m]		Code	Observation	MPEG	Photo	Grade
0.00		MH	Start node type, manhole, reference number: S106	00:00:00		
0.00		RM	Roots, mass, 20% cross-sectional area loss	00:00:03		3
0.00		WL	Water level, 10% of the vertical dimension	00:11:29		
6.80	S01	RFJ	Roots, fine at joint, start	00:00:38		
15.00	F01	RFJ	Roots, fine at joint, finish	00:01:23		2
16.00	S02	DEEJ	Attached deposits, encrustation at joint from 7 o'clock to 9 o'clock, 5% cross-sectional area loss, start	00:01:23		
16.00	S03	DEEJ	Attached deposits, encrustation at joint from 3 o'clock to 5 o'clock, 5% cross-sectional area loss, start	00:01:35	S106X_a94f010f-5eee-4c10-8b4	
26.70		CN	Connection other than junction at 3 o'clock, diameter: 150mm	00:02:46		
27.90		CN	Connection other than junction at 9 o'clock, diameter: 150mm	00:03:02		
31.30	F02	DEEJ	Attached deposits, encrustation at joint from 7 o'clock to 9 o'clock, 5% cross-sectional area loss, finish	00:03:36		2
31.30	F03	DEEJ	Attached deposits, encrustation at joint from 3 o'clock to 5 o'clock, 5% cross-sectional area loss, finish	00:03:37		2
31.30		MHF	Finish node type, manhole, reference number: S107	00:03:40	S106X_ad4d31cd-5d50-4eee-b	

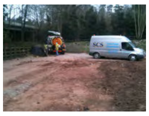
S107

Depth: m

Construction Features | Miscellaneous Features

Structural Defects | Service & Operational Observations

STR No. Def	STR Peak	STR Mean	STR Total	STR Grade	SER No. Def	SER Peak	SER Mean	SER Total	SER Grade
0	0.0	0.0	0.0	1.0	4	4.0	2.8	45.0	4.0



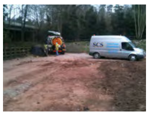
PES

Section Pictures - 21/03/2022 - S106X

Section	Inspection Direction	PLR	Client`s Job Ref	Contractor`s Job Ref
6	Downstream	S106X		

S106X_a94f010f-5eee-4c10-8b44-7a9f45c6d115_20220321_150731_528.jpg, 00:01:35, 16.00 m
Attached deposits, encrustation at joint from 3 o'clock to 5 o'clock, 5% cross-sectional area loss, start

S106X_ad4d31cd-5d50-4eee-b0ec-daba47cec43a_20220321_151142_361.jpg, 00:03:40, 31.30 m
Finish node type, manhole, reference number: S107



PES

Section Inspection - 21/03/2022 - S107X

Section	Inspection	Date	Time	Client`s Job Ref	Weather	Pre Cleaned	PLR
7	1	21/03/22	15:12	Not Specified	No Rain Or Snow	Not Specified	S107X

Operator	Vehicle	Camera	Preset Length	Legal Status	Alternative ID
Not Specified	Not Specified	Not Specified	Not Specified	Not Specified	Not Specified

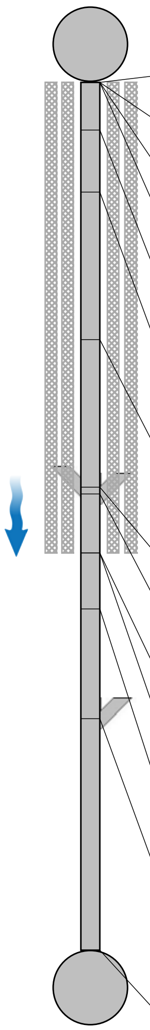
Town or Village:	Yarnton	**Inspection Direction:**	Downstream	**Upstream Node:**	S107
Road:	Woodstock Road	**Inspected Length:**	55.90 m	**Upstream Pipe Depth:**	
Location:		**Total Length:**	55.90 m	**Downstream Node:**	S108
Surface Type:		**Joint Length:**	2.50 m	**Downstream Pipe Depth:**	

Use:	Surface water	**Pipe Shape:**	Circular
Type of Pipe:		**Dia/Height:**	600 mm
Year Constructed:		**Pipe Material:**	Concrete
Flow Control:	No flow control	**Lining Type:**	No Lining
Inspection Purpose:		**Lining Material:**	No Lining

Comments:
Recommendations:

Scale: 1:487

Depth: m
S107

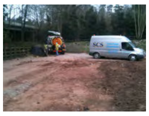


S108
Depth: m

Position [m]		Code	Observation	MPEG	Photo	Grade
0.00		MH	Start node type, manhole, reference number: S107	00:00:00		
0.00		WL	Water level, 10% of the vertical dimension	00:03:45		
0.00	S01	DEEJ	Attached deposits, encrustation at joint from 7 o'clock to 10 o'clock, 5% cross-sectional area loss, start	00:03:45		
0.00	S02	DEEJ	Attached deposits, encrustation at joint from 2 o'clock to 5 o'clock, 5% cross-sectional area loss, start	00:03:45		
3.10		GP	General photograph taken at this point	00:00:20	S107X_8b74c302-038f-4c18-8c	
7.10		H	Hole in drain or sewer at 11 o'clock	00:00:52	S107X_4543b6e3-0a35-45a1-9	4
16.60		WL	Water level, 20% of the vertical dimension	00:01:57		
26.10		CN	Connection other than junction at 2 o'clock, diameter: 150mm	00:02:46		
26.50		CN	Connection other than junction at 10 o'clock, diameter: 150mm	00:02:47		
30.30	F01	DEEJ	Attached deposits, encrustation at joint from 7 o'clock to 10 o'clock, 5% cross-sectional area loss, finish	00:03:23		2
30.30	F02	DEEJ	Attached deposits, encrustation at joint from 2 o'clock to 5 o'clock, 5% cross-sectional area loss, finish	00:03:24		2
33.90		DEEJ	Attached deposits, encrustation at joint from 5 o'clock to 7 o'clock, 15% cross-sectional area loss	00:04:05		3
41.00		CN	Connection other than junction at 10 o'clock, diameter: 150mm	00:04:25		
55.90		MHF	Finish node type, manhole, reference number: S108	00:05:51	S107X_3c6a1067-1707-40eb-af	

Construction Features — Miscellaneous Features
Structural Defects — Service & Operational Observations

STR No. Def	STR Peak	STR Mean	STR Total	STR Grade	SER No. Def	SER Peak	SER Mean	SER Total	SER Grade
1	80.0	0.0	80.0	4.0	3	4.0	0.0	64.0	3.0



PES

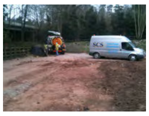
Section Pictures - 21/03/2022 - S107X

Section	Inspection Direction	PLR	Client`s Job Ref	Contractor`s Job Ref
7	Downstream	S107X		

S107X_8b74c302-038f-4c18-8c05-c3566754dc0a_20220321_151431_563.jpg, 00:00:20, 3.10 m
General photograph taken at this point

S107X_4543b6e3-0a35-45a1-90d7-8e7e8112ee26_20220321_151515_715.jpg, 00:00:52, 7.10 m
Hole in drain or sewer at 11 o'clock

S107X_3c6a1067-1707-40eb-afea-2f511ff5346c_20220321_152147_610.jpg, 00:05:51, 55.90 m
Finish node type, manhole, reference number: S108



PES

Section Inspection - 22/03/2022 - S108AX

Section	Inspection	Date	Client`s Job Ref	Weather	Pre Cleaned	PLR
8	1	22/03/22	Not Specified	No Rain Or Snow	Not Specified	S108AX
Operator		**Vehicle**	**Camera**	**Preset Length**	**Legal Status**	**Alternative ID**
Not Specified		Not Specified	Not Specified	Not Specified	Not Specified	Not Specified

Town or Village:	Yarnton	**Inspection Direction:**	Upstream	**Upstream Node:**	S108A
Road:	Woodstock Road	**Inspected Length:**	16.80 m	**Upstream Pipe Depth:**	
Location:		**Total Length:**	16.80 m	**Downstream Node:**	S109
Surface Type:		**Joint Length:**	2.50 m	**Downstream Pipe Depth:**	
Use:	Surface water	**Pipe Shape:**	Circular		
Type of Pipe:		**Dia/Height:**	600 mm		
Year Constructed:		**Pipe Material:**	Concrete		
Flow Control:	No flow control	**Lining Type:**	No Lining		
Inspection Purpose:		**Lining Material:**	No Lining		

Comments:

Recommendations:

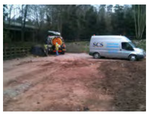
Scale: 1:147

Depth: m
S109

Position [m]	Code	Observation	MPEG	Photo	Grade
0.00	MH	Start node type, manhole, reference number: S109	00:00:00		
0.00	WL	Water level, 25% of the vertical dimension	00:00:00		
2.40	RTJ	Roots, tap at joint	00:00:23	S108X_50ea22db-2d5b-47fb-9f	4
8.10	CN	Connection other than junction at 3 o'clock, diameter: 150mm	00:01:07		
9.00	CN	Connection other than junction at 9 o'clock, diameter: 150mm	00:01:14		
12.20	CN	Connection other than junction at 3 o'clock, diameter: 150mm	00:01:31		
16.80	MHF	Finish node type, manhole, reference number: S108A	00:01:59	S108X_1991bc0b-5cce-4964-b5	

S108A
Depth: m

Construction Features					Miscellaneous Features				
Structural Defects					Service & Operational Observations				
STR No. Def	STR Peak	STR Mean	STR Total	STR Grade	SER No. Def	SER Peak	SER Mean	SER Total	SER Grade
0	0.0	0.0	0.0	1.0	1	5.0	2.1	5.0	4.0



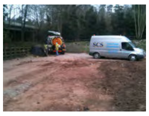
PES

Section Pictures - 22/03/2022 - S108AX

Section	Inspection Direction	PLR	Client`s Job Ref	Contractor`s Job Ref
8	Upstream	S108AX		

S108X_50ea22db-2d5b-47fb-9f1c-a1608e24df1a_20220322_092012_835.jpg, 00:00:23, 2.40 m
Roots, tap at joint

S108X_1991bc0b-5cce-4964-b559-1759a43a65bf_20220322_092322_006.jpg, 00:01:59, 16.80 m
Finish node type, manhole, reference number: S108A



PES

Section Inspection - 22/03/2022 - S108X

Section	Inspection	Date	Client`s Job Ref	Weather	Pre Cleaned	PLR
9	1	22/03/22	Not Specified	No Rain Or Snow	Not Specified	S108X
Operator		**Vehicle**	**Camera**	**Preset Length**	**Legal Status**	**Alternative ID**
Not Specified		Not Specified	Not Specified	Not Specified	Not Specified	Not Specified

Town or Village: Yarnton
Road: Woodstock Road
Location:
Surface Type:

Inspection Direction: Upstream
Inspected Length: 55.00 m
Total Length: 55.00 m
Joint Length: 2.50 m

Upstream Node: S108
Upstream Pipe Depth:
Downstream Node: S108A
Downstream Pipe Depth:

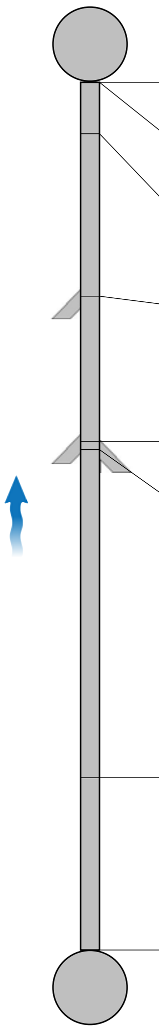
Use: Surface water
Type of Pipe:
Year Constructed:
Flow Control: No flow control
Inspection Purpose:

Pipe Shape: Circular
Dia/Height: 600 mm
Pipe Material: Concrete
Lining Type: No Lining
Lining Material: No Lining

Comments:
Recommendations:

Scale: 1:479

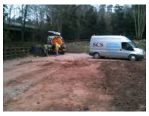
Depth: m
S108A



S108
Depth: m

Position [m]	Code	Observation	MPEG	Photo	Grade
0.00	MH	Start node type, manhole, reference number: S108A	00:00:00		
0.00	WL	Water level, 50% of the vertical dimension	00:02:04		
3.30	DEEJ	Attached deposits, encrustation at joint from 5 o'clock to 7 o'clock, 15% cross-sectional area loss	00:00:39		3
13.60	CN	Connection other than junction at 2 o'clock, diameter: 150mm	00:01:33		
22.80	CN	Connection other than junction at 3 o'clock, diameter: 150mm	00:02:22		
23.30	CN	Connection other than junction at 9 o'clock, diameter: 150mm	00:02:25		
44.10	DEEJ	Attached deposits, encrustation at joint from 4 o'clock to 7 o'clock, 10% cross-sectional area loss	00:04:05	S108X_36 c0df14-087 e-43cd-9fc	3
55.00	MHF	Finish node type, manhole, reference number: S108	00:05:20		

Construction Features					Miscellaneous Features				
Structural Defects					Service & Operational Observations				
STR No. Def	STR Peak	STR Mean	STR Total	STR Grade	SER No. Def	SER Peak	SER Mean	SER Total	SER Grade
0	0.0	0.0	0.0	1.0	2	2.0	0.1	4.0	3.0

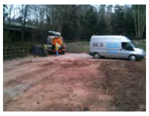


PES

Section Pictures - 22/03/2022 - S108X

Section	Inspection Direction	PLR	Client`s Job Ref	Contractor`s Job Ref
9	Upstream	S108X		

S108X_36c0df14-087e-43cd-9fcf-647d7d96c550_20220322_093028_183.jpg, 00:04:05, 44.10 m
Attached deposits, encrustation at joint from 4 o'clock to 7 o'clock, 10% cross-sectional area loss



PES

Section Inspection - 22/03/2022 - S109X

Section	Inspection	Date	Client`s Job Ref	Weather	Pre Cleaned	PLR
10	1	22/03/22	Not Specified	No Rain Or Snow	Not Specified	S109X
Operator		**Vehicle**	**Camera**	**Preset Length**	**Legal Status**	**Alternative ID**
Not Specified		Not Specified	Not Specified	Not Specified	Not Specified	Not Specified

Town or Village:	Yarnton	**Inspection Direction:**	Downstream	**Upstream Node:**	S109
Road:	Woodstock Road	**Inspected Length:**	32.20 m	**Upstream Pipe Depth:**	
Location:		**Total Length:**	32.20 m	**Downstream Node:**	S110
Surface Type:		**Joint Length:**	2.50 m	**Downstream Pipe Depth:**	

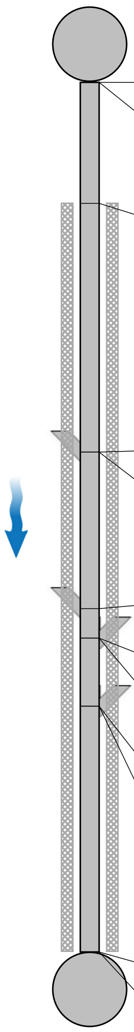
Use:	Surface water	**Pipe Shape:**	Circular
Type of Pipe:		**Dia/Height:**	600 mm
Year Constructed:		**Pipe Material:**	Concrete
Flow Control:	No flow control	**Lining Type:**	No Lining
Inspection Purpose:		**Lining Material:**	No Lining

Comments:

Recommendations:

Scale: 1:280

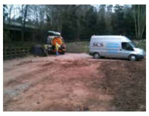
Depth: m
S109



S110
Depth: m

Position [m]		Code	Observation	MPEG	Photo	Grade
0.00		MH	Start node type, manhole, reference number: S109	00:00:00		
0.00		WL	Water level, 50% of the vertical dimension	00:00:00		
4.50	S01	RFJ	Roots, fine at joint, start	00:00:28	S109X_f23fdcdf-9389-4127-aed	
13.70		CN	Connection other than junction at 2 o'clock, diameter: 150mm	00:01:19		
13.70		WL	Water level, 35% of the vertical dimension	00:01:21	S109X_d8bc4172-3de3-42a2-a	
19.50		CN	Connection other than junction at 2 o'clock, diameter: 150mm	00:01:54		
20.60		CN	Connection other than junction at 9 o'clock, diameter: 150mm	00:02:04		
20.60		RF	Roots, fine: from connection	00:02:05	S109X_9ccc50ed-3193-4d11-a	2
23.10		CN	Connection other than junction at 10 o'clock, diameter: 150mm	00:02:24		
23.10		RT	Roots, tap	00:02:25	S109X_8737a462-f4cb-486c-82e	4
32.20	F01	RFJ	Roots, fine at joint, finish	00:03:27		2
32.20		MHF	Finish node type, manhole, reference number: S110	00:03:29	S109X_fb73b341-8a30-416c-bd9	

Construction Features					Miscellaneous Features				
Structural Defects					Service & Operational Observations				
STR No. Def	**STR Peak**	**STR Mean**	**STR Total**	**STR Grade**	**SER No. Def**	**SER Peak**	**SER Mean**	**SER Total**	**SER Grade**
0	0.0	0.0	0.0	1.0	3	5.0	7.6	34.0	5.0



PES

Section Pictures - 22/03/2022 - S109X

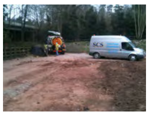
Section	Inspection Direction	PLR	Client`s Job Ref	Contractor`s Job Ref
10	Downstream	S109X		

S109X_f23fdcdf-9389-4127-aed3-ee993a9a81c1_20220322_093834_534.jpg, 00:00:28, 4.50 m
Roots, fine at joint, start

S109X_d8bc4172-3de3-42a2-a885-a94c745dfcfb_20220322_093944_851.jpg, 00:01:21, 13.70 m
Water level, 35% of the vertical dimension

S109X_9ccc50ed-3193-4d11-a232-f96f93422653_20220322_094102_409.jpg, 00:02:05, 20.60 m
Roots, fine, from connection

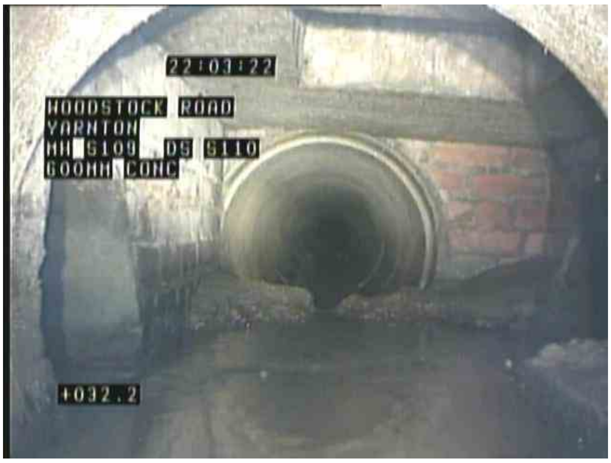
S109X_8737a462-f4cb-486c-82ec-8fb1cb7209ef_20220322_094142_471.jpg, 00:02:25, 23.10 m
Roots, tap



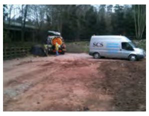
PES

Section Pictures - 22/03/2022 - S109X

Section	Inspection Direction	PLR	Client`s Job Ref	Contractor`s Job Ref
10	Downstream	S109X		



S109X_fb73b341-8a30-416c-bd90-d522baf04e7d_20220322_094318_124.jpg, 00:03:29, 32.20 m
Finish node type, manhole, reference number: S110



PES

Section Inspection - 22/03/2022 - S110Y

Section	Inspection	Date	Client`s Job Ref	Weather	Pre Cleaned	PLR
11	1	22/03/22	Not Specified	No Rain Or Snow	Not Specified	S110Y
Operator		**Vehicle**	**Camera**	**Preset Length**	**Legal Status**	**Alternative ID**
Not Specified		Not Specified	Not Specified	Not Specified	Not Specified	Not Specified

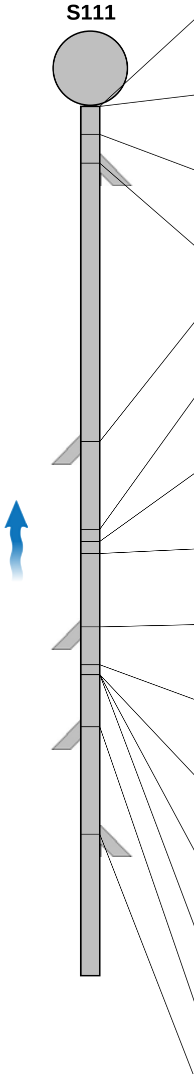
Town or Village:	Yarnton	**Inspection Direction:**	Upstream	**Upstream Node:**	S110
Road:	Woodstock Road	**Inspected Length:**	56.80 m	**Upstream Pipe Depth:**	
Location:		**Total Length:**	56.80 m	**Downstream Node:**	S111
Surface Type:		**Joint Length:**	2.50 m	**Downstream Pipe Depth:**	

Use:	Surface water	**Pipe Shape:**	Circular
Type of Pipe:		**Dia/Height:**	600 mm
Year Constructed:		**Pipe Material:**	Concrete
Flow Control:	No flow control	**Lining Type:**	No Lining
Inspection Purpose:		**Lining Material:**	No Lining

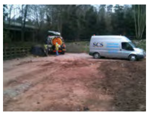
Comments:
Recommendations:

Scale: 1:318

Depth: m
S111



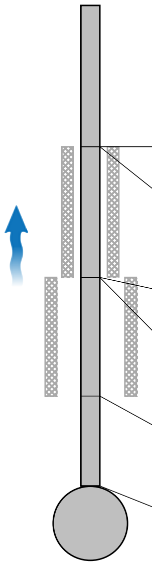
Position [m]	Code	Observation	MPEG	Photo	Grade
0.00	MH	Start node type, manhole, reference number: S111	00:00:00		
0.00	WL	Water level, 20% of the vertical dimension: Overflow pipe	00:00:22		
1.20	RFJ	Roots, fine at joint	00:00:22	S110Y_5c76185f-aef6-467d-9e	2
2.40	CN	Connection other than junction at 10 o'clock, diameter: 150mm	00:00:33		
14.10	CN	Connection other than junction at 2 o'clock, diameter: 150mm	00:01:19		
17.80	DEX	Settled deposits, other, 20% cross-sectional area loss: stones	00:01:38	S110Y_097f52c4-3a56-490a-9d	3
18.30	FL	Fracture, longitudinal at 3 o'clock	00:01:55	S110Y_dc2b7d6d-5632-467d-9	3
18.80	FL	Fracture, longitudinal at 9 o'clock	00:01:54		3
21.90	CN	Connection other than junction at 2 o'clock, diameter: 150mm	00:03:15		
23.50	FL	Fracture, longitudinal at 9 o'clock	00:03:23		3
23.90	FL	Fracture, longitudinal at 12 o'clock	00:03:25		3
23.90	FL	Fracture, longitudinal at 3 o'clock	00:03:26		3
23.90	D	Deformed drain or sewer, 5%	00:03:27	S110Y_bc141263-5f02-49c9-ab	2
26.10	CN	Connection other than junction at 1 o'clock, diameter: 150mm	00:03:49		
30.60	CXI	Connection defective, connecting pipe is intruding at 10 o'clock, diameter: 150mm, intrusion: 5%	00:04:08	S110Y_242886fb-0be3-4737-8f	2



PES

Section Inspection - 22/03/2022 - S110Y

Section	Inspection	Date	Client`s Job Ref	Weather	Pre Cleaned	PLR
11	1	22/03/22	Not Specified	No Rain Or Snow	Not Specified	S110Y
Operator		**Vehicle**	**Camera**	**Preset Length**	**Legal Status**	**Alternative ID**
Not Specified		Not Specified	Not Specified	Not Specified	Not Specified	Not Specified

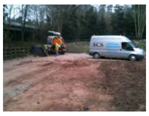


Scale: 1:318 Position [m]		Code	Observation	MPEG	Photo	Grade
42.50		WL	Water level, 5% of the vertical dimension	00:04:58		
42.50	S01	RMJ	Roots, mass at joint, 20% cross-sectional area loss, start	00:04:59	S110Y_8f5debc7-31dd-41f4-a96	
48.00	F01	RMJ	Roots, mass at joint, 20% cross-sectional area loss, finish	00:05:29		3
48.00	S02	RMJ	Roots, mass at joint, 30% cross-sectional area loss, start	00:05:30	S110Y_0163fcbb-7220-4892-b9	
53.00	F02	RMJ	Roots, mass at joint, 30% cross-sectional area loss, finish	00:06:15		5
56.80		MHF	Finish node type, manhole, reference number: S110	00:06:17	S110Y_f0d66736-f3ff-4af9-8139-	

S110

Depth: m

Construction Features					Miscellaneous Features				
Structural Defects					Service & Operational Observations				
STR No. Def	STR Peak	STR Mean	STR Total	STR Grade	SER No. Def	SER Peak	SER Mean	SER Total	SER Grade
6	140.0	183.3	220.0	3.0	5	14.0	65.0	78.0	5.0

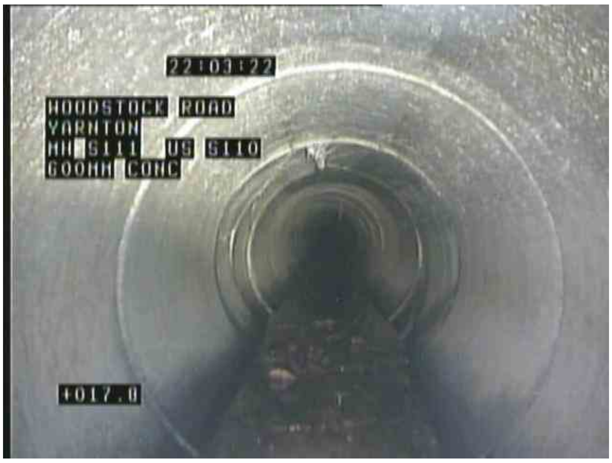


PES

Section Pictures - 22/03/2022 - S110Y

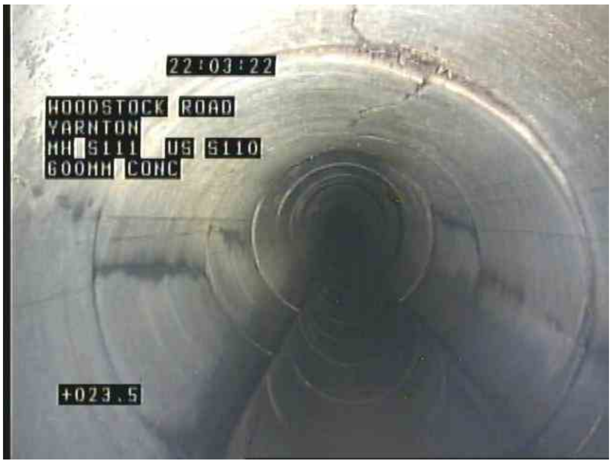
Section	Inspection Direction	PLR	Client`s Job Ref	Contractor`s Job Ref
11	Upstream	S110Y		

S110Y_5c76185f-aef6-467d-9e5a-4100cbace6f1_20220322_100419_664.jpg, 00:00:22, 1.20 m
Roots, fine at joint



S110Y_097f52c4-3a56-490a-9d01-66e2e416319a_20220322_100644_005.jpg, 00:01:38, 17.80 m
Settled deposits, other, 20% cross-sectional area loss, stones

S110Y_dc2b7d6d-5632-467d-9eff-6e3f7eb967a2_20220322_100801_085.jpg, 00:01:55, 18.30 m
Fracture, longitudinal at 3 o'clock

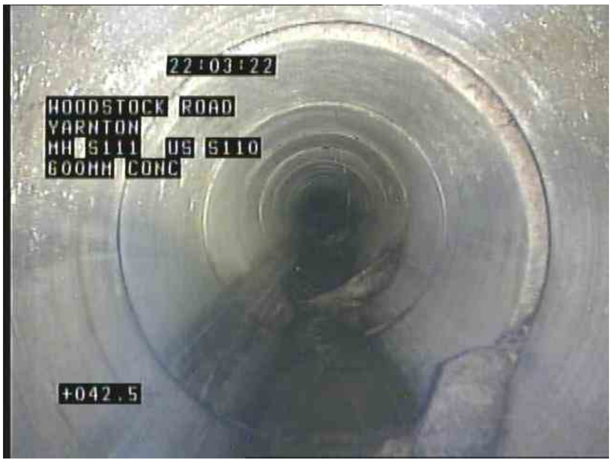


S110Y_bc141263-5f02-49c9-abce-6e79919baf32_20220322_100938_622.jpg, 00:03:27, 23.90 m
Deformed drain or sewer, 5%

Section Pictures - 22/03/2022 - S110Y

Section	Inspection Direction	PLR	Client`s Job Ref	Contractor`s Job Ref
11	Upstream	S110Y		

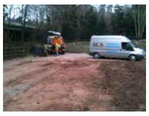
S110Y_242886fb-0be3-4737-8f9f-a1a2a2dca511_20220322_101047_019.jpg, 00:04:08, 30.60 m
Connection defective, connecting pipe is intruding at 10 o'clock, diameter: 150mm, intrusion: 5%



S110Y_8f5debc7-31dd-41f4-a965-5b78ce165c18_20220322_101210_048.jpg, 00:04:59, 42.50 m
Roots, mass at joint, 20% cross-sectional area loss, start

S110Y_0163fcbb-7220-4892-b9b1-390351d34a93_20220322_101306_443.jpg, 00:05:30, 48.00 m
Roots, mass at joint, 30% cross-sectional area loss, start

S110Y_f0d66736-f3ff-4af9-8139-66a092e1dce7_20220322_101426_026.jpg, 00:06:17, 56.80 m
Finish node type, manhole, reference number: S110



PES

Section Inspection - 22/03/2022 - S111Y

Section	Inspection	Date	Client`s Job Ref	Weather	Pre Cleaned	PLR
12	1	22/03/22	Not Specified	No Rain Or Snow	Not Specified	S111Y
Operator		**Vehicle**	**Camera**	**Preset Length**	**Legal Status**	**Alternative ID**
Not Specified		Not Specified	Not Specified	Not Specified	Not Specified	Not Specified

Town or Village:	Yarnton	**Inspection Direction:**	Downstream	**Upstream Node:**	S111
Road:	Woodstock Road	**Inspected Length:**	16.40 m	**Upstream Pipe Depth:**	
Location:		**Total Length:**	20.00 m	**Downstream Node:**	S112
Surface Type:		**Joint Length:**	2.50 m	**Downstream Pipe Depth:**	

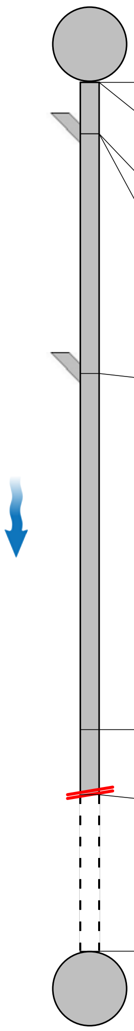
Use:	Surface water	**Pipe Shape:**	Circular
Type of Pipe:		**Dia/Height:**	600 mm
Year Constructed:		**Pipe Material:**	Concrete
Flow Control:	No flow control	**Lining Type:**	No Lining
Inspection Purpose:		**Lining Material:**	No Lining

Comments:

Recommendations:

Scale: 1:174

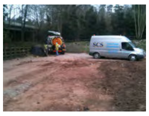
Depth: m
S111



Position [m]	Code	Observation	MPEG	Photo	Grade
0.00	MH	Start node type, manhole, reference number: S111	00:00:00		
0.00	WL	Water level, 20% of the vertical dimension	00:06:21		
1.20	CXI	Connection defective, connecting pipe is intruding at 2 o'clock, diameter: 150mm, intrusion: 15%	00:00:13		3
1.20	CXI	Connection defective, connecting pipe is intruding at 4 o'clock, diameter: 150mm, intrusion: 10%	00:00:14	S111Y_28500920-604a-43d8-9	3
6.70	CXI	Connection defective, connecting pipe is intruding at 2 o'clock, diameter: 150mm, intrusion: 15%	00:00:52	S111Y_f5987ff3-c6cc-4d4f-9b27-	3
14.90	OBP	Obstacles, external pipe or cable at 9 o'clock, 100% cross-sectional area loss: Possible service pipe	00:01:53	S111Y_f5efa44c-a95a-4a00-95d	5
16.40	SA	Survey abandoned: Camera Unable to pass	00:02:19		
20.00		End of pipe			

S112
Depth: m

Construction Features					Miscellaneous Features				
Structural Defects					Service & Operational Observations				
STR No. Def	**STR Peak**	**STR Mean**	**STR Total**	**STR Grade**	**SER No. Def**	**SER Peak**	**SER Mean**	**SER Total**	**SER Grade**
0	0.0	0.0	0.0	1.0	4	10.0	13.3	16.0	5.0



PES

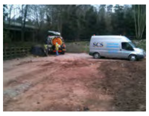
Section Pictures - 22/03/2022 - S111Y

Section	Inspection Direction	PLR	Client`s Job Ref	Contractor`s Job Ref
12	Downstream	S111Y		

S111Y_28500920-604a-43d8-9854-b10838b3e46a_20220322_103005_337.jpg, 00:00:14, 1.20 m
Connection defective, connecting pipe is intruding at 4 o'clock, diameter: 150mm, intrusion: 10%

S111Y_f5987ff3-c6cc-4d4f-9b27-7930db9371ed_20220322_103105_056.jpg, 00:00:52, 6.70 m
Connection defective, connecting pipe is intruding at 2 o'clock, diameter: 150mm, intrusion: 15%

S111Y_f5efa44c-a95a-4a00-95d4-505e0b2d4aef_20220322_103249_221.jpg, 00:01:53, 14.90 m
Obstacles, external pipe or cable at 9 o'clock, 100% cross-sectional area loss, Possible service pipe



PES

Section Inspection - 22/03/2022 - SW01Y

Section	Inspection	Date	Client`s Job Ref	Weather	Pre Cleaned	PLR
13	1	22/03/22	Not Specified	No Rain Or Snow	Not Specified	SW01Y
Operator		**Vehicle**	**Camera**	**Preset Length**	**Legal Status**	**Alternative ID**
Not Specified		Not Specified	Not Specified	Not Specified	Not Specified	Not Specified

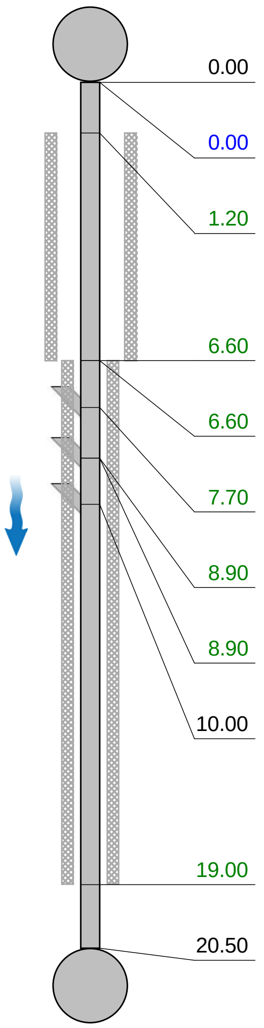
Town or Village:	Yarnton	**Inspection Direction:**	Downstream	**Upstream Node:**	SW01
Road:	Rutten Lane	**Inspected Length:**	20.50 m	**Upstream Pipe Depth:**	
Location:		**Total Length:**	20.50 m	**Downstream Node:**	S103A
Surface Type:		**Joint Length:**	2.50 m	**Downstream Pipe Depth:**	

Use:	Surface water	**Pipe Shape:**	Circular
Type of Pipe:		**Dia/Height:**	525 mm
Year Constructed:		**Pipe Material:**	Concrete
Flow Control:	No flow control	**Lining Type:**	No Lining
Inspection Purpose:		**Lining Material:**	No Lining

Comments:
Recommendations:

Scale: 1:179

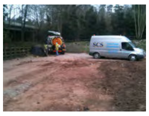
Depth: m
SW01



S103A
Depth: m

Position [m]		Code	Observation	MPEG	Photo	Grade
0.00		MH	Start node type, manhole, reference number: SW01	00:00:00		
0.00		WL	Water level, 10% of the vertical dimension	00:04:40		
1.20	S01	LR	Line deviates right, start	00:04:54		
6.60	F01	LR	Line deviates right, finish	00:04:54		
6.60	S02	LL	Line deviates left, start	00:04:54	SW01Y_e5dc7b49-6504-4839-	
7.70		CXI	Connection defective, connecting pipe is intruding at 2 o'clock, diameter: 150mm, intrusion: 5%	00:04:54		2
8.90		OBX	Other obstacles in invert from 5 o'clock to 6 o'clock, 20% cross-sectional area loss: Rock	00:04:54		5
8.90		CXI	Connection defective, connecting pipe is intruding at 2 o'clock, diameter: 150mm, intrusion: 5%	00:04:54		2
10.00		CN	Connection other than junction at 2 o'clock, diameter: 150mm	00:04:54		
19.00	F02	LL	Line deviates left, finish	00:04:54		
20.50		MHF	Finish node type, manhole, reference number: S103A	00:04:54	SW01Y_e86273d0-4f7c-447e-b	

Construction Features					Miscellaneous Features				
Structural Defects					Service & Operational Observations				
STR No. Def	STR Peak	STR Mean	STR Total	STR Grade	SER No. Def	SER Peak	SER Mean	SER Total	SER Grade
0	0.0	0.0	0.0	1.0	3	11.0	0.0	12.0	5.0



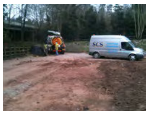
PES

Section Pictures - 22/03/2022 - SW01Y

Section	Inspection Direction	PLR	Client`s Job Ref	Contractor`s Job Ref
13	Downstream	SW01Y		

SW01Y_e5dc7b49-6504-4839-bd9a-255dbce77b8e_20220322_113843_961.jpg, 00:04:54, 6.60 m
Line deviates left, start

SW01Y_e86273d0-4f7c-447e-b9c9-7546685eb266_20220322_113739_788.jpg, 00:04:54, 20.50 m
Finish node type, manhole, reference number: S103A



PES

Section Inspection - 22/03/2022 - MHY

Section	Inspection	Date	Client`s Job Ref	Weather	Pre Cleaned	PLR
14	1	22/03/22	Not Specified	No Rain Or Snow	Not Specified	MHY

Operator	Vehicle	Camera	Preset Length	Legal Status	Alternative ID
Not Specified	Not Specified	Not Specified	Not Specified	Not Specified	Not Specified

Town or Village:	Yarnton	**Inspection Direction:**	Upstream	**Upstream Node:**	MH
Road:	Rutten Lane	**Inspected Length:**	9.20 m	**Upstream Pipe Depth:**	
Location:		**Total Length:**	9.20 m	**Downstream Node:**	O/F 1
Surface Type:		**Joint Length:**	3.00 m	**Downstream Pipe Depth:**	

Use:	Surface water	**Pipe Shape:**	Circular
Type of Pipe:		**Dia/Height:**	100 mm
Year Constructed:		**Pipe Material:**	Polypropylene
Flow Control:	No flow control	**Lining Type:**	No Lining
Inspection Purpose:		**Lining Material:**	No Lining

Comments:
Recommendations:

Depth: m
O/F 1

Scale: 1:80 Position [m]	Code	Observation	MPEG	Photo	Grade
0.00	OF	Start node type, outfall, reference number: O/F 1			
0.00	WL	Water level, 0% of the vertical dimension			
0.60	LL	Line deviates left			
4.70	JN	Junction at 3 o'clock, diameter: 100mm			
8.90	LR	Line deviates right			
9.20	MHF	Finish node type, manhole, reference number: MH		_5e559d00-3ddc-4abb-808d-2a2	

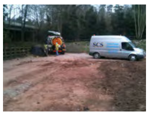
MH
Depth: m

Construction Features					Miscellaneous Features				
Structural Defects					Service & Operational Observations				
STR No. Def	**STR Peak**	**STR Mean**	**STR Total**	**STR Grade**	**SER No. Def**	**SER Peak**	**SER Mean**	**SER Total**	**SER Grade**
0	0.0	0.0	0.0	1.0	0	0.0	0.0	0.0	1.0

Section Pictures - 22/03/2022 - MHY

Section	Inspection Direction	PLR	Client`s Job Ref	Contractor`s Job Ref
14	Upstream	MHY		

_5e559d00-3ddc-4abb-808d-2a2be32d9aa0_20220323_182605.jpg, 9.20 m
Finish node type, manhole, reference number: MH



PES

Section Inspection - 22/03/2022 - RWPY

Section	Inspection	Date	Client`s Job Ref	Weather	Pre Cleaned	PLR
15	1	22/03/22	Not Specified	No Rain Or Snow	Not Specified	RWPY
Operator		**Vehicle**	**Camera**	**Preset Length**	**Legal Status**	**Alternative ID**
Not Specified		Not Specified	Not Specified	Not Specified	Not Specified	Not Specified

Town or Village:	Yarnton	**Inspection Direction:**	Upstream	**Upstream Node:**	RWP
Road:	Rutten Lane	**Inspected Length:**	4.50 m	**Upstream Pipe Depth:**	
Location:		**Total Length:**	4.50 m	**Downstream Node:**	O/F 2
Surface Type:		**Joint Length:**	3.00 m	**Downstream Pipe Depth:**	

Use:	Surface water	**Pipe Shape:**	Circular
Type of Pipe:		**Dia/Height:**	100 mm
Year Constructed:		**Pipe Material:**	Polypropylene
Flow Control:	No flow control	**Lining Type:**	No Lining
Inspection Purpose:		**Lining Material:**	No Lining

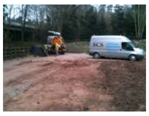
Comments:
Recommendations:

Scale: 1:50

Depth: m
O/F 2

Position [m]	Code	Observation	MPEG	Photo	Grade
0.00	OF	Start node type, outfall, reference number: O/F 2			
0.00	WL	Water level, 0% of the vertical dimension			
4.50	LU	Line deviates up: RWP			
4.50	SA	Survey abandoned: End of survey		_6cf6c5f1-4514-4249-9d9e-e12	

Construction Features					Miscellaneous Features				
Structural Defects					Service & Operational Observations				
STR No. Def	**STR Peak**	**STR Mean**	**STR Total**	**STR Grade**	**SER No. Def**	**SER Peak**	**SER Mean**	**SER Total**	**SER Grade**
0	0.0	0.0	0.0	1.0	0	0.0	0.0	0.0	1.0



PES

Section Pictures - 22/03/2022 - RWPY

Section	Inspection Direction	PLR	Client`s Job Ref	Contractor`s Job Ref
15	Upstream	RWPY		

_6cf6c5f1-4514-4249-9d9e-e124c1d41fd9_20220323_182615.jpg,
4.50 m
Survey abandoned, End of survey

DRAINAGE RUN FROM “CENTRAL OUTFALL” INFALL COFHW – MH S105

MANHOLE RUN FROM “CENTRAL OUTFALL”

INFALL COFHW – MH S105

COFHW

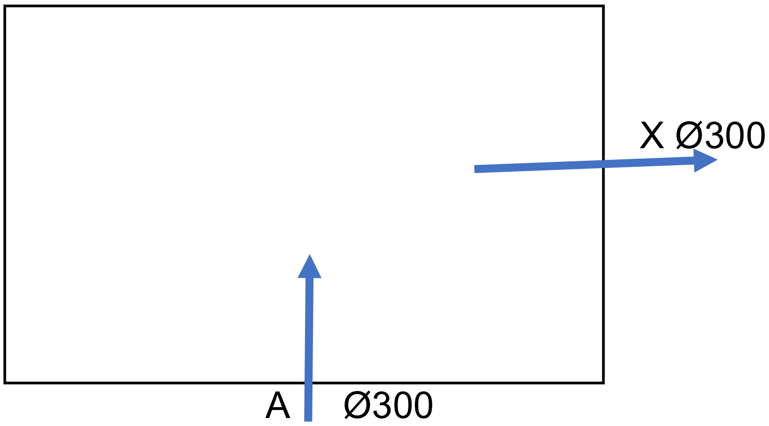
T.O.W=69.81 IL=68.91

HEADWALL

TOP SHOT TO STREAM

MHWR4 (BROKEN COVER SO CONE LEFT IN PLACE ON VERGE)

CL=69.82 IL=68.20



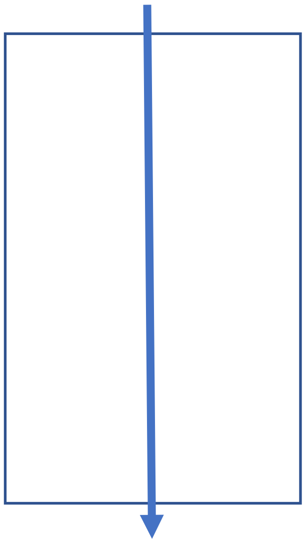
LOCATION

TOP SHOTS

MHWR3

CL=69.08 IL=67.78

A Ø300



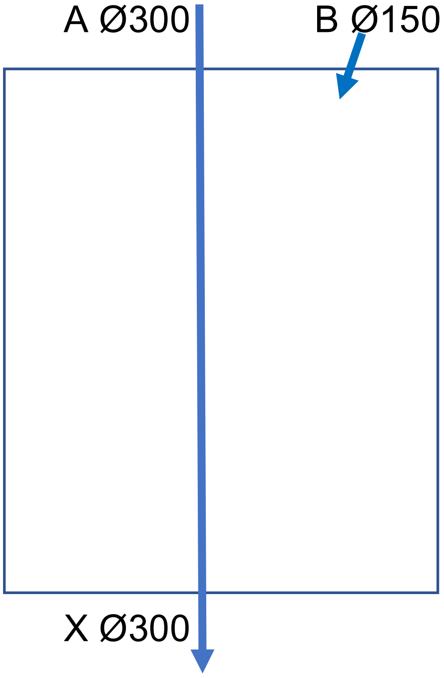
X Ø300

LOCATION

TOP SHOT

MHWR2

CL=67.88 IL=66.58

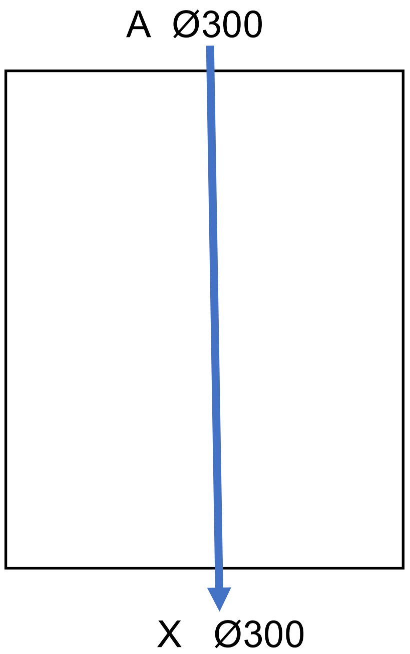


LOCATION

TOP SHOT

MHWR1

CL=67.38 IL=66.05



(ULTIMATELY CONNECTS INTO SOUTHERLY STORM RUN AT S105)

LOCATION

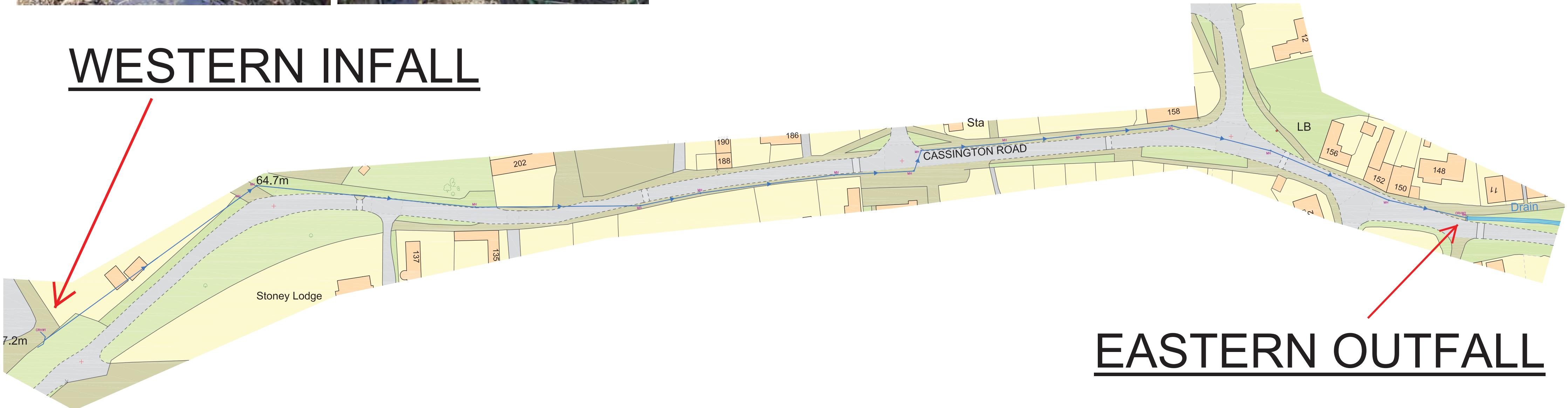
TOP SHOT

CASSINGTON ROAD

STORM DRAINAGE ROUTE

CASSINGTON ROAD DRAINAGE ROUTE

WESTERN INFALL



EASTERN OUTFALL

Rutten Lane Storm Drainage
“Residential Home” –
Outfall Ditch at The Paddocks

Rutten Lane Storm Drainage Route

“Residential Home” – Outfall at The Paddocks

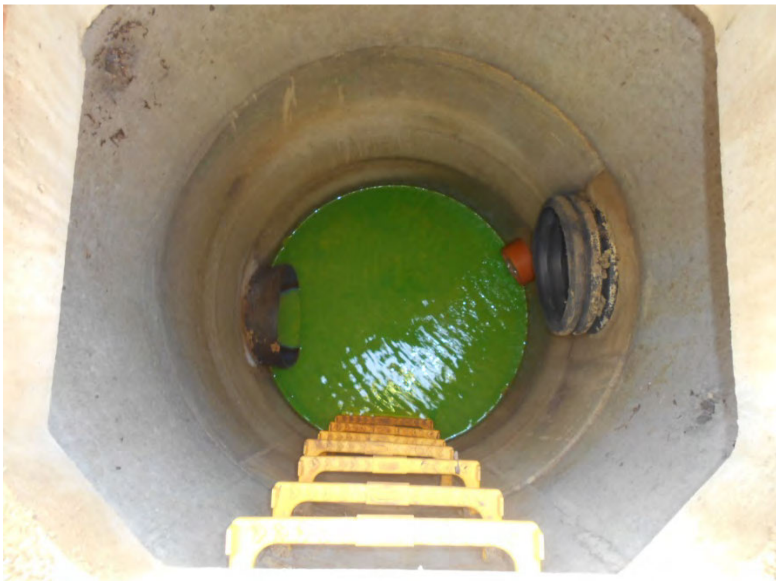
The route was traced from the garden of the old peoples home on Rutten Lane. Initially there is a concrete ditch running along the length of the rear garden. There was found to be no water in the ditch so we presume that its to prevent run off from the adjoining fields going through the home’s grounds in times of storm/high rainfall. At the eastern end of the ditch the water flows into a storm system via a headwall(shown on the original topo survey.

Storm Relief Ditch

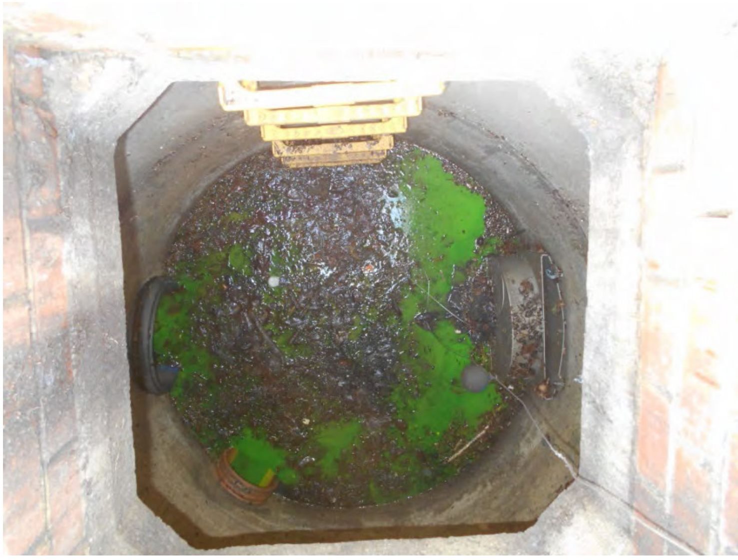
Headwall at end of ditch

Headwall Grill

From the headwall the storm drain runs into a large catchpit manhole then proceeds to flow into a Hydrobrake manhole and on down the access drive and connects into the main highway drain at the entrance to the home.



Catchpit Manhole



Hydrobrake Manhole

Connection Manhole on Rutten Lane at entrance

to old peoples home.

Rutten Lane storm drainage is both open and culverted as can be seen on the overall survey plan. Generally the west side of the road is a mixture of ditches and small culverts at property access points with the eastern side of the roads drainage running southwards through a series of manholes. We were unable to dye test the crossing but we assume that western ditches link to the eastern side of the road somewhere in the area of Little Blenheim as there appears to be a grille covered pipe going from the end of the ditch on the western side. The culverted run then runs down Rutten Lane until it meets the junction with

“The Paddocks”. Along the northern roadside of the Paddocks is a ditch which near the junction contains a headwall and outfall from Rutten Lane.

Headwall Location

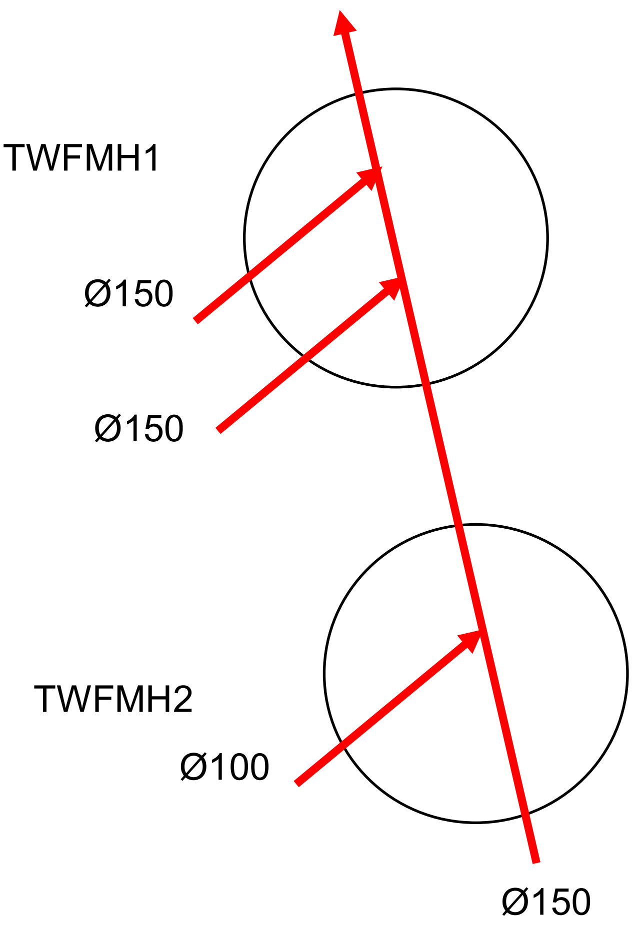
Outfall Headwall

MANHOLE SURVEY INFORMATION

WOODSTOCK ROAD

FOUL MANHOLES

<u>THAMES WATER FOUL MANHOLES (IN SERVICE ROAD NORTH OF SITE)</u>



TWFMH1

COORDS X 447062.300, Y 213794.620

COVER LEVEL=67.62 INVERT LEVEL=65.77

TOP SHOT

TWFMH2

COORDS X 447062.789, Y 213791.700

COVER LEVEL=67.69 INVERT LEVEL=65.89

TOP SHOT

<u>"School Outfall Headwalls"</u>

The outfall headwalls in the ditch outside the school were CCTV'd and found to collect the roof drainage from the new school building constructed behind the hedge.

HEADWALLS

Appendix D Existing Drainage Features Plan

NOTES

These drawings have been produced with reference to the CDM Regulations 2015. Please note that these are pre-construction phase drawings and should be subject to further design risk management as required in accordance with Regulation 9

1. This Drawing is not to be reproduced in any part or form without the consent of PJA Civil Engineering Ltd. All copyright reserved.
2. All dimensions are in meters unless otherwise stated.
3. All levels are in meters above ordance datum.
4. Drawing should be read in conjunction with all other relevant scheme drawings.
5. Drawing Includes:
   - 5.1. OS Mapping provided by DEFINE in January 2022.
   - 5.2. Topographic Survey produced by MKSurveys in September 2018.
   - 5.3. CCTV Survey produced by MK Surveys in July 2021.
   - 5.4. Risk of Surface Water Flood Extents downloaded from the Environment Agency in February 2022.
   - 5.5. Existing Asset Mapping produced by Thames Water in February 2022.

Key:

- Site Boundary
- Existing Drainage Ditches
- Existing Foul Water Sewer
- Existing Foul Water Rising Main
- Existing Combined Sewer
- Existing Surface Water Sewer
- Thames Water Abandoned Sewer
- Existing Water Sludge Rising Main
- Existing Culvert
- Existing Overland Flow Route

REV	DATE	REVISION NOTE	BY
P2	24/05/2022	UPDATED INFORMATION	PR
P1	01/03/2022	DRAFT FOR COMMENT	CT

PJA

Seven House ▫ High Street
Longbridge ▫ Birmingham
B31 2UQ ▫ Tel: 0121 475 0234

Birmingham ▫ Bristol
Exeter ▫ London ▫ Reading
pja.co.uk

CLIENT
Merton College

PROJECT
Land West of Yarnton

DRAWING TITLE
Existing Drainage Features Plan

DRAWING ISSUE STATUS
INFORMATION

PJA JOB No.	SUB-CODE	DRAWING NO.	REVISION
06058 -	-	0100 -	P2

Revision Letter : P - Prelim / A - Approval / T - Tender / C - Construction

BIM DRAWING REFERENCE

SCALE	DRAWN	REVIEWED	DATE
A1@2000	CT	PR	MAR 2022

Appendix E Thames Water Asset Mapping

Asset location search

Property Searches

Groundwise Searches Ltd
Suite 8 Chichester House
45Chichester Road
SOUTHEND ON SEA
SS1 2JU

Search address supplied Land Near Yarnton
Oxfordshire
OX5 1QD

Your reference 22630DM

Our reference ALS/ALS Standard/2018_3883092

Search date 3 October 2018

Keeping you up-to-date

Notification of Price Changes

From 1 September 2018 Thames Water Property Searches will be increasing the price of its Asset Location Search in line with RPI at 3.23%.

For further details on the price increase please visit our website: www.thameswater-propertysearches.co.uk
Please note that any orders received with a higher payment prior to the 1 September 2018 will be non-refundable.

Thames Water Utilities Ltd
Property Searches, PO Box 3189, Slough SL1 4WW
DX 151280 Slough 13

searches@thameswater.co.uk
www.thameswater-propertysearches.co.uk

0845 070 9148

searchcode

Search address supplied: Land Near Yarnton, Oxfordshire, OX5 1QD

Dear Sir / Madam

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

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

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

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

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

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

Contact Us

If you have any further queries regarding this enquiry please feel free to contact a member of the team on 0845 070 9148, or use the address below:

Thames Water Utilities Ltd
Property Searches
PO Box 3189
Slough
SL1 4WW

Email: searches@thameswater.co.uk
Web: www.thameswater-propertysearches.co.uk

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:

SP4712SW
SP4613NE
SP4612SE
SP4712NW
SP4612NE
SP4713NW
SP4713SW

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.

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

SP4612NW
SP4613SE

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:

SP4712SW
SP4613NE
SP4712NW
SP4713NW
SP4713SW

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.

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

SP4612NW
SP4612SE
SP4613SE
SP4612NE

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

Asset Location Search Sewer Map - ALS/ALS Standard/2018_3883092	SP4712SW

The width of the displayed area is 500m and the centre of the map is located at OS coordinates 447250,212250

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.

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

Manhole Reference	Manhole Cover Level	Manhole Invert Level
4204	n/a	63.88
4205	n/a	64.2
4210	n/a	n/a
4213	65.48	63.78
4202	64.96	62.84
4209	64.73	62.47
4203	65.2	63.55
301A	n/a	n/a
301B	n/a	n/a
3002	64.54	63.03
3001	63.48	62.07
4002	63.02	61.56
4001	61.95	60.4
4101	64.19	62.64

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

Asset Location Search Sewer Map - ALS/ALS Standard/2018_3883092 | SP4613NE

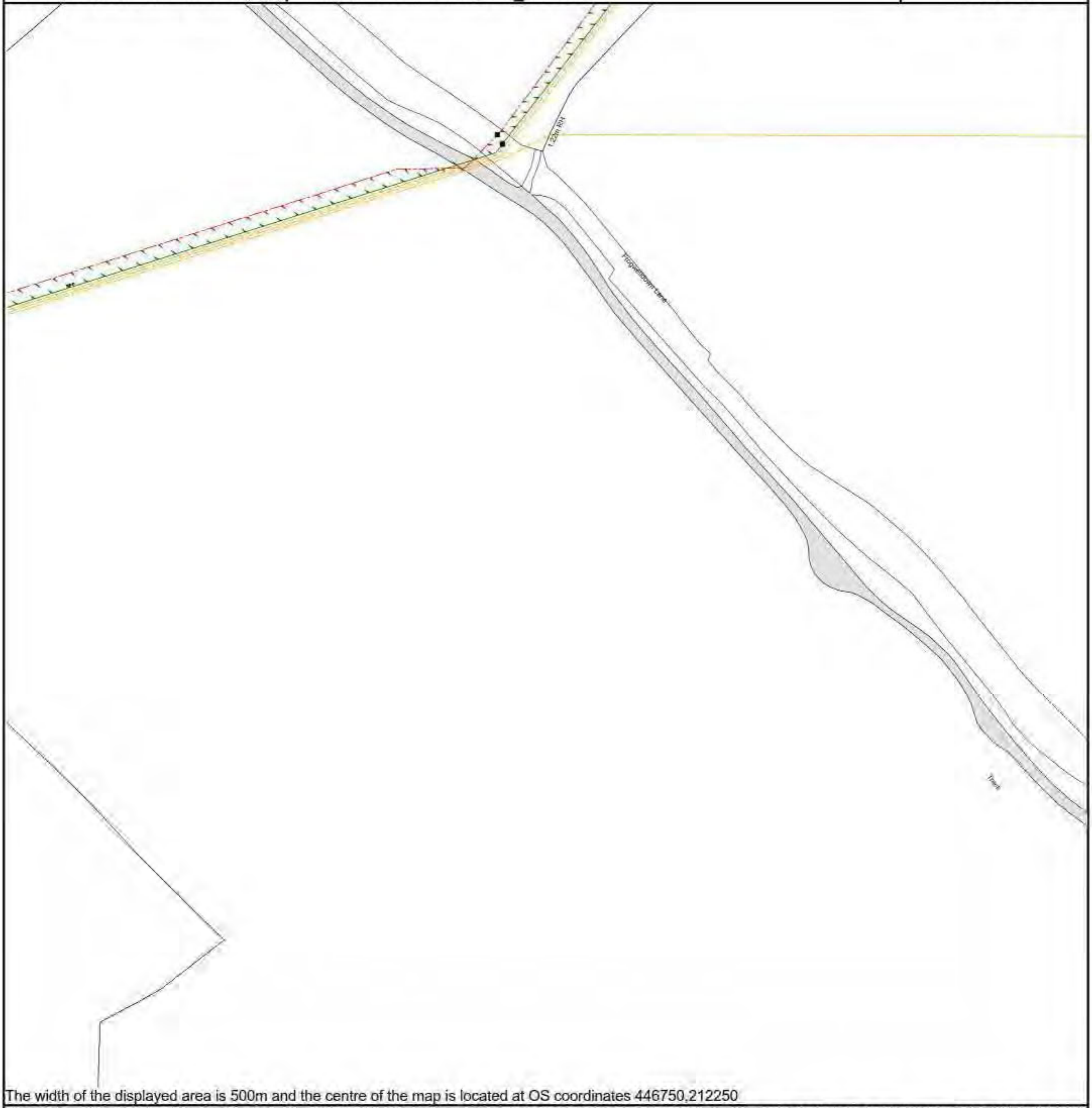
The width of the displayed area is 500m and the centre of the map is located at OS coordinates 446750,213750

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.

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

Manhole Reference	Manhole Cover Level	Manhole Invert Level
5601	76.58	75.22
6701	75.54	73.85
6702	75.18	73.18
6791	n/a	n/a
7701	71.83	70.32
7801	69.3	67.65
8901	68.63	67.33
881B	n/a	n/a
881A	n/a	n/a
8801	67.22	65.91
9801	67.23	66.06
9851	67.1	66.37
9802	67.02	65.74

Asset Location Search Sewer Map - ALS/ALS Standard/2018_3883092	SP4612SE



The width of the displayed area is 500m and the centre of the map is located at OS coordinates 446750,212250

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

Manhole Reference	Manhole Cover Level	Manhole Invert Level
n/a	n/a	n/a

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

Asset Location Search Sewer Map - ALS/ALS Standard/2018_3883092	SP4712NW

The width of the displayed area is 500m and the centre of the map is located at OS coordinates 447250,212750

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.

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

Manhole Reference	Manhole Cover Level	Manhole Invert Level
4902	69.52	67.73
4952	69.5	68.13
4601	68.23	66.45
461D	n/a	n/a
461C	n/a	n/a
471I	n/a	n/a
471K	n/a	n/a
471L	n/a	n/a
471M	n/a	n/a
471N	n/a	n/a
471J	n/a	n/a
4951	69.51	67.62
4901	69.48	67.36
4791	n/a	n/a
4852	69.26	67.44
4801	69.36	67.16
4851	68.19	66.5
4802	68.25	66.48
471H	n/a	n/a

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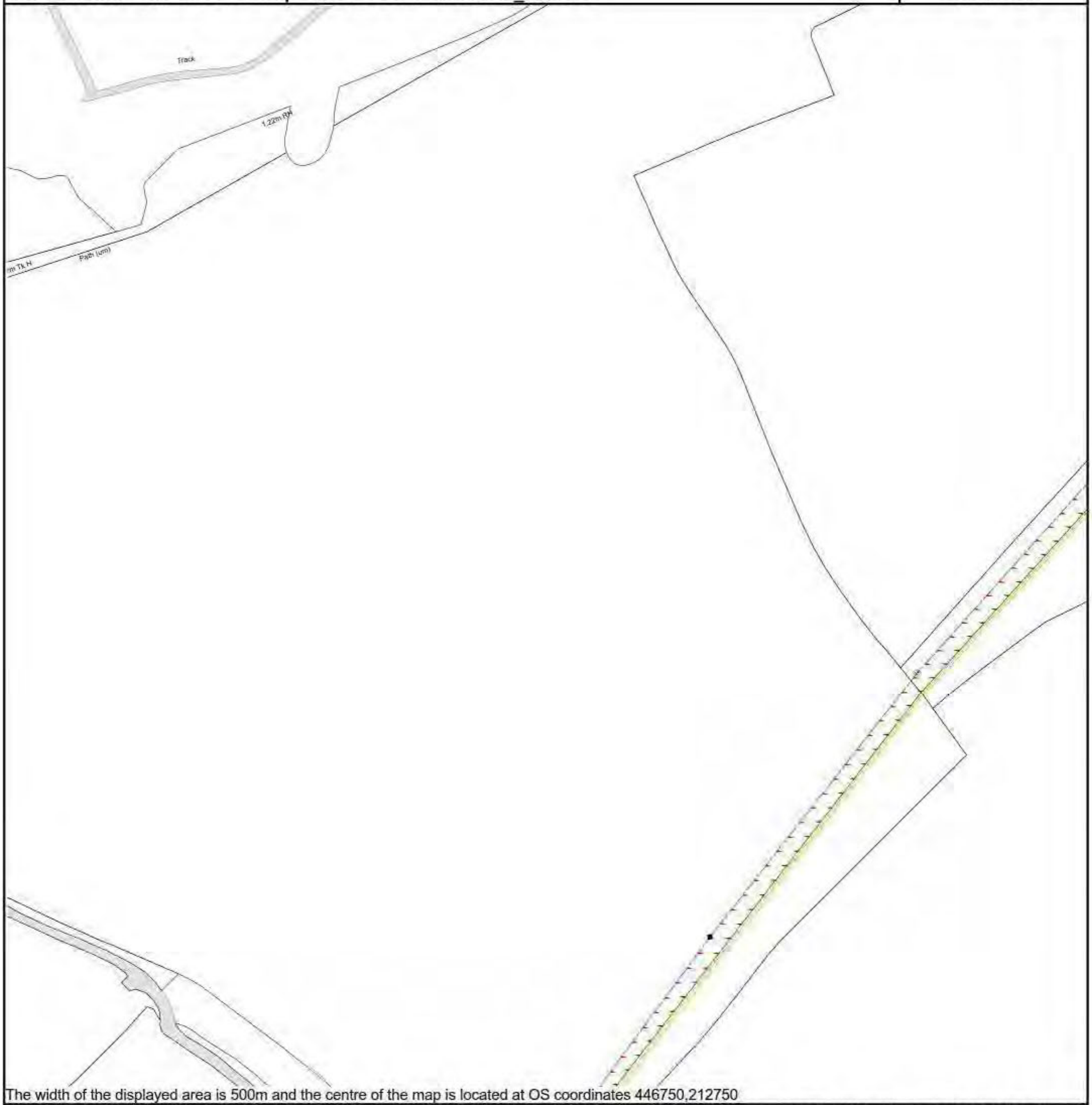
Asset Location Search Sewer Map - ALS/ALS Standard/2018_3883092	SP4612NE



The width of the displayed area is 500m and the centre of the map is located at OS coordinates 446750,212750

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Manhole Reference	Manhole Cover Level	Manhole Invert Level
n/a	n/a	n/a

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Asset Location Search Sewer Map - ALS/ALS Standard/2018_3883092	SP4713NW

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

Manhole Reference	Manhole Cover Level	Manhole Invert Level
481A	n/a	n/a
4807	65.32	62.71
4802	65.41	62.2
4808	n/a	n/a
4804	n/a	n/a
4801	66.07	62.89
2891	n/a	n/a
3802	66.1	62.86
3801	66.21	63.64
491E	n/a	n/a
4991	n/a	n/a
491A	n/a	n/a
491C	n/a	n/a
491H	n/a	n/a
491B	n/a	n/a
491F	n/a	n/a
4951	67.1	66.16
4910	67.86	66.54
2901	67.53	65.93
2802	67.08	64.83
2801	66.8	64.93
3904	n/a	n/a
3905	n/a	n/a
3902	67.56	65.41
3993	n/a	n/a
3901	68.27	65.7
391A	n/a	n/a
3903	68.08	65.83
4902	68.21	65.9
491D	n/a	n/a
0891	n/a	n/a
0701	67.73	65.87
0702	67.64	65.84
0901	67.54	65.25
0802	67.39	65.08
191C	n/a	n/a
1801	67.35	64.68
191B	n/a	n/a
191A	n/a	n/a
1901	68.37	65.51
181D	n/a	n/a
181B	n/a	n/a
181C	n/a	n/a
181A	n/a	n/a
1991	n/a	n/a
1891	n/a	n/a
2991	n/a	n/a
081B	n/a	n/a
081A	n/a	n/a

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Asset Location Search Sewer Map - ALS/ALS Standard/2018_3883092	SP4713SW

The width of the displayed area is 500m and the centre of the map is located at OS coordinates 447250,213250

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.

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

Manhole Reference	Manhole Cover Level	Manhole Invert Level
401B	n/a	n/a
401A	n/a	n/a
4002	68.18	64.64
4001	68.08	65.95
3102	68.29	66.37
3101	68.95	67.61

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/2018_3883092

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Scale:	1:7161
Width:	2000m
Printed By:	SAsirvat
Print Date:	03/10/2018
Map Centre:	446903,212864
Grid Reference:	SP4612NE

Comments:

ALS Sewer Map Key

Public Sewer Types (Operated & Maintained by Thames Water)

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

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

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

- Trunk Surface Water
- Trunk Foul
- Storm Relief
- Trunk Combined
- Vent Pipe
- Bio-solids (Sludge)
- Proposed Thames Surface Water Sewer
- Proposed Thames Water Foul Sewer
- Gallery
- Foul Rising Main
- Surface Water Rising Main
- Combined Rising Main
- Sludge Rising Main
- Proposed Thames Water Rising Main
- Vacuum

Sewer Fittings

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

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

Operational Controls

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

- Control Valve
- Drop Pipe
- Ancillary
- Weir

End Items

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

- Outfall
- Undefined End
- Inlet

Other Symbols

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

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

Areas

Lines denoting areas of underground surveys, etc.

- Agreement
- Operational Site
- Chamber
- Tunnel
- Conduit Bridge

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

- Foul Sewer
- Surface Water Sewer
- Combined Sewer
- Gulley
- Culverted Watercourse
- Proposed
- Abandoned Sewer

Notes:

1) All levels associated with the plans are to Ordnance Datum Newlyn.

2) All measurements on the plans are metric.

3) Arrows (on gravity fed sewers) or flecks (on rising mains) indicate direction of flow.

4) Most private pipes are not shown on our plans, as in the past, this information has not been recorded.

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

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

Asset Location Search Water Map - ALS/ALS Standard/2018_3883092	SP4712SW

The width of the displayed area is 500m and the centre of the map is located at OS coordinates 447250,212250

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

Asset Location Search Water Map - ALS/ALS Standard/2018_3883092

SP4613NE

The width of the displayed area is 500m and the centre of the map is located at OS coordinates 446750,213750

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

Asset Location Search Water Map - ALS/ALS Standard/2018_3883092 | **SP4712NW**

The width of the displayed area is 500m and the centre of the map is located at OS coordinates 447250,212750

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

Asset Location Search Water Map - ALS/ALS Standard/2018_3883092

SP4713NW

The width of the displayed area is 500m and the centre of the map is located at OS coordinates 447250,213750

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

Asset Location Search Water Map - ALS/ALS Standard/2018_3883092	SP4713SW

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

ALS/ALS Standard/2018_3883092

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Print Date:	03/10/2018
Map Centre:	446903,212864
Grid Reference:	SP4612NE

Comments:

ALS Water Map Key

Water Pipes (Operated & Maintained by Thames Water)

4"

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

16"

Trunk Main: A main carrying water from a source of supply to a treatment plant or reservoir, or from one treatment plant or reservoir to another. Also a main transferring water in bulk to smaller water mains used for supplying individual customers.

3" SUPPLY

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

3" FIRE

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

3" METERED

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

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

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

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

Valves

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

Hydrants

- Single Hydrant

Meters

- Meter

End Items

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

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

Operational Sites

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

Other Symbols

- Data Logger

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

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

Private Main: Indiates 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.

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 14 days from due 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. Thames Water does not accept post-dated cheques-any cheques received will be processed for payment on date of receipt.
5. In case of dispute TWUL`s terms and conditions shall apply.
6. 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'.
7. Interest will be charged in line with current Court Interest Charges, if legal action is taken.
8. 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).

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If you are unhappy with our service you can speak to your original goods or customer service provider. If you are not satisfied with the response, your complaint will be reviewed by the Customer Services Director. You can write to her at: Thames Water Utilities Ltd. PO Box 492, Swindon, SN38 8TU.

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 0121 345 1000 or write to them at Consumer Council for Water, 1st Floor, Victoria Square House, Victoria Square, Birmingham, B2 4AJ.

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Credit Card	BACS Payment	Telephone Banking	Cheque
Call **0845 070 9148** quoting your invoice number starting CBA or ADS / OSS	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	Made payable to '**Thames Water Utilities Ltd**' Write your Thames Water account number on the back. Send to: **Thames Water Utilities Ltd., PO Box 3189, Slough SL1 4WW** or by DX to **151280 Slough 13**

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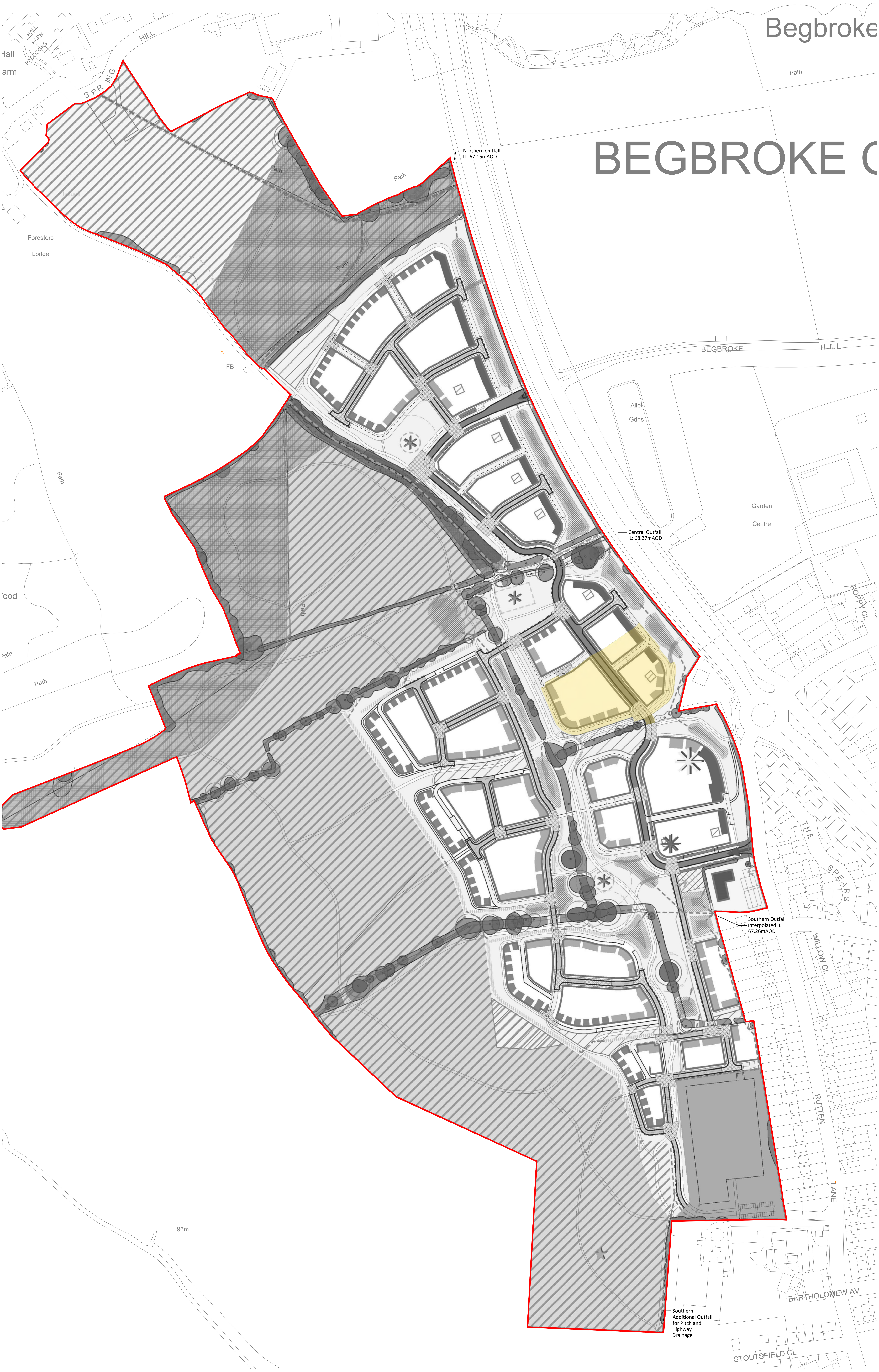
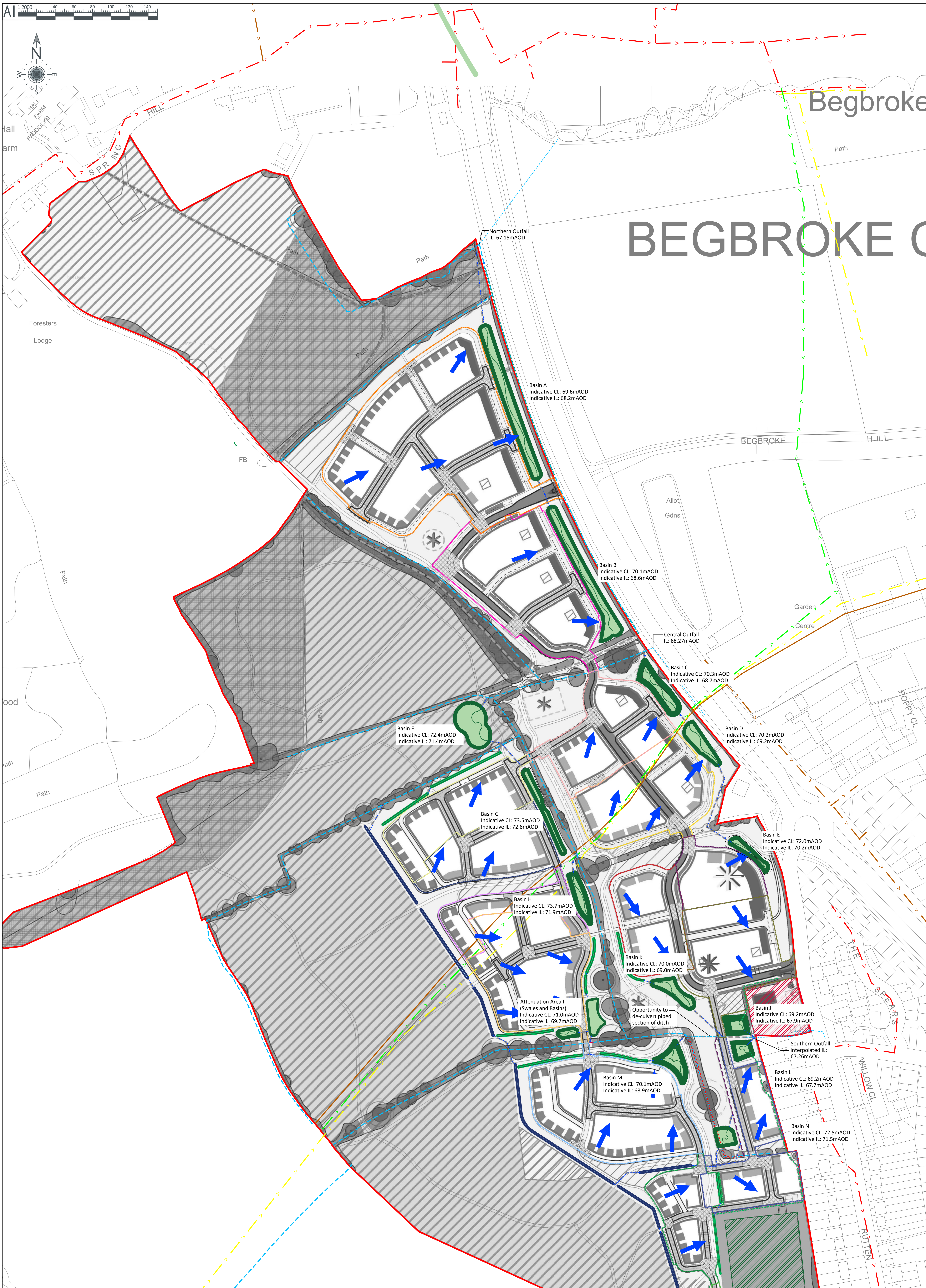
Appendix F Surface Water Drainage Strategy



Begbroke
BEGBROKE C
SPRING HILL
HALL FARM PADDOCKS
Hall
arm
Foresters
Lodge
Path
Path
Path
Path
Path
Path
Path
FB
Northern Outfall
IL: 67.15mAOD
BEGBROKE HILL
Allot
Gdns
Garden
Centre
Central Outfall
IL: 68.27mAOD
POPPY CL
THE SPEARS
Southern Outfall
Interpolated IL:
67.26mAOD
WILLOW CL
RUTTEN LANE
96m
Southern
Additional Outfall
for Pitch and
Highway
Drainage
BARTHOLOMEW AV
STOUTSFIELD CL



SURFACE WATER DRAINAGE STRATEGY

CATCHMENT	PROPOSED DEVELOPMENT AREA (ha)	ASSUMED PROPOSED IMPERMEABLE AREA (ha)	APPROXIMATE 1 IN 100 YEAR + 40% CC ATTENUATION VOLUME REQUIRED (m^3)	PROPOSED DISCHARGE RATE (l/s)
Catchment A	3.20	1.92	1,210	19.4
Catchment B	1.70	1.02	850	
Catchment C	1.00	0.60	610	10.7
Catchment D	1.20	0.72	400	
Catchment E	0.50	0.30	180	
Catchment F	0.80	0.48	630	6.7
Catchment G	0.80	0.48	210	
Catchment H	0.40	0.24	150	2.0
Catchment I	1.30	0.78	590	3.2
Catchment J	1.00	0.60	400	4.2
Catchment K	0.80	0.48	320	3.2
Catchment L	1.00	0.60	360	4.0
Catchment M	1.60	1.02	620	6.2
Catchment N	0.60	0.36	220	2.4
Pitch Drainage	0.95	0.95	850	2.0
Highway Catchment	0.08	0.08	40	2.0
TOTAL	17.03	10.63	7,620	64.0

NOTES

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   - 5.3. CCTV Survey produced by MK Surveys in July 2021.
   - 5.4. Existing Asset Mapping produced by Thames Water in February 2022.
   - 5.5. PR9 Framework Plan, DEFINE (May 2022)
6. Surface water drainage design based on:
   - 6.1. 60% impermeable area
   - 6.2. FEH rainfall data
   - 6.3. Discharge limited to the QBar greenfield runoff rates up to the 1 in 100 year + 40% climate change allowance
   - 6.4. Sensitivity testing undertaken for 10% development creep
7. No assessment has been made for surcharged outfall at this stage.
8. Subject to approval by Oxfordshire County Council LLFA and Cherwell District Council.
9. Any alterations to watercourses are subject to a Land Drainage Consent.

Key:

- Site Boundary
- Existing Drainage Ditches
- Existing Foul Water Sewer
- Existing Foul Water Rising Main
- Existing Combined Sewer
- Existing Surface Water Sewer
- Thames Water Abandoned Sewer
- Existing Water Sludge Rising Main
- Existing Culvert
- Proposed Surface Water Route
- Proposed Attenuation Basin with Low Flow Channel
- Proposed Conveyance Feature
- Proposed Surface Water Sewer
- Proposed Vortex Flow Control
- Catchment A
- Catchment B
- Catchment C
- Catchment D
- Catchment E
- Catchment F
- Catchment G
- Catchment H
- Catchment I
- Catchment J
- Catchment K
- Catchment L
- Catchment M
- Catchment N
- Highway Drainage Catchment
- Proposed Cut-Off Feature
- Proposed Conveyance Swale
- Section of Ditch to be Abandoned
- Diverted Ditch
- Proposed Pitch Drainage
- Proposed Filter Drain
- Existing Medical Centre (Drainage to Remain as Existing)

REV	DATE	REVISION NOTE	BY
P5	07/12/2022	REVISED MASTERPLAN	NM
P4	26//05/2022	REVISED MASTERPLAN	PR
P3	24/05/2022	REVISED MASTERPLAN	PR
P2	30/03/2022	REVISED BASINS BASED ON COMMENTS	PR
P1	18/03/2022	DRAFT FOR COMMENT	PR

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PROJECT
Land West of Yarnton

DRAWING TITLE
Indicative Surface Water Drainage Strategy

DRAWING ISSUE STATUS
INFORMATION

PJA JOB No.	SUB-CODE	DRAWING NO.	REVISION
06058 -	-	0101 -	P5

Revision Letter : P - Prelim / A - Approval / T - Tender / C - Construction

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SCALE	DRAWN	REVIEWED	DATE
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   - 6.1. 60% impermeable area
   - 6.2. FEH rainfall data
   - 6.3. Discharge limited to the QBar greenfield runoff rates up to the 1 in 100 year + 40% climate change allowance
   - 6.4. Basins either 1m or 1.5m deep with 1:4 side slopes
   - 6.5. Sensitivity testing undertaken for 10% development creep
7. No assessment has been made for surcharged outfall at this stage.
8. Subject to approval by Oxfordshire County Council LLFA and Cherwell District Council.
9. Any alterations to watercourses are subject to a Land Drainage Consent.

Key:

- Site Boundary
- Existing Drainage Ditches
- Proposed Attenuation Basin with Low Flow Channel
- Proposed Conveyance Feature
- Proposed Surface Water Sewer
- Proposed Vortex Flow Control
- Catchment A (drains to Basin A)
- Catchment B (drains to Basin B)
- Catchment C (drains to Basin C)
- Catchment D (drains to Basin D)
- Catchment E (drains to Basin E)
- Catchment F (drains to Basin F)
- Catchment G (drains to Basin G)
- Catchment H (drains to Basin H)
- Catchment I(drains to Basin I)
- Catchment J (drains to Basin J)
- Catchment K (drains to Basin K)
- Catchment L (drains to Basin L)
- Catchment M (drains to Basin M)
- Catchment N (drains to Basin N)
- Highway Drainage Catchment
- Pitch Drainage
- Proposed Cut-Off Feature
- Proposed Conveyance Swale
- Section of Ditch to be Abandoned
- Diverted Ditch

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DRAWING TITLE

Indicative
Surface Water Drainage Strategy
Catchment Plan

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PJA JOB No.	SUB-CODE	DRAWING NO.	REVISION
06058 -	-	0102 -	P3

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SCALE	DRAWN	REVIEWED	DATE
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Appendix G Foul Water Drainage Strategy

NOTES

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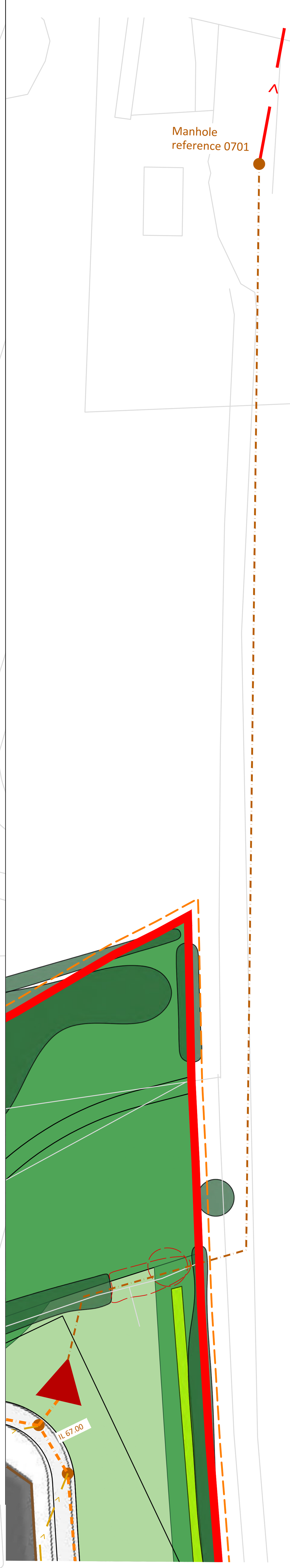
Design is based upon information available at the time.
Design is subject to full review as additional information becomes available.
Design is subject to full review upon receipt of comments from

- Development Control
- LA Planning Authority
- Environment Agency
- LA Highways Department
- Sewerage Undertaker

Key

- Site Boundary
- Foul Sewer
- Foul Manhole
- Private Foul
- Pumping station
- Existing Foul Sewer
- Existing Rising Main
- Existing Combined Sewer
- Foul below 3m
- Foul Sewer 3-5m
- Foul Sewer 5-7m



REV	DATE	REVISION NOTE	BY
P03	07.12.22	REVISED MASTERPLAN	NM
P02	23.05.22	Key Plan added, layout updated	JP
P01	29.04.22	First Issue	JP

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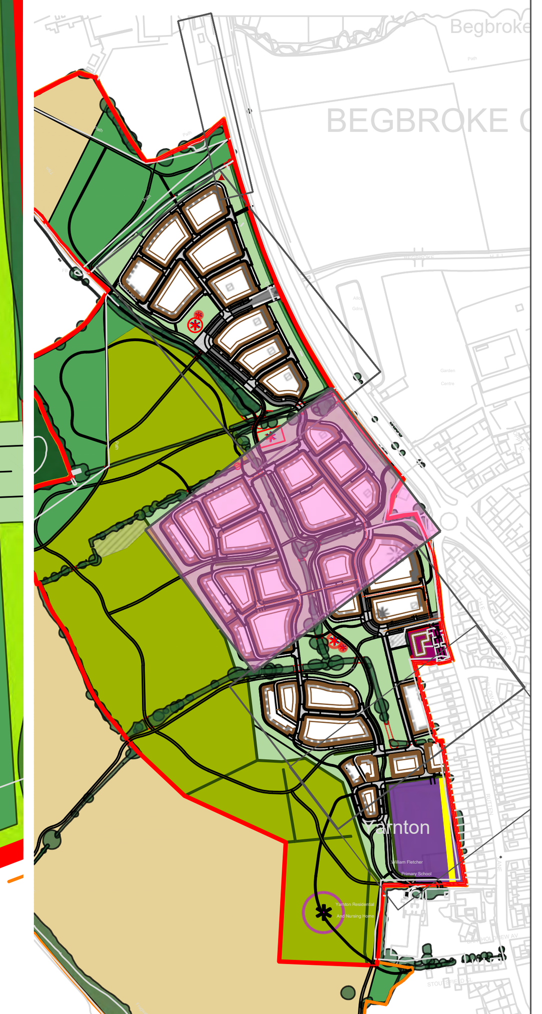
- Foul Sewer 5-7m



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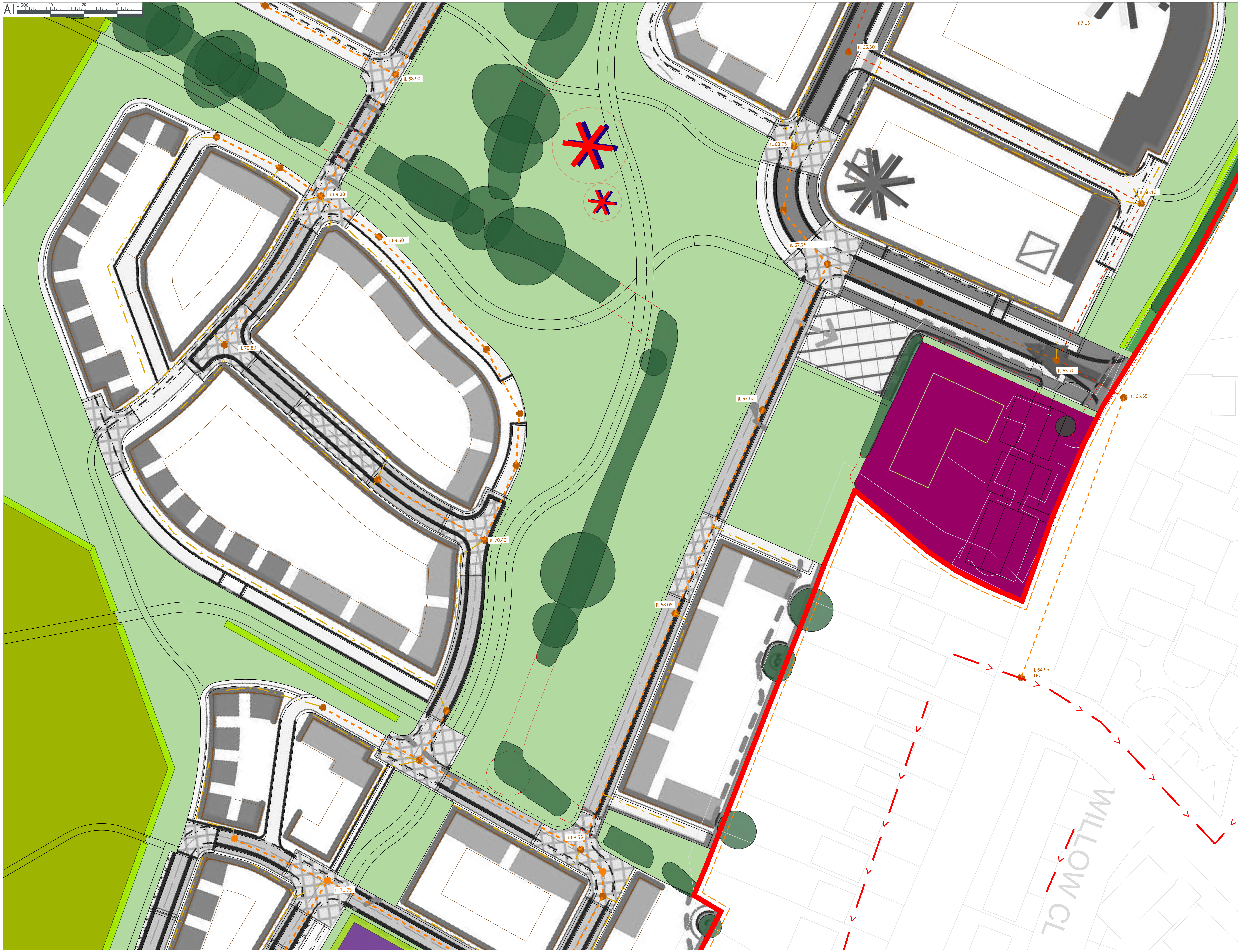

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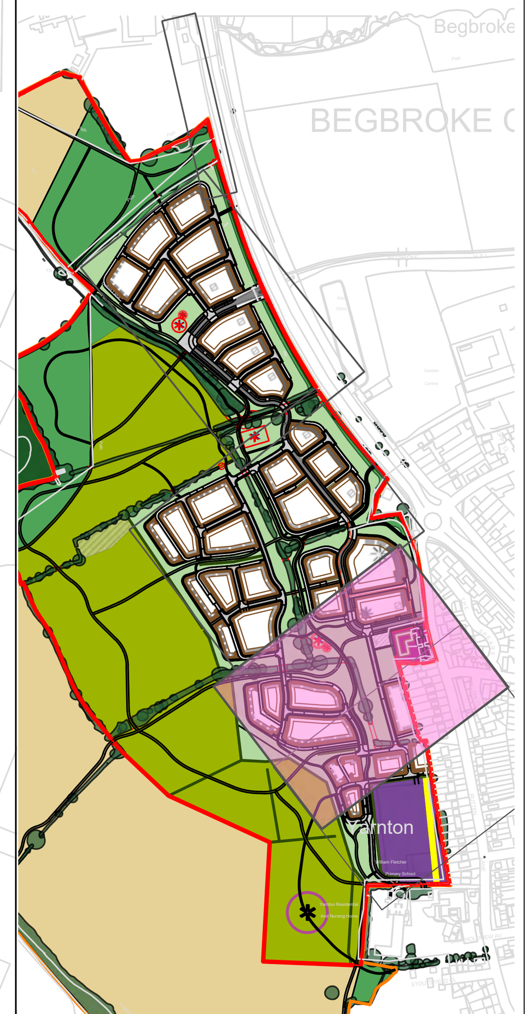

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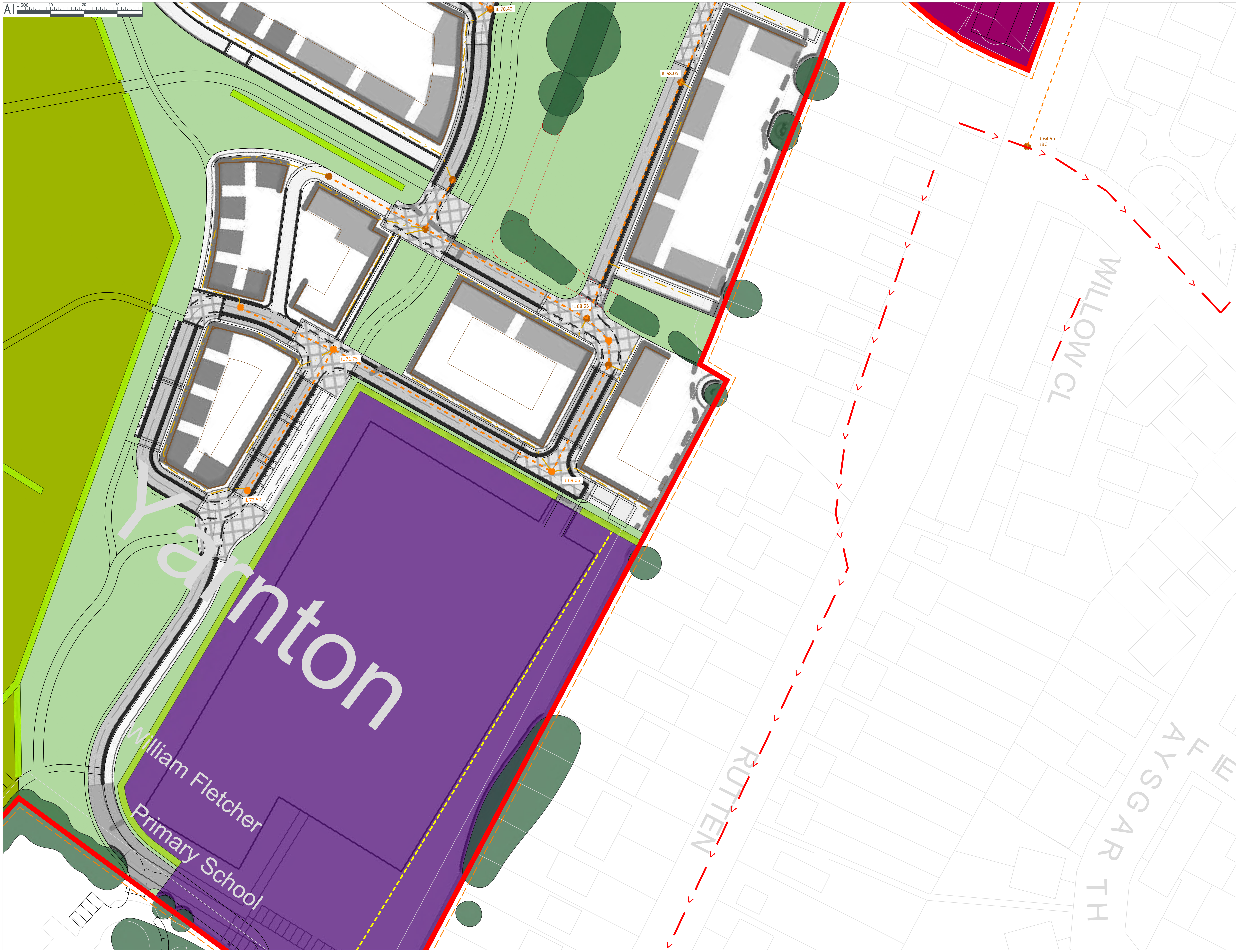

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Sheet 4 of 4

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Appendix H Exceedance Flow Route Plan

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   - 5.4. Existing Asset Mapping produced by Thames Water in February 2022.
   - 5.5. PR9 Framework Plan, DEFINE (May 2022)
6. Subject to approval by Oxfordshire County Council LLFA and Cherwell District Council.
7. Please read in conjunction with drawing 06058-WR-A-101-P4, PJA (May 2022).

Key:

- Site Boundary
- Existing Drainage Ditches
- Existing Foul Water Sewer
- Existing Foul Water Rising Main
- Existing Combined Sewer
- Existing Surface Water Sewer
- Thames Water Abandoned Sewer
- Existing Water Sludge Rising Main
- Existing Culvert
- Proposed Surface Water Exceedance Flow Route
- Proposed Attenuation Basin with Low Flow Channel
- Proposed Conveyance Feature
- Proposed Surface Water Sewer
- Proposed Vortex Flow Control
- Catchment A
- Catchment B
- Catchment C
- Catchment D
- Catchment E
- Catchment F
- Catchment G
- Catchment H
- Catchment I
- Catchment J
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- Catchment M
- Catchment N
- Highway Drainage Catchment
- Proposed Cut-Off Feature
- Proposed Conveyance Swale
- Section of Ditch to be Abandoned
- Diverted Ditch
- Proposed Pitch Drainage
- Proposed Filter Drain
- Existing Medical Centre (Drainage to Remain as Existing)

REV	DATE	REVISION NOTE	BY
P2	07/12/2022	REVISED MASTERPLAN	NM
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DRAWING TITLE
Indicative
Surface Water
Exceedance Strategy

DRAWING ISSUE STATUS
INFORMATION

PJA JOB No.	SUB-CODE	DRAWING NO.	REVISION
06058 -	-	0103 -	P2

Revision Letter : P - Prelim / A - Approval / T - Tender / C - Construction

BIM DRAWING REFERENCE

SCALE	DRAWN	REVIEWED	DATE
A1@1:2000	PR	PR	MAY 2022

Appendix I Greenfield Run Off Calculations

IH 124 Mean Annual Flood

Input

Return Period (years)	100	Soil	0.450
Area (ha)	50.000	Urban	0.000
SAAR (mm)	639	Region Number	Region 6

Results	**l/s**
QBAR Rural	197.4
QBAR Urban	197.4
Q100 years	629.8
Q1 year	167.8
Q2 years	173.9
Q5 years	252.7
Q10 years	319.8
Q20 years	395.5
Q25 years	424.1
Q30 years	447.4
Q50 years	517.3
Q100 years	629.8
Q200 years	740.4
Q250 years	775.9
Q1000 years	1018.7

Appendix J Causeway Flow Calculations

Design Settings

Rainfall Methodology	FEH-99
Return Period (years)	100
Additional Flow (%)	0
C (1km)	-0.023
D1 (1km)	0.317
D2 (1km)	0.346
D3 (1km)	0.231
E (1km)	0.291
F (1km)	2.440
CV	0.750

Time of Entry (mins)	4.00
Maximum Time of Concentration (mins)	30.00
Maximum Rainfall (mm/hr)	50.0
Minimum Velocity (m/s)	1.00
Connection Type	Level Soffits
Minimum Backdrop Height (m)	0.200
Preferred Cover Depth (m)	1.200
Include Intermediate Ground	✓
Enforce best practice design rules	✓

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Easting (m)	Northing (m)	Depth (m)
Pond A	1.920	4.00	69.600	55.362	46.990	1.400
Pond B	1.020	4.00	70.100	61.930	30.392	1.500
Pond C	0.600	4.00	70.300	90.030	-2.588	1.600
Pond D	0.720	4.00	70.200	110.655	-32.818	1.000
Pond E	0.300	4.00	72.000	142.397	-81.617	1.800
Pond F	0.480	4.00	72.400	-26.871	2.204	1.000
Pond G	0.480	4.00	73.500	14.677	-60.351	0.900
Pond H	0.240	4.00	73.700	52.796	-131.794	1.800
Pond I	0.780	4.00	71.100	73.700	-181.752	1.100
Pond J	0.630	4.00	69.200	179.960	-123.541	1.300
Pond K	0.480	4.00	70.000	130.664	-145.431	1.000
Pond L	0.600	4.00	69.200	214.690	-168.028	1.300
Pond M	0.960	4.00	70.400	105.105	-233.229	1.500
Pond N	0.360	4.00	72.500	181.457	-274.746	1.000
Southern Highway Drainage	0.080	4.00	61.000	100.363	-361.533	1.000
Pitch Drainage	0.950	4.00	70.700	301.059	-361.113	0.500

Links

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	T of C (mins)	Rain (mm/hr)
3.000	Pond B	Pond A	38.000	0.600	68.600	68.200	0.400	95.0	375	4.34	50.0
1.001	Pond D	Pond C	20.000	0.600	69.200	68.700	0.500	40.0	300	5.05	50.0
1.000	Pond E	Pond D	80.000	0.600	70.200	69.200	1.000	80.0	225	4.91	50.0
2.000	Pond G	Pond F	50.000	0.600	72.600	71.400	1.200	41.7	225	4.41	50.0

Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)	Pro Depth (mm)	Pro Velocity (m/s)
3.000	1.859	205.3	138.2	1.125	1.025	1.020	0.0	226	1.989
1.001	2.493	176.2	138.2	0.700	1.300	1.020	0.0	201	2.748
1.000	1.463	58.2	40.7	1.575	0.775	0.300	0.0	138	1.577
2.000	2.032	80.8	65.1	0.675	0.775	0.480	0.0	153	2.252

Pipeline Schedule

Link	Length (m)	Slope (1:X)	Dia (mm)	Link Type	US CL (m)	US IL (m)	US Depth (m)	DS CL (m)	DS IL (m)	DS Depth (m)
3.000	38.000	95.0	375	Circular	70.100	68.600	1.125	69.600	68.200	1.025
1.001	20.000	40.0	300	Circular	70.200	69.200	0.700	70.300	68.700	1.300
1.000	80.000	80.0	225	Circular	72.000	70.200	1.575	70.200	69.200	0.775
2.000	50.000	41.7	225	Circular	73.500	72.600	0.675	72.400	71.400	0.775

Link	US Node	Node Type	DS Node	Node Type
3.000	Pond B	Junction	Pond A	Junction
1.001	Pond D	Junction	Pond C	Junction
1.000	Pond E	Junction	Pond D	Junction
2.000	Pond G	Junction	Pond F	Junction

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Connections	Link	IL (m)	Dia (mm)
Pond A	55.362	46.990	69.600	1.400	1	3.000	68.200	375
Pond B	61.930	30.392	70.100	1.500	0	3.000	68.600	375
Pond C	90.030	-2.588	70.300	1.600	1	1.001	68.700	300
Pond D	110.655	-32.818	70.200	1.000	1	1.000	69.200	225
					0	1.001	69.200	300
Pond E	142.397	-81.617	72.000	1.800	0	1.000	70.200	225
Pond F	-26.871	2.204	72.400	1.000	1	2.000	71.400	225
Pond G	14.677	-60.351	73.500	0.900	0	2.000	72.600	225
Pond H	52.796	-131.794	73.700	1.800				
Pond I	73.700	-181.752	71.100	1.100				

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Connections	Link	IL (m)	Dia (mm)
Pond J	179.960	-123.541	69.200	1.300	∘			
Pond K	130.664	-145.431	70.000	1.000	∘			
Pond L	214.690	-168.028	69.200	1.300	∘			
Pond M	105.105	-233.229	70.400	1.500	∘			
Pond N	181.457	-274.746	72.500	1.000	∘			
Southern Highway Drainage	100.363	-361.533	61.000	1.000	∘			
Pitch Drainage	301.059	-361.113	70.700	0.500	∘			

Simulation Settings

Rainfall Methodology	FEH-99	E (1km)	0.291	Skip Steady State	x
C (1km)	-0.023	F (1km)	2.440	Drain Down Time (mins)	240
D1 (1km)	0.317	Summer CV	0.750	Additional Storage (m³/ha)	20.0
D2 (1km)	0.346	Winter CV	0.840	Check Discharge Rate(s)	x
D3 (1km)	0.231	Analysis Speed	Normal	Check Discharge Volume	x

Storm Durations

15	30	60	120	180	240	360	480	600	720	960	1440

Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
100	0	0	0
100	40	0	0
100	40	10	0

Node Pond A Online Hydro-Brake® Control

Flap Valve	✓	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	✓	Sump Available	✓
Invert Level (m)	68.200	Product Number	CTL-SHE-0194-1930-1100-1930
Design Depth (m)	1.100	Min Outlet Diameter (m)	0.225
Design Flow (l/s)	19.3	Min Node Diameter (mm)	1500

Node Pond B Online Hydro-Brake® Control

Flap Valve	✓	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	✓	Sump Available	✓
Invert Level (m)	68.600	Product Number	CTL-SHE-0079-3000-1200-3000
Design Depth (m)	1.200	Min Outlet Diameter (m)	0.100
Design Flow (l/s)	3.0	Min Node Diameter (mm)	1200

Node Pond C Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	✓	Sump Available	✓
Invert Level (m)	68.700	Product Number	CTL-SHE-0145-1060-1300-1060
Design Depth (m)	1.300	Min Outlet Diameter (m)	0.225
Design Flow (l/s)	10.6	Min Node Diameter (mm)	1200

Node Pond D Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Downstream Link	1.001	Sump Available	✓
Replaces Downstream Link	✓	Product Number	CTL-SHE-0165-1250-0700-1250
Invert Level (m)	69.200	Min Outlet Diameter (m)	0.225
Design Depth (m)	0.700	Min Node Diameter (mm)	1200
Design Flow (l/s)	12.5		

Node Pond E Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	✓	Sump Available	✓
Invert Level (m)	70.200	Product Number	CTL-SHE-0075-3000-1500-3000
Design Depth (m)	1.500	Min Outlet Diameter (m)	0.100
Design Flow (l/s)	3.0	Min Node Diameter (mm)	1200

Node Pond F Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	✓	Sump Available	✓
Invert Level (m)	71.400	Product Number	CTL-SHE-0122-6300-0700-6300
Design Depth (m)	0.700	Min Outlet Diameter (m)	0.150
Design Flow (l/s)	6.3	Min Node Diameter (mm)	1200

Node Pond G Online Orifice Control

Flap Valve	x	Replaces Downstream Link	✓	Diameter (m)	0.100
Downstream Link	2.000	Invert Level (m)	72.600	Discharge Coefficient	0.600

Node Pond H Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	✓	Sump Available	✓
Invert Level (m)	71.900	Product Number	CTL-SHE-0067-2000-1000-2000
Design Depth (m)	1.000	Min Outlet Diameter (m)	0.100
Design Flow (l/s)	2.0	Min Node Diameter (mm)	1200

Node Pond I Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	✓	Sump Available	✓
Invert Level (m)	70.000	Product Number	CTL-SHE-0085-3200-1000-3200
Design Depth (m)	1.000	Min Outlet Diameter (m)	0.100
Design Flow (l/s)	3.2	Min Node Diameter (mm)	1200

Node Pond J Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	✓	Sump Available	✓
Invert Level (m)	67.900	Product Number	CTL-SHE-0094-4200-1200-4200
Design Depth (m)	1.200	Min Outlet Diameter (m)	0.150
Design Flow (l/s)	4.2	Min Node Diameter (mm)	1200

Node Pond K Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	✓	Sump Available	✓
Invert Level (m)	69.000	Product Number	CTL-SHE-0089-3200-0700-3200
Design Depth (m)	0.700	Min Outlet Diameter (m)	0.150
Design Flow (l/s)	3.2	Min Node Diameter (mm)	1200

Node Pond L Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	✓	Sump Available	✓
Invert Level (m)	67.900	Product Number	CTL-SHE-0099-4000-0700-4000
Design Depth (m)	0.700	Min Outlet Diameter (m)	0.150
Design Flow (l/s)	4.0	Min Node Diameter (mm)	1200

Node Pond M Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	✓	Sump Available	✓
Invert Level (m)	68.900	Product Number	CTL-SHE-0115-6300-1200-6300
Design Depth (m)	1.200	Min Outlet Diameter (m)	0.150
Design Flow (l/s)	6.3	Min Node Diameter (mm)	1200

Node Pond N Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	✓	Sump Available	✓
Invert Level (m)	71.500	Product Number	CTL-SHE-0084-2800-0700-2800
Design Depth (m)	0.700	Min Outlet Diameter (m)	0.100
Design Flow (l/s)	2.8	Min Node Diameter (mm)	1200

Node Southern Highway Drainage Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	✓	Sump Available	✓
Invert Level (m)	60.000	Product Number	CTL-SHE-0067-2000-1000-2000
Design Depth (m)	1.000	Min Outlet Diameter (m)	0.100
Design Flow (l/s)	2.0	Min Node Diameter (mm)	1200

Node Pitch Drainage Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	✓	Sump Available	✓
Invert Level (m)	70.200	Product Number	CTL-SHE-0075-2000-0500-2000
Design Depth (m)	0.500	Min Outlet Diameter (m)	0.100
Design Flow (l/s)	2.0	Min Node Diameter (mm)	1200

Node Pond A Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	68.200
Side Inf Coefficient (m/hr)	0.00000	Porosity	1.00	Time to half empty (mins)	

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	1130.0	0.0	1.400	2580.0	0.0

Node Pond B Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	68.600
Side Inf Coefficient (m/hr)	0.00000	Porosity	1.00	Time to half empty (mins)	180

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	970.0	0.0	1.500	2370.0	0.0

Node Pond C Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	68.700
Side Inf Coefficient (m/hr)	0.00000	Porosity	1.00	Time to half empty (mins)	

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	380.0	0.0	1.600	1260.0	0.0

Node Pond D Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	69.200
Side Inf Coefficient (m/hr)	0.00000	Porosity	1.00	Time to half empty (mins)	

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	390.0	0.0	1.000	890.0	0.0

Node Pond E Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	70.200
Side Inf Coefficient (m/hr)	0.00000	Porosity	1.00	Time to half empty (mins)	0

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	125.0	0.0	1.800	580.0	0.0

Node Pond F Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	71.400
Side Inf Coefficient (m/hr)	0.00000	Porosity	1.00	Time to half empty (mins)	

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	1000.0	0.0	1.000	1700.0	0.0

Node Pond G Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	72.600
Side Inf Coefficient (m/hr)	0.00000	Porosity	1.00	Time to half empty (mins)	148

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	100.0	0.0	0.900	930.0	0.0

Node Pond H Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	71.900
Side Inf Coefficient (m/hr)	0.00000	Porosity	1.00	Time to half empty (mins)	0

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	220.0	0.0	1.800	840.0	0.0

Node Pond I Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	70.000
Side Inf Coefficient (m/hr)	0.00000	Porosity	1.00	Time to half empty (mins)	

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	500.0	0.0	1.100	1110.0	0.0

Node Pond J Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	67.900
Side Inf Coefficient (m/hr)	0.00000	Porosity	1.00	Time to half empty (mins)	

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	120.0	0.0	1.300	610.0	0.0

Node Pond K Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	69.000
Side Inf Coefficient (m/hr)	0.00000	Porosity	1.00	Time to half empty (mins)	

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	320.0	0.0	1.000	820.0	0.0

Node Pond L Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	67.900
Side Inf Coefficient (m/hr)	0.00000	Porosity	1.00	Time to half empty (mins)	

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	130.0	0.0	1.300	480.0	0.0

Node Pond M Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	68.900
Side Inf Coefficient (m/hr)	0.00000	Porosity	1.00	Time to half empty (mins)	

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	240.0	0.0	1.200	930.0	0.0

Node Pond N Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	71.500
Side Inf Coefficient (m/hr)	0.00000	Porosity	1.00	Time to half empty (mins)	

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	220.0	0.0	1.000	500.0	0.0

Node Southern Highway Drainage Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	60.000
Side Inf Coefficient (m/hr)	0.00000	Porosity	0.30	Time to half empty (mins)	198

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	200.0	0.0	1.000	200.0	0.0

Node Pitch Drainage Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	70.200
Side Inf Coefficient (m/hr)	0.00000	Porosity	0.30	Time to half empty (mins)	

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	9000.0	0.0	0.500	9000.0	0.0

Results for 100 year Critical Storm Duration. Lowest mass balance: 99.99%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
360 minute winter	Pond A	344	68.751	0.551	123.3	794.4973	0.0000	OK
1440 minute winter	Pond B	1380	69.070	0.470	21.7	564.8693	0.0000	SURCHARGED
720 minute winter	Pond C	705	69.412	0.712	34.1	415.2525	0.0000	OK
180 minute winter	Pond D	176	69.699	0.499	80.7	264.0009	0.0000	SURCHARGED
240 minute winter	Pond E	236	70.789	0.589	25.8	119.3691	0.0000	SURCHARGED
720 minute winter	Pond F	720	71.754	0.354	27.2	401.6326	0.0000	OK
60 minute winter	Pond G	60	73.054	0.454	121.5	145.3953	0.0000	SURCHARGED
360 minute winter	Pond H	344	72.249	0.349	15.1	98.7483	0.0000	OK
960 minute winter	Pond I	930	70.572	0.572	22.7	384.8712	0.0000	OK
360 minute winter	Pond J	352	68.795	0.895	39.5	267.0827	0.0000	OK
480 minute winter	Pond K	464	69.468	0.468	23.9	208.9803	0.0000	OK
360 minute winter	Pond L	352	68.827	0.927	37.7	244.6026	0.0000	OK
360 minute winter	Pond M	352	69.736	0.836	60.2	412.3512	0.0000	OK
360 minute winter	Pond N	352	72.004	0.504	22.6	150.0885	0.0000	OK
60 minute winter	Southern Highway Drainage	60	60.397	0.397	20.3	24.4353	0.0000	OK
1440 minute winter	Pitch Drainage	1410	70.414	0.214	20.2	586.5789	0.0000	OK

Link Event (Outflow)	US Node	Link	DS Node	Outflow (l/s)	Discharge Vol (m³)
15 minute winter	Pond A	Hydro-Brake®		19.3	283.9
180 minute winter	Pond B	Hydro-Brake®	Pond A	2.9	
15 minute winter	Pond C	Hydro-Brake®		10.6	157.4
180 minute winter	Pond D	Hydro-Brake®	Pond C	12.5	
15 minute summer	Pond E	Hydro-Brake®	Pond D	2.6	
60 minute winter	Pond F	Hydro-Brake®		6.3	101.8
60 minute winter	Pond G	Orifice	Pond F	13.3	
60 minute winter	Pond H	Hydro-Brake®		2.0	32.6
15 minute summer	Pond I	Hydro-Brake®		3.2	47.6
15 minute winter	Pond J	Hydro-Brake®		4.2	59.5
15 minute summer	Pond K	Hydro-Brake®		3.2	47.4
360 minute winter	Pond L	Hydro-Brake®		4.5	140.2
60 minute winter	Pond M	Hydro-Brake®		6.3	98.3
15 minute summer	Pond N	Hydro-Brake®		2.8	41.4
15 minute summer	Southern Highway Drainage	Hydro-Brake®		2.0	18.4
360 minute summer	Pitch Drainage	Hydro-Brake®		2.0	53.3

Results for 100 year +40% CC Critical Storm Duration. Lowest mass balance: 99.99%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
480 minute winter	Pond A	464	68.977	0.777	136.7	1212.3340	0.0000	OK
1440 minute winter	Pond B	1410	69.258	0.658	30.4	848.5635	0.0000	SURCHARGED
960 minute winter	Pond C	930	69.639	0.939	36.7	606.6409	0.0000	OK
240 minute winter	Pond D	232	69.887	0.687	89.2	396.1403	0.0000	SURCHARGED
480 minute winter	Pond E	464	70.996	0.796	20.9	182.3477	0.0000	SURCHARGED
960 minute winter	Pond F	960	71.928	0.528	30.7	630.8833	0.0000	OK
120 minute winter	Pond G	114	73.172	0.572	99.8	214.0600	0.0000	SURCHARGED
480 minute winter	Pond H	464	72.387	0.487	16.7	149.3870	0.0000	OK
1440 minute winter	Pond I	1380	70.803	0.803	23.3	591.7393	0.0000	OK
480 minute winter	Pond J	472	69.054	1.154	43.9	400.5760	0.0000	OK
600 minute winter	Pond K	585	69.640	0.640	27.9	313.2017	0.0000	OK
480 minute winter	Pond L	464	69.108	1.208	41.8	364.4727	0.0000	OK
480 minute winter	Pond M	472	69.991	1.091	66.9	617.6584	0.0000	OK
480 minute winter	Pond N	464	72.190	0.690	25.1	223.5462	0.0000	OK
120 minute winter	Southern Highway Drainage	118	60.612	0.612	16.6	37.6922	0.0000	OK
1440 minute winter	Pitch Drainage	1440	70.514	0.314	28.3	859.1909	0.0000	OK

Link Event (Outflow)	US Node	Link	DS Node	Outflow (l/s)	Discharge Vol (m³)
15 minute summer	Pond A	Hydro-Brake®		19.3	285.9
480 minute summer	Pond B	Hydro-Brake®	Pond A	2.9	
240 minute winter	Pond C	Hydro-Brake®		10.6	246.5
480 minute winter	Pond D	Hydro-Brake®	Pond C	12.5	
60 minute winter	Pond E	Hydro-Brake®	Pond D	2.6	
15 minute winter	Pond F	Hydro-Brake®		6.3	92.8
120 minute winter	Pond G	Orifice	Pond F	15.1	
15 minute summer	Pond H	Hydro-Brake®		2.0	28.9
60 minute summer	Pond I	Hydro-Brake®		3.2	51.5
60 minute summer	Pond J	Hydro-Brake®		4.2	63.6
1440 minute winter	Pond K	Hydro-Brake®		3.2	252.0
480 minute winter	Pond L	Hydro-Brake®		5.1	187.5
360 minute winter	Pond M	Hydro-Brake®		6.3	195.3
180 minute summer	Pond N	Hydro-Brake®		2.8	58.4
15 minute summer	Southern Highway Drainage	Hydro-Brake®		2.0	25.1
30 minute winter	Pitch Drainage	Hydro-Brake®		2.0	30.7

Results for 100 year +40% CC +10% A Critical Storm Duration. Lowest mass balance: 99.99%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
480 minute winter	Pond A	472	69.050	0.850	150.1	1360.0900	0.0000	OK
1440 minute winter	Pond B	1410	69.320	0.720	33.5	951.1459	0.0000	SURCHARGED
960 minute winter	Pond C	945	69.708	1.008	39.2	671.0300	0.0000	OK
240 minute winter	Pond D	236	69.950	0.750	97.9	444.6861	0.0000	FLOOD RISK
480 minute winter	Pond E	464	71.063	0.863	23.0	205.0838	0.0000	SURCHARGED
960 minute winter	Pond F	975	71.982	0.582	33.2	706.4236	0.0000	OK
120 minute winter	Pond G	116	73.210	0.610	109.8	239.5587	0.0000	FLOOD RISK
480 minute winter	Pond H	472	72.434	0.534	18.4	168.1551	0.0000	OK
1440 minute winter	Pond I	1410	70.877	0.876	25.6	664.9384	0.0000	OK
600 minute winter	Pond J	585	69.135	1.235	40.2	448.8461	0.0000	OK
600 minute winter	Pond K	585	69.694	0.694	30.7	350.0807	0.0000	OK
480 minute winter	Pond L	464	69.198	1.298	46.0	408.8408	0.0000	OK
600 minute winter	Pond M	585	70.072	1.172	61.3	692.8083	0.0000	OK
480 minute winter	Pond N	464	72.251	0.751	27.6	250.2846	0.0000	OK
120 minute winter	Southern Highway Drainage	118	60.686	0.686	18.3	42.3639	0.0000	OK
1440 minute winter	Pitch Drainage	1440	70.549	0.349	31.2	957.4227	0.0000	OK

Link Event (Outflow)	US Node	Link	DS Node	Outflow (l/s)	Discharge Vol (m³)
15 minute summer	Pond A	Hydro-Brake®		19.3	285.1
720 minute summer	Pond B	Hydro-Brake®	Pond A	2.9	
240 minute winter	Pond C	Hydro-Brake®		10.6	238.7
480 minute winter	Pond D	Hydro-Brake®	Pond C	12.5	
60 minute summer	Pond E	Hydro-Brake®	Pond D	2.6	
15 minute summer	Pond F	Hydro-Brake®		6.3	92.7
120 minute winter	Pond G	Orifice	Pond F	15.6	
15 minute summer	Pond H	Hydro-Brake®		2.0	29.1
240 minute summer	Pond I	Hydro-Brake®		3.2	71.8
600 minute winter	Pond J	Hydro-Brake®		4.3	190.6
960 minute winter	Pond K	Hydro-Brake®		3.2	192.2
480 minute winter	Pond L	Hydro-Brake®		5.3	193.5
120 minute winter	Pond M	Hydro-Brake®		6.3	120.1
480 minute winter	Pond N	Hydro-Brake®		2.9	106.8
15 minute summer	Southern Highway Drainage	Hydro-Brake®		2.0	26.9
30 minute summer	Pitch Drainage	Hydro-Brake®		2.0	30.6

Appendix K Thames Water Developer Enquiry

Thames Water

Phoede Ryding

PJA Civil Engineering Ltd
Seven House
High Street
Longbridge
West Midlands
B31 2UQ

Wastewater pre-planning
Our ref DS6092970

4th March 2022

Pre-planning enquiry: Capacity concerns

Site Address: Land West Of Yarnton, Oxfordshire, OX5 1LT

Dear Phoebe,

Thank you for providing information on the proposals to construct 550 houses, 1000m^2 of elderly/extra care residential floorspace, a community work hub and play/sports areas on the areas of previously Greenfield land.

We have completed the assessment of the foul water flows and surface water run-off based on the information submitted in your application with the purpose of assessing sewer capacity within the existing Thames Water sewer network.

Foul Water

We've assessed your **foul water** proposals and concluded from our initial review, that our sewerage network may not have sufficient capacity to meet your requirements.

This assessment is based on the foul water flows being pumped from the site at 13l/s and discharged to manhole ref. 0701 on the 150mm dia. foul water sewer to the North of the site in Woodstock Road West.

In order to ensure we make the appropriate upgrades – or 'off-site reinforcement' – to serve the development, we'll need to carry out modelling work and, if required, design a solution and build the necessary improvements. This work is done at our cost.

Once we've begun modelling, we may need to contact you to discuss changing the connection point for capacity reasons. Please note that we'll pay the cost of covering any extra distance if the connection needs to be made at a point further away than the nearest practicable point of at least the same diameter.

How long could modelling and reinforcement take?

Typical timescales for a development of your size are:

Modelling: 8 months
Design: 6 months
Construction: 6 months
Total: 20 months

If the time you're likely to take from planning and construction through to first occupancy is longer than this, we'll be able to carry out the necessary upgrades in time for your development. If it's shorter, please contact me on the number below to discuss the timing of our activities.

What do you need to tell us before we start modelling?

We're responsible for funding any modelling and reinforcement work. We need, though, to spend our customers' money wisely, so we'll only carry out modelling once we're confident that your development will proceed.

In order to have this confidence, we'll need to know that you **own the land and have either outline or full planning permission**. **The proposed build programme will also be useful.** Please provide this information to us as soon as you have it.

If you'd like us to start modelling work before you own the land and have outline or full planning permission, we can do this if you agree to underwrite the cost of modelling and design. That means we'll fund the work – but you agree to pay the cost if you don't achieve first occupancy within five years.

A copy of our underwriting agreement is available upon request.

If the modelling shows we need to carry out reinforcement work, then before we start construction we'll need you to supply us with notification that you've confirmed your F10 – Notification of construction project - submission to the Health and Safety Executive.

Surface Water

Please note that discharging surface water to the public sewer network should only be considered after all other methods of disposal have been investigated and proven to not be viable. In accordance with the Building Act 2000 Clause H3.3, positive connection to a public sewer will only be consented when it can be demonstrated that the hierarchy of disposal methods have been examined and proven to be impracticable. The disposal hierarchy being: 1st Soakaways; 2nd Watercourses; 3rd Sewers.

As all surface water run-off will be taken directly to a watercourse, this does not involve a connection to the existing public sewer network and hence we would have no objections to this.

Please note that the Local Planning authority may comment on surface water discharge under the planning process.

Please Note

All connection requests are subject to a full Section 106 (Water Industry Act 1991) application before the Company can confirm approval to the connection itself. Please also note that capacity in the public sewerage system cannot be reserved. Please make sure you submit your connection application giving us at least 21 days' notice of the date you wish to make your new connection/s.

The discharge of non-domestic effluent is not permitted until a consent has been issued by Thames Water. If anything other than domestic sewage is discharged into the public sewers without the above agreement an offence is committed and the applicant will be liable to the penalties contained in Section 109(1) (WIA 1991).

If discharge of effluent from trade processes is sort applicants should contact Trade Effluent prior to seeking a connection approval, to discuss trade effluent consent and conditions of discharge. For Trade Effluent queries and to apply for Discharge Consents please call 0203 577 9200 or email trade.effluent@thameswater.co.uk.

The views expressed by Thames Water in this letter are in response to this pre development enquiry at this time and do not represent our final views on any future planning applications made in relation to this site.

Please note that you must keep us informed of any changes to your design – for example, an increase in the number or density of homes.

Yours sincerely,

Jonathan Shildrick BSc
Development Engineer
Developer Services

From:	DEVELOPER.SERVICES@THAMESWATER.CO.U
To:	Daniel Flello
Subject:	RE: RE: RE: RE: RE: [PJA: 06058] RE: Wastewater Pre-Planning Enquiry for Land West of Yarnton (TW ref. DS6092970)
Date:	10 June 2022 15:32:54
Attachments:	image350862.png image001.png image002.png image001.png image001.png image001.png image001.png image003.png image001.png image004.png image001.png image005.png image006.png image007.png image008.png

---

Hi Daniel,

Further to my email below, I have now heard back from our Asset Planners and they have confirmed that our response will be the same as previously issued i.e. that we would still have capacity concerns based on the foul water flows from 160 houses draining to the proposed pumping station on the site that will pump at 8l/s and discharge to manhole 0701 on the 150mm dia. foul water sewer in Woodstock Road to the North and the foul water flows from the remaining 380 houses gravitating from the site and connecting to the 150mm dia. foul water sewer in Rutten Lane near to the junction with Aysgarth Road between manholes 471I and 471J.

All surface water to still drain directly to an adjacent watercourse.

Regards

Jonathan Shildrick BSc
Development Engineer
Sewer Adoptions Team
Developer Services

Helpdesk: 0800 009 3921

Clearwater Court, Vastern Road, Reading, RG1 8DB
Find us online at developers.thameswater.co.uk

Original Text

From:	"DEVELOPER.SERVICES@THAMESWATER.CO.U" <DEVELOPER.SERVICES@THAMESWATER.CO.UK>
To:	daniel.flello@pja.co.uk
CC:	Phoebe.ryding@pja.co.uk <Phoebe.ryding@pja.co.uk>;dave.woolley@pja.co.uk <dave.woolley@pja.co.uk>
Sent:	08.06.22 10:14:08
Subject:	RE: RE: RE: RE: [PJA: 06058] RE: Wastewater Pre-Planning Enquiry for Land West of Yarnton (TW ref. DS6092970)

Hi Daniel,

Many thanks for your email below.

Further to this I have had to consult with our Asset Planning team for their comments. We give them 5 working days to get back to us so hopefully I should be able to issue our formal response towards the end of next week.

Regards

Jonathan Shildrick BSc
Development Engineer
Sewer Adoptions Team
Developer Services

Helpdesk: 0800 009 3921

Clearwater Court, Vastern Road, Reading, RG1 8DB
Find us online at developers.thameswater.co.uk

Original Text

From:	Daniel Flello <daniel.flello@pja.co.uk>
To:	DEVELOPER.SERVICES@THAMESWATER.CO.U <DEVELOPER.SERVICES@THAMESWATER.CO.UK>
CC:	Phoebe Ryding <Phoebe.ryding@pja.co.uk>;Dave Woolley <dave.woolley@pja.co.uk>
Sent:	07.06.22 08:34:05
Subject:	RE: RE: RE: [PJA: 06058] RE: Wastewater Pre-Planning Enquiry for Land West of Yarnton (TW ref. DS6092970)

Hi Jonathon,

The pump rate of the pumping station is going to be 8l/s.

The previous is incorrect and the correct split is:

We are looking at 160 dwellings being pumped North to MH 0701 at an assumed rate of 8l/s.

The remaining 380 dwellings will discharge via gravity to Rutten lane at an assumed rate 19l/s.

Kind regards,

Daniel

Daniel Flello
Senior Engineer
T. 0121 387 7935
Seven House, High Street, Longbridge, Birmingham, B31 2UQ
www.pja.co.uk

From: DEVELOPER.SERVICES@THAMESWATER.CO.U <DEVELOPER.SERVICES@THAMESWATER.CO.UK>
Sent: 07 June 2022 08:03
To: Daniel Flello <daniel.flello@pja.co.uk>
Cc: Phoebe Ryding <Phoebe.ryding@pja.co.uk>; Dave Woolley <dave.woolley@pja.co.uk>
Subject: RE: RE: RE: [PJA: 06058] RE: Wastewater Pre-Planning Enquiry for Land West of Yarnton (TW ref. DS6092970)

Hi Daniel,

Thanks for your email below and for confirming the split of the development size between the Northern part and Southern part of the proposed development.

However, I keep getting different rates from you. On her email of the 24th May, Joshua Pope confirmed the following;

'We are now proposing to connect into two locations the first being manhole reference 0701 as per the previous approval at 4 l/s.

The second location is at the junction of Aysgarth road and Rutten lane with the new chamber on the existing network at 9 l/s.'

Is this therefore incorrect?

If so, can you please confirm that the pump rate of the pumping station serving the Northern part of the development will actually now be 8l/s?

Regards

Jonathan Shildrick BSc
Development Engineer
Sewer Adoptions Team
Developer Services

Helpdesk: 0800 009 3921

Clearwater Court, Vastern Road, Reading, RG1 8DB
Find us online at developers.thameswater.co.uk

Original Text

From: Daniel Flello <daniel.flello@pja.co.uk>
To: DEVELOPER.SERVICES@THAMESWATER.CO.U <DEVELOPER.SERVICES@THAMESWATER.CO.UK>
CC: Phoebe Ryding <Phoebe.ryding@pja.co.uk>;Dave Woolley <dave.woolley@pja.co.uk>
Sent: 06.06.22 11:58:38
Subject: RE: RE: [PJA: 06058] RE: Wastewater Pre-Planning Enquiry for Land West of Yarnton (TW ref. DS6092970)

Good morning Jonathon,

Regarding the Yarnton Enquiry the total assumed foul flow is 27l/s.

We are looking at 160 dwellings being pumped North to MH 0701 at an assumed rate of 8l/s.

The remaining 380 dwellings will discharge via gravity to Rutten lane at an assumed rate 19l/s.

Kind regards,

Daniel

Daniel Flello
Senior Engineer
T. 0121 387 7935
Seven House, High Street, Longbridge, Birmingham, B31 2UQ
www.pja.co.uk

From: DEVELOPER.SERVICES@THAMESWATER.CO.U <DEVELOPER.SERVICES@THAMESWATER.CO.UK>
Sent: 06 June 2022 11:13
To: Dave Woolley <dave.woolley@pja.co.uk>
Subject: RE: RE: [PJA: 06058] RE: Wastewater Pre-Planning Enquiry for Land West of Yarnton (TW ref. DS6092970)

Dave,

Many thanks for your email below.

When we consulted our Asset Planners previously, all foul water flows were to be pumped from the whole development at 13l/s to manhole 0701.

Now I understand that the flows will be split - pumping from the Northern part of the development at 4l/s to mh 0701 and the remainder of the development discharging via gravity to a connection in Rutten Lane to the South.

For me to re-consult our Asset Planners on the new proposals, I need to know the size of the proposed development i.e. no. of properties etc., that will drain via the pump station and the size of the development going to the gravity connection.

This information is absolutely essential for me to progress with your enquiry.

Regards

Jonathan Shildrick BSc
Development Engineer
Sewer Adoptions Team
Developer Services

Helpdesk: 0800 009 3921

Clearwater Court, Vastern Road, Reading, RG1 8DB
Find us online at developers.thameswater.co.uk

Original Text

From:	Dave Woolley <dave.woolley@pja.co.uk>
To:	DEVELOPER.SERVICES@THAMESWATER.CO.U <DEVELOPER.SERVICES@THAMESWATER.CO.UK>
CC:	Daniel Flello <daniel.flello@pja.co.uk>;Phoebe Ryding <Phoebe.ryding@pja.co.uk>;Joshua Pope <Joshua.Pope@pja.co.uk>
Sent:	01.06.22 09:36:47
Subject:	RE: [PJA: 06058] RE: Wastewater Pre-Planning Enquiry for Land West of Yarnton (TW ref. DS6092970)

Jonathan

Many thanks for your email and apologies there appears to be a bit of a crossover in correspondence.

Would it be possible to arrange a call early next week please.

Please see attached proposals, including Surface Water Plans to provide context , on the following link.

06058-Yarnton - Drainage Plans.pdf

The proposed scheme, now includes to split flows North and South, and utilises a proposed pumping station, details on the attached.

Look forward to catching up, have a great extended weekend and apologies again for any confusion caused.

Regards

Dave

Dave Woolley
Director
T. 0121 387 7929 M. 07739 190990
Seven House, High Street, Longbridge, Birmingham, B31 2UQ
www.pja.co.uk

From: DEVELOPER.SERVICES@THAMESWATER.CO.U
<DEVELOPER.SERVICES@THAMESWATER.CO.UK>
Sent: 31 May 2022 09:04
To: Phoebe Ryding <Phoebe.ryding@pja.co.uk>
Cc: Dave Woolley <dave.woolley@pja.co.uk>
Subject: RE: RE: RE: RE: RE: [PJA: 06058] RE: Wastewater Pre-Planning Enquiry for Land West of Yarnton (TW ref. DS6092970)

Hi Phoebe,

Many thanks for your email below.

It is essential that we know the split of the development draining to each proposed connection point in order to progress your application.

You mention in your previous email that you are aware of a flow rate that you are intending to discharge at to both connection points. As you mention there will be no pumped flows, I assume therefore that the size of the development draining to each point was known in order to calculate these rates?

Regards

Jonathan Shildrick BSc
Development Engineer
Sewer Adoptions Team
Developer Services

Helpdesk: 0800 009 3921

Clearwater Court, Vastern Road, Reading, RG1 8DB
Find us online at developers.thameswater.co.uk

Original Text

From: Phoebe Ryding <Phoebe.ryding@pja.co.uk>
DEVELOPER.SERVICES@THAMESWATER.CO.U

To: <DEVELOPER.SERVICES@THAMESWATER.CO.UK>

CC: Joshua Pope <Joshua.Pope@pja.co.uk>;Daniel Flello <daniel.flello@pja.co.uk>;Dave Woolley <dave.woolley@pja.co.uk>

Sent: 27.05.22 10:09:54

Subject: RE: RE: RE: RE: [PJA: 06058] RE: Wastewater Pre-Planning Enquiry for Land West of Yarnton (TW ref. DS6092970)

Hello,

Thanks for the below.

We can confirm all flows discharging to the sewer in Rutten Lane will be gravity.

Given the outline planning application, at this stage we cannot confirm the exact quantum of development that will drain via each connection.

I am on annual leave next week. Please can you copy Dave Woolley (cc'd) in your response.

Kind regards,
Phoebe

Phoebe Ryding
Senior Flood Risk and Drainage Engineer
T. 0121 387 7961 M. 07872 858452
Seven House, High Street, Longbridge, Birmingham, B31 2UQ
www.pja.co.uk

From: DEVELOPER.SERVICES@THAMESWATER.CO.U <DEVELOPER.SERVICES@THAMESWATER.CO.UK>
Sent: 25 May 2022 11:10
To: Joshua Pope <Joshua.Pope@pja.co.uk>
Subject: RE: RE: RE: RE: [PJA: 06058] RE: Wastewater Pre-Planning Enquiry for Land West of Yarnton (TW ref. DS6092970)

Hi Joshua,

Many thanks for your email below confirming that there has been an update to the proposed foul water drainage strategy.

Further to this, can you please confirm that the flows connecting to the 150mm dia. foul water sewer in Rutten Lane will be purely gravity discharges i.e. these flows will not be pumped from the site?

Can you please confirm how the proposed development will be split between this connection and the connection to manhole 0701 further North in Woodstock Road via the pumping station i.e. how many of the 550 properties etc draining to each point?

Regards

Development Engineer
Sewer Adoptions Team
Developer Services

Helpdesk: 0800 009 3921

Clearwater Court, Vastern Road, Reading, RG1 8DB
Find us online at developers.thameswater.co.uk

Original Text

From:	Joshua Pope <Joshua.Pope@pja.co.uk>
To:	DEVELOPER.SERVICES@THAMESWATER.CO.U <DEVELOPER.SERVICES@THAMESWATER.CO.UK>
CC:	Daniel Flello <daniel.flello@pja.co.uk>;Phoebe Ryding <Phoebe.ryding@pja.co.uk>
Sent:	24.05.22 07:40:45
Subject:	RE: RE: RE: [PJA: 06058] RE: Wastewater Pre-Planning Enquiry for Land West of Yarnton (TW ref. DS6092970)

Dear Jonathan

Following your conversation with Phoebe there has been an update to the foul drainage strategy that reduces the need for pumping on site.
We are now proposing to connect into two locations the first being manhole reference 0701 as per the previous approval at 4 l/s.
The second location is at the junction of Aysgarth road and Rutten lane with the new chamber on the existing network at 9 l/s.
Please find attached Link for the foul drainage strategy for information
https://we.tl/t-aAuPRi75De
If any problems please feel free to contact me

Kind regards
Josh

Joshua Pope
Technician

T. 0121 387 7943

Seven House, High Street, Longbridge, Birmingham, B31 2UQ

www.pja.co.uk

From: DEVELOPER.SERVICES@THAMESWATER.CO.U
<DEVELOPER.SERVICES@THAMESWATER.CO.UK>
Sent: 04 March 2022 11:16
To: Phoebe Ryding <Phoebe.ryding@pja.co.uk>
Subject: FW: RE: RE: [PJA: 06058] RE: Wastewater Pre-Planning Enquiry for Land West of Yarnton (TW ref. DS6092970)

Dear Phoebe,

I write further to your Pre-Planning Enquiry application in relation to the above site.

Further to consulting with our Asset Planners, I have now received their comments and I can therefore attach our formal response to your application.

Regards

Jonathan Shildrick BSc
Development Engineer
Sewer Adoptions Team
Developer Services

Helpdesk: 0800 009 3921

Clearwater Court, Vastern Road, Reading, RG1 8DB
Find us online at developers.thameswater.co.uk

Original Text

From:	"DEVELOPER.SERVICES@THAMESWATER.CO.U" <DEVELOPER.SERVICES@THAMESWATER.CO.UK>
To:	phoebe.ryding@pja.co.uk
CC:	
Sent:	02.03.22 15:13:35
Subject:	RE: RE: [PJA: 06058] RE: Wastewater Pre-Planning Enquiry for Land West of Yarnton (TW ref. DS6092970)

Hi Phoebe,

Many thanks for your email below.

Further to this I have had to consult with our Asset Planning team for their comments. We give them 5 working days to get back to us so hopefully I should be able to issue our formal response towards the middle of next week.

Regards

Jonathan Shildrick BSc
Development Engineer
Sewer Adoptions Team
Developer Services

Helpdesk: 0800 009 3921

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Original Text

From:	Phoebe Ryding <Phoebe.ryding@pja.co.uk>
To:	DEVELOPER.SERVICES@THAMESWATER.CO.U <DEVELOPER.SERVICES@THAMESWATER.CO.UK>
CC:	Daniel Flello <daniel.flello@pja.co.uk>
Sent:	01.03.22 15:16:22
Subject:	RE: [PJA: 06058] RE: Wastewater Pre-Planning Enquiry for Land West of Yarnton (TW ref. DS6092970)

Hi Jonathan,

The connection will be pumped, likely flow rate to serve the proposed development is 13l/s.

Kind regards,
Phoebe

Phoebe Ryding
Senior Flood Risk and Drainage Engineer
T. 0121 387 7961 M. 07872 858452
Seven House, High Street, Longbridge, Birmingham, B31 2UQ
www.pja.co.uk

From: DEVELOPER.SERVICES@THAMESWATER.CO.U <DEVELOPER.SERVICES@THAMESWATER.CO.UK>
Sent: 01 March 2022 15:07
To: Phoebe Ryding <Phoebe.ryding@pja.co.uk>
Subject: RE: [PJA: 06058] RE: Wastewater Pre-Planning Enquiry for Land West of Yarnton (TW ref. DS6092970)

Hi Phoebe,

Many thanks for your email below.

Can you please confirm whether the flows will gravitate from the site to that point or whether they will need to be pumped? If pumping please confirm the proposed pump rate.

Regards

Jonathan Shildrick BSc
Development Engineer
Sewer Adoptions Team
Developer Services

Helpdesk: 0800 009 3921

Clearwater Court, Vastern Road, Reading, RG1 8DB
Find us online at developers.thameswater.co.uk

Original Text

From:	Phoebe Ryding <Phoebe.ryding@pja.co.uk>
To:	DEVELOPER.SERVICES@THAMESWATER.CO.U <DEVELOPER.SERVICES@THAMESWATER.CO.UK>
CC:	Daniel Flello <daniel.flello@pja.co.uk>
Sent:	01.03.22 10:09:45
Subject:	[PJA: 06058] RE: Wastewater Pre-Planning Enquiry for Land West of Yarnton (TW ref. DS6092970)

Hi Jonathan,

We are currently proposing to connect to the manhole north of the Site in the A44:

Approx. grid reference: SP 47063 13789

Please let me know if you need any further information.

Kind regards,
Phoebe

Phoebe Ryding
Senior Flood Risk and Drainage Engineer
T. 0121 387 7961 M. 07872 858452
Seven House, High Street, Longbridge, Birmingham, B31 2UQ
www.pja.co.uk

From: DEVELOPER.SERVICES@THAMESWATER.CO.U <DEVELOPER.SERVICES@THAMESWATER.CO.UK>
Sent: 28 February 2022 16:08
To: Phoebe Ryding <Phoebe.ryding@pja.co.uk>
Subject: Wastewater Pre-Planning Enquiry for Land West of Yarnton (TW ref. DS6092970)

Dear Phoebe,

Many thanks for your Pre-Planning Enquiry application for the proposed development at the above site.

In order to proceed we will need some further information.

We would need you to confirm where you would prefer to connect the foul water flows as we are unaware of where you would have access to lay a connection to in order to discharge to the existing foul water sewers to the East of the site in Rutten Lane in Yarnton.

If you need to obtain a copy of our sewer records to determine where our sewers are in the area to determine this please contact our Property Searches team at 'onlinecustomers@thameswater.co.uk' or via 0800 009 4540.

Please confirm whether you will be connecting via gravity or would need to pump to your preferred connection point. If pumping please confirm the proposed pump rate.

Regards

Jonathan Shildrick BSc
Development Engineer
Sewer Adoptions Team
Developer Services

Helpdesk: 0800 009 3921

Clearwater Court, Vastern Road, Reading, RG1 8DB
Find us online at developers.thameswater.co.uk

Original Text

From:	Phoebe Ryding <Phoebe.ryding@pja.co.uk>
To:	developer.services@thameswater.co.u <developer.services@thameswater.co.uk>
CC:	Daniel Flello <daniel.flello@pja.co.uk>
Sent:	25.02.22 16:23:48
Subject:	[PJA: 06058] Yarnton - Pre-development Enquiry

Hello,

Please find attached the developer enquiry for proposed allocated development at Yarnton, Oxfordshire. Approximate postcode OX5 1LT and OS Co-ordinates 447231 , 212966. Site location plan below:

Map Description automatically generated

The Site is currently seeking planning under planning ref. 21/03522/OUT for

The erection of up to 540 dwellings (Class C3), up to 9,000sqm GEA of elderly/extra care residential floorspace (Class C2), a Community Home Work Hub (up to 200sqm)(Class E), alongside the creation of two locally equipped areas for play, one NEAP, up to 1.8 hectares of playing pitches and amenity

At this stage, we are currently undertaking a review of Site earthworks to understand whether a foul or gravity connection would be best placed and would be grateful if you could confirm a suitable point of connection for foul drainage from the Site.

Given the current outline planning stage, we have no phasing information or fixed masterplan – just the development framework plan attached.

Surface water drainage is proposed to discharge to the existing watercourses on Site.

If you require any additional information, please don't hesitate to contact me.

Kind regards,
Phoebe

Phoebe Ryding
Senior Flood Risk and Drainage Engineer
T. 0121 387 7961 M. 07872 858452
Seven House, High Street, Longbridge, Birmingham, B31 2UQ
www.pja.co.uk

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Appendix L Infiltration Investigation

IAN FARMER ASSOCIATES

1A Batford Mill, Lower Luton Road, Harpenden, Hertfordshire, AL5 5BZ. Tel: 01582 460018
harpenden@ianfarmer.co.uk www.ianfarmer.co.uk

Our Ref: EM/em/2240500/ 19th November 2021

WSP UK CPL
PO Box 240
Leeds
LS11 1ED

F.A.O. Rebecca Fagan

Dear Sirs,

Re: Yarnton, Kidlington, Oxfordshire

Further to your instruction, we have pleasure in enclosing the findings of the site works undertaken at the above location, together with our invoice no. SI7508521 for the work carried out. We would be grateful if you could approve the invoice and forward for payment.

Four trial pits, designated SA1 to SA4, for the purpose of soakaway testing were excavated by mechanical excavator at the positions shown on the attached exploratory hole location plan, Figure A1.1. The positions of the trial pits were proposed by the client, and amended, where required, subject to site constraints.

The depths of trial pits, descriptions of strata encountered and comments on groundwater conditions are given in the trial pit records, Figure A2.1, together with photographs of the trial pits in Figure A2.2. Results of the soakaway tests are given in Figure A2.3.

The co-ordinates and ground levels at the exploratory hole locations were surveyed in based on OS National Grid. These values are reported on the trial pit records in Figure A2.1.

We trust our report is satisfactory for your requirements, but should you have any queries please do not hesitate to contact us.

Yours faithfully,

[redacted]

Emma Moore
Senior Geotechnical Engineer

Encs
Figure A1.1 – Exploratory Hole Location Plan
Figure A2.1 – Trial Pit Records
Figure A2.2 – Trial Pit Photographs
Figure A2.3 – Results of Soakaway Tests

Project Id:	2240500	Title:	Exploratory Hole Location Plan
Project Title:	Yarnton, Kidlington, Oxfordshire	Scale:	1:5000
Location:	OS National Grid Reference - SP 472 130	Engineer:	SG
Client:	WSP UK Limited	Figure No:	A1.1

IAN FARMER ASSOCIATES

IAN FARMER ASSOCIATES	Plant used: Mechanical Excavator	Project: Yarnton, Kidlington, Oxfordshire	Location ID: **SA1**
	Dates: 03/11/2021	Client: WSP UK Limited	Sheet 1 of 1

Trial Pit Log	Location: 446980.77E 213498.13N	Ground level: 71.40mOD	Logged by: SG	Vertical scale: 1:25	Contract ID: 2240500

Samples & In Situ Testing			Strata Details			
Depth	Sample ID	Test Result	Level (mAOD)	Depth (m) (Thickness)	Strata Description	Water Strike
			71.05	(0.35) 0.35	MADE GROUND comprising soft dark greyish brown slightly gravelly very sandy clayey SILT with occasional to frequent rootlets. Gravel is subangular to rounded, fine and medium of flint and possible sandstone.	
			70.75	(0.30) 0.65	MADE GROUND comprising soft to firm orange brown slightly gravelly very sandy clayey SILT. Gravel is angular, fine of possible asphalt and coal.	
			69.10	(1.65) 2.30	Stiff to very stiff orange mottled grey brown gravelly sandy CLAY. Gravel is subangular to rounded, fine to coarse of flint, possible quartz/sandstone and occasional black possible coal. *From 1.00m; With occasional light grey veins.*	
					End of Trial Pit at 2.30m	

Scale: 1, 2, 3, 4, 5

Termination:

Stability:

Remarks:
Groundwater not encountered.

Dimensions (Length m x Width m):
1.30 x 0.50

Water Strikes

Strike (m)	Time (mins)	Rose to (m)	Remarks

Checked by:		IFA TP v01.01
Status:	FINAL	

Figure A2.1

Plant used:	Project:	Location ID:
Mechanical Excavator	Yarnton, Kidlington, Oxfordshire	**SA2**
Dates: 03/11/2021	Client: WSP UK Limited	Sheet 1 of 1

IAN FARMER ASSOCIATES

Trial Pit Log

Location:	Ground level:	Logged by:	Vertical scale:	Contract ID:
447166.13E 213055.56N	73.55mOD	SG	1:25	2240500

Depth	Sample ID	Test Result	Level (mAOD)	Depth (m) (Thickness)	Strata Description	Legend	Scale	Water Strike	Backfill/ Installation
			73.15	(0.40) 0.40	MADE GROUND comprising soft to firm brown and grey mottled slightly gravelly slightly sandy CLAY with frequent decomposing roots and rootlets. Gravel is rounded and subrounded, fine to coarse of flint and possible sandstone.				
			71.65	(1.50) 1.90	Firm greyish orange slightly gravelly sandy CLAY. Gravel is subangular to rounded, fine to coarse of flint and possible sandstone. *From 0.80m; Becomes greyish orange brown mottled grey.* *From 1.30m; Becomes sandy to very sandy.*		1		
			71.35	(0.30) 2.20	Stiff to very stiff friable dark grey mottled dark brown CLAY with rare rounded fine gravel of flint and possible sandstone and rootlets.		2		
					End of Trial Pit at 2.20m		3, 4, 5		

Termination:

Stability:

Remarks:
Groundwater not encountered.

Dimensions (Length m x Width m):
1.30 x 0.55

Water Strikes

Strike (m)	Time (mins)	Rose to (m)	Remarks

Checked by:		IFA TP v01.01
Status:	FINAL	

Figure A2.1

IAN FARMER ASSOCIATES	Plant used: Mechanical Excavator	Project: Yarnton, Kidlington, Oxfordshire			Location ID: **SA3**
	Dates: 04/11/2021	Client: WSP UK Limited			Sheet 1 of 1
Trial Pit Log	Location: 447341.80E 212957.55N	Ground level: 72.46mOD	Logged by: SG	Vertical scale: 1:25	Contract ID: 2240500

Depth	Sample ID	Test Result	Level (mAOD)	Depth (m) (Thickness)	Strata Description	Legend	Scale	Water Strike	Backfill/ Installation
				(0.40)	MADE GROUND comprising soft dark greyish brown slightly gravelly sandy CLAY with frequent roots and rootlets. Gravel is rounded and subrounded, fine and medium, occasionally coarse, of flint and possible sandstone.				
			72.06	0.40	MADE GROUND comprising firm brown gravelly sandy CLAY. Gravel is subrounded and rounded, fine and medium of flint and possible sandstone. (Encountered on part of the western pit face) *At 0.57m; A possible orange ceramic/brick fragment.*				
			71.86	0.60	Stiff to very stiff light grey blue mottled orange CLAY with frequent rootlets.		1		
				(1.75)	*From 1.40m; Becomes friable, dark grey and red orange mottled. Rootlets become rare.*				
					From 2.00m; Becomes dark grey, occasionally red mottled red and yellow stained.		2		
			70.11	2.35	End of Trial Pit at 2.35m				
							3		
							4		
							5		

Termination:

Dimensions (Length m x Width m): 1.60 x 0.55

Stability:

Remarks:
Groundwater not encountered.

Water Strikes

Strike (m)	Time (mins)	Rose to (m)	Remarks

Checked by:		IFA TP v01.01
Status:	FINAL	

Figure A2.1

IAN FARMER ASSOCIATES	Plant used: Mechanical Excavator	Project: Yarnton, Kidlington, Oxfordshire			Location ID: **SA4**
	Dates: 04/11/2021	Client: WSP UK Limited			Sheet 1 of 1
Trial Pit Log	Location: 447390.19E 212658.93N	Ground level: 71.85mOD	Logged by: SG	Vertical scale: 1:25	Contract ID: 2240500

Samples & In Situ Testing			Strata Details						
Depth	Sample ID	Test Result	Level (mAOD)	Depth (m) (Thickness)	Strata Description	Legend	Scale	Water Strike	Backfill/ Installation
				(0.35)	MADE GROUND comprising soft dark greyish brown slightly gravelly very sandy CLAY with occasional to frequent rootlets. Gravel is subrounded and rounded, fine and medium of flint and possible sandstone.				
			71.50	0.35	MADE GROUND comprising firm orangish grey slightly gravelly CLAY. Gravel is subrounded, fine and medium of flint.				
				(0.45)					
			71.05	0.80	Firm to stiff orange brown occasionally mottled grey very sandy CLAY with rare possible black coal fragments. and decomposing rootlets.		1		
				(1.40)			2		
			69.65	2.20	End of Trial Pit at 2.20m		3		
							4		
							5		

Termination:

Dimensions (Length m x Width m): 1.60 x 0.30

Stability:

Remarks:
Groundwater not encountered.

Water Strikes

Strike (m)	Time (mins)	Rose to (m)	Remarks

Checked by:		IFA TP v01.01
Status:	FINAL	

Figure A2.1

Trial Pit SA1

Trial Pit SA1

IAN FARMER ASSOCIATES	**TRIAL PIT PHOTOGRAPHS**	Job no. 2240500
	Yarnton, Kidlington, Oxfordshire	Fig. A2.2

Trial Pit SA1

Trial Pit SA2

IAN FARMER ASSOCIATES

TRIAL PIT PHOTOGRAPHS	Job no.	2240500
Yarnton, Kidlington, Oxfordshire	Fig.	A2.2


Trial Pit SA2


Trial Pit SA3

IAN FARMER ASSOCIATES	**TRIAL PIT PHOTOGRAPHS**	Job no. 2240500
	Yarnton, Kidlington, Oxfordshire	Fig. A2.2

Trial Pit SA4

Trial Pit SA4

IAN FARMER ASSOCIATES	**TRIAL PIT PHOTOGRAPHS**	Job no. 2240500
	Yarnton, Kidlington, Oxfordshire	Fig. A2.2

Trial Pit Soakaway Test

IAN FARMER ASSOCIATES

Client:	**WSP UK Limited**		
Project:	**Yarnton, Kidlington, Oxfordshire**		
Job No:	**2240500**		
Location:	**SA1**	**Test Ref.:**	**Test 1**
Date:	**03/11/2021**	**Weather:**	**Overcast with showers**

INPUT DATA AND CALCULATION

Time (min)	Depth (m)
0	0.63
0.5	0.636
1	0.636
1.5	0.636
2	0.636
2.5	0.636
3	0.636
5	0.636
10	0.636
60	0.64
120	0.64
182	0.644
1320	0.671

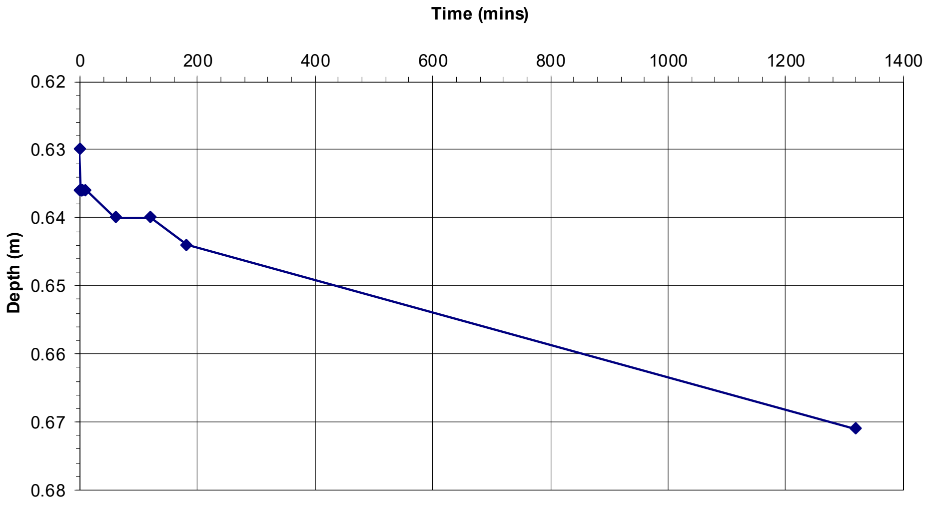
Pit dimensions		
	Length (m) =	1.30
	Width (m) =	0.50
	Depth (m) =	2.30

Depth to water at start of test (m) =	0.63
Depth to water at end of test (m) =	0.67
Depth to water at 75% level (m) =	1.05
Depth to water at 50% level (m) =	1.47
Depth to water at 25% level (m) =	1.88
Base area of pit (m^2) =	0.65
Effective area of loss a_{s50} (m^2) =	3.66
V_{P75} - V_{P25} (m^3) =	0.54

From the graph:	
t_{p75} (min) =	
t_{p25} (min) =	

Soil infiltration rate, f, (m/s) =		normal test

Tested by:	**SG**	**Date:**	**03/11/2021**
Checked by:	**EM**	**Date:**	**09/11/2021**



Notes

1. Calculated in accordance with BRE Digest 365

SOF: 11:02, EOF: 11:04

Infiltration rate not obtained.

Trial Pit Soakaway Test

Client:	**WSP UK Limited**		
Project:	**Yarnton, Kidlington, Oxfordshire**		
Job No:	**2240500**		
Location:	**SA2**	**Test Ref.:**	**Test 1**
Date:	**03/11/2021**	**Weather:**	**Overcast with showers**

INPUT DATA AND CALCULATION

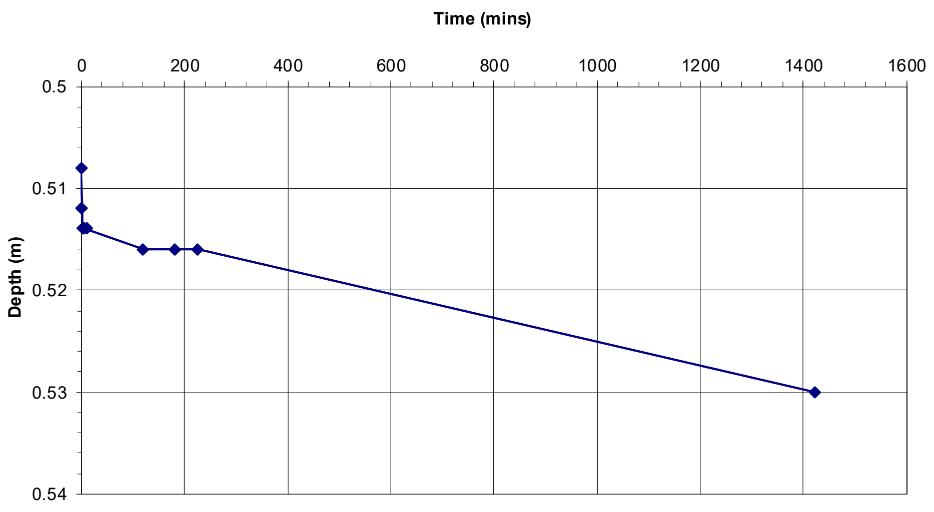
Time (min)	Depth (m)
0	0.508
0.5	0.512
1	0.512
1.5	0.514
2	0.514
2.5	0.514
3	0.514
5	0.514
10	0.514
120	0.516
180	0.516
226	0.516
1422	0.53

Pit dimensions		
	Length (m) =	1.30
	Width (m) =	0.55
	Depth (m) =	2.20

Depth to water at start of test (m) =	0.51
Depth to water at end of test (m) =	0.53
Depth to water at 75% level (m) =	0.93
Depth to water at 50% level (m) =	1.35
Depth to water at 25% level (m) =	1.78
Base area of pit (m^2) =	0.72
Effective area of loss a_{s50} (m^2) =	3.85
$V_{P75} - V_{P25}$ (m^3) =	0.60

From the graph:	
t_{p75} (min) =	
t_{p25} (min) =	

Soil infiltration rate, f, (m/s) =		normal test	
Tested by:	**SG**	**Date:**	**03/11/2021**
Checked by:	**EM**	**Date:**	**09/11/2021**



Notes

1. Calculated in accordance with BRE Digest 365

SOF: 09:47, EOF: 09:49

Infiltration rate not obtained.

Trial Pit Soakaway Test

Client:	WSP UK Limited
Project:	Yarnton, Kidlington, Oxfordshire
Job No:	2240500
Location:	SA3
Test Ref.:	Test 1
Date:	04/11/2021
Weather:	Overcast with showers

INPUT DATA AND CALCULATION

Time (min)	Depth (m)
0	0.608
0.5	0.608
1	0.608
1.5	0.608
2	0.608
2.5	0.608
3	0.608
5	0.608
10	0.608
60	0.6
120	0.595
180	0.597
240	0.585
300	0.585

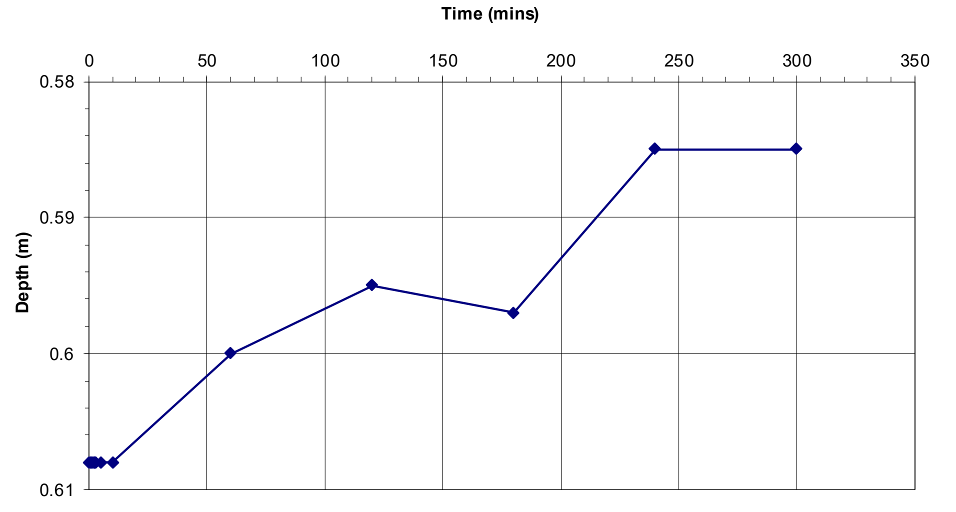
Pit dimensions		
	Length (m) =	1.60
	Width (m) =	0.55
	Depth (m) =	2.20

Depth to water at start of test (m) =	0.59
Depth to water at end of test (m) =	0.61
Depth to water at 75% level (m) =	0.99
Depth to water at 50% level (m) =	1.39
Depth to water at 25% level (m) =	1.80
Base area of pit (m^2) =	0.88
Effective area of loss a_{s50} (m^2) =	4.35
$V_{P75} - V_{P25}$ (m^3) =	0.71

From the graph:	
t_{p75} (min) =	
t_{p25} (min) =	

Soil infiltration rate, f, (m/s) =		normal test

Tested by:	SG	Date:	03/11/2021
Checked by:	EM	Date:	09/11/2021



Notes

1. Calculated in accordance with BRE Digest 365

SOF: 10:03, EOF: 10:06

Infiltration rate not obtained.

Trial Pit Soakaway Test

IAN FARMER ASSOCIATES

Client:	WSP UK Limited		
Project:	Yarnton, Kidlington, Oxfordshire		
Job No:	2240500		
Location:	SA4	Test Ref.:	Test 1
Date:	04/11/2021	Weather:	Overcast with showers

INPUT DATA AND CALCULATION

Time (min)	Depth (m)
0	0.503
0.5	0.503
1	0.505
1.5	0.505
2	0.505
2.5	0.505
3	0.505
5	0.505
10	0.505
60	0.53
120	0.551
180	0.567
240	0.586
275	0.592

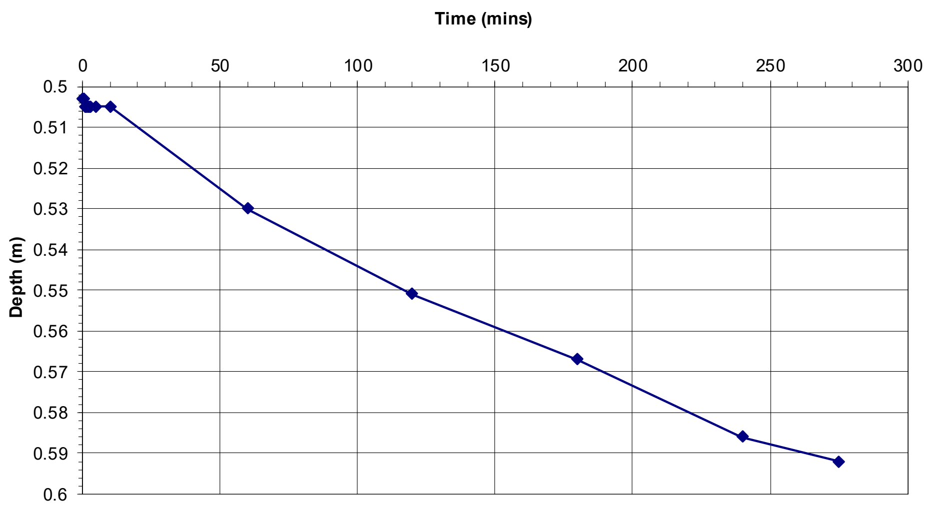
Pit dimensions		
	Length (m) =	1.60
	Width (m) =	0.50
	Depth (m) =	2.20

Depth to water at start of test (m) =	0.50
Depth to water at end of test (m) =	0.59
Depth to water at 75% level (m) =	0.93
Depth to water at 50% level (m) =	1.35
Depth to water at 25% level (m) =	1.78
Base area of pit (m^2) =	0.80
Effective area of loss a_{s50} (m^2) =	4.36
$V_{P75} - V_{P25}$ (m^3) =	0.68

From the graph:	
t_{p75} (min) =	
t_{p25} (min) =	

Soil infiltration rate, f, (m/s) =		normal test

Tested by:	SG	Date:	03/11/2021
Checked by:	EM	Date:	09/11/2021



Notes

1. Calculated in accordance with BRE Digest 365

SOF: 10:44, EOF: 10:46

Infiltration rate not obtained.

Appendix M Planning Consultation and Pre-Application Responses

Yarnton - Technical Note

Subject: Flood Risk and Drainage Consultation Responses

Client:	Merton College	**Version:**	P1
Project No:	06058	**Author:**	PR
Date:	08th April 2022	**Approved:**	AE / DW

1 Introduction

1.1.1 PJA have been appointed by Merton College to review the comments submitted by various stakeholders in relation to the proposed planning application at Yarnton, Oxfordshire.

1.2 Context

1.2.1 This Technical Note provides a supplementary submission in relation to flood risk and drainage at OS Parcel 3673 Adjoining And West Of 161 Rutten Lane Yarnton OX5 1LT for the:

1.2.2 *'Erection of up to 540 dwellings (Class C3), up to 9,000sqm GEA of elderly/extra care residential floorspace (Class C2), a Community Home Work Hub (up to 200sqm)(Class E), alongside the creation of two locally equipped areas for play, one NEAP, up to 1.8 hectares of playing pitches and amenity space for the William Fletcher Primary School, two vehicular access points, green infrastructure, areas of public open space, two community woodland areas, a local nature reserve, footpaths, tree planting, restoration of historic hedgerow, and associated works. All matters are reserved, save for the principal access points'* (Cherwell District Council Planning Application Reference Number: 21/03522/OUT).

1.2.3 The status of this planning application is still be determined.

1.2.4 This Technical Note provides a response to the stakeholder comments on the planning application which have been received to date, which have been summarised and tabulated alongside our response. Further to this, no formal comments have been made by Oxfordshire County Council in their role as the Lead Local Flood Authority (LLFA). Given this, a response has been provided to their pre-application comments below.

2 Cherwell District Council Drainage Team

2.1.1 Following the submission of the planning application, Tony Brummel at Cherwell District Councils Land Drainage Team provided comment on the 29th October 2021.

Table 2 – Summary Table of Cherwell District Council Drainage Team Comments

Comment	Cherwell District Council Drainage Team Comment Summary	PJA Response Summary
1	General Comment that drainage comments have been taken on board	Noted
2	Surface water discharge should be reduced further than usually required	Surface water is being attenuated to the QBar greenfield discharge rate up to the 1 in 100 year plus 40% climate change event. Furthermore, additional cut-off ditches and cut-off basins will be provided which are proposed to further reduce downstream flood depths and volumes.
3	Land drainage and cut-off drains should be revised to include further detail as it comes forward	Cut-off ditches and cut-off basins will be provided which are proposed to further reduce downstream flood depths and volumes. As additional detailed design comes forward, modelling will be updated to continue to demonstrate their function and protection they provide.
4	Outfall B discharges to drainage in Aysgarth Road and not the Rowell Brook	CCTV survey which has been undertaken on the three existing outfall from the Site prior to the submission of planning. This appears to confirm that the central outfall from the Site discharges via the drainage system in Aysgarth Road and not the Rowell Brook. Discharge via this outfall is from the existing catchment, flows will be limited to QBar up to the 1 in 100 year plus 40% climate change event.
5	Future Maintenance	Given the outline nature of the application, some typical maintenance information has been provided however, until the final housebuilder / developer information is available the final adoption information will not be available. This could be provided under a relevant pre-occupation condition if required.
6	Foul Drainage	Foul drainage will be agreed with Thames Water as the Site is bought forwards to ensure that adequate points of connection and infrastructure is available.

3 Oxfordshire County Council LLFA Pre-Application Correspondence

3.1.1 Following a pre-planning meeting held on the 23rd July 2021 between Oxfordshire County Council Lead Local Flood Authority (LLFA) and Cherwell District Council Land Drainage Team, the LLFA reviewed the submitted Flood Risk Assessment and Drainage Strategy, WSP (2020) in detail and provided comments.

Table 3 – Summary Table of Oxfordshire County Council LLFA Comments

Comment	Oxfordshire County Council LLFA Comment Summary	PJA Response Summary
1	Surface water flood risk should be assessed as high.	Surface water flood risk, including hydraulic modelling is contained within Section 5.4 of the PJA Flood Risk Assessment and Drainage Strategy Report (April 2022).
2	Justify the SPR value of 0.4 which has been used.	Trial pits have been dug which confirm underlying geology of made ground, below which is clay. This was identified to be highly impermeable, will all falling head soakaway tests failing. As such, an SPR value of 0.4 is appropriate.
3	Modelling calculations should be re-run based on a more conservative greenfield value, with an allowance for urban creep, FEH rainfall and climate change.	Trial pits have been dug which confirm underlying geology of made ground, below which is clay. This was identified to be highly impermeable, will all falling head soakaway tests failing. As such, an SPR value of 0.4 is appropriate and thus the greenfield discharge rate is appropriate. . Calculations have been provided within the Appendix of this Flood Risk Assessment and Drainage Strategy Report, which show simulations using FEH Rainfall and a 10% allowance for development creep.
4	Infiltration testing should be undertaken in accordance with BRE Digest 365 Soakaway Design Guidance.	Infiltration testing has been undertaken which demonstrates an infiltration-led drainage strategy is not appropriate for use on Site. The infiltration test report is contained in Appendix L of this Flood Risk Assessment and Drainage Strategy Report.
5	Parameters must be set at outline stage to ensure the future provision of adequate SuDS.	Parameters have been set out for the drainage strategy which demonstrate the land take required for attenuation and provides additional information on the types of additional SuDS that could be used on-Plot within the submitted Flood Risk Assessment and Drainage Strategy Report (PJA, April 2022). Further detail could be secured via an appropriately worded condition.
6	A water quality assessment in accordance with Sections 4 and 26 if CIRIA C753 'The SuDS Manual'.	A water quality assessment has been completed and is contained in Section 6.8 and 6.9 of the Flood Risk Assessment and Drainage Strategy Report (PJA, April 2022)
7	A detailed surface water drainage strategy should be submitted.	Parameters have been set out for the drainage strategy which demonstrate the land take required for attenuation and also provides

Comment	Oxfordshire County Council LLFA Comment Summary	PJA Response Summary
		additional information on the types of additional SuDS that could be used on-Plot within the submitted FRA. Further detail could be secured via an appropriately worded condition.
8	A flood risk assessment should be submitted.	This FRA document assess flood risk from all known sources.
9	A sequential approach to masterplanning should be undertaken which considers flood risk and surface water attenuation from the beginning of the planning process.	A sequential approach to masterplanning has been undertaken. This takes into account the detailed hydraulic modelling.
10	A SuDS Proforma should be submitted.	A SuDS Proforma has been completed which is contained in Appendix S of the Flood Risk Assessment and Drainage Strategy Report (PJA, April 2022)

4 Begbrooke Parish Council

4.1.1 Following the planning submission, a response was provided by Begbroke Parish Council in relation to the proposed flood risk and drainage at the proposed development Site.

Table 4 - Summary Table of Begbrooke Parish Council Comments

Comment	Begbrooke Parish Council Comment Summary	PJA Response Summary
1	The sewage and drainage will present problems and will impact on flooding in Yarnton and Begbroke	We are liaising with Thames Water to ensure that appropriate network upgrades are in place prior to discharge to the foul sewerage networks in the vicinity of the Site to ensure there is no increase in risk from foul flooding. Furthermore, the Site will limit flows to the QBar greenfield discharge rate up to the 1 in 100 year + 40% Climate change event to ensure surface water flood risk is not exacerbated.
2	CDC confirm the greenfield rate here is known to already cause downstream flooding in Yarnton. Therefore, it is desirable and important that the discharge is limited to less than the greenfield rate	The Site will limit flows to the QBar greenfield discharge rate up to the 1 in 100 year + 40% Climate change event to ensure surface water flood risk is not exacerbated.
3	The principles of the proposed surface water drainage strategy including the use of 'cut-off' ditches and basins ensure the site may be developed safely and the post-development surface water flood risk may be considered low. The flooding Yarnton in 2021 and the images submitted by 161 Rutten Lane and Yarnton Flood Watch do not support this view.	A revised FRA has been submitted, Flood Risk Assessment and Drainage Strategy Report (PJA, April 2022), in which Section 5.4 of this demonstrates the surface water flood risk to the Site and mitigation. The drainage strategy conditioned in Section 6 also demonstrates that The Site will limit flows to the QBar greenfield discharge rate up to the 1 in 100 year + 40% Climate change event to ensure surface water flood risk is not exacerbated.
4	This clay soil is not free draining.	We agree with this, Section 3.3 of the Flood Risk Assessment and Drainage Strategy Report (PJA, April 2022) identifies the underlying ground conditions are impermeable.
5	This development will impact Begbroke East as well as Yarnton. Begbroke East experiences flooding both now and historically and there will be thousands of houses built because of PR8. They mitigate this by saying balancing ponds will be constructed with slow release.	The surface water drainage has been designed to limit flows the QBar greenfield discharge rate up to the 1 in 100 year + 40% Climate change event to ensure surface water flood risk is not exacerbated.

5 Letter to Planning Committee from from Yarnton Flood Defence Group via Begbroke Parish Council

5.1.1 Appended to the Begbrooke Parish Council planning response, a letter from Yarnton Flood Defence Group to the Planning Committee has been provided, which is dated 24th November 2021. The comments therein are responded to below.

Table 5 - Summary Table of Yarnton Flood Defence Group Comments

Comment	Yarnton Flood Defence Group Consultation Response Summary	PJA Response Summary
1	There is no acknowledgement or consideration of the combined flood risk at the development site and the existing village – there is a large omission in the flood assessment maps of the known River Thames Flood plain.	The time to peak for a flood on the River Thames is greater than the time to peak for the development drainage. Fluvial flood risk has been addressed in Section 5.3 of the Flood Risk Assessment and Drainage Strategy Report (PJA, April 2022).
2	No acknowledgement or consideration to address existing flood risk from foul sewage, again, which has occurred recently and historically.	Sewer flooding is addressed in Section 5.7 of the Flood Risk Assessment and Drainage Strategy Report (PJA, April 2022). A pre-development enquiry has been undertaken with Thames Water contained in Appendix J and a foul drainage strategy has been produced, detailed in Section 7.
3	Limited understanding of historic drainage channels and local topography with disconnected development leading to a heightened flood risk for the whole community.	As detailed in the FRA, PJA have undertaken a number of Site visits, including one with Yarnton Flood Defence Group on the 20th December 2021 to have a more detailed understanding of the existing ditches and local topography.
4	Inadequate drainage assets both historical and part of development sites which have not considered the wider community context and been neglected for many years.	A CCTV survey of the drainage assets through the village of Yarnton downstream of the Site have been undertaken which is contained in Appendix B of the Flood Risk Assessment and Drainage Strategy Report (PJA, April 2022).

6 Letter to Development Briefs Project Team

6.1.1 Appended to the Begbrooke Parish Council planning response was a letter from the Development Briefs Project Team, in relation to flood risk and drainage, dated September 2021 is available. The comments therein are responded to below.

Table 6 – Summary Table of Development Briefs Project Team Comments

Comment	Development Briefs Project Team Consultation Response Summary	PJA Response Summary
1	The Environment Agency has issued flood alerts and warnings for large areas to the south of the village on many occasions which often coincide with perfect flooding conditions, a high water table and heavy surface water run off. The hap-hazard expansion of the village without careful consideration of local topography and drainage has without doubt contributed to the increased risk of flooding to the whole community with the historic core at greatest risk. We fear that further development will exacerbate this issue, increasing the frequency of large flooding events without careful planning and consideration.	PJA have undertaken a number of Site walkovers, including one with Yarnton Flood Defence Group on the 20th December 2021 to have a more detailed understanding of the existing ditches and local topography. The Site is proposing to manage surface water up to the 1 in 100 year plus 40% climate change event, discharging at the QBar greenfield discharge rate.
2	The proposed PR9 development site is located on the eastern slope of Spring Hill and falls sharply towards the A44. The top of the hill comprises an ancient river gravel terrace which overlays the Oxford Clay band. The terrace gravel is known to store groundwater and there is a spring-line on the slope at the junction with the clay band, hence the name Spring Hill. To the east of the Oxford Clay is the River Cherwell/Thames alluvial drift deposits mostly consisting of sandy clays which is relatively permeable in comparison to the heavy clay. The topography and geology of the area would suggest the ancient surface water and groundwater regime was for the terrace gravel to discharge at the spring-line onto the surface of the clay band and flow across land to meet the alluvial drift deposits and from there into open channels feeding into the Thames.	A review of the geology within the development Site has been undertaken and is contained within Section 3.3 of the Flood Risk Assessment and Drainage Strategy Report (PJA, April 2022).

Comment	Development Briefs Project Team Consultation Response Summary	PJA Response Summary
3	Yarnton Medical Practice. The site does include a SuDS attenuation pond, which was quickly overwhelmed by the Christmas 2020 surface water flash flows off the fields onto which the PR9 development adjoins, with the excess water freely flowing through the nearby streets to the dual carriageway. The two principle flash flood routes now seem to be; the Cassington Road and Church Lane to the south and the north section of Rutten Lane into Aysgarth Road, effectively the north and south extremities of the current village. It has also put new areas at risk including the most recent large development off of Cassington Road. Residents were assured that sufficient measures had been designed into the scheme to safeguard it from up to 1 in 100 year flood.	A CCTV Survey has been undertaken of the Medical Practice Drainage and the wider downstream drainage network through Yarnton to provide a better understanding of the existing drainage assets and arrangements.
4	Considering the close proximity of the River Thames water-table outline, we would like to know what allowance was made for the possible presence of groundwater in the SUDS design?	SuDS could be lined to prevent groundwater ingress, this would be considered at the detailed design stage following further ground investigation

Consultee Comment for planning application 21/03522/OUT

Application Number	21/03522/OUT
Location	Os Parcel 3673 Adjoining And West Of 161 Rutten Lane Yarnton OX5 1LT Cross Parish Boundary Application: Begbroke and Yarnton Parish Councils
Proposal	The erection of up to 540 dwellings (Class C3), up to 9,000sqm GEA of elderly/extra care residential floorspace (Class C2), a Community Home Work Hub (up to 200sqm)(Class E), alongside the creation of two locally equipped areas for play, one NEAP, up to 1.8 hectares of playing pitches and amenity space for the William Fletcher Primary School, two vehicular access points, green infrastructure, areas of public open space, two community woodland areas, a local nature reserve, footpaths, tree planting, restoration of historic hedgerow, and associated works. All matters are reserved, save for the principal access points.
Case Officer	Samantha Taylor
Organisation	CDC - Land Drainage
Name	Tony Brummell
Address	Cherwell District Council Bodicote House White Post Road Bodicote Banbury OX15 4AA
Type of Comment	Comment
Type	
Comments	1. General Comments In line with guidance and discussions that have taken place during the evolution of the development proposals, the applicant has addressed in principle the need to manage both surface water generated on the site through run-off from newly created impermeable areas, and land drainage/groundwater arising on and upstream of the site from land that will remain undeveloped. 2. Surface Water Management Normally the maximum rate of discharge from a site would be limited to the greenfield (undeveloped) maximum rate. However, the greenfield rate here is known to already cause downstream flooding in Yarnton. Therefore, it is desirable and important that the discharge is limited to less than the greenfield rate. This can be achieved by providing on-site attenuation additional to what would normally be required through the enlargement of the attenuation basins. I have no objections at this stage subject to further negotiations to maximise the degree of protection to the already developed parts of Yarnton. 3. Land Drainage Interceptor drains and basins/ponds additional to the surface water drainage infrastructure are proposed. These follow discussions to further protect the existing development. At this outline stage, because no detailed work has yet been done, it is not possible to assess the benefits that can be provided. Again, to maximise the benefits the degree of land drainage attenuation should also be maximised to the limit of what is practical. 4. Outfall B Within the Flood Risk Assessment there is reference to Outfall B discharging to the Rowel Brook. This is not the case. Outfall B discharges to the systems within Yarnton, initially to a system under Aysgarth Road. 5. Future Maintenance of Attenuation Basins (both surface water and land drainage) The outline application is silent on the intentions for future maintenance. If for Cherwell, Landscape Services need to be part of the discussions going forward. 6. Foul Drainage No comments on foul drainage/sewerage. As with potable water supply, I am assuming that the applicant will agree with Thames Water the strategy, detail and programme for ensuring there is sufficient treatment capacity as the development proceeds.
Received Date	29/10/2021 11:34:02
Attachments	

BEGBROKE PARISH COUNCIL

Planning Application 21/03522/OUT

- Begbroke parish council **object** to this application.

- The parish council are not convinced that any notice will be taken of objections. Several thousand people objected to the removal of green belt and were ignored by CDC giving a green light for this application to proceed.

- The government is against building in the Green Belt. This was a manifesto commitment.

- We believe this application is about the demands of Oxford University, Begbroke Science Park and in the case of PR9 - Merton College. It is about a fictitious unmet housing need in Oxford. There are many brownfield and other sites that could be used.

- The sheer number of documents submitted and paid for by the applicant and their consultants do not give confidence on the impartiality of their findings and conclusions.

- It is impossible to properly assimilate the number of documents submitted – we are not planners or experts in the many fields presented.

- We think it will also be difficult for CDC Planning Committee to also evaluate the scheme.

- The parish council have read comments from other objectors and fully support their views for example (Emma, Rowel House, 7 Woodstock Road East, Begbroke, Kidlington, OX5 1RL; Mark Rowan-Hull, Foresters Lodge, Spring Hill Road, Begbroke, Kidlington, OX5 1RX; 8 Stocks Tree Close, Yarnton, Kidlington, OX5 1LU; Mrs. E. and C McDonnell 153 Rutten Lane, Yarnton, Kidlington, OX5 1LT; Richard Saunders 161 Rutten Lane, Yarnton, Kidlington, OX5 1LT; **Yarnton Flood Defence documents – less images – appended.**

- This planning application appears to have buildings up to four storeys. Apart from the probable **overbearing appearance** of such properties and their inability to blend into the landscape, we are concerned that they may exceed CDC Policy C28 of the adopted Cherwell Local Plan and Government guidance contained within the National Planning Policy Framework – see below:

- Begbroke Science Park. OUTLINE PERMISSION FOR DEVELOPMENT SUBJECT TO CONDITIONS. Date of Decision: 30th April 2014 Head of Public Protection & Development Management. **Application No: 01/00662/OUT** SCHEDULE OF CONDITIONS 5 That the proposed development shall be constructed **as single or two-storey buildings only.** Reason - To ensure that the proposed development is in scale and harmony with its neighbours and surroundings and to **comply with Policy C28 of the adopted Cherwell Local Plan and Government guidance contained within the National Planning Policy Framework.**

- These plans, whilst mainly in Yarnton, offer little to Begbroke. It is difficult to see how the possibility of perhaps a thousand more residents could improve the village.

- These buildings will cause virtual coalescence with Yarnton.

BEGBROKE PARISH COUNCIL

Planning Application 21/03522/OUT

- **A Pedestrian crossing** for Begbroke village is not included in the plans This is a major priority for this village and there is much correspondence on this recorded with Oxfordshire County Council. There must be a commitment for section 106 monies from the developers. The current lack of a controlled crossing is also discriminatory to the old, the young and anyone who is mobility impaired. This needs to be addressed in advance of any construction works. A similar problem exists for Vehicles trying to exit service roads and Spring Hill due to traffic volumes and speed.

- Allowing traffic on to the A44 at the science park junction will further increase queuing and reduce the gaps in traffic through Begbroke making it even more difficult to cross - the current traffic light sensors are also defective.

- The speed awareness signs work overtime - another reason a crossing is required.

- Water infrastructure is inadequate for this development and substantiated by Thames Water response who may object

- Oxford Clinical Commissioning Group have objected saying: Insufficient Consulting rooms to cope with increased population growth as a direct result of the increase in dwellings. The addition of the Extra Care housing will put a significant pressure on the local practices, and we will have to determine if any have the capacity to take on this additional workload. This PCN area is already under pressure from future additional patients due to nearby planning applications, and this application will directly impact on the ability of The Key Medical Practice in particular, to provide primary care services to the increasing population. OCCG is in discussion with practices, the Council, landowners / developers, or agents, to consider how the Kidlington area can support health to the 4,400 dwellings.

- Lighting throughout the development should meet the general standards of BS5489-1:2020. Lighting plans should be provided which should set out how this standard will be achieved not only on adopted highways, but also un-adopted roads and parking courts.

- We object to proposals to close Sandy Lane. Shopping and many other types of journeys will require a car either via Langford Lane or Loop Farm if Sandy Lane is closed. People without transport will be stuck especially with one mini-bus trip/week. Retention and integration of Yarnton Medical Practice into the development is noted. Many people travel from Kidlington to the surgery, care home and nursery/retail Centre. This must be addressed.

- No retail provision meaning that all residents must go to a larger settlement such as Kidlington for shopping. The nearest small facility to Begbroke is Budgens Yarnton.

- Transport Links - no direct bus link from Begbroke to Oxford Parkway or Water Eaton P&R which has buses to hospitals. Impractical bus changes, in either Oxford or Woodstock necessary.

- There is bound to be Increased air pollution - is regular monitoring to take place?

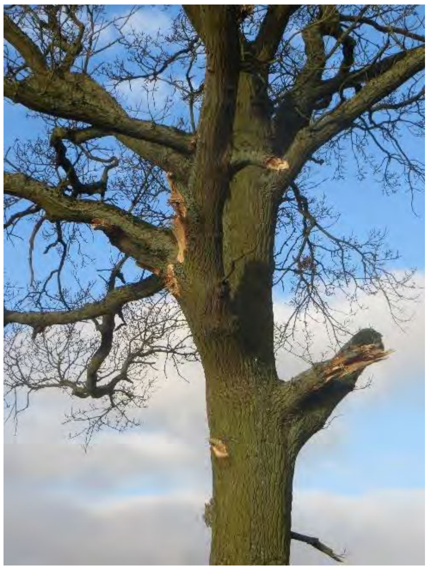
- Oxford City Council prime reason for building on the greenbelt was that their unmet need for houses. Now thousands of houses are planned to be built around Oxford There is no reason to build on our bit of the greenbelt north of Oxford. The Data provided by Oxford city council does not match the reality of misleading data on infrastructure that is available example flooding, transport, Sewerage and Computer modelling on car movements.

- They have had meetings regarding flooding with experts from Europe attending. The minutes of these meetings should be available for examination.

- Long-term management plans and effective, sensitive management (with regular reviews) will be needed for all sites - they all have green infrastructure and wildlife habitat. To ensure management lasts for as long as the built environment is built up (e.g., likely to be forever) then an endowment fund may be needed to ensure that management costs can be covered. Ideally, there would be a funded officer-role to coordinate and oversee this. This could be alongside or sharing a role as a community engagement officer. This role could for example be delivered by an officer in an external organisation with appropriate experience.

- According to their website “Merton College has a rich 757-year history of responsible stewardship of historic buildings, farmlands and the environment. This is in addition to our excellence in academic teaching and research. I am proud to be the Warden of a college community so committed to improving biodiversity and creating a sustainable future” *(from their website and hardly fits with destruction of green belt and local environment)*

Illustration set 1 – Hedge and tree damage at PR9 site



- Ideas about Dolton Lane are upsetting. The nature of this lovely ancient rural lane is that sometimes it is impassable, but this is what makes it so special. It would be a disaster if it were turned into an urban pathway The character of the lane would be lost forever. Turning the whole Binfield into woodland rather than just part of it is not a preferred option. It is a special field for wildlife.
- There is a wide range of wildlife species that inhabit the PR9 and Binfield. Owls fly over, swifts who are becoming endangered, hares, rabbits (also in decline) crickets, spiders on whose gossamer threads the swifts feed on, deer and insects.

- Begbroke Parish Council could be involved in the stewardship of the woodland and nature areas that have been proposed for PR8 and PR9.

  Dolton Lane after tree and hedge work.

- 
  

- Cherwell Landscape said: The Parameter Green Infrastructure Plan must clarify that the hedgerows and trees within the productive areas are to remain and be protected. *The above images show what has happened in the past.*

- How can the development of agricultural land be considered to 'provide significant ecological and biodiversity gains'? Development and increased population bring disturbance to wildlife including the presence of cat's dogs and rats.

BEGBROKE PARISH COUNCIL

Planning Application 21/03522/OUT

- ***Footpath FP 124/9/10 is incorrectly shown on all diagrams in the documents*****.** The definitive map shows it directly opposite Hall Farm, The Position where the incorrectly placed finger post and gate is opposite hall Fam Paddocks and is a permissive route only. A meeting earlier this year with Merton agreed this point.

- Ridge and Furrow fields are of significance from historical medieval Farming – especially in how they control surface water (Binfield)

- The sewage and Drainage will present problems and will impact of flooding in Yarnton and Begbroke

- CDC confirm the greenfield rate here is known to already cause downstream flooding in Yarnton. Therefore, it is desirable and important that the discharge is limited to less than the greenfield rate.

- Conclusion by WSP say: The principles of the proposed surface water drainage strategy including the use of 'cut-off' ditches and basins ensure the site may be developed safely and the post-development surface water flood risk may be considered low. The flooding Yarnton in 2021 and the images submitted by 161 Rutten Lane and Yarnton Flood Watch do not support this view. This clay soil is not free draining. Soilscapes soil types viewer - National Soil Resources Institute. Cranfield University (landis.org.uk)

- Most of PR9 is slowly permeable seasonally wet slightly acid but base-rich loamy and clayey soils, seasonally wet pastures and woodlands and impeded drainage. Main risks are associated with overland flow from compacted or poached fields. Organic slurry, dirty water, fertiliser, pathogens, and fine sediment can all move in suspension or solution with overland flow or drain water. Mostly suited to grass production for dairying or beef, some cereal production often for feed. Timeliness of stocking and fieldwork is important, and wet ground conditions should be avoided at the beginning and end of the growing season to avoid damage to soil structure. Land is tile drained and periodic moling or subsoiling will assist drainage. Nearer Rutten Lane is Freely draining.

- *We fear that this development will impact Begbroke East as well as Yarnton*. Begbroke east experiences flooding both now and historically and there will be thousands of houses built because of PR8. They mitigate this by saying balancing ponds will be constructed with slow release.

- The city council has put on two conferences to discuss flooding around Oxford they then go-ahead spending Millions of pounds of taxpayer's money with Flood prevention to then be worse off by building thousands of houses north of the Abingdon Gap where there is a maximum amount of water flow that you can get through this gap at any one time. It is no good ignoring the advice given by the international participants. Flooding is not going to go away. You can sit in a traffic queue for hours on end and it will not really affect anyone whereas water movements will, and the councils are negligent in looking after their residents which is a statutory requirement.

- Oxford City Council should be compelled to pay for an independent hydrologist report on this area before a single house has been built.

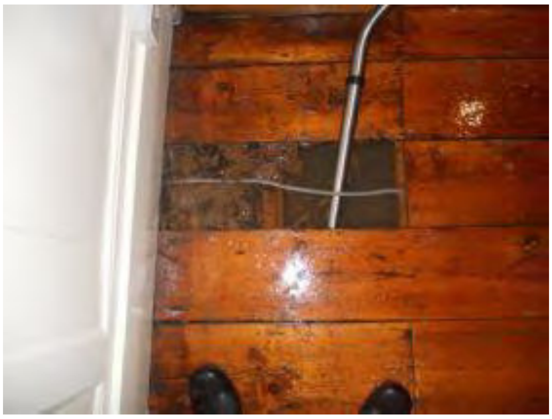
The series of images below shows water flow from east of Hall Farm Spring Hill down to St Michaels Lane, flooding the Old Rectory, high water by Orchard House, a flooded burial ground at the church and continuining to the A44.

Blocked and hidden drains

BEGBROKE PARISH COUNCIL

Planning Application 21/03522/OUT

Flooded property



Dolton Lane

BEGBROKE PARISH COUNCIL

Planning Application 21/03522/OUT

Alongside FP 10

Begbroke West near FP 10

PR9 fields

PR9 from A44 Cycle path with water on ground

Begbroke East

Rowel very near house boundary.

Site of proposed school

Footpath 7 Near pumping station

Views of flooding adjacent to Rowel Brook and pumping station

Begbroke Science Park – from Begbroke Lane near Roundham

Outflow of Rowel Brook to Oxford Canal

Flooding in 1975 – Fernhill Road

Dec 2021 archeological survey trenches

Appendix 1

Planning Committee
Cherwell District Council
Bodicote House
Bodicote
Banbury
Oxon
OX15 4AA
Ref: Planning Objection - 21/03522/OUT
Date: 22nd November 2021
Dear Planning Committee,
We are writing to make a strong formal objection to the planning application 21/03522/OUT - Land West of Yarnton based primarily on the failure to address increased risk of flooding to the existing community.
As recently as January 2021 our village has been severely affected by surface water and foul water flooding with properties inundated with water ruining homes and gardens, causing anxiety across our community every time a significant period of rainfall approaches. Whilst we are

working to address the insufficiencies in the existing drainage system with various agencies who have a responsibility for drainage, there is a genuine fear that if the development of PR9 proceeds without full integration and assessment of current flood-related issues in Yarnton the overall impact from flooding will increase to a level that is entirely unknown.

Our objection is based on the following:

1. There is no acknowledgement or consideration of the combined flood risk at the development site and the existing village – there is a large omission in the flood assessment maps of the known River Thames Flood plain (see comparison maps below).
2. There is limited documentation demonstrating an understanding of historic drainage channels and local topography. The proposed development will lead to a heightened flood risk for the Yarnton community due to a squeezing of available drainage capacity between the PR9 development site (the source) and the Thames flood plain, (the sink) on which the village of Yarnton borders highlighted by point 1 above.
3. No measures have been detailed for the displacement of ground water within the development site either during construction or upon completion.
4. No information or assessment of grey water systems within development site and their impact on existing foul sewage networks has been included in the PR9 plans.
5. No information is in the PR9 plans about proposed foul sewage pumping main routes or outfall points in the existing village of Yarnton.

6. There is concern in regard possible exceedance flow routes and flow depths from the development site through the existing village of Yarnton which does not have sufficient capacity in its drainage, as has been proven in recent flooding events.
7. There is a lack of clarity in regards the management and maintenance responsibility for the drainage scheme post development ensuring liability is clearly defined from outset.

Empirical evidence and in-depth community knowledge to support our objection can be provided to applicable planning officers upon request. Please refer to our prior detailed letter to the Development Briefs Project Team dated 08.09.2021 ref: Local Plan Partial Review Draft Development Briefs for PR9 (Land West of Yarnton) which is also included in this objection for reference.

We have serious concerns that if these factors are not fully considered and addressed through the planning process the community in Yarnton will suffer from increased flooding risk both in severity and frequency. Should this indeed be realised we would in the first instance pursue a remedy via the local flood authorities. If unsuccessful we would encourage private individuals to seek recompense for future damages from the stakeholders concerned.

Our objection is fully supported by Yarnton Parish Council.

We look forward to receiving your response.

Kind regards,

David Thornhill, Colin Rhodes and Steve Smith
Yarnton Flood Defence

Development Briefs Project Team
Planning Policy, Conservation and Design
Cherwell District Council
Bodicote House
Bodicote

BEGBROKE PARISH COUNCIL

Planning Application 21/03522/OUT

Banbury
OX15 4AA
Ref: Local Plan Partial Review Draft Development Briefs for PR9 (Land West of Yarnton)
Date: 08.09.2021
Dear whom it may concern,
Thank you for the opportunity to comment on the development briefs recently released for public response with particular focus on the development PR9 – Land West of Yarnton. On behalf of the village residents, we have concerns regarding several points outlined below and believe these should be taken into careful consideration within the planning of the proposed development.
Our primary concerns are:
1. No acknowledgement or consideration of the combined flood risk from groundwater and flash flooding at the development site or existing village both of which have been shown to be at real risk and not just hypothetical with recent evidence to showcase this
2. No acknowledgement or consideration to address existing flood risk from foul sewage, again, which has occurred recently and historically
3. Limited understanding of historic drainage channels and local topography with disconnected development leading to a heightened flood risk for the whole community
4. Inadequate drainage assets both historical and part of development sites which have not considered the wider community context and been neglected for many years
What we are seeking is a well-planned and empirically evidenced proposal from the developers that addresses the existing flooding risk to the wider village of Yarnton and not just the site of development with an adequate surface water and drainage strategy in place. The overall risk of flooding should not be increased either during development or post development. Given the known flooding risk to the village, both of which ODC and CDC are fully aware of, we believe an in-depth flood survey across the full village should be undertaken as part of the project and a condition placed
on the development to achieve it so that the risk of flooding is mitigated against through design and maintenance. We believe that the local flood authority has a duty to protect our community and may
even consider extending the flood assessment and management to PR8 due to its close proximity and likely connected influence.
We would very much welcome the opportunity to engage with you and the planning team on these matters and look forward to receiving your response.
We have extensive evidence of the flooding that occurs in our community and have spent time mapping all water courses within the village to identify the issues and possible solutions all of which we can make available should they be beneficial to the development brief. Below is further evidence and information to support our response.

Local context:
Yarnton is a historic village with human settlement dating back 3000 years with a permanent settlement being recorded here in the Doomsday book. Over time the village has grown from five farms at or near the junction of Cassington Road, Rutten Lane, and Church Lane to the village it is today with hundreds of properties with thousands of residents.
Flooding in the village is not new and has been occurring over many years. The Environment Agency has issued flood alerts and warnings for large areas to the south of the village on many occasions which often coincide with perfect flooding conditions, a high water table and heavy surface water

run off, events we have experienced far too frequently.
The hap-hazard expansion of the village without careful consideration of local topography and drainage has without doubt contributed to the increased risk of flooding to the whole community with the historic core at greatest risk. We fear that further development will exacerbate this issue, increasing the frequency of large flooding events without careful planning and consideration.

Proposed development site:
The proposed PR9 development site is located on the eastern slope of Spring Hill and falls sharply towards the A44. The top of the hill comprises an ancient river gravel terrace which overlays the Oxford Clay band. The terrace gravel is known to store groundwater and there is a spring-line on the slope at the junction with the clay band, hence the name Spring Hill. To the east of the Oxford Clay is the River Cherwell/Thames alluvial drift deposits mostly consisting of sandy clays which is relatively permeable in comparison to the heavy clay. The topography and geology of the area would suggest the ancient surface water and groundwater regime was for the terrace gravel to discharge at the spring-line onto the surface of the clay band and flow across land to meet the alluvial drift deposits and from there into open channels feeding into the Thames.

We suspect that Rutten Lane was at first an un-metalled track connection to Begbroke, its route being along the bottom of the Spring Hill slope. The track bed lays mostly on the impermeable Oxford Clay leading to it becoming rutted and virtually unpassable in winter. The metalling of Rutten Lane enabled the village to expand northwards first by speculative frontage development on both sides of the road and later by infill development.
The impact of this has been to disrupt the original flow pattern off of Spring Hill, training it towards a constantly reducing number of open gaps in the now continuous dwelling frontage. There is still an open ditch in parts on the west side of Rutten Lane which we think was originally intended to cut off the flow from Spring Hill keeping the road dry and channel the water to crossing points under the lane. With the now continuous dense frontage development the ditch has largely been made redundant with perhaps the exception of being used as an open soak-away for the school roofs and hard paving which is particularly noticeable.
It is not entirely clear how the drainage of the village between Rutten Lane and the A44 is now supposed to work. We have been reliably informed that there are no public surface water sewers in the village and it is entirely drained by a patchwork of highway drains and riparian ditches. Many of these seem to have been abandoned or backfilled resulting in their continuity having not been maintained. There seems to have been a disjointed and only rudimentary consideration of how a combination of flash flows and groundwater runoff will reach the River Thames through this system which has further exacerbated the problem faced in the village of seasonal flooding.
Having extended north over the past 50 years the village has gradually cut off the natural combination of groundwater and surface water flows from the higher ground overlooking the village.
The proposed PR9 development will continue this trend extending the village yet further north and more or less fill the remaining drainage corridor between Spring Hill, the Cherwell and Thames flood plains.

One of the most recent extensions north along Rutten Lane has been the construction of the Yarnton
Medical Practice. The site does include a SUDS attenuation pond, which was quickly overwhelmed by the Christmas 2020 surface water flash flows off the fields onto which the PR9 development adjoins,

with the excess water freely flowing through the nearby streets to the dual carriageway.
The two principle flash flood routes now seem to be; the Cassington Road and Church Lane to the south and the north section of Rutten Lane into Aysgarth Road, effectively the north and south extremities of the current village.
It has also put new areas at risk including the most recent large development off of Cassington Road. Residents were assured that sufficient measures had been designed into the scheme to safeguard it from up to 1 in 100 year flood. What was observed was the attenuation ponds were already partially filled with groundwater from the Thames water-table in advance of the Christmas flash flood event. It is our understanding the ponds were at one point during the Christmas event perilously close to being overtopped.
Considering the close proximity of the River Thames water-table outline, we would like to know what
allowance was made for the possible presence of groundwater in the SUDS design? At the same time the Environment Agency had put the area on a red warning for groundwater flooding. The Agency's flood warning zone abuts the southern fringe of the village.

It seems this opens the possibility of a number of combinations of high groundwater levels in the Spring Hill gravel terrace. High intensity rainfall over the local catchment and a high water table in the
River Thames could all combine to bring the flood risk to areas of the village well short of the 1 in 100 year gold standard quoted in early consultation information.
It is our contention that the planning brief for PR9 should contain a requirement for a full investigation of how the existing village will be protected from flooding including the PR9 and also perhaps PR8 at a strategic level. This of course may highlight the need for additional "off-site" works that the planning and drainage authorities will need to decide how they would be funded. It is also our contention that the local drainage authority has a duty to protect from flash flooding the existing population as a consequence of the development, particularly considering its scale.
We can perhaps forgive previous generations of planners for lack of knowledge and foresight about the hydrological implications of the ribbon development that took place in the village and perhaps hampered by lack of statutory powers to appropriately control it. Now, through the emergence of the
unintended consequences of their past decisions we have seen first-hand, ignorance will be no defence.
Sewage Management:
Your draft document references pumping mains crossing the development site. Is it serving Begbroke
and linking it to the now derelict Yarnton sewage works, or is it linked to discharges from the Cassington sewerage works? Cassington works seem much too large for Cassington alone. Can we therefore assume it also treats sewage from Eynsham?
We would also like to know if the treated effluent is then pumped east into the Cherwell catchment and discharges into an open watercourse presumably on the east side of the A44.
Another question is whether Thames Water is currently licensed to discharge untreated sewage from
Cassington sewage works (in storm conditions when capacity of the works is exceeded) into the natural environment and if so, then where does it outfall?
Carterton and Witney in the Windrush Valley have been allowed to expand at a pace with very little

consideration of the risk of untreated sewage overflow due to insufficient sewage storage capacity in
the catchment. I'm sure you are aware of the ongoing campaign to stop the continuing pollution of the River Windrush. We are very keen to avoid the same situation with the Rover Cherwell.
We have concerns about the public foul sewerage and its ability to cope with 540 additional homes.
Our concern for Yarnton is that foul sewage flooding already occurs simultaneously with groundwater flooding and flash flooding. This resulted in village residents having to endure their gardens filling with untreated sewage on a regular basis when the water table rises.
Thames Water operatives who attended the most recent incident stated they were unable to offer practical assistance because of groundwater infiltrating and filling the foul sewerage, similarly overwhelming it as it does the surface water drainage system – foul drainage should be a self contained system, not subject to fluctuations in groundwater levels, however we do appreciate the circa +20% extra capacity Thames Water have to pump away excess surface water that enters their system.
Our fear is that the connection of 540 new homes (and eventually the addition of PR8) will make a repeat of this event far more likely and more extensive in years to come. There seems to be a similar picture developing across the country. We have already mentioned Witney – Oxford City also has a problem with the inundation of the foul sewerage when the River Thames is in flood, which Thames Water is unable to fully explain or offer a remedy to. A large part of the Public Health Legislation was aimed to ensure proper drainage and a healthy environment free of filth in urban areas. We can't lose sight of that in the current dash for growth.

SUDS and Surface Water Management:
Developers put great faith in the provision of SUDS that comply with national guidance. However, designing to a 1 in 100-year return does not in itself provide assurance for the next 100 years. That requires an appropriate level of maintenance over the same time period. The development will create new infrastructure that residents will rely upon to protect their homes for the next 100 years.
Previous SUDS schemes the liability to maintain this capacity has not been made entirely clear (via a planning condition or covalent on the development) and we suspect many will look to the local District or Parish Councils as the responsible body of last resort.
As we have seen in recent flooding events there is minimal planned maintenance carried out on the existing drainage assets. Intervention has simply been to respond after the event when it is too late to be of practical help. There is no flood warning system in operation for flash flooding. A suitable method of guaranteeing, or ring-fenced funding must be put in place to ensure maintenance activities do regularly happen, not left at risk of economic austerity forced upon local councils. Maintenance of the physical environment (roads, drainage, public parks, and open spaces) is usually the prime target to budget cuts.

Our final point is that however sophisticated or robust the SUDS designs submitted by the developer might be, it will rely to some degree on assumptions about probable rainfall profiles, water-table levels and infiltration rates over weeks and months prior to a localised torrential downpour. We are sure the risks will be designed out as far as practicable, but we will inevitably be left with a residual risk.
We would like to know who will be liable for this risk and do they propose to secure an appropriate level of flood insurance cover for losses that the existing village and possibly the proposed development might suffer? If not; can you tell us with whom the residual risks will finally rest?

We will look forward to hearing from you in response to the above.
Best regards,

December 2021

creating a better place

Environment Agency

Cherwell District Council
Planning & Development Services
Bodicote House White Post Road
Bodicote
Banbury
OX15 4AA

Our ref: WA/2021/129424/01-L01
Your ref: 21/03522/OUT

Date: 10 January 2022

Dear Sir/Madam

The erection of up to 540 dwellings (class C3), up to 9,000sqm GEA of elderly/extra care residential floorspace (class c2), a community home work hub (up to 200sqm)(class E), alongside the creation of two locally equipped areas for play, one NEAP, up to 1.8 hectares of playing pitches and amenity space for the William Fletcher Primary School, two vehicular access points, green infrastructure, areas of public open space, two community woodland areas, a local nature reserve, footpaths, tree planting, restoration of historic hedgerow, and associated works.

OS Parcel 3673 adjoining and west of 161, Rutten Lane, Yarnton, OX5 1LT

Thank you for consulting us on the above application. Please accept my apologies for the delay in responding.

We have no objection to the application.

Yours faithfully

Miss Sarah Green
Sustainable Places - Planning Advisor

Direct dial 0208 474 9253
Direct e-mail planning_THM@environment-agency.gov.uk

OXFORDSHIRE COUNTY COUNCIL'S PRE APPLICATION ADVICE ON THE RESPONSE TO CONSULTATION ON THE FOLLOWING DEVELOPMENT PROPOSAL

District: Cherwell
Application No: 21/00233/PREAPP
Proposal: The erection of up to 540 dwellings (Class C3), up to 9,000sqm GEA of elderly/extra care residential floorspace (Class C2), a Community Home Work Hub (up to 200 sqm)(Class E), alongside the creation of two locally equipped areas for play, one NEAP, up to 1.8 hectares of playing pitches and amenity space for the William Fletcher Primary School, two vehicular access points, green infrastructure, areas of public open space, community woodland, a local nature reserve, footpaths, tree planting, restoration of historic hedgerow, and associated works
Location: OS Parcel 3673 Adjoining and West Of 161, Rutten Lane, Yarnton

Response date: 5 August 2021

Purpose of document

This report sets out Oxfordshire County Council's view on the proposal.

This report contains officer advice in the form of a strategic response (if appropriate) and technical team response(s).

Where possible these comments contain:

- **Advice on the feasibility of the location.**
- **Advice on what to include in a full application.**
- **Advice on the need for any pre-application surveying to be undertaken.**

Disclaimer

Please note this advice represents the opinion of an Officer(s) of the Council only, which is given entirely without prejudice to the formal consideration of any planning application which may be submitted.

Application No: 21/00233/PREAPP
Location: OS Parcel 3673 Adjoining and West Of 161, Rutten Lane, Yarnton

Strategic Comments

The County Council is actively engaged on an ongoing basis in respect of the proposals for development on this strategic site allocated in the Cherwell Local Plan Partial Review (adopted September 2020). The site is allocated under Policy PR9.

This preapp relates to only part of the 99ha allocated site. The Local Plan removed some 25-27ha of the allocated land from the Green Belt and indicated that this is the land for development. The preapplication identifies a 'red line' which excludes the land remaining in community woodland and agricultural use.

The District Council has been working on a development brief for the site for some time, together with development briefs for all the other allocations in the Local Plan Partial Review. The development briefs have not yet reached a public consultation stage, so our comments are focused on consideration of the proposal in relation to the allocation.

We acknowledge that Merton College, as landowner, has undertaken some public consultation on this proposal and established a website: https://www.pr9-consultation.co.uk/.

The proposal makes provision for up to 540 dwellings, a community work hub of up to 200sqm, and up to 1.8ha for the expansion of William Fletcher Primary School and these uses appear to be as envisaged in the application. We have specific comments on the school site, as set out in our Property comments attached.

The proposal indicates that in addition, a care home of up to 9,000m2 is to be accommodated within the land removed from the Green Belt. As a result of providing land for this use, the 540 dwellings would be at a higher density on the remaining land. The draft planning statement in the preapplication documentation indicates at 5.11: 'While not listed as a specific ‘Key Delivery Requirement’ within Policy PR9, the provision of a new Care Home (Land use Class C2) provides a complimentary use within the new village extension to Yarnton which will meet an identified need for extra care and elderly care provision the surrounding area'. The identified need is described in paragraphs 5.14-5.16 as being evident from paragraphs 91-92 of the NPPF; Planning Practice Guidance and Policy BSC 4 of the adopted Cherwell Local Plan Part 1 (adopted July 2015). Policy BSC 4 in fact requires housing sites such as this to 'provide a minimum of 45 self-contained extra care dwellings as part of the overall mix' and includes some flexibility on the requirement, although it envisages only Land Use Class C3 uses, not C2.

The County Council has a Market Position Statement on care services, and an Extra Care Housing Supplement to that, both dated 2019 and covering the period to 2022, with some consideration of the period to 2031. This PR9 site (which was not yet allocated in 2019) is not mentioned in the Extra Care Housing Supplement. However, the County Council is interested in this matter and will work further with the District Council and applicant on identifying the appropriate provision for older people on this site.

A key strategic matter is how the development of this site relates to existing development in Yarnton, and future development, particularly that on the other side of the A44 at Begbroke further to the allocation PR8. We are pleased that the applicant has sought to address this, but note that in the absence of development briefs for both PR9 and PR8, comments are limited at this stage.

Our Transport comments attached are dated 28 June 2021 and were previously provided to the applicant. They are initial comments at this stage, and there is ongoing highways preapplication work, for example about transport modelling, walking and cycling paths, and design.

Our Education and Property comments provide some indication of the likely contributions to be sought for school and other community uses that the County Council is responsible for. Please note that the costs of the primary school expansion are being appraised. Also, we acknowledge the complexity of expanding the school as it involves not only the additional land within the allocated site, but also land currently used for access to the adjoining Yarnton Residential and Nursing Home. Agreement on the land needed would best be concluded in advance of the lodging of the planning application for development of the PR9 site and we are actively involved in those discussions. A new footpath using part of the school site at the southern edge (outside of the red line of the application site) might be provided as part of those negotiations.

Our LLFA comments attached are general advice and also include some specific matters further to a meeting that was held on 23 July 2021. We acknowledge that the matters relating to drainage are a key matter that the applicant is seeking to further engage on.

Please also see our Archaeology, Waste Management and Ihub comments attached.

Officer's Name: Lynette Hughes
Officer's Title: Principal Planner
Date: 4 August 2021

Transport Development Control

As you may be aware, Oxfordshire County Council is a consultee of the local planning authority and provides advice on the likely transport and highways impact of development where necessary.

It should be noted that the advice below represents the informal opinion of an Officer of the Council only, which is given entirely without prejudice to the formal consideration of any planning application, which may be submitted. Nevertheless, the comments are given in good faith and fairly reflect an opinion at the time of drafting given the information submitted.

Access / A44 works

The site access junction from the A44 appears to be suitable. I note that the draft TA states that the access is designed to ensure that it does not preclude the A44 corridor works, however, it is very likely that the Highway Authority will request that the A44 works along the site frontage are delivered via a S278 agreement as part of the mitigation package from the development.

In terms of the crossings, LTN 1/20 states that cycle crossings at junctions and across links should not be staggered. Crossings should be made in a legible manner, without requiring people to deviate significantly from their overall desire lines and also that cyclists should preferably be kept separate from pedestrians through junctions.

Since the provision of high-quality sustainable infrastructure will be key in delivering these sites, we therefore consider that cycle crossing facilities should be provided directly adjacent to the pedestrian crossings as per LTN 1/20 paras 10.4.21 - 10.4.25 (copied below). Such facilities will increase the attractiveness of the cycle routes.

Signal controlled cycle facility

10.4.21 A signal-controlled cycle facility may be provided where a cycle track is connected across a road or an arm of a junction. The crossing may be for cyclists only, but can be provided adjacent to a pedestrian crossing facility which may be useful where separate but parallel routes exist. The pedestrian and cycle crossings do not have to operate with the same signal timings.

10.4.22 The pedestrian crossing is signalled in the usual way, and the cycle facility is indicated using signals to TSRGD diagrams 3000.2 or 3000.2A, and markings to TSRGD diagram 1055.3. Cyclists generally travel faster than pedestrians and the cycle crossing should preferably operate as a single stage, without the need for cyclists to wait on refuges in the middle of the carriageway. This can be achieved by setting the cycle crossing outside any pedestrian crossing refuges. On two-stage crossings a straight or angled alignment at the refuge should be provided for cyclists even if the pedestrian crossing is staggered (see Figures 10.9 and 10.10).

10.4.23 The design of the cycle crossing should make it clear that it is not to be used by pedestrians. The footway and cycle track on the approach to the crossing should be paved in contrasting materials and preferably at different levels, separated by a kerb.

10.4.24 When provided as part of a junction, or as a stand-alone facility, signal controlled cycle facilities must not be marked with a controlled area indicated by zig-zag markings.

10.4.25 However, a stand-alone pedestrian crossing (puffin or pedex) provided alongside a signal controlled cycle facility will require a controlled area in the usual way. Sufficient space will need to be provided between the crossing and the cycle facility to accommodate this, noting the flexibility in the number of zig-zag marks that may be provided. Where this is not possible, the Department may consider authorising a controlled area to be placed in a layout that encompasses both facilities.

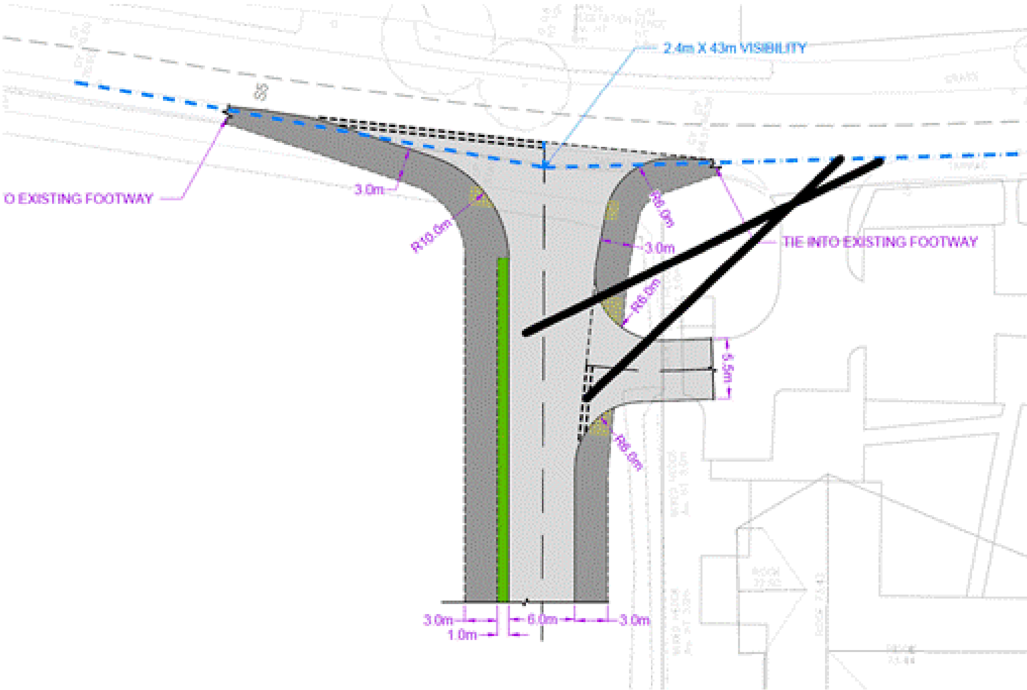
It is understood that the crossing between the access junction and the Rutten Lane roundabout is located where it is in order to provide a direct connection between the PR9 site and the PR8 site opposite. It would be useful to have these connection points between the sites demonstrated on a plan. The crossing is not ideally located for access to the southbound bus stop, however the location of the bus stop could be reviewed in the future, particularly with the delivery of a southbound bus lane along this section of the A44.

A scheme to signalise the A44 Rutten Lane was discussed and this is something that the county council would certainly wish to explore, given the benefits such a scheme could provide for public transport and active travel movements.

A formalised parking arrangement alongside the access road adjacent to the Budgens and PFS was discussed. The county council has no objections in principle to the proposal to provide a parking layby opposite the Budgens store and note that residents of the proposed development are likely to both use the Budgens store or otherwise travel to the development site via the Garth.

We discussed the layout arrangement for the southern access junction with Rutten Lane and the proposed proximity of the medical centre access. As discussed, we would need to see visibility splays demonstrated on the vertical plane.

There was also some concern raised from our Road Agreements engineer over the proximity of the two junctions (medical centre and Rutten Lane) and the need for a good degree of indivisibility between the two junctions. Please see the sketched lines on the plan below which indicates the area that will need to be kept clear in order to maintain visibility and avoid conflicting turning movements.



Public Transport

To confirm, we do not expect the development to provide a bus service through the site itself, only contributions towards improved services and infrastructure on the A44 and Rutten Lane. Walking / cycling routes to these stops will need to be direct, overlooked and lit.

We welcome the proposed provision of cycle parking at the nearest bus stops.

Traffic Impact Assessment

As discussed at our recent meeting, we consider that the Partial Review developments should be modelled using the North Oxford VISSIM with an updated 2031 base. This in order to more accurately reflect the conditions of road network in this area, given the impacts and interrelations that junctions in this area have on each other which otherwise would not be reflected in individual junction capacity assessments. These developments are likely to come under intense scrutiny and the assessment and conclusions will need to be thorough and fully justified.

We discussed parking levels and stated that the county council has considered that suppressed parking provision would be suitable for these developments, given the required focus on sustainable transport and as a method of suppressing SOV trips.

We welcome further discussion on trip rates, travel demand and modelling requirements with you in the near future.

In terms of the study area for assessment, including and analysis of PIA data, it was discussed that this should extend toward Langford Lane and the A4260 through Kidlington. In terms of PIA data, close attention should be paid to vulnerable road users to identify any weaknesses in the infrastructure for pedestrians and cyclists. Traffic flow and PIA data should also be updated to include recent years.

In terms of committed development (para 5.17 of the draft TA), the two recent applications in Woodstock should also be included (WODC planning refs: 21/00189/FUL (180 dwellings) and 21/00217/OUT (250 dwellings))

The ES Transport chapter will need to follow IEMA guidelines.

Mitigation

It is agreed that the package of highways / transport mitigation works and / or obligations are to be focused on improving sustainable transport access to the development sites. It is also agreed that the main elements of the mitigation package required to deliver the Growth allocated in the Local Plan Partial Review has been identified through the Local Plan work.

The county council is working on a contribution / delivery strategy which seeks to fairly identify and distribute the required mitigation among the Partial Review sites. We hope to be able to share this strategy with developers in the near future.

We discussed the potential for the PR9 site to deliver the section of A44 corridor improvements between the site frontage and Cassington Road roundabout junction as part of this particular site's contribution towards delivery of the mitigation schemes. We welcome further discussions on this but note that there is also a requirement to secure claw back funding from the Cassington Road to Loop Farm section of the corridor, which currently has Growth Deal funding allocated, and also to deliver items such as the Park and Ride site.

Innovation

The county council is keen to encourage innovation in new developments in general (not only related to travel and transport). As Highway Authority, we encourage developers to consider innovation as a tool for reducing travel demand. As discussed, we will invite a member of the county council's Research and Innovation team to a future discussion on the site in order to outline the need for an Innovation Framework Plan to support these sites and discuss the sort of measures that could be included.

Officer’s Name: Tim Peart
Officer’s Title: Senior Transport Planner
Date: 28 June 2021

Application No: 21/00233/PREAPP
Location: OS Parcel 3673 Adjoining and West Of 161, Rutten Lane, Yarnton

Local Lead Flood Authority

Pre-App Comments following meeting on 23rd July 2021

Detailed comments:

Following the meeting between the applicant's consultants, the LLFA and Cherwell DC Land Drainage Officer on the 23/07/2021, I have now reviewed the FRA in detail and have the following comments to make.

Surface Water and overland flow Flood Risk
The site is at high risk of surface water flooding, but the existing risk has been assessed as low. This needs to be shown as high in the report.

However, measures are proposed to minimise the risk from these sources and the approach to existing modelling and proposed mitigation measures seems reasonable. The LLFA will need to be consulted on this further as the designs develop.

Greenfield Rates
According to the UK SuDS website, the soil type is classed as 1 (SPR 0.1) which is based on highly permeable soils. Whilst this might not be the case on site, the greenfield rates in the FRA have been calculated using a SPR of 0.4 which has not been confirmed by onsite soil investigation. Therefore, a more conservative value must be used until detailed site information is available.

Modelling Calcs
The calculations must be rerun using more conservative greenfield rates or based on detail site investigation when available.

FEH data and 40% Climate change has been included as well as urban creep calculations however, the final attenuation volumes and final discharge rates must include an allowance of 10% urban creep, and this must not increase the post development rates.

Infiltration Rates
Infiltration testing to BRE365 must be carried out and provided as part of the application.

Detailed Design for RM and Discharge of Conditions.
Parameters must be set at this stage to ensure that the future parcels provide adequate SuDS to convey water to the strategic drainage features Our guidance expects developers to move away from traditional pipe and gully systems and source control and above ground measures must be provided wherever possible, to treat and convey surface water.

Space must be made available for appropriate SuDS for the adopted highways.

General Pre app comments
A water quality assessment in accordance with Section 4 and Section 26 of SuDS Manual must be provided.

Proposed development must meet local standards, L19, "At least one surface feature should be deployed within the drainage system for water quality purposes, or more features for runoff which may contain higher levels of pollutants in accordance with the CIRIA SuDS Manual C753. Only if surface features are demonstrated as not viable, then approved proprietary engineered pollution control features such as vortex separators, serviceable/ replaceable filter screens, or pollution interceptors may be used"

A detailed surface water management strategy must be submitted in accordance with the **Local Standards and Guidance for Surface Water Drainage on Major Development in Oxfordshire**
In line with this guidance, runoff must be managed at source (i.e. close to where it falls) with residual flows then conveyed downstream to further storage or treatment components, where required. The proposed drainage should mimic the existing drainage regime of the site as much as possible.
The applicant is required to provide a Surface Water Management Strategy in accordance with the following guidance;

The Sustainable Drainage Systems (SuDS) Policy, which came into force on the 6th April 2015 requires the use of sustainable drainage systems to manage runoff on all applications relating to major development. As well as dealing with surface water runoff, they are required to provide water quality, biodiversity and amenity benefits in line with National Guidance. The Sustainable Drainage Systems (SuDS) Policy also implemented changes to the Town and Country Planning (Development Management Procedure) (England) Order 2010 to make the Lead Local Flood Authority (LLFA) a statutory Consultee for Major Applications in relation to surface water drainage. This was implemented in place of the SuDS Approval Bodies (SAB's) proposed in Schedule 3 of the Flood and Water Management Act 2010.

All full and outline planning applications for Major Development must be submitted with a Surface Water Management Strategy. A site-specific Flood Risk Assessment (FRA) is also required for developments of 1 hectare or greater in Flood Zone 1; all developments in Flood Zones 2 and 3 or in an area within Flood Zone 1 notified as having critical drainage problems; and where development or a change of use to a more vulnerable class may be subject to other sources of flooding.

Further information on flood risk in Oxfordshire, which includes access to view the existing fluvial and surface water flood maps, can be found on the Oxfordshire flood tool kit website. The site also includes specific flood risk information for developers and Planners.

The National Planning Policy Framework (NPPF), which was updated in February 2019 provides specific principles on flood risk (Section 14, from page 45). National Planning Practice Guidance (NPPG) provides further advice to ensure new development will come forward in line with the NPPF.

Paragraph 155 states; "Inappropriate development in areas at risk of flooding should be avoided by directing development away from areas at highest risk (whether existing or future). Where development is necessary in such areas, the development should be made safe for its lifetime without increasing flood risk elsewhere."

As stated in Paragraph 158 of the NPPF, we will expect a sequential approach to be used in areas known to be at risk now or in the future from any form of flooding.

The Non-statutory technical Standards for sustainable drainage systems were produced to provide initial principles to ensure developments provide SuDS in line with the NPPF and NPPG. Oxfordshire County Council have published the "Local Standards and Guidance for Surface Water Drainage on Major Development in Oxfordshire" to assist developers in the design of all surface water drainage systems, and to support Local Planning Authorities in considering drainage proposals for new development in Oxfordshire. The guide sets out the standards that we apply in assessing all surface water drainage proposals to ensure they are in line with National legislation and guidance, as well as local requirements.

The SuDS philosophy and concepts within the Oxfordshire guidance are based upon and derived from the CIRIA SuDS Manual (C753), and we expect all development to come forward in line with these principles.

In line with the above guidance, surface water management must be considered from the beginning of the development planning process and throughout – influencing site layout and design. The proposed drainage solution should not be limited by the proposed site layout and design.

Wherever possible, runoff must be managed at source (i.e. close to where it falls) with residual flows then conveyed downstream to further storage or treatment components, where required. The proposed drainage should mimic the existing drainage regime of the site. Therefore, we will expect existing drainage features on the site to be retained and they should be utilised and enhanced wherever possible.

Although we acknowledge it will be hard to determine all the detail of source control attenuation and conveyance features at concept stage, we will expect the Surface Water Management Strategy to set parameters for each parcel/phase to ensure these are included when these parcels/phases come forward. Space must be made for shallow conveyance features throughout the site and by also retaining existing drainage features and flood flow routes, this will ensure that the existing drainage regime is maintained, and flood risk can be managed appropriately.

By the end of the Concept Stage evaluation and initial design/investigations Flows and Volumes should be known. Therefore, we ask that the following Pro-Forma is completed and returned as soon as possible:

Officer's Name: Richard Bennett
Officer's Title: Flood Risk Engineer
Date: 4th August 2021

Education Comments

This proposed development would have an impact on educational infrastructure, which includes childcare and nursery education providers, primary schools, secondary schools and Special Educational Needs (SEN) schools. The scale of this impact will depend on the number of dwellings, housing mix and build rate, and will be fully assessed at the time of any future application.

The proposed development is served by the school capacity in the school planning areas of Woodstock and Kidlington, where additional primary (including nursery), secondary and special school capacity is required due to planned development at the Cherwell Local Plan sites.

Information about school planning in this area can be found in the Pupil Place Plan available at www.oxfordshire.gov.uk/cms/content/pupil-place-plan. This Plan is updated annually (although not in 2020) and there may have been changes in the school planning context since its publication. The county council's response to any future application will be based on the latest data and information available.

Legal Agreement required to secure:

As previously advised during the Cherwell Local Plan process, the expansion of William Fletcher Primary School to two forms of entry would need to be fully funded by this development, and an additional playing field will also need to be provided. The land identified for the additional playing field is separated from the main primary school site by the access road to the care home, meaning that there is currently no legally enforceable access right between the school site and the planned playing field. We are aware that discussions are currently ongoing regarding access to the additional playing field, but need to be clear that until this issue is resolved, the primary school cannot be expanded in an acceptable manner. Any planning application will, therefore, need to demonstrate that all barriers to expanding the primary school have been removed.

S106 contributions will also be expected towards the expansion of secondary school capacity serving the area. A new secondary school is planned on the Begbroke site, to meet the cumulative needs of the Cherwell Local Plan sites. The scale of this school will be confirmed as the timescales of the different developments become clearer, and informed by ongoing discussions with local education providers as to whether any of the need generated by these developments can be met on existing school sites. At this stage, indicative contributions have been based on a working assumption of a maximum 1,100 place school on an 8.03ha site, towards which all the Cherwell Local Plan developments would be expected to contribute on a proportionate basis.

The contributions required from this developments are therefore currently expected to be:

- Full funding of the capital costs of expanding William Fletcher Primary School in Yarnton - options appraisal work is underway to identify the expected cost of this expansion, and we hope this cost would be available by the time of any planning application.
- Provision of the additional playing field for William Fletcher Primary School, to the standards required by the council, at no cost to the council.

- Proportionate financial contribution towards secondary school capacity - the table below gives an indicative cost per dwelling based on an 1,100 place school, which is estimated to cost a total of £38,001,000 at BCIS TPI = 327. When a planning application is submitted, a contribution will be calculated based on the housing mix and trajectory details provided, and the planned education solution at that time.
- Proportionate financial contribution towards the site for the new secondary school - the table below gives an indicative cost per dwelling based on a 8.03ha site for an 1,100 place school, assuming a cost per hectare of educational land of £424,778 at Jun 2021. When a planning application is submitted, a contribution will be calculated based on the housing mix and trajectory details provided, and the planned education solution at that time.
- Proportionate financial contribution towards expansion of special school capacity - the table below gives an indicative cost per dwelling based on expansion of special schools.

Rate Per Dwelling*

	1 Bed	***2 Bed***	***3 Bed***	***4 + Bed***
Secondary school build costs	£0.00	£3,455	£8,982	£14,509
Secondary school site	£0.00	£310	£806	£1,302
Special schools	£0.00	£286	£704	£1,041

* Financial contributions must be indexed-linked to maintain the real values of the contributions (so they can in future years deliver the same level of infrastructure provision currently envisaged). Build cost amounts shown are to be index linked from BCIS All-in Tender Price Index Value 327, and land costs from RPIX = 305.5 (June 2021)

Officer's Name: Louise Heavey
Officer's Title: Access to Learning Information Analyst
Date: 15 July 2021

Application No: 21/00233/PREAPP
Location: OS Parcel 3673 Adjoining and West Of 161, Rutten Lane, Yarnton

Archaeology

Recommendation:

Comments

Key issues:

See below

Detailed comments:

The site is located in an area of archaeological interest 800m west of a Iron Age and Roman settlement site identified from cropmarks and confirmed by an archaeological excavation ahead of gravel extraction. Further cropmarks of probable Bronze Age round barrows have been recorded 800m north east of the application site. A shrunken medieval village has also been recorded 500m north of the proposed site. A programme of systematic fieldwalking in an around the site has recovered prehistoric flint tools which are likely to relate to further prehistoric settlement.

An archaeological desk-based assessment has been undertaken which sets out the archaeological background of the site. A geophysical survey has also been undertaken on the site. Although this was undertaken in October 2020 a copy of this has only just been sent to us and the report has not yet been agreed as set out in the written scheme of investigation for this survey.

This survey does not appear to have recorded significant archaeological deposits across the site but has recorded an extensive area of ridge and furrow which has been seen elsewhere in the county to mask any earlier features on the site from being identified from such surveys. As such an archaeological evaluation will need to be undertaken on the site ahead of the determination of any planning application in order to test the veracity of these geophysical survey results identify if archaeological deposits do survive on the site.

Officer's Name: Richard Oram
Officer's Title: Archaeology Lead
Date: 22 July 2021

Application No: 21/00233/PREAPP
Location: OS Parcel 3673 Adjoining and West Of 161, Rutten Lane, Yarnton

Minerals & Waste

Recommendation:

N/A

Key issues:

N/A

Legal agreement required to secure:

N/A

Conditions:

N/A

Informatives:

N/A

Detailed comments:

The site is not in a Strategic Resource Area and nor is it in a Mineral Consultation Area. There are no safeguarded waste facilities close by. Therefore, we have no comments.

Officer's Name: Anna Herriman
Officer's Title: Mineral and Waste Planning Policy Office**r**
Date: 20 July 2021

Property

School sites response

Headline
The key concern remains the Care Home and their agreement to relocate their access. Until this access is resolved, by the Developer, and the school gain direct access to the playing field, the school cannot be expanded. The access road currently serves the Care Home and the school only have use of the access road in case of emergency.

The access footpath from the Care Home to Rutland lane, to the south of the school, is also dependent on the Developer carrying out a feasibility and design whilst liaising and agreeing the proposal with OCC, the Care home, school and pre-school. This will be prior to an application as the Care home require this access in order to agree to the relocation their vehicular access.

Process and information

Attached are the following documents:
- S106 Education site checklist
- S106 Info and process to assess the suitability of a school site
- S106 2FE Primary school – Typical pitch layout
- S106 draft drop-off standards at a new primary school

These explain the process and information that should be provided for new school site. Once this information is received and the process and checklist completed then the exact site parameters can be established.

Also attached is an initial mark-up – DE234-54A School & Care Home Layout – JFx (as previously issued) of the proposed site with levels including adjacent levels to access roads. NB all access roads and footpaths are to be no steeper that 1:21.

Access
The width of the vehicular accesses, through the development, to the new school site, are to be 6m wide with pavements either side of not less than 2m.

Stormwater
The mark-up shows the assumed site boundary. We note the suggested swale, but this cannot form part of the school site. The LLFA's current recommendation for school sites is that the surface attenuation provision, that account for the outfall from school sites, shall be provided externally to any school site. This, 'on the surface' water storage, shall form part of the overall surface water management infrastructure and shall fall under the responsibility of your appointed Management and Maintenance Company to maintain, in perpetuity.

Levels
The levels shown on the drawing define the appropriate levels required for the essential use of the playing areas and to create level access for all. Further, the travel routes, into the site, from the development should be no steeper than 1:21 to ensure safe and level access to the school site. Working back from the know levels on both the primary school site and the Care Home some very approximate levels are shown for the access route in.

Preparatory works
The works shown on the drawing would need to be completed 1 year prior to the expansion work commencing on the school site. This will provide the school with alternative parking and safe useable playing field and hard play area, whilst the construction work for expansion of the school is taking place.

Pupil drop off
Information should be provided on how and where this will safely take place when parents choose to drive their children to school. There shall be no dead ends in the vicinity of the school site.

Officer's Name: Jane Farrow
Officer's Title: Corporate Landlord Officer
Date: 29 July 2021

Property

Community response

S106 Contributions as summarised in the tables below and justified, along with generic obligation, in this response.

Contribution	**Amount £**	**Price base**	**Index**	**Towards (details)**
Children's services; Children's Homes	TBC – calculation details below	TPI 328 at 3Q20	BCIS All in Tender	Increased provision at children's homes.
Community Support Services Centre - Adult day care	TBC - see detailed Community Support Services notes below.	TBC	TBC	To enable the County Council to provide expansion facilities.
Archaeological storage	TBC - see detailed Archaeological storage notes below.	TBC	TBC	Extension of the archaeological storage facility at Standlake.
Fire Service	NA - see generic requirements below.	NA	NA	NA
Waste	See separate response direct from service manager.	NA	NA	NA
Independent accommodation for young people	See requirements below.	NA	NA	NA

Introduction

Below are the S106 contributions which OCC may seek to mitigate the impact of the proposed development on local infrastructure.

The proposed development will increase the demands placed on local infrastructure and services. To mitigate the impact of these demands on County Council related infrastructure, the funds below will be required through a S106 agreement.

Detailed Comments:

The County Council considers that the impacts of the development proposal (if permitted) will place additional strain on its existing community infrastructure.

Children's Home Provisions arising from Growth

The number of children in Oxfordshire is set to increase from 152,476 in 2017 to a forecasted 192,983 in 2031.

There is a rise nationally and locally in the number of children becoming looked after. There is also an increase in the number of children living in residential children's homes. The growth in the use of residential care is led by societal factors including the increased awareness of child sexual exploitation, the increased complexity of need and entry into care occurring later in childhood.

Both the local and national policy is to keep children in county where at all possible. Placing children away from their locality makes placements hard to monitor and can put children at additional risk. Feedback from the Children in Care Council indicated children wanted to remain in county wherever possible. They were also more likely to go missing if placed further afield. Stable school placements were also shown to be critical for the positive future outcomes of LAC's.

There is a strong national driver for Local Authorities to avoid placing children out of county as there is growing evidence that they are more prone to going missing and to being vulnerable to issues such as child sexual exploitation. There are also considerable challenges around transitions for young people into adult services which are only exacerbated when young people are placed out of county. Care pathways are more effectively managed when there is integrated working between the Local Authority, schools, health and housing partners in one locality. There are frequent difficulties in accessing suitable education and mental health provision for children placed out of county. This has led OCC to increase its capacity to look after their own children, who require residential provision, by the creation of more Children's Homes to cope with the need.

Residential care is targeted mainly at children whose needs are unable to be met, at that time, in a family home setting. This predominantly affects children over the age of 12.

The County Council currently place 101 children and young people in care homes within Oxfordshire. The Council's population forecasts estimate 66,631 people aged 10-17, giving a rate of 15.16 children in every 10,000 who require residential accommodation.

The capital costs of a children's home for 4 children has been estimated to cost £2.1m (BCIS TPI 328 at 3q20)

345 children have left the cared for system since April 2018, who were aged between 10-17. They had been cared for on average for 864 days or 2 years 4 months (2.333).

Oxfordshire Children Homes are usually 75% occupied, on average, due to the innate complexity of organising and caring for children's needs when accessing and leaving the homes.

A building delivered is anticipated to provide 60 years of use therefore, based on 75% occupancy, it can accommodate 77.15 placements during its period of use [60 / 2.333 x (4x0.75) = 77.15]

The capital costs per child are therefore: £2.1m / 77.15 = £27,220 per child

The number of children resulting from the housing development aged between 10 and 17 at any one time are forecast to be X

15.16 in 10,000 children will demand residential care in Oxfordshire.

The number of children needing accommodation arising from this development will therefore be 15.16/10,000x(X) = Y
The capital contribution required is therefore 27,220 x Y = Z (BCIS TPI 328 at 3Q20).

Community Support Services Centre

Day care
Access to community support services (day care for the elderly and adults with learning disabilities) is required. The County is considering providing a satellite provision for existing and future need and is in the process of establishing where and how this will be provided.

Consequently, the needs of the development are likely to be met within that facility

A study to evaluate the contributions required is yet to be carried out and contributions may be sought when the study is concluded.

Archaeological Storage

Existing storage facilities based in Standlake will not hold capacity to meet the needs of the development. The mechanism for addressing this need will be met through application of a charge set against the m² of finds generated by the development.

Work is in hand to assess the potential for extension of the existing building, the capacity that extension would have, and its capital costs. A mechanism for developer contributions would then be applied through the section 106 process.

Fire Service

The needs of the development would be met by the existing Fire Station located within Eynsham.

Generic Requirements of Oxfordshire Fire and Rescue Service

1. Water Supplies for Fire Fighting

The requirements for water supplies for residential developments:

No residential property should be more than 150 (un-obstructed) metres from a fire hydrant on a water main of no less than a 90-millimeter nominal diameter. The location and number of fire hydrants will be determined by Oxfordshire County Council's Fire and Rescue Service Fire *following a risk assessment once a water scheme has been received or once a copy of the existing water infrastructure has been supplied.*

The requirements for water supplies for commercial developments:

New developments will be required to be within and as a minimum, have a distance of no more than 100 metres from an existing hydrant, otherwise a new hydrant should be provided within 90 metres of an entry point and not more than 90 metres apart unless stated as otherwise within the guidelines on flow requirements for firefighting below. Generally and where a planning condition is imposed, the location and number of fire hydrants will be determined by Oxfordshire County Council's Fire and Rescue Service *following a risk assessment once a water scheme has been received or once a copy of the existing water infrastructure has been supplied.*

Where no piped water supply is available or there is insufficient pressure and flow in the water main, or an alternative arrangement is proposed, the alternative source of supply should be provided in accordance with the following recommendations:

- A charged static water tank of at least 45,000 litre capacity; or

- A spring, river, canal or pond capable of providing or storing at least 45,000 litres of water at all times of the year, to which access, space and a hard standing are available for a pumping appliance; or

- Any other means of providing a water supply for firefighting operations considered appropriate by the fire and rescue authority.

2. Guidelines on flow requirements for fire fighting

The following flows represent the ideal requirements on new developments and during permanent system changes. In some locations it is accepted that the existing distribution system will not allow the delivery of such flows.

Housing

Housing developments with units of detached or semidetached houses of not more than two floors should have a water supply capable of delivering a minimum of eight litres per second through any single hydrant.

Multi occupied housing developments

With units of more than two floors should have a water supply capable of delivering a minimum of 20 to 35 litres per second through any single hydrant on the development.

Transportation

Lorry/coach parks - multi-storey car parks - service stations: all of these amenities should have a water supply capable of delivery a minimum of 25 litres per second through any single hydrant on the development or within a vehicular distance of 90 metres from the complex.

Industry
In order that an adequate supply of water is available for use by the fire and rescue service in case of fire, it is recommended that the water supply infrastructure to any estate is as follows with the mains network on site being normally at least 150mm nominal diameter –

- Up to one hectare 20 litres per second.
- One to two hectares 35 litres per second.
- Two to three hectares 50 litres per second.
- Over three hectares 75 litres per second.

Shopping, offices, recreation and tourism
Commercial developments of this type should have a water supply capable of delivering a minimum flow of 20 to 75 litres per second to the development site.

Education, health and community facilities
Primary schools and single storey health centres
Should have a water supply capable of delivering a minimum flow of 20 litres per second through any single hydrant on the development or within a vehicular distance of 70 metres from the complex

Secondary schools, colleges, large health and community facilities
Should have a water supply capable of delivering a minimum flow of 35 litres per second through any single hydrant on the development or within a vehicular distance of 70 metres from the complex.

Village halls
Should have a water supply capable of delivering a minimum flow of 15 litres per second through any single hydrant on the development or within a vehicular distance of 100 metres from the complex.

However, these requirements may be lessened with the provision of suitable suppression systems within the dwellings/premises (see below).

3. Fire Suppression Systems

Fires in the home still account for the greatest number of fire deaths and injuries each year and, therefore, the installation of automatic fire suppression systems, such as sprinklers, in domestic premises is something that Oxfordshire County Council's Fire and Rescue Service strongly advocate. More and more vulnerable people with less mobility are remaining in their own homes and the evacuation policy of "get out, stay out, call 999" is becoming increasingly less appropriate as a result of an ageing demography. Additionally, automatic fire suppression systems can increase the sustainability and life expectancy of buildings by limiting fire development and significantly reducing the amount of smoke, CO_2 and other pollutants.

For any system that has the potential to improve safety in the communities, we will provide a commitment of early dialogue with developers to explore the potential use and the level of compensatory features this would provide. This will include financial contributions that we might otherwise require by virtue of Section 106 and the Community Infrastructure Levy.

Arson & Deliberate Fires
Oxfordshire County Council’s Fire and Rescue Service supports the UK Police’s ‘Secured by Design’ principles and design guides in aiming to minimise opportunities for antisocial behaviour (ASB) through good design and layout that can also reduce arson and deliberate fire setting.

Deliberate fires have a significant impact on communities. Whilst the financial cost for all public services, can be calculated, what is more difficult to quantify is the wider adverse impact on communities. Types of fires and their causation range from; anti-social behaviour (ASB) of small refuse fires through to vehicle fires and property fires.

Areas for consideration within the design scope should include the following:

- Security of premises both internal and external
- Disposal of refuse and location of refuse bins
- Lighting and movement of people through the complex
- CCTV in public spaces
- Open spaces, layout, construction (type of materials used) and community equipment placed into them
- Visibility designing out secluded locations
- Through-roads and cul-de-sacs

Waste

See separate response direct from service manager

Independent accommodation for young people

There is currently an unmet need for sustainable housing for young people, particularly care leavers and others on limited income. Affordable rents set at up to 80% of market rents are not within reach for our care leavers. Most will rely on the housing cost element of Universal Credit when they first become independent so there is a need for 1 bed properties at a social rent. In West Oxfordshire there are approximately 14 care leavers per year seeking independent accommodation. In Oxford City there are approximately 80 per year.

There is also a need for larger family homes for social rent or genuinely affordable rent. The County Council is seeking to attract additional foster carers and we are aware of a pressure on 3 and 4 bed properties needed by potential foster carers in order to accommodate 1 or more foster children who often require a bedroom of their own. This need is particularly acute in Oxford City.

Officer's Name: Jane Farrow
Officer's Title: Corporate Landlord Officer
Date: 29 July 2021

Application no: 21/00233/PREAPP
Location: OS Parcel 3673 Adjoining and West Of 161, Rutten Lane, Yarnton

Innovation Hub Comments

Electric vehicle charging allocation should be provided in line with Oxfordshire Electric Vehicle Infrastructure Strategy (OEVIS):

- All residential properties with a drive: min 1 charge point
- Unallocated residential and non-residential parking: min 25% of spaces
- Smart chargers to be used, minimum 7kWh AC
- Fast charging points recommended for most applications, with rapid only appropriate in some specific situations (e.g. some higher density housing, and workplaces using commercial vehicles)

Community Hub – will need to ensure good levels of digital connectivity to be effective: OCC requires full fibre as standard in new development, and 5G connectivity should be designed for inclusion as follows:

- Provision of suitable accessible assets, e.g. streetlighting for mounting and electricity
- Provision of suitable space to avoid cabinets on pavements causing obstruction

The community should also be engaged to ensure the design of the hub will be effective to likely needs of future residents.

We would be keen to see some provision for monitoring of changing requirements over time, e.g. inclusion of sensors that can distinguish different modes of transport, and for which data would be integrated into OCC traffic management systems.

We recommend futureproofing measures be taken for the mainstreaming of other innovations and/or to support integration of other innovation into the site as follows:

- High definition digital mapping of the site and assets (to support future connected and autonomous vehicle (CAV) use, use of digital twinning, management of micromobility schemes, Mobility as a Service delivery, drone usage, and use of virtual and augmented reality)
- Consideration of parking provision with future use requirements in mind (e.g. location/design to allow non-allocated parking to be easily subsumed into green space, as private ownership declines; consideration of future use of on-street parking as CAV idling locations, and providing charging infrastructure/electricity capacity as needed.)
- Provision of on-site renewable energy generation and smart energy infrastructure (e.g. to facilitate peer-to-peer trading) - We understand that the development brief for PR9, which is due to be released for public consultation in the near future,

- will include an expectation for the development to be designed to minimise carbon emissions and promote decentralised and renewable or lower carbon energy.

Officer's Name: Katie Parnell
Officer's Title: Policy and Strategic Planning Innovation Lead
Date: 29 July 2021

Application no: 21/00233/PREAPP
Location: OS Parcel 3673 Adjoining and West Of 161, Rutten Lane, Yarnton

Waste Management

Detailed Comments

Oxfordshire councils have ambitious targets to reduce the amount of waste generated and increase the amount recycled as demonstrated in our Joint Municipal Waste Management Strategy 2018-2023. Enabling the residents of new dwellings to fully participate in district council waste and recycling collections, for example through providing sufficient and convenient storage space for bins both inside properties and externally, will allow Oxfordshire's high recycling rates to be maintained and minimise an increase in residual waste.

Given the pressing urgency of climate change and the need to embed the principles of the circular economy into all areas of our society, we encourage the applicant to consider including community spaces that help reduce waste and build community cohesion through assets such as community fridges, space for the sharing economy (library of things), refill stations, space for local food growing etc.

At the detailed application stage, we expect to see plans for how the developer will design the development in accordance with waste management policies in Cherwell District Council's waste planning guidance.

Bin store provision which can accommodate the correct number of mixed recycling, refuse and food recycling bins, are safe and easy to use for both residents and waste collection crews and meets the requirements of the waste collection authority are required.

The development will increase domestic waste arisings and the demand for waste management services, including the household waste recycling centres (HWRC) at Ardley, which experiences capacity issues.

Financial contributions will be required towards Household Waste Recycling Centre (HWRC) infrastructure. Amount TBC

Officer's Name: Rachel Burns
Officer's Title: Waste Strategy Manager
Date: 03 August 2021

IAN FARMER ASSOCIATES

1A Batford Mill, Lower Luton Road, Harpenden, Hertfordshire, AL5 5BZ. Tel: 01582 460018
harpenden@ianfarmer.co.uk www.ianfarmer.co.uk

Our Ref: EM/em/2240500/ 19th November 2021

WSP UK CPL
PO Box 240
Leeds
LS11 1ED

F.A.O. Rebecca Fagan

Dear Sirs,

Re: Yarnton, Kidlington, Oxfordshire

Further to your instruction, we have pleasure in enclosing the findings of the site works undertaken at the above location, together with our invoice no. SI7508521 for the work carried out. We would be grateful if you could approve the invoice and forward for payment.

Four trial pits, designated SA1 to SA4, for the purpose of soakaway testing were excavated by mechanical excavator at the positions shown on the attached exploratory hole location plan, Figure A1.1. The positions of the trial pits were proposed by the client, and amended, where required, subject to site constraints.

The depths of trial pits, descriptions of strata encountered and comments on groundwater conditions are given in the trial pit records, Figure A2.1, together with photographs of the trial pits in Figure A2.2. Results of the soakaway tests are given in Figure A2.3.

The co-ordinates and ground levels at the exploratory hole locations were surveyed in based on OS National Grid. These values are reported on the trial pit records in Figure A2.1.

We trust our report is satisfactory for your requirements, but should you have any queries please do not hesitate to contact us.

Yours faithfully,

[redacted]

Emma Moore
Senior Geotechnical Engineer

Encs
Figure A1.1 – Exploratory Hole Location Plan
Figure A2.1 – Trial Pit Records
Figure A2.2 – Trial Pit Photographs
Figure A2.3 – Results of Soakaway Tests

Project Id:	2240500	Title:	Exploratory Hole Location Plan
Project Title:	Yarnton, Kidlington, Oxfordshire	Scale:	1:5000
Location:	OS National Grid Reference - SP 472 130	Engineer:	SG
Client:	WSP UK Limited	Figure No:	A1.1

IAN FARMER ASSOCIATES

IAN FARMER ASSOCIATES	Plant used: Mechanical Excavator	Project: Yarnton, Kidlington, Oxfordshire			Location ID: **SA1**
	Dates: 03/11/2021	Client: WSP UK Limited			Sheet 1 of 1
Trial Pit Log	Location: 446980.77E 213498.13N	Ground level: 71.40mOD	Logged by: SG	Vertical scale: 1:25	Contract ID: 2240500

Samples & In Situ Testing			Strata Details						
Depth	Sample ID	Test Result	Level (mAOD)	Depth (m) (Thickness)	Strata Description	Legend	Scale	Water Strike	Backfill/ Installation
				(0.35)	MADE GROUND comprising soft dark greyish brown slightly gravelly very sandy clayey SILT with occasional to frequent rootlets. Gravel is subangular to rounded, fine and medium of flint and possible sandstone.				
			71.05	0.35					
				(0.30)	MADE GROUND comprising soft to firm orange brown slightly gravelly very sandy clayey SILT. Gravel is angular, fine of possible asphalt and coal.				
			70.75	0.65	Stiff to very stiff orange mottled grey brown gravelly sandy CLAY. Gravel is subangular to rounded, fine to coarse of flint, possible quartz/sandstone and occasional black possible coal.		1		
					From 1.00m; With occasional light grey veins.				
				(1.65)			2		
			69.10	2.30	End of Trial Pit at 2.30m				
							3		
							4		
							5		

Termination:

Stability:

Remarks:
Groundwater not encountered.

Dimensions (Length m x Width m):
1.30 x 0.50

Water Strikes

Strike (m)	Time (mins)	Rose to (m)	Remarks

Checked by:		IFA TP v01.01
Status:	FINAL	

Figure A2.1

Plant used: Mechanical Excavator	Project: Yarnton, Kidlington, Oxfordshire			Location ID: SA2
Dates: 03/11/2021	Client: WSP UK Limited			Sheet 1 of 1
Location: 447166.13E 213055.56N	Ground level: 73.55mOD	Logged by: SG	Vertical scale: 1:25	Contract ID: 2240500

IAN FARMER ASSOCIATES

Trial Pit Log

Depth	Sample ID	Test Result	Level (mAOD)	Depth (m) (Thickness)	Strata Description	Legend	Scale	Water Strike	Backfill/ Installation
				(0.40)	MADE GROUND comprising soft to firm brown and grey mottled slightly gravelly slightly sandy CLAY with frequent decomposing roots and rootlets. Gravel is rounded and subrounded, fine to coarse of flint and possible sandstone.				
			73.15	0.40					
				(1.50)	Firm greyish orange slightly gravelly sandy CLAY. Gravel is subangular to rounded, fine to coarse of flint and possible sandstone. *From 0.80m; Becomes greyish orange brown mottled grey.* *From 1.30m; Becomes sandy to very sandy.*		1		
			71.65	1.90					
				(0.30)	Stiff to very stiff friable dark grey mottled dark brown CLAY with rare rounded fine gravel of flint and possible sandstone and rootlets.		2		
			71.35	2.20	End of Trial Pit at 2.20m				
							3		
							4		
							5		

Termination:

Stability:

Remarks:
Groundwater not encountered.

Dimensions (Length m x Width m):
1.30 x 0.55

Water Strikes

Strike (m)	Time (mins)	Rose to (m)	Remarks

Checked by:		IFA TP v01.01
Status:	FINAL	

Figure A2.1

Plant used: Mechanical Excavator	Project: Yarnton, Kidlington, Oxfordshire	Location ID: SA3
Dates: 04/11/2021	Client: WSP UK Limited	Sheet 1 of 1

IAN FARMER ASSOCIATES

Trial Pit Log

Location:	Ground level:	Logged by:	Vertical scale:	Contract ID:
447341.80E 212957.55N	72.46mOD	SG	1:25	2240500

Samples & In Situ Testing			Strata Details						
Depth	Sample ID	Test Result	Level (mAOD)	Depth (m) (Thickness)	Strata Description	Legend	Scale	Water Strike	Backfill/ Installation
				(0.40)	MADE GROUND comprising soft dark greyish brown slightly gravelly sandy CLAY with frequent roots and rootlets. Gravel is rounded and subrounded, fine and medium, occasionally coarse, of flint and possible sandstone.				
			72.06	0.40	MADE GROUND comprising firm brown gravelly sandy CLAY. Gravel is subrounded and rounded, fine and medium of flint and possible sandstone. (Encountered on part of the western pit face) *At 0.57m; A possible orange ceramic/brick fragment.*				
			71.86	0.60	Stiff to very stiff light grey blue mottled orange CLAY with frequent rootlets.		1		
				(1.75)	*From 1.40m; Becomes friable, dark grey and red orange mottled. Rootlets become rare.*				
					From 2.00m; Becomes dark grey, occasionally red mottled red and yellow stained.		2		
			70.11	2.35	End of Trial Pit at 2.35m				
							3		
							4		
							5		

Termination:	Stability:	Remarks: Groundwater not encountered.
Dimensions (Length m x Width m): 1.60 x 0.55		

Water Strikes

Strike (m)	Time (mins)	Rose to (m)	Remarks

Checked by:		IFA TP v01.01
Status:	FINAL	

Figure A2.1

IAN FARMER ASSOCIATES	Plant used: Mechanical Excavator	Project: Yarnton, Kidlington, Oxfordshire			Location ID: **SA4**
	Dates: 04/11/2021	Client: WSP UK Limited			Sheet 1 of 1
Trial Pit Log	Location: 447390.19E 212658.93N	Ground level: 71.85mOD	Logged by: SG	Vertical scale: 1:25	Contract ID: 2240500

Samples & In Situ Testing			Strata Details						
Depth	Sample ID	Test Result	Level (mAOD)	Depth (m) (Thickness)	Strata Description	Legend	Scale	Water Strike	Backfill/ Installation
			71.50	(0.35) 0.35	MADE GROUND comprising soft dark greyish brown slightly gravelly very sandy CLAY with occasional to frequent rootlets. Gravel is subrounded and rounded, fine and medium of flint and possible sandstone.				
			71.05	(0.45) 0.80	MADE GROUND comprising firm orangish grey slightly gravelly CLAY. Gravel is subrounded, fine and medium of flint.				
			69.65	(1.40) 2.20	Firm to stiff orange brown occasionally mottled grey very sandy CLAY with rare possible black coal fragments. and decomposing rootlets.		1, 2		
					End of Trial Pit at 2.20m		3, 4, 5		

Termination:

Dimensions (Length m x Width m): 1.60 x 0.30

Stability:

Remarks:
Groundwater not encountered.

Water Strikes

Strike (m)	Time (mins)	Rose to (m)	Remarks

Checked by:		IFA TP v01.01
Status:	FINAL	

Figure A2.1

Trial Pit SA1

Trial Pit SA1

IAN FARMER ASSOCIATES

TRIAL PIT PHOTOGRAPHS	Job no.	2240500
Yarnton, Kidlington, Oxfordshire	Fig.	A2.2

Trial Pit SA1

Trial Pit SA2

Trial Pit SA2

Trial Pit SA3

IAN FARMER ASSOCIATES	**TRIAL PIT PHOTOGRAPHS**	Job no. 2240500
	Yarnton, Kidlington, Oxfordshire	Fig. A2.2

Trial Pit SA4

Trial Pit SA4

IAN FARMER ASSOCIATES	**TRIAL PIT PHOTOGRAPHS**	Job no. 2240500
	Yarnton, Kidlington, Oxfordshire	Fig. A2.2

Trial Pit Soakaway Test

IAN FARMER ASSOCIATES

Client:	WSP UK Limited		
Project:	Yarnton, Kidlington, Oxfordshire		
Job No:	2240500		
Location:	SA1	Test Ref.:	Test 1
Date:	03/11/2021	Weather:	Overcast with showers

INPUT DATA AND CALCULATION

Time (min)	Depth (m)
0	0.63
0.5	0.636
1	0.636
1.5	0.636
2	0.636
2.5	0.636
3	0.636
5	0.636
10	0.636
60	0.64
120	0.64
182	0.644
1320	0.671

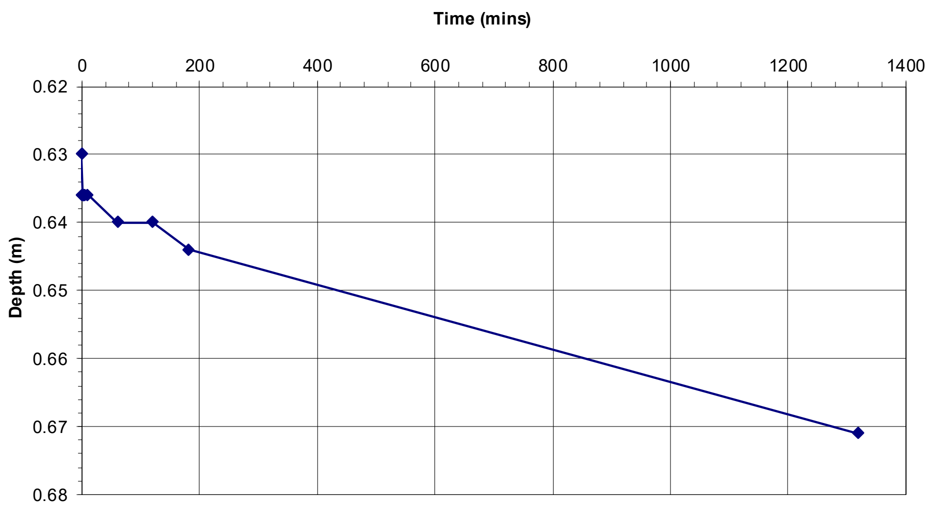
Pit dimensions		
	Length (m) =	1.30
	Width (m) =	0.50
	Depth (m) =	2.30

Depth to water at start of test (m) =	0.63
Depth to water at end of test (m) =	0.67
Depth to water at 75% level (m) =	1.05
Depth to water at 50% level (m) =	1.47
Depth to water at 25% level (m) =	1.88
Base area of pit (m^2) =	0.65
Effective area of loss a_{s50} (m^2) =	3.66
$V_{P75} - V_{P25}$ (m^3) =	0.54

From the graph:	
t_{p75} (min) =	
t_{p25} (min) =	

Soil infiltration rate, f, (m/s) =		normal test

Tested by:	SG	Date:	03/11/2021
Checked by:	EM	Date:	09/11/2021



Notes

1. Calculated in accordance with BRE Digest 365

SOF: 11:02, EOF: 11:04

Infiltration rate not obtained.

Trial Pit Soakaway Test

IAN FARMER ASSOCIATES

Client:	**WSP UK Limited**		
Project:	**Yarnton, Kidlington, Oxfordshire**		
Job No:	**2240500**		
Location:	**SA2**	**Test Ref.:**	**Test 1**
Date:	**03/11/2021**	**Weather:**	**Overcast with showers**

INPUT DATA AND CALCULATION

Time (min)	Depth (m)
0	0.508
0.5	0.512
1	0.512
1.5	0.514
2	0.514
2.5	0.514
3	0.514
5	0.514
10	0.514
120	0.516
180	0.516
226	0.516
1422	0.53

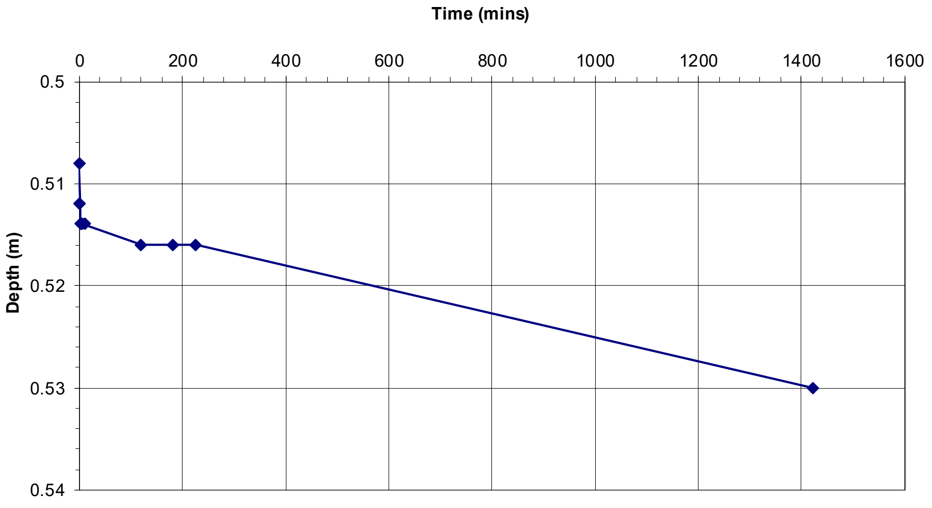
Pit dimensions		
	Length (m) =	1.30
	Width (m) =	0.55
	Depth (m) =	2.20

Depth to water at start of test (m) =	0.51
Depth to water at end of test (m) =	0.53
Depth to water at 75% level (m) =	0.93
Depth to water at 50% level (m) =	1.35
Depth to water at 25% level (m) =	1.78
Base area of pit (m^2) =	0.72
Effective area of loss a_{s50} (m^2) =	3.85
$V_{P75} - V_{P25}$ (m^3) =	0.60

From the graph:	
t_{p75} (min) =	
t_{p25} (min) =	

Soil infiltration rate, f, (m/s) =		normal test

Tested by:	**SG**	**Date:**	**03/11/2021**
Checked by:	**EM**	**Date:**	**09/11/2021**



Notes

1. Calculated in accordance with BRE Digest 365

SOF: 09:47, EOF: 09:49

Infiltration rate not obtained.

IAN FARMER ASSOCIATES

RESULTS OF SOAKAWAY TESTS

Yarnton, Kidlington, Oxfordshire

Job no. 2240500

Fig. A2.3

Trial Pit Soakaway Test

Client:	WSP UK Limited		
Project:	Yarnton, Kidlington, Oxfordshire		
Job No:	2240500		
Location:	SA3	Test Ref.:	Test 1
Date:	04/11/2021	Weather:	Overcast with showers

INPUT DATA AND CALCULATION

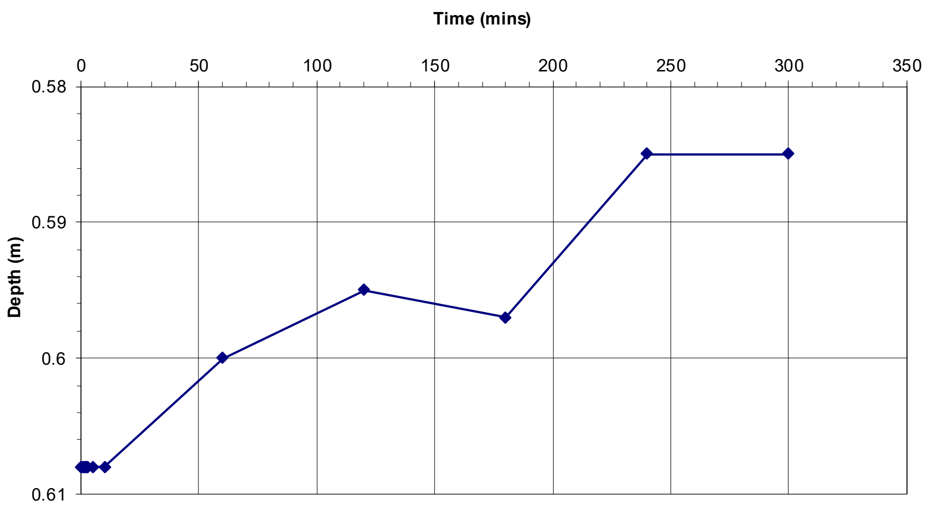
Time (min)	Depth (m)
0	0.608
0.5	0.608
1	0.608
1.5	0.608
2	0.608
2.5	0.608
3	0.608
5	0.608
10	0.608
60	0.6
120	0.595
180	0.597
240	0.585
300	0.585

Pit dimensions		
	Length (m) =	1.60
	Width (m) =	0.55
	Depth (m) =	2.20

Depth to water at start of test (m) =	0.59
Depth to water at end of test (m) =	0.61
Depth to water at 75% level (m) =	0.99
Depth to water at 50% level (m) =	1.39
Depth to water at 25% level (m) =	1.80
Base area of pit (m^2) =	0.88
Effective area of loss a_{s50} (m^2) =	4.35
$V_{P75} - V_{P25}$ (m^3) =	0.71

From the graph:	
t_{p75} (min) =	
t_{p25} (min) =	

Soil infiltration rate, f, (m/s) =		normal test	
Tested by:	SG	Date:	03/11/2021
Checked by:	EM	Date:	09/11/2021



Notes

1. Calculated in accordance with BRE Digest 365

SOF: 10:03, EOF: 10:06

Infiltration rate not obtained.

IAN FARMER ASSOCIATES

Trial Pit Soakaway Test

Client:	WSP UK Limited		
Project:	Yarnton, Kidlington, Oxfordshire		
Job No:	2240500		
Location:	SA4	Test Ref.:	Test 1
Date:	04/11/2021	Weather:	Overcast with showers

INPUT DATA AND CALCULATION

Time (min)	Depth (m)
0	0.503
0.5	0.503
1	0.505
1.5	0.505
2	0.505
2.5	0.505
3	0.505
5	0.505
10	0.505
60	0.53
120	0.551
180	0.567
240	0.586
275	0.592

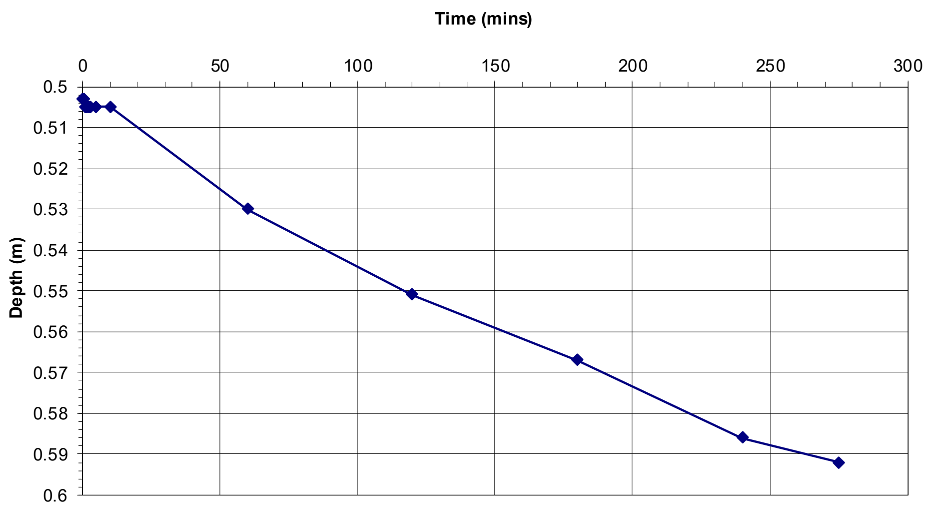
Pit dimensions		
	Length (m) =	1.60
	Width (m) =	0.50
	Depth (m) =	2.20

Depth to water at start of test (m) =	0.50
Depth to water at end of test (m) =	0.59
Depth to water at 75% level (m) =	0.93
Depth to water at 50% level (m) =	1.35
Depth to water at 25% level (m) =	1.78
Base area of pit (m^2) =	0.80
Effective area of loss a_{s50} (m^2) =	4.36
$V_{P75} - V_{P25}$ (m^3) =	0.68

From the graph:	
t_{p75} (min) =	
t_{p25} (min) =	

Soil infiltration rate, f, (m/s) =		normal test

Tested by:	SG	Date:	03/11/2021
Checked by:	EM	Date:	09/11/2021



Notes

1. Calculated in accordance with BRE Digest 365

SOF: 10:44, EOF: 10:46

Infiltration rate not obtained.

Appendix N OCC LLFA and CDC Scoping Note

Scoping Note

Project: Yarnton, Oxfordshire

Subject: Flood Risk & Drainage Scoping Note

Client:	Merton College	**Version:**	1
Project No:	06058	**Author:**	Phoebe Ryding
Date:	21/02/2022	**Approved:**	Amy Evans / Dave Woolley

1 Introduction

1.1.1 Following planning submission for the proposed PR9 development in Yarnton, Oxfordshire (planning ref. 21/03522/OUT), there have been a number of comments raised with regards to flood risk and drainage in response to the Flood Risk Assessment (WSP, October 2021) prepared to support the outline planning application.

1.1.2 It should be noted that Oxfordshire County Council as the Lead Local Flood Authority (LLFA) have provided no response to the application to date, however there have been comments received voicing concerns with regards to flood risk and drainage by Cherwell District Council, Begbroke Parish Council, Yarnton Parish Council and Yarnton Flood Defence Group.

1.1.3 PJA has been commissioned by Merton College to prepare a scoping note to provide to the LLFA to demonstrate a methodology as to how the issues raised during the consultation with regards to flood risk and surface water drainage will be addressed. It is hoped that the LLFA can agree to this scope to ensure that the issues raised are addressed as efficiently as possible.

2 Site Setting

2.1 Context

2.1.1 The Site is at OS Parcel 3673 Adjoining And West Of 161 Rutten Lane Yarnton OX5 1LT and the following development is proposed:

2.1.2 *'Erection of up to 540 dwellings (Class C3), up to 9,000sqm GEA of elderly/extra care residential floorspace (Class C2), a Community Home Work Hub (up to 200sqm)(Class E), alongside the creation of two locally equipped areas for play, one NEAP, up to 1.8 hectares of playing pitches and amenity space for the William Fletcher Primary School, two vehicular access points, green infrastructure, areas of public open space, two community woodland areas, a local nature reserve, footpaths, tree planting, restoration of historic hedgerow, and associated works. All matters are reserved, save for the principal access points*' (Cherwell District Council Planning Application Reference Number: 21/03522/OUT).

2.1.3 The Site forms Site Allocation PR9 in Cherwell District Local Plan.

2.1.4 The status of this planning application is still be determined.

2.1.5 Following the submission of the planning application, further discussions were held with Nagina Bawar (OCC LLFA Officer) on Friday 4th February 2022 to understand the concerns set out in the pre-planning application correspondence from Oxfordshire County Council received on the 5th August 2021 and the wider responses from the planning submission. During this discussion, it was agreed that a Scoping Note would be produced outlining our approach to responding to their concerns in addition to walkover with the LLFA which occurred on 16th February 2022 to discuss the issues on Site.

2.2 Site Location

2.2.1 The Site is located west of the village of Yarnton, Oxfordshire. The Site is bound to the east by the A44 (Woodstock Road) and the existing village of Yarnton. To the north of the Site is the village of Begbrooke, and to the south and west is existing agricultural land.

2.2.2 A Site location Plan is available in Figure 2-1.

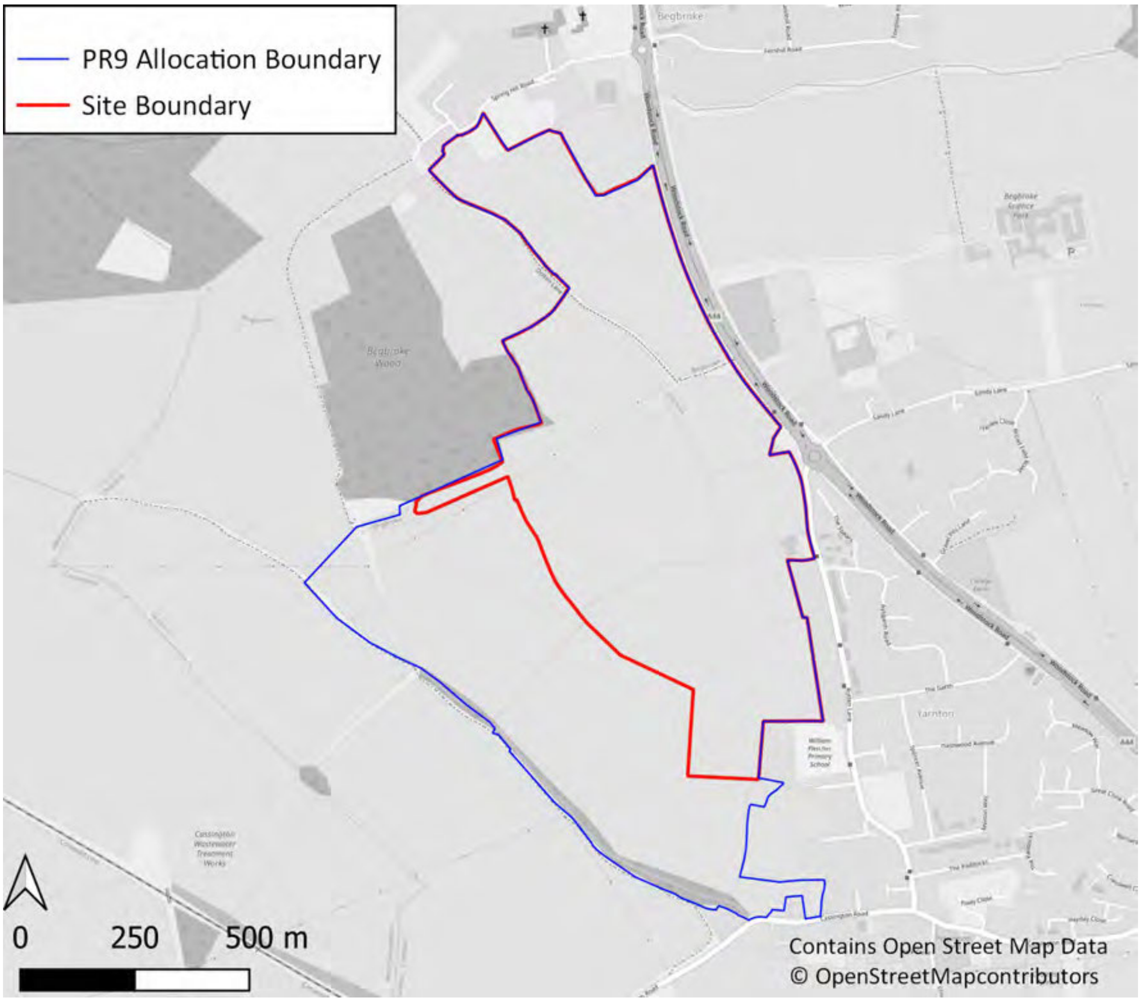


Figure 2-1 – Site Location Plan

3 Existing Submitted Planning Application

3.1.1 As part of the planning application an ES was produced. Drainage and Flood Risk was detailed within Chapter 11 of the submitted application and a Flood Risk Assessment and Drainage Strategy (WSP, October 2021) was provided as an appendices to this document.

3.1.2 It was noted that a number of comments raised through the pre-application process with OCC LLFA were not addressed through the submitted FRA and OCC LLFA have not provided any formal updated comments on the planning application subsequent to the submission.

4 Proposed Approach

4.1.1 Our approach to address the flood risk and drainage comments recived were discussed with Nagina Bawar (OCC LLFA Officer) on the 4th February 2022 and during the site walkover on 16th February 2022. During these meetings, the following scope was discussed to address these comments received as part of a resubmission to the planning application.

4.2 ES Chapter 11

4.2.1 The ES Chapter 11 (flood risk and drainage) will be updated to take account of the comments raised by the parties and the additional works undertaken to demonstrate any effects on the construction and operational impacts of the development.

4.3 Flood Risk Assessment

4.3.1 A new Flood Risk Assessment (FRA) and drainage strategy document will be submitted to supersede the previous report produced by WSP.

4.3.2 The re-submitted FRA will include commentary on additional CCTV survey undertaken on the drainage outfalls from the Site to demonstrate their connectivity to the wider network. Infiltration testing undertaken following the submission of the previous report will also be summarised.

4.3.3 Any revisions in the proposed masterplan and earthworks strategy will be captured as part of the re-submission and re-working of the proposed surface water drainage strategy, which will be supported by a MicroDrainage Model or similar. The strategy will also be updated to reflect the infiltration testing results for the Site.

4.3.4 The FRA will also be updated to include a foul water drainage strategy, which was omitted in the current FRA submission.

4.3.5 The FRA will encompass revised hydraulic modelling which will supersede the hydraulic modelling study that was undertaken previously by WSP and contained in the previous submitted FRA. This 1D-2D modelling will incorporate the latest publicly available LiDAR data, revised model hydrology, the Site-specific topographic survey and the downstream outfalls as surveyed through the CCTV survey.

4.3.6 An additional Appendix will be provided to the revised FRA submission which will illustrate how the observations raised by key stakeholders, including the LLFA and Yarnton Flood Defence Group have been addressed.

5 Summary

5.1.1 PJA has been commissioned by Merton College to prepare a scoping note to provide to the LLFA to demonstrate a methodology as to how the issues raised during the consultation with regards to flood risk and surface water drainage will be addressed (planning ref. 21/03522/OUT).

5.1.2 This Scoping Note sets out the proposed approach to provide an updated ES Chapter, FRA including updated hydraulic modelling and drainage strategy, encompassing both foul and surface water drainage strategies. These will be updated to reflect updated site information including; revised masterplan, consideration of Site infiltration testing, consideration of proposed earthworks, foul drainage strategy and additional survey works which have been undertaken.

6 Limitations

6.1 Purpose

6.1.1 This document has been prepared for Merton College. PJA Civil Engineering Ltd. accepts no responsibility or liability for any use that is made of this document other than by the Merton College for the purposes for which it was originally commissioned and prepared.

6.1.2 The conclusions and recommendations contained herein are limited by the availability of background information and the planned use for the Site.

6.1.3 Third party information has been used in the preparation of this report, which PJA Civil Engineering Ltd, by necessity assumes is correct at the time of writing. Whilst all reasonable checks have been made on data sources and the accuracy of the data, PJA Civil Engineering Ltd accepts no liability for same.

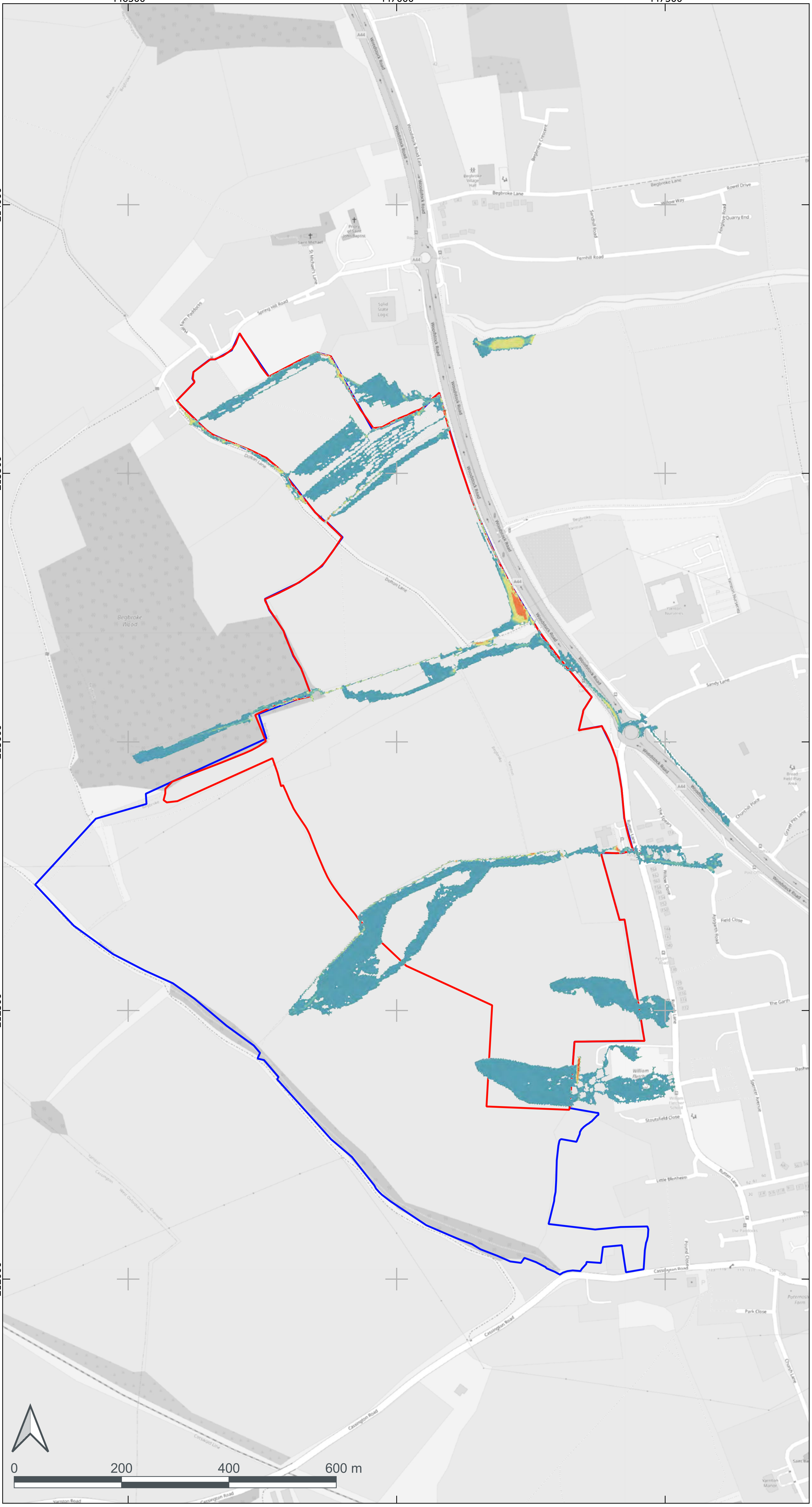
6.1.4 PJA Civil Engineering Ltd. has no liability regarding the use of this report except to Merton College.

6.2 CDM

6.2.1 The revised Construction (Design and Management) Regulations 2015 (CDM Regulations) came into force on April 2015 to update certain duties on all parties involved in a construction project, including those promoting the development. One of the designer's responsibilities under clause 9 (1) is to ensure that the client organisation, in this instance Merton College, is made aware of their duties under the CDM Regulations.

6.3 Copyright

Appendix O Hydraulic Model Baseline Results



KEY:

- Site Boundary
- PR9 Allocation Boundary

Baseline 1 in 20 Year Flood Depths (m)

- <= 0.05
- 0.05 - 0.10
- 0.10 - 0.30
- 0.30 - 0.50
- > 0.5

NOTES

These drawings have been produced with reference to the CDM Regulations 2015. Please note that these are pre-construction phase drawings and should be subject to further design risk management as required in accordance with Regulation 9

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PROJECT

Yarnton, Oxfordshire

DRAWING TITLE

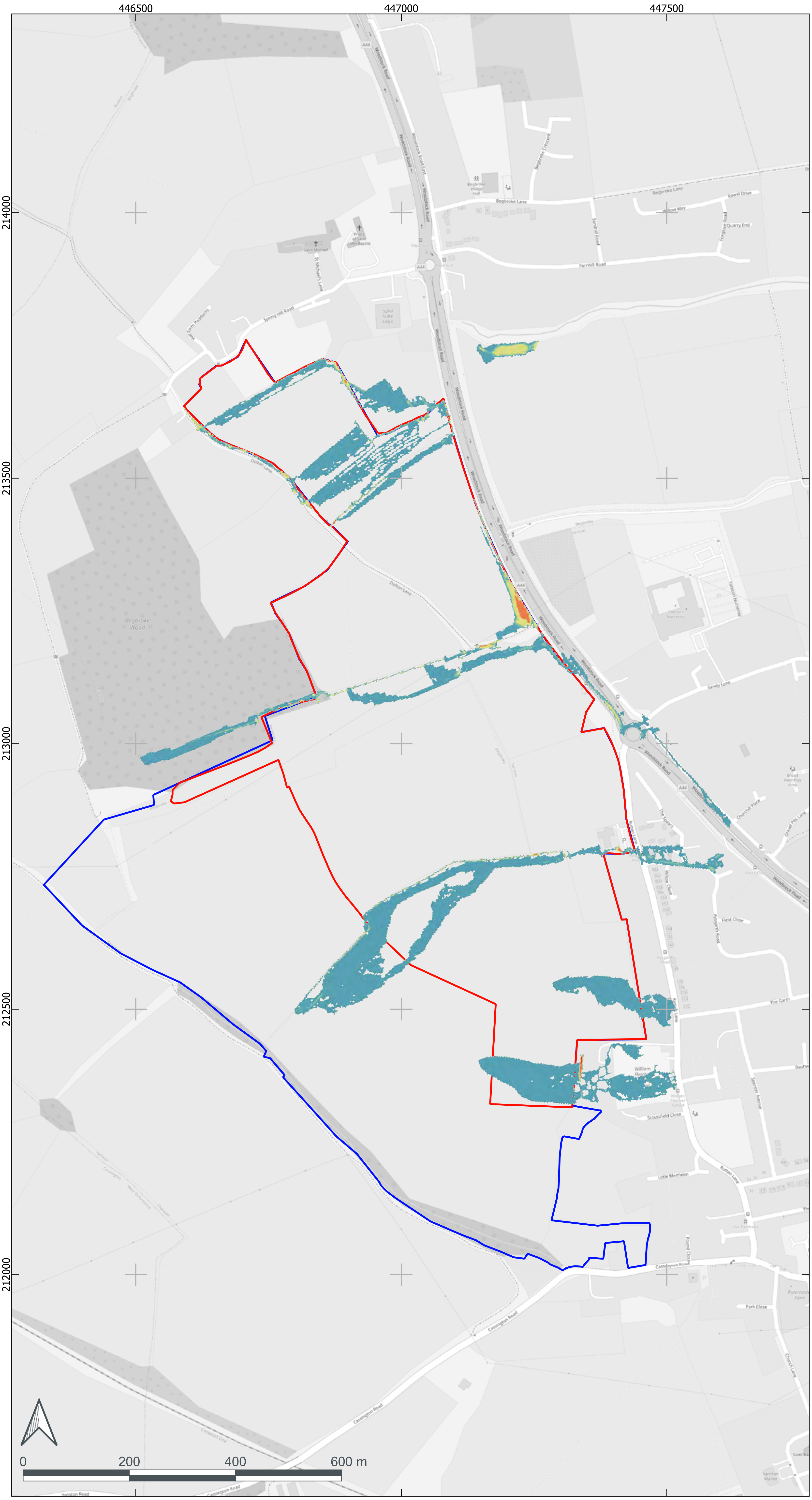
Baseline Modelled 1 in 20 Year Flood Depths

DRAWING INFORMATION STATUS

FOR INFORMATION

SCALE @	DRAWN	REVIEWED	DATE
1:7,000	CT	AE	19/05/22

FIGURE NUMBER	REVISION
01	P01



KEY:

- Site Boundary
- PR9 Allocation Boundary

Baseline 1 in 100 Year Flood Depths (m)

- <= 0.05
- 0.05 - 0.10
- 0.10 - 0.30
- 0.30 - 0.50
- > 0.5

NOTES

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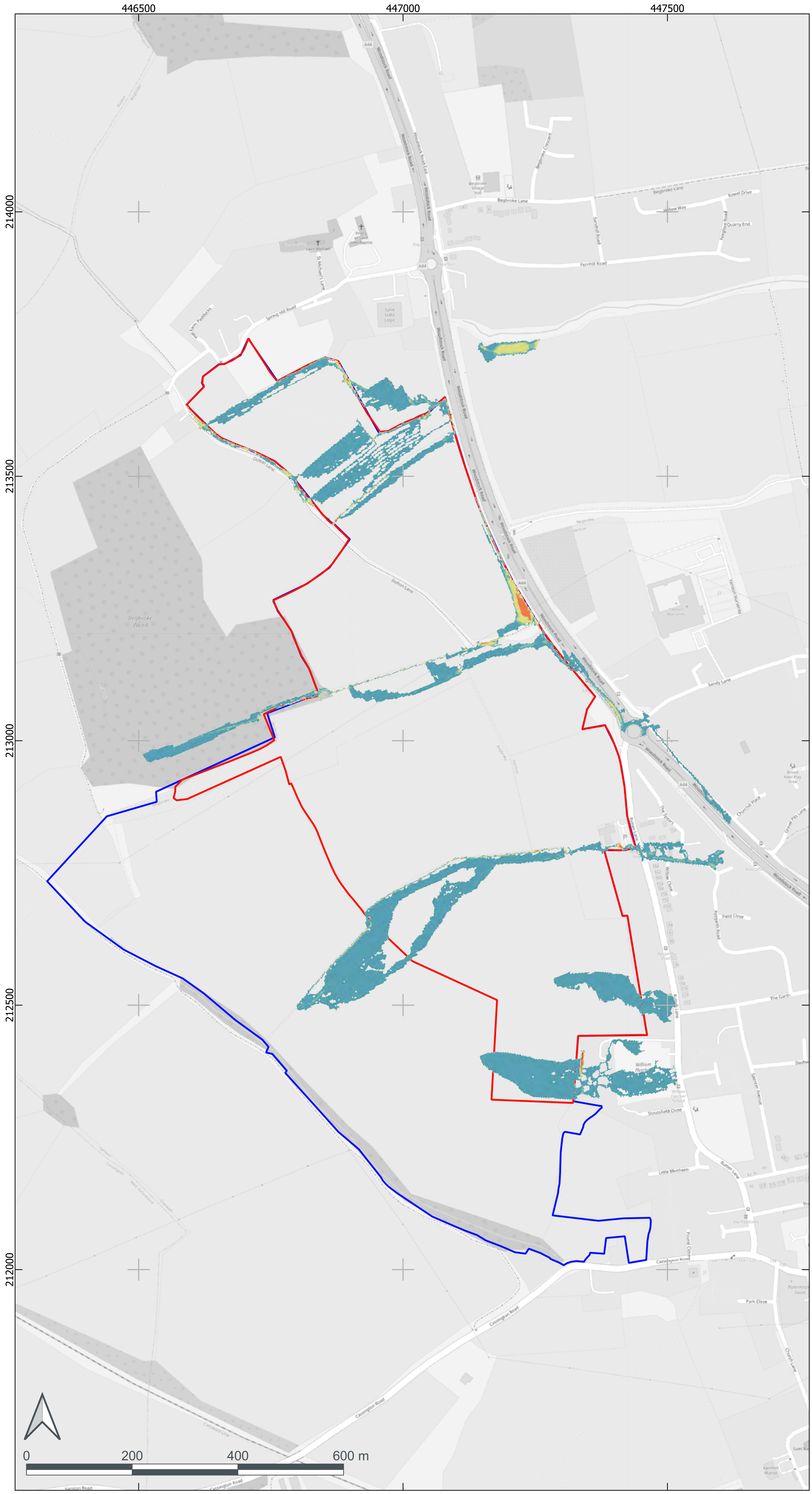
Baseline Modelled 1 in 100 Year Flood Depths

DRAWING INFORMATION STATUS

FOR INFORMATION

SCALE @	DRAWN	REVIEWED	DATE
1:7,000	CT	AE	19/05/22

FIGURE NUMBER	REVISION
02	P01



KEY:

Site Boundary

PR9 Allocation Boundary

Baseline 1 in 100 Year plus Climate Change (20%) Flood Depths (m)

<= 0.05

0.05 - 0.10

0.10 - 0.30

0.30 - 0.50

> 0.5

NOTES

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DRAWING TITLE

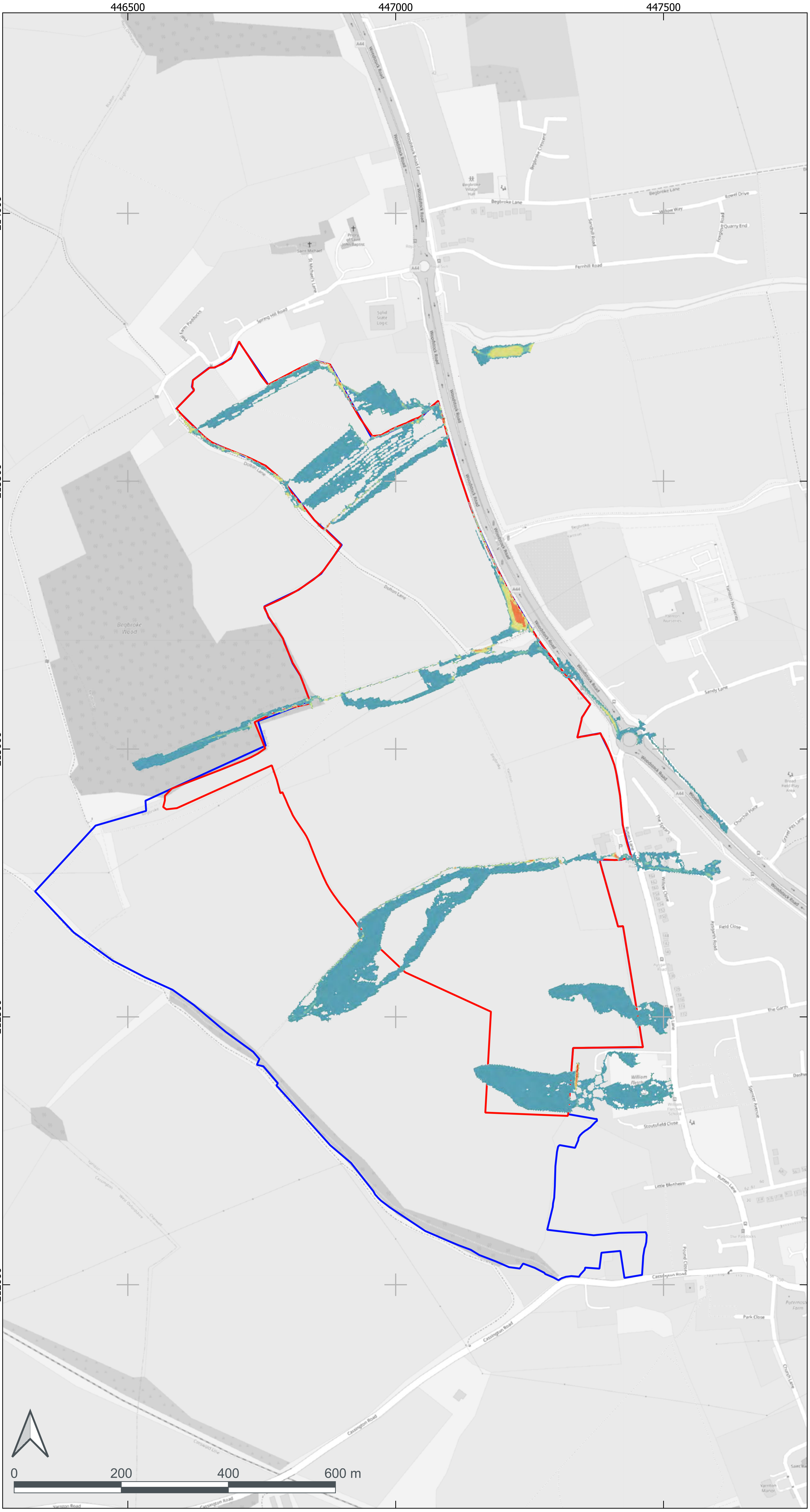
Baseline Modelled 1 in 100 Year plus Climate Change (20%) Flood Depths

DRAWING INFORMATION STATUS

FOR INFORMATION

SCALE @	DRAWN	REVIEWED	DATE
1:7,000	CT	AE	19/05/22

FIGURE NUMBER	REVISION
03	P01



KEY:

Site Boundary

PR9 Allocation Boundary

Baseline 1 in 100 Year plus Climate Change (40%) Flood Depths
(m)

- <= 0.05
- 0.05 - 0.10
- 0.10 - 0.30
- 0.30 - 0.50
- > 0.5

NOTES
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DRAWING TITLE

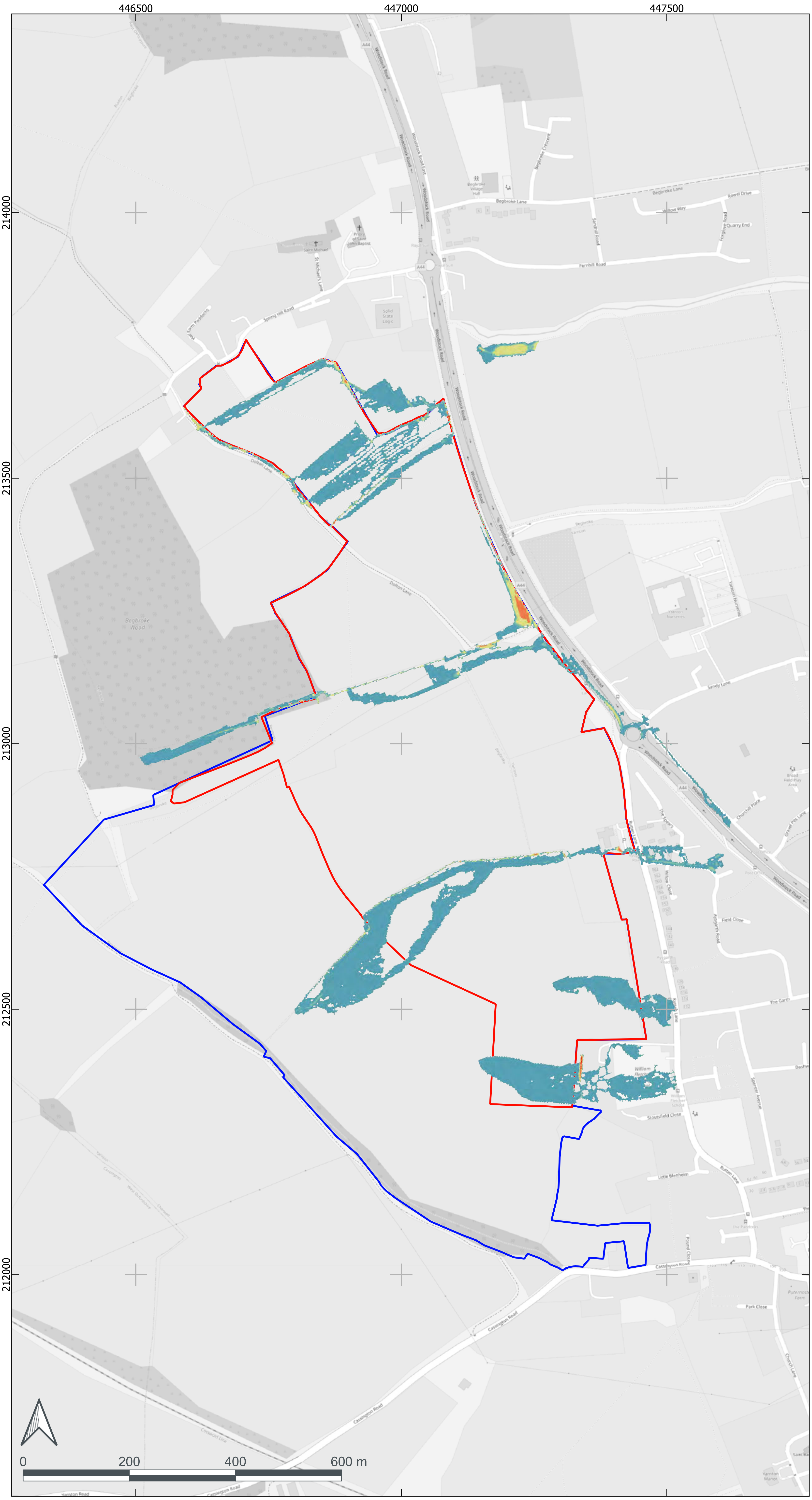
Baseline Modelled 1 in 100 Year plus Climate Change (40%) Flood Depths

DRAWING INFORMATION STATUS

FOR INFORMATION

SCALE @	DRAWN	REVIEWED	DATE
1:7,000	CT	AE	19/05/22

FIGURE NUMBER	REVISION
04	P01



KEY:

- Site Boundary
- PR9 Allocation Boundary

Baseline 1 in 1,000 Year Flood Depths (m)

- <= 0.05
- 0.05 - 0.10
- 0.10 - 0.30
- 0.30 - 0.50
- > 0.5

NOTES

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Baseline Modelled 1 in 1,000 Year Flood Depths

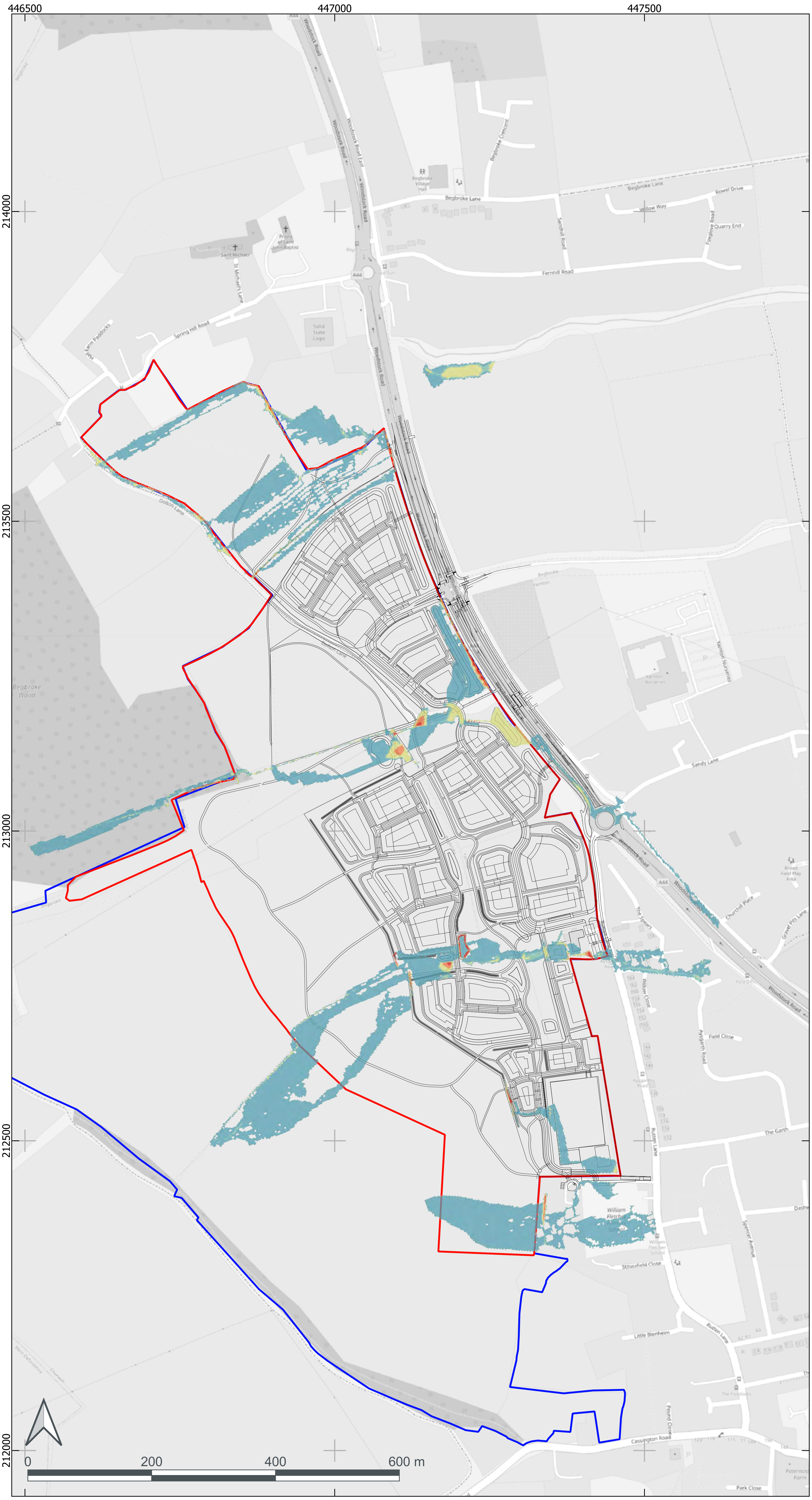
DRAWING INFORMATION STATUS

FOR INFORMATION

SCALE @	DRAWN	REVIEWED	DATE
1:7,000	CT	AE	19/05/22

FIGURE NUMBER	REVISION
05	P01

Appendix P Hydraulic Model Proposed Development Results



KEY:

- PR9 Allocation Boundary
- Site Boundary
- Masterplan Outline

Design 1 in 20 Year Flood Depths (m)

- <= 0.05
- 0.05 - 0.10
- 0.10 - 0.30
- 0.30 - 0.50
- > 0.5

NOTES

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DRAWING TITLE

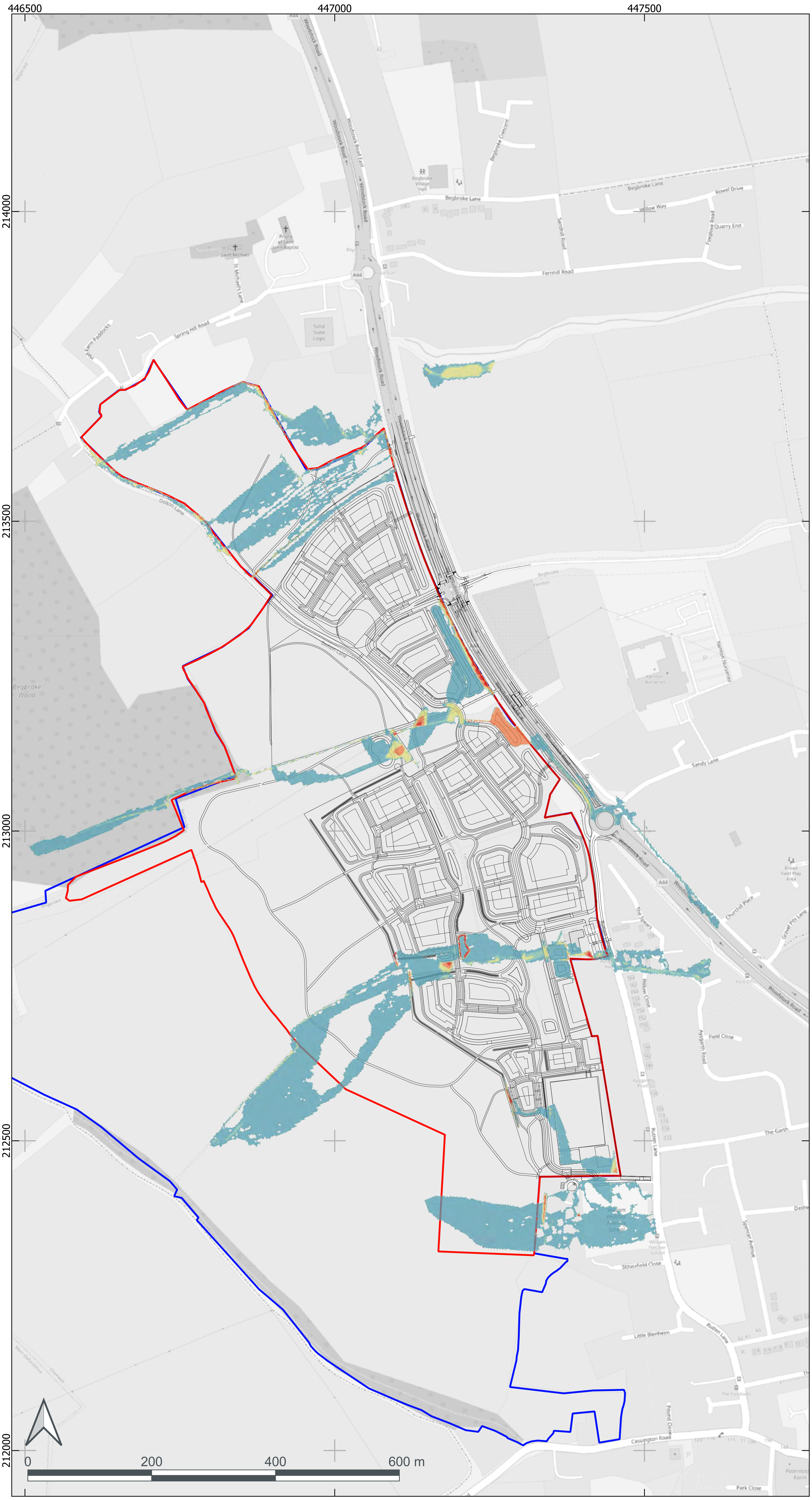
Design Modelled 1 in 20 Year Flood Depths

DRAWING INFORMATION STATUS

FOR INFORMATION

SCALE @	DRAWN	REVIEWED	DATE
1:6,000	CT	AE	27/05/22

FIGURE NUMBER	REVISION
01	P01



KEY:

- PR9 Allocation Boundary
- Site Boundary
- Masterplan Outline

Design 1 in 100 Year Flood Depths
(m)

- <= 0.05
- 0.05 - 0.10
- 0.10 - 0.30
- 0.30 - 0.50
- > 0.5

NOTES
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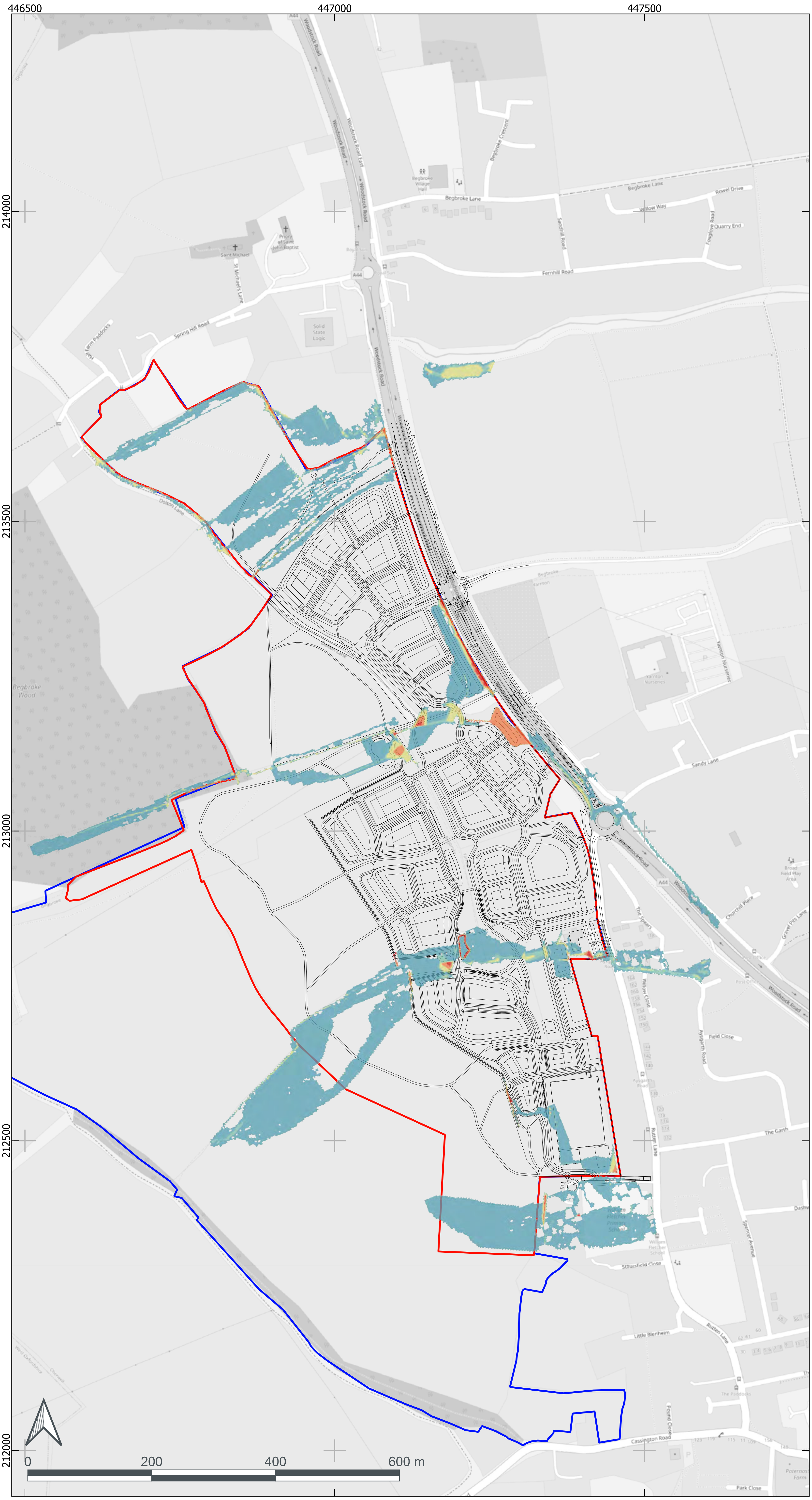
DRAWING TITLE
Design Modelled 1 in 100 Year Flood Depths

DRAWING INFORMATION STATUS
FOR INFORMATION

SCALE @	DRAWN	REVIEWED	DATE
1:6,000	CT	AE	27/05/22

FIGURE NUMBER	REVISION
02	P01



KEY:

- PR9 Allocation Boundary
- Site Boundary
- Masterplan Outline

Design 1 in 100 Year plus Climate Change (20%) Flood Depths
(m)

- <= 0.05
- 0.05 - 0.10
- 0.10 - 0.30
- 0.30 - 0.50
- > 0.5

NOTES
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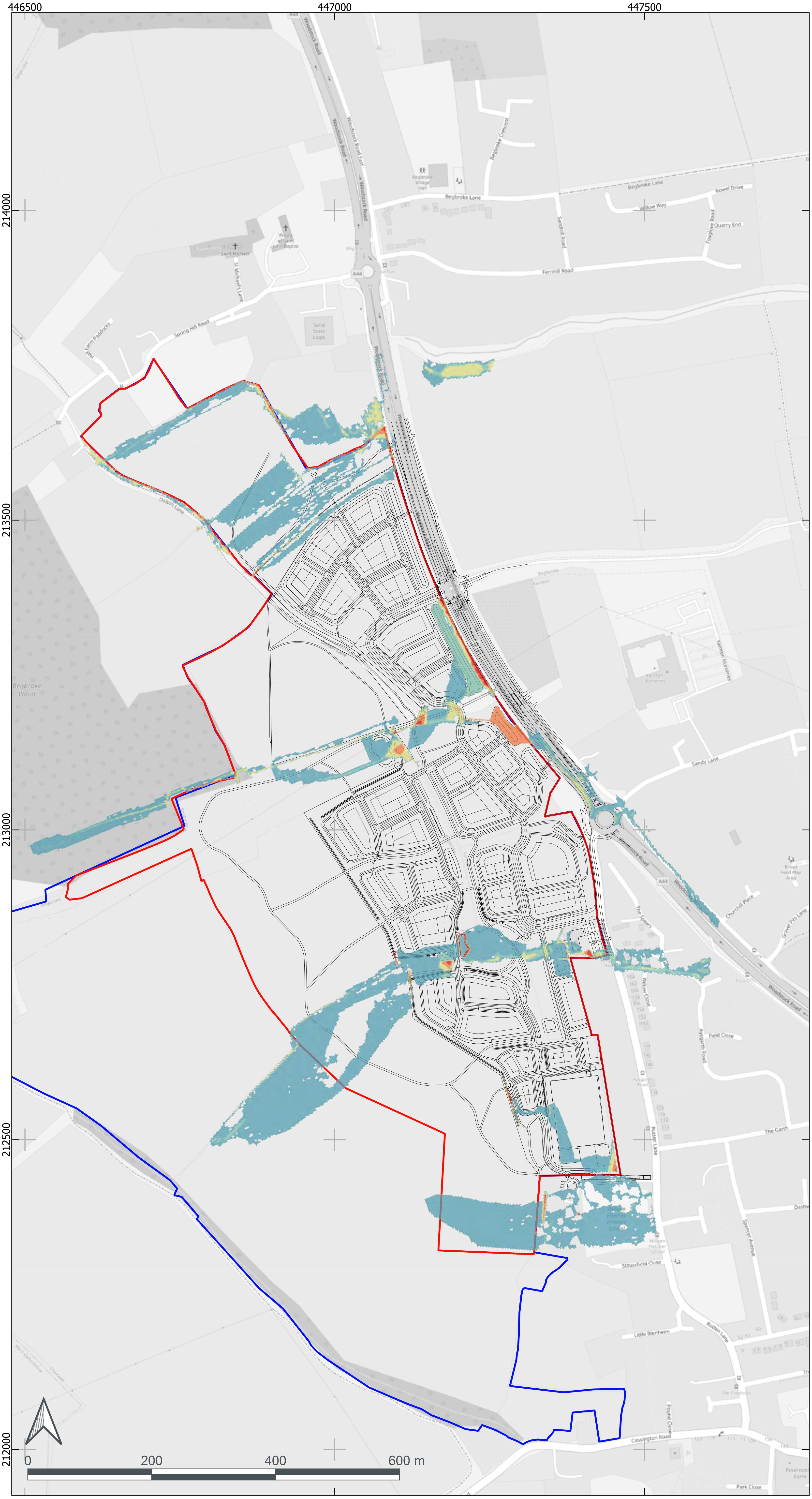
DRAWING TITLE
Design Modelled 1 in 100 Year plus Climate Change (20%) Flood Depths

DRAWING INFORMATION STATUS
FOR INFORMATION

SCALE @	DRAWN	REVIEWED	DATE
1:6,000	CT	AE	27/05/22

FIGURE NUMBER	REVISION
03	P01



KEY:

PR9 Allocation Boundary

Site Boundary

Masterplan Outline

Design 1 in 100 Year plus Climate Change (40%) Flood Depths (m)

<= 0.05

0.05 - 0.10

0.10 - 0.30

0.30 - 0.50

> 0.5

NOTES

These drawings have been produced with reference to the CDM Regulations 2015. Please note that these are pre-construction phase drawings and should be subject to further design risk management as required in accordance with Regulation 9

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Land West of Yarnton, Oxfordshire

DRAWING TITLE

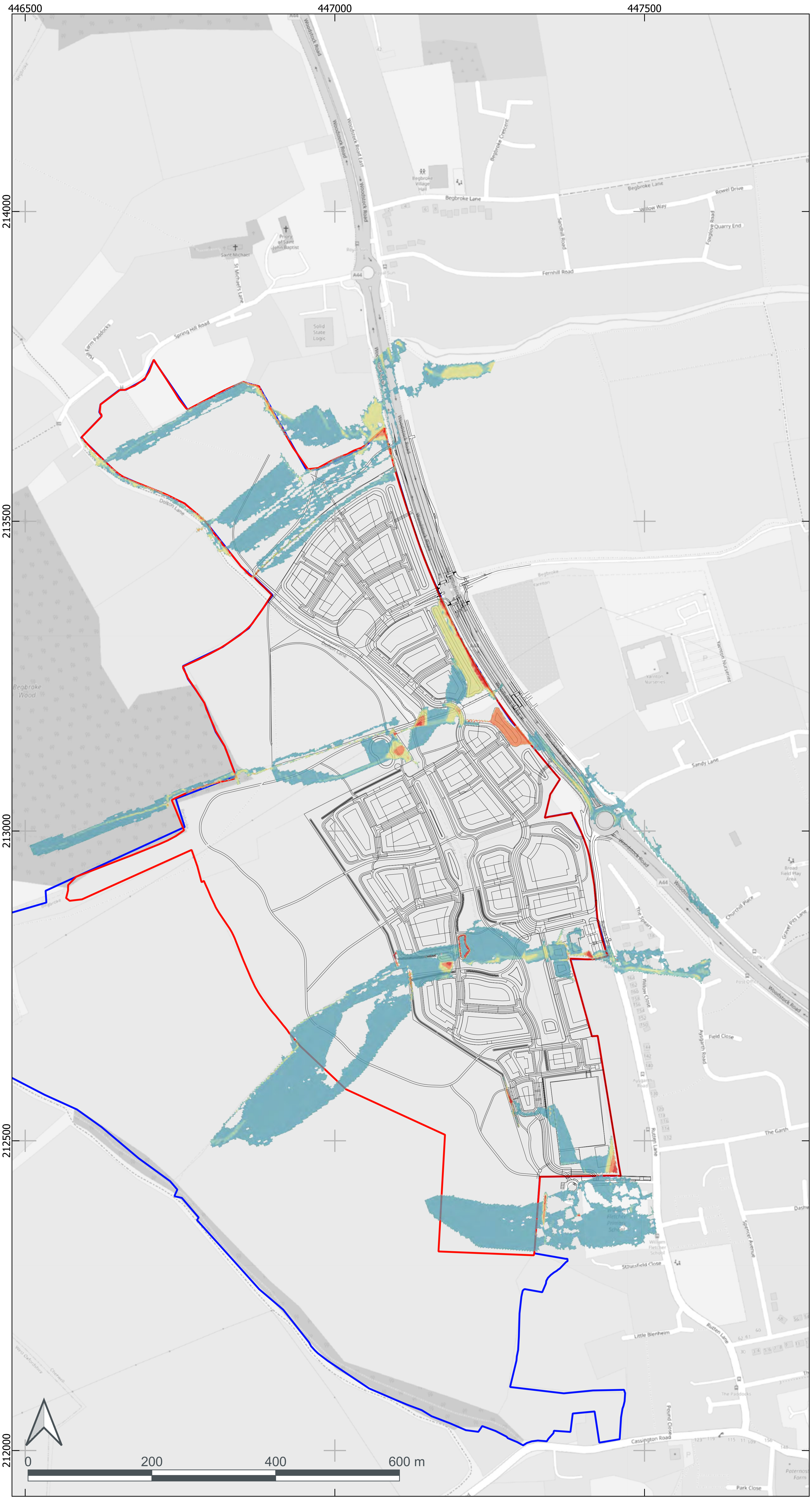
Design Modelled 1 in 100 Year plus Climate Change (40%) Flood Depths

DRAWING INFORMATION STATUS

FOR INFORMATION

SCALE @	DRAWN	REVIEWED	DATE
1:6,000	CT	AE	27/05/22

FIGURE NUMBER	REVISION
04	P01



KEY:

- PR9 Allocation Boundary
- Site Boundary
- Masterplan Outline

Design 1 in 1,000 Year Flood Depths (m)

- <= 0.05
- 0.05 - 0.10
- 0.10 - 0.30
- 0.30 - 0.50
- > 0.5

NOTES

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PROJECT

Land West of Yarnton, Oxfordshire

DRAWING TITLE

Design Modelled 1 in 1,000 Year Flood Depths

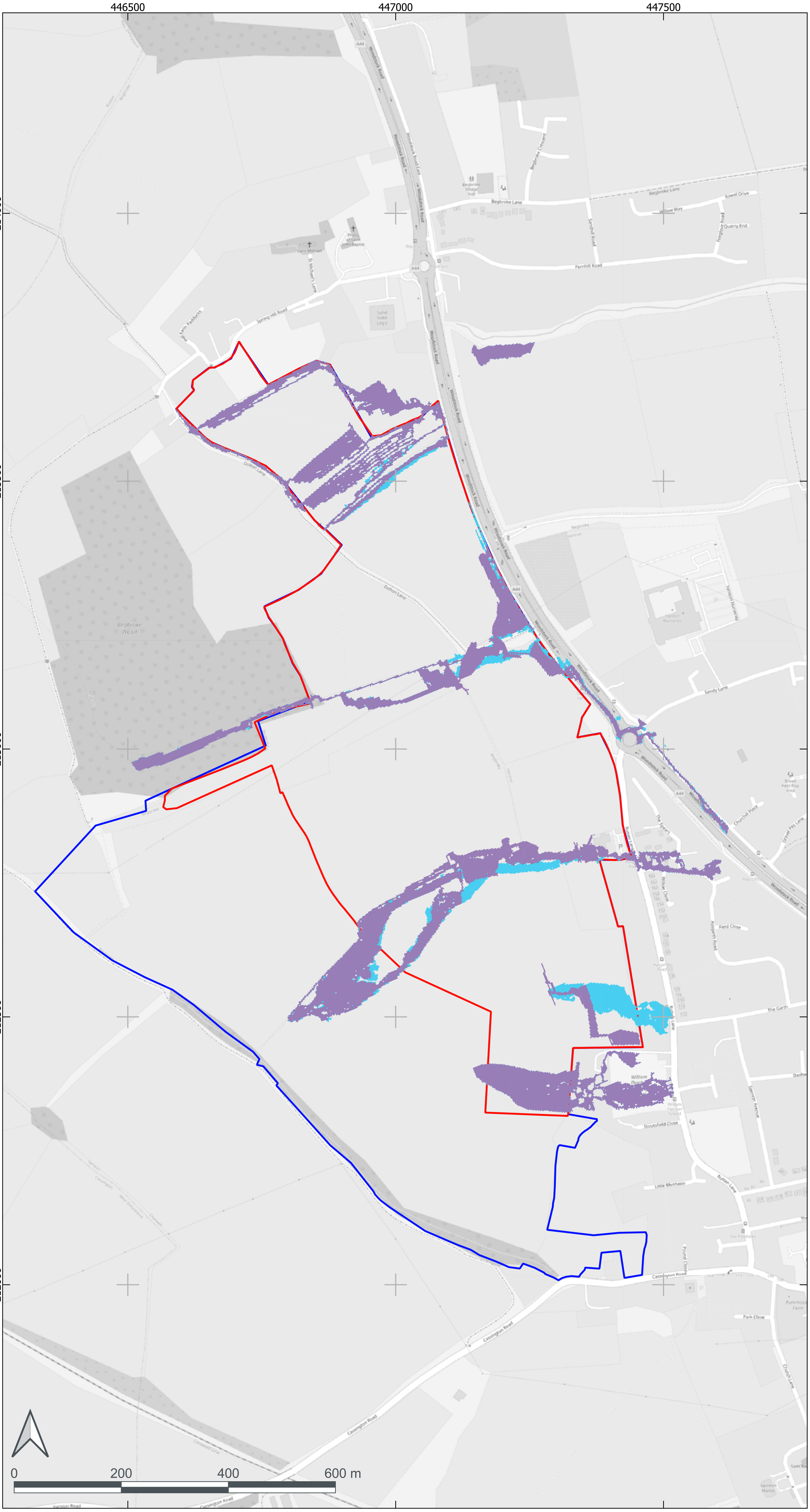
DRAWING INFORMATION STATUS

FOR INFORMATION

SCALE @	DRAWN	REVIEWED	DATE
1:6,000	CT	AE	27/05/22

FIGURE NUMBER	REVISION
05	P01

Appendix Q Hydraulic Model Comparison Plans



KEY:
- Site Boundary
- PR9 Allocation Boundary
- Baseline 1 in 20 Year Extent
- Design 1 in 20 Year Extent

NOTES

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DRAWING TITLE

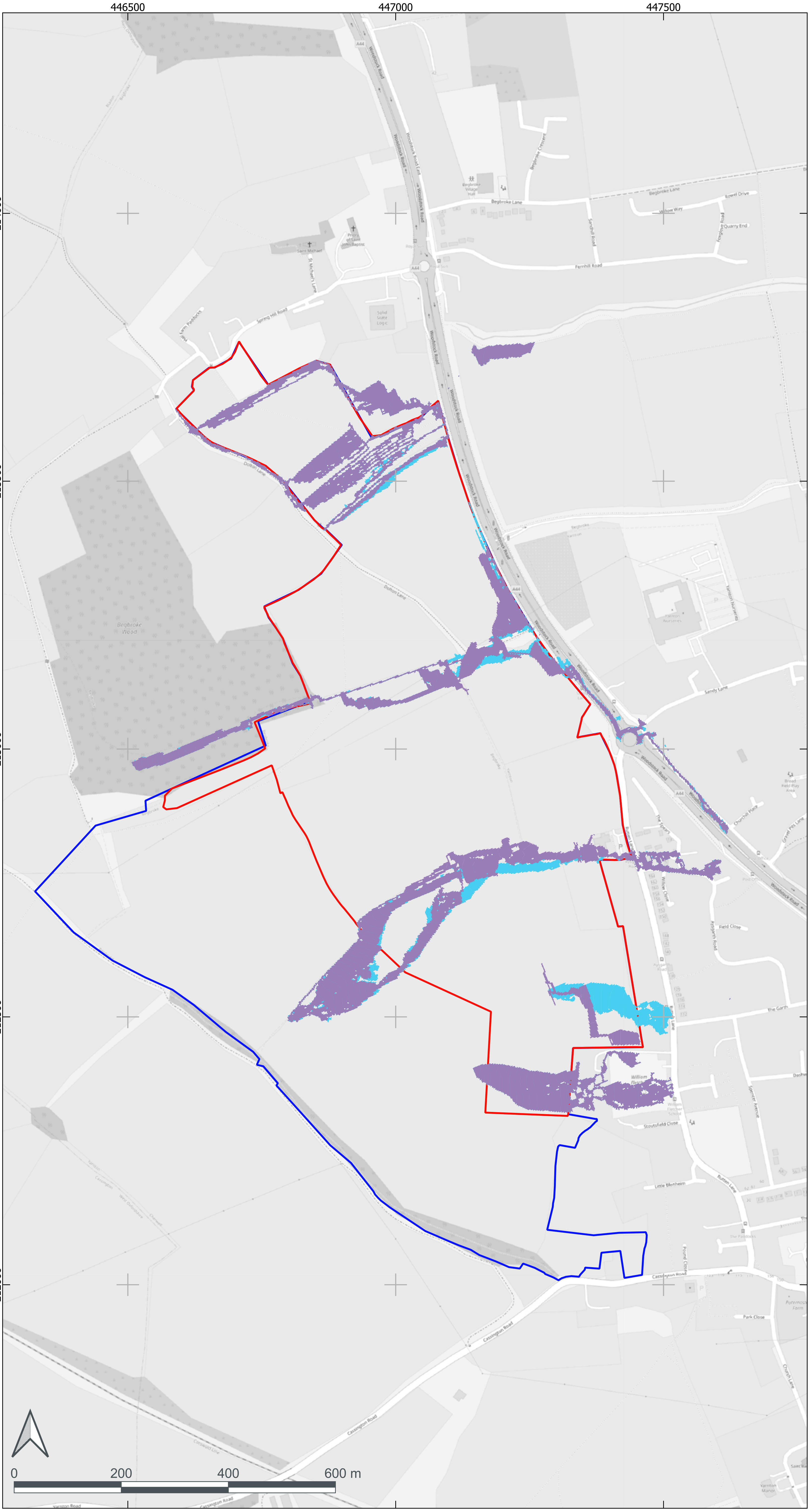
Baseline vs Design Modelled 1 in 20 Year Flood Extents

DRAWING INFORMATION STATUS

FOR INFORMATION

SCALE @	DRAWN	REVIEWED	DATE
1:7,000	CT	AE	19/05/22

FIGURE NUMBER	REVISION
01	P01



KEY:

- Site Boundary
- PR9 Allocation Boundary
- Baseline 1 in 100 Year Extent
- Design 1 in 100 Year Extent

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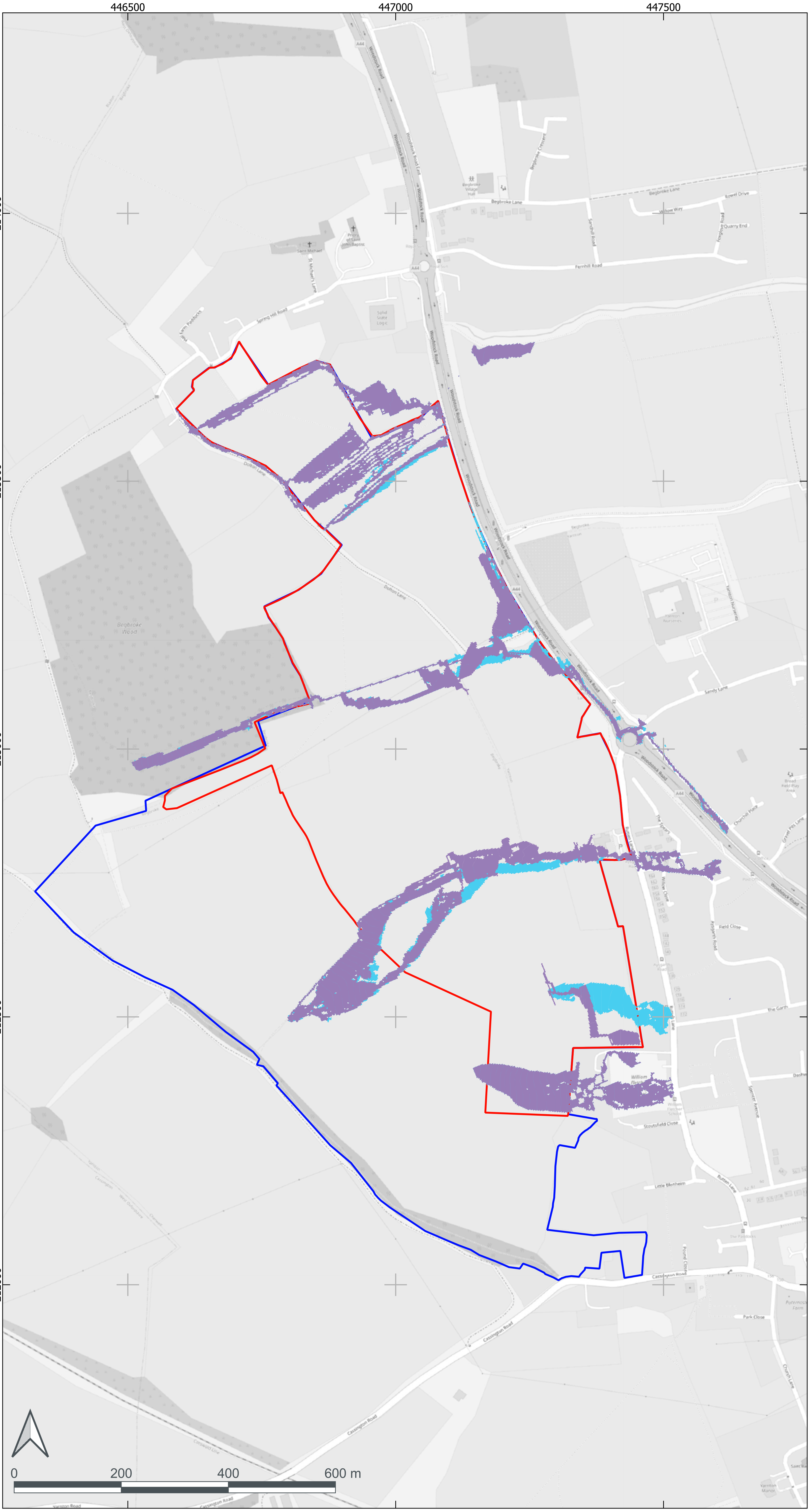
Baseline vs Design Modelled 1 in 100 Year Flood Extents

DRAWING INFORMATION STATUS

FOR INFORMATION

SCALE @	DRAWN	REVIEWED	DATE
1:7,000	CT	AE	19/05/22

FIGURE NUMBER	REVISION
02	P01



KEY:

- Site Boundary
- PR9 Allocation Boundary
- Baseline 1 in 100 Year plus Climate Change (20%) Extent
- Design 1 in 100 Year plus Climate Change (20%) Extent

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DRAWING TITLE

Baseline vs Design Modelled 1 in 100 Year plus Climate Change (20%) Flood Extents

DRAWING INFORMATION STATUS

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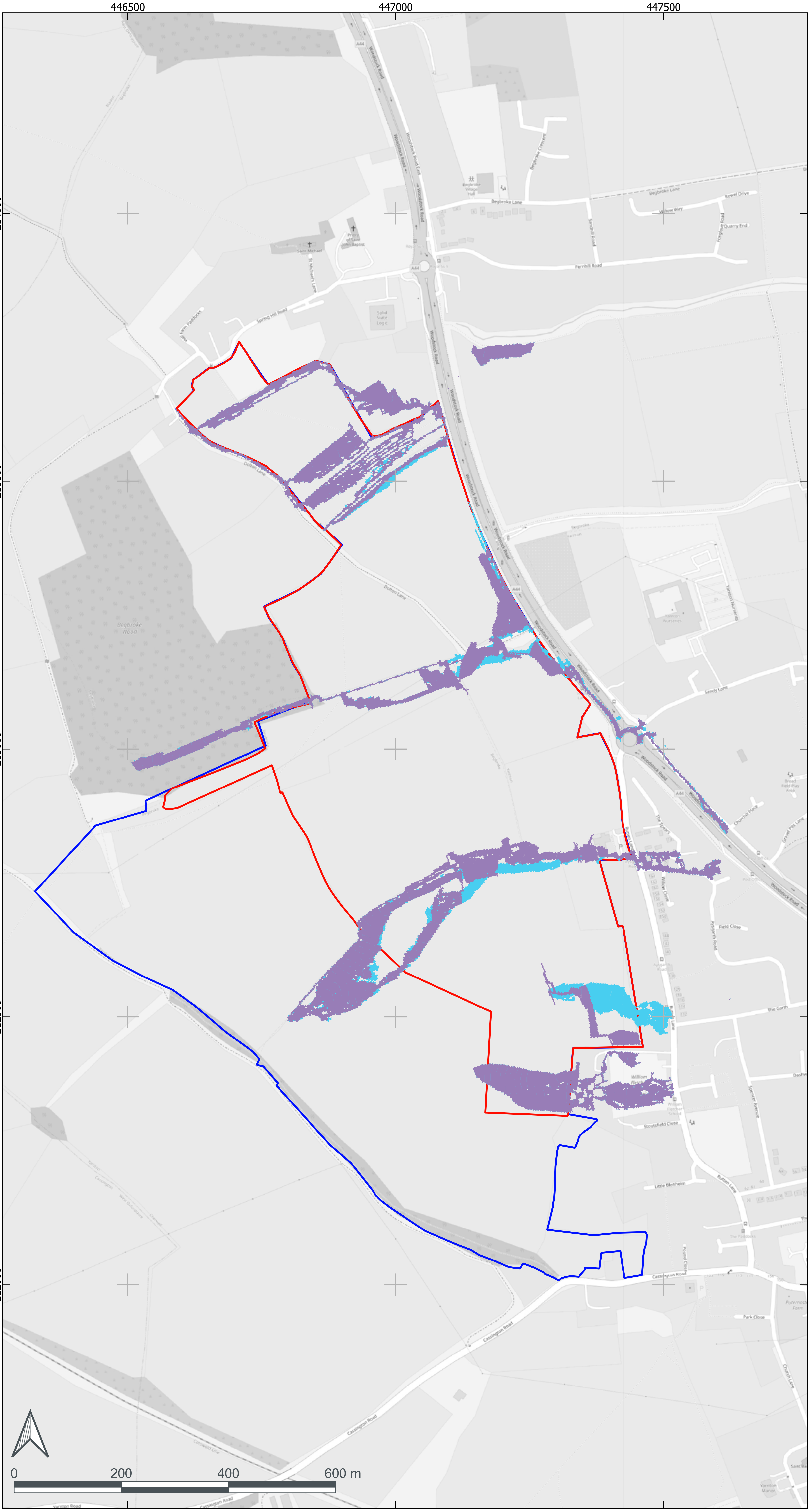
SCALE @	DRAWN	REVIEWED	DATE
1:7,000	CT	AE	19/05/22

FIGURE NUMBER	REVISION
03	P01



KEY:

Site Boundary

PR9 Allocation Boundary

Baseline 1 in 100 Year plus Climate Change (40%) Extent

Design 1 in 100 Year plus Climate Change (40%) Extent

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DRAWING TITLE

Baseline vs Design Modelled 1 in 100 Year plus Climate Change (40%) Flood Extents

DRAWING INFORMATION STATUS

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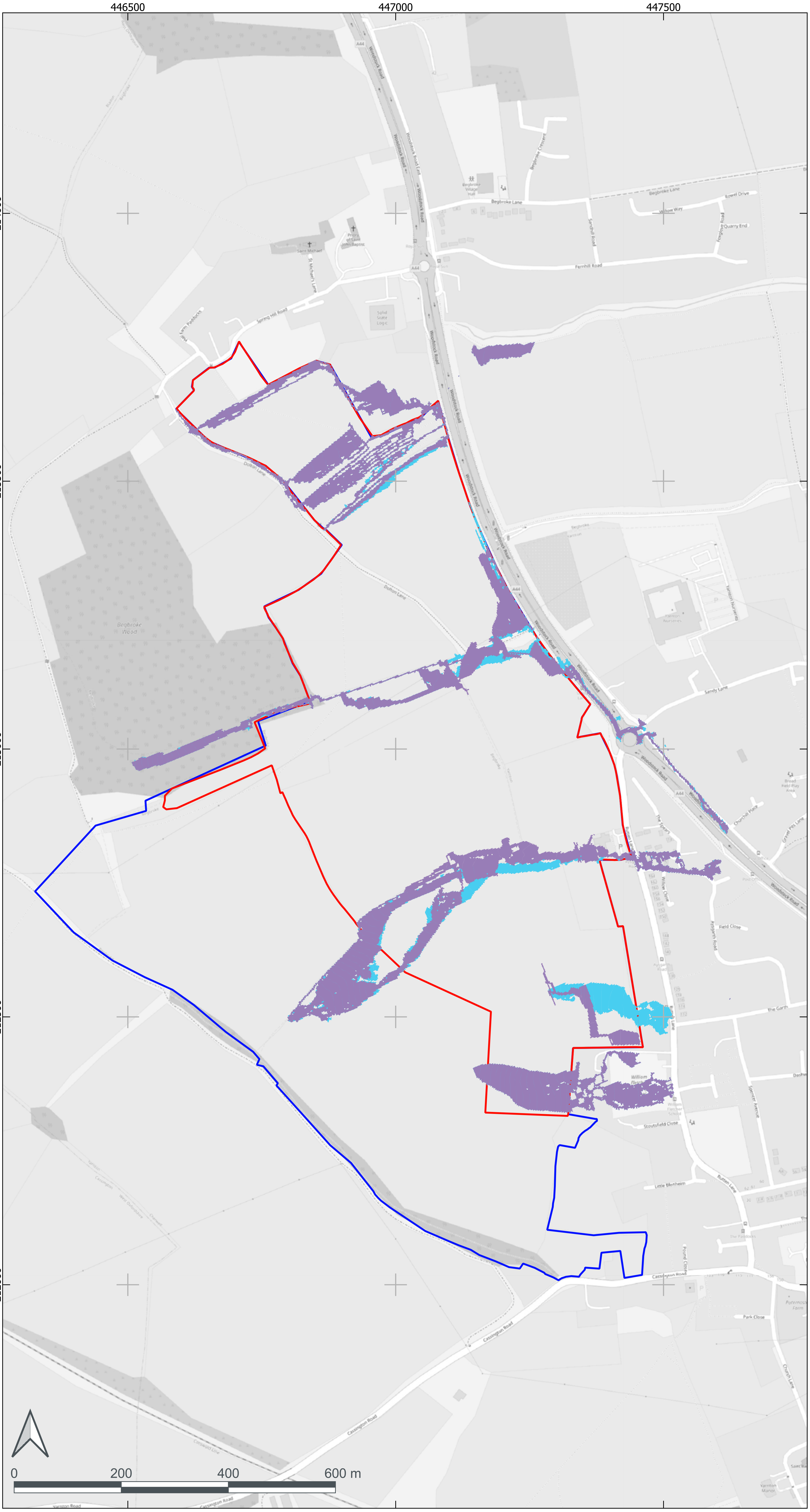
SCALE @	DRAWN	REVIEWED	DATE
1:7,000	CT	AE	19/05/22

FIGURE NUMBER	REVISION
04	P01



KEY:
- Site Boundary
- PR9 Allocation Boundary
- Baseline 1 in 1,000 Year Extent
- Design 1 in 1,000 Year Extent

NOTES

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DRAWING TITLE
Baseline vs Design Modelled 1 in 1,000 Year Flood Extents

DRAWING INFORMATION STATUS
FOR INFORMATION

SCALE @	DRAWN	REVIEWED	DATE
1:7,000	CT	AE	19/05/22

FIGURE NUMBER	REVISION
05	P01

KEY:

Site Boundary

PR9 Allocation Boundary

Design vs Baseline 20-Year Flood Risk Impacts

>10mm decrease to maximum water levels

No impact on maximum water levels

> 10mm increase to maximum water levels

NOTES

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DRAWING TITLE

Flood Risk Impacts
(Design vs Baseline 20-Year Hydraulic Modelling Scenario)

DRAWING INFORMATION STATUS

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SCALE @	DRAWN	REVIEWED	DATE
1:6,000	CT	PR	16/05/22

FIGURE NUMBER	REVISION
01	P01

KEY:

Site Boundary

PR9 Allocation Boundary

Design vs Baseline 100-Year Flood Risk Impacts

>10mm decrease to maximum water levels

No impact on maximum water levels

> 10mm increase to maximum water levels

NOTES

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DRAWING INFORMATION STATUS
FOR INFORMATION

SCALE @	DRAWN	REVIEWED	DATE
1:6,000	CT	PR	16/05/22

FIGURE NUMBER	REVISION
02	P01

KEY:

- Site Boundary
- PR9 Allocation Boundary

Design vs Baseline 100-Year plus 20% Climate Change Flood Risk Impacts

- >10mm decrease to maximum water levels
- No impact on maximum water levels
- > 10mm increase to maximum water levels

NOTES

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FOR INFORMATION

SCALE @	DRAWN	REVIEWED	DATE
1:6,000	CT	PR	16/05/22

FIGURE NUMBER	REVISION
03	P01

KEY:

Site Boundary

PR9 Allocation Boundary

Design vs Baseline 100-Year plus 40% Climate Change Flood Risk Impacts

>10mm decrease to maximum water levels

No impact on maximum water levels

> 10mm increase to maximum water levels

NOTES

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Flood Risk Impacts
(Design vs Baseline 100-Year plus 40% Climate Change Hydraulic Modelling Scenario)

DRAWING INFORMATION STATUS

FOR INFORMATION

SCALE @	DRAWN	REVIEWED	DATE
1:6,000	CT	PR	16/05/22

FIGURE NUMBER	REVISION
04	P01

KEY:

Site Boundary

PR9 Allocation Boundary

Design vs Baseline 1,000-Year Flood Risk Impacts

>10mm decrease to maximum water levels

No impact on maximum water levels

> 10mm increase to maximum water levels

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1:6,000	CT	PR	16/05/22

FIGURE NUMBER	REVISION
05	P01

Appendix R FEH Calculation Record

Flood estimation report:
Yarnton Flood Risk Assessment

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6 REVITALISED FLOOD HYDROGRAPH 2 (REFH2) METHOD ---- 14

7 DISCUSSION AND SUMMARY OF RESULTS ---- 15

8 ANNEX ---- 18

Approval

This document has been issued and amended as follows:

Version	Date	Description	Created by	Verified and Approved by
1.0	26/05/2022	Issued to client	M Green BEng, MSc, CEng, MCIWEM, C.WEM	M Green BEng, MSc, CEng, MCIWEM, C.WEM

Abbreviations

AEP .... annual exceedance probability
AM .... Annual Maximum
AREA .... Catchment area (km^2)
BFI .... Base Flow Index
BFIHOST.................... Base Flow Index derived using the HOST soil classification
CPRE........................ Council for the Protection of Rural England
FARL........................ FEH index of flood attenuation due to reservoirs and lakes
FEH .... Flood Estimation Handbook
FSR .... Flood Studies Report
HOST .... Hydrology of Soil Types
NRFA .... National River Flow Archive
OS........................... Ordnance Survey
POT .... Peaks Over a Threshold
QMED .... Median Annual Flood (with return period 2 years)
ReFH .... Revitalised Flood Hydrograph method
ReFH2 .... Revitalised Flood Hydrograph 2 method
SAAR........................ Standard Average Annual Rainfall (mm)
SPR .... Standard percentage runoff
SPRHOST .... Standard percentage runoff derived using the HOST soil classification
Tp(0) .... Time to peak of the instantaneous unit hydrograph
URBAN .... Flood Studies Report index of fractional urban extent
URBEXT1990............... FEH index of fractional urban extent
URBEXT2000............... Revised index of urban extent, measured differently from URBEXT1990
WINFAP-FEH .... Windows Frequency Analysis Package - used for FEH statistical method

1 SUMMARY OF ASSESSMENT

1.1 Summary

Catchment location	Yarnton, near Oxford
Purpose of study and scope	A fluvial hydrological analysis to derive inflow hydrographs for a hydrodynamic hydraulic model to check fluvial flood risk for a potential development site in Yarnton.
Key catchment features	The site is at the top of a number of small ungauged shallow and rural catchments.
Flooding mechanisms	The main sources of flood risk are surface water and fluvial. The purpose of this hydrological analysis is to derive inflow hydrographs for a fluvial model to check fluvial flood risk. A separate model exists to check surface water flood risk.
Gauged / ungauged	There are no suitable gauges in or near the subject catchments.
Final choice of method	ReFH2
Key limitations / uncertainties in results	The FEH catchment descriptors were taken from the nearest catchment in the FEH web service which overlaps with the subject catchments but covering a slightly different area.

1.2 Note on flood frequencies

The frequency of a flood can be quoted in terms of a return period, which is defined as the average time between years with at least one larger flood, or as an annual exceedance probability (AEP), which is the inverse of the return period.

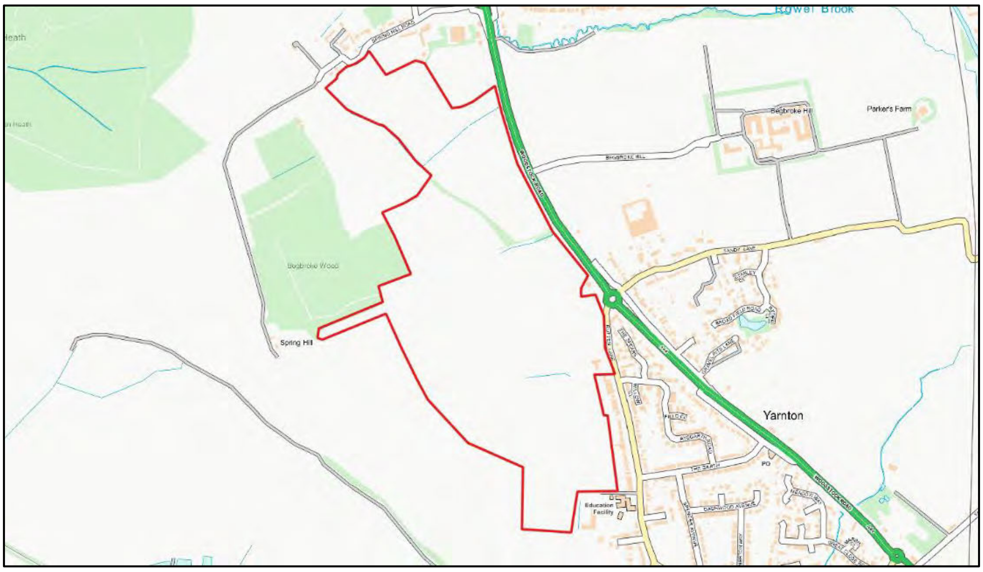
The table below is provided to enable quick conversion between return periods and annual exceedance probabilities.

Annual exceedance probability (AEP) and related return period reference table

AEP (%)	50	20	10	5	3.33	2	1.33	1	0.5	0.1
AEP	0.5	0.2	0.1	0.05	0.033	0.02	0.0133	0.01	0.005	0.001
Return period (yrs)	2	5	10	20	30	50	75	100	200	1,000

2 METHOD STATEMENT

2.1 Requirements for flood estimates

Overview	Hydrogreen Consulting Ltd were approached by HydroLand Consulting Engineers and PJA Civil Engineering Ltd to undertake a fluvial hydrological analysis for a potential development site in Yarnton, Oxfordshire, shown in Figure 1 below.  *Contains OS data © Crown copyright and database right 2022* **Figure 1: Subject site** Inflow hydrographs were required for the fluvial model to check flood risk to and from the potential development for the 1 in 20 year, 1 in 100 year, 1 in 100 year plus climate change and 1 in 1000 year return period events. Due to the small size of the subject catchments (less than 5 km^2) the peak rainfall intensity was increased by 20% (central) and 40% (upper end) for the 1 in 100 year return period event in the ReFH2 model to test the potential impact of climate change.
Project scope	There is no existing hydrological analysis from previous studies available in this location, so this study has undertaken new statistical and rainfall-runoff analyses to estimate flood hydrographs for the required return periods. The hydrology required for the model was for the purposes of checking fluvial flood risk to the site. A separate model was developed in parallel to this study to check surface water flood risk as part of the drainage strategy.

hydrogreen consulting ltd

2.2 The catchment

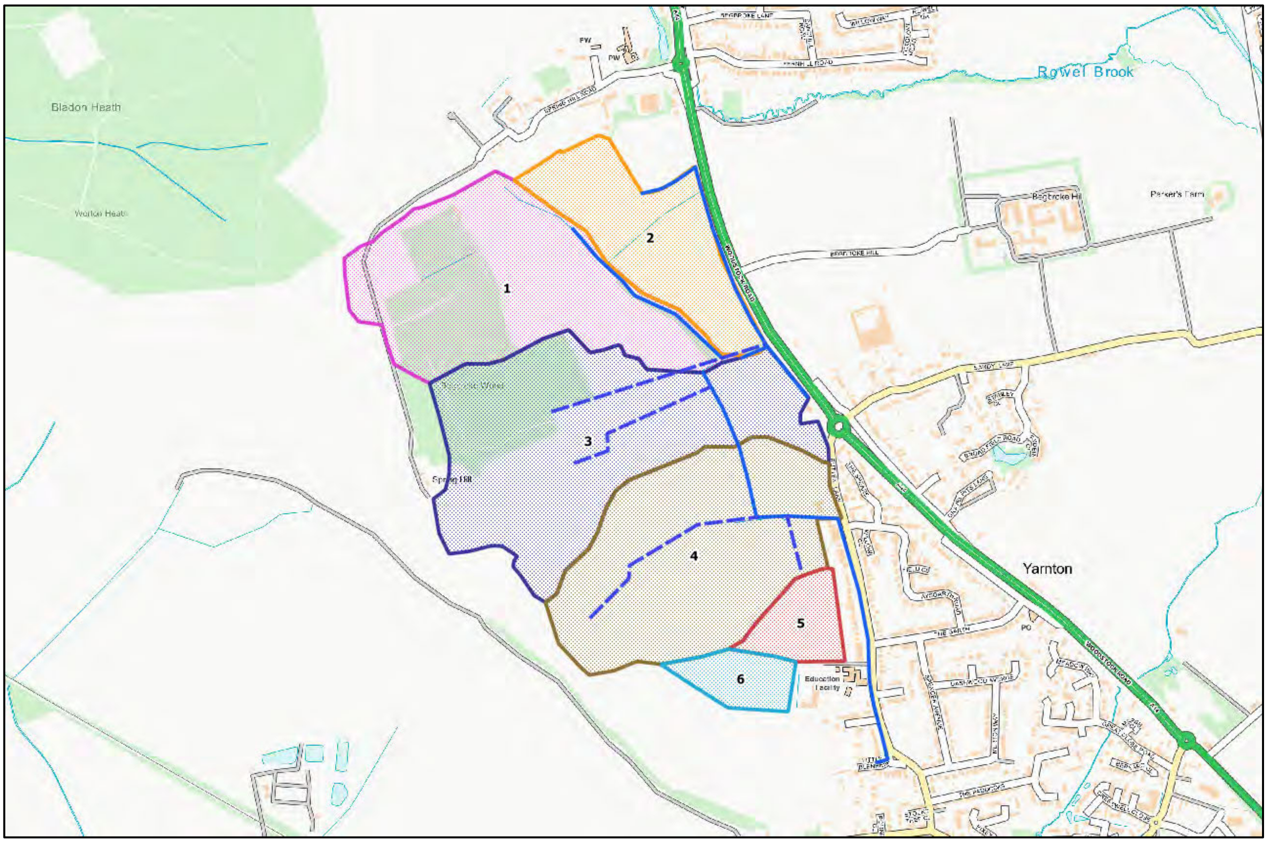


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Figure 2: Catchment boundaries (colour shaded and numbered) and small watercourses near the site (blue lines)

Description	The potential development site lies at the top of a number of small catchments that drain into a number of small watercourses as shown in Figure 2. These flow from west to east and ultimately drain into the Kingsbridge Brook, a tributary of the River Thames. The catchment is rural and shallow. The underlying bedrock consists of Oxford Clay, with some overlying sand and gravel towards the south west of the catchments. The soil is predominately slowly permeable and seasonally wet slightly acid but base-rich loamy and clayey.

2.3 Source of flood peak data

Source	NRFA peak flows dataset, Version 10, released August 2021. This contains data up to water year 2019-20.

2.4 Gauging stations (flow or level)

There are no useful gauges at or near the catchments being considered in this study.

Water-course	Station name	Gauging authority number	NRFA number	Catchment area (km²)	Type (rated / ultrasonic / **level…)**	Start of record and end if station closed
N/A	N/A	N/A	N/A	N/A	N/A	N/A

2.5 Data available at each flow gauging station in Table 2.4

Station name	Start and end of NRFA flood peak record	Update for this study?	OK for QMED?	OK for pooling?	Data quality check needed?	Other comments on station and flow data quality
N/A	N/A	N/A	N/A	N/A	N/A	N/A

2.6 Rating equations

Station name	Type of rating	Rating review needed?	Comments and link to any rating reviews
N/A	N/A	N/A	N/A

2.7 Other data available and how it has been obtained

Type of data	Data relevant to this study?	Data available?	Source of data	Details
Check flow gaugings	N/A	N/A	N/A	N/A
Historical flood data	There was flooding in Yarnton village recorded in July 2007, January 2008, October -December 2012, January - March 2013 and January / February 2014.[1] Most recently, Rutten Lane, Aysgarth Road and Cassington Road were flooded in December 2020.[2] Although these roads are close to the potential development site, they are also downstream of the site itself - there are no available records of the site itself flooding. The historical flooding layer available from the Environment Agency does not include any flooding near the potential development site.			
Flow or river level data for events	N/A	N/A	N/A	N/A
Rainfall data for events	N/A	N/A	N/A	N/A
Potential evaporation data	N/A	N/A	N/A	N/A
Results from previous studies	N/A	N/A	N/A	N/A
Other data or information	N/A	N/A	N/A	N/A

2.8 Hydrological understanding of catchment

Conceptual model	The main sources of flood risk to the site are surface water and fluvial. The scope of this hydrological analysis is to provide inflow hydrographs to check fluvial flood risk to the site and downstream of the site. A separate model was developed in parallel to this study to check surface water flood risk as part of the drainage strategy. The impermeable proposed development area was included in the hydrology for the urban drainage model. For the design scenario therefore point inflows were applied to the fluvial model in this study from the urban drainage model to account for the impermeable areas. These areas were therefore removed from the fluvial catchments for

[1] Cherwell District Council Level 1 SFRA, p. 21.

[2] https://www.oxfordmail.co.uk/news/18965147.flooding-witney-yarnton-west-oxfordshire/

	the design scenario model runs up to and including the 1 in 100 year plus climate change event to avoid double-counting these areas.
Unusual catchment features	Although the sum of the catchment areas was greater than 0.5 km^2, each individual catchment was less than this.

2.9 Initial choice of approach

Is FEH appropriate?	Flood Estimation Handbook methodologies are not normally applicable on catchments less than 0.5 km^2 in area. However, the ReFH2 method does allow for applying plot scale equations for catchments less than 0.5 km^2. This facility was therefore utilised in this study.
Initial choice of method(s) and reasons	A statistical analysis was also undertaken on an equivalent lumped catchment of 0.6 km^2 (as exported from the FEH web service) for comparison purposes with the ReFH2 method which was also applied to the same size catchment for comparison. One of these methods was selected for the peak flows, with the ReFH2 method being used to derive the hydrograph shapes for the inputs to the hydrodynamic hydraulic model.
Software to be used (with version numbers)	FEH Web Service[3] / WINFAP-FEH v5[4] / ReFH 2.3

[3] CEH 2015. The Flood Estimation Handbook (FEH) Online Service, Centre for Ecology & Hydrology, Wallingford, UK.

[4] WINFAP-FEH v5 © Wallingford HydroSolutions Limited and NERC (CEH) 2021.

3 LOCATIONS WHERE FLOOD ESTIMATES REQUIRED

Flood estimates were required for the entire proposed development site. The overlap of the catchments, watercourses and site boundary is shown in Figure 3 below.

3.1 Summary of subject sites

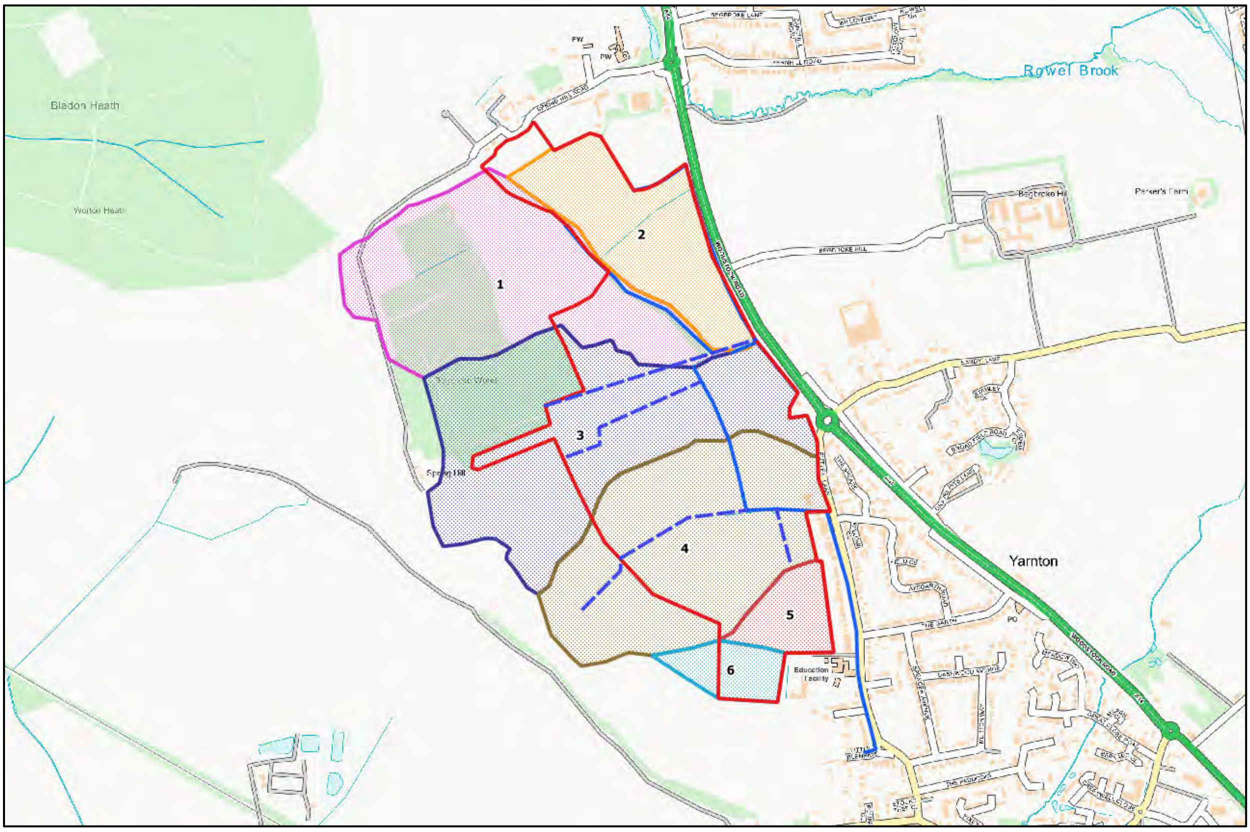

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Figure 3: Catchment boundaries (colour shaded and numbered) and site boundary (red outline)

3.2 Important catchment descriptors at each subject site (incorporating any changes made)

The catchment descriptors were taken from the nearest catchment available on the FEH web service which is shown in Figure 4 below. The key catchment descriptors are given in the following table.

Site code	FARL	PROPWET	BFIHOST	DPLBAR (km)	DPSBAR (m/km)	SAAR (mm)	URBEXT 2000	FPEXT
FEH web service catchment	1	0.32	0.65	0.89	23.8	621	0.037	0.1

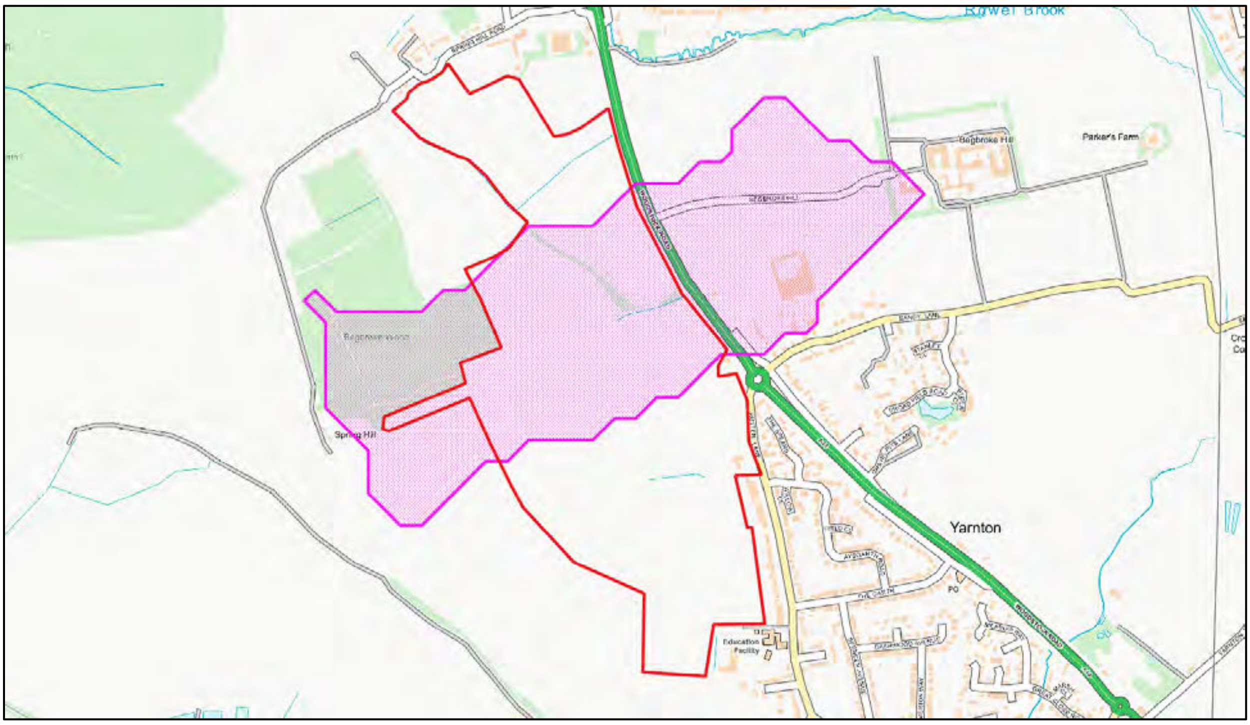

Figure 4: Nearest catchment in FEH web service (shaded pink)

3.3 Checking catchment descriptors

Record how catchment boundary was checked and describe any changes	The catchment boundaries were redrawn using the 1 metre LiDAR Digital Terrain Model taken in 2020 and utilising tools in GRASS GIS.
Record how other catchment descriptors were checked and describe any changes.	DPSBAR was checked against the LiDAR and contour data. BFIHOST was checked against the geological and soils data. DPLBAR was adjusted for each catchment based on area using equation 7.1 in FEH Volume 5 (page 68).
Source of URBEXT	URBEXT2000 is used for both the statistical method and ReFH2 method.
Method for updating of URBEXT	The urbanised area was calculated from the up-to-date 1 in 10k OS data and entered directly in the ReFH2 software. In this study there was no urbanised area in the catchments of interest.

4 STATISTICAL METHOD

4.1 Application of Statistical method

What is the purpose of applying this method?	A statistical analysis was undertaken on an equivalent lumped catchment of 0.6 km^2 (as exported from the FEH web service) for comparison purposes with the ReFH2 method.

4.2 Overview of estimation of QMED at each subject site

Site code	QMED (rural) from CDs (m^3/s)	Final method	Data transfer					Urban adjust-ment factor UAF	Final estimate of QMED (m^3/s)
			NRFA numbers for donor sites used (see 4.3)	Distance between centroids d_{ij} (km)	Moderated QMED adjustment factor, $(A/B)^a$	If more than one donor: Weight	If more than one donor: Weighted ave. adjustment		
FEH web service default	0.064	DT	1	16.16	1.03			N/A	0.066

Are the values of QMED spatially consistent?	N/A
Method used for urban adjustment for subject and donor sites	N/A

Notes

Methods: AM - Annual maxima; POT - Peaks over threshold; DT - Data transfer (with urban adjustment); CD - Catchment descriptors alone (with urban adjustment); BCW - Catchment descriptors and bankfull channel width (add details); LF - Low flow statistics (add details).

The QMED adjustment factor A/B for each donor site is moderated using the power term, a, which is a function of the distance between the centroids of the subject catchment and the donor catchment. The final estimate of QMED is $(A/B)^a$ times the initial (rural) estimate from catchment descriptors.

Important note on urban adjustment

The method used to adjust QMED for urbanisation published in Kjeldsen (2010)Error! Bookmark not defined. in which PRUAF is calculated from BFIHOST is not correctly applied in WINFAP-FEH v3.0.003. Significant differences occur only on urban catchments that are highly permeable. This is discussed in Wallingford HydroSolutions (2016)Error! Bookmark not defined..

4.3 Search for donor sites for QMED (if applicable)

Comment on potential donor sites	No suitable donor was found by means of inspection of nearby gauges and catchments. One was, however, provided by the Winfap version 5 software (39002 - Thames @ Days Weir) using the method proposed by Kjeldsen et. al., 2014[5] and applied according to Phase 2 of the small catchments research, Stewart et. al., 2019[6].

4.4 Donor sites chosen and QMED adjustment factors

NRFA no.	Method (AM or POT)	Adjustment for climatic variation?	QMED from flow data (A)	QMED from catchment descriptors (B)	Adjustment ratio (A/B)
39002	AM	N	148.014	133.190	1.11

[5] Kjeldsen, T.R, Jones. D. A., and Morris, D. G. (2014). Using multiple donor sites for enhanced flood estimation in ungauged catchments, Water Resour. Res., 50, 6646–6657, doi:10.1002/ 2013WR015203.

[6] Stewart, L., Faulkner, D., Formetta. F., Griffin, A., Haxton, T., Prosdocimi, I., Vesuviano, G., Young. A. (2019). Estimating flood peaks and hydrograph for small catchments (Phase 2). Report SC090031/R0, Environment Agency.

4.5 Derivation of pooling groups

See the composition of the final pooling group in the Annex (Section 8)

Name of group	Site code from whose descriptors group was derived	Subject site treated as gauged?	Changes made to default pooling group, with reasons	Weighted average L-moments
Yarnton lumped	FEH web service default	No	7011 (Black Burn @ Pluscarden) rejected due to small number of station gauged years (less than 8)	L-CV: 0.270 L-Skew: 0.239
Note: Pooling groups were derived using the procedures from Science Report SC050050 (2008).				

4.6 Derivation of flood growth curves at subject sites

Site code	Method	If P, ESS or J, name of pooling group	Distribution used and reason for choice	Note any urban adjustment or permeable adjustment	Parameters of distribution	Growth factor for 100-year return period
FEH web service default	P	Yarnton lumped	GL - recommended for UK and gives the largest flows (precautionary)	N/A	Location: 1.0 Scale: 0.273 Shape: -0.239	3.3
Notes Methods: SS - Single site; P - Pooled; ESS - Enhanced single site; J - Joint analysis Urban adjustments are all carried out using the method of Kjeldsen (2010). Growth curves were derived using the procedures from Science Report SC050050 (2008).						

4.7 Flood estimates from the statistical method

Site code	Flood peak (m^3/s) for the following return periods (in years)			
	2	20	100	1000[7]
FEH web service default	0.07	0.14	0.21	0.38

[7] The statistical 1 in 1000 year peak flow estimation is projected beyond the data available in the pooling group and is given here for comparison purposes only.

5 REVITALISED FLOOD HYDROGRAPH (REFH) METHOD

The ReFH2 method was used instead of the ReFH method since the ReFH2 model is considered to outperform its predecessor (now often referred to as ReFH1) in the following ways.

- ReFH2 considers the impact of catchment urbanisation explicitly.
- ReFH2 using the FEH13 DDF model is physically based and does not require the 'alpha' factor to 'correct' the initial conditions in the rainfall model. This is particularly advantageous in permeable catchments such as those in this analysis.
- Research reported in the ReFH2 Technical Guidance indicates that QMED estimates using the ReFH2 model on the catchments selected was closer to the observed flows than ReFH1, particularly in permeable catchments.

6 REVITALISED FLOOD HYDROGRAPH 2 (REFH2) METHOD

6.1 Application of ReFH2 method

What is the purpose of applying this method?	The ReFH2 method was applied: • to derive hydrograph shapes; • to derive the 1 in 1000 year peak flow; • for comparison purposes with the FEH statistical method to derive at the preferred method for determining flood peaks.

6.2 Catchment sub-divisions for ReFH2 model

The catchment is essentially rural and no urban sub-divisions were applied.

6.3 Parameters for ReFH2 model

Site code	Method	Tp_{rural} (hours)	Tp_{urban} (hours)	C_{max} (mm)	PR_{imp}	BL (hours)	BR
FEH web service default	CD	2.3	2.3	660	N/A	49.7	2.6
Brief description of any flood event analysis carried out			N/A				
Methods: OPT: Optimisation, BR: Baseflow recession fitting, CD: Catchment descriptors, DT: Data transfer (give details)							

6.4 Design events for ReFH2 method: Lumped catchments

Site code	Urban or rural	Season of design event (summer or winter)	Storm duration (hours)
FEH web service default	Rural	Winter	3.5

6.5 Design events for ReFH2 method: Sub-catchments and intervening areas

Site code	Season of design event	Storm duration (hours)	Storm area for ARF (if not catchment area)	Reason for selecting storm
All	Winter	3.75	-	Critical storm duration for flood extents and depths
Results of storm duration testing.		1.75 hour, 2.75 hour and 3.75 hour storm durations were tested for the 1 in 100 year event. The 3.75 hour storm duration resulted in the greatest flood extents and depths.		

6.6 Flood estimates from the ReFH2 method

Site code	Flood peak (m^3/s) for the following return periods (in years)			
	2	20	100	1000
FEH web service default	0.07	0.15	0.22	0.39

7 DISCUSSION AND SUMMARY OF RESULTS

7.1 Comparison of results from different methods

Site code	Ratio of peak flow to FEH Statistical peak					
	Return period 2 years / 50% AEP			Return period 100 years / 1% AEP		
	ReFH	ReFH2	Other method	ReFH	ReFH2	Other method
FEH web service default		1			1.05	

7.2 Final choice of method

Choice of method and reasons	The ReFH2 method was selected for the derivation of peak flows for all sub-catchments for the following reasons. - The ReFH2 method (using the plot scale equations) is applicable on these very small catchments whereas the FEH statistical method would need to be applied outside its intended range. - In practice the FEH statistical method produces very similar growth curves for all small catchments because of the limited number of small catchments in the NRFA peak flow dataset which are deemed to be 'suitable for pooling'. The ReFH2 method is a rainfall-runoff method and therefore uses the physical characteristics of the catchment to derive flows. - The results from both methods were very similar, but the flows from the ReFH2 method were slightly higher. Given that these are small ungauged catchments for which the uncertainty in flow estimates is high, it is prudent to adopt the slightly higher flows as a precautionary approach.
How will the flows be applied to a hydraulic model?	Inflow hydrographs were derived for each catchment shown in Figure 2 (numbered 1 to 6) and these were applied at the upstream ends of the model.

7.3 Assumptions, limitations and uncertainty

List the main assumptions made (specific to this study)	The FEH catchment descriptors were taken from the nearest catchment in the FEH web service which overlaps with the subject catchments but covering a slightly different area. Inspection of geological and soil data showed that the areas in this study are relatively homogeneous in terms of soils, geology and steepness.
Discuss any particular limitations	The FEH statistical method was applied to a very small catchment of only 0.6 km^2 for the purposes of comparing peak flows with those derived from the ReFH2 method. FEH methodologies are normally only applied to catchments greater than 0.5 km^2, so this is near the boundaries of applicability of the FEH statistical method. It was also used to derive a peak flow for the 1 in 1000 year return period for the purposes of comparison with ReFH2, although the pooling group only had 500 years of data and therefore should not normally be used for deriving flows greater than a 1 in 100 year return period.
Provide information on the uncertainty in the design peak flow estimates and the methodology used	The 68% confidence interval for the 1 in 100 year return period peak flow for the default FEH catchment is between 0.15 and 0.31 m^3/s. The 95% confidence interval for the 1 in 100 year return period peak flow for the default FEH catchment is between 0.11 and 0.45 m^3/s.
Comment on the suitability of the	The flows in this study have been derived for the purposes of this Flood Risk Assessment for this site using current best practice

results for future studies	guidelines, software and data; the hydrology should be reviewed prior to being applied for any future purposes.
Give any other comments on the study	Monitoring flows and levels in the modelled watercourses in this study would reduce uncertainties in future flood estimates.

7.4 Checks

Are the results consistent, for example at confluences?	Yes, the flows derived are broadly proportional to the catchment sizes.
What do the results imply regarding the return periods / frequency of floods during the period of record?	There are no gauges or gauged data available.
What is the range of 100-year / 1% AEP growth factors? Is this realistic?	The 1 in 100 growth factor is 3.3 which is fairly standard for the UK.
If 1000-year / 0.1% AEP flows have been derived, what is the range of ratios for 1000-year / 0.1% AEP flow over 100-year / 1% AEP flow?	The 1 in 1000 year to 1 in 100 year peak flow ratio is 1.77
How do the results compare with those of other studies? Explain any differences and conclude which results should be preferred.	N/A
Are the results compatible with the longer-term flood history?	N/A
Describe any other checks on the results	The results from the hydraulic model are reasonable given the flooding history, or absence of recorded flooding, at the site.

7.5 Final results

Catchment number (see Fig 2)	Catchment Area	Flood peak (m^3/s) for the following return periods (in years)					
	(Km^2)	2	20	100	100 +20% CC	100 +40% CC	1000
1	0.260	0.040	0.087	0.128	0.159	0.191	0.219
2	0.130	0.020	0.044	0.066	0.082	0.100	0.115
3	0.319	0.042	0.092	0.137	0.170	0.206	0.237
4	0.267	0.036	0.080	0.118	0.148	0.179	0.205
5	0.038	0.007	0.016	0.024	0.029	0.036	0.041
6	0.033	0.006	0.014	0.021	0.026	0.032	0.036

7.6 Uncertainty bounds

This table reports the 95% confidence interval flows derived from the uncertainty analysis detailed in Section 7.3. The 'true' value is more likely to be near the estimate reported in Section 7.5 than the bounds. However, it is possible that the 'true' value could still lie outside these bounds.

Catchment number (see Fig 2)	Flood peak (m^3/s) for the following return periods (in years)							
	2		20		100		1,000	
	Lower	Upper	Lower	Upper	Lower	Upper	Lower	Upper
1	0.020	0.082	0.043	0.177	0.063	0.261	0.107	0.447
2	0.010	0.041	0.022	0.090	0.032	0.135	0.056	0.235
3	0.021	0.086	0.045	0.188	0.067	0.279	0.116	0.483
4	0.018	0.073	0.039	0.163	0.058	0.241	0.100	0.418
5	0.003	0.014	0.008	0.033	0.012	0.049	0.020	0.084
6	0.003	0.012	0.007	0.029	0.010	0.043	0.018	0.073

8 ANNEX

The final pooling group composition is as follows.

Station	Distance (SDM)	Years of data	QMED AM	L-CV Observed	L-SKEW Observed	Discordancy
76011 (Coal Burn @ Coalburn)	1.804	43	1.84	0.167	0.303	1.156
27073 (Brompton Beck @ Snainton Ings)	2.086	40	0.816	0.214	0.02	1.455
27051 (Crimple @ Burn Bridge)	2.248	48	4.544	0.219	0.146	0.347
26016 (Gypsey Race @ Kirby Grindalythe)	2.639	23	0.101	0.312	0.258	0.3
25019 (Leven @ Easby)	2.671	42	5.384	0.338	0.386	0.754
45816 (Haddeo @ Upton)	2.701	27	3.456	0.298	0.417	0.988
49005 (Bolingey Stream @ Bolingey Cocks Bridge)	2.986	10	5.972	0.256	0.136	2.35
28033 (Dove @ Hollinsclough)	3.004	45	4.15	0.225	0.373	0.886
36010 (Bumpstead Brook @ Broad Green)	3.019	53	7.5	0.377	0.173	1.865
27010 (Hodge Beck @ Bransdale Weir)	3.02	41	9.42	0.224	0.293	0.33
44008 (South Winterbourne @ Winterbourne Steepleton)	3.102	41	0.448	0.407	0.319	1.411
26014 (Water Forlornes @ Driffield)	3.172	22	0.431	0.298	0.12	0.517
41020 (Bevern Stream @ Clappers Bridge)	3.372	51	13.66	0.204	0.174	0.933
47022 (Tory Brook @ Newnham Park)	3.382	26	5.88	0.257	0.195	0.707
Rejected Stations						
7011 (Black Burn @ Pluscarden Abbey)	3.321	7	5.205	0.544	0.571	

Appendix S SuDS Proforma

APPENDIX C: INFORMATION REQUIRED FOR OUTLINE PLANNING APPLICATIONS

The following information should be provided for every drainage strategy submitted to the LLFA for consideration as part of an **Outline Planning Application**.

Detail required for Outline Applications	Provided?
Non-Technical Summary Non-technical summary of the proposed drainage strategy.	FRA Section 6
Description of the type of development Description of the type of development proposed and where it will be located. Include whether it is new development, an extension to existing development or change of use etc. State the area of the development site itself, how much of the site is currently hard standing, the proposed area to be hard standing post-development, and any proposed areas of public open space. Note that in calculations proposed values of impermeable area should include a 10% allowance for Urban Creep, as taken from CIRIA C753 (version 6) paragraph 24.7.2.	Description in Section 3.5 Proposed impermeable area noted in Table 6-5 and development creep in Section 6.7
A location plan Location plan at an appropriate scale should be provided with the application, showing site outline and other adjacent land under the applicant's control.	FRA Figure 3.1
Plans Plans showing the existing site layout, its topography, any water features, and how the site currently drains. Plans should also be provided of the proposed layout if available and demonstration that the proposed drainage system and other mitigation measures are achievable and that adequate space has been made for water.	Existing Drainage Features Plan in Appendix C of the FRA
Assessment of all flooding risks to the site This should include groundwater, overland surface water flows, sewer flooding, infrastructure flooding (from reservoirs/ponds/canals), watercourse flooding and the risk posed by the proposed development.	Section 5 of the FRA
Explanation of how each of these flood risks will be mitigated This may require modelling of some sources where significant flood risk is shown on high level datasets. It might mean applying the sequential approach to the site by avoiding building on one part of the site where there is known flooding.	Section 5 of the FRA
Explanation of how the drainage discharge hierarchy has been followed, providing evidence why any are inappropriate: • 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)	Section 6.3 of the FRA
Evidence that the site has an agreed point of discharge - If a significant portion of surface water is to be infiltrated on site, provide a BRE365 infiltration assessment to prove that this will work effectively. At outline stage it may be acceptable to base infiltration values on typical values for the local geology, as long as an alternative drainage design and agreed point of discharge is provided should infiltration	Section 6.3 of the FRA

Detail required for Outline Applications	Provided?
rates prove to be unsuitable. - If discharge is to an ordinary watercourse, evidence will need to be provided to ensure that the system can accept the proposed flows to an acceptable downstream point without increasing risk to others. If the watercourse is not within the boundary of the site, evidence will be required that the developer has a right to cross 3rd party land. - If discharge is to a surface water or combined sewer, or highways ditch or drain, letter of confirmation from the Water Company or responsible body will be required, stating their required discharge maximum rates and confirmation that there is adequate capacity in the existing system. This information is generally provided by going through the relevant water company's "Pre-Planning Service". This is a formal process that all developers are expected to go through to inform their planning applications. There is normally an associated cost for this service and a minimum timescale of 15 working days to obtain a response. The advice is then usually valid for a one year period. This process will provide assurance that there are no capacity issues with third party assets, as we as the LLFA are not able to make this type of assumption on behalf of a Water and Sewerage provider. - Thames Water: https://my.thameswater.co.uk/dynamic/cps/rde/xchg/corp/hs.xsl/18710.htm - Anglian Water: http://www.anglianwater.co.uk/developers/pre-planning-service-.aspx - Severn Trent Water: https://www.stwater.co.uk/developers/application-forms-and-guidance-notes/ (> application forms > Development enquiry application form)	
Calculations of current runoff from site • For greenfield sites, existing greenfield runoff rates and volumes can be produced through the UK SuDS website http://www.ukSuDS.com/, or by using the Institute of Hydrology IoH124 method. • If brownfield sites, clearly state the existing impermeable area and calculate the rates of runoff from the site. If a piped drainage system already exists within the site, the existing capacity of these pipes will need to be estimated.	Section 6.4 and Appendix H of the FRA
Calculations of allowable runoff from site Clearly state the proposed impermeable areas for the site and how this compares to existing values. In all calculations, proposed values of impermeable area should include a 10% allowance for Urban Creep, as taken from CIRIA C753 (version 6) paragraph 24.7.2. The Modified Rational Method is considered acceptable only for initial design estimates (i.e. at Outline planning) or for very simple sites (i.e. Minor developments). • Greenfield sites should discharge at no greater than the current greenfield rate so that the site behaves like the original site across the range of events. • Brownfield sites are strongly encouraged to discharge at the greenfield rate wherever possible. As a minimum, brownfield sites should reduce the discharge by 40% to account for the impacts of climate change, from the existing site runoff OR from the original un-surcharged pipe-full capacity of the existing system, whichever is the lowest. • Developers have the option to limit discharge for all events to the QBAR flow rate; or install a complex discharge control which reflects the original discharge for run-off rates from the site across the range of storm events. E.g. QBAR, 3.3% (1in30), 1% (1in100), and provide Long Term Storage for all runoff volume greater than the greenfield volume (as set out in 'Calculation of Storage Volume' below). It is understood that some guidance recommends minimum discharge rates of 5 l/s, to minimise use of small orifice openings that could be at risk of blockages. However, appropriate	Section 6.5 of the FRA and Appendix I

Detail required for Outline Applications	Provided?
consideration of filtration features to remove suspended matter and suitable maintenance regimes should minimise this risk and therefore the minimum limit of 5l/s does not apply in Oxfordshire. • Due to the additional datasets that have been added to the Flood Estimation Handbook (FEH) since design rainfall events were developed originally in the Flood Studies Report (FSR) (NERC, 1975), rainfall depths obtained using FEH show significant differences from those obtained from FSR in some parts of the country. Within Oxfordshire, rainfall depths are often greater using more up to date FEH datasets than those using FSR, therefore for various storm events, greater run-off is produced, and additional attenuation is likely to be required. As FEH rainfall data is more up to date, calculations should use FEH data for surface water drainage design, except where the critical storm duration is less than 60 minutes, as it is recognised that FEH data is less robust for short duration storms. If FEH rainfall data is not used as described above, then sensitivity testing to assess the implications of FEH rainfall must be provided. This should demonstrate that the development proposals remain safe and do not increase flood risk to third parties.	
A calculation of storage volume Volume of storage required on site for the 1% (1in100) plus climate change storm, in order to meet the controlled discharge rate or available infiltration rate. Where appropriate this should specify the volumes of both attenuation storage and Long-Term storage. See also note above about use of FEH rainfall data. An estimation of storage (acceptable only for outline applications) can be produced through the UK SuDS website http://www.ukSuDS.com/, or using the WinDes Quick Storage Estimate tool.	Appendix I of the FRA
Plans showing a logical location of storage within the proposed development Attenuation storage within areas at risk of flooding will not be acceptable.	Appendix E of the FRA
Explanation of likely forms of SuDS for the site and reasons for the use of these features. If no SuDS methods are proposed, then justification and evidence will need to be provided as to why they are not appropriate for the site.	Table 6-4 of the FRA
Explanation of who will maintain the drainage system over the lifetime of the development and evidence that all elements of the drainage system will be fully accessible for maintenance without entering 3rd party land. Ideally, SuDS features should be located within public space.	Section 8 of the FRA
Phasing An explanation of how the site will adequately consider flood risk at all stages of the development.	See ES Chapter