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NPPF: Flood Risk Assessment & Outline Drainage Strategy

New Farm, Melksham

Bloor Homes Ltd

SHF.102.003.HY.R.002.C

'Experience and expertise working in union'

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New Farm, Melksham

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Executive Summary

This report presents a Flood Risk Assessment in accordance with the National Planning Policy Framework and National Planning Practice Guidance: Flood Risk and Coastal Change ID: 7 guidance[1], for a proposed residential development located on land north of Sandridge Common, Melksham.

The report assesses the flood risk and how this could be managed to allow the proposals to be developed in support of the outline planning application. The FRA also includes a summary of the surface water and foul drainage requirements.

A summary of the baseline Site condition is included below:

- The 14.95-hectare (ha) Site is comprised of several parcels of agricultural land, underlain by clayey soils and bedrock with low infiltration potential.
- The Site slopes towards the central watercourse, which conveys flows north through the centre of the Site.

The risk of flooding is assessed as follows:

- The risk of fluvial flooding is assessed as negligible for most of the development with a residual risk of flooding from the onsite watercourses; Watercourse 1 and Watercourse 2.
- The risk of surface water flooding is assessed as negligible for most of the development, but low to medium associated with Watercourse 1 and along the reach of the interception swales.
- The risk of flooding from sewers is assessed as negligible for most of the development but low along the reach of the two water mains.
- The risk of flooding from highway drainage is assessed as negligible for most of the development but low along the reach of the diversion swale.
- The risk of flooding from all other sources is assessed as negligible.

Flood risk from identified sources can be reduced to a negligible or low and acceptable level through the following approach:



Subject to the proposed avoidance measures, the Sequential Test is not required:

- Sequentially develop the development, limiting the built development (including surface water attenuation) outside the mapped extent of pluvial flooding, as per Enzygo modelled flood mapping (proposed).
- Set finished floor levels a minimum of +150mm above external levels.
- The number of highway crossings along the route of the onsite/bounding watercourses should be kept to a minimum. Free spanning structures are proposed designed to convey the 1 in 100-year plus climate change event, with a freeboard allowance.
- Set the surface water outfall from the proposed development at an appropriate height above or at the bed level of the receiving watercourses.

[1] https://www.gov.uk/guidance/flood-risk-assessment-local-planning-authorities

- Introduction of interception and conveyance swales to divert flooding around the development.

Further to the above, the FRA has recommended further measures in line with statutory requirements / following best practice. The FRA has explored control, mitigate and management measures. A summary is included in the table below.

The proposed residential use is classified as more vulnerable. More vulnerable uses are considered acceptable in terms of flood risk in Flood Zone 1 and 2, 3a (low to high risk). There is however a risk of flooding from other sources.

Source of Flooding	Risk of Flooding	Risk Without Measures	Recommended Measures	Risk to Development with Measures
Fluvial – Watercourse 1, 2 and Land Drains	Negligible for most of the Site but Low/Residual from onsite watercourses	Negligible to Low (Residual)	Avoid and Control	Negligible
Tidal – N/A	Negligible	Negligible	N/A	Negligible
Groundwater – N/A	Negligible	Negligible	N/A	Negligible
Surface Water – Poor permeability and Site topography	Negligible for most of the Site but Low to Medium along Watercourse 1 and interception swales.	Negligible to Medium	Avoid and Control	Negligible
Sewers and Mains – Water Mains	Negligible for most of the Site but Low along two water mains	Negligible to Low	Avoid	Negligible
Infrastructure Failure – Highway Drains	Negligible for most of the development but low along the diversion swale	Negligible to Low	Avoid	Negligible

The FRA demonstrates the proposed development would be operated with minimal risk from flooding and would not increase flood risk elsewhere. The development should therefore not be precluded on the grounds of flood risk, as well as surface water and foul drainage.

1.0 Introduction

1.1 Background

1.1.1 Enzygo Ltd was commissioned by Bloor Homes Ltd to carry out a site-specific Flood Risk Assessment (FRA), including a surface water drainage strategy, in support of an outline planning application for a proposed residential development. The development is located on land north of Sandridge Common, Melksham (the 'Development').

1.1.2 The proposal is for an outline planning application for a residential development; public open space including formal play space and allotments; sustainable drainage systems and associated infrastructure a 100-place nursery and access points for pedestrians and cyclists. All matters are reserved except for access; the principal point of access is to be provided from a new northern arm onto an improved arrangement of the Eastern Way/A3102 roundabout junction and an emergency access onto the A3102. A copy of the proposed layout is included in Appendix 1.

1.1.3 A site-specific FRA assesses the current and future flood risk to and from a development site. It demonstrates how flood risk will be managed now and over the development's lifetime, taking climate change, drainage, and the vulnerability of its intended users into account.

1.1.4 The objectives of a site-specific FRA are to:

- Assess whether a proposed development is likely to be affected by current or future flooding from a range of sources.
- Assess whether the development will increase flood risk elsewhere.
- Decide on measures to deal with these effects and risks and assess their appropriateness.
- Provide enough evidence for the local planning authority to apply (if necessary) the Sequential Test.
- Decide whether the development will be safe and will pass the Exception Test if applicable.

1.1.5 In England, planning applications for development need an FRA[2] for most developments including:

- In Flood Zones 2 and 3 including minor development and change of use.
- Sites of 1ha or larger in Flood Zone 1.
- Sites of less than 1ha in Flood Zone 1, including change of use to a more vulnerable class (for example from commercial to residential), and where they could be affected by sources of flooding other than rivers and the sea.
- Land in Flood Zone 1 in a Critical Drainage Area (CDA) as notified by the Environment Agency (EA).
- Land in Flood Zone 1 identified in a Strategic Flood Risk Assessment (SFRA) as being at increased flood risk in future.

[2] Department for Environment, Food & Rural Affairs and Environment Agency (published March 2014 and updated April 2025). Flood Risk Assessments if You're Applying for Planning Permission [https://www.gov.uk/guidance/flood-risk-assessment-for-planning-applications].

1.1.6 An FRA is required for this development, as initial screening using EA online indicative flood mapping shows that the development is mainly located in Flood Zone 1 but the area along the watercourse is within Flood Zone 2, is more than 1ha, and is at risk of surface water flooding.

1.1.7 The purpose of this FRA is to assess the risk of flooding to the proposed development and where possible recommend measures to demonstrate that future users of the development would remain safe throughout its lifetime, that the development would not increase flood risk on Site and elsewhere and, where practicable, would reduce flood risk overall.

1.2 Scope

1.2.1 Government policy on development and flood risk is set out in the National Planning Policy Framework (NPPF) [3] and is supported by National Planning Practice Guidance: Flood Risk and Coastal Change [NPPG ID7] [4].

1.2.2 NPPF paragraphs 161-186 set out the need for an appropriate assessment of flood risk at all levels of the planning process and require the application of a sequential risk-based approach to assess the suitability of land for development in flood risk areas[5].

1.2.3 The FRA should also make allowances for climate change[6] to minimise vulnerability and provide resilience to flooding and coastal change in the future. The allowances are predictions of anticipated change in:

- Peak river flow by river basin district.
- Peak rainfall intensity.
- Sea level rise.
- Offshore wind speed and extreme wave height.

1.2.4 The allowances are based on climate change projections and different scenarios of carbon dioxide emissions to the atmosphere. There are different allowances for different periods of time over the next century.

1.2.5 Site-specific FRAs are categorised according to level[7]. Simple Level 1 Screening studies give a general indication of the potential flood risk to a site and identify whether more detailed Level 2 assessment is required or not. A Level 2 assessment is a qualitative appraisal to develop understanding of flood risk to a site and the effects of the site on flooding elsewhere including recommended measures (see Section 5 - Avoid, Control, Mitigate, Manage). Level 3 assessments are more detailed quantitative studies, for example modelling to establish flood levels at a site in the absence of EA or other data or providing detailed outline drainage designs.

1.2.6 This report is a Level 2 qualitative FRA, which includes a Level 3 assessment of the surface water and foul drainage requirements for the proposed development.

[3] Ministry of Housing, Communities & Local Government (published March 2012 and updated February 2025). National Planning Policy Framework [https://www.gov.uk/government/publications/national-planning-policy-framework--2].
[4] Department for Levelling Up, Housing and Communities and Ministry of Housing, Communities & Local Government (published March 2014 and updated September 2025). Planning Practice Guidance ID7-020-20220825; Flood Risk & Coastal Change [https://www.gov.uk/guidance/flood-risk-and-coastal-change].
[5] https://www.gov.uk/guidance/national-planning-policy-framework/14-meeting-the-challenge-of-climate-change-flooding-and-coastal-change#footnote59
[6] Environment Agency (published February 2016 and updated May 2022). Flood Risk Assessments: Climate Change Allowances [https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances].
[7] CIRIA (October 2004) CIRIA C624 - Part C, Chapter 6, Section 6.1 to 6.3.

1.3 Aims

1.3.1 This FRA aims to provide enough flood risk information to satisfy the requirements of the NPPF, PPG ID7 and regional/local government plans and policies. It describes the potential for the Site to be impacted by flooding, the impacts of the proposed development on flooding elsewhere near the Site, and the recommended measures that could be incorporated into the development to manage the identified risks.

1.4 Planning Context

National Policy

1.4.1 The FRA was prepared in accordance with the NPPF and NPPG ID7.

Regional/Local Policy

1.4.2 The FRA considers the following policies within the Wiltshire Council Local Plan – Planning for Melksham (January 2021)[8], and the following policies within the Wiltshire Council Core Strategy (2015)[9] and the Joint Melksham Neighbourhood Plan (2020-2026)[10].

- Core Policy 67: Flood Risk
- Core Policy 68: Water Resources
- Core Policy 69: Protection of the River Avon
- Policy 3: Flood Risk and Natural Flood Management

Strategic Flood Risk Assessment (SFRA)

1.4.3 The FRA has reviewed the guidance within the Wiltshire Council Strategic Flood Risk Assessment (SFRA) report and associated mapping[11].

1.4.4 Below is a summary of our review which justifies the requirement of site-specific assessment of all sources of flooding as part of this FRA (refer to Section 4):

- The SFRA is a Level 1 Screening study. One of the aims of the SFRA (Section 1.5.1) is "*to be used as evidence and, where necessary, reference should also be made to relevant evidence in other documents detailed in this [SFRA] report. The Flood Zone maps and flood risk information on other sources of flooding contained in this SFRA should be used where appropriate to apply the Sequential Test.*"
- The mapping of key flooding sources (fluvial/tidal, groundwater, surface water) is based on the following data sources, with caveats on limitations detailed below:
  - Fluvial/Tidal - Flood Map for Planning (Rivers and Sea)[12]

[8] https://www.wiltshire.gov.uk/media/5638/Planning-for-Melksham/pdf/WLP_Market_Town_Planning_for_Melksham_FINAL.pdf?m=637938114955330000

[9] https://www.wiltshire.gov.uk/media/372/Wiltshire-Core-Strategy-adopted-2015/pdf/Wcs.pdf?m=637099399373530000

[10] https://www.wiltshire.gov.uk/media/6822/Joint-Melksham-Neighbourhood-Plan-2020-2026/pdf/Joint_Melksham_Neighbourhood_Plan_2020-2026_Made-_July_2021.pdf?m=1625751939583

[11] www.wiltshire.gov.uk/media/14443/SD32-Wiltshire-Council-Level-1-SFRA-2019/pdf/SD32_Wiltshire_Council_Level_1_SFRA_2019.pdf?m=1732884080003

[12] https://www.data.gov.uk/dataset/bed63fc1-dd26-4685-b143-2941088923b3/flood-map-for-planning-rivers-and-sea-flood-zone-3

Flood Zones describe the land that would flood from rivers if there were no defences present. They are based on broad scale modelling that has been refined with detailed hydraulic models in areas of higher risk. Where outlines are not infirmed by detailed hydraulic modelling, the Flood Map for Planning is based on generalised modelling to provide an indication of flood risk. Whilst the generalised modelling is mostly accurate on a large scale, it is not provided for specific sites or for land where the catchment area of the watercourse falls below 3km^2. For this reason, the Flood Map for Planning is not of a resolution for use as application evidence to provide details for flooding of individual properties or sites, and for any sites with watercourses on, or adjacent to the Site. Accordingly, for site specific assessments it will be necessary to perform more detailed studies in circumstances where flood risk is an issue. Where the Flood Map for Planning is based on generalised modelling, developers may be required to undertake their own detailed modelling.

- Groundwater - BGS Groundwater Flooding[13]

  The risk of groundwater flooding is dependent on local geological/soil conditions at any given time The JBA Groundwater Flood Map provides a detailed assessment of the risk of groundwater flooding emergence in a 1 in 100-year event at a 5m resolution. The risk is scaled between 0 and 4, 0 indicating no risk and 4 identifying groundwater levels either at or very near (within 0.025m of) the ground surface. The groundwater levels are compared against ground surface levels to determine the head difference in metres; with 0, suggesting artesian discharge of groundwater at the ground surface. The JBA Groundwater Flood Map should be used in combination with other information, such as local data or historic data. It should not be used as sole evidence for any specific flood risk management, land use planning or other decisions at any scale. The data can however help identify areas for further assessment at a local scale, where finer resolution datasets may exist or more data could be gathered.

- Surface Water - Risk of Flooding from Surface Water Extent[14]

  The RoFSW predominantly follows topographical flow paths of existing watercourses or dry valleys with some isolated ponding located in low lying areas. It should be noted that because of the broad-scale nature of surface water flooding, wherever possible, these mapped outlines should be used in conjunction with other sources of local flooding information to confirm the presence of surface water risk.

1.4.5 In summary, the SFRA gives a broad indication of the potential flow paths and flood extents from watercourses. At the planning application stage, developers should be expected to undertake more detailed hydrological and hydraulic assessments of the watercourses to verify flood extents, inform development zoning within the site and prove, if required, whether the Sequential and Exception Tests can be satisfied.

Guidance Documents / Best Practice

1.4.6 This FRA also considers the following flood risk and drainage guidance documents[15]:

- Wiltshire Council Developers Guidance Notes.
- Wiltshire Council Drainage Betterment Strategy.
- Wiltshire Local Flood Risk Management Strategy.

https://www.data.gov.uk/dataset/cf494c44-05cd-4060-a029-35937970c9c6/flood-map-for-planning-rivers-and-sea-flood-zone-2

[13] https://www.bgs.ac.uk/datasets/groundwater-flooding/

[14] https://www.data.gov.uk/dataset/95ea1c96-f3dd-4f92-b41f-ef21603a2802/risk-of-flooding-from-surface-water-extent-3-3-percent-annual-chance

[15] https://www.wiltshire.gov.uk/civil-emergencies-drainage

1.5 Report Structure

1.5.1 This report is structured as follows:

- Section 2 identifies the sources of information that were consulted.
- Section 3 describes the existing Site.
- Section 4 outlines the baseline flood risk from all sources.
- Section 5 details the recommended measures against identified flood risk sources.
- Section 6 assesses the surface water drainage requirements of the proposed development.
- Section 7 assesses the foul drainage requirements of the proposed development.
- Section 8 presents a summary and conclusions.

2.0 Sources of Information

2.1 Sources of Information

2.1.1 The following information was consulted:

- Ordnance Survey mapping (Drawings 001 and 002).
- Detailed topographic survey (Appendix 2).
- EA online mapping (Flood Map for Planning[16], Long Term Flood Risk Assessment for Locations in England[17], Catchment Data Explorer[18] and Main River Map[19]).
- EA Reduction in Risk of Flooding from Rivers and Sea online mapping[20].
- Online mapping for Climate Change Allowances for Peak River Flow and Peak Rainfall in England online mapping[21].
- National Soils Resources Institute (NSRI): Soilscapes online mapping[22].
- British Geological Survey [BGS] Geology Viewer online mapping[23].
- British Geological Survey [BGS] Borehole Records online mapping[24].
- Landmark's Promap: Flood Data package (see Drawings).
- Geosmart 1 in 100-year groundwater flood risk map (see Drawings).
- DEFRA's Magic Map for identifying Designated Sites[25].
- River Levels UK for identifying Flood Alert and Flood Warning areas[26].

2.2 Consultation and Discussion with Regulators

2.2.1 Consultation and discussions were undertaken with the relevant water regulators.

Environment Agency

2.2.2 The Environment Agency (EA) is a statutory consultee on flood risk and planning and is directly responsible for the prevention, mitigation, and remediation of flood damage for main rivers and coastal areas; and it has a strategic overview for all forms of flooding.

2.2.3 EA Standing Advice[27] and the NPPF/PPG ID: 7 was consulted and reviewed. The Environment Agency were also consulted as part of the modelling undertaken for the Site.

[16] https://flood-map-for-planning.service.gov.uk/
[17] https://flood-warning-information.service.gov.uk/long-term-flood-risk/
[18] http://environment.data.gov.uk/catchment-planning/
[19] https://environment.maps.arcgis.com/apps/webappviewer/index.html?id=17cd53dfc524433980cc333726a56386
[20] ArcGIS - My Map
[21] https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances
[22] https://www.landis.org.uk/soilscapes/
[23] https://www.bgs.ac.uk/map-viewers/bgs-geology-viewer/
[24] https://www.bgs.ac.uk/information-hub/borehole-records/
[25] https://magic.defra.gov.uk/magicmap.aspx
[26] https://riverlevels.uk/flood-map#.XclKwPn7RPZ
[27] Environment Agency and Department for Environment, Food & Rural Affairs (published April 2012 and updated April 2025). Preparing a Flood Risk Assessment: Standing Advice [https://www.gov.uk/guidance/flood-risk-assessment-standing-advice].

2.2.4 Correspondence with the EA is included in Appendix 3.

Lead Local Flood Authority

2.2.5 Wiltshire County Council as the Lead Local Flood Authority (LLFA) is responsible for local flood risk management in their area and for maintaining a register of flood risk assets. They also have lead responsibility for managing the risk of flooding from surface water, groundwater, and ordinary watercourses.

2.2.6 Correspondence with the LLFA is included in Appendix 4.

Water Utility

2.2.7 Drainage and sewerage services in the UK are provided by a number of water and sewerage companies. Wessex Water is responsible for sewerage within the area of the development.

2.2.8 All sewerage undertakers maintain the 'DG5 register' of properties and external areas (such as gardens, highways, open spaces) which have suffered flooding from public foul/combined sewers. It does not include flooding caused by blockages.

2.2.9 Wessex Water asset plans and correspondence are included in Appendix 5.

2.3 Site Walkover

2.3.1 Enzygo staff carried out a walkover of the Site during June 2022. Observations made were used to inform the Site description.

3.0 Site Location and Description

3.1 Location

3.1.1 The development is located on land north of Sandridge Common, Melksham, SN12 7QY.

3.1.2 The development is centred on National Grid Reference (NGR) 391963, 164531.

3.1.3 The 14.95ha development location is shown in Drawing SHF.102.003.HY.D.001 and in more detail in Drawing SHF.102.003.HY.D.002.

3.2 Land Use

3.2.1 The land use is comprised of several parcels of agricultural land, bounded and divided by hedgerows and trees (Figures 3.1 and 3.2). A watercourse conveys flow south to north and bisects the development east to west.

3.2.2 The development is bounded by; residential dwellings and Sandridge Common (road) to the south; agricultural buildings, New Road with agricultural land beyond to the east; agricultural land to the north and residential dwellings to the west. A residential dwelling with associated access track inundates but is located outside the eastern boundary of the development.

3.2.3 The development is currently accessed via gated access along Sandridge Common to the south and gated access off New Road to the east.

Figure 3.1: Photographs of the Site



View from the east of the Site looking west.



View from the south of the Site looking north.

Figure 3.2: Aerial Photograph of the Site



Image © 2025 Digital Globe.

3.3 Topographic Information

3.3.1 A detailed topographic survey was undertaken in June 2023 (Appendix 2). The Site has been divided into four topographic land parcels shown in Figure 3.3.

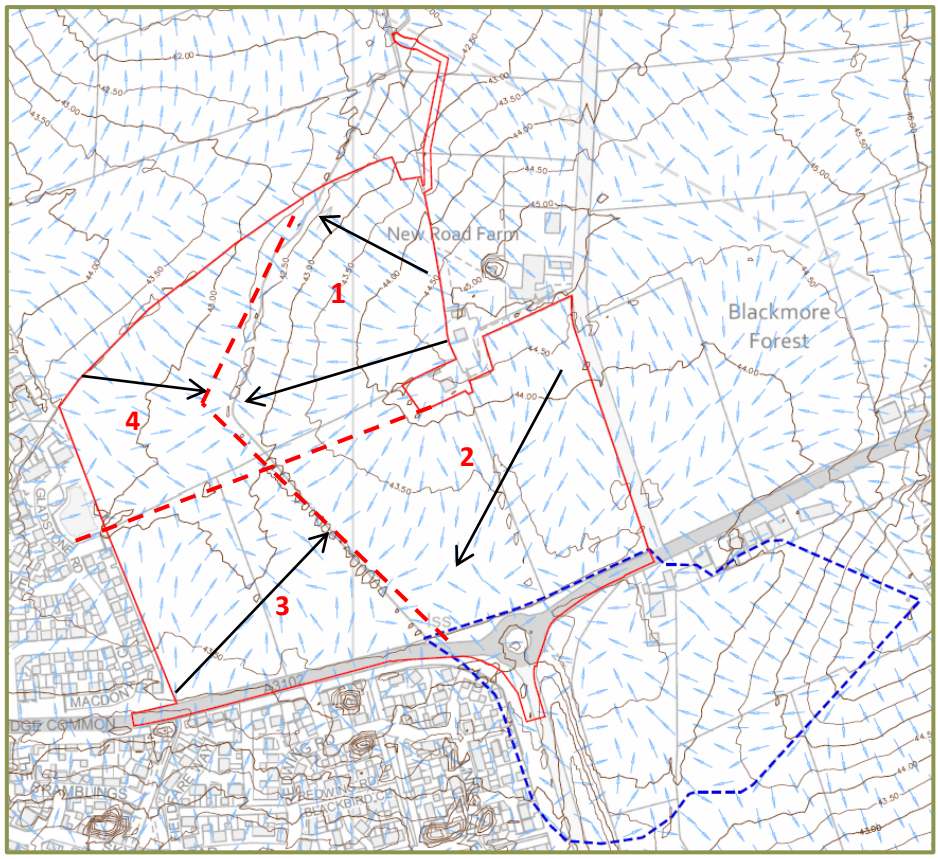
3.3.2 Parcel 1 falls northwest and west from 45.19m AOD to 42.31m AOD. The fall of 2.88m over 171m gives a gradient of 1:59.

3.3.3 Parcel 2 falls southwest from 44.49m AOD to 43.14m AOD. The fall of 1.35m over 280m gives a gradient of 1:207.

3.3.4 Parcel 3 falls northeast from 44.41m AOD to 42.84m AOD. The fall of 1.57m over 204m gives a gradient of 1:129.

3.3.5 Parcel 4 falls east from 43.73m AOD to 42.10m AOD. The fall of 1.63m over 140m gives a gradient of 1:85.

Figure 3.3: Summary of Site Topography



3.4 Soils and Geology

Soils Mapping

3.4.1 The Soilscapes online soils map viewer shows that the development is underlain by slowly permeable seasonally wet slightly acid but base rich loamy and clayey soils (Figure 3.4).

3.4.2 The soils mapping is indicative and there may be localised variation in soil type.

Figure 3.4: Soils Mapping

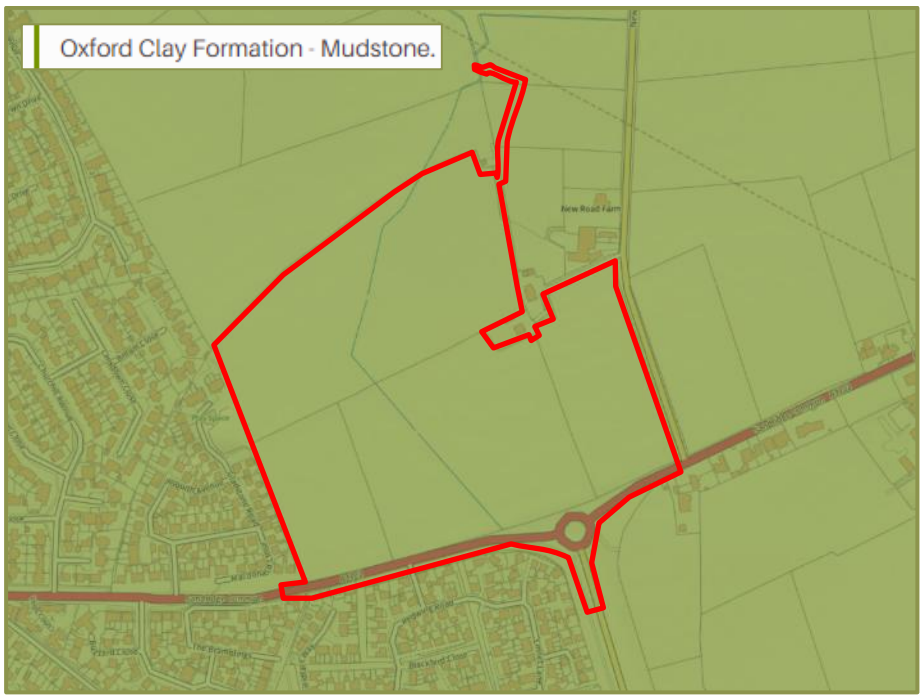


Soils Data © Cranfield University (NSRI) and for the Controller of HMSO [2025].

Geology Mapping

3.4.3 The Geology of Britain online map viewer (Figure 3.5) shows there are no superficial deposits recorded beneath the development. The bedrock beneath the development is Oxford Clay Formation - mudstone.

Figure 3.5: Geology Mapping



Bedrock Geology Contains British Geological Survey materials © NERC [2025].

BGS Borehole Records

3.4.4 The Geology of Britain online map viewer shows there are no historical boreholes located within or around the development boundary.

Soakaway Testing

3.4.5 Soakaway testing was undertaken by Eastwood Consulting engineers during October 2023 (included in Site Investigation report REF: 48309-ECE-XX-XX-RP-C-0002). Six trial pits were excavated to depths of 0.9-2m bgl across the development.

3.4.6 Each of the tests was allowed to run for at least three hours and over this time period the water level in the pits did not drop. As such it has not been possible to calculate infiltration rates. Based on these results infiltration drainage is unlikely to be viable and alternative surface water drainage options will need to be considered.

3.5 Hydrogeology

Infiltration Potential

3.5.1 The SuDS Infiltration Potential Mapping (Drawing 005) shows the entire development is in the mapped extent indicative of low potential, which is likely to be associated with the underlying bedrock geology.

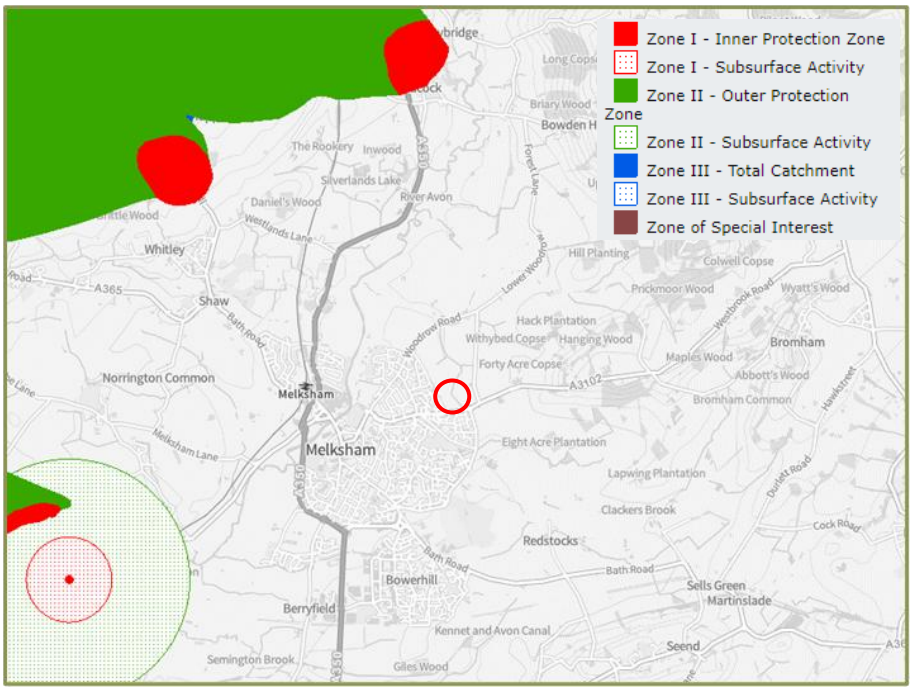
3.5.2 The clayey soils and geology are indicative of low infiltration potential.

3.5.3 Soakaway testing demonstrated low infiltration potential.

Defra Magic Map

3.5.4 The online Defra Magic Map mapping (Figure 3.6) shows the development is not located in a groundwater Source Protection Zone (SPZ).

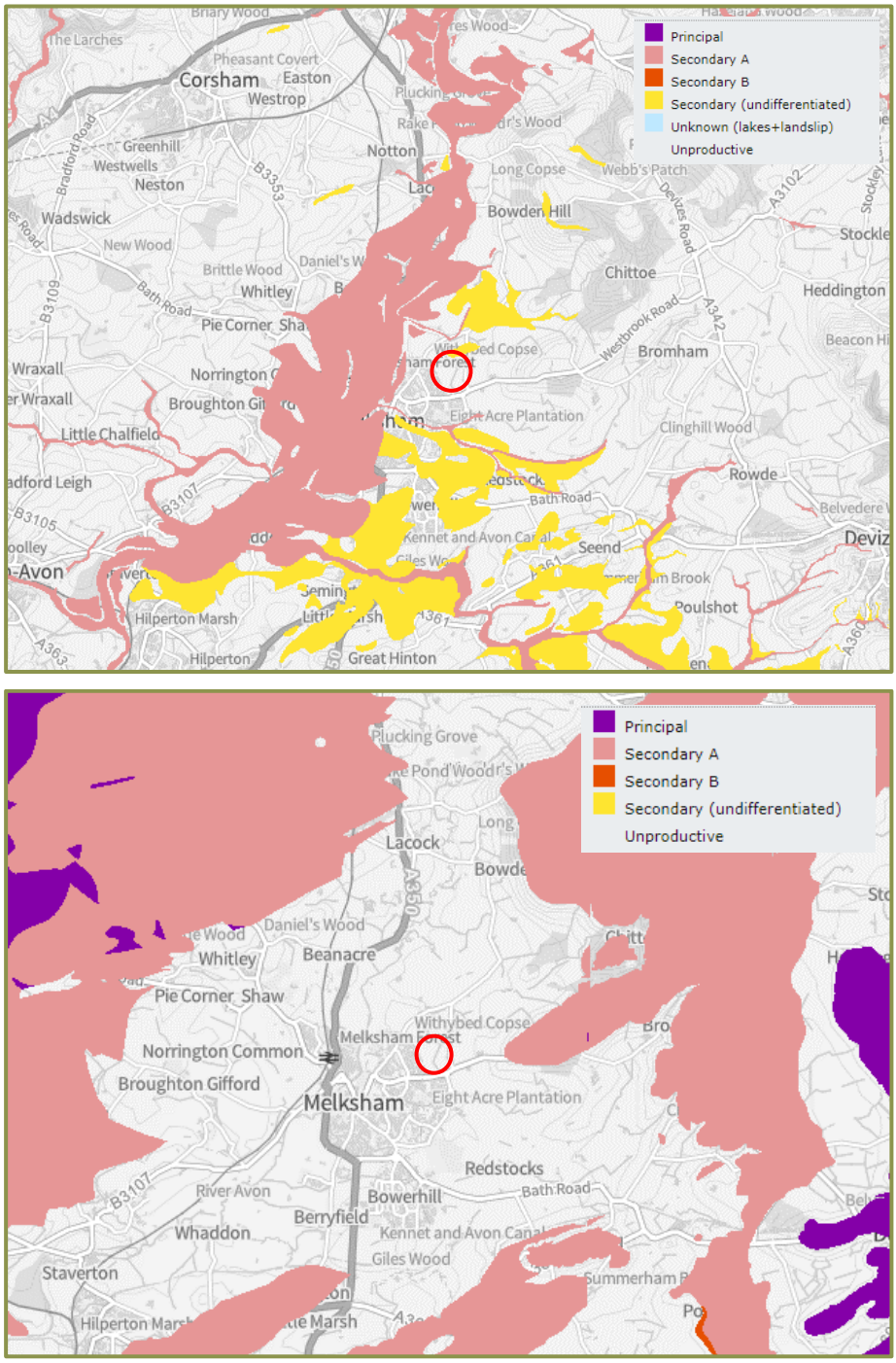
Figure 3.6: Source Protection Zone Map



From Magic Map. Contains EA information © EA and database right [2025].

3.5.5 The development is not located above a Principal Aquifer (bedrock designation). The development is not located above any other aquifers (Figure 3.7).

Figure 3.7: Aquifer Designation Map



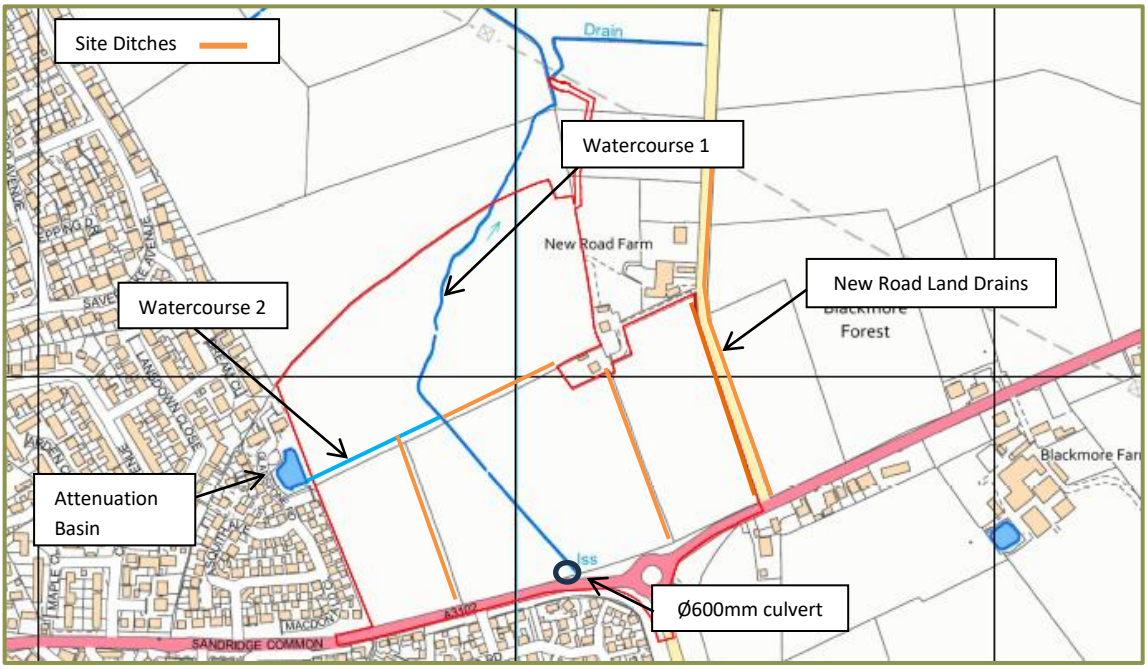
Top: Aquifer Designation (superficial deposits). Bottom: Aquifer Designation (bedrock). From Magic Map. Contains EA information © EA and database right [2025].

3.6 Catchment Hydrology

OS Mapping and Site Walkover Observations

3.6.1 OS mapping (Figure 3.8) shows an unnamed watercourse originating from issues in the south of the development hereafter referred to as 'Watercourse 1'. Watercourse 1 is a 'Main River' under the authority of the Environment Agency. The presence of Watercourse 1 was confirmed during the site walkover with walkover observations described below.

Figure 3.8: Map of Watercourses



Watercourse 1

3.6.2 Watercourse 1 conveys flow north through the centre of the development, originating through a Ø600mm culvert along the central southern boundary.

3.6.3 The channel was uniform in shape throughout its reach with approximately 1m bed width, 3.5m top of bed, 1.5m depth and approximately 1:3 side slopes (Figure 3.9).

3.6.4 Watercourse 1 was observed to be dry and heavily vegetated which is considered normal for the time of year (June 2023).

Figure 3.9: Watercourse 1



Left: Watercourse 1 within centre of the development. Right: Ø600mm culvert at southern boundary

Watercourse 2

3.6.5 A second watercourse was observed conveying flows east through the centre of the development ('Watercourse 2' [Figure 3.10]). The watercourse was observed to originate at the balancing pond from the adjacent development to the west of the development. The balancing pond of the adjacent development has been sized to attenuate the 1 in 100-year storm event with discharge at the QBAR rate of 15.4l/s. Watercourse 2 joins Watercourse 1 within the centre of the development.

Figure 3.10: Watercourse 2



Left: Balancing Pond on adjacent development Right: Watercourse 2 looking east

Land Drains

3.6.6 Two land drains (Figure 3.11) were also observed along the development's eastern boundary along New Road. The land drain conveyed flows north along New Road.

3.6.7 There were several ditches acting as informal field boundary ditches within the hedgerows. They were dry and contained grass at the time of the walkover.

Figure 3.11: Land Drains along New Road



Ditch on west of New Road conveying flow north.

CCTV Survey

3.6.8 A CCTV survey was undertaken in June 2023 (Appendix 7). The survey observed Watercourse 1 emerging from a Ø600mm culvert. The manhole that contained the culvert also had two inlets, a Ø225mm pipe from the west and a Ø300mm pipe from the east. Both pipes were silted and partially surcharged.

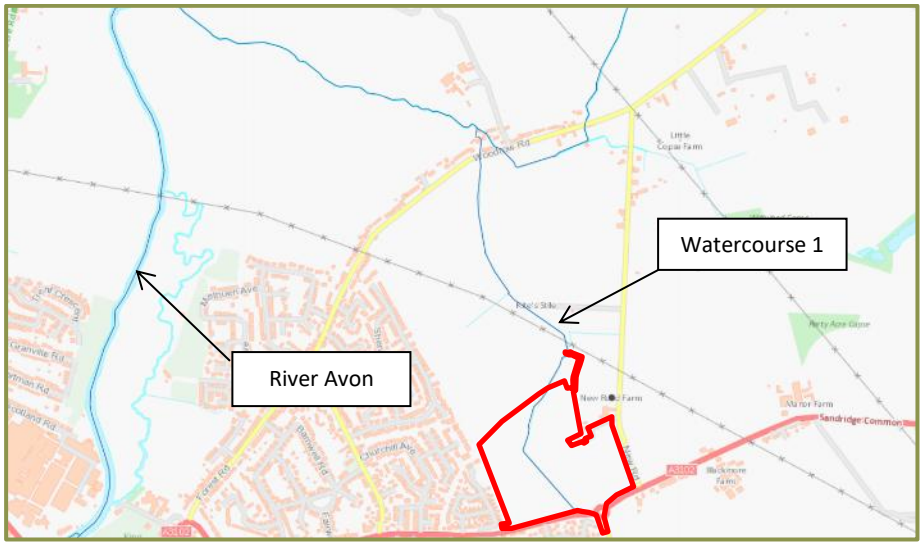
3.6.9 There were drainage gullies along Sandridge Common. They ran into a separate surface water sewer system and flowed east. It is presumed that the culvert connected to the watercourse is attached to the roads original drainage system. When the new residential development was built to the south of the development, they created a new surface water system along Sandridge Common.

Main River Map

3.6.10 The Environment Agency online main river map (Figure 3.12) identifies Watercourse 1 as a 'main river', which is a watercourse where flood risk work is carried out by the Environment Agency. It is also a tributary of the River Avon which lies 1.2km west of the development at its closest point.

3.6.11 Watercourse 2 is an 'ordinary watercourses', where flood risk work is carried out by the local authority or riparian landowner.

Figure 3.12: Main River Map

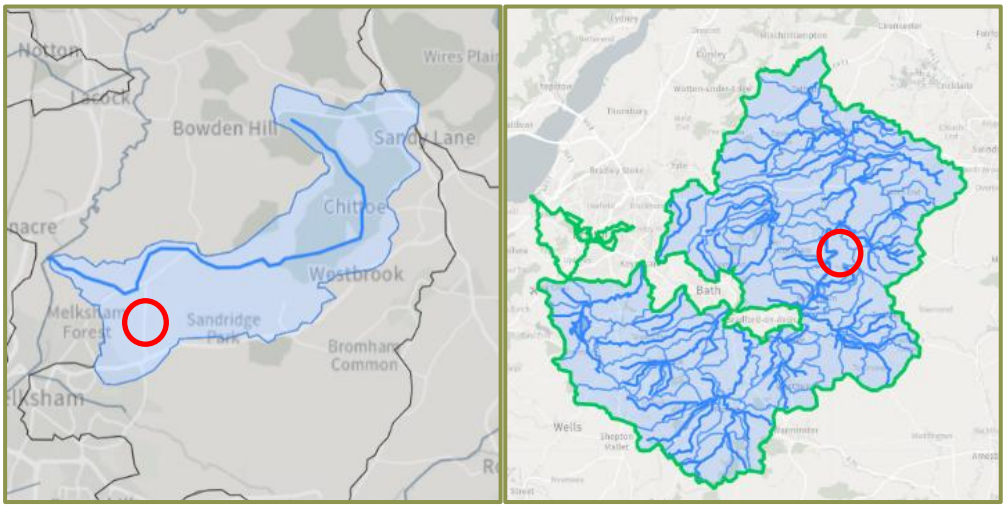


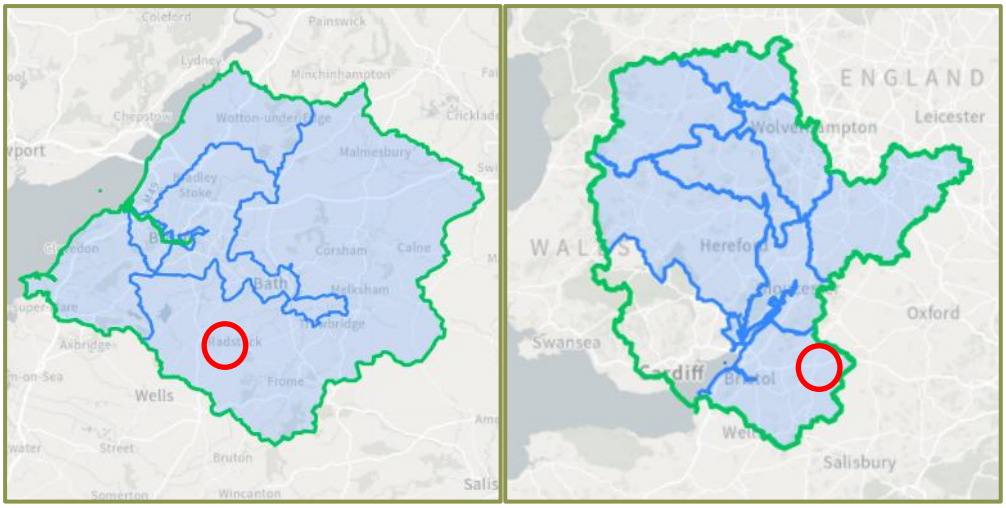
Contains EA information © EA and database right [2025].

EA Catchment Data Explorer Mapping

3.6.12 The development resides within the Forest Brook Water Body (Figure 3.13), which is within the Avon Bristol Rural Operational Catchment, Avon Bristol and Somerset North Streams Management Catchment and Severn River Basin District.

Figure 3.13: Catchment Data Explorer





Top Left: Forest Brook Water Body. Top Right: Avon Bristol Rural Operational Catchment. Bottom Left: Avon Bristol and Somerset North Streams Management Catchment. Bottom Right: Severn River Basin District. Contains EA information © EA and database right [2025].

3.7 Sewerage Assets

3.7.1 Wessex Water asset plans show that there is a network of public sewers surrounding the development. There is a Ø150mm private surface water sewer and a Ø125mm private foul water sewer located within the housing estate to the west of the development. A section 104 surface water sewer outfalls into the balancing pond.

3.7.2 An abandoned foul rising main conveys flow along the southern boundary of the development. Wessex Water were consulted, and it was agreed that this could be removed as part of the development subject to any open end being fully sealed to prevent groundwater and rodents (Appendix 5).

3.7.3 Two private rising main runs east - west along Sandridge Common along with a Ø150mm public foul sewer that exits Sandridge Common and conveys flow south down Eastern Way.

3.7.4 There are two water distributions mains, 4” and 12” conveying flow through the southern boundary of the development. The distribution mains have been surveyed and mapped as part of the FRA (Appendix 8).

3.7.5 A Ø450mm highway drain runs from west to east through the west of the development and outfalls into Watercourse 1 (Figure 3.14).

Figure 3.14: Highway Drain



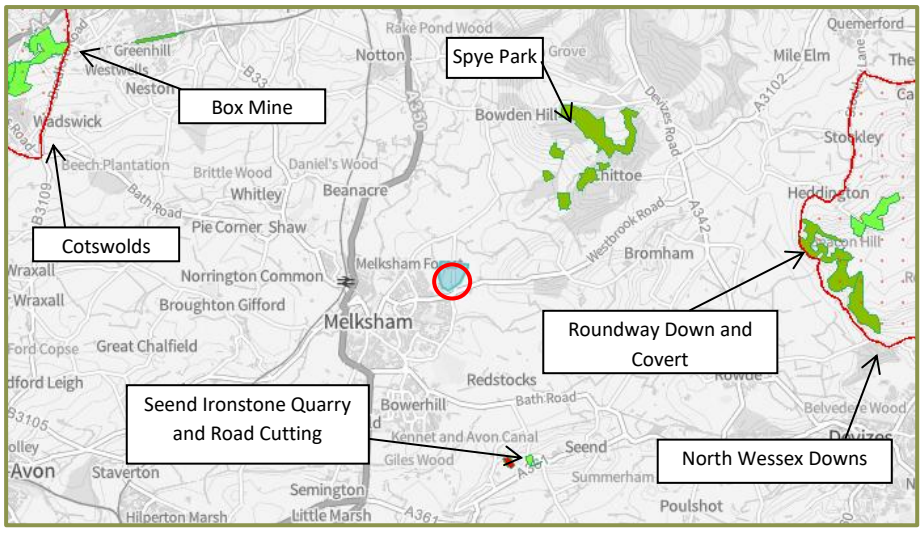
3.8 Designated Sites

3.8.1 The DEFRA Magic Map (England and Wales) (Figure 3.15) shows the nearest designated sites include;

- Roundway Down and Covert (SSSI) 7km east.
- Box Mine (SSSI) 8.7km northwest.
- Cotswolds (Areas of Outstanding Natural Beauty) 8.4km west.
- Spye Park (Site of Special Scientific Interest [SSSI]) 2.5km northeast.
- Seend Ironstone Quarry and Road Cutting (SSSI) 3.6km south.

3.8.2 However, these designated sites do not have a hydrological connectivity to the development. The proposed development would not impact any designated sites.

Figure 3.15: Designated Sites



From Magic Map. Contains EA information © EA and database right [2025].

4.0 Assessment of Flood Risk Sources

4.1 Potential Sources of Flooding

4.1.1 A summary of the potential sources of flooding and source is summarised in Table 4.1. Each source of flooding and level of risk is then assessed in further detail below.

Table 4.1: Potential Risk Posed by Flooding Sources

Flooding Source	Potential Flood Risk at Application Site (Yes/No)	Potential Source	Data Sources
Fluvial	Yes	Watercourse 1, 2 and Land Drains	EA consultation response/data (Appendix 3) and EA Flood Zone mapping (Drawing 003).
Tidal	No	None identified	EA consultation response/data (Appendix 3) and EA Flood Zone mapping (Drawing 003).
Groundwater	No	None identified	Geosmart Groundwater (Drawing 004) and Soakaway Test Results (Appendix 7).
Surface Water	Yes	Poor permeability and Site topography	EA Complex Surface Water Flood Mapping (Drawings 006.1 to 006.2).
Sewers and Mains	Yes	Water Mains	Wessex Water asset plans (Appendix 5)
Infrastructure Failure	Yes	Highway Drain	OS mapping (Drawings 001 to 002) and EA online mapping: Long Term Flood Risk Assessment for Locations in England.

4.2 Fluvial Flooding

EA Flood Zone Mapping

4.2.1 The EA Flood Zones are the current best information on the extent of the extremes of flooding from rivers or the sea that would occur without the presence of flood defences, since these can be breached, overtopped and may not be in existence for the lifetime of a development.

4.2.2 The Environment Agency flood map (Drawing 003) shows most of the development is located within Flood Zone 1; outside the 1 in 1000-year probability of fluvial (river) flooding (0.1% Annual Exceedance Probability [AEP]), at 'low' risk. However, there are extents of south east of the Site and through the centre of the Site located within Flood Zone 2 (land between the 1 in 100-year (1% AEP) and 1 in 1000-year (0.1% AEP) probability of fluvial flooding, at 'medium' risk) and Flood Zone 3 (land within the 1 in 100-year [>1%AEP]).

Modelled Flood Levels and Flood Outline Mapping

4.2.3 Enzygo undertook a modelling exercise to refine the flood outlines.

4.2.4 The outlines from the data source tables on the EA flood map state the flood map in this location is derived from a direct rainfall model and not a fluvial model and therefore surface water is the dominant source of flooding across the Site. We would support this consensus

given the flooding originates to the east of the Site where there are no observed of mapped watercourses and the flows are generated by Site topography.

4.2.5 Full details of the modelling are outlined in the technical note Document Reference: SHF.102.003.HY.R.004.C, October 2025, Appendix 9.

4.2.6 SFRA mapping shows that the development is outside the mapped extent of the recorded historical fluvial flood events of 1999.

4.2.7 Correspondence with the Environment Agency (Appendix 3) confirmed they hold no records of historical flooding in the immediate vicinity of the development.

Flood History

4.2.8 The Environment Agency online historic flood map shows the development is located outside the mapped extent of historic flooding.

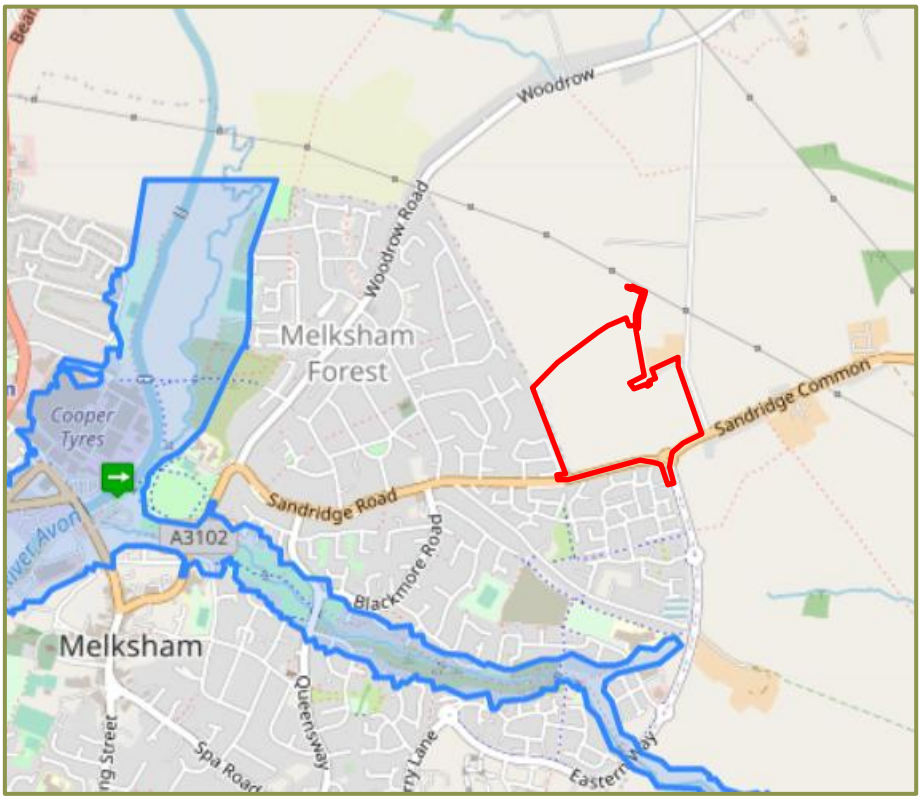
Flood Defences

4.2.9 Environment Agency online flood mapping and SFRA mapping show that the development does benefit from flood defences along the reaches of Watercourse 1 in the form of naturally high ground along its reach. The standard of protection (return period) is not recorded.

Flood Warning Service

4.2.10 The River Levels UK website (Figure 4.1) shows the development is not within a flood warning area but the land to the west and south of the development is located within an area which receives flood warnings for Mid Bristol Avon area.

Figure 4.1: Flood Warning Areas



River Levels UK [2025].

Flood Risk Summary

4.2.11 The risk of fluvial flooding is assessed as negligible for most of the development with a residual risk of flooding from the onsite watercourses; Watercourse 1 and Watercourse 2.

Residual Risk

4.2.12 There is a residual risk of flooding from the onsite watercourses; Watercourse 1 and 2.

4.2.13 Measures required for residual fluvial flooding are discussed in Section 5.

4.3 Tidal Flooding

EA Flood Zone Mapping

4.3.1 OS mapping (Drawings 001 to 002) shows the development is not located close to tidally affected flooding sources.

Flood Risk Summary

4.3.2 The risk of tidal flooding is assessed as negligible.

4.4 Groundwater Flooding

Introduction

4.4.1 Groundwater flooding occurs when subsurface water emerges either at surface or in made ground or in subsurface structures such as basements and services ducts. It occurs as diffuse seepage, emergence from new point source springs or an increase in flow from existing springs. It results from aquifer recharge from infiltrating rainfall, from sinking streams entering aquifers from adjacent non-aquifers, or from high river levels or tides driving water through near surface deposits. It tends to occur with a delay following rainfall and can last for several weeks or months. Groundwater flooding or shallow water tables also prevent or reduce infiltration and so can worsen surface water flooding.

Flood History

4.4.2 Consultation with the LLFA reported no historical groundwater flooding incidents within the development boundary.

SFRA Mapping

4.4.3 SFRA mapping shows the development is in a location where there is no susceptibility to groundwater flooding. The mapping also shows there are no historical groundwater flooding incidents within the vicinity of the development.

4.4.4 The SFRA mapping is coarse and should be superseded by the Geosmart groundwater flood risk map.

Geosmart Groundwater Flood Risk Map

4.4.5 The Geosmart 1 in 100-year groundwater flood risk map (Drawing 004) shows the development is at negligible risk of groundwater flooding and falls within Risk Class 4 (Table 4.2).

4.4.6 Mapped classes combine understanding of likelihood, model and data uncertainty, and possible severity. Likelihood is ranked according to whether we expect groundwater flooding

at a site due to extreme elevated groundwater levels with an annual probability of occurrence greater than 1%, considering model and data uncertainty. Severity relates to expectations of the amount of property damage or other harm that groundwater flooding at that location might cause (Table 4.2).

Table 4.2: Groundwater Flood Risk Classification

Risk Class	Probability of Groundwater Flooding	Effect
4: Negligible	Annual probability less than 1%.	Negligible unless unusually sensitive use.
3: Low	Annual probability greater than 1%.	Remote possibility of damage to property or harm to sensitive receptors Flooding likely to be limited to seepages and waterlogged ground, damage to basements and subsurface infrastructure, and should pose no significant risk to life. Surface water flooding may be worsened.
2: Moderate	Annual probability greater than 1%.	Significant possibility of damage to property or harm to other sensitive receptors at or near this location. flooding is likely to be in the form of shallow pools or streams. Surface water flooding and failure of drainage systems may be worsened when groundwater levels are high.
1: High	Annual probability greater than 1%.	Groundwater flooding will occur which could lead to damage to property or harm to other sensitive receptors at or near this location. Flooding may result in damage to property, road, or rail closures and, in exceptional cases, may pose a risk to life. Surface water flooding and failure of drainage systems may be worsened when groundwater levels are high.

Flood Risk Summary

4.4.7 The risk of groundwater flooding is assessed as negligible.

4.5 Surface Water Flooding

Introduction

4.5.1 Surface water flooding occurs following rainfall on ground where infiltration rates are less than the rainfall precipitation rate. This can occur when either:

- Soils or ground materials are naturally of low permeability or have been compacted (infiltration excess runoff).
- Soils or ground materials are saturated from previous rainfall either directly or from upslope (saturation excess runoff and return flow) or from high groundwater levels.

Flood History

4.5.2 Consultation with the LLFA reported no historical surface water flooding incidents within the development boundary.

SFRA Mapping

4.5.3 SFRA mapping recorded no incidents of surface water flooding within or around the development.

4.5.4 The SFRA mapping is superseded by the more detailed Environment Agency Complex Surface Water Flood mapping.

EA Online Surface Water Flood Mapping

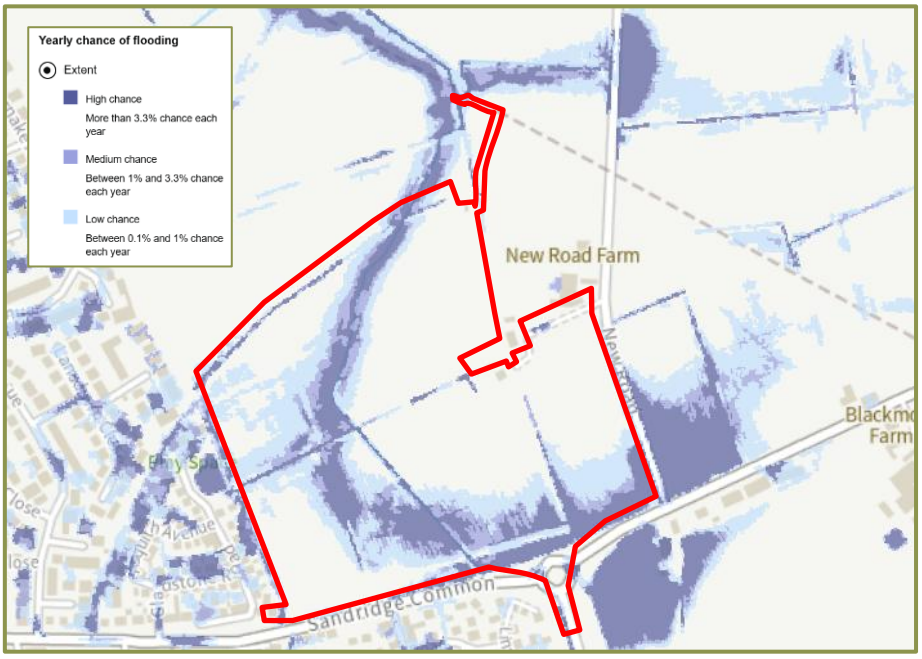
4.5.5 The Environment Agency Online Surface Water Flood Mapping (Drawings 006.1 to 006.2, Figure 4.2) shows the Site is located within the mapped extent of surface water flooding. A surface water flow pathway conveys flows from west to east and then north through the centre of the Site.

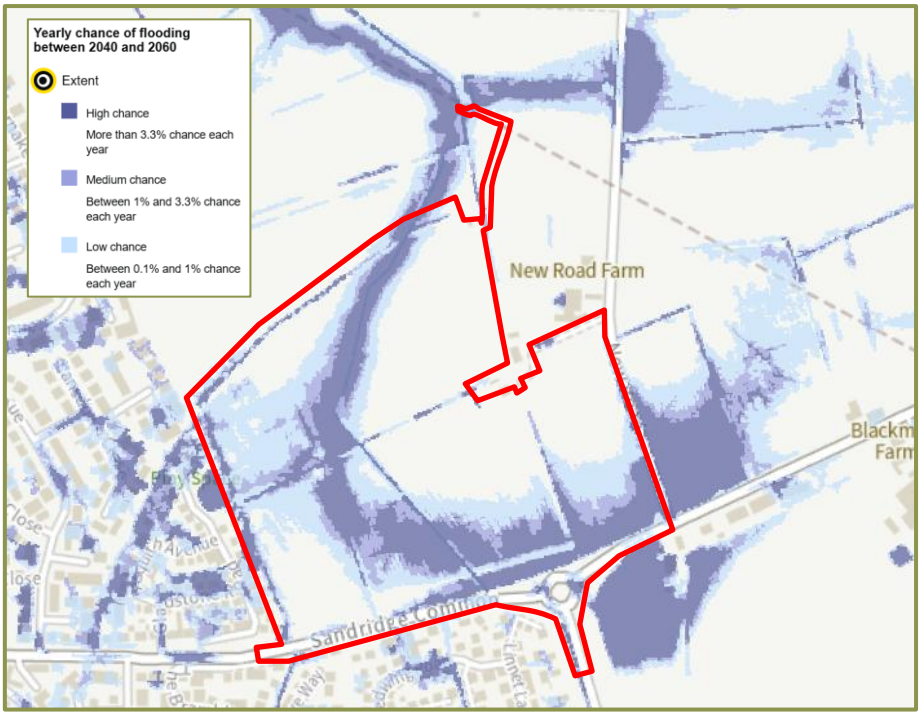
4.5.6 The EA Flood Map for planning shows the Site to be in Flood Zones 2 and 3, however, this is representative of surface water flooding as detailed above (4.2.4) and is the dominant source of flooding to the Site.

4.5.7 The flow pathway is associated with Low (>0.1% to <1% AEP) to High (>3.3% AEP) chance of flooding between 2040 to 2060. A summary of depths is described below.

- 20cm Flood Depth: 'Low' to 'High' chance.
- 30cm Flood Depth: 'Low' to 'High' chance.
- 60cm Flood Depth: 'Low' to 'High' chance within watercourse channel.
- 90cm Flood Depth: 'Low' to 'Medium' chance within watercourse channel.

Figure 4.2: Environment Agency Surface Water Flood Outlines




Yearly chance of flooding between 2040 and 2060
Extent
High chance
More than 3.3% chance each year
Medium chance
Between 1% and 3.3% chance each year
Low chance
Between 0.1% and 1% chance each year
New Road Farm
Sandridge Common


To 20cm (8in)
To 30cm (1ft)
To 60cm (2ft)
To 90cm (3ft)
New Road Farm
Sandridge Common


To 20cm
(8in)
To 30cm
(1ft)
To 60cm
(2ft)
To 90cm
(3ft)
New Road Farm
Play Space
Lansdown Close
Gladstone Road
Redwing Road


To 20cm
(8in)
To 30cm
(1ft)
To 60cm
(2ft)
To 90cm
(3ft)
New Road Farm
Play Space
Lansdown Close
Gladstone Road
Redwing Road



Surface Water Flooding Analysis

4.5.8 The surface water flood mapping does not consider a host of betterment features (watercourses, culverts, surface water management strategies and highways drainage [Figure 4.3]). As such further analysis in the form of modelling was undertaken to bring the mapping up to date.

Figure 4.3: Observed Highway Drainage



Left: observed highway drainage at roundabout south of the development. Right: highway drainage adjacent to watercourse in Sandridge Common (Image © 2024 Digital Globe)

LLFA Correspondence and Meetings

4.5.9 A meeting with Wiltshire County Council was held during February 2024 to discuss the proposals to deal with surface water flooding across the development the approach was supported to refine the surface water flooding through pluvial modelling. Correspondence with Wiltshire Council is included in Appendix 4.

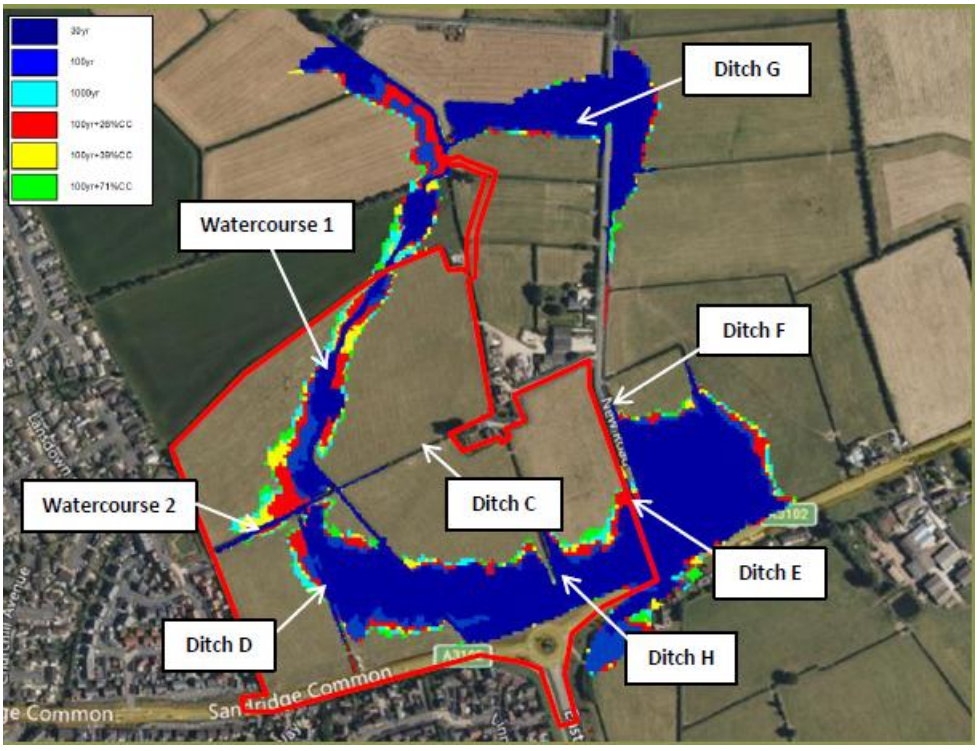
Hydraulic Modelling

4.5.10 Enzygo Ltd undertook a 'baseline scenario' hydraulic modelling exercise (Appendix 9, Document Reference: SHF.102.003.HY.R.004.C, October 2025), including the 1 in 30-year event to represent the functional floodplain (Flood Zone 3b), the 1 in 100-year event to represent Flood Zone 3a, the 1 in 100-year event with latest climate change allowances (26% Central, 39% Higher and 71% Upper for the Avon Bristol and North Somerset Streams Management Catchment) and the 1 in 1000-year event to represent Flood Zone 2.

4.5.11 A summary of the modelling methodology and findings is included below, and mapped baseline outline extracts are included in Figure 4.4.

- The model results show that all return events exceed the banks of the Watercourse 1 channel as well as Watercourse 2, Ditches D, E, H, F and G. Flows remain in channel for Ditch C. Flows remain in channel for Ditches C and D for their entire reach (Figure 4.4).
- Ditch E exceeds via the left bank and continue to exceed ditches to the west along the southern boundary of the Site until Watercourse 1 is reached. Flows also exceed the right bank and follow the local topography before entering the wider ditch network.
- Ditch H exceeds the capacity of the channel during all return events within the upstream extent of the watercourse and inundates the low-lying land to the east.
- The upper model extent displays low sensitivity to Manning's roughness changes and inflow changes, with minimal changes shown when blockages are simulated within the model domain. Changes are as expected and result in minor changes to flood extents with no significant changes to flow pathways, i.e. the creation of new or removal of baseline pathways.

Figure 4.4: Baseline Modelled Flood Outlines



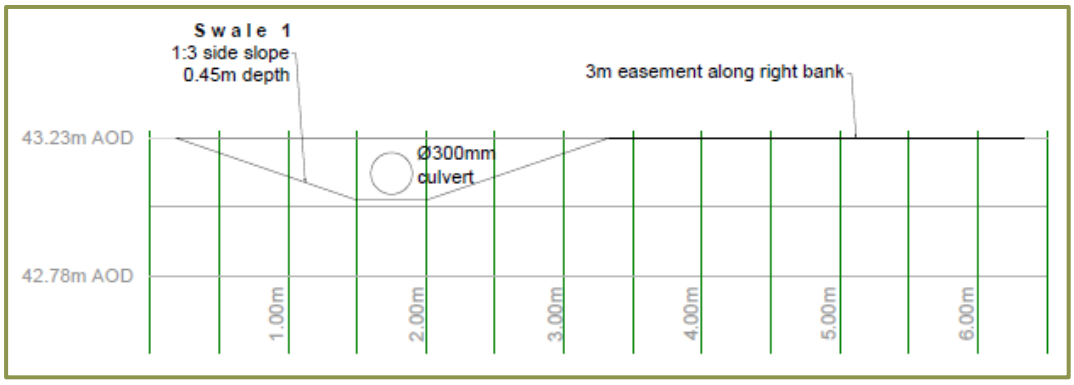
4.5.12 The flow pathway entering the development from the west would have restricted flows as a result of the new development's surface water management strategy whereby flows are controlled within the attenuation basin and discharged at a controlled rate (QBAR) into Watercourse 2. The flows entering the development from the east would be significantly reduced by Ditch E and F.

4.5.13 Nevertheless, there is still flooding present within the development following the baseline modelling exercise and therefore a betterment opportunity was identified.

4.5.14 The model was re-run for a 'proposed scenario' (Appendix 9, Document Reference: SHF.102.003.HY.R.005.B, October 2025), which included the following (Drawing SHF.102.003-ENZ-XX-DR-D-0005 – Swale Cross Sections):

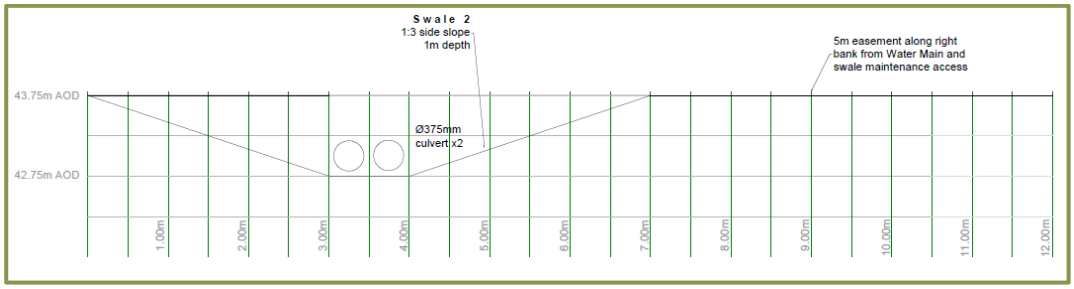
- Removal of Ditch D from the model.
- Introduction of new swale (Swale 1), designed to intercept the highway drainage at the western development boundary. This would improve maintenance and water quality of the asset. The swale was sized based on the highway drainage discharging at full bore from the Ø450mm asset (conservative approach). The designed swale has a 1:3 side slope, with a 0.45m depth and an easement of 3m along the right-hand bank (Figure 4.5).

Figure 4.5: Swale 1 – Example Dimensions



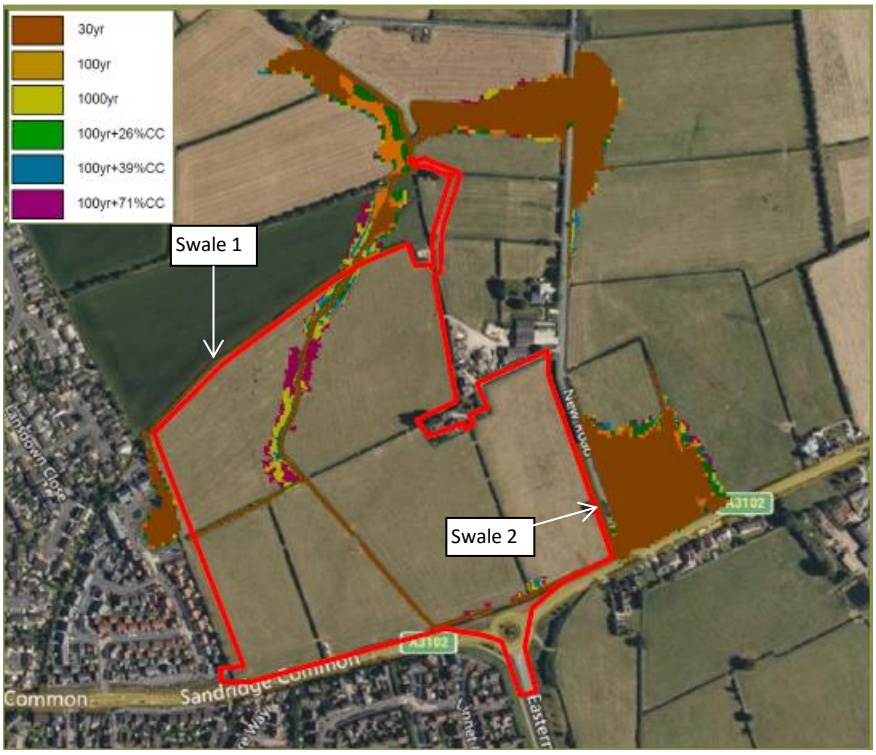
- Removal of Ditch C and H.
- Shortening of Ditch E. A new channel ('Swale 2') is to be routed along the southern and eastern boundary of the development to convey intercepted surface water flows from Ditch E to Watercourse 1. Ditch E has been regraded with a 3m easement along the right-hand bank. Swale 2 has a 1:3 side slope, with a 1.00m depth and an easement of 5m along the southern bank accounted for the existing water main and to allow maintenance access (Figure 4.6). 2 x Ø375mm culverts have been added to Swale 2 to convey flows under the proposed access to the development. The swale and culverts have been designed to convey the 1 in 100yr+71%CC event.

Figure 4.6: Swale 2 – Example Dimensions



- The resultant output from the modelling shows that flows for all return periods remain in channel (Figure 4.7).

Figure 4.7: Modelled Flood Outlines – Proposed



Conclusions

4.5.15 The proposed modelling outputs shows that the surface water flow pathways from the east and south of the development can be intercepted and conveyed around the development with suitably sized interception swales offering a betterment to existing conditions and alleviating flooding across the development. The modelling also demonstrates there would be no increase to flooding in the watercourse downstream and reduces the flood extent outside the eastern boundary of the development. Full details of the modelling and report can be found in Appendix 9.

Flood Risk

4.5.16 The risk of surface water flooding is assessed as negligible for most of the development, but low to medium associated with Watercourse 1 and along the reach of the interception swales.

4.5.17 Measures required for surface water flooding are discussed in Section 5.

4.6 Sewer Flooding

Introduction

4.6.1 Sewer flooding occurs when urban drainage networks become overwhelmed after heavy or prolonged rainfall due to restrictions or blockage in the sewer network or if the volume of water draining into the system exceeds the sewer design capacity.

4.6.2 New adoptable sewers are built to have a minimum design standard up to and including the 1 in 30-year rainfall event. Older sewers were not designed to any standard. Modern sewer systems will only surcharge during rainstorm events with a return period greater than 1 in 30-years (e.g. 1 in 100-years).

Asset Plans

4.6.3 There are two 4" and 12" water distribution mains within the south of the development, as well as an abandoned foul main.

4.6.4 The two water mains were surveyed, and Wessex Water were consulted on appropriate easements. WW have confirmed the live mains comprise a 12" AC main, which has a 5m easement applied to either side and a 4" PE main, which has a 3m easement applied.

4.6.5 The abandoned main is to be removed as part of the development.

Flood Risk

4.6.6 The risk of flooding from sewers is assessed as negligible for most of the development but low along the reach of the two live mains.

4.6.7 Measures required for sewer flooding are discussed in Section 5.

4.7 Flooding from Infrastructure Failure

Reservoir Failure

4.7.1 The EA online flood mapping shows the development is outside the extent of flooding. The risk of flooding from reservoir failure is assessed as negligible.

Pond

4.7.2 A balancing pond has been identified outside the western boundary. The pond is small and not impounded. The risk of flooding from pond failure is assessed as negligible.

Highway Drainage

4.7.3 The Wessex Water Asset plans identified a highway drain running east west through the centre of the development outfalling into Watercourse 1.

4.7.4 As part of the proposals the highway drain will be intercepted on the development's eastern boundary and diverted within a swale along the northern boundary. This will improve maintenance and water qualify of the asset. The swale has been sized based on the culvert running at full bore to ensure there is sufficient capacity and no exceedance.

4.7.5 The risk of flooding from highway drainage is assessed as negligible for most of the development but low along the reach of the diversion swale.

4.7.6 Measures required for highway flooding are discussed in Section 5.

5.0 Planning and Flood Risk

5.1 Introduction

5.1.1 The main steps to be followed in addressing flood risk are set out below:



5.2 Assess

5.2.1 As per Paragraph: 003 Reference ID: 7-003-20220825 (Revision date: 25 08 2022) of NPPG ID7, we have prepared a site-specific FRA to assess flood risk from all sources to the Development. A summary is included below:

- The risk of fluvial flooding is assessed as negligible for most of the but there is a low risk of flooding along the reaches of the onsite watercourses; Watercourse 1 and Watercourse 2.
- The risk of surface water flooding is assessed as low to high across the Site.
- The risk of flooding from sewers is assessed as negligible for most of the development but low along the reach of the two water mains.
- The risk of flooding from highway drainage is assessed as negligible for most of the development but low along the reach of the diversion swale.
- The risk of flooding from all other sources is assessed as negligible.

5.3 Decision Making Process

5.3.1 As per Paragraph: 004 Reference ID: 7-004-20220825 (Revision date: 25 08 2022) of NPPG ID7, where an assessment shows that flood risk is a consideration for a plan or development proposal, the process is set out below:

Avoid

5.3.2 The approach is designed to ensure that areas at little or no risk of flooding from any source are developed in preference to areas at higher risk. This means avoiding, so far as possible, development in current and future medium and high flood risk areas considering all sources of flooding including areas at risk of surface water flooding.

5.3.3 As per the National flood risk standing advice for local planning authorities ('*When development is exempt from the sequential test*')[28],

"A development is exempt from the sequential test if it is a:

- *a householder development like residential extensions, conservatories or loft conversions*
- *a small non-domestic extension with a footprint of less than 250 square metres*

[28] https://www.gov.uk/guidance/flood-risk-assessment-local-planning-authorities#:~:text=A%20development%20is%20exempt%20from,extensions%2C%20conservatories%20or%20loft%20conversions

- *a change of use (except changes of use to a caravan, camping or chalet site, or to a mobile home or park home site)*
- *Solely at risk from surface water flooding and a site-specific FRA demonstrates it will be safe throughout its lifetime, without increasing flood risk elsewhere – this exemption does not apply to sources of flooding other than surface water*

A development is also exempt from the sequential test if it is a development on a site allocated in the development plan through the sequential test and:

- *The proposal is consistent with site's allocated use*
- *There have been no significant changes to the known level of flood risk to the site, now or in the future, which would have affected the outcome of the test*

You may not need a sequential test if development can be laid out so that only elements such as public open space, biodiversity and amenity areas are located in areas at risk of any source of current or future flooding.*"*

5.3.4 Subject to the below avoidance measures, the Sequential Test is not required:

- Sequentially develop the development, limiting the built development (including surface water attenuation) outside the mapped extent of pluvial flooding, as per Enzygo modelled flood mapping (proposed).
- Set finished floor levels a minimum of +150mm above external levels.
- The number of highway crossings along the route of the onsite/bounding watercourses should be kept to a minimum. Free spanning structures are proposed to convey the 1 in 100-year plus climate change event, with a freeboard allowance.
- Set the surface water outfall from the proposed development at an appropriate height above or at the bed level of the receiving watercourses.
- Introduction of interception and conveyance swales to divert the surface water flooding around the development.

5.3.5 Further to the above, the following measures are recommended in line with statutory requirements / following best practice:

- Providing a minimum 8m easement free from development along either side of Watercourse 1 (main river) and a 4m easement along Watercourse 2 (ordinary watercourse). The easement would provide access for inspection and maintenance purposes, including vehicle access.
- Provide easement along reach of proposed swales within the development. It was agreed with Wiltshire Council that the easement should be 3m and provided on one side of the swale for inspection and maintenance (Appendix 4).
- Appropriately sized easement along reach of Wessex Water mains.
- Divestment and removal of abandoned sewer.
- Redirect Highway Drain into swale around the northern development boundary.
- Provide 3m easement along reach of interception swale.

Control

5.3.6 We recommend the following control measures to manage the risk of flooding to and from the development:

- Adoption of a surface water management strategy (see Section 6).
- Undertake maintenance activities to keep the on/bounding watercourses and swales clear from debris and overgrown vegetation to maintain the conveyance of the channels.

Mitigate

5.3.7 Based on the above avoidance measures, no mitigation measures are proposed.

5.4 Summary

5.4.1 Table 5.1 summarises the risk of flooding, both without and with recommended measures.

Table 5.1: Risk of Flooding and Recommended Measures

Source of Flooding	Risk of Flooding	Risk Without Measures	Recommended Measures	Risk to Development with Measures
Fluvial – Watercourse 1, 2 and Land Drains	Negligible for most of the Site but Low/Residual from onsite watercourses	Negligible for most of the Site but Low/Residual from onsite watercourses	Avoid and Control	Negligible
Tidal – N/A	Negligible	Negligible	N/A	Negligible
Groundwater – N/A	Negligible	Negligible	N/A	Negligible
Surface Water – Poor permeability and Site topography	Negligible to Medium	Negligible to Medium	Avoid and Control	Negligible
Sewers and Mains – Water Mains	Negligible for most of the development but Low along two water mains	Negligible to Low	Avoid	Negligible
Infrastructure Failure – Highway Drains	Negligible for most of the development but low along the diversion swale	Negligible to Low	Avoid	Negligible

Key: Green - Negligible, Yellow - Low, Orange - Medium and Red - High; based on risk with without/with recommended measures from each flooding source.

5.5 Flood Guidance and Sequential Test

5.5.1 The sequential test should be applied to 'Major' and 'Non-major' development proposed in areas at risk of flooding, as set out in paragraphs 173 to 174 of the National Planning Policy Framework. Paragraphs 175, 176 and 180 set out exemptions from the sequential test.

5.5.2 Referencing this guidance[29]:

1. *In applying paragraph 175 a proportionate approach should be taken.*

[29] https://www.gov.uk/guidance/flood-risk-and-coastal-change#the-sequential-approach-to-the-location-of-development

5.5.3 This applies to all sources of flooding. As outlined above, the flood risk is associated with surface water flooding with a residual risk from fluvial flooding. The only infrastructure shown in flood risk areas are the crossing points of the watercourse. However, footings of the structure have been designed to be located outside flood risk areas. Furthermore, they have and deck heights of the structures been designed in such a way that they allow flow for the 100yr+CC event with a freeboard on top of this. This provides a betterment on existing conditions and therefore a proportionate approach would be not to apply the sequential test.

2. "Where a site-specific flood risk assessment demonstrates clearly that the proposed layout, design, and mitigation measures would ensure that occupiers and users would remain safe from current and future surface water flood risk for the lifetime of the development (therefore addressing the risks identified e.g. by Environment Agency flood risk mapping), without increasing flood risk elsewhere, then the sequential test need not be applied."

5.5.4 Post development the Site's flooding is reduced with only a small area of flooding shown along the reach of Watercourse 1. This is due to the interception features intercepting the surface water originating from the east of the Site. The Site has been laid out in such a way that only PoS is located in the small area of flooding. The more vulnerable aspects of development are located entirely within Flood Zone 1 post development. The proposed scenario has been modelled and shown to not increase flood risk elsewhere and provides a betterment on existing conditions.

5.5.5 The proposal is for a residential development. The PPG ID: 7 (not included in this report) classifies the proposed use as 'more vulnerable'.

5.5.6 The EA Flood Zones and acceptable development types are listed in Table 5.2. All development types (including residential uses) are acceptable in Flood Zone 1 and 2 and 3a (low to high risk).

5.5.7 The FRA has shown surface water flooding to be fully mitigated through interception swales and sequential development of the Site limiting only PoS to areas at risk ensuring the development is safe for its lifetime.

Table 5.2: EA Flood Zones and Appropriate Land Use

Flood Zone	Probability	Explanation	Appropriate Land use
Zone 1	Low	Less than 1 in 1000 annual probability of river or sea flooding in any year (<0.1%).	All development types generally acceptable.
Zone 2	Medium	Between a 1 in 100 and 1 in 1000 annual probability of river flooding (1% - 0.1%) or between a 1 in 200 and 1 in 1000 annual probability of sea flooding (0.5% 0.1%) in any year.	Most development type are generally acceptable.
Zone 3a	High	A 1 in 100 or greater annual probability of river flooding (>1%) or a 1 in 200 or greater annual probability of flooding from the sea (>0.5%) in any year.	Some development types not acceptable.

Flood Zone	Probability	Explanation	Appropriate Land use
Zone 3b	'Functional Floodplain'	Land where water must flow or be stored in times of flood. SFRAs should identify this zone (land which would flood with an annual probability of 1 in 30 (3.33%) or greater in any year or is designed to flood in an extreme (0.1% flood, or at another probability to be agreed between the LPA and the EA, including water conveyance routes).	Some development types not acceptable.

Note: The Flood Zones are the current best information on the extent of the extreme flood from rivers or the sea that would occur without the presence of flood defences, because these can be breached, overtopped and may not be in existence for the lifetime of the development. The identified risk of fluvial flooding is highlighted green.

Table 5.3: Vulnerability and Flood Zone 'Compatibility' as Identified in Table 2 of PPG ID: 7

Flood Risk Vulnerability classification (see Table 1 of PPG ID: 7)	Essential Infrastructure	Water Compatible	Highly Vulnerable	More Vulnerable	Less Vulnerable
Zone 1	Yes	Yes	Yes	Yes	Yes
Zone 2	Yes	Yes	Exception test required	Yes	Yes
Zone 3a	Exception test required	Yes	No	Exception test required	Yes
Zone 3b 'Functional Floodplain'	Exception test required	Yes	No	No	No

Key: Yes: Development is appropriate, No: Development should not be permitted. The identified risk of fluvial flooding is highlighted green.

6.0 Surface Water Drainage

6.1 Surface Water Drainage

6.1.1 A detailed drainage strategy has been produced by Paul Basham Associates Limited (REF: 027/5011/DS/2).

6.1.2 The proposed drainage strategy is to discharge to the onsite watercourses at a restricted discharge rate as per the Wiltshire Council Guidance.

6.1.3 Vortex separators are proposed to provide sufficient water treatment in line with CIRICA C753, prior to discharging into the public sewer.

6.1.4 The surface water network has been designed to ensure no flooding occurs during the 100-year+45% climate change allowance.

7.0 Foul Drainage Strategy

7.1 Proposed Strategy

7.1.1 Foul water from the development is to drain via gravity towards a pump station north of the Site which will discharge to a proposed manhole within the development further south. The foul ultimately discharges via gravity to an existing Wessex Water Foul Sewer.

8.0 Summary and Conclusions

8.1 Introduction

8.1.1 A site-specific Flood Risk Assessment (FRA) has been undertaken for a proposed residential development, located on a 14.95ha Site on land north of Sandridge Common, Melksham.

8.2 Flood Risk

8.2.1 The risk of flooding is assessed as follows:

- The risk of fluvial flooding is assessed as negligible for most of the development with a residual risk of flooding from the onsite watercourses; Watercourse 1 and Watercourse 2.
- The risk of surface water flooding is assessed as negligible for most of the development, but low to medium associated with Watercourse 1 and along the reach of the interception swales.
- The risk of flooding from sewers is assessed as negligible for most of the development but low along the reach of the two water mains.
- The risk of flooding from highway drainage is assessed as negligible for most of the development but low along the reach of the diversion swale.
- The risk of flooding from all other sources is assessed as negligible.

8.3 Measures

8.3.1 Flood risk from identified sources can be reduced to a negligible or low and acceptable level through the following approach:



8.3.2 Subject to the proposed avoidance measures, the Sequential Test is not required:

- Sequentially develop the development, limiting the built development (including surface water attenuation) outside the mapped extent of pluvial flooding, as per Enzygo modelled flood mapping (proposed).
- Set finished floor levels a minimum of +150mm above external levels.
- The number of highway crossings along the route of the onsite/bounding watercourses should be kept to a minimum. Free spanning structures are proposed designed to convey the 1 in 100-year plus climate change event, with a freeboard allowance
- Set the surface water outfall from the proposed development at an appropriate height above or at the bed level of the receiving watercourses.
- Introduction of interception and conveyance swales to divert flooding around the development.

8.3.3 Further to the above, the FRA has recommended further measures in line with statutory requirements / following best practice. The FRA has explored control, mitigate and management measures.

8.4 Flood Guidance

8.4.1 The proposed residential use is classified as more vulnerable. More vulnerable uses are considered acceptable in terms of flood risk in Flood Zone 1, 2 and 3 (low to high risk).

8.5 Site Drainage

Surface Water

8.5.1 The proposed drainage strategy is to discharge to the onsite watercourses at a restricted discharge rate as per the Wiltshire Council Guidance.

Foul Water

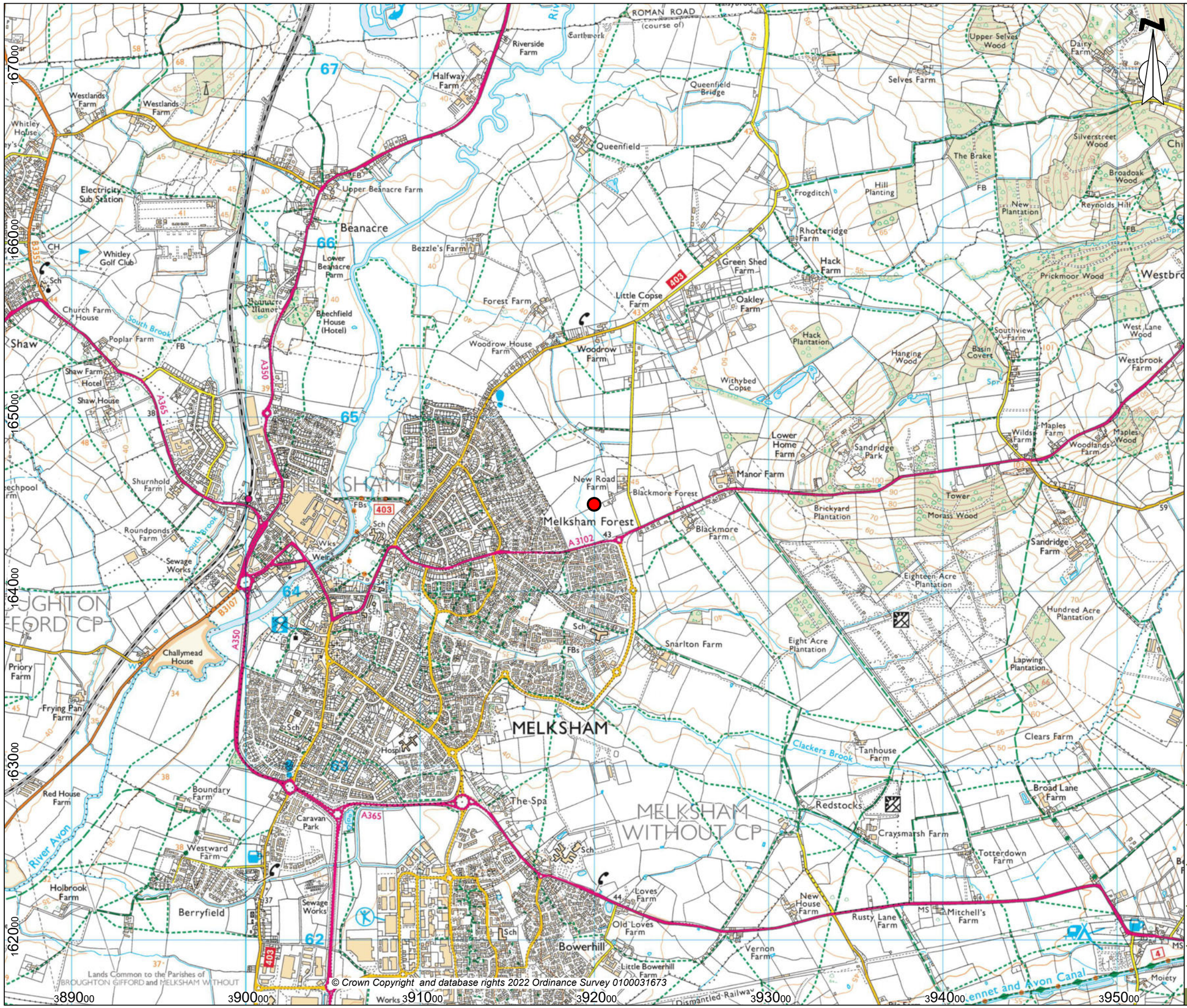
8.5.2 Foul water from the development is to drain via gravity towards a pump station north of the development which will discharge to a proposed manhole within the development further south. The foul ultimately discharges via gravity to an existing Wessex Water Foul Sewer.

8.6 Conclusion

8.6.1 This FRA demonstrates the proposed development would be operated with minimal risk from flooding, would not increase flood risk elsewhere and is compliant with the requirements of national policy and guidance.

8.6.2 The development should not therefore be precluded on the grounds of flood risk and surface water drainage.

DRAWINGS



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environmental consultants

Samuel House, 5 Fox Valley Way, Stocksbridge, Sheffield, S36 2AA

CLIENT: Bloor Homes Limited

SCALE: 1:20,000@A3

PROJECT REF: SHF.102.003

DRAWN: MG

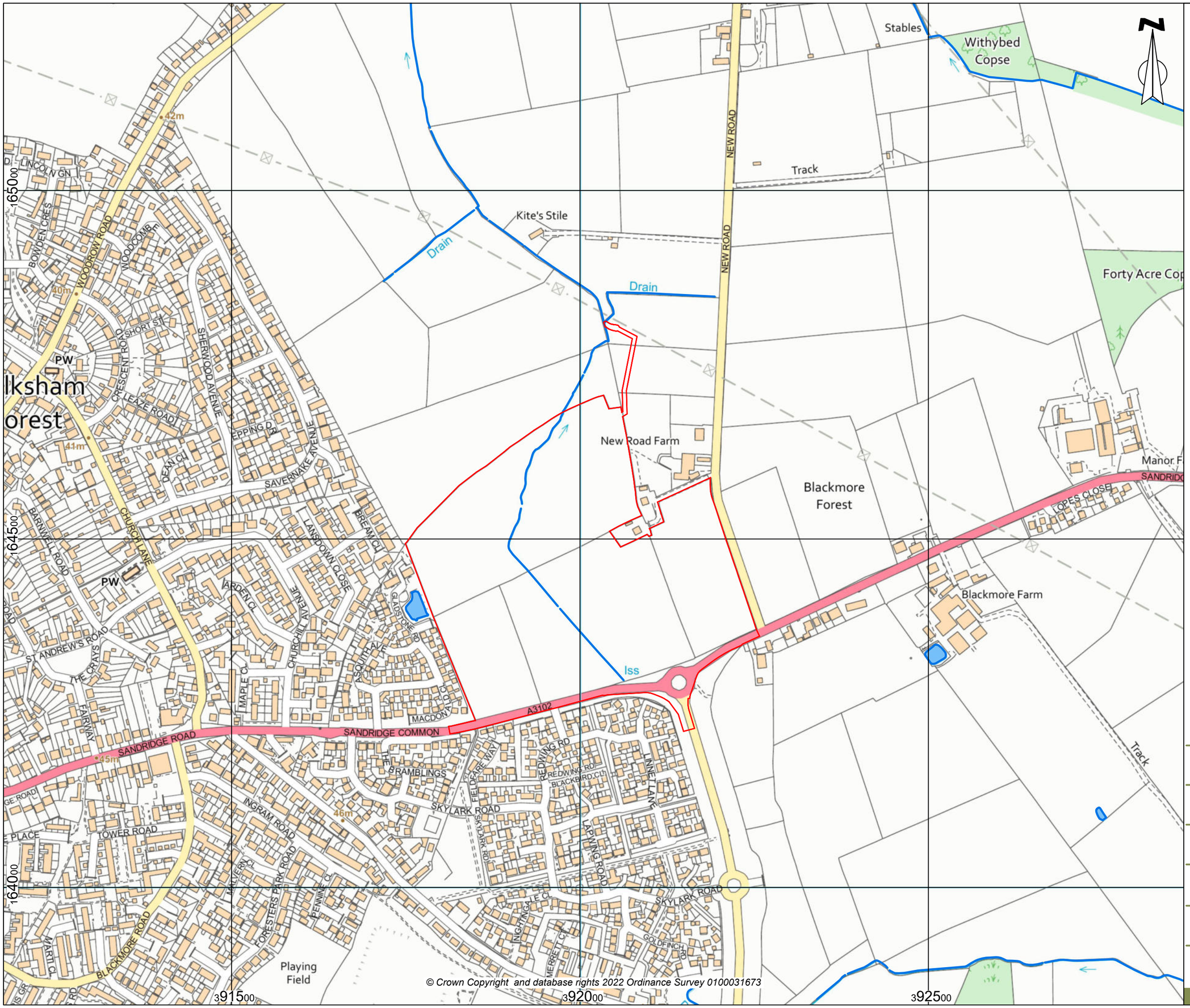
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DATE: June 2022

PROJECT: New Farm, Melksham

TITLE: Site Location Plan

DRAWING NO: SHF.102.003.HY.D.001



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Key

- Site Boundary
- Surface Water Features

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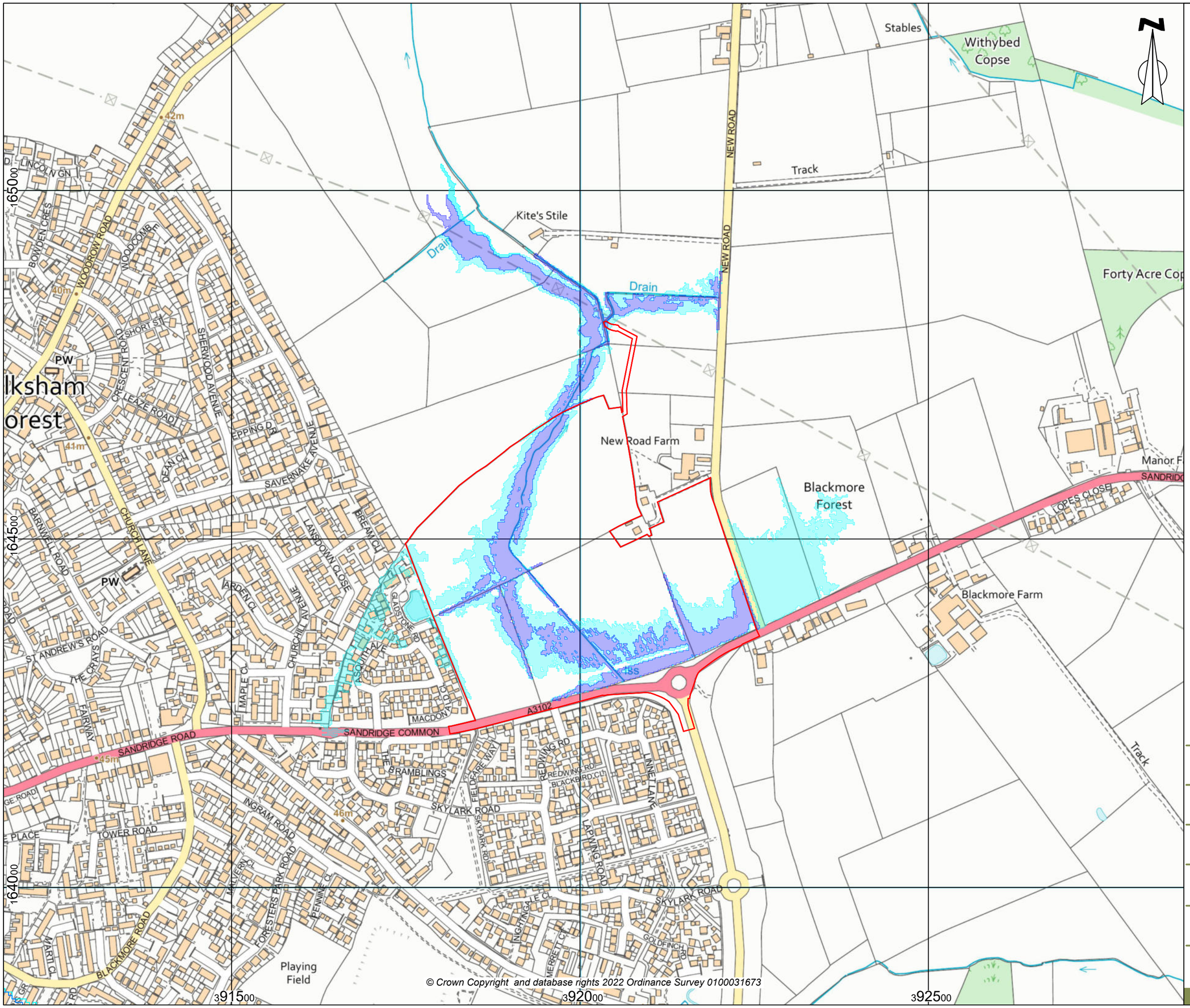
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DATE: June 2022

PROJECT: New Farm, Melksham

TITLE: Surface Water Features

DRAWING NO: SHF.102.003.HY.D.002



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Key

- Site Boundary
- Flood Zone 3
- Flood Zone 2
- Flood Zone 1

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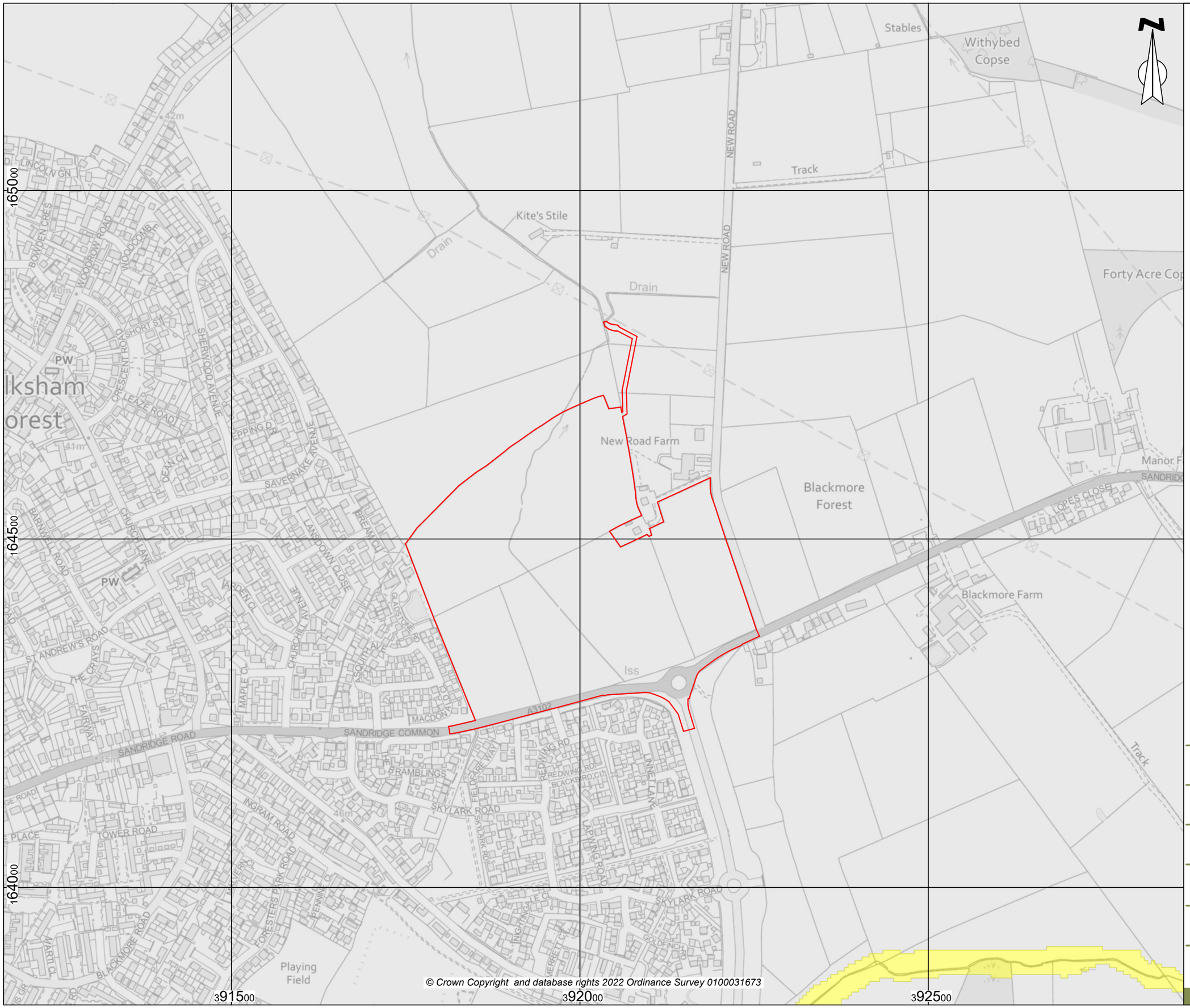
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DATE: June 2022

PROJECT: New Farm, Melksham

TITLE: Environment Agency Flood Zones

DRAWING NO: SHF.102.003.HY.D.003



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Key

- Site Boundary
- Class 1 - High Risk
- Class 2 - Moderate Risk
- Class 3 - Low Risk
- Class 4 - Negligible Risk

Notes:

GEOSMART GROUNDWATER FLOOD RISK MAP GW5
Version 2.4© - www.geosmartinfo.co.uk

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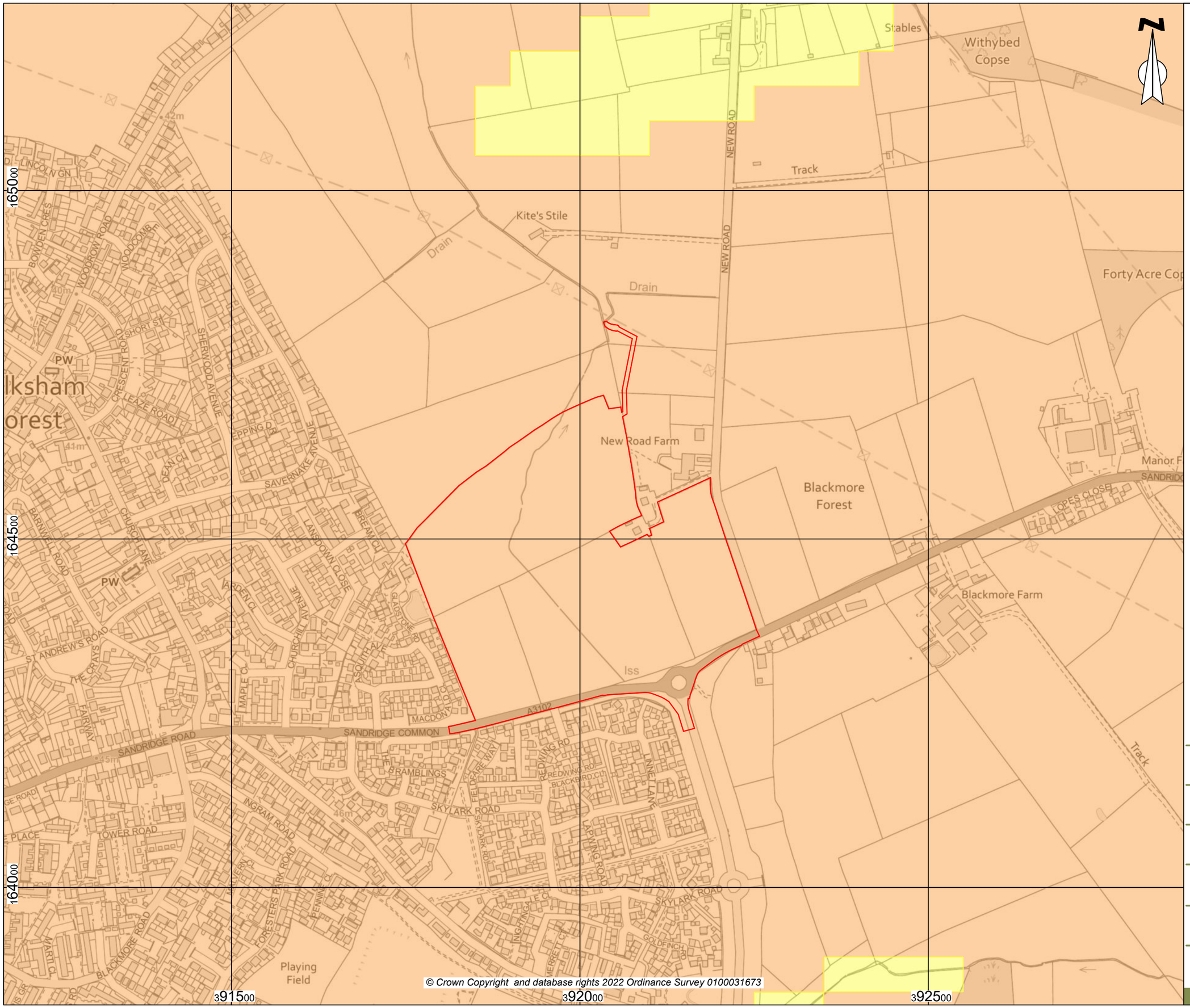
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DATE: June 2022

PROJECT: New Farm, Melksham

TITLE: Groundwater Flood Risk Map

DRAWING NO: SHF.102.003.HY.D.004



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Key

- Site Boundary
- High Potential
- Moderate Potential
- Low Potential

Notes:

GEOSMART SUDS INFILTRATION POTENTIAL MAP SD50
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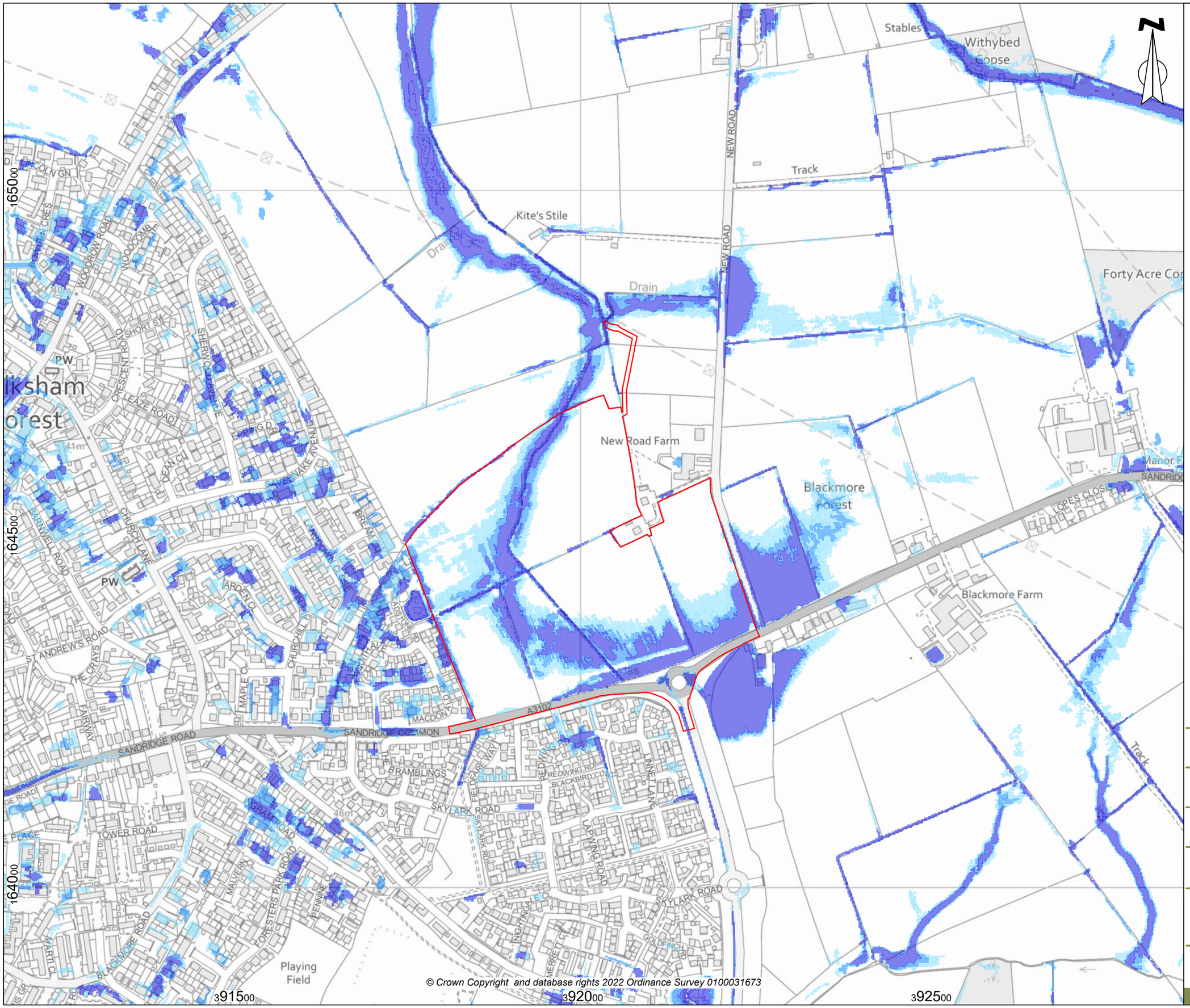
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DATE: June 2022

PROJECT: New Farm, Melksham

TITLE: SuDS Infiltration Potential Map

DRAWING NO: SHF.102.003.HY.D.005



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Key

- Site Boundary
- Search Extent
- 30 Year Extent
- 100 Year Extent
- 1000 Year Extent
- Flow Direction

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SCALE: 1:5,000@A3

PROJECT REF: SHF.102.003

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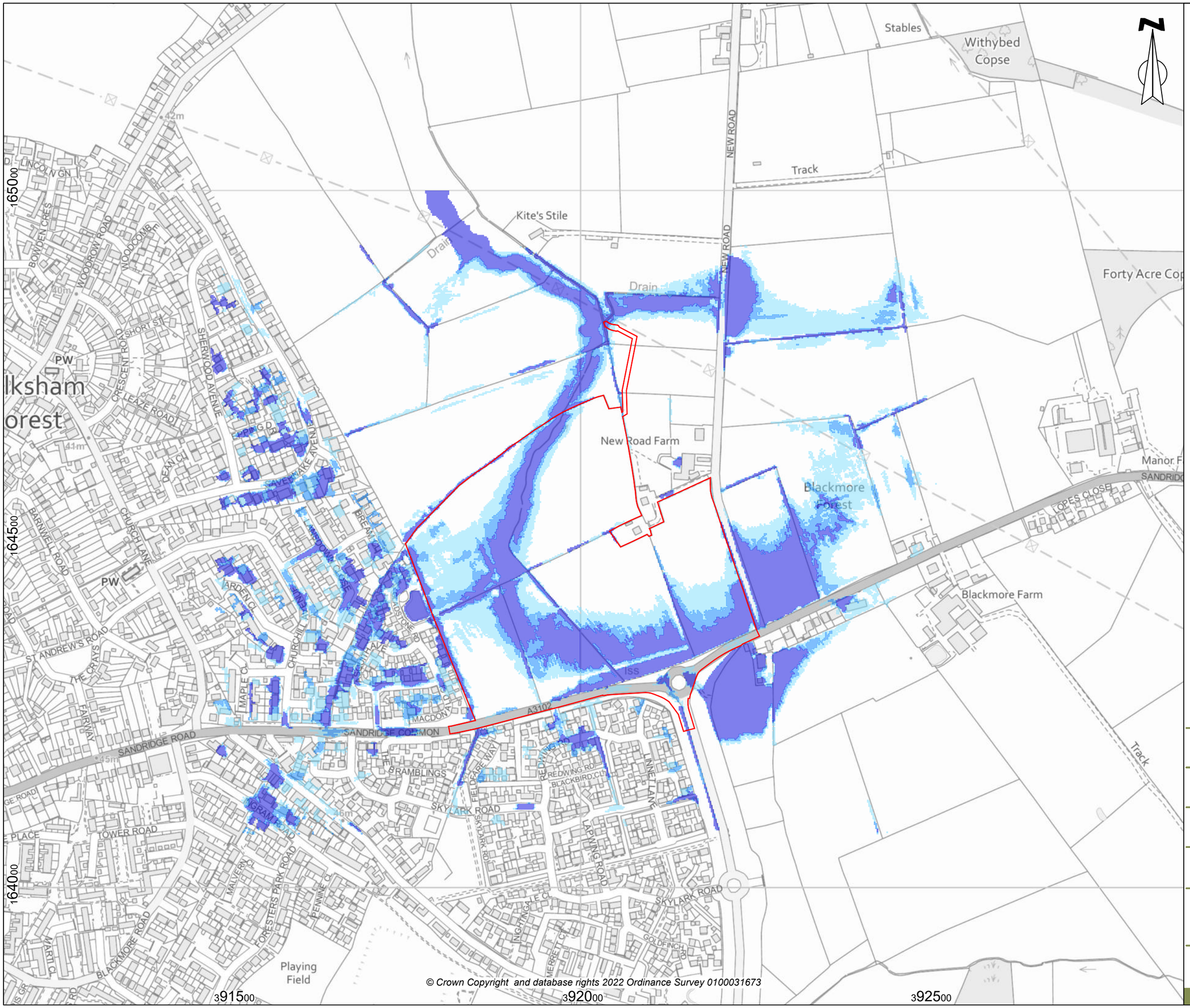
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DATE: June 2022

PROJECT: New Farm, Melksham

TITLE: Environment Agency Surface Water Flood Risk

DRAWING NO: SHF.102.003.HY.D.006.1



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Key

- Site Boundary
- Search Extent
- 30 Year Extent
- 100 Year Extent
- 1000 Year Extent
- Flow Direction

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SCALE: 1:5,000@A3

PROJECT REF: SHF.102.003

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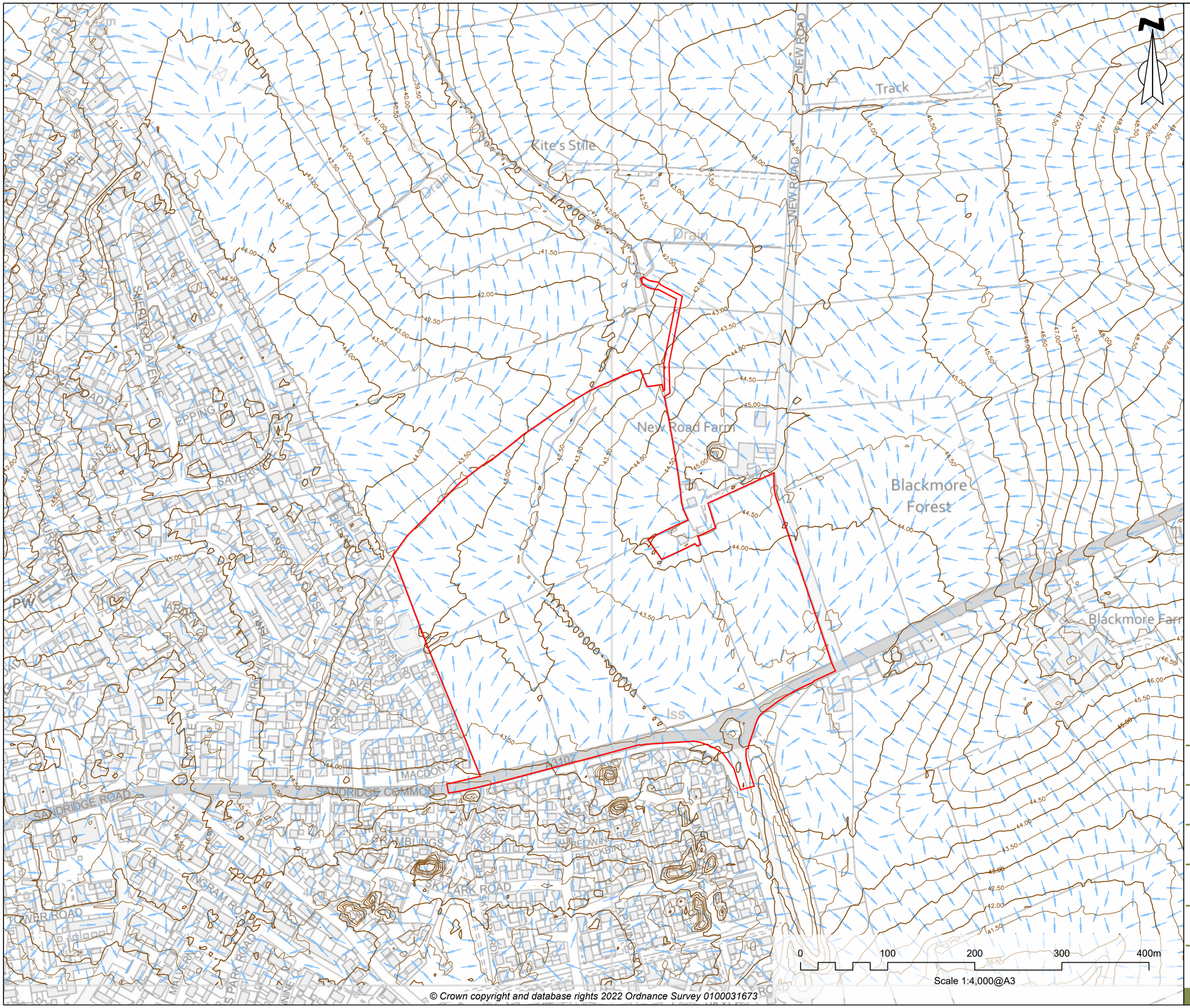
CHECKED: EO'C

DATE: June 2022

PROJECT: New Farm, Melksham

TITLE: Environment Agency Surface Water Flood Risk

DRAWING NO: SHF.102.003.HY.D.006.2



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PROJECT REF: SHF.102.003

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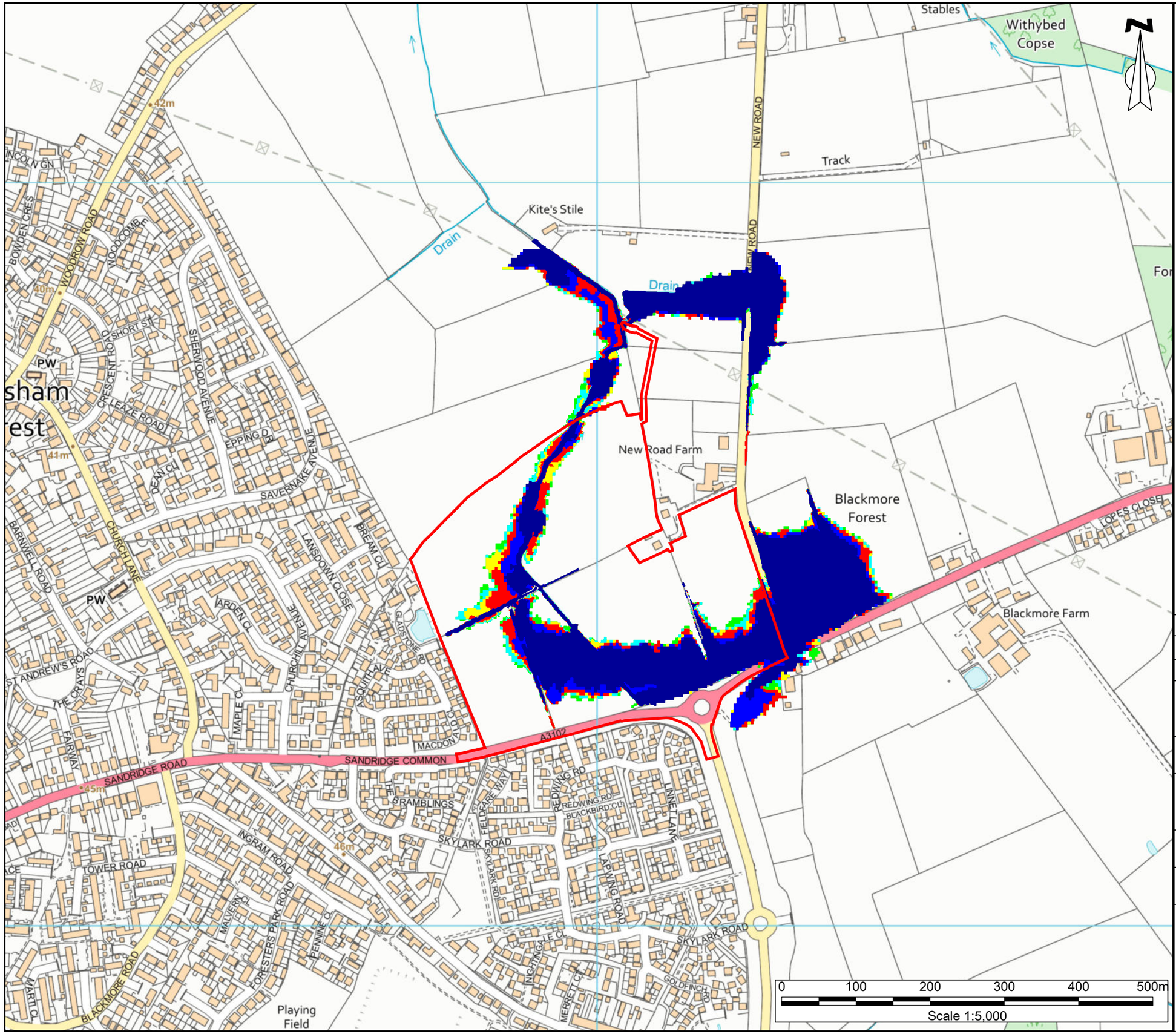
CHECKED: EO'C

DATE: July 2022

PROJECT: New Farm, Melksham

TITLE: Flow Pathway Analysis

DRAWING NO: SHF.102.003.HY.D.007



KEY:

- Site Boundary
- 30yr
- 100yr
- 1000yr
- 100yr+26%CC
- 100yr+39%CC
- 100yr+71%CC

Rev	Date	Description			
P01	07/10/25	Issued for comment / approval	DL	HDR	EOC

Project
New Farm, Melksham

Client
Bloor Homes Limited

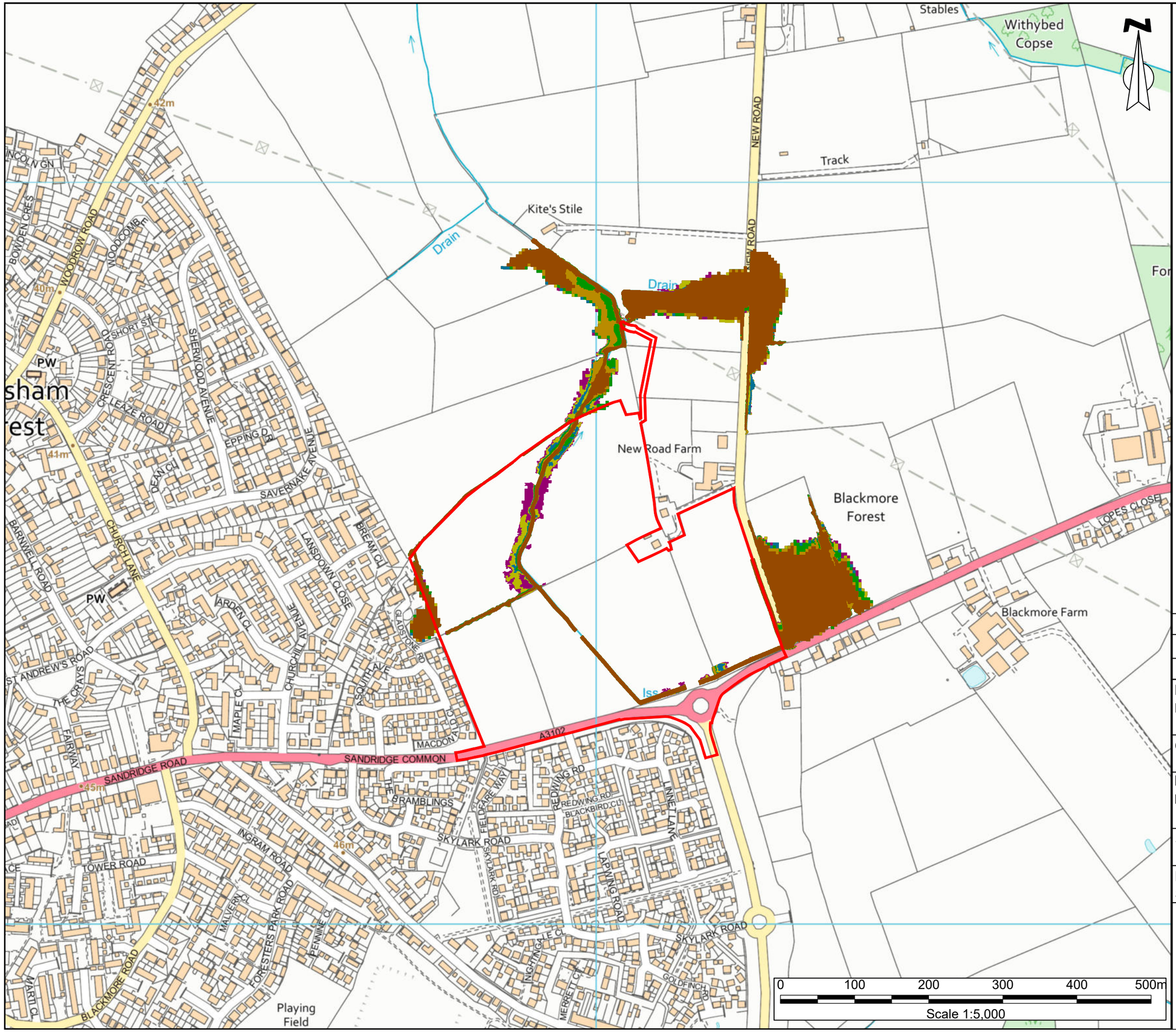
Drawing Title
Baseline Flood Outlines

Scale	Date	Status
1:5000@A3	07/10/25	Preliminary

DWG No. SHF102003-ENZ-XX-XX-DR-Y-0002 **Revision** P01

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Cardiff 02920 023 700
Manchester 0161 413 6444
Cambridge 01799 542 473
Sheffield 0114 321 5151
Belfast 07377673948

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KEY:

- Site Boundary
- 30yr
- 100yr
- 1000yr
- 100yr+26%CC
- 100yr+39%CC
- 100yr+71%CC

Rev	Date	Description			
P01	10/10/25	Issued for comment / approval	DL	HDR	EOC

Project
New Farm, Melksham

Client
Bloor Homes Limited

Drawing Title
Proposed Flood Outlines

Scale	Date	Status
1:5000@A3	10/10/25	Preliminary

DWG No. SHF102003-ENZ-XX-XX-DR-Y-0001 **Revision** P01

Bristol 01454 269 237
Cardiff 02920 023 700
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APPENDICES

Appendix 1 – Proposed Layout

BLOOR HOMES LIMITED
UNIT 7, LATHAM ROAD, SWINDON, SN25 4DL
TELEPHONE: 01793 835600

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THIS DRAWING IS TO BE READ IN CONJUNCTION WITH SEPARATE GROUP / SITE SPECIFIC CONSTRUCTION NOTES AND MATERIALS SPECIFICATION.

NORTH

0m 10 20 30 40 50 60 70 80m
1:1000

Accommodation schedule.

Private			60.0%
Type	Beds	Storeys	No
Danby - M4(2)	2	2	10
Bepton M4(2)	3	2	6
Lebberston - M4(2)	3	2	11
Lebberston SD - M4(2)	3	2	6
Kempton M4(2)	3	2	22
Holmston - M4(2)	3	2	21
Whitby-M4(2)	3	2	9
McCall-M4(2)	3	2.5	4
Hove - M4(2)	4	2	13
Westbury-M4(2)	4	2	3
Warwick-M4(2)	4	2	30
Cromer-M4(2)	4	2	6
Leighton-M4(2)	4	2	8
Horsham-M4(2)	4	2	10
Portland-M4(2)	4	2	10
Dover-M4(2)	4	2	8
			177

Social Rent			25.4%
Type	Beds	Storeys	No
M4(3)1BF01 Sahlberg GF-M4(3)	1	1	14
1BF01 Sahlberg FF	1	1	14
NSSM4(3)-1BB2P Tiverton-M4(3)	1	1	3
NSSM4(3)-2BB3P Typton-M4(3)	2	1	3
NSS-4B6P Scurfield	4	2	3
NSSM-2B4P Sansom-M4(2)	2	2	25
NSSM-3B5P Sutherland-M4(2)	3	2	10
B80059 Sapsford	3	2	3
			75

Shared			5.1%
Type	Beds	Storeys	No
NSSM-2B4P Sansom-M4(2)	2	2	9
NSSM-3B5P Sutherland-M4(2)	3	2	5
B80059 Sapsford	3	2	1
			15

First Homes			9.5%
Type	Beds	Storeys	No
NSSM1BF01 Sulivan GF	1	2	9
NSSM1BF01 Sulivan FF	1	2	9
NSSM2BF03 Sadler GF	2	2	5
NSSM2BF03 Sadler FF	2	2	5
			28

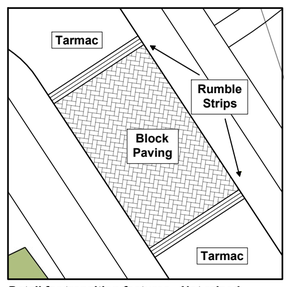
Total	295

Key.

- Application boundary
- Extent of land within applicants ownership
- bcp — Bin collection points
- Visitor spaces (57no.)
- Proposed trees
- Custom build (14no.)
- Main river / Bank top

Affordable units:

- Rent
- Shared ownership
- First homes



Detail for transition features - Not raised

Melksham, Land off Sandridge Common

Revision.

C	Order of plots within schedule updated (size order).	22/10/24	MW
D	Northern SW outfall route and red line adjusted.	25/10/24	MW
E	Main river detail added, continental style crossings introduced for shared surface roads, footpath links added as per UD officer request, S278 design updated, detail added for watercourse crossings, loop road added (and plots adjusted accordingly) to remove secondary access. 2no. LEB replaced by 2no. BEP, parking court amended serving plots 162-167.	26/03/25	MW
F	Plots 51-58 distribution adjusted, raised block paving area added to frontage of plots 193-199, plot 295 handed.	28/03/25	MW
G	Fence lines around plots 45-78 updated. Social tenures swapped around.	02/04/25	AB
H	Blocks updated to Issue 7.	10/04/25	JE/AB
J	Roundabout design updated, existing vegetation re-instated for revised roundabout design, highway boundary added, tenure of plots 185-186, 247-248, 253-256 corrected to reflect drawing: SW164-PD-1010C.	28/05/25	MW
K	Layout updated following UD comments	19/08/25	LWI
L	Layout updated following UD comments	15/09/25	FM
M	Layout updated following Highways and Landscape Officer comments	24/09/25	FM
N	Layout updated following comments from Highways, Landscape Officer and Region	01/10/25	FM
P	Affordable housing mix corrected, MCC in place of MCQ (M4(2) compliance).	21/10/25	MW

Land off Sandridge Common
Melksham

Planning Layout

DATE: **Sep 24**
SCALE: **1:1000 @ A1**
DRAWN: **MW**
CHECKED:

BLOOR HOMES

Drawing No. SW164-PD-1001P

Appendix 2 – Topographic Survey

392020E 392040E 392060E 392080E 392100E 392120E 392140E 392160E 392180E 392200E 392220E

164880N 164860N 164840N 164820N 164800N 164780N 164760N 164740N

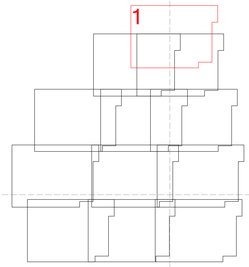
NORTH

W E

S

SCALE

0m 5m 10m 20m



Hedgerow Post & Wire Fence 1m+1m Post & Rail Fence 1m+1.1m Post & Rail Fence 1m+1.7m Post & Rail Fence 1m+1.5m Post & Wire Fence 1m+1m Post & Rail Fence 1m+1.7m Triangular Post & Rail Structure over Ditch 1mH-2.5m Post & Rail Fence 1m+1.1m 300mm Pipe 300mm Pipe 450mm Pipe Grass Asphalt Gravel Gate Gateway Water Riser Water Trough New Road Ditch in front 44.00 Ditch 44.00 Ditch 43.99 Ditch 43.97 Ditch 43.97 Ditch 43.97

391920E 391940E 391960E 391980E 392000E 392020E 392040E 392060E 392080E 392100E 392120E

164800N 164780N 164760N 164740N 164720N 164700N 164680N 164660N

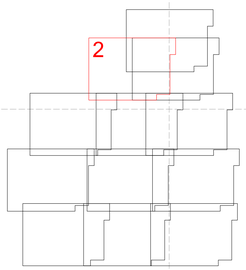
NORTH

W E

S

SCALE

0m 5m 10m 20m



SURVEY STATIONS				
Name	Coords	Northing	Height	Remark
PGM1	391922.000	164755.000	43.000	Peg
PGM2	391922.000	164755.000	43.000	Peg
PGM3	391942.450	164618.140	43.060	PGM
PGM4	391942.450	164618.140	43.060	PGM
PGM5	392053.113	164536.168	43.208	PGM
PGM6	392130.619	164411.889	43.048	PGM
PGM7	392130.619	164411.889	43.048	PGM
PGM8	392133.007	164522.065	44.260	PGM
PGM9	392133.007	164522.065	44.260	PGM
PGM10	391930.835	164622.733	43.343	PGM
PGM11	392075.511	164592.697	44.765	PGM
PGM12	392075.511	164592.697	44.765	PGM
PGM13	392130.492	164608.267	43.067	PGM
PGM14	392130.492	164608.267	43.067	PGM
PGM15	392130.492	164608.267	43.067	PGM
PGM16	392063.682	164668.668	41.977	PGM
T1	392130.619	164411.889	43.048	Tie
T2	392159.452	164438.249	43.821	Tie
T3	392218.972	164341.207	43.811	Tie
T4	392130.492	164608.267	43.067	Tie
T5	392152.208	164581.412	44.051	Tie
T6	391978.193	164541.193	44.141	Tie
T7	391978.193	164541.193	44.141	Tie
T8	391978.193	164541.193	44.141	Tie
T9	391852.621	164632.248	44.872	Tie
T10	391914.063	164562.399	44.067	Tie
T11	391778.218	164472.225	43.853	Tie
T12	391778.218	164472.225	43.853	Tie
T13	392050.382	164672.699	43.009	Peg
T14	392050.382	164672.699	43.009	Peg
T15	392130.492	164608.267	43.067	Tie
T16	392191.955	164668.123	45.302	Tie
T17	392208.045	164654.066	45.045	Peg
T18	392208.045	164654.066	45.045	Peg
T19	392208.045	164654.066	45.045	Peg
T20	392208.045	164654.066	45.045	Peg
T21	392208.045	164654.066	45.045	Peg
T22	392208.045	164654.066	45.045	Peg
T23	392208.045	164654.066	45.045	Peg
T24	392208.045	164654.066	45.045	Peg
T25	392208.045	164654.066	45.045	Peg
T26	392208.045	164654.066	45.045	Peg
T27	392208.045	164654.066	45.045	Peg
T28	392208.045	164654.066	45.045	Peg
T29	392208.045	164654.066	45.045	Peg
T30	392208.045	164654.066	45.045	Peg
T31	392208.045	164654.066	45.045	Peg
T32	392208.045	164654.066	45.045	Peg
T33	392208.045	164654.066	45.045	Peg
T34	392208.045	164654.066	45.045	Peg
T35	392208.045	164654.066	45.045	Peg
T36	392208.045	164654.066	45.045	Peg
T37	392208.045	164654.066	45.045	Peg
T38	392208.045	164654.066	45.045	Peg
T39	392208.045	164654.066	45.045	Peg
T40	392208.045	164654.066	45.045	Peg
T41	392208.045	164654.066	45.045	Peg
T42	392208.045	164654.066	45.045	Peg
T43	392208.045	164654.066	45.045	Peg
T44	392208.045	164654.066	45.045	Peg
T45	392208.045	164654.066	45.045	Peg
T46	392208.045	164654.066	45.045	Peg
T47	392208.045	164654.066	45.045	Peg
T48	392208.045	164654.066	45.045	Peg
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T52	392208.045	164654.066	45.045	Peg
T53	392208.045	164654.066	45.045	Peg
T54	392208.045	164654.066	45.045	Peg
T55	392208.045	164654.066	45.045	Peg
T56	392208.045	164654.066	45.045	Peg
T57	392208.045	164654.066	45.045	Peg
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T61	392208.045	164654.066	45.045	Peg
T62	392208.045	164654.066	45.045	Peg
T63	392208.045	164654.066	45.045	Peg
T64	392208.045	164654.066	45.045	Peg
T65	392208.045	164654.066	45.045	Peg
T66	392208.045	164654.066	45.045	Peg
T67	392208.045	164654.066	45.045	Peg
T68	392208.045	164654.066	45.045	Peg
T69	392208.045	164654.066	45.045	Peg
T70	392208.045	164654.066	45.045	Peg
T71	392208.045	164654.066	45.045	Peg
T72	392208.045	164654.066	45.045	Peg
T73	392208.045	164654.066	45.045	Peg
T74	392208.045	164654.066	45.045	Peg
T75	392208.045	164654.066	45.045	Peg
T76	392208.045	164654.066	45.045	Peg
T77	392208.045	164654.066	45.045	Peg
T78	392208.045	164654.066	45.045	Peg
T79	392208.045	164654.066	45.045	Peg
T80	392208.045	164654.066	45.045	Peg
T81	392208.045	164654.066	45.045	Peg
T82	392208.045	164654.066	45.045	Peg
T83	392208.045	164654.066	45.045	Peg
T84	392208.045	164654.066	45.045	Peg
T85	392208.045	164654.066	45.045	Peg
T86	392208.045	164654.066	45.045	Peg
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T89	392208.045	164654.066	45.045	Peg
T90	392208.045	164654.066	45.045	Peg
T91	392208.045	164654.066	45.045	Peg
T92	392208.045	164654.066	45.045	Peg
T93	392208.045	164654.066	45.045	Peg
T94	392208.045	164654.066	45.045	Peg
T95	392208.045	164654.066	45.045	Peg
T96	392208.045	164654.066	45.045	Peg
T97	392208.045	164654.066	45.045	Peg
T98	392208.045	164654.066	45.045	Peg
T99	392208.045	164654.066	45.045	Peg
T100	392208.045	164654.066	45.045	Peg

UNDERGROUND UTILITIES LEGEND

- STORM WATER SEWER (SWS)
- FOUL WATER SEWER (FWS)
- COMBINED SEWER (CWS)
- SEWER
- ELECTRIC CABLE
- HV HIGH VOLTAGE CABLE
- LV LOW VOLTAGE CABLE
- TELECOMS CABLE
- CABLE TELEVISION
- TRAFFIC TRAFFIC SIGNAL CABLE
- WATER UNDERGROUND WATER SUPPLY
- GAS
- GAS (MP) GAS MEDIUM PRESSURE
- GAS (IP) GAS INTERMEDIATE PRESSURE
- GAS (HP) GAS HIGH PRESSURE
- OIL OIL PIPE
- UNK UNKNOWN SERVICE METALLIC
- UNK UNKNOWN SERVICE FOUND WITH GPR
- CABLE UNKNOWN SERVICE CABLE
- DRAIN DRAIN
- OH (TYPE) OVERHEAD CABLE
- SA CCTV NOTES - SURVEY ABANDONED

Note attached eg. BT 5.6 .62 Type Depth Quality

UNDERGROUND UTILITY SURVEY NOTES:
This survey has been carried out to the standard, as described by The Survey Association (TSA), for a Level 4 Survey. (PAS128 Type B) Utilities on this drawing have been detected using non-invasive technologies. The performance of these technologies can be affected by many factors including ground and site conditions and the control of Brunel Surveys. Consequently some utilities may be undetectable and therefore, whilst Brunel Surveys uses best endeavours to detect all utilities we cannot guarantee that 100% detection can always be achieved.
Before any excavation is commenced by a utility survey and statutory plans, any groundworks should be undertaken with extreme caution and in accordance with health and safety executive guidelines HSG 47 AVOIDING DANGER FROM UNDERGROUND SERVICES

LEGEND

AV	Air Valve	GV	Gas Valve	SVP	Soil Vent Pipe
BL	Bollard	GY	Gulley	THL	Threshold Level
BH	Bore Hole	HL	Hedge	TOB	Top of Bank
BT	Bus Stop	IC	Inspection Cover	TP	Traffic Light Pole
ST	Telecom Cover	IL	Invert Level	TS	Traffic Sign
CL	Cover Level	VI	Kerb Inlet	BTB	Illuminated TS
DS	Down Pipe	MH	Manhole	TV	Cable TV Box
EM	Electricity Cover	MH	Manhole	TVL	Cable TV Cover
EOS	End of Survey	MKA	Spec Marker Post	TWL	Top of Wall level
EP	Electric Pole	MP	Meter Pit / Gas Gate	UCO	Unknown Cover
EP	Electricity Pole	PB	Post Box	UTS	Unsafe to Survey
ER	Earth Rod	RE	Rodding Eye	UTT	Unsafe to Trace
FL	Fence Post Level	SC	Stop Cock (Gas)	VC	Vent Cover
FH	Fire Hydrant	SC	Stop Cock (Water)	VT	Vegetation Top
FP	Fence Post	SL	SB Level	WL	Water Level
GL	Ground Level	SP	Soil Pipe	WO	Waste Out
GPR	Ground Penetrating Radar	SV	Stop Valve	WO	Wash Out

KEY

STN1 SURVEY STATION | GATE | BANK | FOLIAGE | CLIFF

50m MAJOR CONTOUR

MINOR CONTOUR (0.25m Interval)

NOTES

Level Datum: OS National Grid OSGM15

Grid Orientation: OS National Grid OSTN15

Scale Factor: Scale Factor 0.99960203

The contractor is to check and verify all critical dimensions and levels before work starts.

Every effort is made to identify all visible above ground features, however, it may be possible that certain features are obscured at the time of survey.

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WEB : www.brunelsurveys.com
TEL : 01793 784700

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Bloor Homes South West
Unit 7
Latham Road
Swindon
Wiltshire
SN25 4DL

JOB TITLE

Topographical / Drainage / Underground Utilities Survey

New Farm
New Road
Melksham
SN12 7QY

REVISIONS

Sheet 2 of 12

SCALE: A0 Sheet @ 1 to 200

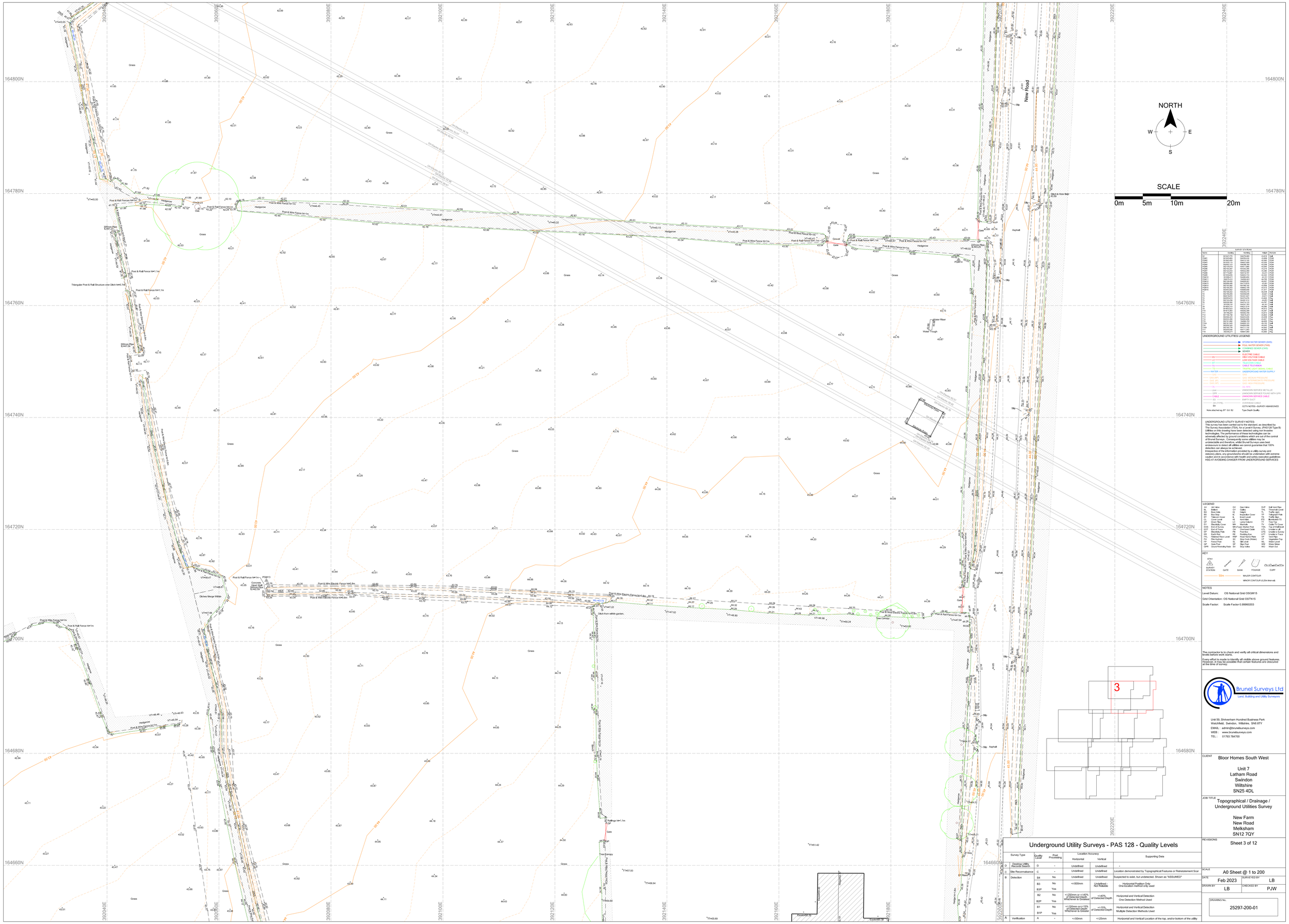
DATE: Feb 2023 SURVEYED BY: LB

DRAWN BY: LB CHECKED BY: PJW

DRAWING No.: 25297-200-01

Underground Utility Surveys - PAS 128 - Quality Levels

	Survey Type	Quality Level	Post Processing	Location Accuracy: Horizontal	Location Accuracy: Vertical	Supporting Data
D	Desktop Utility Records Search	D	-	Undefined	Undefined	-
C	Site Reconnaissance	C	-	Undefined	Undefined	Location demonstrated by Topographical Features or Reinstatement Scar
B	Detection	B4	No	Undefined	Undefined	Suspected to exist, but undetected. Shown as "ASSUMED"
		B3	No	+/-500mm	Undefined - Not Reliable	Horizontal Position Only One location method only used
		B3P	Yes			
		B2	No	+/-250mm or +/-40% of Detected Depth Whichever is Greatest	+/-40% of Detected Depth	Horizontal and Vertical Detection One Detection Method Used
		B2P	Yes			
		B1	No	+/-150mm or+/-15% of Detected Depth Whichever is Greater	+/-15% of Detected Depth	Horizontal and Vertical Detection Multiple Detection Methods Used
		B1P	Yes			
A	Verification	A	-	+/-50mm	+/-25mm	Horizontal and Vertical Location of the top, and/or bottom of the utility


392060E
392080E
392100E
392120E
392140E
392160E
392180E
392200E
392220E
392240E
164800N
164780N
164760N
164740N
164720N
164700N
164680N
164660N
NORTH
W
E
S
SCALE
0m 5m 10m 20m
New Road
Grass
Hedgerow
Asphalt
Gate
Water Trough
Water Fiber
Ditch from within garden.
Ditches Merge Within
Triangular Post & Rail Structure over Ditch trim0.7m
Post & Rail Fence h/e1.1m
Post & Rail Fence h/e1.5m
Post & Wire Fence h/e1.0m
Post & Wire Electric Fence h/e0.9m
Post & Rail Fence h/e1.1m
Post & Wire Fence h/e1.1m
Railings h/e1.1m
Tree Canopy
Overhead Power Line
Electricity Pylon
Concrete Yard With Steel Gate
Gravel
Ground
Kerb
Dry Ditch
Dry Ditch Invert 42.57
Dry Ditch Invert 42.54
Dry Ditch Invert 42.52
Dry Ditch Invert 42.50
Dry Ditch Invert 42.48
Dry Ditch Invert 42.46
Dry Ditch Invert 42.44
Dry Ditch Invert 42.42
Dry Ditch Invert 42.40
Dry Ditch Invert 42.38
Dry Ditch Invert 42.36
Dry Ditch Invert

391760E 391780E 391800E 391820E 391840E 391860E 391880E 391900E 391920E 391940E 391960E 391980E

164660N 164640N 164620N 164600N 164580N 164560N 164540N 164520N

NORTH

W E S

SCALE

0m 5m 10m 20m

4

SURVEY STATIONS

Name	Easting	Northing	Height	Remark
TP1	391922.551	164574.284	43.818	Trig
TP2	391922.551	164574.284	43.818	Trig
PSM2	391942.450	164618.140	43.940	PSM
PSM3	391955.112	164636.488	43.958	PSM
PSM4	392053.121	164784.168	43.958	PSM
PSM5	392130.619	164911.889	43.948	PSM
PSM6	392152.027	164932.469	44.060	PSM
PSM7	392152.027	164932.469	44.060	PSM
PSM8	391938.835	164633.733	43.943	PSM
PSM10	391938.835	164633.733	43.943	PSM
PSM11	392075.521	164852.847	44.060	PSM
PSM12	392126.402	164928.267	44.067	PSM
PSM13	392126.402	164928.267	44.067	PSM
PSM14	392150.282	164784.168	43.958	PSM
PSM15	392053.121	164784.168	43.958	PSM
PSM16	392063.682	164668.668	41.977	PSM
T1	392159.452	164826.049	43.821	Trig
T2	392159.452	164826.049	43.821	Trig
T3	392218.972	164541.207	43.811	Trig
T4	392218.972	164541.207	43.811	Trig
T5	392152.438	164561.213	44.001	Trig
T6	392152.438	164561.213	44.001	Trig
T7	391929.193	164541.193	44.141	Trig
T8	391929.193	164541.193	44.141	Trig
T9	391902.621	164632.248	44.917	Trig
T10	391914.063	164562.399	44.957	Trig
T11	391902.621	164632.248	44.917	Trig
T12	391756.738	164415.221	43.803	Trig
T13	392250.382	164672.699	43.938	Trig
T14	392250.382	164672.699	43.938	Trig
T15	392151.955	164692.123	44.103	Trig
T16	392208.345	164654.066	44.045	Trig
T17	392208.345	164654.066	44.045	Trig
T18	392255.674	164711.063	44.063	Trig
T19	392255.674	164647.066	43.890	Trig

UNDERGROUND UTILITIES LEGEND

- STORM WATER SEWER (SWS)
- FOUL WATER SEWER (FWS)
- COMBINED SEWER (CWS)
- SEWER
- ELECTRIC CABLE
- HIGH VOLTAGE CABLE
- LOW VOLTAGE CABLE
- TELECOMS CABLE
- CABLE TELEVISION
- TRAFFIC LIGHT SIGNAL CABLE
- WATER — UNDERGROUND WATER SUPPLY
- GAS (MP) — GAS MEDIUM PRESSURE
- GAS (IP) — GAS INTERMEDIATE PRESSURE
- GAS (HP) — GAS HIGH PRESSURE
- OIL PIPE
- UNKNOWN SERVICE METALLIC
- UNKNOWN SERVICE PLANE WITH GPR
- UNKNOWN SERVICE CABLE
- DRAIN
- DISTRIBUTED CABLE
- SA — CCTV NOTES - SURVEY ABANDONED
- Note attached eg. BT. 5.6 .62 — Type Depth Quality

UNDERGROUND UTILITY SURVEY NOTES:

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Irrespective of the information provided by a utility survey and statutory plans, any groundworks should be undertaken with extreme caution and in accordance with health and safety executive guidelines HSG 47 AVOIDING DANGER FROM UNDERGROUND SERVICES

LEGEND

GV	Gate Valve	GV	Gas Valve	SVP	Soil Vent Pipe
BL	Bollard	CV	Gulley	THL	Threshold Level
BH	Bore Hole	CP	Cattle Grid	TP	Test Pit
BS	Bus Stop	KC	Kissing/Box Cover	TP	Telegraph Pole
ST	Telecom Cover	IL	Invert Level	TS	Traffic Sign
CH	Chimney Stack	LP	Lamp Post	TW	Transformer Pit
OP	Down Pipe	LC	Lamp Column	TT	Tree Top
EY	Electricity Cover	MH	Manhole	TV	Cable TV Cover
EOT	End of Overhang	OHL	Overhead Line	UP	Unidentified Pipe
EOT	End of Fence	OH	Overhead Cable	UTL	Unable to Lift
EP	Electricity Pole	PB	Post Box	UTS	Unable to Survey
FH	Fire Hydrant	PC	Private Cover	VC	Vent Pipe Cover
FTL	Finished Floor Level	PNP	Road Name Plate	VP	Vent Pipe
FH	Fire Hydrant	SC	Stop Cock (Water)	VT	Vegetation Top
GM	Gas Marker	SL	Street Light	WC	Water Cover
GP	Gate Post	SP	Sign Post	WM	Water Meter
GPR	Ground Penetrating Radar	SV	Stop Valve	WO	Wash Out

KEY

SURVEY STATION | GATE | BANK | FOLIAGE | CLIFF

50m — MAJOR CONTOUR

MINOR CONTOUR (0.25m Interval)

NOTES

Level Datum: OS National Grid OSGM15

Grid Orientation: OS National Grid OSTN15

Scale Factor: Scalle Factor 0.99960203

The contractor is to check and verify all critical dimensions and levels before work starts.

Every effort is made to identify all visible above ground features. However, it may be possible that certain features are obscured at the time of survey.

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CLIENT

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SN25 4DL

JOB TITLE

Topographical / Drainage / Underground Utilities Survey

New Farm
New Road
Melksham
SN12 7QY

REVISIONS

Sheet 4 of 12

SCALE	A0 Sheet @ 1 to 200
DATE	Feb 2023
SURVEYED BY	LB
DRAWN BY	LB
CHECKED BY	PJW

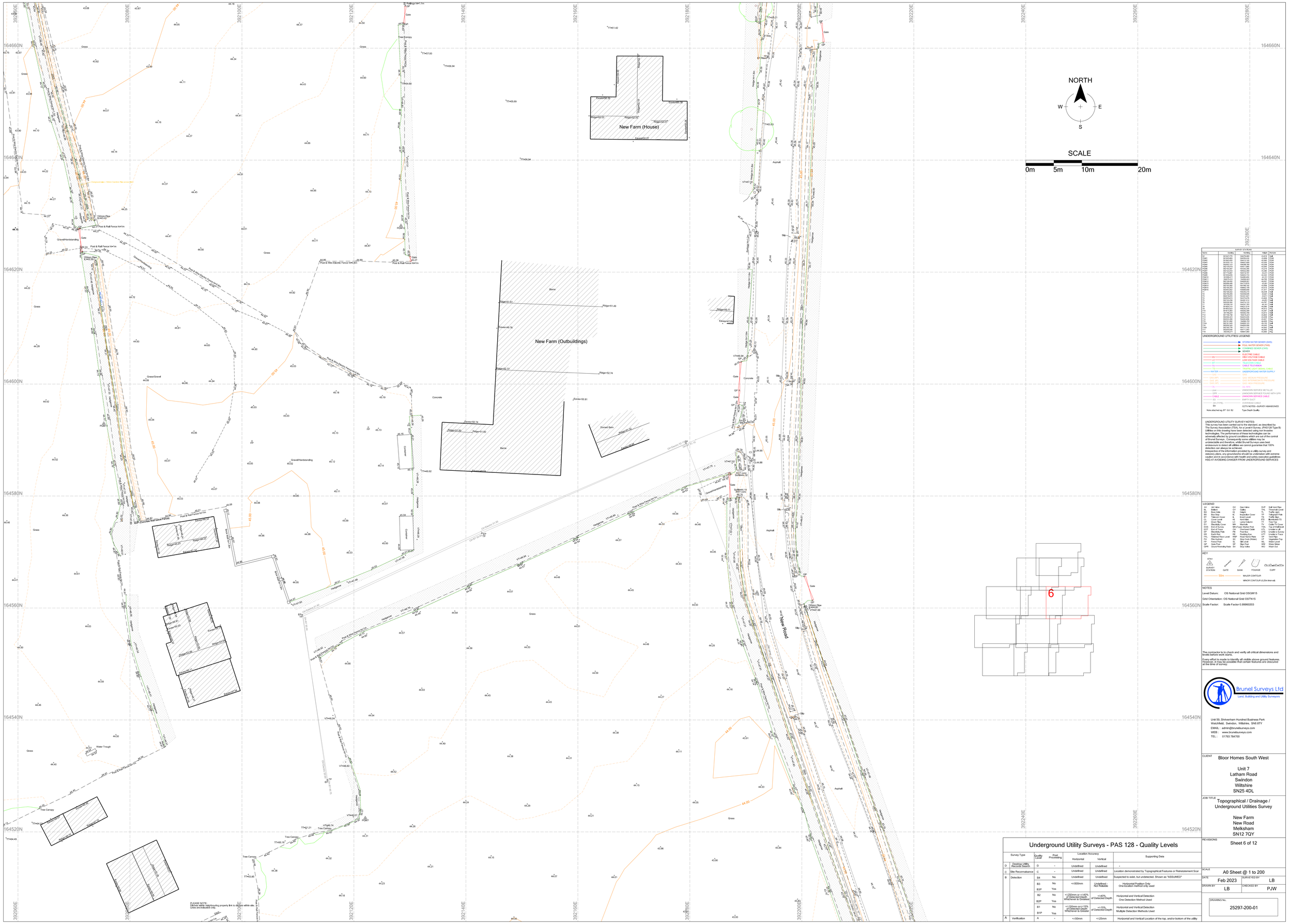
DRAWING No.

25297-200-01

Underground Utility Surveys - PAS 128 - Quality Levels

Survey Type		Quality Level	Post Processing	Location Accuracy Horizontal	Location Accuracy Vertical	Supporting Data
D	Desktop Utility Records Search	D	-	Undefined	Undefined	-
C	Site Reconnaissance	C	-	Undefined	Undefined	Location demonstrated by Topographical Features or Reinstatement Scar
B	Detection	B4	No	Undefined	Undefined	Suspected to exist, but undetected. Shown as "ASSUMED"
		B3	No	+/-500mm	Undefined - Not Reliable	Horizontal Position Only - One location method only used
		B3*	Yes			
		B2	No	+/-250mm or +/-40% of Detected Depth Whichever is Greatest	+/-40% of Detected Depth	Horizontal and Vertical Detection One Detection Method Used
		B2*	Yes			
		B1	No	+/-150mm or +/-15% of Detected Depth Whichever is Greatest	+/-15% of Detected Depth	Horizontal and Vertical Detection Multiple Detection Methods Used
		B1*	Yes			
A	Verification	A	-	+/-50mm	+/-125mm	Horizontal and Vertical Location of the top, and/or bottom of the utility


391940E
391960E
391980E
392000E
392020E
392040E
392060E
392080E
392100E
392120E
392140E
164660N
164640N
164620N
164600N
164580N
164560N
164540N
164520N
NORTH
W
E
S
SCALE
0m
5m
10m
20m
Post & Rail Fence 1m
Post & Wire Fence 1m
Post & Rail Fence 1m
Post & Wire Electric Fence 1m
Post & Rail Fence 1m
Post & Rail Fence 1m
Post & Rail Fence 1m
Post & Rail Fence 1m
Post & Wire Electric Fence 1m
Post & Rail Fence 1m
Post & Rail Fence 1m
Post & Rail Fence 1m
Post & Rail


New Farm (House)
New Farm (Outbuildings)
New Road
Barns
Domed Barn
Asphalt
Concrete
Gravel/Hardstanding
Grass
Grass/Gravel
Water Trough
Tree Canopy
Hedgerow
Post & Wire Electric Fence top=1m
Post & Rail Fence top=1m
Post & Wire Fence top=1m
Post & Wire Electric Fence top=1.2m
Post & Rail Fence top=1.2m
Post & Wire Fence top=1.2m
Post & Rail Fence top=1.5m
Post & Wire Fence top=1.5m
Post & Wire Electric Fence top=1.5m
Post & Rail Fence top=1.6m
Post & Wire Fence top=1.6m
Post & Wire Electric Fence top=1.6m
Post & Rail Fence top=1.8m
Post & Wire Fence top=1.8m
Post & Wire Electric Fence top=1.8m
Post & Rail Fence top=2m
Post & Wire Fence top=2m
Post & Wire Electric Fence top=2m
Post & Rail Fence top=2.1m
Post & Wire Fence top=2.1m
Post & Wire Electric Fence top=2.1m
Post & Rail Fence top=2.2m
Post & Wire Fence top=2.2m
Post & Wire Electric Fence top=2.2m
Post & Rail Fence

NORTH

SCALE
0m 5m 10m 20m

Gloucester Road

Childrens Play Park

Attenuation Basin

Grass

Asphalt

Block Paving

Tree Canopy

Hedgerow

Post & Rail Fence

Railings

Concrete Head Wall

Gate

Water Trough

Bollards

Ditch

Kerb

Footway

Verge

Carriageway

Embankment

Retaining Wall

Building

Fence

Hedge

Wall

Manhole

Gully

Catchpit

Inspection Chamber

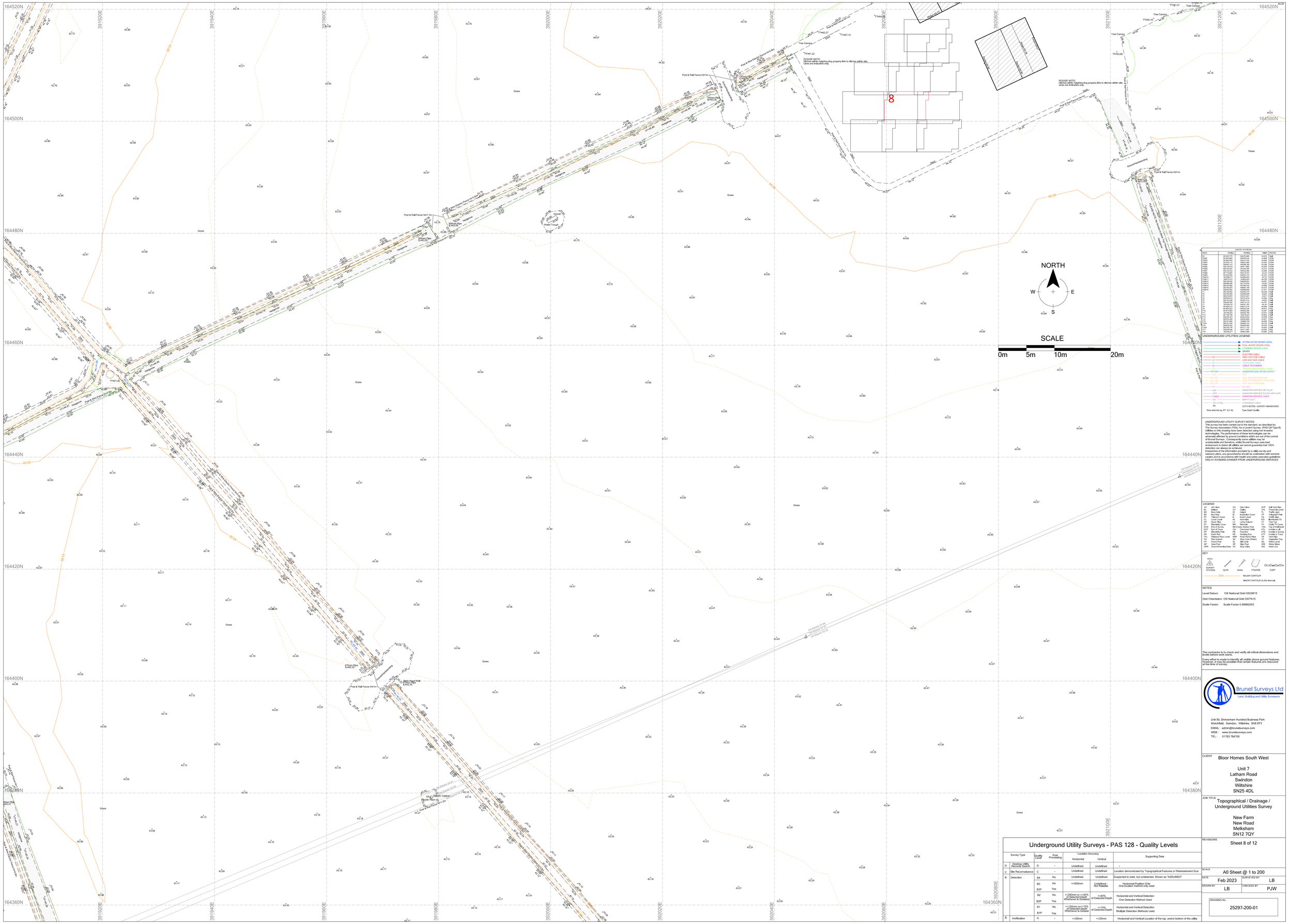
Soakaway

Pipe Outfall

Culvert

Pond

Stream


164520N
164500N
164480N
164460N
164440N
164420N
164400N
164380N
164360N
391920E
391940E
391960E
391980E
392000E
392020E
392040E
392060E
392080E
392100E
392120E
8
NORTH
W
E
S
SCALE
0m
5m
10m
20m
PLEASE NOTE:
Ditches within neighbouring property &/or to ditches within site.
Lines are indicative only.
Post & Rail Fence NW1.1m
Post & Wire Electric Fence NW1.5m
Hedgerow
Grass
Water Trough
Gravel Pit
Brick Head Wall
Post & Rail Fence NW1m
Post & Rail Fence NW1.5m
Electric Fence
Electric Fence NW1.5m
Electric Meter
Electric Cabinet
Overhead Cables
Tree Canopy
Tree Canopy
Tree Canopy

PLEASE NOTE:
Ditches within neighbouring property link to ditches within site.
Levels are indicative only.

Post & Rail Fence h=1m

Post & Rail Fence h=1.2m

Post & Rail Fence h=1.5m

Post & Rail Fence h=1.8m

Post & Rail Fence h=1.8m

Post & Rail Fence h=1m

Post & Rail Fence h=1m

Post & Rail Fence h=1

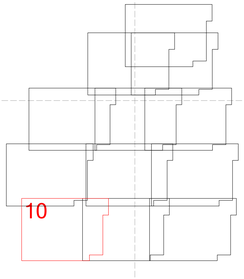
391740E 391760E 391780E 391800E 391820E 391840E 391860E 391880E 391900E 391920E 391940E 391960E

164360N 164340N 164320N 164300N 164280N 164260N 164240N 164220N

NORTH

SCALE
0m 5m 10m 20m

Gladstone Road
Macdonald Close
Sandridge Common (A3102)



SURVEY STATIONS

Name	Easting	Northing	Height	Remark
PG01	391922.970	164376.249	43.818	Pvd
PG02	391922.970	164376.249	43.818	Pvd
PG03	391942.450	164416.140	43.940	PGM
PG04	391942.450	164416.140	43.940	PGM
PG05	392053.113	164356.785	43.958	PGM
PG06	392130.619	164411.889	43.948	PGM
PG07	392130.619	164411.889	43.948	PGM
PG08	392122.027	164522.365	44.260	PGM
PG09	392122.027	164522.365	44.260	PGM
PG10	391930.835	164623.733	43.943	PGM
PG11	391930.835	164623.733	43.943	PGM
PG12	392075.421	164692.697	44.165	PGM
PG13	392126.402	164628.267	43.957	PGM
PG14	392126.402	164628.267	43.957	PGM
PG15	392150.280	164766.162	43.958	PGM
PG16	392150.280	164766.162	43.958	PGM
PG17	392063.662	164668.668	43.977	PGM
PG18	392063.662	164668.668	43.977	PGM
T1	392159.450	164826.249	43.821	Tre
T2	392218.972	164341.207	43.811	Tre
T3	392218.972	164341.207	43.811	Tre
T4	392154.238	164381.212	44.001	Tre
T5	392154.238	164381.212	44.001	Tre
T6	391929.781	164341.393	44.141	Tre
T7	391929.781	164341.393	44.141	Tre
T8	391902.621	164232.234	44.872	Tre
T9	391914.063	164262.399	44.267	Tre
T10	391914.063	164262.399	44.267	Tre
T11	391758.738	164415.225	43.802	Tre
T12	392250.382	164652.899	43.939	Tre
T13	392250.382	164652.899	43.939	Tre
T14	392250.382	164652.899	43.939	Tre
T15	392308.345	164658.066	44.245	Tre
T16	392308.345	164658.066	44.245	Tre
T17	392258.676	164771.283	44.063	Tre
T18	392258.676	164771.283	43.892	Tre

UNDERGROUND UTILITIES LEGEND

- STORM WATER SEWER (SWS)
- FOUL WATER SEWER (FWS)
- COMBINED SEWER (CWS)
- SEWER
- ELECTRIC CABLE
- HV HIGH VOLTAGE CABLE
- LV LOW VOLTAGE CABLE
- TELECOMS CABLE
- CABLE TELEVISION
- TRAFFIC LIGHT SIGNAL CABLE
- WATER UNDERGROUND WATER SUPPLY
- GAS (MP) GAS MEDIUM PRESSURE
- GAS (IP) GAS INTERMEDIATE PRESSURE
- GAS (HP) GAS HIGH PRESSURE
- OIL PIPE
- UNKN UNKNOWN SERVICE METALLIC
- UNKN UNKNOWN SERVICE FOUND WITH GPR
- CABLE UNKNOWN SERVICE CABLE
- DRAIN DRAINAGE
- OH (CYTR) OVERHEAD CABLE
- SA CCTV NOTES - SURVEY ABANDONED
- Note attached eg. BT 5.6 .62 Type Depth Quality

UNDERGROUND UTILITY SURVEY NOTES:
This survey has been carried out to the standard, as described by The Survey Association (TSA), for a Level 4 Survey. (PAS128 Type B). Utilities on this drawing have been detected using non invasive technologies. The performance of these technologies can be affected by a number of factors including depth, size and the control of Buried Surveys. Consequently some utilities may be undetectable and therefore, whilst Brunel Surveys uses best endeavours to detect all utilities we cannot guarantee that 100% detection can always be achieved.
Irrespective of the information provided by a utility survey and statutory plans, any groundworks should be undertaken with extreme caution and in accordance with health and safety executive guidelines HSG 47 AVOIDING DANGER FROM UNDERGROUND SERVICES

LEGEND

AV	Air Valve	CV	Gas Valve	SVP	Soil Vent Pipe
BB	Bus Box	EL	Electric	TBM	Temporary Bench Mark
BH	Bore Hole	HI	Height	TL	Traffic Light
BS	Bus Stop	IC	Inspection Cover	TP	Telegraph Pole
CC	Communication Cover	IL	Invert Level	TR	Trial Hole
CL	Crown Level	KI	Kerb Inlet	BTS	Illuminated TS
DP	Down Pipe	LC	Lamp Column	TT	Toss Toy
EOS	End of Survey	MH	Manhole Cover	UC	Unknown Cover
EOT	End of Trace	MK	MK(Cast) Marker Post	THL	Top of Hill Level
EOT	End of Trace	OH	Overhead Cable	UTL	Unable to Lift
GR	Garage Roller	PB	Post Box	UTS	Unable to Survey
GR	Earth Rod	RE	Rodding Eye	UTT	Unable to Trace
FFL	Flatbed Floor Level	RNP	Road Name Plate	VP	Vent Pipe
FH	Fire Hydrant	SA	Survey Abandoned	WC	Water Company Tap
FP	Fence Post	SL	SM Level	WL	Water Level
GP	Gate Post	SP	Sign Post	WM	Water Meter
GPR	Ground Penetrating Radar	SV	Stop Valve	WO	Wash Out

KEY

STN1 SURVEY STATION · GATE · BANK · FOLIAGE · CLIFF
50m MAJOR CONTOUR
MINOR CONTOUR (0.25m Interval)
(Area covered in more detail)

NOTES

Level Datum: OS National Grid OSGM15

Grid Orientation: OS National Grid OSTN15

Scale Factor: Scale Factor 0.99960203

The contractor is to check and verify all critical dimensions and levels before work starts.

Every effort is made to identify all visible above ground features. However, there are possibilities that certain features are obscured at the time of survey.

Brunel Surveys Ltd
Land, Building and Utility Surveyors

Unit 59, Shrivenham Hundred Business Park
Watchfield, Swindon, Wiltshire, SN6 8TY
EMAIL : admin@brunelsurveys.com
WEB : www.brunelsurveys.com
TEL : 01793 784700

CLIENT
Bloor Homes South West

Unit 7
Latham Road
Swindon
Wiltshire
SN25 4DL

JOB TITLE
Topographical / Drainage / Underground Utilities Survey

New Farm
New Road
Melksham
SN12 7QY

Underground Utility Surveys - PAS 128 - Quality Levels

	Survey Type	Quality Level	Post Processing	Location Accuracy: Horizontal	Location Accuracy: Vertical	Supporting Data
D	Desktop Utility Records Search	D	-	Undefined	Undefined	-
C	Site Reconnaissance	C	-	Undefined	Undefined	Location demonstrated by Topographical Features or Reinstatement Scar
B	Detection	B4	No	Undefined	Undefined	Suspected to exist, but undetected. Shown as "ASSUMED"
		B3	No	+/-500mm	Undefined - Not Reliable	Horizontal Position Only One location method only used
		B3P	Yes			
		B2	No	+/-250mm or +/-40% of Detected Depth Whichever is Greatest	+/-40% of Detected Depth	Horizontal and Vertical Detection One Detection Method Used
		B2P	Yes			
		B1	No	+/-150mm or +/-15% of Detected Depth Whichever is Greater	+/-15% of Detected Depth	Horizontal and Vertical Detection Multiple Detection Methods Used
		B1P	Yes			
A	Verification	A	-	+/-50mm	+/-25mm	Horizontal and Vertical Location of the top, and/or bottom of the utility

REVISIONS
Sheet 10 of 12

SCALE
A0 Sheet @ 1 to 200

DATE
Feb 2023

SURVEYED BY
LB

DRAWN BY
LB

CHECKED BY
PJW

DRAWING No.
25297-200-01

391900E 391920E 391940E 391960E 391980E 392000E 392020E 392040E 392060E 392080E 392100E 392120E

164360N 164340N 164320N 164300N 164280N 164260N 164240N 164220N

Sandridge Common (A3102)

Post & Rail Fence 1m Hi

Post & Wire Fence 1m Hi

Hedgerow

Grass

Asphalt

Concrete

Concrete Slabs (Chamber)

Water Trough

Water Riser

Electric Cabinet

Gas

Gully

Manhole

Inspection Cover

Kerb

Sign

Post

Gate

Fence

Retaining Wall

Boundary

Ditch

Bollard

Tree

Hedge

Bush

Shrub

Kerb Line

Edge of Road

Footway

Carriageway

Centre Line

Lamp Post

Telegraph Pole

Traffic Light

Traffic Sign

Bollard


392080E
392100E
392120E
392140E
392160E
392180E
392200E
392220E
392240E
392260E
392280E
164360N
164340N
164320N
164300N
164280N
164260N
164240N
164220N
Sandridge Common (A3102)
Eastern Way
Post & Rail Fence 1m high
Triangular Post & Rail Structure over Ditch 1mH 2.7m
Post & Wire Fence 1.5m
Pipe with In Hedgerow 225mm
Concrete Slabs (Chamber)
Chainlink Fence 1.5m
Hedgerow
Grass
Asphalt
Trees & Bushes
Overhead Line
Block Paving
Building 1
Building 2
Building 3
Building 4
Building 5
Building 6
Building 7
Building 8
Building 9
Building 10
Building 11
Building 12
Building 13
Building 14
Building 15
Building 16
Building 17
Building 18
Building 19
Building 20
Building

Appendix 3 – Environment Agency Correspondence

creating a better place

Environment Agency

Eric O'Connor
Enzygo
eric.oconnor@enzygo.com

Our ref: 306272-WX
Your ref: SHF.102.003
Date: 28 April 2023

Dear Eric

Thank you for your enquiry which was received on 29th March 2023. We respond to requests under the Freedom of Information Act 2000 and Environmental Information Regulations 2004.

Abstract

Name	Product 4
Description	Flood Risk Information for land at **New Farm, Sandridge Common, Melksham, SN12 7QY** NGR: ST9216664608
Licence	Open Government Licence
Information Warnings	*The mapping of features provided as a background in this product is © Ordnance Survey. It is provided to give context to this product. The Open Government Licence does not apply.*
Attribution	Contains Environment Agency information © Environment Agency and/or database rights. Contains Ordnance Survey data © Crown copyright 2020 Ordnance Survey 100024198.

Open Data

The following Environment Agency published datasets are now available on the weblink below as part of the Government's 'Open Data' project and are available for you to download free of charge.

Environment Agency published datasets: https://data.gov.uk/data/search?publisher=environment-agency&unpublished=false

You will need to search and select the name of the following datasets to take you directly to the weblink to enable you to download the data:

- Flood Map for Planning (Rivers and the Sea) – Flood Zones 2 and 3
- Flood Map for Planning (Rivers and Sea) – Areas Benefiting from Defences
- Flood Map for Planning (Rivers and Sea) Spatial Flood Defences
- Flood Map for Planning (Rivers and Sea) Flood Storage Areas
- Recorded Flood Outlines
- Historic Flood Map
- Risk of Flooding from Surface Water Extent for:
  - → 3 percent annual chance
  - → 1 percent annual chance
  - → 0.5 percent annual chance

You can also access the Flood Map for Planning here: https://flood-map-for-planning.service.gov.uk/

You can also access the Risk of Flooding from Surface Water maps and Risk of Flooding from Reservoirs information here: https://flood-warning-information.service.gov.uk/long-term-flood-risk/map

Recorded Historic Flood Events

We do not have any record of the area flooding from the river or sea. Please note, however, that this could mean either that the site has not flooded, or that the site has flooded, and we are not aware of the fact that the site has flooded.

Please note - we cannot guarantee that this is an exhaustive list of all past flood events in this location. All reasonable care has been taken to ensure that the historical flood event data is as accurate as possible. The Environment Agency will update its records if new evidence emerges.

2D Modelled Flood Plain Water Levels

The current flood map for planning has been informed by the S105 modelling from the S105 Level B study carried out by Posford Haskoning in 1997. We do not have any water level information available from this 1997 study. The Environment Agency plans to carry out improvements to its understanding of the flood risk in Melksham over the next few years. This will include updates to the existing flood hydrology which is outdated and updated flood outlines to inform the Flood Map for Planning.

For more information on climate change allowances please see the guidance on the Gov.UK website here: Flood risk assessments: climate change allowances - GOV.UK. **Please be aware that this information is subject to change, please check the guidance regularly.**

Environmental Permit for Flood Risk Activities

In addition to any other permission(s) that you may have already obtained e.g. planning permission, you may need an environmental permit for flood risk activities (formerly known as Flood Defence Consent prior to 06 April 2016) if you want to do work:

- in, under, over or near a main river (including where the river is in a culvert)
- on or near a flood defence on a main river
- in the flood plain of a main river
- on or near a sea defence

For further information and to check whether a permit is required please visit: https://www.gov.uk/guidance/flood-risk-activities-environmental-permits.

For any further advice, please email Blandford.frap@environment-agency.gov.uk.

Flood Asset Information

Please find enclosed details of Flood Assets within the area. This information has been taken from our Asset Information Management System database (AIMS).

Please note that flood defences can increase water levels elsewhere eg through channels being restricted by defences, or because defences prevent flood water flowing back into the river channel.

Planning

If you have questions regarding the planning nature of your enquiry, or require advice on floor levels, please contact our Sustainable Places team on SWX.SP@environment-agency.gov.uk.

Customer & Engagement, Wessex
Rivers House, East Quay, Bridgwater, Somerset, TA6 4YS
Email: wessexenquiries@environment-agency.gov.uk
www.environment-agency.gov.uk

Please be aware that we now charge for planning advice when consulted on pre-application enquiries. This new approach provides advice to developers in two ways. Firstly, there is the provision of 'free' advice available to everyone where we give a preliminary opinion on a proposed development. This sets out the environmental constraints together with any issues this raises for us. Should you wish us to review in detail any of these issues then we can do this through a chargeable scheme aimed at recovering our costs.

Strategic Flood Risk Assessment (SFRA)

When preparing a FRA to support a development proposal in this location you should refer to Wiltshire Council's SFRA Reports Level 1 which is available to download via the following link: https://www.wiltshire.gov.uk/media/5691/Strategic-Flood-Risk-Assessment-Level-1/pdf/Wiltshire_Council_Level_1_SFRA_v5.0.pdf?m=637459765054370000

The Wiltshire Council Local Plan is available via this link: https://www.wiltshire.gov.uk/planning-policy-local-plan-review-consultation

Further Information

We advise that you also contact the drainage engineer/ flood risk management team at Wiltshire Council by email: drainage@wiltshire.gov.uk, or by phone: 0300 456 0105, based at: Bythesea Road, Trowbridge, Wiltshire, BA14 8JN, as they may be able to provide further advice with respect to localised flooding and drainage issues.

Further details about the Environment Agency information supplied can be found on our website: https://www.gov.uk/browse/environment-countryside/flooding-extreme-weather

We hope you find this information helpful. It is provided subject to the attached notice 'Use of Environment Agency Information for Flood Risk Assessments', which we strongly recommend you read.

Yours sincerely

Corinne Moyse

Customer & Engagement, Wessex
Rivers House, East Quay, Bridgwater, Somerset, TA6 4YS
Email: wessexenquiries@environment-agency.gov.uk

Enc: Use of Environment Agency Information for Flood Risk Assessments (below)
306272-WX Defence Map
306272-WX Defence Data

Use of Environment Agency Information for Flood Risk Assessments (FRAs)

Important
Use of Environment Agency data: you should note that

1. Information supplied by the Environment Agency may be used to assist in producing a Flood Risk Assessment (FRA) where one is required, but the use of Environment Agency information does not constitute such an assessment on its own.

2. As part of your data request, we have provided all of the modelled data we hold for your location. Please note that some of our modelled information may have been produced for purposes other than for flood zone generation. This may mean that some of the modelled data you have been provided with has a lower confidence level, and has not been used in producing our flood map, nor definitively reflects the predicted flood water level at the property/development site scale. To check the suitability of the use of this information in your FRA please contact your local Partnership & Strategic Overview (PSO) team.

3. This information covers flood risk from main rivers and the sea, and you will need to consider other potential sources of flooding, such as groundwater or surface water runoff. The information produced by the Local Planning Authority and the Lead Local Flood Authority (LLFA) may assist in assessing other sources of flood risk.

4. Where a planning application requires a FRA and this is not submitted or deficient, the Environment Agency may well raise an objection.

5. For more significant proposals in higher flood risk areas, we would be pleased to discuss details with you ahead of making any planning application, and you should also discuss the matter with your Local Planning Authority.

Pre-Planning Advice from the Environment Agency
If you have requested this information to help inform a development proposal, then we recommend that you undertake a formal pre-application enquiry using the form available from our website:

Pre-application Preliminary Opinion:
https://www.gov.uk/government/publications/pre-planning-application-enquiry-form-preliminary-opinion

Pre-application Charged Service:
https://www.gov.uk/government/publications/planning-advice-environment-agency-standard-terms-and-conditions

Depending on the enquiry we may also provide advice on other issues related to our responsibilities, including flooding, waste, land contamination, water quality, biodiversity, navigation, pollution, water resources, foul drainage or Environmental Impact Assessment.

Flood Risk Assessment (FRA) Guidance
You should refer to the Planning Practice Guidance of the National Planning Policy Framework (NPPF) and the Environment Agency's Flood Risk Standing Advice for information about Flood Risk Assessment (FRA) for new development in the different Flood Zones. These documents can be accessed via:

National Planning Policy Framework Planning Practice Guidance:
http://planningguidance.planningportal.gov.uk/

Customer & Engagement, Wessex
Rivers House, East Quay, Bridgwater, Somerset, TA6 4YS
Email: wessexenquiries@environment-agency.gov.uk
www.environment-agency.gov.uk

VAT No: 662 4901 34

Environment Agency advice on FRAs:
https://www.gov.uk/flood-risk-assessment-for-planning-applications#when-to-follow-standing-advice

https://www.gov.uk/government/publications/planning-applications-assessing-flood-risk

Customer & Engagement, Wessex
Rivers House, East Quay, Bridgwater, Somerset, TA6 4YS
Email: wessexenquiries@environment-agency.gov.uk
www.environment-agency.gov.uk

Appendix 4 – Wiltshire Council Correspondence

Eric O'Connor

From: Malton, Renate <Renate.Malton@wiltshire.gov.uk>
Sent: 13 September 2023 14:32
To: Eric O'Connor
Cc: Biggs, Emma
Subject: New Farm Melksham -

Eric

Thank you for your email regarding diverting a watercourse on the proposed development.

If you are planning works on or within 8 mtrs of an ordinary watercourse you will need to apply for Land Drainage Consent from Wiltshire Council.

I should also advise that if any works you are planning might involved e.g. discharge into a third party ditch you will need to supply written permission from the owners to this effect alongside your application.

The form and relevant information can be found at: https://www.wiltshire.gov.uk/civil-emergencies-land-drainage-ordinary-watercourse

A fee of £50 per item is charged.

I hope this is of assistance.

Renate Malton
Flood Resilience Officer
Drainage Team - Chippenham Bath Road
Wiltshire Council
Wiltshire Council

Please note my working hours are Tuesday to Thursday

www.wiltshire.gov.uk
Email: renate.malton@wiltshire.gov.uk
Tel: 01225 712514
Follow Wiltshire Council

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of this e-mail does not imply consent to use or provide this e-mail address to any third party for any purpose. Wiltshire Council will not request the disclosure of personal financial information by means of e-mail any such request should be confirmed in writing by contacting Wiltshire Council.

Wiltshire Council Planning Consultation Response

1st August 2023

Wiltshire Council Drainage Engineer
Technical Services Drainage Engineer
Wiltshire Council

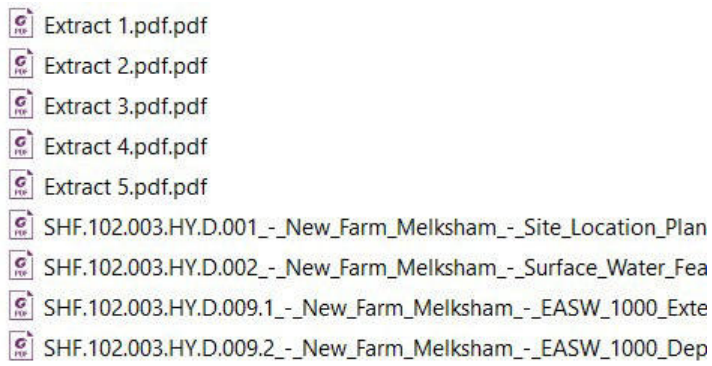
Officer's Name: David Cox
Direct Line: 01225 770234

Application No: **ENQ/2023/01018**
Pre-Application enquiry
Outline Planning Advice - Residential development of approx. 388 units and green infrastructure
LAND AT NEW ROAD FARM, MELKSHAM, WILTSHIRE

Please note the particulars in connection with the above planning application are available to view on the planning website http://www.wiltshire.gov.uk/planninganddevelopment.htm

Pre-Application Advice

Following our response to the pre-application enquiry (ENQ/2023/00953) on 19th July 2023, further information (see image below) has been submitted under ENQ/2023/01018.



All requirements detailed in our response to ENQ/2023/00953 still apply i.e. we'd expect to see a site-specific Flood Risk Assessment (FRA) which should demonstrate that the site is not adversely affected by flood risk from different sources, and how the flood risk from **all sources** will be managed without increasing flood risk to the development itself or elsewhere. It should also outline the proposed drainage strategy for the site. The applicant is referred to the Environment Agency's advice on how to prepare an FRA, as well as their standing advice for vulnerable developments.

The FRA and drainage strategy should also take into consideration the 450mm diameter surface water drain that crosses the site from the west with respect to the proximity of buildings and appropriate depth of cover depending on the proposed land use.

--
James Playfair (Atkins) working on behalf of Wiltshire Council Drainage.

Eric O'Connor

From: Wilding, Ben <Ben.Wilding@atkinsrealis.com>
Sent: 24 July 2024 11:49
To: Eric O'Connor
Subject: RE: LAND AT NEW ROAD FARM, 240 NEW ROAD, MELKSHAM, SN12 7QY

Hi Eric
I would be in agreement that the below would be acceptable for the easement

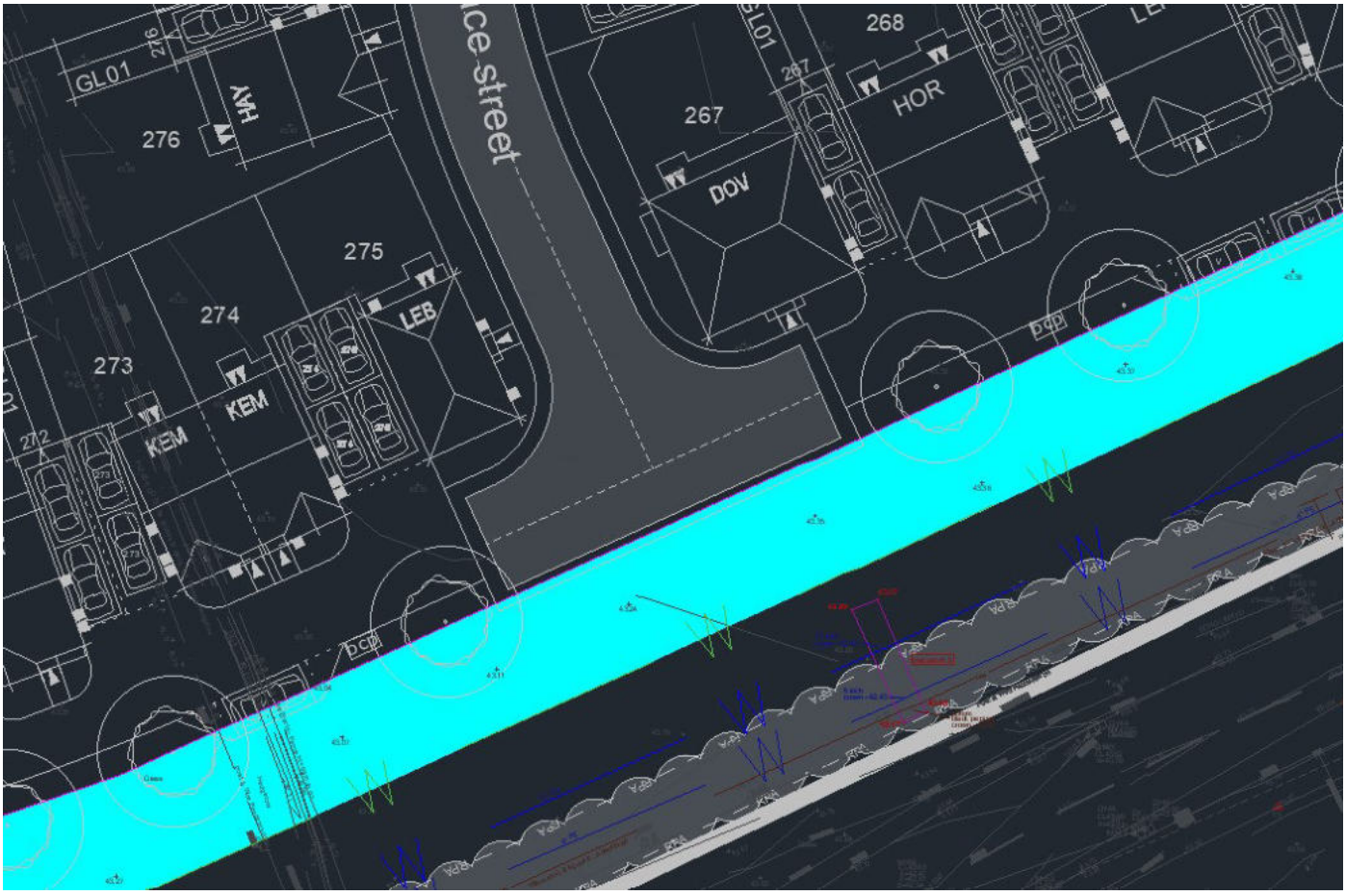
Kind Regards

Ben Wilding *MEng (Hons) CEng MICE*
Principal Civil Engineer

From: Eric O'Connor <eric.oconnor@enzygo.com>
Sent: Wednesday, July 24, 2024 11:40 AM
To: Wilding, Ben <Ben.Wilding@atkinsrealis.com>
Subject: RE: LAND AT NEW ROAD FARM, 240 NEW ROAD, MELKSHAM, SN12 7QY

Ben,

Thanks for the speedy response, very helpful. I have attached the masterplan which shows what would be in the swale easement. Some tree planting but sporadic so accessible, some car parking spaces and a road. There needs to be a minor shift of this north to make sure the car parking spaces etc are fully out of the designed swale but was wondering if you seek clarification on whether the attached would be acceptable in the swale easement.



Many thanks, and any questions let me know.

Kind Regards,

Eric

Eric O'Connor BSc (Hons), MSc, MCIWEM, C.WEM
Principal Hydrologist

Phone: 0114 321 5151
Mobile: 07710549218
Email: eric.oconnor@enzygo.com
Web: enzygo.com

From: Wilding, Ben <Ben.Wilding@atkinsrealis.com>
Sent: Tuesday, July 23, 2024 2:15 PM
To: Eric O'Connor <eric.oconnor@enzygo.com>
Subject: RE: LAND AT NEW ROAD FARM, 240 NEW ROAD, MELKSHAM, SN12 7QY

Hi Eric
I would suggest the pavement would be acceptable as per your below example. My understanding of an easement is that this is to ensure maintenance access for the future, and therefore you are correct that we would want to avoid buildings, fencing and significant planting which would impact on this.

Kind Regards

Ben Wilding MEng (Hons) CEng MICE

Principal Engineer
Networks & Drainage Solutions, Infrastructure
AtkinsRéalis
T: +44 121 483 5490 LinkedIn
Two Chamberlain Square
Birmingham, West Midlands, B3 3AX, GB
Annual Leave: 15 - 26 August 2024

From: Eric O'Connor <eric.oconnor@enzygo.com>
Sent: Tuesday, July 23, 2024 2:04 PM
To: Wilding, Ben <Ben.Wilding@atkinsrealis.com>
Subject: RE: LAND AT NEW ROAD FARM, 240 NEW ROAD, MELKSHAM, SN12 7QY

Hi Ben,

Just looking to bottom out what would be acceptable in this easement. I was wondering if pavement would be okay (such as below)? I'm assuming you're just looking to avoid buildings, fencing and significant planting that would restrict access to the feature for inspection and maintenance purposes?



Kind Regards,

Eric

Eric O'Connor BSc (Hons), MSc, MCIWEM, C.WEM
Principal Hydrologist

Phone: 0114 321 5151
Mobile: 07710549218
Email: eric.oconnor@enzygo.com
Web: enzygo.com

From: Wilding, Ben <Ben.Wilding@atkinsrealis.com>
Sent: Wednesday, June 19, 2024 10:17 AM
To: Eric O'Connor <eric.oconnor@enzygo.com>
Cc: Helena Du-Roe <helena.du-roe@enzygo.com>
Subject: RE: LAND AT NEW ROAD FARM, 240 NEW ROAD, MELKSHAM, SN12 7QY

Hi Eric
Happy for the easement to be provided on one side as it will be routed on the perimeter – the easements are there to provide maintenance access. It makes sense therefore as long as maintenance can be provided, that it is only needed on the one side in this case

Kind Regards

Ben Wilding MEng (Hons) CEng MICE

Principal Engineer
Networks & Drainage Solutions, Infrastructure
AtkinsRéalis
T: +44 121 483 5490 LinkedIn
Two Chamberlain Square
Birmingham, West Midlands, B3 3AX, GB
Annual Leave: -

From: Eric O'Connor <eric.oconnor@enzygo.com>
Sent: Wednesday, June 19, 2024 9:58 AM
To: Wilding, Ben <Ben.Wilding@atkinsrealis.com>
Cc: Helena Du-Roe <helena.du-roe@enzygo.com>
Subject: RE: LAND AT NEW ROAD FARM, 240 NEW ROAD, MELKSHAM, SN12 7QY

Hi Ben,

No problem, that's helpful. The ditch/swale wouldn't be offered for adoption so therefore we will design it based on safely managing flood risk rather than to their design guidance.

Just finally regarding the easement question below – '*it is our intention to route it round the permitter of the Site and then into the watercourse within the centre of the Site. We are placing easements on this but were wondering if it would need to be either side or just the Site side, given its on the perimeter and would still be accessible for maintenance purposes.*'

If you could clarify the position on this that would be really appreciated as it will let us know the land take required.

Kind Regards,

Eric

Eric O'Connor BSc (Hons), MSc, MCIWEM, C.WEM
Principal Hydrologist

Phone: 0114 321 5151
Mobile: 07710549218
Email: eric.oconnor@enzygo.com
Web: enzygo.com

From: Wilding, Ben <Ben.Wilding@atkinsrealis.com>
Sent: Wednesday, June 19, 2024 9:50 AM
To: Eric O'Connor <eric.oconnor@enzygo.com>
Subject: RE: LAND AT NEW ROAD FARM, 240 NEW ROAD, MELKSHAM, SN12 7QY

Hi Eric
Apologies if I had not responded – multiple Planning Inspectorate Inquiries going on with proofs of evidence needing to be submitted etc.
I would agree that the 300mm flow depth would relate to the provision of new swales, whereas you are realistically diverting an ordinary watercourse, so it would not apply to your case.
For the proposed "diversion swale" I would assume that this will be maintained by riparian duties, rather than offered for adoption via WW (I am not convinced based on the purpose of the feature that they would adopt it) – if so we would not look to strictly apply Wessex Water's design guidance.
Obviously the diversion would still need to be designed to safely manage flood risk and not cause additional flow restrictions

Hope that helps clarify?

Kind Regards

Ben Wilding *MEng (Hons) CEng MICE*
Principal Civil Engineer

AtkinsRéalis

AtkinsRéalis on behalf of Wiltshire Council Drainage

E: ben.wilding@atkinsrealis.com
T: 0121 483 5490

From: Eric O'Connor <eric.oconnor@enzygo.com>
Sent: Wednesday, June 19, 2024 9:37 AM
To: Wilding, Ben <Ben.Wilding@atkinsrealis.com>
Subject: FW: LAND AT NEW ROAD FARM, 240 NEW ROAD, MELKSHAM, SN12 7QY

Hi Ben,

Apologies if I have missed a response but if not just wondering if you'd managed to get an answer on the below questions?

Kind Regards,

Eric

Eric O'Connor BSc (Hons), MSc, MCIWEM, C.WEM
Principal Hydrologist

Phone: 0114 321 5151
Mobile: 07710549218
Email: eric.oconnor@enzygo.com
Web: enzygo.com

From: Eric O'Connor
Sent: Thursday, May 9, 2024 9:05 AM
To: Wilding, Ben <Ben.Wilding@atkinsrealis.com>
Cc: Drainage <Drainage@wiltshire.gov.uk>
Subject: RE: LAND AT NEW ROAD FARM, 240 NEW ROAD, MELKSHAM, SN12 7QY

Hi Ben,

Sorry to bother you further but also in the Wessex guidance it states no depth greater than 300mm in the 1 in 30-year storm. To me this is referring to a drainage system swale rather than a interception / diversion swale for surface water flooding and therefore would not apply to the interception swale. If you are able to confirm this is the case as well that would be great.

Thanks,

Eric

Eric O'Connor BSc (Hons), MSc, MCIWEM, C.WEM
Principal Hydrologist

Phone: 0114 321 5151
Mobile: 07710549218
Email: eric.oconnor@enzygo.com
Web: enzygo.com

From: Wilding, Ben <Ben.Wilding@atkinsrealis.com>
Sent: Thursday, May 9, 2024 8:30 AM
To: Eric O'Connor <eric.oconnor@enzygo.com>
Cc: Drainage <Drainage@wiltshire.gov.uk>
Subject: RE: LAND AT NEW ROAD FARM, 240 NEW ROAD, MELKSHAM, SN12 7QY

You don't often get email from ben.wilding@atkinsrealis.com. Learn why this is important

Morning Eric
Thanks for your email – I will ask the questions and come back to you.

Kind Regards

Ben Wilding MEng (Hons) CEng MICE

Principal Engineer
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AtkinsRéalis
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Two Chamberlain Square
Birmingham, B3 3AX, UK
Annual Leave: 17 May 2024

From: Eric O'Connor <eric.oconnor@enzygo.com>
Sent: Thursday, May 9, 2024 8:25 AM
To: Wilding, Ben <Ben.Wilding@atkinsrealis.com>
Cc: Drainage <Drainage@wiltshire.gov.uk>
Subject: RE: LAND AT NEW ROAD FARM, 240 NEW ROAD, MELKSHAM, SN12 7QY

Hi Ben,

Given the below you may not be able to answer this but I have been requested to ask for masterplanning purposes. Regarding the interception swale for surface water flooding as you may recall, it is our intention to route it round the permitter of the Site and then into the watercourse within the centre of the Site. We are placing easements on this but were wondering if it would need to be either side or just the Site side, given its on the perimeter and would still be accessible for maintenance purposes. If you are able to get me a response on this for the evolving masterplan that would be great.

Kind Regards,

Eric

Eric O'Connor BSc (Hons), MSc, MCIWEM, C.WEM
Principal Hydrologist

Phone: 0114 321 5151
Mobile: 07710549218
Email: eric.oconnor@enzygo.com
Web: enzygo.com

From: Wilding, Ben <Ben.Wilding@atkinsrealis.com>
Sent: Monday, March 4, 2024 9:05 AM
To: Eric O'Connor <eric.oconnor@enzygo.com>
Cc: Drainage <Drainage@wiltshire.gov.uk>
Subject: RE: LAND AT NEW ROAD FARM, 240 NEW ROAD, MELKSHAM, SN12 7QY

You don't often get email from ben.wilding@atkinsrealis.com. Learn why this is important

Hi Eric
Apologies for not coming back to you on Friday
Currently there is nothing within Wiltshire's own standards regarding easements. I have noted that for previous developments Wiltshire have deferred to Wessex Water's standards for SuDS adoption sudsguide.pdf (wessexwater.co.uk); where it is stated that a 3m easement would be required.

I would suggest that best practice would be for you to provide a 3m easement.

Kind Regards

Ben Wilding MEng (Hons) CEng MICE

Principal Engineer
Networks & Drainage Solutions, Infrastructure
AtkinsRéalis
T: +44 121 483 5490 LinkedIn
Two Chamberlain Square
Birmingham, B3 3AX, UK
Annual Leave: -

From: Eric O'Connor <eric.oconnor@enzygo.com>
Sent: Friday, March 1, 2024 8:50 AM
To: Wilding, Ben <Ben.Wilding@atkinsrealis.com>
Subject: RE: LAND AT NEW ROAD FARM, 240 NEW ROAD, MELKSHAM, SN12 7QY

Hi Ben,

Thanks again for your time on this one. Just had a quick follow up question regarding the swale we have designed. Do you have a minimum easement requirement from top of bank for management and maintenance of these features?

Kind Regards,

Eric

Eric O'Connor BSc (Hons), MSc, MCIWEM, C.WEM
Principal Hydrologist

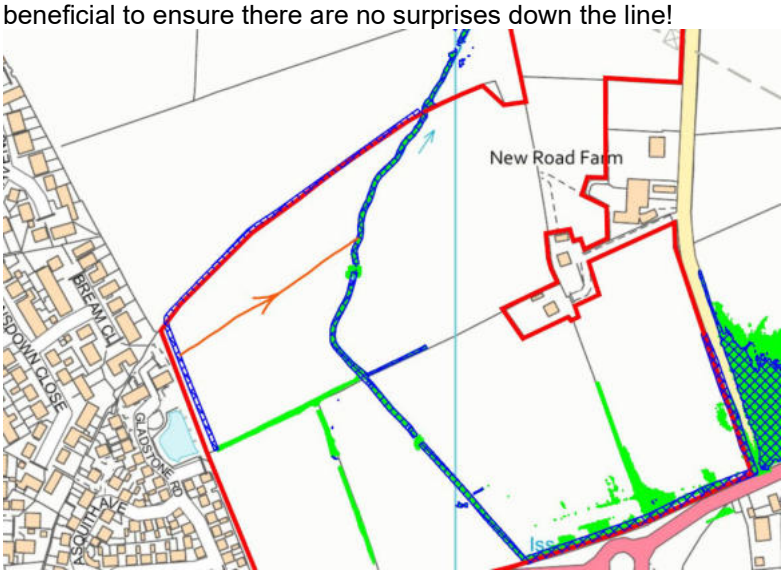
Phone: 0114 321 5151
Mobile: 07710549218
Email: eric.oconnor@enzygo.com
Web: enzygo.com

From: Wilding, Ben <Ben.Wilding@atkinsrealis.com>
Sent: Tuesday, February 13, 2024 8:49 AM
To: Eric O'Connor <eric.oconnor@enzygo.com>
Cc: Nick Jordan <Nick.Jordan@bloorhomes.com>; Matt Travis <matt.travis@enzygo.com>; Rory Brown <Rory.Brown@enzygo.com>; Drainage <Drainage@wiltshire.gov.uk>
Subject: RE: LAND AT NEW ROAD FARM, 240 NEW ROAD, MELKSHAM, SN12 7QY

Eric
Thanks for your time yesterday to talk me through the drainage proposals and pluvial flood modelling that has been completed to date for the above site.
As I mentioned yesterday, it is good to see an applicant proactively completing pluvial modelling where the site has been identified to potentially be at risk of surface water flooding on the EA maps to more accurately account for local small ditches / watercourses etc.

Pluvial Flood Risk:
We discussed the pluvial modelling completed to date (comparison of baseline scheme, and the proposed scheme incorporating additional swales on the perimeter to manage flood risk). We discussed that your "with scheme" modelling indicates that there is a net decrease in pluvial flood risk across the site, and that the proposed interventions will help in managing SW flood risk. Please ensure that the modelling approach, and the outputs presented are included within your FRA at submission so as we can refer to it in our response for how you have assessed flood risk, and considered the site within the sequential test for pluvial flood risk

You mentioned that a highways drain currently crosses the site (very rough snip below to illustrate what we discussed), and that you would be seeking to divert this into your perimeter swale on the NW side of the site; ultimately this would still discharge to the OWC (as per current arrangement), there would be no increase in flows, and there would be additional water quality benefit provided. Whilst I would be satisfied that as long as this is included within any detailed design models for the site's drainage and that I did not see a detriment to this approach, that early discussion on the principles with Wiltshire's highways drainage officers (Daniel.Everett@wiltshire.gov.uk) would be beneficial to ensure there are no surprises down the line!



Surface Water Drainage Plan

We spoke through your current SW Drainage Plans for the site, which have been modelled within Microdrainage (assuming 55% impermeable area at this stage, which can be refined as part of detailed design). Key points of note are:

- Ponds / Basins and swales are provided around the site in order to manage water quality and quantity
- The northern attenuation basin may become a hybrid feature of a basin and a geocellular tank (although preference would be for this to just be an open basin feature for ease of future maintenance)
- Exceedance routes, including from the proposed attenuation features will be shown
- A SW pumping station is proposed on site – this was deemed by yourselves to be the most holistically sustainable solution when considering the impact of level raising across the site (which would also have a significant impact on flood risk elsewhere). I advised that we would expect to see Duty Standby pumps and would want to see a sensitivity analysis for potential flooding in case of pump failure.
- Discharge to be limited in line with Wiltshire Council's betterment policy to the Ordinary Watercourse – this will require LDC (which will need to be applied for separately and outside of the planning process)

Hope that is an accurate representation of the key discussion points from yesterday's call.

Kind Regards

Ben Wilding *MEng (Hons) CEng MICE*
Principal Civil Engineer

AtkinsRéalis

AtkinsRéalis on behalf of Wiltshire Council Drainage

From: Eric O'Connor <eric.oconnor@enzygo.com>
Sent: Friday, February 9, 2024 4:24 PM
To: Wilding, Ben <Ben.Wilding@atkinsrealis.com>
Cc: Nick Jordan <Nick.Jordan@bloorhomes.com>; Matt Travis <matt.travis@enzygo.com>; Rory Brown <Rory.Brown@enzygo.com>
Subject: LAND AT NEW ROAD FARM, 240 NEW ROAD, MELKSHAM, SN12 7QY

Hi Ben,

Please find attached proposed agenda with supporting information ahead of Monday.

Monday 12th February with Wiltshire Council / Enzygo / Bloor Homes

1. Presentation and discussion of pluvial flooding modelling undertaken to date.
2. Presentation of proposed drainage strategy.
3. Views of LLFA on items 1 and 2.

Kind Regards,

Eric

Eric O'Connor BSc (Hons), MSc, MCIWEM, C.WEM
Principal Hydrologist

Phone: 0114 321 5151
Mobile: 07710549218
Email: eric.oconnor@enzygo.com
Web: enzygo.com

Air Quality | Landscape | Hydrology | Permitting | Ecology | Geo-environmental | Noise | Transport | Planning | Arboriculture

enzygo.com

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Offices in Bristol, Cardiff, Cambridge, Sheffield & Manchester

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Association of Geotechnical & Geoenvironmental Specialists

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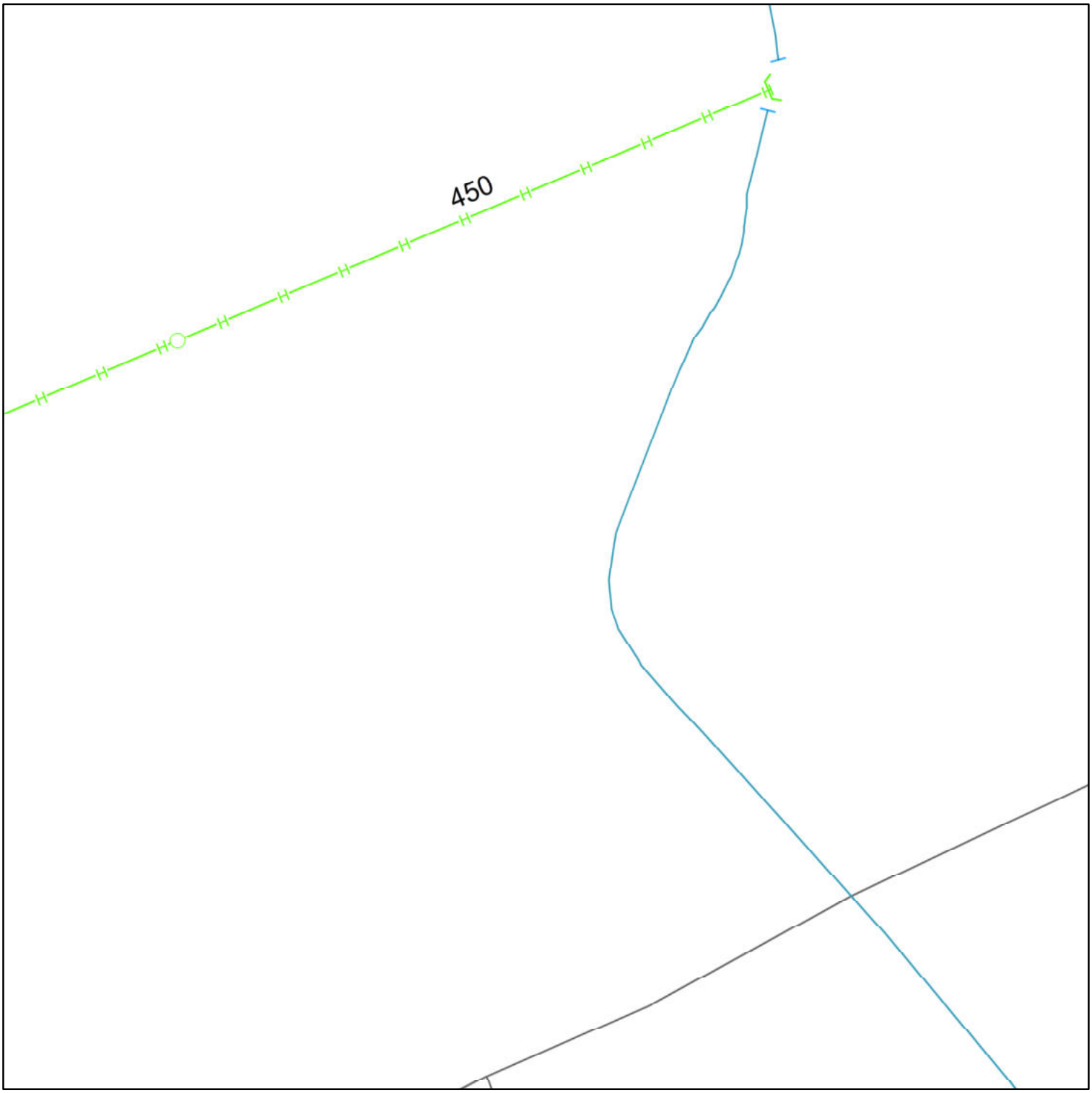
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Appendix 5 – Wessex Water Correspondence

Wessex Water Network Map



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WATER MAINS
- Distribution
- Washout
- Raw Water
- Abandoned
- Private

FITTINGS
- Hydrant
- Other

SEWERS

	STRATEGIC	PUBLIC	PRIVATE	SECTION 104
Foul				
Surface				
Combined				
Abandoned				

Colours generally indicate the use of the sewer/drain (i.e Red - Foul, Dark Blue - Surface, Magenta - Combined/Dual Use, Light Green - Highway Drain, Mid Green - Overflow).
Some styles of line and symbol are shown on the key in sample/typical colours.

STRUCTURES
- Manhole - Foul
- Manhole - Surface
- Manhole - Combined
- Inlet
- Outfall
- Lamphole
- Bifurcation - Foul
- Bifurcation - Surface
- Bifurcation - Combined
- Combined Sewage Overflow
- Pumping Station - Surface
- Pumping Stn - Foul/Combined
- Gully
- Vent Column
- Rodding Eye
- Catchpit
- Flushing Chamber
- Soakaway
- Non Return Valve
- Air Valve
- Hatch Box
- Washout

OTHER WESSEX PIPES
- Rising Mains
- Standby Rising Mains
- EDM — Effluent Disposal
- Overflow
- S — Syphon

NON-WESSEX / UNKNOWN
- Private Rising Mains
- CW — Culverted Watercourse
- H — Highway Drain
- ? — Use Unknown
- SU — Status Unknown

OTHER STRUCTURES
- Attenuation Tank
- Storage Tank
- Chamber
- Tunnel
- Interceptor

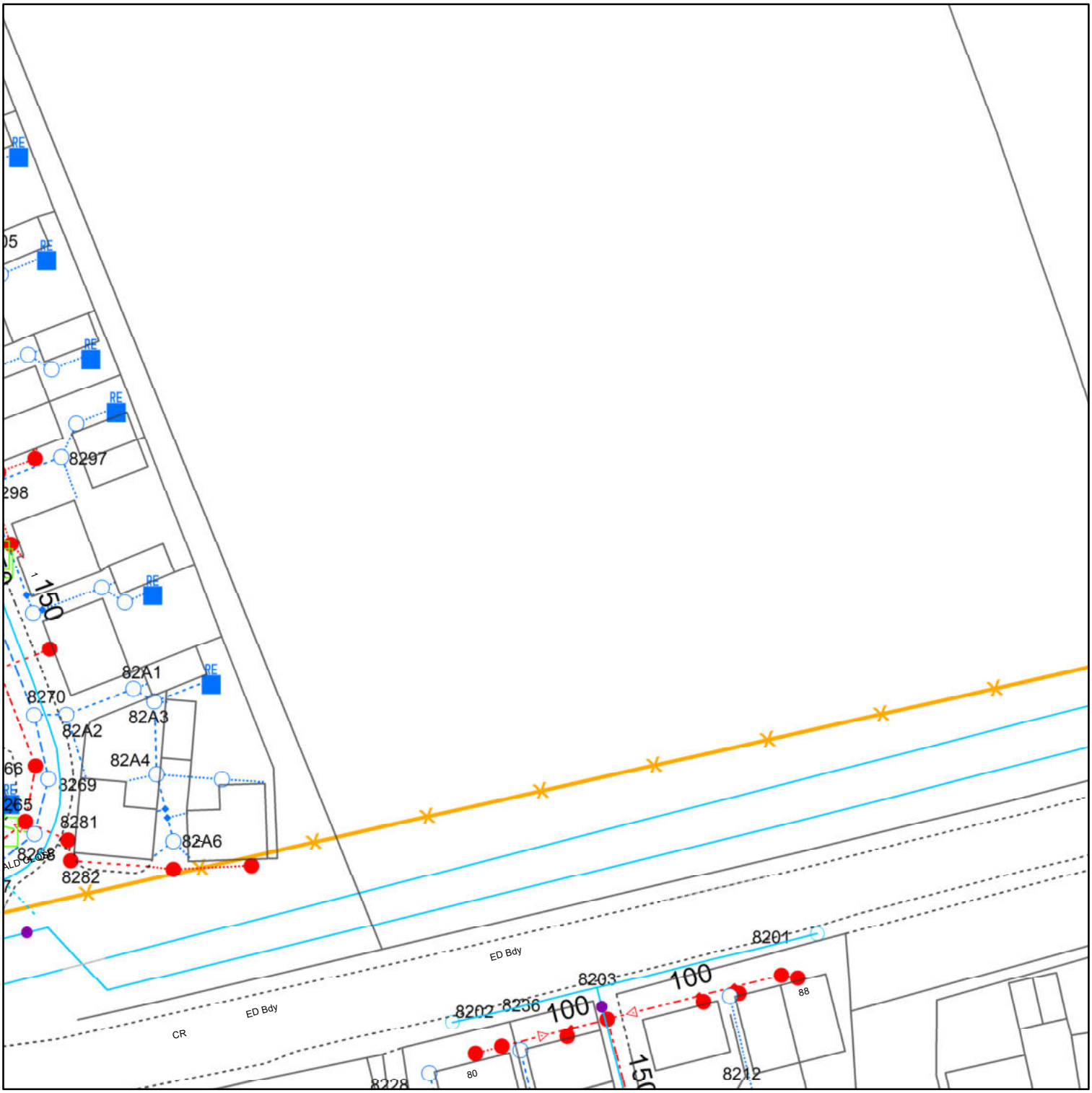
Wessex Water
YTL GROUP

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Date: 07/07/2022
Centre: 391890, 164494
Scale: 1:625
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N
W E
S

Wessex Water Network Map



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WATER MAINS
- Distribution
- Washout
- Raw Water
- Abandoned
- Private

FITTINGS
- Hydrant
- Other

SEWERS — STRATEGIC / PUBLIC / PRIVATE / SECTION 104
- Foul
- Surface
- Combined
- Abandoned

Colours generally indicate the use of the sewer/drain (i.e Red - Foul, Dark Blue - Surface, Magenta - Combined/Dual Use, Light Green - Highway Drain, Mid Green - Overflow). Some styles of line and symbol are shown on the key in sample/typical colours.

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- Pumping Station - Surface
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- Rodding Eye
- Catchpit
- Flushing Chamber
- Soakaway
- Non Return Valve
- Air Valve
- Hatch Box
- Washout

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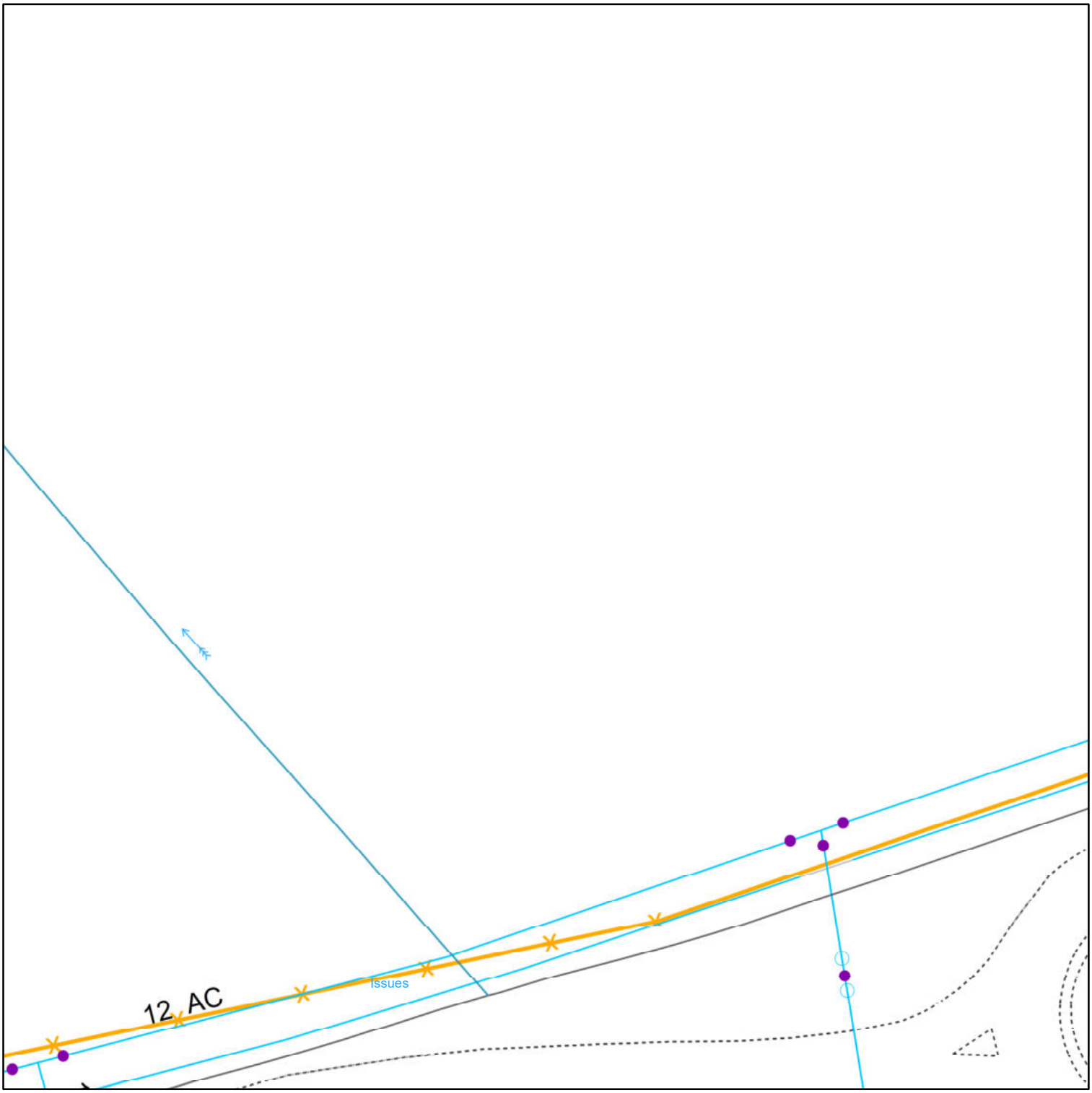
Wessex Water
YTL GROUP

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N W E S

Wessex Water Network Map



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WATER MAINS
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STRATEGIC

PUBLIC

PRIVATE

SECTION 104

Colours generally indicate the use of the sewer/drain (i.e Red - Foul, Dark Blue - Surface, Magenta - Combined/Dual Use, Light Green - Highway Drain, Mid Green - Overflow).
Some styles of line and symbol are shown on the key in sample/typical colours.

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- Catchpit
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- Soakaway
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- Air Valve
- Hatch Box
- X Washout

OTHER WESSEX PIPES
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- Interceptor

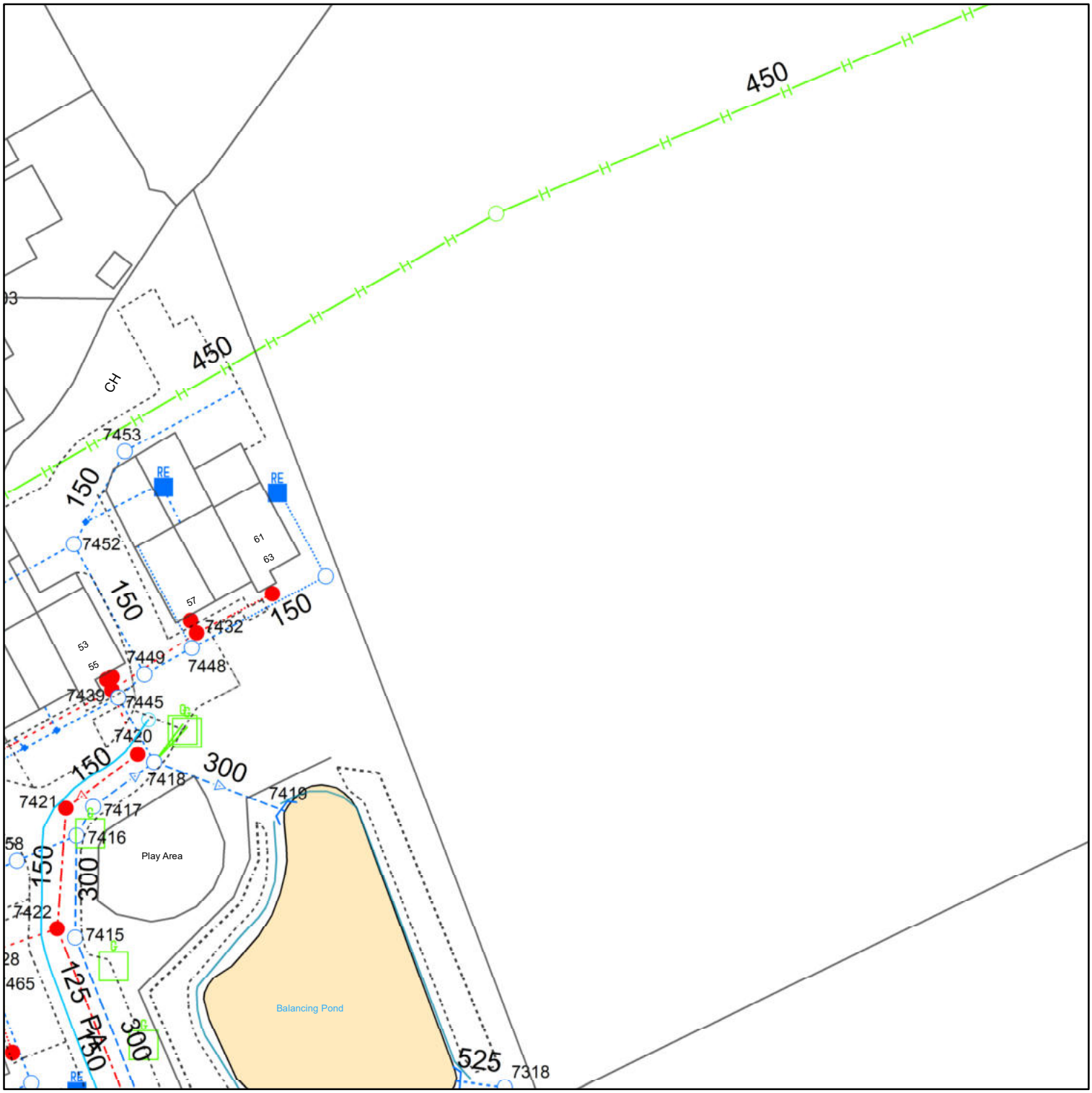
Wessex Water
YTL GROUP

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N W E S

Wessex Water Network Map



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WATER MAINS
- Distribution
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FITTINGS
- Hydrant
- Other

SEWERS

	STRATEGIC	PUBLIC	PRIVATE	SECTION 104
Foul				
Surface				
Combined				
Abandoned				

Colours generally indicate the use of the sewer/drain (i.e Red - Foul, Dark Blue - Surface, Magenta - Combined/Dual Use, Light Green - Highway Drain, Mid Green - Overflow).
Some styles of line and symbol are shown on the key in sample/typical colours.

STRUCTURES
- Manhole - Foul
- Manhole - Surface
- Manhole - Combined
- Inlet
- Outfall
- Lamphole
- Bifurcation - Foul
- Bifurcation - Surface
- Bifurcation - Combined
- Combined Sewage Overflow
- Pumping Station - Surface
- Pumping Stn - Foul/Combined
- Gully
- Vent Column
- Rodding Eye
- Catchpit
- Flushing Chamber
- Soakaway
- Non Return Valve
- Air Valve
- Hatch Box
- X Washout

OTHER WESSEX PIPES
- Rising Mains
- Standby Rising Mains
- EDM Effluent Disposal
- Overflow
- S Syphon

NON-WESSEX / UNKNOWN
- Private Rising Mains
- CW Culverted Watercourse
- H Highway Drain
- ? Use Unknown
- SU Status Unknown

OTHER STRUCTURES
- Attenuation Tank
- Storage Tank
- Chamber
- Tunnel
- Interceptor

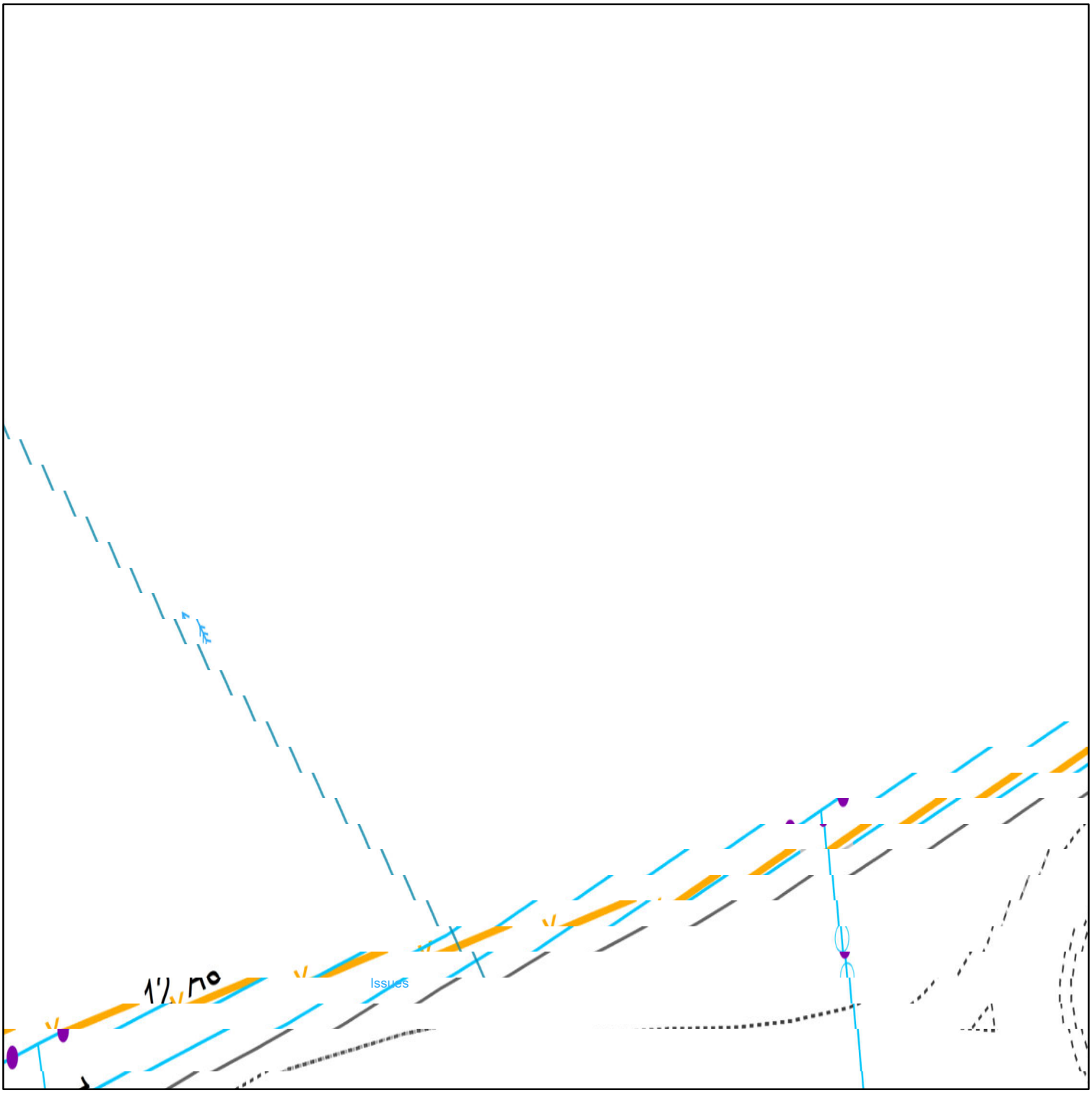
Wessex Water
YTL GROUP

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Date: 07/07/2022
Centre: 391790, 164453
Scale: 1:625
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N W E S

Wessex Water Network Map



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WATER MAINS
- Distribution
- Washout
- Raw Water
- Abandoned
- Private

FITTINGS
- Hydrant
- Other

SEWERS
- Foul
- Surface
- Combined
- Abandoned

STRATEGIC

PUBLIC

PRIVATE

SECTION 104

Colours generally indicate the use of the sewer/drain (i.e Red - Foul, Dark Blue - Surface, Magenta - Combined/Dual Use, Light Green - Highway Drain, Mid Green - Overflow).
Some styles of line and symbol are shown on the key in sample/typical colours.

STRUCTURES
- Manhole - Foul
- Manhole - Surface
- Manhole - Combined
- Inlet
- Outfall
- Lamphole
- Bifurcation - Foul
- Bifurcation - Surface
- Bifurcation - Combined
- Combined Sewage Overflow
- Pumping Station - Surface
- Pumping Stn - Foul/Combined
- Gully
- Vent Column
- Rodding Eye
- Catchpit
- Flushing Chamber
- Soakaway
- Non Return Valve
- Air Valve
- Hatch Box
- X Washout

OTHER WESSEX PIPES
- Rising Mains
- Standby Rising Mains
- EDM Effluent Disposal
- Overflow
- S Syphon

NON-WESSEX / UNKNOWN
- Private Rising Mains
- CW Culverted Watercourse
- H Highway Drain
- ? Use Unknown
- SU Status Unknown

OTHER STRUCTURES
- Attenuation Tank
- Storage Tank
- Chamber
- Tunnel
- Interceptor

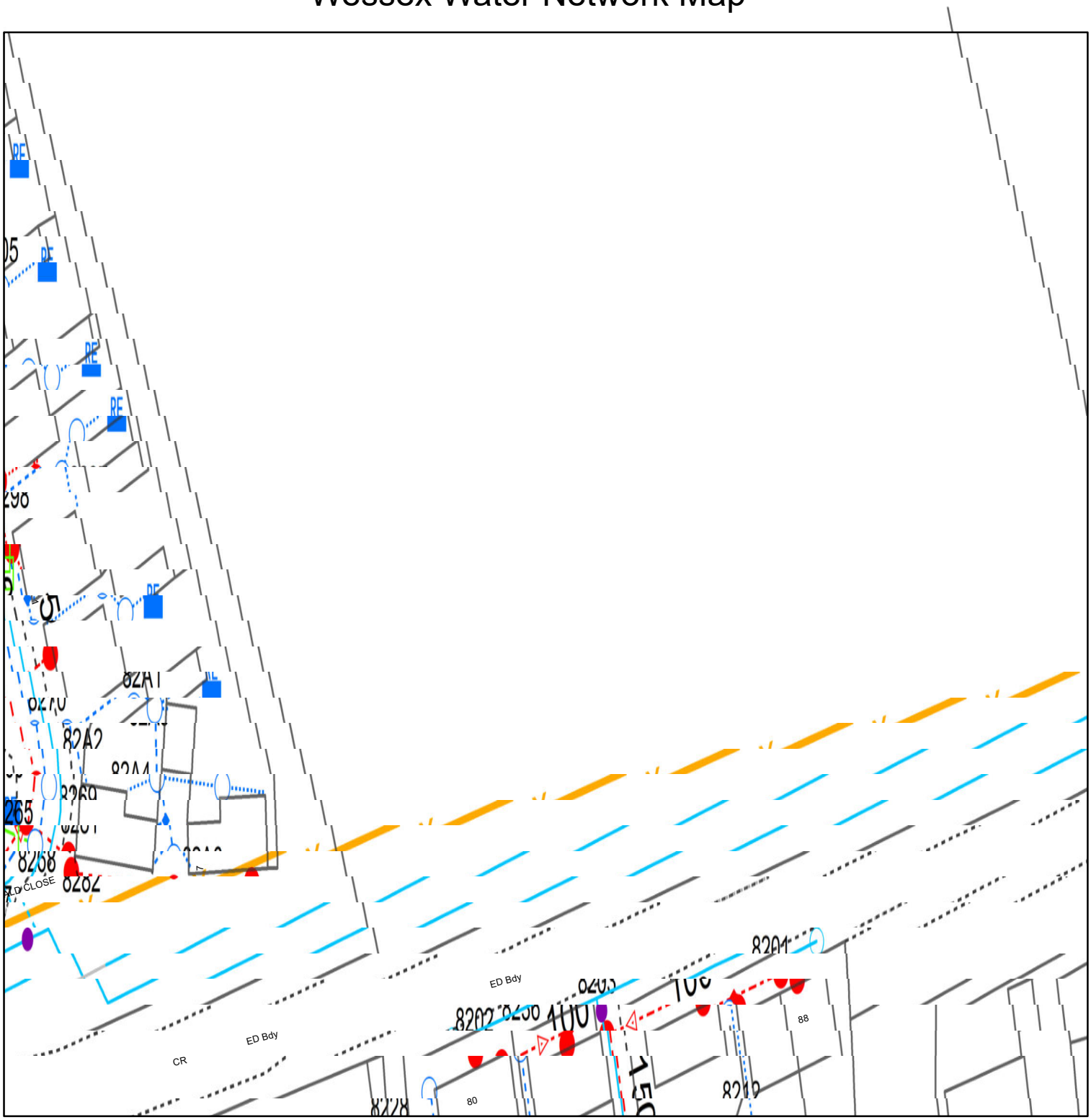
Wessex Water
YTL GROUP

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Date: 07/07/2022
Centre: 392069, 164347
Scale: 1:625
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N W E S

Wessex Water Network Map



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WATER MAINS
- Distribution
- Washout
- Raw Water
- Abandoned
- Private

FITTINGS
- Hydrant
- Other

SEWERS — STRATEGIC / PUBLIC / PRIVATE / SECTION 104
- Foul
- Surface
- Combined
- Abandoned

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- Washout

OTHER WESSEX PIPES
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- Standby Rising Mains
- EDM — Effluent Disposal
- Overflow
- S — Syphon

NON-WESSEX / UNKNOWN
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- CW — Culverted Watercourse
- H — Highway Drain
- ? — Use Unknown
- SU — Status Unknown

OTHER STRUCTURES
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- Chamber
- Tunnel
- Interceptor

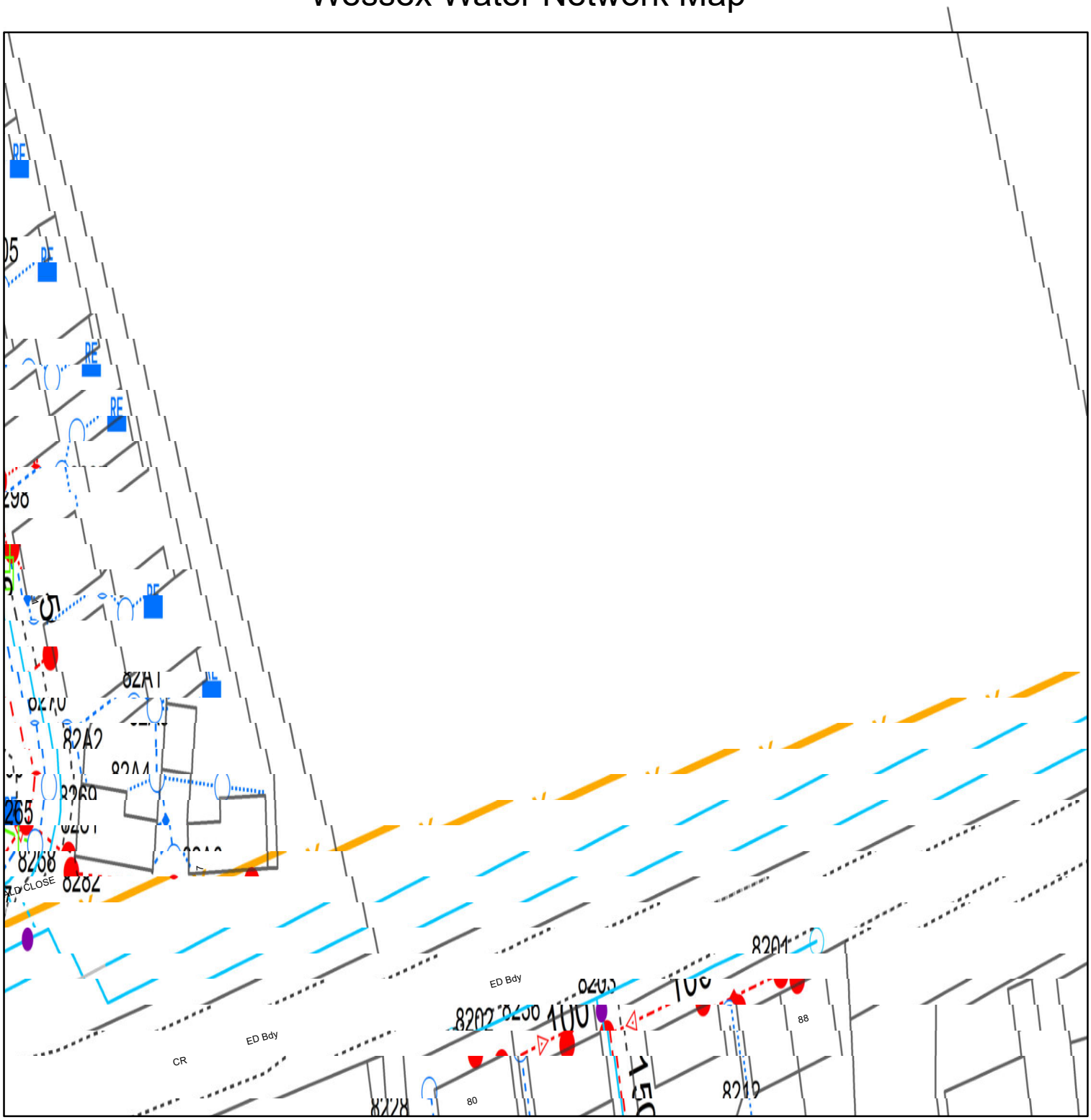
Wessex Water
YTL GROUP

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Date: 07/07/2022
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N W E S

Wessex Water Network Map



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WATER MAINS
- Distribution
- Washout
- Raw Water
- Abandoned
- Private

FITTINGS
- Hydrant
- Other

SEWERS — STRATEGIC / PUBLIC / PRIVATE / SECTION 104
- Foul
- Surface
- Combined
- Abandoned

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OTHER WESSEX PIPES
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NON-WESSEX / UNKNOWN
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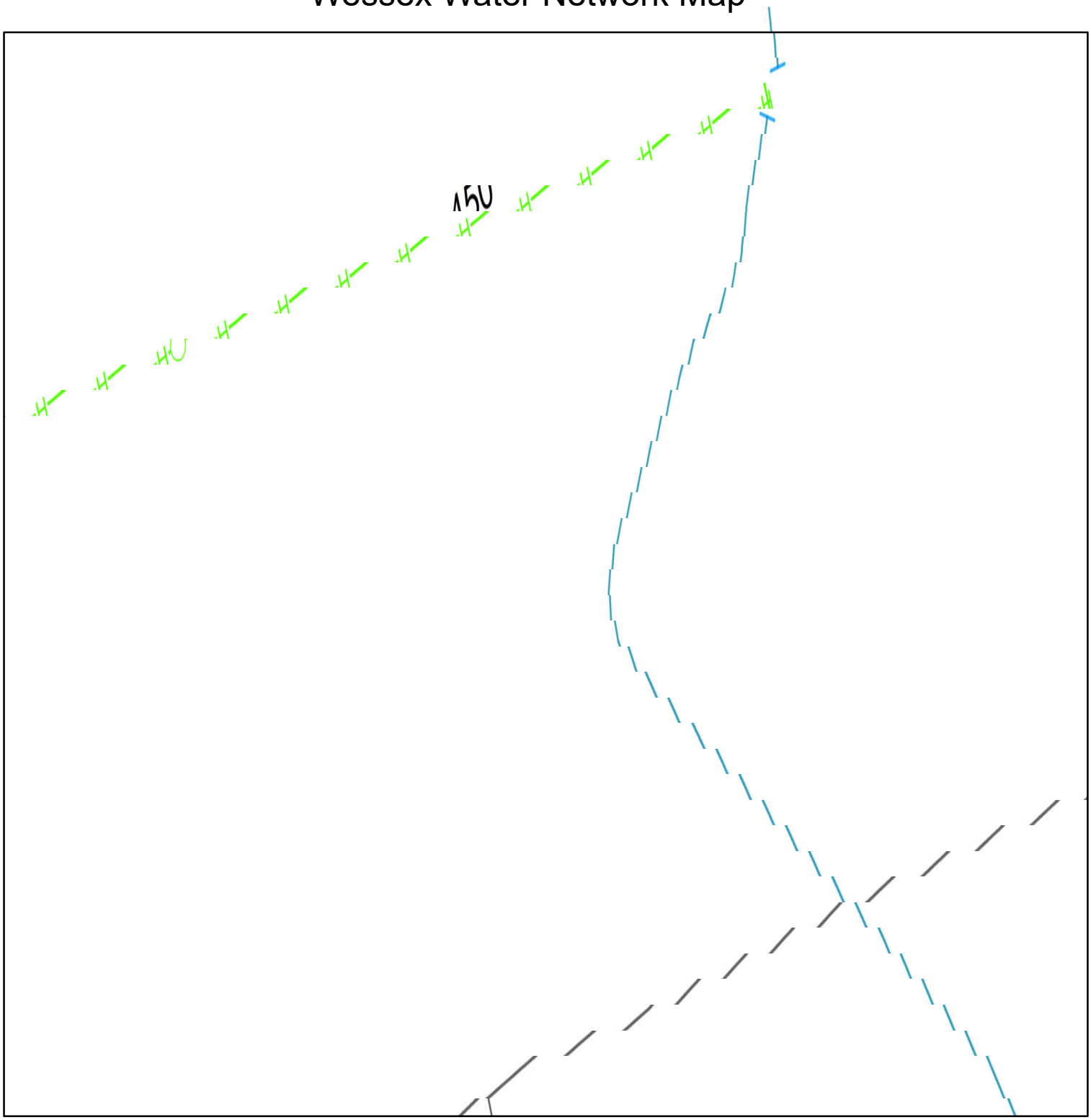
Wessex Water
YTL GROUP

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N W E S

Wessex Water Network Map



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WATER MAINS
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- Washout
- Raw Water
- Abandoned
- Private

FITTINGS
- Hydrant
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SEWERS
- Foul
- Surface
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- Abandoned

STRATEGIC

PUBLIC

PRIVATE

SECTION 104

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OTHER STRUCTURES
- Attenuation Tank
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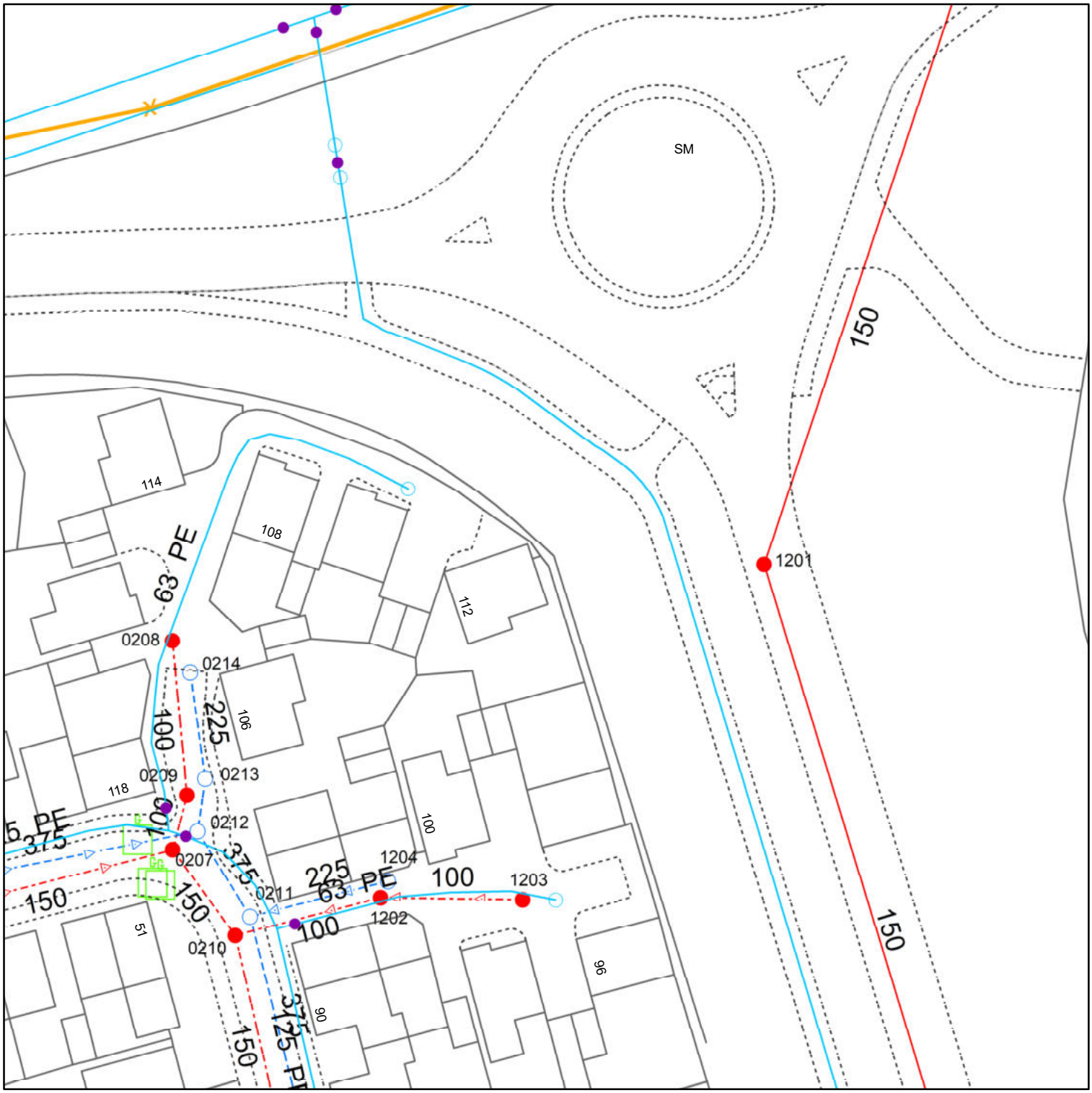
Wessex Water
YTL GROUP

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Date: 07/07/2022
Centre: 391890, 164494
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N
W E
S

Wessex Water Network Map



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WATER MAINS
- Distribution
- Washout
- Raw Water
- Abandoned
- Private

FITTINGS
- Hydrant
- Other

SEWERS — STRATEGIC / PUBLIC / PRIVATE / SECTION 104
- Foul
- Surface
- Combined
- Abandoned

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STRUCTURES
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- Combined Sewage Overflow
- Pumping Station - Surface
- Pumping Stn - Foul/Combined
- Gully
- Vent Column
- Rodding Eye
- Catchpit
- Flushing Chamber
- Soakaway
- Non Return Valve
- Air Valve
- Hatch Box
- Washout

OTHER WESSEX PIPES
- Rising Mains
- Standby Rising Mains
- EDM — Effluent Disposal
- Overflow
- S — Syphon

NON-WESSEX / UNKNOWN
- Private Rising Mains
- CW — Culverted Watercourse
- H — Highway Drain
- ? — Use Unknown
- SU — Status Unknown

OTHER STRUCTURES
- Attenuation Tank
- Storage Tank
- Chamber
- Tunnel
- Interceptor

Wessex Water
YTL GROUP

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Date: 07/07/2022
Centre: 392127, 164254
Scale: 1:625
(when printed at A4 size)

Eric O'Connor

From: Mark Prebble <Mark.Prebble@wessexwater.co.uk>
Sent: 06 October 2023 20:49
To: Eric O'Connor
Cc: Joanne Wright
Subject: RE: Divestment New Farm, Sandridge Common, Melksham, SN12 7GT

Eric

Thanks for your patience while this has been reviewed with our operations team. I'm happy to advise that this abandoned asset can be removed from the ground as necessary subject to any open end being fully sealed to prevent ingress of groundwater and rodents.

Regards

Mark Prebble

Deputy Development Engineer Manager

Developer Services
Kennet Way
Trowbridge
BA14 8RN

01225 522685
07341 090056

www.wessexwater.co.uk

From: Denise Glasson (nee. Clinch) <Denise.Glasson@wessexwater.co.uk>
Sent: 06 September 2023 11:35
To: Mark Prebble <Mark.Prebble@wessexwater.co.uk>
Cc: Joanne Wright <Joanne.Wright@wessexwater.co.uk>
Subject: Divestment New Farm, Sandridge Common, Melksham, SN12 7GT

From: Eric O'Connor <eric.oconnor@enzygo.com>
Sent: 06 September 2023 11:30
To: Development North <Development.North@wessexwater.co.uk>
Cc: Ann-Marie Wood <Ann-Marie.Wood@wessexwater.co.uk>
Subject: FW: New Farm, Melksham

[EXTERNAL EMAIL] DO NOT CLICK links or attachments unless you recognise the sender and know the content is safe.

To whom it may concern,

I was wondering if I could get a response on this?

Kind Regards,

Eric

Eric O'Connor BSc (Hons), MSc, MCIWEM, C.WEM
Prinicpal Hydrologist

Enzygo Ltd,
Samuel House, 5 Fox Valley Way, Stocksbridge, Sheffield, S36 2AA
Offices in Bristol, Cardiff, Cambridge, Sheffield & Manchester

Landscape, Hydrology, Permitting, Ecology, Geo-environmental, Noise, Air Quality, Transport, Planning and Arboriculture

☎: +44 (0) 114 321 5151
☎: 07710 549 218
✉: eric.oconnor@enzygo.com
🌍: www.enzygo.com

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From: Ann-Marie Wood <Ann-Marie.Wood@wessexwater.co.uk>
Sent: Monday, August 7, 2023 2:59 PM
To: Eric O'Connor <eric.oconnor@enzygo.com>
Cc: Development North <Development.North@wessexwater.co.uk>
Subject: RE: New Farm, Melksham

Hi Eric

Thank you for your email. The de-vesting and removal of Wessex Water Assets is not something that the Planning Liaison Team deal with. I would advise that you contact our Development North Area team (I have copied them into this email so you have their address) and they should be able to advise you.

Kind regards
Ann-marie

Ann-marie Wood
Senior Planning Liaison Engineer

Wessex Water
Claverton Down Bath BA2 7WW
Mobile number 07385 433347
wessexwater.co.uk

These comments are based upon known circumstances prevailing at the time of writing. A review of the contents of this email is required where 18 months or more have elapsed since issue or in the light of significant changes likely to impact upon the response (e.g. changes in development numbers or phasing). Please email review requests to planning.liaison@wessexwater.co.uk

From: Eric O'Connor <eric.oconnor@enzygo.com>
Sent: 07 August 2023 14:50
To: Ann-Marie Wood <Ann-Marie.Wood@wessexwater.co.uk>
Subject: New Farm, Melksham

[EXTERNAL EMAIL] DO NOT CLICK links or attachments unless you recognise the sender and know the content is safe.

Hi Ann-Marie,

I am currently working on a Site located at land off Sandridge Common, Melksham, SN12 7GT (location plan attached).

We have obtained plans and had it confirmed that there is a Ø450mm abandoned rising main along the southern boundary of the Site which historically served Sandridge Road PS on the opposite side of Sandridge Common. Given that this is abandoned, and a new network is now in place could you confirm if we are able to remove this abandoned rising main as part of our development?

Kind Regards,

Eric

Eric O'Connor BSc (Hons), MSc, MCIWEM, C.WEM
Prinicpal Hydrologist

Enzygo Ltd,
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☎: +44 (0) 114 321 5151
☎: 07710 549 218
✉: eric.oconnor@enzygo.com
🌍: www.enzygo.com

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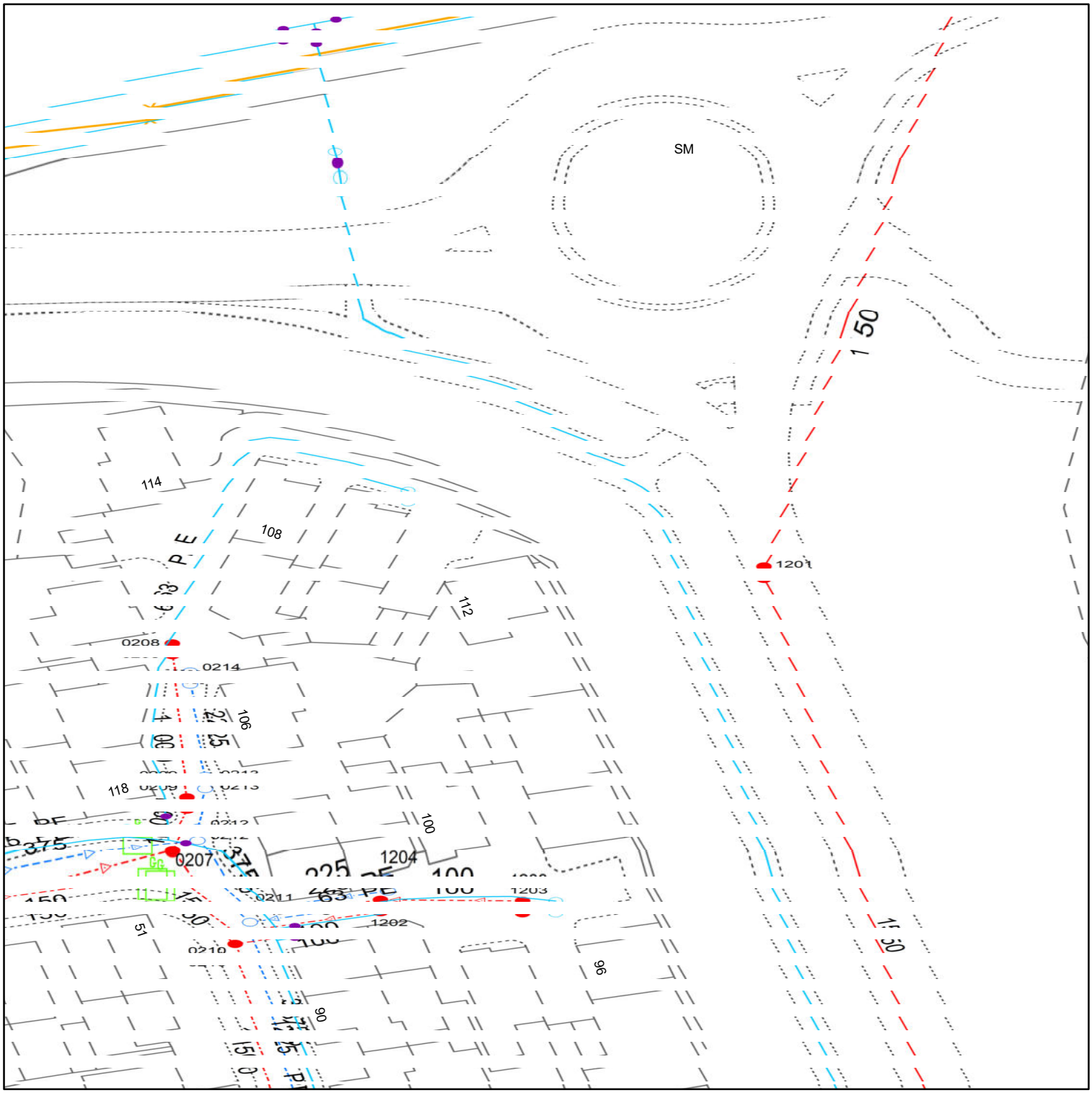
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Wessex Water Network Map



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WATER MAINS
- Distribution
- Washout
- Raw Water
- Abandoned
- Private

FITTINGS
- Hydrant
- Other

SEWERS — STRATEGIC / PUBLIC / PRIVATE / SECTION 104
- Foul
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YTL GROUP

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N W E S

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- Washout
- Raw Water
- Abandoned
- Private

FITTINGS
- Hydrant
- Other

SEWERS — STRATEGIC / PUBLIC / PRIVATE / SECTION 104
- Foul
- Surface
- Combined
- Abandoned

Colours generally indicate the use of the sewer/drain (i.e Red - Foul, Dark Blue - Surface, Magenta - Combined/Dual Use, Light Green - Highway Drain, Mid Green - Overflow). Some styles of line and symbol are shown on the key in sample/typical colours.

STRUCTURES
- Manhole - Foul
- Manhole - Surface
- Manhole - Combined
- Inlet
- Outfall
- Lamphole
- Bifurcation - Foul
- Bifurcation - Surface
- Bifurcation - Combined
- Combined Sewage Overflow
- Pumping Station - Surface
- Pumping Stn - Foul/Combined
- Gully
- Vent Column
- Rodding Eye
- Catchpit
- Flushing Chamber
- Soakaway
- Non Return Valve
- Air Valve
- Hatch Box
- X Washout

OTHER WESSEX PIPES
- Rising Mains
- Standby Rising Mains
- EDM Effluent Disposal
- Overflow
- S Syphon

NON-WESSEX / UNKNOWN
- Private Rising Mains
- CW Culverted Watercourse
- H Highway Drain
- ? Use Unknown
- SU Status Unknown

OTHER STRUCTURES
- Attenuation Tank
- Storage Tank
- Chamber
- Tunnel
- Interceptor

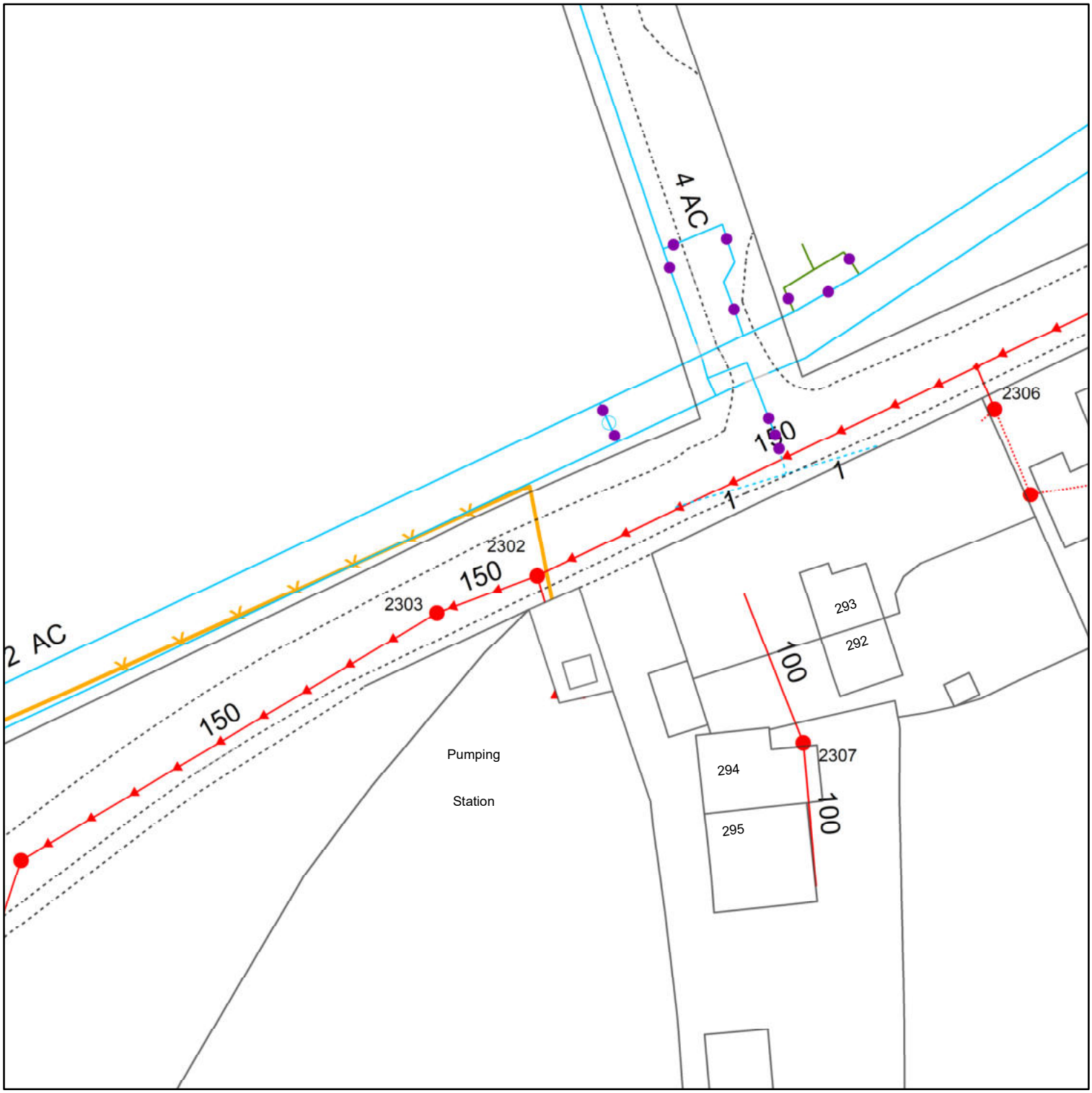
Wessex Water
YTL GROUP

Information in this map is provided for identification purposes only. No warranty as to accuracy is given or implied. The precise route of pipe work may not exactly match that shown. Wessex Water does not accept liability for inaccuracies. Sewers and lateral drains adopted by Wessex Water under the Water Industry (Schemes for Adoption of Private Sewers) Regulations 2011 are to be plotted over time and may not yet be shown. In carrying out any works, you accept liability for the cost of any repairs to Wessex Water apparatus damaged as a result of your works. You are advised to commence excavations using hand tools only. Mechanical digging equipment should not be used until pipe work has been precisely located. If you are considering any form of building works and pipe work is shown within the boundary of your property or a property to be purchased (or very close by) a surveyor should plot its exact position prior to commencing works or purchase. If you are proposing to build over or near Wessex Water's apparatus you should contact the Developer Services Team, tel: 01225 526333 or e-mail: developer.enquiries@wessexwater.co.uk to discuss your proposals. Details of assets within Wessex Water's land ownership are unavailable through this service.

Date: 27/07/2023
Centre: 392323, 164397
Scale: 1:625
(when printed at A4 size)

N W E S

Wessex Water Network Map



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WATER MAINS
- Distribution
- Washout
- Raw Water
- Abandoned
- Private

FITTINGS
- Hydrant
- Other

SEWERS — STRATEGIC / PUBLIC / PRIVATE / SECTION 104
- Foul
- Surface
- Combined
- Abandoned

Colours generally indicate the use of the sewer/drain (i.e Red - Foul, Dark Blue - Surface, Magenta - Combined/Dual Use, Light Green - Highway Drain, Mid Green - Overflow). Some styles of line and symbol are shown on the key in sample/typical colours.

STRUCTURES
- Manhole - Foul
- Manhole - Surface
- Manhole - Combined
- Inlet / Outfall
- Lamphole
- Bifurcation - Foul
- Bifurcation - Surface
- Bifurcation - Combined
- Combined Sewage Overflow
- Pumping Station - Surface
- Pumping Stn - Foul/Combined
- Gully
- Vent Column
- Rodding Eye
- Catchpit
- Flushing Chamber
- Soakaway
- Non Return Valve
- Air Valve
- Hatch Box
- X Washout

OTHER WESSEX PIPES
- Rising Mains
- Standby Rising Mains
- EDM Effluent Disposal
- Overflow
- S Syphon

NON-WESSEX / UNKNOWN
- Private Rising Mains
- CW Culverted Watercourse
- H Highway Drain
- ? Use Unknown
- SU Status Unknown

OTHER STRUCTURES
- Attenuation Tank
- Storage Tank
- Chamber
- Tunnel
- Interceptor

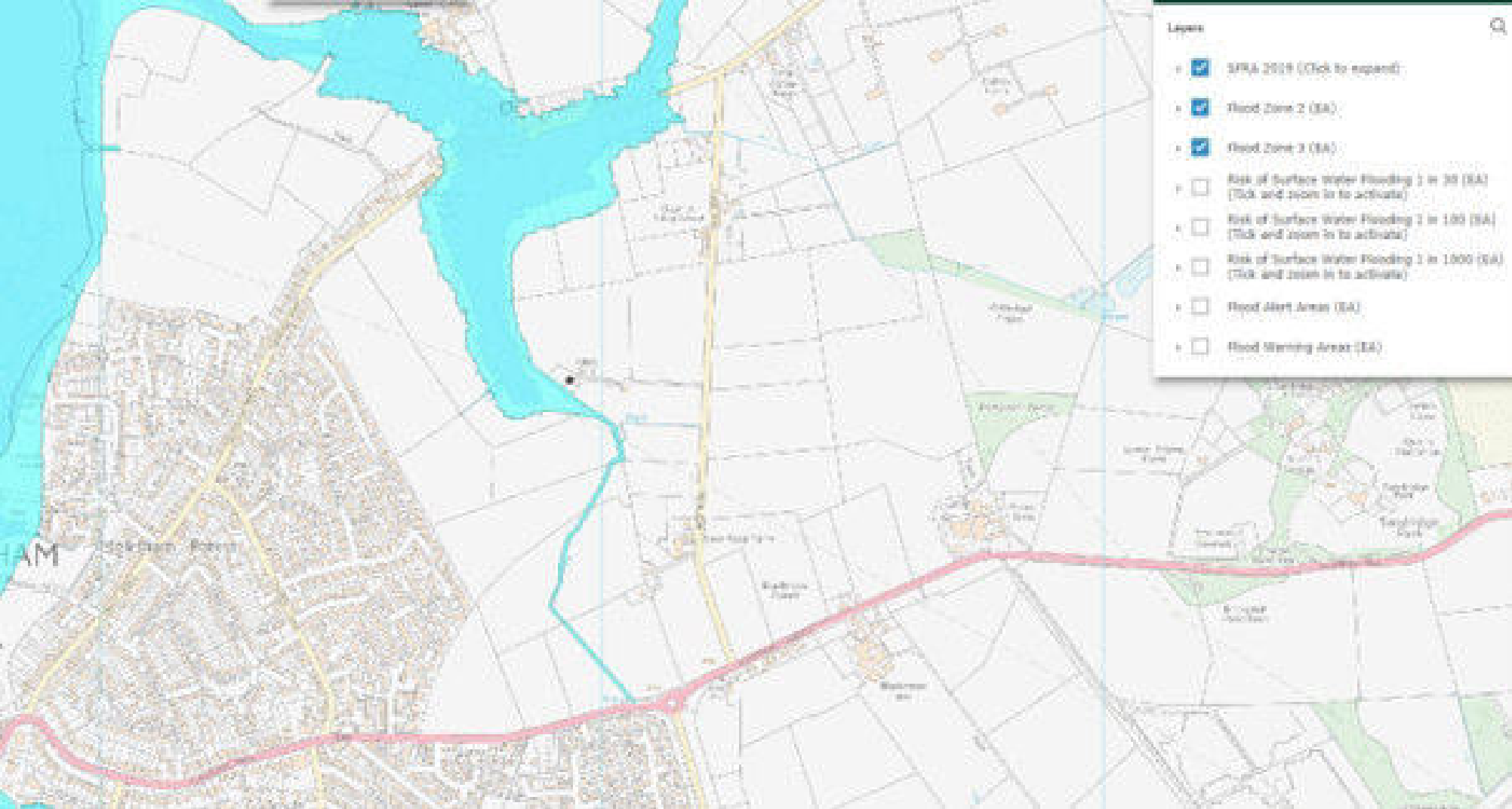
Wessex Water
YTL GROUP

Information in this map is provided for identification purposes only. No warranty as to accuracy is given or implied. The precise route of pipe work may not exactly match that shown. Wessex Water does not accept liability for inaccuracies. Sewers and lateral drains adopted by Wessex Water under the Water Industry (Schemes for Adoption of Private Sewers) Regulations 2011 are to be plotted over time and may not yet be shown. In carrying out any works, you accept liability for the cost of any repairs to Wessex Water apparatus damaged as a result of your works. You are advised to commence excavations using hand tools only. Mechanical digging equipment should not be used until pipe work has been precisely located. If you are considering any form of building works and pipe work is shown within the boundary of your property or a property to be purchased (or very close by) a surveyor should plot its exact position prior to commencing works or purchase. If you are proposing to build over or near Wessex Water's apparatus you should contact the Developer Services Team, tel: 01225 526333 or e-mail: developer.enquiries@wessexwater.co.uk to discuss your proposals. Details of assets within Wessex Water's land ownership are unavailable through this service.

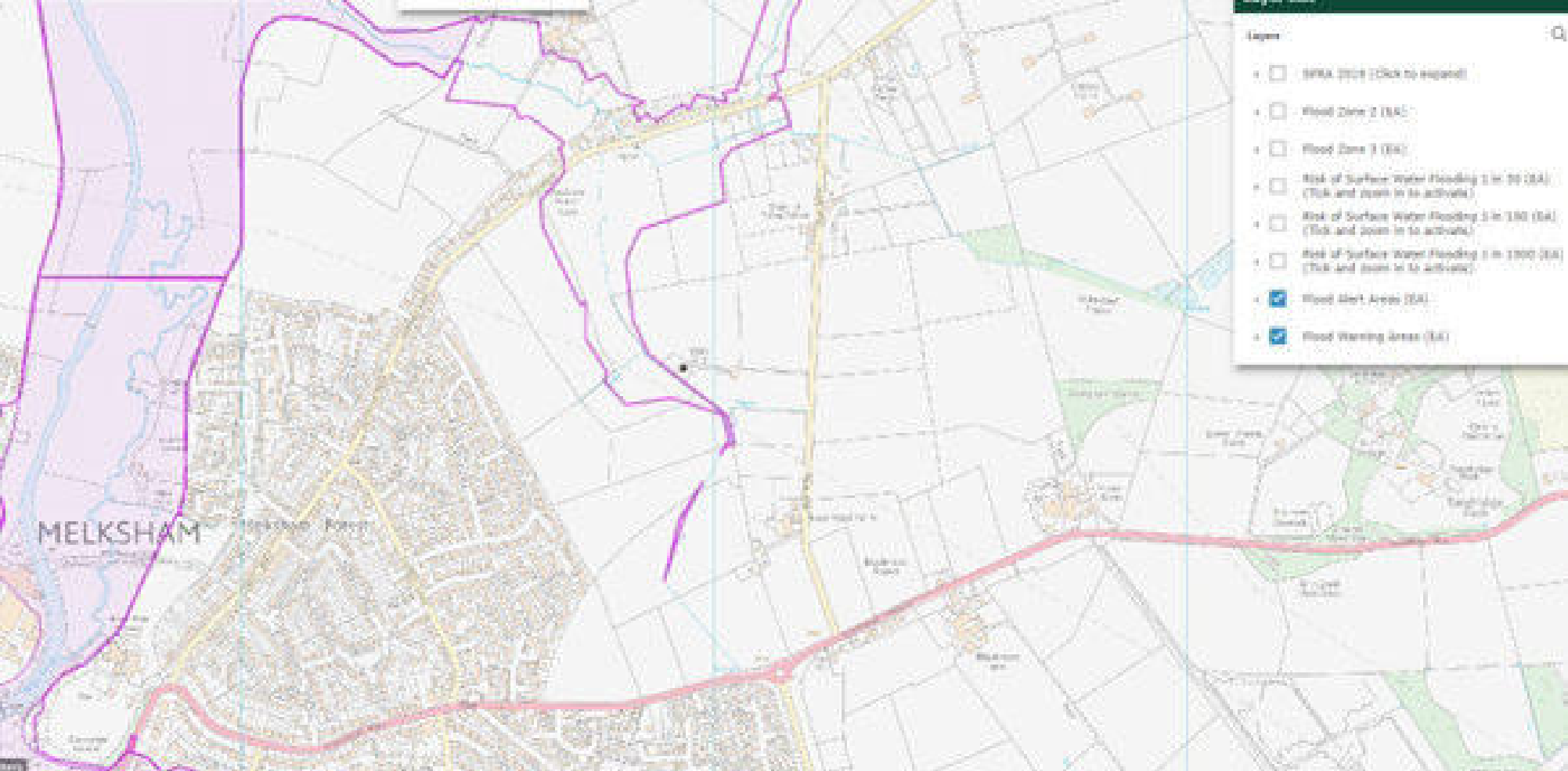
Date: 27/07/2023
Centre: 392235, 164356
Scale: 1:625 (when printed at A4 size)

N W E S

Appendix 6 – SFRA Mapping


Layers
SFRA 2019 (Click to expand)
Flood Zone 2 (EA)
Flood Zone 3 (EA)
Risk of Surface Water Flooding 1 in 30 (EA) (Tick and zoom in to activate)
Risk of Surface Water Flooding 1 in 100 (EA) (Tick and zoom in to activate)
Risk of Surface Water Flooding 1 in 1000 (EA) (Tick and zoom in to activate)
Flood Alert Areas (EA)
Flood Warning Areas (EA)


SFRA 2019 (Click to expand)
Flood Zone 2 (EA)
Flood Zone 3 (EA)
Risk of Surface Water Flooding 1 in 30 (EA) (Tick and zoom in to activate)
Risk of Surface Water Flooding 1 in 100 (EA) (Tick and zoom in to activate)
Risk of Surface Water Flooding 1 in 1000 (EA) (Tick and zoom in to activate)
Flood Alert Areas (EA)
Flood Warning Areas (EA)


MELKSHAM
Layers
SPRA (Click to expand)
Flood Zone 2 (EA)
Flood Zone 3 (EA)
Risk of Surface Water Flooding 1 in 30 (EA) (Tick and zoom in to activate)
Risk of Surface Water Flooding 1 in 100 (EA) (Tick and zoom in to activate)
Risk of Surface Water Flooding 1 in 1000 (EA) (Tick and zoom in to activate)
Flood Alert Areas (EA)
Flood Warning Areas (EA)

Appendix 7 – CCTV Report

CCTV Drainage Survey

West of New Road
Melksham, SN12 7QY

CCTV DRAINAGE SURVEY REPORT













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Project Name	Project Number	Project Date
MELKSHAM CULVERT		01/06/2023

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Section Item 2: CP 2 > CP 1 (CP 2X) 2
Section Item 3: CP 3 > CP 1 (CP 3X) 3
Section Item 4: CP 4 > CP 1 (CP 4X) 5
Section Item 5: GY 1 > MAIN (GY 1X) 6
Section Item 6: GY 2 > MH 1 (GY 2X) 7
Section Item 7: MH 1 > MH 2 (MH 1X) 8
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Project Information

Project Name	Project Number	Project Date
MELKSHAM CULVERT		01/06/2023

Client

Company: Enzygo
Contact: Dani Lister
Department: Consultant Hydrologist
Street: Samuel House, 5 Fox Valley Way
Town or City: Stocksbridge, Sheffield
Post Code: S36 2AA
Phone: 0114 321 5151
Email: dani.lister@enzygo.com

Site

Street: West of New Road
Town or City: Melksham
Post Code: SN12 7QY

Contractor

Company: Sewer Surveys UK Ltd
Contact: Andrew Froggatt/ Simon Bennett
Department: Directors
Street: 14B Orgreave Close
Town or City: Sheffield
Post Code: S13 9NP
Phone: 0114 251 3481
Mobile: 07837 768649/07808 220160
Email: info@sewersurveysuk.co.uk

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Section Inspection - 01/06/2023 - CP 1X

Item No.	Insp. No.	Date	Time	Client`s Job Ref	Weather	Pre Cleaned	PLR
1	1	01/06/23	9:07	ENZYGO	No Rain Or Snow	No	CP 1X

Operator	Vehicle	Camera	Preset Length	Criticality Grade	Alternative ID
KB	YR15 THK	Forward View	Not Specified	Category C	Not Specified

Town or Village:	Melsham	**Inspection Direction:**	Downstream	**Upstream Node:**	CP 1
Road:	Sandridge Common	**Inspected Length:**	2.40 m	**Upstream Pipe Depth:**	
Location:	Gardens	**Total Length:**	2.40 m	**Downstream Node:**	OUTFALL
Surface Type:		**Joint Length:**	1.00 m	**Downstream Pipe Depth:**	

Use:	Surface water	**Pipe Shape:**	Rectangular		
Type of Pipe:	Gravity drain/sewer	**Dia/Height:**	600 mm	**Width:**	700 mm
Flow Control:	No flow control	**Pipe Material:**	Concrete		
Year Constructed:	Not Specified	**Lining Type:**	No Lining		
Inspection Purpose:	Sample survey to determine asset condition	**Lining Material:**	No Lining		

Comments:
Recommendations:



Scale: 1:50 Position [m]	Code	Observation	MPEG	Photo	Grade
0.00	CP	Start node, catchpit, reference: CP 1	00:00:00		
0.00	WL	Water level, 40% of the vertical dimension	00:00:07		
0.73	SC	Size changes, new size(s), 300mm high	00:01:12		
1.00	MCPVC	Material changes to polyvinyl chloride	00:01:18		
2.40	REM	General remark: OUTLET IN VIEW	00:01:56		
2.40	SA	Survey abandoned: SIZE CHANGE	00:01:57		

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 - 01/06/2023 - CP 2X

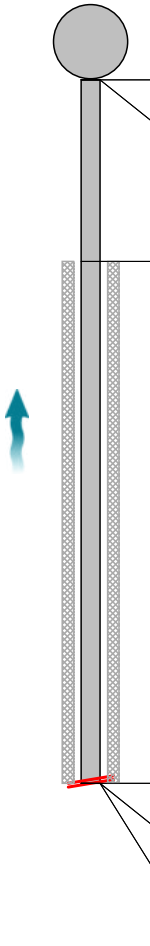
Item No.	Insp. No.	Date	Time	Client`s Job Ref	Weather	Pre Cleaned	PLR
2	1	01/06/23	9:26	ENZYGO	No Rain Or Snow	No	CP 2X

Operator	Vehicle	Camera	Preset Length	Criticality Grade	Alternative ID
KB	YR15 THK	Forward View	Not Specified	Category C	Not Specified

Town or Village:	Melsham	**Inspection Direction:**	Upstream	**Upstream Node:**	CP 2
Road:	Sandridge Common	**Inspected Length:**	4.65 m	**Upstream Pipe Depth:**	
Location:	Gardens	**Total Length:**	4.65 m	**Downstream Node:**	CP 1
Surface Type:		**Joint Length:**	1.20 m	**Downstream Pipe Depth:**	

Use:	Surface water	**Pipe Shape:**	Circular
Type of Pipe:	Gravity drain/sewer	**Dia/Height:**	225 mm
Flow Control:	No flow control	**Pipe Material:**	Vitrified clay pipe (i.e. all clayware)
Year Constructed:	Not Specified	**Lining Type:**	No Lining
Inspection Purpose:	Sample survey to determine asset condition	**Lining Material:**	No Lining

Comments:
Recommendations:



Scale: 1:50	Position [m]		Code	Observation	MPEG	Photo	Grade
	0.00		CP	Start node, catchpit, reference: CP 1	00:00:00		
	0.00		WL	Water level, 60% of the vertical dimension	00:00:03		
	1.20	S01	CUW	Loss of vision, camera under water, start	00:00:14		
	4.65	F01	CUW	Loss of vision, camera under water, finish	00:00:48		
	4.65		REM	General remark: ABANDONED SURVEY CAMERA SAFETY	00:00:49		
	4.65		SA	Survey abandoned: CAMERA UNDER WATER	00:00:50		

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 - 01/06/2023 - CP 3X

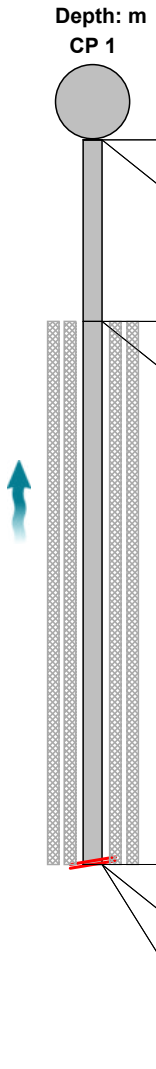
Item No.	Insp. No.	Date	Time	Client`s Job Ref	Weather	Pre Cleaned	PLR
3	1	01/06/23	9:49	ENZYGO	No Rain Or Snow	No	CP 3X

Operator	Vehicle	Camera	Preset Length	Criticality Grade	Alternative ID
KB	YR15 THK	Forward View	Not Specified	Category C	Not Specified

Town or Village:	Melsham	**Inspection Direction:**	Upstream	**Upstream Node:**	CP 3
Road:	Sandridge Common	**Inspected Length:**	4.79 m	**Upstream Pipe Depth:**	
Location:	Gardens	**Total Length:**	4.79 m	**Downstream Node:**	CP 1
Surface Type:		**Joint Length:**	1.20 m	**Downstream Pipe Depth:**	

Use:	Surface water	**Pipe Shape:**	Circular
Type of Pipe:	Gravity drain/sewer	**Dia/Height:**	225 mm
Flow Control:	No flow control	**Pipe Material:**	Vitrified clay pipe (i.e. all clayware)
Year Constructed:	Not Specified	**Lining Type:**	No Lining
Inspection Purpose:	Sample survey to determine asset condition	**Lining Material:**	No Lining

Comments:
Recommendations:



Scale: 1:50 Position [m]		Code	Observation	MPEG	Photo	Grade
0.00		CP	Start node, catchpit, reference: CP 1	00:00:00		
0.00		WL	Water level, 70% of the vertical dimension	00:00:03		
1.20	S01	DES	Settled deposits, fine, 20% cross-sectional area loss, start	00:00:16		
1.20	S02	CUW	Loss of vision, camera under water, start	00:00:17		
4.79	F01	DES	Settled deposits, fine, 20% cross-sectional area loss, finish	00:01:22		3
4.79	F02	CUW	Loss of vision, camera under water, finish	00:01:23		
4.79		SA	Survey abandoned: debris and cuw	00:01:24	CP 3X_c3a62 a3f-b646-4	

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	2.0	1.7	8.0	3.0

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Section Pictures - 01/06/2023 - CP 3X

Item No.	Inspection Direction	PLR	Client`s Job Ref	Contractor`s Job Ref
3	Upstream	CP 3X	ENZYGO	23/258



CP
3X_c3a62a3f-b646-42f8-8bf5-ee29fa73fd4f_20230601_095204_420.jpg, 00:01:24, 4.79 m
Survey abandoned, debris and cuw

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Section Inspection - 01/06/2023 - CP 4X

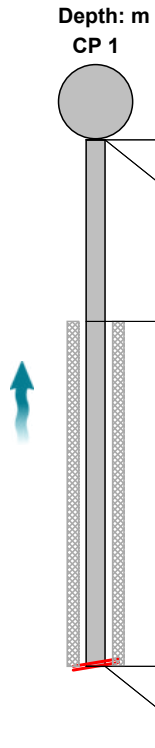
Item No.	Insp. No.	Date	Time	Client`s Job Ref	Weather	Pre Cleaned	PLR
4	1	01/06/23	9:41	ENZYGO	No Rain Or Snow	No	CP 4X

Operator	Vehicle	Camera	Preset Length	Criticality Grade	Alternative ID
KB	YR15 THK	Forward View	Not Specified	Category C	Not Specified

Town or Village:	Melsham	**Inspection Direction:**	Upstream	**Upstream Node:**	CP 4
Road:	Sandridge Common	**Inspected Length:**	3.48 m	**Upstream Pipe Depth:**	
Location:	Gardens	**Total Length:**	3.48 m	**Downstream Node:**	CP 1
Surface Type:		**Joint Length:**	1.20 m	**Downstream Pipe Depth:**	

Use:	Surface water	**Pipe Shape:**	Circular
Type of Pipe:	Gravity drain/sewer	**Dia/Height:**	225 mm
Flow Control:	No flow control	**Pipe Material:**	Vitrified clay pipe (i.e. all clayware)
Year Constructed:	Not Specified	**Lining Type:**	No Lining
Inspection Purpose:	Sample survey to determine asset condition	**Lining Material:**	No Lining

Comments:
Recommendations:



Scale: 1:50	Position [m]		Code	Observation	MPEG	Photo	Grade
	0.00		CP	Start node, catchpit, reference: CP 1	00:00:00		
	0.00		WL	Water level, 70% of the vertical dimension	00:00:03		
	1.20	S01	CUW	Loss of vision, camera under water, start	00:00:20		
	3.48	F01	CUW	Loss of vision, camera under water, finish	00:00:59		
	3.48		SA	Survey abandoned: camera under water and safety	00:01:00		

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 - 01/06/2023 - GY 1X

Item No.	Insp. No.	Date	Time	Client`s Job Ref	Weather	Pre Cleaned	PLR
5	1	01/06/23	10:41	ENZYGO	No Rain Or Snow	No	GY 1X

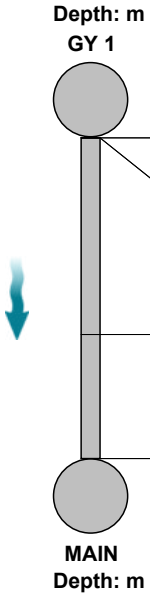
Operator	Vehicle	Camera	Preset Length	Criticality Grade	Alternative ID
KB	YR15 THK	Forward View	Not Specified	Category C	Not Specified

Town or Village:	Melsham	**Inspection Direction:**	Downstream	**Upstream Node:**	GY 1
Road:	Sandridge Common	**Inspected Length:**	2.12 m	**Upstream Pipe Depth:**	
Location:	Gardens	**Total Length:**	2.12 m	**Downstream Node:**	MAIN
Surface Type:		**Joint Length:**	1.00 m	**Downstream Pipe Depth:**	

Use:	Surface water	**Pipe Shape:**	Circular
Type of Pipe:	Gravity drain/sewer	**Dia/Height:**	150 mm
Flow Control:	No flow control	**Pipe Material:**	Vitrified clay pipe (i.e. all clayware)
Year Constructed:	Not Specified	**Lining Type:**	No Lining
Inspection Purpose:	Sample survey to determine asset condition	**Lining Material:**	No Lining

Comments:
Recommendations:

Scale: 1:50



Position [m]	Code	Observation	MPEG	Photo	Grade
0.00	GY	Start node, gully, reference: GY 1	00:00:00		
0.00	WL	Water level, 0% of the vertical dimension	00:00:03		
1.30	LL	Line deviates left	00:00:15		
2.12	BRF	Finish node, major connection without manhole, reference: MAIN	00:00:21		

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 - 01/06/2023 - GY 2X

Item No.	Insp. No.	Date	Time	Client`s Job Ref	Weather	Pre Cleaned	PLR
6	1	01/06/23	10:43	ENZYGO	No Rain Or Snow	No	GY 2X

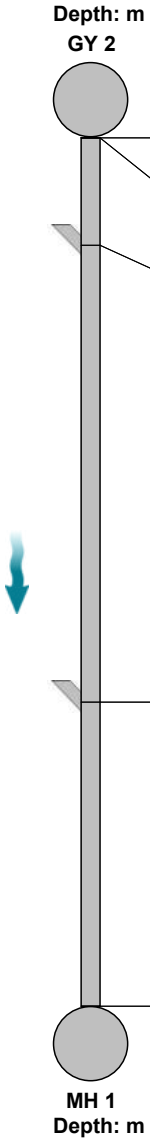
Operator	Vehicle	Camera	Preset Length	Criticality Grade	Alternative ID
KB	YR15 THK	Forward View	Not Specified	Category C	Not Specified

Town or Village:	Melsham	**Inspection Direction:**	Downstream	**Upstream Node:**	GY 2
Road:	Sandridge Common	**Inspected Length:**	16.20 m	**Upstream Pipe Depth:**	
Location:	Gardens	**Total Length:**	16.20 m	**Downstream Node:**	MH 1
Surface Type:		**Joint Length:**	1.00 m	**Downstream Pipe Depth:**	

Use:	Surface water	**Pipe Shape:**	Circular
Type of Pipe:	Gravity drain/sewer	**Dia/Height:**	150 mm
Flow Control:	No flow control	**Pipe Material:**	Vitrified clay pipe (i.e. all clayware)
Year Constructed:	Not Specified	**Lining Type:**	No Lining
Inspection Purpose:	Sample survey to determine asset condition	**Lining Material:**	No Lining

Comments:
Recommendations:

Scale: 1:141



Position [m]	Code	Observation	MPEG	Photo	Grade
0.00	GY	Start node, gully, reference: GY 2	00:00:00		
0.00	WL	Water level, 5% of the vertical dimension	00:00:07		
2.01	JN	Junction at 3 o'clock, diameter: 150mm	00:00:23		
10.52	JN	Junction at 3 o'clock, diameter: 150mm	00:01:31		
16.20	MHF	Finish node, manhole, reference: MH 1	00:02:08		

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 - 01/06/2023 - MH 1X

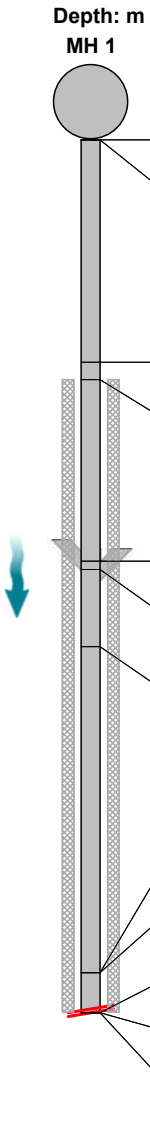
Item No.	Insp. No.	Date	Time	Client`s Job Ref	Weather	Pre Cleaned	PLR
7	1	01/06/23	11:27	ENZYGO	No Rain Or Snow	No	MH 1X

Operator	Vehicle	Camera	Preset Length	Criticality Grade	Alternative ID
KB	YR15 THK	Forward View	Not Specified	Category C	Not Specified

Town or Village:	Melsham	**Inspection Direction:**	Downstream	**Upstream Node:**	MH 1
Road:	Sandridge Common	**Inspected Length:**	42.24 m	**Upstream Pipe Depth:**	
Location:	Gardens	**Total Length:**	42.24 m	**Downstream Node:**	MH 2
Surface Type:		**Joint Length:**	1.20 m	**Downstream Pipe Depth:**	

Use:	Surface water	**Pipe Shape:**	Circular
Type of Pipe:	Gravity drain/sewer	**Dia/Height:**	225 mm
Flow Control:	No flow control	**Pipe Material:**	Vitrified clay pipe (i.e. all clayware)
Year Constructed:	Not Specified	**Lining Type:**	No Lining
Inspection Purpose:	Sample survey to determine asset condition	**Lining Material:**	No Lining

Comments:
Recommendations:



Scale: 1:366 Position [m]		Code	Observation	MPEG	Photo	Grade
0.00		MH	Start node, manhole, reference: MH 1	00:00:00		
0.00		WL	Water level, 5% of the vertical dimension	00:00:05		
10.77		GP	General photograph taken at this point	00:01:30	MH 1X_28f03f21-ae2c-4	
11.61	S01	DES	Settled deposits, fine, 15% cross-sectional area loss, start	00:01:44		
20.40		CN	Connection other than junction at 2 o'clock, diameter: 150mm	00:03:04		
20.80		JN	Junction at 10 o'clock, diameter: 150mm	00:03:11		
24.55		GP	General photograph taken at this point	00:03:45	MH 1X_c6e74427-2c53-	
40.33		GP	General photograph taken at this point	00:07:34	MH 1X_16bcc8fb-bbf1-4	
40.33		DES	Settled deposits, fine, 45% cross-sectional area loss	00:07:34	MH 1X_4f43aa99-a6e6-4	4
42.24		DES	Settled deposits, fine, 50% cross-sectional area loss	00:08:13		4
42.24	F01	DES	Settled deposits, fine, 15% cross-sectional area loss, finish	00:08:14		3
42.24		SA	Survey abandoned: SILT	00:08:15	MH 1X_992c13af-2de8-4	

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	7.0	1.7	72.0	4.0

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Section Pictures - 01/06/2023 - MH 1X

Item No.	Inspection Direction	PLR	Client`s Job Ref	Contractor`s Job Ref
7	Downstream	MH 1X	ENZYGO	23/258



MH
1X_28f03f21-ae2c-43dd-84c2-e34baffc0159_20230601_112914_113.jpg, 00:01:30, 10.77 m
General photograph taken at this point



MH
1X_c6e74427-2c53-421f-a1a7-49703e15683e_20230601_113234_155.jpg, 00:03:45, 24.55 m
General photograph taken at this point



MH
1X_16bcc8fb-bbf1-4161-baf1-897591e55aca_20230601_113633_487.jpg, 00:07:34, 40.33 m
General photograph taken at this point



MH
1X_4f43aa99-a6e6-4d78-aa96-e1cf5d988c21_20230601_113647_757.jpg, 00:07:34, 40.33 m
Settled deposits, fine, 45% cross-sectional area loss

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Section Pictures - 01/06/2023 - MH 1X

Item No.	Inspection Direction	PLR	Client`s Job Ref	Contractor`s Job Ref
7	Downstream	MH 1X	ENZYGO	23/258



MH
1X_992c13af-2de8-4d02-b35d-8143b554ce6e_20230601_113814_137.jpg, 00:08:15, 42.24 m
Survey abandoned, SILT

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Section Inspection - 01/06/2023 - GY 3X

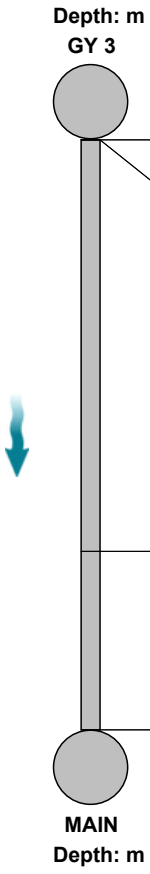
Item No.	Insp. No.	Date	Time	Client`s Job Ref	Weather	Pre Cleaned	PLR
8	1	01/06/23	11:01	ENZYGO	No Rain Or Snow	No	GY 3X

Operator	Vehicle	Camera	Preset Length	Criticality Grade	Alternative ID
KB	YR15 THK	Forward View	Not Specified	Category C	Not Specified

Town or Village:	Melsham	**Inspection Direction:**	Downstream	**Upstream Node:**	GY 3
Road:	Sandridge Common	**Inspected Length:**	3.90 m	**Upstream Pipe Depth:**	
Location:	Gardens	**Total Length:**	3.90 m	**Downstream Node:**	MAIN
Surface Type:		**Joint Length:**	1.20 m	**Downstream Pipe Depth:**	

Use:	Surface water	**Pipe Shape:**	Circular
Type of Pipe:	Gravity drain/sewer	**Dia/Height:**	150 mm
Flow Control:	No flow control	**Pipe Material:**	Vitrified clay pipe (i.e. all clayware)
Year Constructed:	Not Specified	**Lining Type:**	No Lining
Inspection Purpose:	Sample survey to determine asset condition	**Lining Material:**	No Lining

Comments:
Recommendations:



Scale: 1:50 Position [m]	Code	Observation	MPEG	Photo	Grade
0.00	GY	Start node, gully, reference: GY 3	00:00:00		
0.00	WL	Water level, 0% of the vertical dimension	00:00:03		
2.72	LL	Line deviates left	00:00:21		
3.90	BRF	Finish node, major connection without manhole, reference: MAIN	00:00:27		

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 - 01/06/2023 - GY 6X

Item No.	Insp. No.	Date	Time	Client`s Job Ref	Weather	Pre Cleaned	PLR
9	1	01/06/23	11:22	ENZYGO	No Rain Or Snow	No	GY 6X

Operator	Vehicle	Camera	Preset Length	Criticality Grade	Alternative ID
KB	YR15 THK	Forward View	Not Specified	Category C	Not Specified

Town or Village:	Melsham	**Inspection Direction:**	Downstream	**Upstream Node:**	GY 6
Road:	Sandridge Common	**Inspected Length:**	2.95 m	**Upstream Pipe Depth:**	
Location:	Gardens	**Total Length:**	2.95 m	**Downstream Node:**	MAIN
Surface Type:		**Joint Length:**	1.00 m	**Downstream Pipe Depth:**	

Use:	Surface water	**Pipe Shape:**	Circular
Type of Pipe:	Gravity drain/sewer	**Dia/Height:**	150 mm
Flow Control:	No flow control	**Pipe Material:**	Vitrified clay pipe (i.e. all clayware)
Year Constructed:	Not Specified	**Lining Type:**	No Lining
Inspection Purpose:	Sample survey to determine asset condition	**Lining Material:**	No Lining

Comments:
Recommendations:

Scale: 1:50



Position [m]	Code	Observation	MPEG	Photo	Grade
0.00	GY	Start node, gully, reference: GY 6	00:00:00		
0.01	WL	Water level, 0% of the vertical dimension	00:00:03		
2.24	LR	Line deviates right	00:00:19		
2.95	BRF	Finish node, major connection without manhole, reference: MAIN	00:00:22		

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 - 01/06/2023 - GY 5X

Item No.	Insp. No.	Date	Time	Client`s Job Ref	Weather	Pre Cleaned	PLR
10	1	01/06/23	11:16	ENZYGO	No Rain Or Snow	No	GY 5X

Operator	Vehicle	Camera	Preset Length	Criticality Grade	Alternative ID
KB	YR15 THK	Forward View	Not Specified	Category C	Not Specified

Town or Village:	Melsham	**Inspection Direction:**	Downstream	**Upstream Node:**	GY 5
Road:	Sandridge Common	**Inspected Length:**	8.63 m	**Upstream Pipe Depth:**	
Location:	Gardens	**Total Length:**	8.63 m	**Downstream Node:**	MAIN
Surface Type:		**Joint Length:**	1.00 m	**Downstream Pipe Depth:**	

Use:	Surface water	**Pipe Shape:**	Circular
Type of Pipe:	Gravity drain/sewer	**Dia/Height:**	150 mm
Flow Control:	No flow control	**Pipe Material:**	Vitrified clay pipe (i.e. all clayware)
Year Constructed:	Not Specified	**Lining Type:**	No Lining
Inspection Purpose:	Sample survey to determine asset condition	**Lining Material:**	No Lining

Comments:
Recommendations:

Scale: 1:75



Position [m]	Code	Observation	MPEG	Photo	Grade
0.00	GY	Start node, gully, reference: GY 5	00:00:00		
0.00	WL	Water level, 0% of the vertical dimension	00:00:04		
0.11	JN	Junction at 9 o'clock, diameter: 150mm	00:00:20		
8.63	BRF	Finish node, major connection without manhole, reference: MAIN	00:01:01		

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 - 01/06/2023 - GY 4X

Item No.	Insp. No.	Date	Time	Client`s Job Ref	Weather	Pre Cleaned	PLR
11	1	01/06/23	11:13	ENZYGO	No Rain Or Snow	No	GY 4X

Operator	Vehicle	Camera	Preset Length	Criticality Grade	Alternative ID
KB	YR15 THK	Forward View	Not Specified	Category C	Not Specified

Town or Village:	Melsham	**Inspection Direction:**	Downstream	**Upstream Node:**	GY 4
Road:	Sandridge Common	**Inspected Length:**	1.53 m	**Upstream Pipe Depth:**	
Location:	Gardens	**Total Length:**	1.53 m	**Downstream Node:**	MAIN
Surface Type:		**Joint Length:**	1.00 m	**Downstream Pipe Depth:**	

Use:	Surface water	**Pipe Shape:**	Circular
Type of Pipe:	Gravity drain/sewer	**Dia/Height:**	150 mm
Flow Control:	No flow control	**Pipe Material:**	Vitrified clay pipe (i.e. all clayware)
Year Constructed:	Not Specified	**Lining Type:**	No Lining
Inspection Purpose:	Sample survey to determine asset condition	**Lining Material:**	No Lining

Comments:
Recommendations:

Scale: 1:50



Position [m]	Code	Observation	MPEG	Photo	Grade
0.00	GY	Start node, gully, reference: GY 4	00:00:00		
0.00	WL	Water level, 0% of the vertical dimension	00:00:02		
0.94	LR	Line deviates right	00:00:09		
1.53	BRF	Finish node, major connection without manhole, reference: MAIN	00:00:13		

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 Profile

Project Name	Project Number	Project Date
MELKSHAM CULVERT		01/06/2023

Circular, 150 mm

Item No.	Upstream Node	Downstream Node	Date	Road	Pipe Material	Total Length	Inspected Length
5	GY 1	MAIN	01/06/2023	SANDRIDGE COMMON	Vitrified clay pipe (i.e. all clayware)	2.12 m	2.12 m
6	GY 2	MH 1	01/06/2023	SANDRIDGE COMMON	Vitrified clay pipe (i.e. all clayware)	16.20 m	16.20 m
8	GY 3	MAIN	01/06/2023	SANDRIDGE COMMON	Vitrified clay pipe (i.e. all clayware)	3.90 m	3.90 m
9	GY 6	MAIN	01/06/2023	SANDRIDGE COMMON	Vitrified clay pipe (i.e. all clayware)	2.95 m	2.95 m
10	GY 5	MAIN	01/06/2023	SANDRIDGE COMMON	Vitrified clay pipe (i.e. all clayware)	8.63 m	8.63 m
11	GY 4	MAIN	01/06/2023	SANDRIDGE COMMON	Vitrified clay pipe (i.e. all clayware)	1.53 m	1.53 m

Total: 6 Inspections x Circular 150 mm = 35.33 m Total Length and 35.33 m Inspected Length

Circular, 225 mm

Item No.	Upstream Node	Downstream Node	Date	Road	Pipe Material	Total Length	Inspected Length
2	CP 2	CP 1	01/06/2023	SANDRIDGE COMMON	Vitrified clay pipe (i.e. all clayware)	4.65 m	4.65 m
3	CP 3	CP 1	01/06/2023	SANDRIDGE COMMON	Vitrified clay pipe (i.e. all clayware)	4.79 m	4.79 m
4	CP 4	CP 1	01/06/2023	SANDRIDGE COMMON	Vitrified clay pipe (i.e. all clayware)	3.48 m	3.48 m
7	MH 1	MH 2	01/06/2023	SANDRIDGE COMMON	Vitrified clay pipe (i.e. all clayware)	42.24 m	42.24 m

Total: 4 Inspections x Circular 225 mm = 55.16 m Total Length and 55.16 m Inspected Length

Rectangular, 600 mm, 700 mm

Item No.	Upstream Node	Downstream Node	Date	Road	Pipe Material	Total Length	Inspected Length
1	CP 1	OUTFALL	01/06/2023	SANDRIDGE COMMON	Concrete	2.40 m	2.40 m

Total: 1 Inspection x Rectangular 600 mm, 700 mm = 2.40 m Total Length and 2.40 m Inspected Length

Total: 11 Inspections = 92.89 m Total Length and 92.89 m Inspected Length

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Scoring Summary

Project Name	Project Number	Project Date
MELKSHAM CULVERT		01/06/2023

Structural Defects

Section	PLR	Grade	Description
All inspected pipes are in an acceptable structural condition (< grade 3).			

Service / Operational Condition

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

Grade 4: Best practice suggests consideration should be given to maintenance activity to avoid potential blockages.

Grade 5: Best practice suggests that this pipe is at a high risk of backing up or causing flooding.

Section	PLR	Grade	Description
3	CP 3X	3	Settled deposits, fine, 20% cross-sectional area loss, finish
7	MH 1X	4	Multiple defects

Abandoned Surveys

Section	PLR	Description
1	CP 1X	Survey abandoned
2	CP 2X	Survey abandoned
3	CP 3X	Survey abandoned
4	CP 4X	Survey abandoned
7	MH 1X	Survey abandoned

Information

These scoring summaries are based on the SRM grading from the WRc.

Sewer Surveys UK

Job Number:		Survey By: KB
Grid Ref:	Node Number: CP1	Cover Level:
Location: Melksham		
Year Laid: Z	Status:PR	Function: SW	Node Type:	Survey Date:
Manufacturer:		Grating:

COVER	Shape:Rx2	Hinged:/	Lockable: /	Duty: H	Size: 920/610	Toxic atmos:
SHAFT	Side Entry: /	Regulating Courses:/	Depth: /	Size: /	Vermin: /	
CHAMBER	Soffit Type:/	No. of Step Irons: /	No. of Ladders: /	No. of Landings: /		
Size: 960/660	Const'n Code: /	Depth of Flow: /	Depth of Silt:/	H of S:/		

	Pipe	U/S D/S node Reference		Shape	Pipe Size			Backdrop Diameter	Pipe Material	Lining Material	Depth from Cover (M)	Invert Level (M)
INCOMING PIPES	**A**	Unknown		C	300						0.97	
	B	Unknown		C	225						0.96	
	C	Unknown		C	225						0.94	
	D											
	E											
	F											
OUTGOING PIPES	**X**	Unknown			300						1.01	
	Y											

CONDITION INFORMATION Enter Y if attention required. Use Remarks to clarify

Cover		Irons/Ladders		Shaft		Chamber		Benching		Other	

Remarks: Overall 1.05





Sewer Surveys UK LTD

Job Number:				Survey By: KB
Grid Ref:	Node Number: CP3			Cover Level:
Location: Melksham				
Year Laid: Z	Status:PR	Function: SW	Node Type:	Survey Date:
Manufacturer:				Grating:

COVER	Shape: DT	Hinged:/	Lockable: /	Duty: H	Size: 600/600	Toxic atmos:
SHAFT	Side Entry: /	Regulating Courses:/	Depth: /	Size: /	Vermin: /	
CHAMBER	Soffit Type:/	No. of Step Irons: /	No. of Ladders: /	No. of Landings: /		
Size: 650/470	Const'n Code: /	Depth of Flow: /	Depth of Silt:/	H of S:/		

	Pipe	U/S D/S node Reference	Shape	Pipe Size		Backdrop Diameter	Pipe Material	Lining Material	Depth from Cover (M)	Invert Level (M)
INCOMING PIPES	A	Unknown							0.95	
	B	Unknown							0.94	
	C									
	D									
	E									
	F									
OUTGOING PIPES	X	Unknown							0.98	
	Y									

CONDITION INFORMATION Enter Y if attention required. Use Remarks to clarify

Cover		Irons/Ladders		Shaft		Chamber		Benching		Other	

Remarks: NCA and unable to set up





Sewer Surveys UK

Job Number:		Survey By: KB
Grid Ref:	Node Number: MH1	Cover Level:
Location: Melksham		
Year Laid: Z	Status:PR	Function: SW	Node Type:	Survey Date:
Manufacturer:		Grating:

COVER	Shape: DT	Hinged:/	Lockable: /	Duty: H	Size: 680/680	Toxic atmos:
SHAFT	Side Entry: /	Regulating Courses:4	Depth: 500	Size: 690/690	Vermin: /	
CHAMBER	Soffit Type:/	No. of Step Irons:25	No. of Ladders: /	No. of Landings: /		
Size: 1200	Const'n Code: /	Depth of Flow: /	Depth of Silt:/	H of S:/		

	Pipe	U/S D/S node Reference		Shape	Pipe Size			Backdrop Diameter	Pipe Material	Lining Material	Depth from Cover (M)	Invert Level (M)
INCOMING PIPES	A	Unknown									1.29	
	B											
	C											
	D											
	E											
	F											
OUTGOING PIPES	X	Unknown									1.33	
	Y											

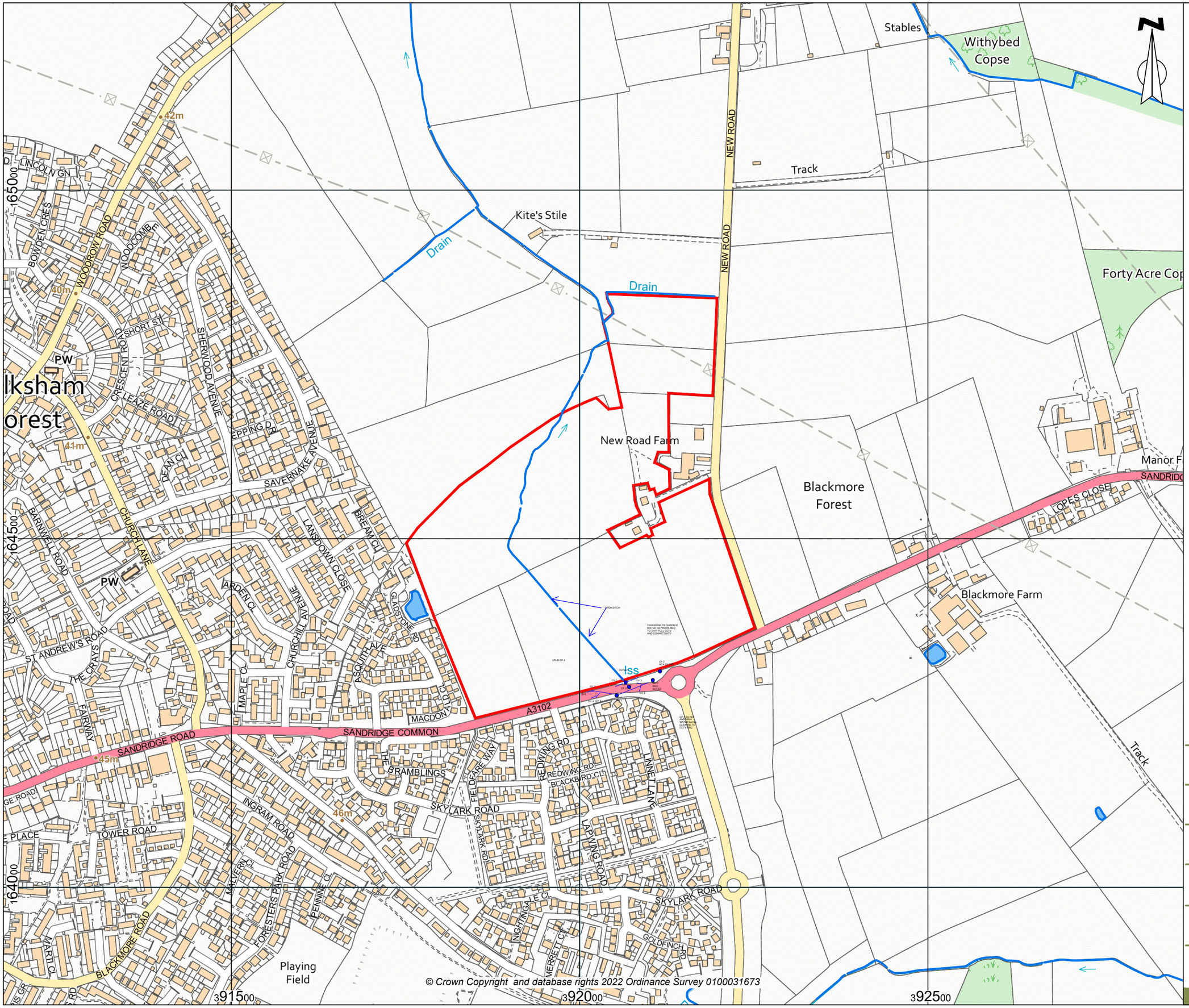
CONDITION INFORMATION Enter Y if attention required. Use Remarks to clarify

Cover		Irons/Ladders		Shaft		Chamber		Benching		Other	

Remarks:







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enzygo
environmental consultants

Samuel House, 5 Fox Valley Way, Stocksbridge, Sheffield, S36 2AA

CLIENT: Bloor Homes Limited

SCALE: 1:5,000@A3

PROJECT REF: SHF.102.003

DRAWN: MG

CHECKED: EO'C

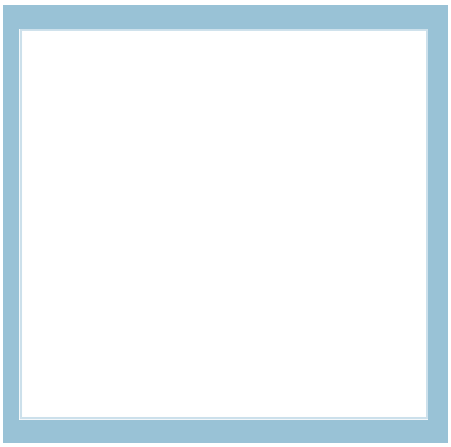
DATE: June 2022

PROJECT: New Farm, Melksham

TITLE: Surface Water Features

DRAWING NO: SHF.102.003.HY.D.002

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Appendix 8 – Water Main Survey

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The Byre, Woodend Lane
Cromhall, Gloucestershire GL12 8AA

Tel: 01454 269237
www.enzygo.com

Adam Rickenbach
Bloor Homes South West
Unit 7 Latham Road,
Swindon,
Wiltshire,
SN25 4DL

CRM.102.011.GE.L.001.A

30th May 2024

Dear Adam,

Sandridge Common, Melksham

Site investigation works were undertaken at the above-named site in April and May 2024, to locate existing water mains.

Background

A mixed-use development is proposed, comprising residential properties, including a nursery, open space, play areas and allotment gardens.

The site is irregular in shape and comprises a series of open grassed fields with fenced and hedged boundaries and occasional semi-mature trees. The fields are located to the north, west and south of New Road Farm, which is to be retained.

The site is bound to the north by open fields and to the south by the A103 Sandridge Common, with residential development and open fields beyond. The site is bound to the east by New Road Farm and New Road, with open fields beyond and to the west by residential development.

A Watercourse is located in the central area, splitting the site into two parts.

BGS records indicate the site is underlain by the Oxford Clay Formation, with no superficial deposits recorded.

Overhead extra high voltage (132kV) Electricity Transmission Lines (ETL's) are present in the northern area of the site, orientated north west to south east. High voltage (11kV) overhead cables are present across the southern area of the site, orientated east to west. Low Voltage overhead service cables are also present along the eastern boundary, parallel with New Road.

The cables are under the control of Scottish and Southern Electricity Networks (SSEN).

Existing water mains are present across the site, located adjacent to and parallel with the southern boundary. The mains are Wessex Water (WW) assets.

WW asset plans confirm that a 12” Asbestos Cement (AC) washout main and a 4” Polyethylene (PE) supply main are present on the site. Both mains are shown across the entire southern boundary, continuing outside the site to the east and west. The 4” main is shown closest to the southern boundary, with the 12” main shown to the north.

An abandoned rising main is also recorded in the vicinity of the 12” and 4” mains. This is shown to follow the 4” main in the eastern area of the site, encroaching slightly further north into the site in the western area, crossing the 12” and 4” mains. The diameter of the abandoned rising main is shown to be 39.5mm inner diameter based on WW records. In the south eastern corner of the site, the abandoned rising main is shown to bend and continue south across the A3102 road.

Two connection points are also presented on the WW asset plans. These are located in the central area of the southern boundary and extend south from the 12” main into the existing residential development to the south of the A3102, which borders the site.

A WW asset comprising a 450mm highway drain is also present in the north western area of the site. This is orientated approximately south west to north east and is marked with manhole covers. The highway drain enters site through the western boundary and discharges into the watercourse in the central area of the site.

An investigation is required to accurately locate the water mains. This is to assist with the evolving proposed development layout, taking account of the relevant easements and wayleaves as required by Wessex Water.

Locating the highway drain is not required as part of the investigation.

Access

Access to the site is gained via the southern boundary, or via New Road Farm through the central eastern boundary.

Wessex Water

Contact was made with WW, to confirm their requirements. WW have confirmed the live mains comprise a 12” AC main, which has a 5m easement applied to either side and a 4” PE main, which has a 3m easement applied.

A proposed method of investigation was discussed with WW and following discussions, Risk Assessments and Method Statements (RAMS) were submitted to WW for review, along with proposed exploratory hole locations.

The works were approved and WW confirmed that their attendance was not required during the works. Relevant WW contact details were provided, should this be required.

SSEN

The extra high voltage ETL’s are located in the northern area of the site. No work is required close to the ETL’s and no plant crossing is required.

The 11kV cables are located in the southern area of the site, to the south of New Road Farm. Access to the western side of the watercourse area is available through the southern boundary without requiring a plant crossing.

Due to the presence of the watercourse which dissects the site, a plant crossing is required below the 11kV cables to allow access to the eastern side of the site. A bridge is present across the watercourse allowing access from west to east. This is located to the north of the overhead cables and therefore requires a plant crossing to allow access from the southern boundary to the bridge. Alternative access to the eastern work area is through New Road Farm and a plant crossing is required below the 11kV cables to allow access from the farm to the southern boundary.

A plant crossing is also required below the overhead low voltage service cable, above the access from New Road Farm.

Cable Height Assessment

Contact was made with SSEN to arrange a GS6 Cable Height Assessment. SSEN had an extended lead time and an appointment date was confirmed for 14th May 2024. Enzygo attendance was not required during the visit.

Following completion of the assessment, a drawing was provided confirming cable heights for the 11kV cables across the site. Cable heights were also provided for the low voltage overhead service cable above the New Road Farm access and a copy of the drawing is included.

Proposed Exploratory Hole Locations

The location of the main was added to topographical survey drawings based on WW asset plans and a copy of the drawing was provided by the Client.

8 No. Trial Trench locations were plotted across the length of the main, including pits adjacent to the western and eastern boundaries. In addition, 2 No. trial trench locations were positioned over the connection points identified on the WW asset plans.

Coordinates were generated from the CAD drawing for each proposed trial trench location and these drawings were approved by WW.

Site Investigation

A site investigation was undertaken by Enzygo Geoenvironmental Limited between the 30th April and 2nd May 2024 and between the 21st and 23rd May 2024. The investigation was undertaken in two phases due to access restrictions associated with the lead time for the SSEN cable height assessment.

The investigation comprised 11 No. Trial Trench Locations (TT1 to TT4, TT4a and TT5 to TT10). Trial Trench TT1 to TT3, TT5, TT6 and TT8 to TT10 were positioned to locate the 12” AC main, the 4” PE main and the abandoned rising main. Trial Trench TT4 and TT7 were positioned to locate the connection points.

Trial Trench TT4a was excavated to expose the 12" main, the 4" main and the abandoned rising main. This was located adjacent to Trial Trench TT4, to confirm the location of the mains prior to locating the connection points.

Exploratory holes undertaken by Enzygo Geoenvironmental Limited are presented on Drawing CRM102011-ENZ-XX-XX-DR-G-0002.1-Proposed Trial Trench Location Plan – Overall Plan. Locations are also presented on a larger scale on Drawings CRM102011-ENZ-XX-XX-DR-G-0002.2-Proposed Trial Trench Location Plan – Sheet 1 of 2 and CRM102011-ENZ-XX-XX-DR-G-0002.3-Proposed Trial Trench Location Plan – Sheet 2 of 2.

Trial Trenches to locate the water mains were orientated perpendicular to the mains and Trial Trenches to locate the connection points were orientated perpendicular to the connections.

Works on the western side of the watercourse were undertaken between the 30th April and the 2nd May (TT1 to TT4, TT4a and TT5). Works to the east of the watercourse were undertaken between the 21st and 23rd May (TT6 to TT10) and in addition, one trial trench was re-visited on the western side of the watercourse (TT4).

For the site investigation undertaken between the 21st May and 23rd May 2024, a suitable location for the plant crossing was selected using the cable height assessment drawings and information obtained from SSEN. A plant crossing utilising height restricting goal posts was installed below the low voltage service connection cable over the site access and below the 11kV cables in the southern area of the site.

Plant crossing was undertaken using only the designated crossing points, for the duration of the works.

All works were undertaken in accordance with the RAMS and WW requirements.

Initially, proposed Trial Trench locations were set out by a specialist surveying contractor, to co-ordinates obtained from the CAD Drawing. Following setting out, a localised GPR survey was undertaken, to confirm if the mains could be identified. Limited signals were received from the GPR.

Prior to excavation, a scan was undertaken using a Cable Avoidance Tool (CAT) to check for other buried services. Excavation was then progressed at a slow rate, using a combination of conventional hand digging, assisted by a mechanical excavator.

Mechanical excavation was generally undertaken to clear out soils near surface, with final excavation to expose the main undertaken using hand digging techniques. Mechanical excavation was undertaken using a 3t tracked 360° excavator, utilising rubber tracks to minimise damage and a smooth bucket was used for the duration.

Shallow groundwater was not encountered during the investigation, with the exception of Trial Trench TT4 and is further discussed below.

During excavation, a watching brief was undertaken to identify any evidence of a backfilled trench within the side walls of the excavation and limited evidence of former trenches was identified. This is common

where a trench is excavated within natural soils and backfilled using arisings with appropriate compaction, which contain no anthropogenic material.

A specialist surveying company was present for the duration and further GPR scans were undertaken as works were progressed. Where limited GPR signals were occasionally identified, these were used to target potential directions of further investigation, where the main was not located within the initial Trial Trench. Based on this, the dimensions and footprint of each Trial Trench were variable.

The 12" AC main and the PE main were located and exposed at nine trial pit locations (TT1 to TT3, TT4a, TT5, TT6 and TT8 to TT10). WW records shown the abandoned rising main changes direction in the south eastern corner, exiting the site to the south. This was confirmed within the trial trenching and the abandoned rising main was identified within eight trial trench locations (TT1 to TT3, TT4a, TT5, TT6, TT8 and TT9). The abandoned rising main was therefore not identified within trial trench TT10, located in the far south eastern corner of the site.

The 12" main comprised a black AC pipe. The PE main is shown on WW records to comprise a 4" diameter pipe. This was confirmed to comprise a black PE main of 6" outer diameter.

The abandoned rising main comprised a black PE pipe of approximately 50mm outer diameter, consistent with the 39.5mm inner diameter obtained from WW records.

Within the site area, the abandoned rising main has been identified closest to the southern boundary. The 6" main is located to the north of the abandoned rising main and the 12" main is located furthest into the site, to the north of the 6" main.

The connection points were located and exposed within Trial Trench TT4 and TT7. Within Trial trench TT4, the connection comprised a 6" blue PE pipe and within trial trench TT7, the connection comprised a 12" blue PE pipe. The abandoned rising main was also identified within Trial Trench TT7.

Locations of exploratory holes where the main was successfully identified are presented on Drawing CRM102011-ENZ-XX-XX-DR-G-0002.1-Proposed Trial Trench Location Plan – Overall Plan. Locations are further presented on Drawing CRM102011-ENZ-XX-XX-DR-G-0002.2-Proposed Trial Trench Location Plan – Sheet 1 of 2. Drawing CRM102011-ENZ-XX-XX-DR-G-0002.3-Proposed Trial Trench Location Plan – Sheet 2 of 2.

Copies of the drawings are included.

While exposed, the location of the water main was accurately surveyed, with an elevation obtained from the crown of the pipe and the survey data is presented on the drawings. The footprint dimensions of the Trial Trenches were surveyed and are also presented on the drawings.

Survey data is also presented in the table below:

Survey Data

Trial Trench Location	Water Main	Survey Data			
		X	Y	Z (Pipe Crown)	Average Ground Level
TT1	12” Main	391854.2584	164244.249	42.89	44.19
	6” Main	391854.4298	164243.775	42.99	
	50mm Abandoned	391854.05	164241.97	43.22	
TT2	12” Main	391927.36	164263.43	42.46	44.19
	6” Main	391926.85	164261.9	42.8	
	50mm Abandoned	391927.94	164260.03	42.97	
TT3	12” Main	391961.9277	164273.5071	42.27	43.56
	6” Main	391963.9996	164271.7029	42.52	43.55
	50mm Abandoned	391963.47	164270.2	42.81	43.54
TT4	125mm connection	392006.437	164284.652	42.25	43.33
TT4a	12” Main	392009.9887	164287.5791	42.13	43.29
	6” Main	392011.38	164284.82	42.21	43.22
	50mm Abandoned	392011.3411	164284.1426	42.39	43.22
TT5	12” Main	392047.6906	164296.7954	42.07	43.26
	6” Main	392048.22	164295.03	42.19	43.2
	50mm Abandoned	392049.3188	164294.1489	42.34	43.18
TT6	12” Main	392080.94	164306.98	42.1	43.13
	6” Main	392081.615	164305.17	42.16	43.13
	50mm Abandoned	392082.24	164303.335	42.32	43
TT7	12” connection	392106.38	164311.185	41.98	43.26
	50mm Abandoned	392106.545	164311.126	42.24	43.15
TT8	12” Main	392154.436	164332.334	42.3	43.26
	6” Main	392155.206	164330.166	42.3	43.16
	50mm Abandoned	392155.351	164328.748	42.48	43.16
TT9	12” Main	392195.566	164351.055	42.47	43.29
	6” Main	392196.886	164348.155	42.43	43.16
	50mm Abandoned	392155.351	164328.748	42.48	43.44
TT10	12” Main	392238.692	164371.233	42.47	42.43
	6” Main	492240.472	164367.746	42.52	43.38

On completion of survey works, the trial pits were backfilled prior to moving to the next location.

A Dig Card was prepared for each Trial Pit. Each Dig Card includes survey data for the main including crown elevation, an extract which includes the trial pit footprint and a photograph of the exposed main.

Copies of the Dig Cards are included the Appendices. A copy of the CAD file from the survey has also been provided separately.

Trial Trench TT4

Trial Trench TT4 was initially excavated on 2nd May 2024, during the first phase of site works. Prior to commencement, an additional Trial Trench (TT4a) was excavated adjacent to Trial Trench TT4, to locate the mains. Trial Trench TT4 was then progressed.

Following a topsoil strip, rapid inflow of groundwater was noted at a depth of 400mm bgl. It was also noted that an area of soft, wet ground was present around the location.

Based on this and given that groundwater was not identified elsewhere across the site, it was suspected that an existing leak may be present from the connection coupler.

Careful excavation using hand tools confirmed the presence of pea shingle just below the base of the pit and it was suspected that the thickness of clay surrounding the pipe and pea shingle may be containing the leak. Based on that, excavation was terminated and the pit was backfilled.

Contact was made with WW and a representative attended site on the 20th May to undertake a walkover. No significant evidence of a leak was identified during the inspection and the WW representative attended site again on the 23rd May 2024, during the second Phase of the investigation.

Trial Trench TT4 was re-excavated on 23rd May 2024. Initially undertaken under a WW watching brief, permission was given in writing to continue excavation in accordance with the agreed RAMS, without a WW presence. Written permission was obtained prior to the WW representative leaving site.

It was noted that the area of boggy ground had reduced during the second phase of the works. Groundwater was still encountered during re-excavation and this was controlled using localised sump pumping.

The connection at Trial Trench TT4 was successfully located, surveyed and the pit was backfilled with arisings on completion.

Photographs and information were sent to the WW representative, who confirmed that WW would attend site separately to investigate if a leak is present, although a date was not confirmed. Access and Client contact details were provided to WW, should they have any further questions.

Ground Conditions

Topsoil Like Made Ground was encountered across the site to a depth of 0.3m bgl, comprising grass over soft dark brown slightly sandy silty clay with frequent roots and rootlets. This is consistent with natural material, reworked by agricultural processes.

Topsoil like Made Ground was underlain by a layer of soft becoming firm and stiff grey mottled brown silty clay with rare roots and rootlets. This material is considered to represent the Oxford Clay Formation.

Ground Conditions were consistent across the site. The oxford clay formation within the backfilled trenches is classified as Made Ground, comprising of only natural clay soils reworked by the process of excavation and backfilling.

The 12” main, 6” main and abandoned rising main appear to have been placed in an open trench prior to backfilling with previously excavated clay soil arisings.

Pea shingle was identified around the connection pipe within Trial Trench TT4. Pea shingle was only identified within Trial Trench TT4 and was not identified elsewhere across the site.

The roots are considered associated with the hedgerow adjacent to the southern boundary and the proportion of roots was noted to decrease with distance away from the hedge.

Conclusion

Within the site area, the abandoned rising main has been identified closest to the southern boundary. The 6” main is located to the north of the abandoned rising main and the 12” main is located further into the site, to the north of the 6” main. This is generally consistent with WW records.

In the western area of the site, WW asset plans show the abandoned rising main to encroach slightly further north into the site, crossing the 6” and 12” mains. This has been disproven, with the abandoned rising main consistently located closest to the hedge across the western area of the site.

The abandoned rising main was identified within Trial Trench TT1 to TT3, TT4A, TT5, TT6, TT8 and TT9. It was not identified within Trial Trench TT10 and this is consistent with WW records, which shows the abandoned rising main to change direction and exit through the southern boundary in the south east corner of the site.

We hope we have correctly interpreted your requirements,

Yours sincerely,

For and on behalf of Enzygo Geoenvironmental Limited



Matt Ward

Principal Consultant

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N

Sheet 1 of 2

Sheet 2 of 2

E: 391853.39
N: 164247.01
TT1

E: 391926.55
N: 164263.32
TT2

E: 391994.57
N: 164274.00
TT3

E: 392010.46
N: 164286.52
TT4

E: 392007.67
N: 164284.44
TT4A

E: 392048.67
N: 164295.76
TT5

E: 392081.63
N: 164305.62
TT6

E: 392105.38
N: 164311.19
TT7

E: 392154.07
N: 164330.06
TT8

E: 392195.79
N: 164350.57
TT9

E: 392239.48
N: 164369.53
TT10

0 25 50 75 100 125m
Scale 1:1,250

KEY:

- Site Boundary
- Trial Trench (TT)
- 12-Inch Water Main
- 6-Inch Water Main
- 50mm Abandoned Rising Main

NOTES:

DO NOT SCALE FROM THIS DRAWING

ALL DIMENSIONS ARE IN METRES UNLESS STATED OTHERWISE

THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL RELEVANT DRAWINGS AND DOCUMENTS ASSOCIATED WITH THIS PROJECT.

ALL EXISTING AND PROPOSED DIMENSIONS, LEVELS AND LOCATIONS TO BE CHECKED AND VERIFIED BY THE MAIN CONTRACTOR ON SITE PRIOR TO THE COMMENCEMENT OF THE WORKS AND ANY ANOMALIES REPORTED TO THE ENGINEER.

Rev	Date	Description	DRA	CHK	APP
P01	10.06.24	Issued for comment / approval	LW	MW	MW

Project
Sandridge Common, Melksham 2024

Client
Bloor Homes Southern

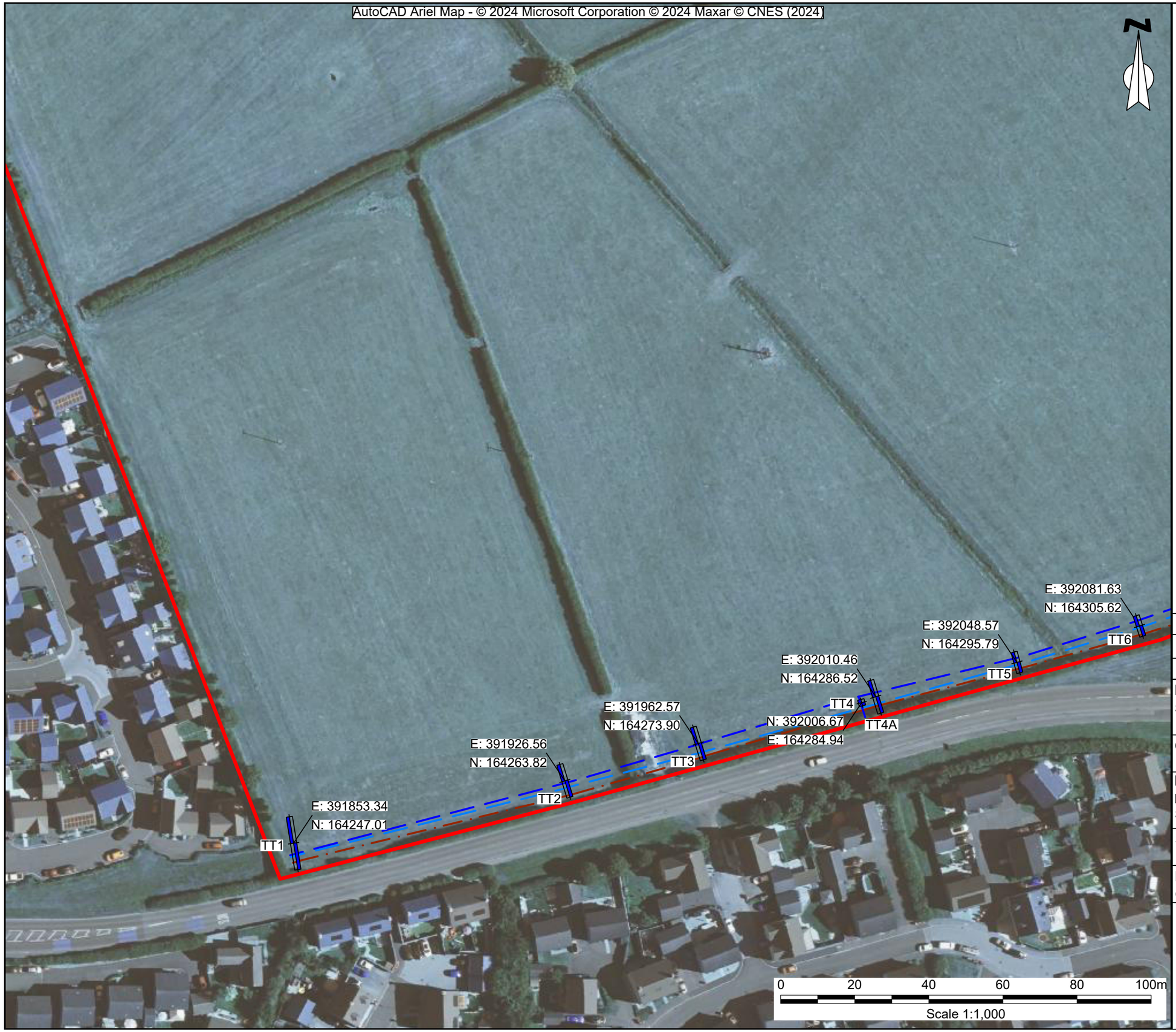
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Proposed Trial Trench Location Plan - Overall Plan

Scale	Date	Status
1:1,250@A1	23/04/24	Preliminary

DWG No. CRM102011-ENZ-XX-XX-DR-G-0002.1 **Revision** P01

Bristol 01454 269 237
Cardiff 02920 023 700
Manchester 0161 413 6444
Cambridge 01799 542 473
Sheffield 0114 321 5151
Belfast 07377673948

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enzygo.com
hello@enzygo.com



KEY:

- Site Boundary
- Trial Trench (TT)
- 12-Inch Water Main
- 6-Inch Water Main
- 50mm Abandoned Rising Main

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Rev	Date	Description	DRA	CHK	APP
P01	10.06.24	Issued for comment / approval	LW	MW	MW

Project
Sandridge Common, Melksham 2024

Client
Bloor Homes Southern

Drawing Title
Proposed Trial Trench Location Plan - Sheet 1 of 2

Scale	Date	Status
1:1000@A3	23/04/24	Preliminary

DWG No. CRM102011-ENZ-XX-XX-DR-G-0002.2 **Revision** P01

Bristol 01454 269 237
Cardiff 02920 023 700
Manchester 0161 413 6444
Cambridge 01799 542 473
Sheffield 0114 321 5151
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KEY:

- Site Boundary
- Trial Trench (TT)
- 12-Inch Water Main
- 6-Inch Water Main
- 50mm Abandoned Rising Main

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Rev	Date	Description	DRA	CHK	APP
P01	10.06.24	Issued for comment / approval	LW	MW	MW

Project
Sandridge Common, Melksham 2024

Client
Bloor Homes Southern

Drawing Title
Proposed Trial Trench Location Plan - Sheet 2 of 2

Scale	Date	Status
1:1000@A3	23/04/24	Preliminary

DWG No. CRM102011-ENZ-XX-XX-DR-G-0002.3 **Revision** P01

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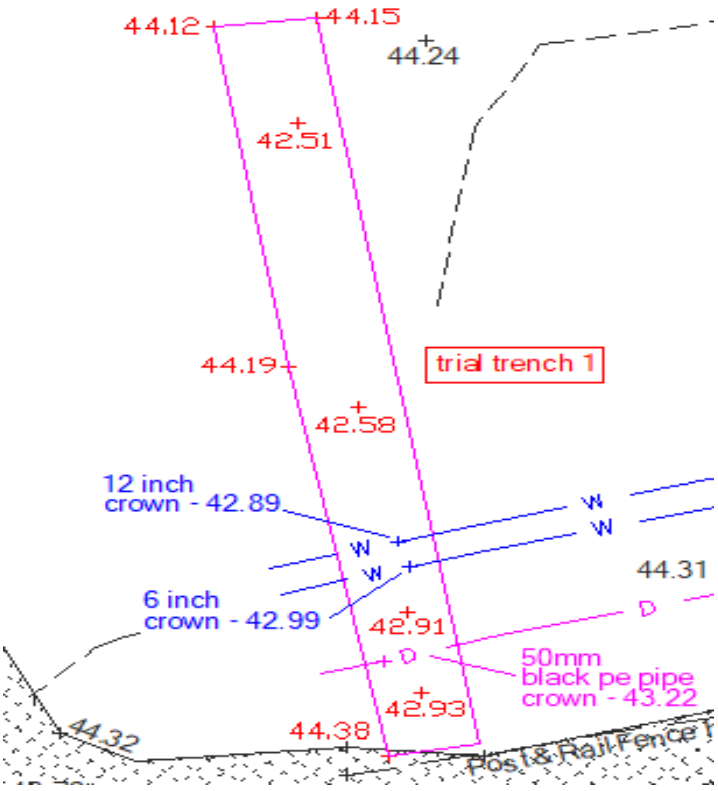
enzygo
@enzygo
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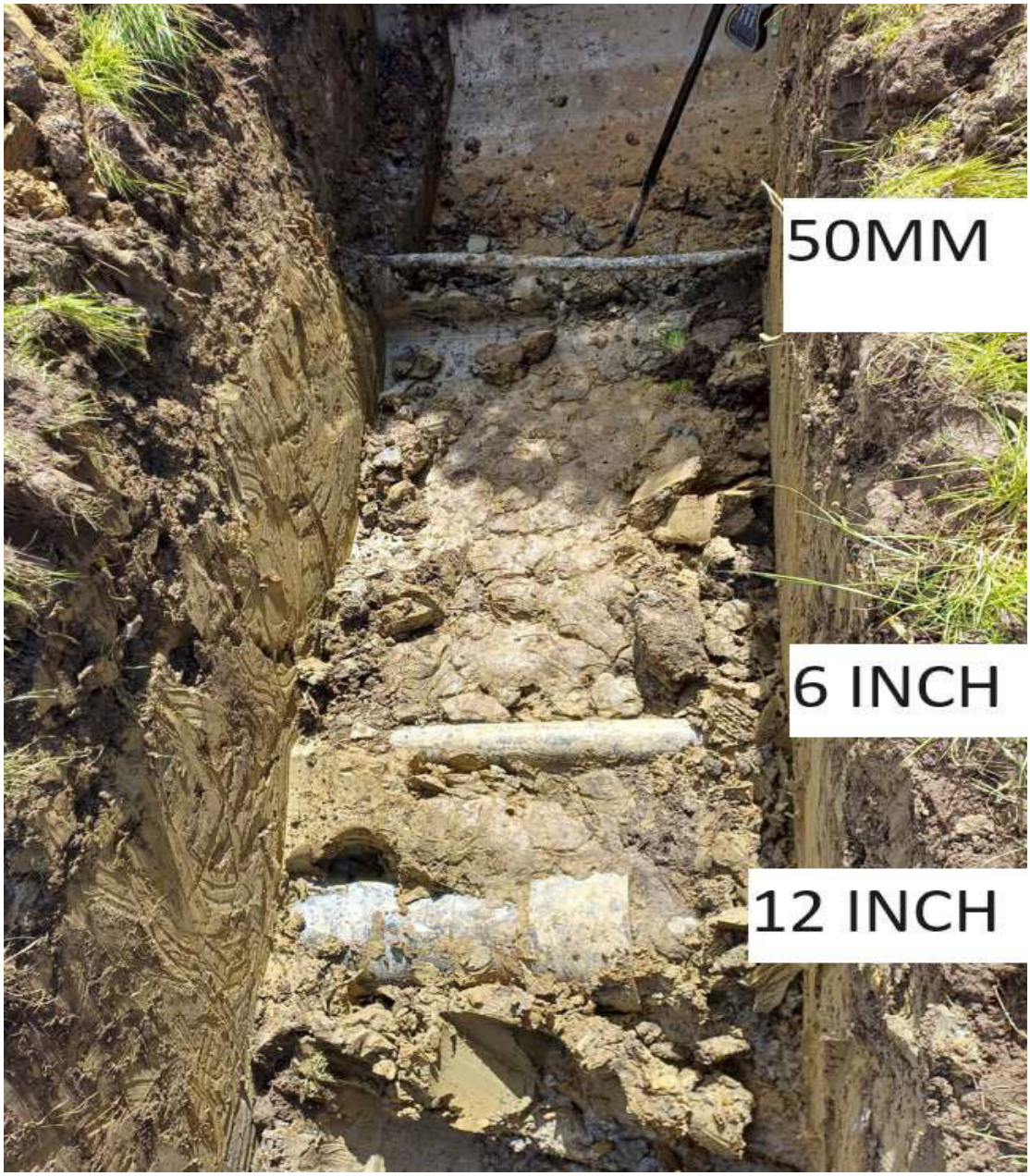
Safe Dig Surveys

subsurface utility mapping

Service Verification Dig Card

Job Number:	1594	**Site Name:**	MELKSHAM	
Trial Hole Number:	TRIAL TRENCH 1	**Date/Time/Surveyor:**	2.4.23	ADAM HUDSON
DETAIL	**Size/Material:**	**Colour:**	**Type:**	
Water main	12 INCH	BLACK	WATER	
Water main	6 INCH	BLACK	WATER	
Water main	50MM PE	BLACK	FOUL PUMP MAIN	
DETAIL	**X**	**Y**	**Z- pipe crown**	**Average Ground Level**
12 INCH	391854.2584	164244.249	42.89	44.19
6 INCH	391854.4298	164243.775	42.99	
50MM	391854.05	164241.97	43.22	



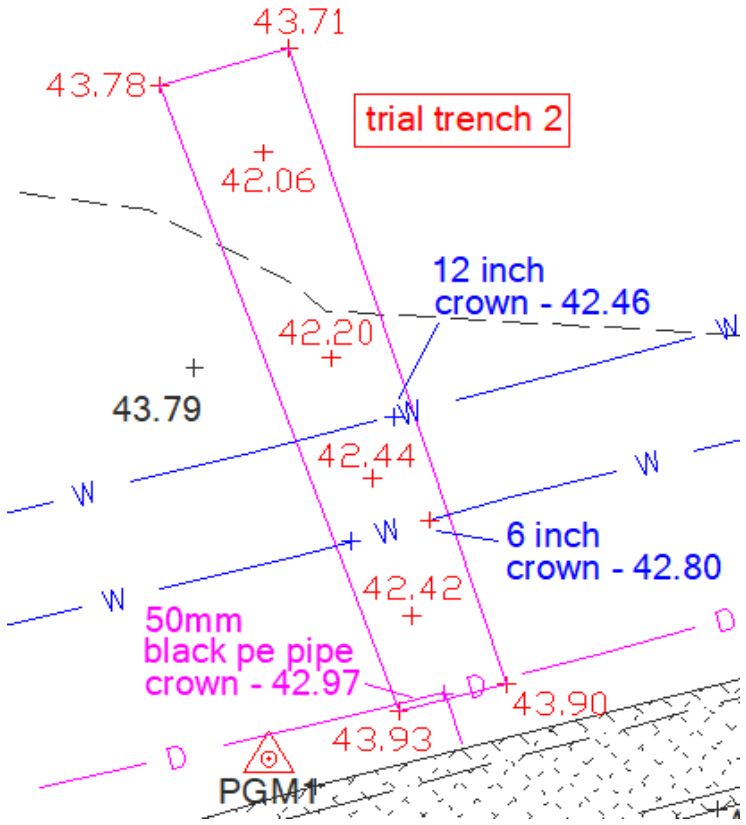

50MM
6 INCH
12 INCH

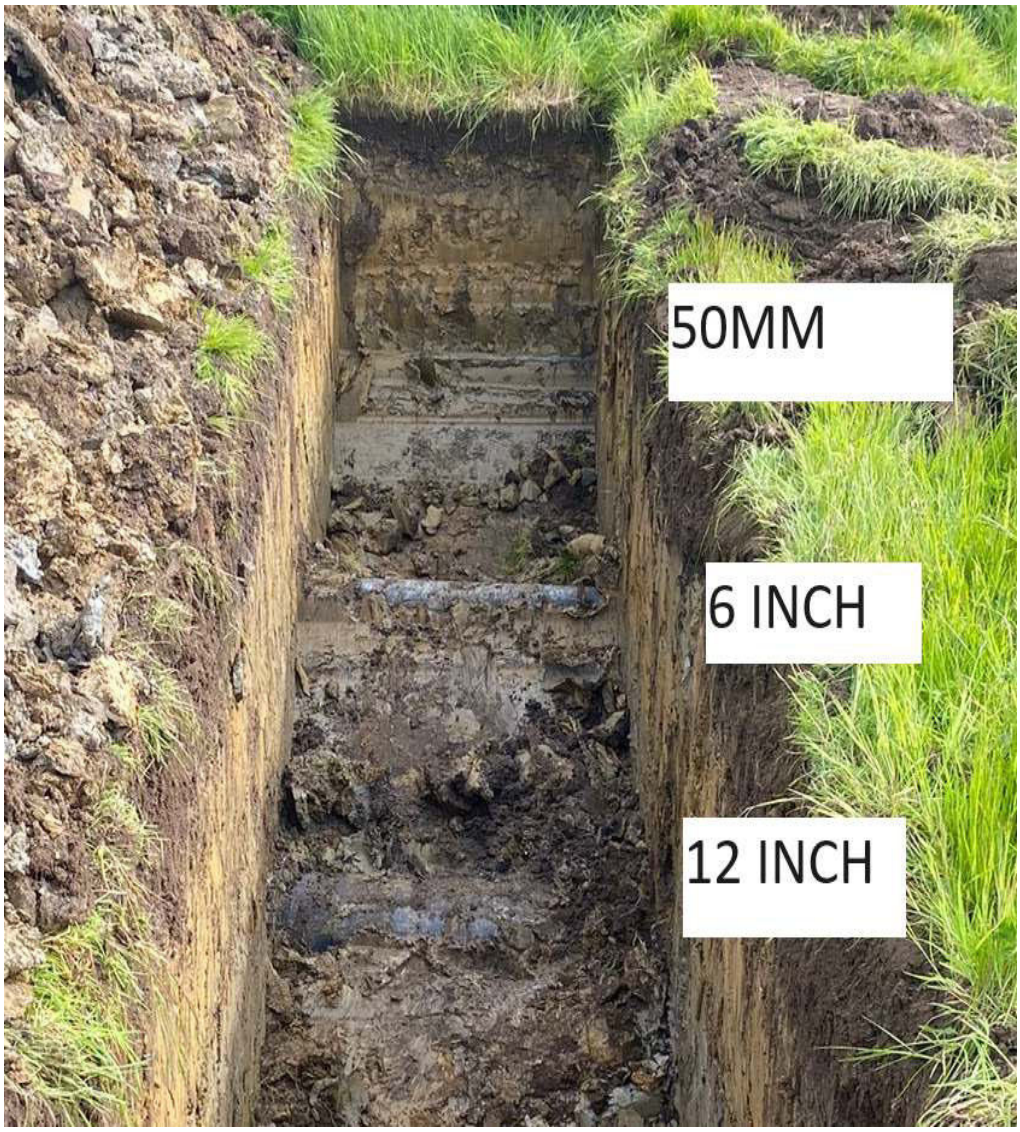
Safe Dig Surveys

subsurface utility mapping

Service Verification Dig Card

Job Number:	1594	Site Name:	MELKSHAM	
Trial Hole Number:	TRIAL TRENCH 2	Date/Time/Surveyor:	2.4.23	ADAM HUDSON
DETAIL	Size/Material:	Colour:	Type:	
Water main	12 INCH	BLACK	WATER	
Water main	6 INCH	BLACK	WATER	
Water main	50MM PE	BLACK	FOUL PUMP MAIN	
DETAIL	X	Y	Z- pipe crown	Average Ground Level
12 INCH	391927.36	164263.43	42.46	44.19
6 INCH	391926.85	164261.9	42.8	
50MM	391927.94	164260.03	42.97	



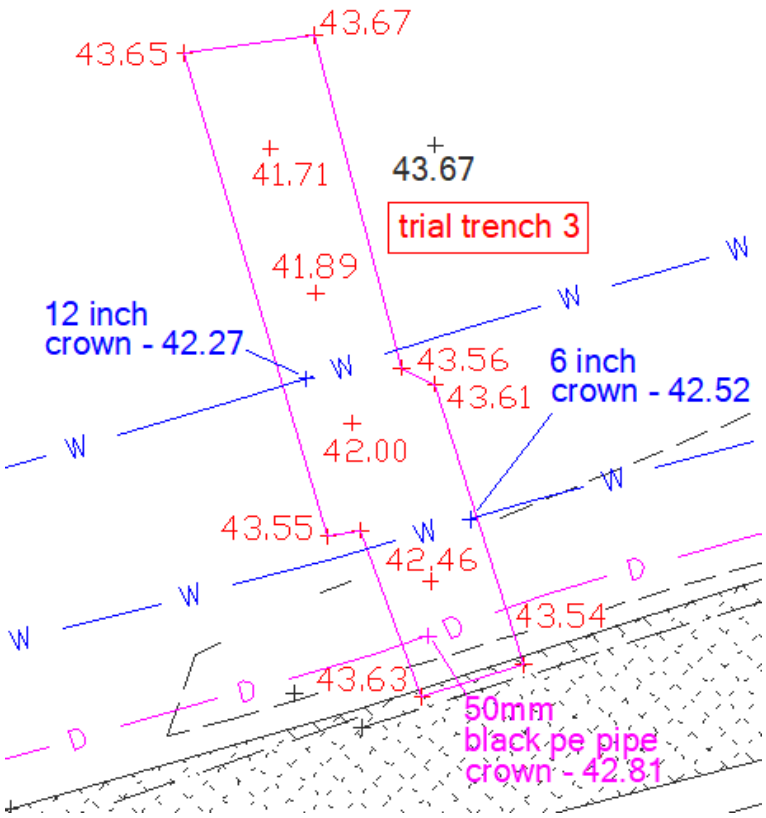

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12 INCH

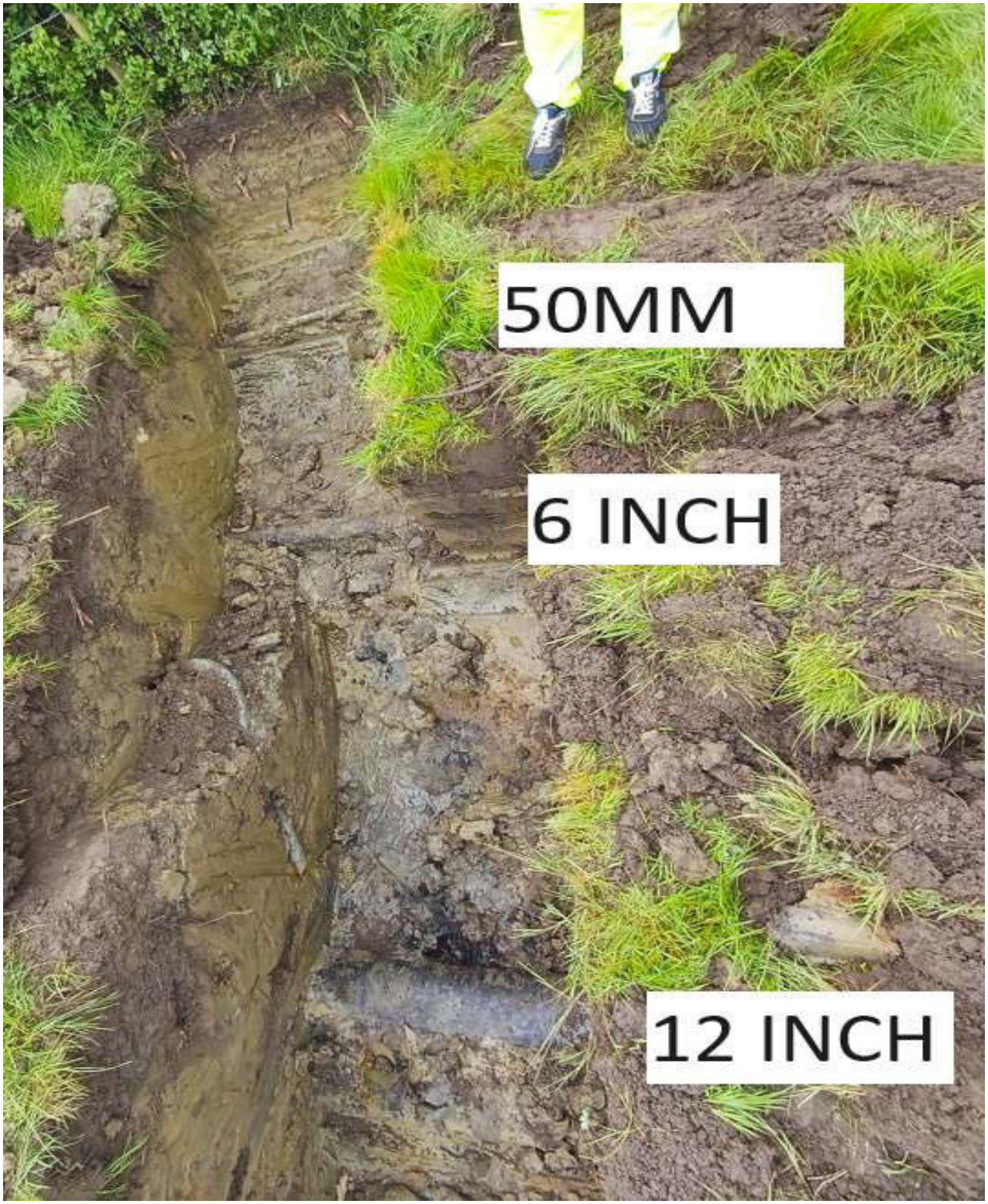
Safe Dig Surveys

subsurface utility mapping

Service Verification Dig Card

Job Number:	1594	Site Name:	MELKSHAM	
Trial Hole Number:	TRIAL TRENCH 3	Date/Time/Surveyor:	2.4.23	ADAM HUDSON
DETAIL	Size/Material:	Colour:	Type:	
Water main	12 INCH	BLACK	WATER	
Water main	6 INCH	BLACK	WATER	
Water main	50MM PE	BLACK	FOUL PUMP MAIN	
DETAIL	X	Y	Z- pipe crown	Average Ground Level
12 INCH	391961.9277	164273.5071	42.27	43.56
6 INCH	391963.9996	164271.7029	42.52	43.55
50MM	391963.47	164270.2	42.81	43.54



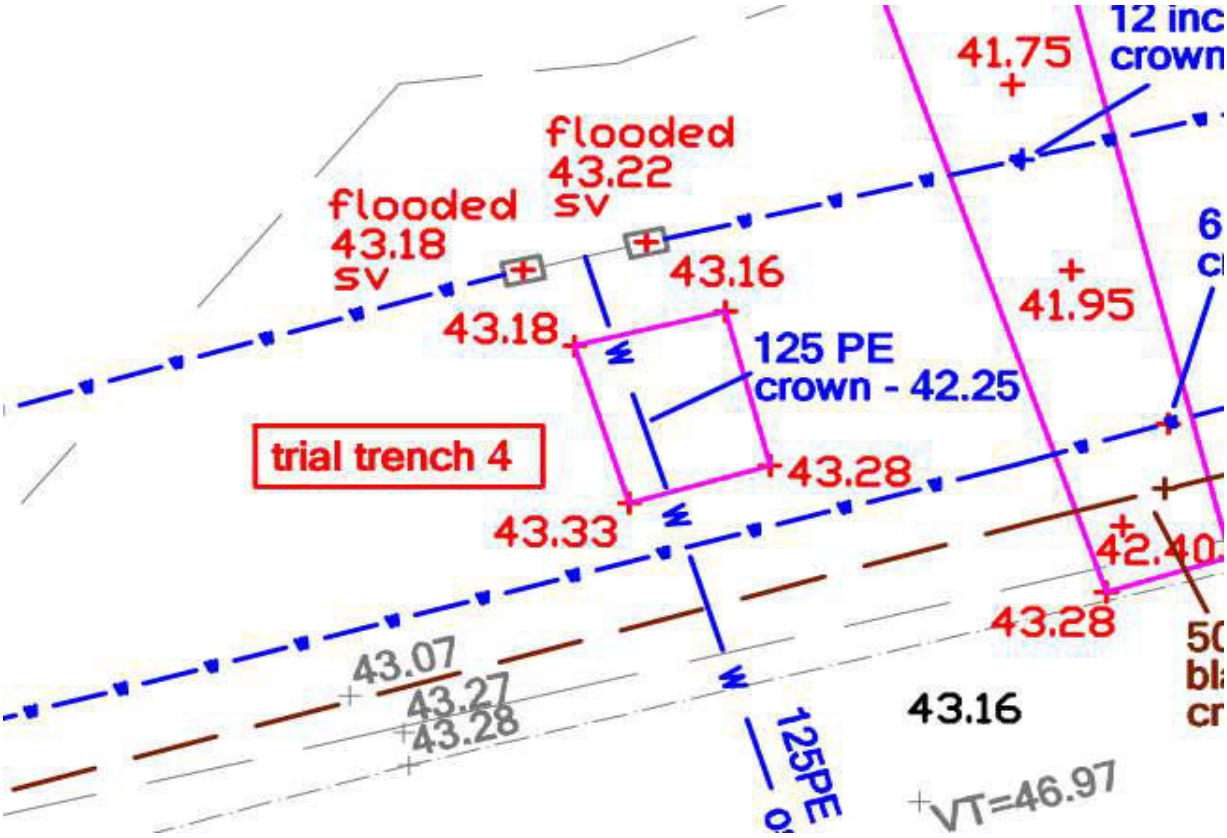

50MM
6 INCH
12 INCH

Safe Dig Surveys

subsurface utility mapping

Service Verification Dig Card

Job Number:	1594	Site Name:	MELKSHAM	
Trial Hole Number:	TRIAL TRENCH 4	Date/Time/Surveyor:	23.05.24	Michael Rowe
DETAIL	Size/Material:	Colour:	Type:	
Water main	125/PE	BLUE	WATER	
DETAIL	X	Y	Z- pipe crown	Average Ground Level
12 INCH	392006.437	164284.652	42.25	43.33



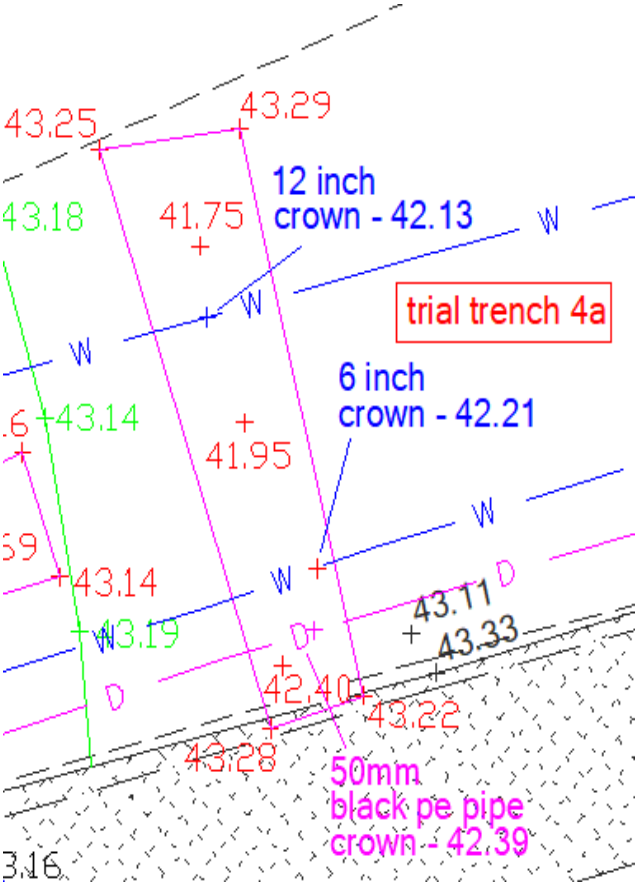

TD4

Safe Dig Surveys

subsurface utility mapping

Service Verification Dig Card

Job Number:	1594	**Site Name:**	MELKSHAM	
Trial Hole Number:	TRIAL TRENCH 4A	**Date/Time/Surveyor:**	2.4.23	ADAM HUDSON
DETAIL	**Size/Material:**	**Colour:**	**Type:**	
Water main	12 INCH	BLACK	WATER	
Water main	6 INCH	BLACK	WATER	
Water main	50MM PE	BLACK	FOUL PUMP MAIN	
DETAIL	**X**	**Y**	**Z- pipe crown**	**Average Ground Level**
12 INCH	392009.9887	164287.5791	42.13	43.29
6 INCH	392011.38	164284.82	42.21	43.22
50MM	392011.3411	164284.1426	42.39	43.22



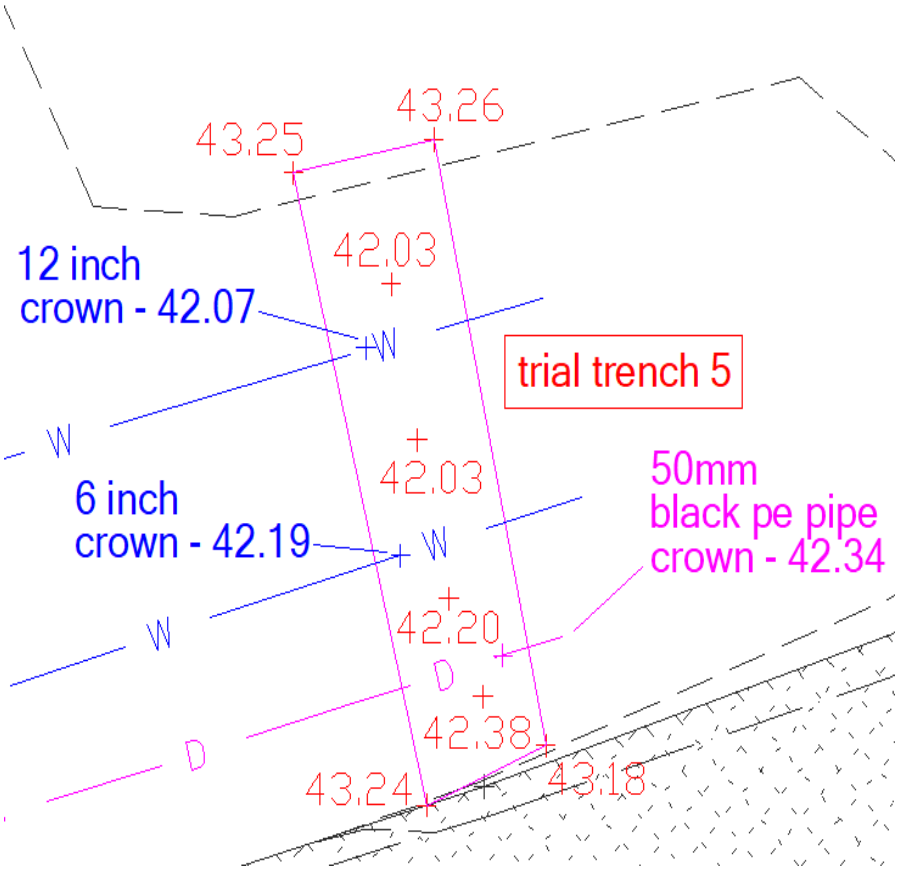

12 INCH
6 INCH
50MM

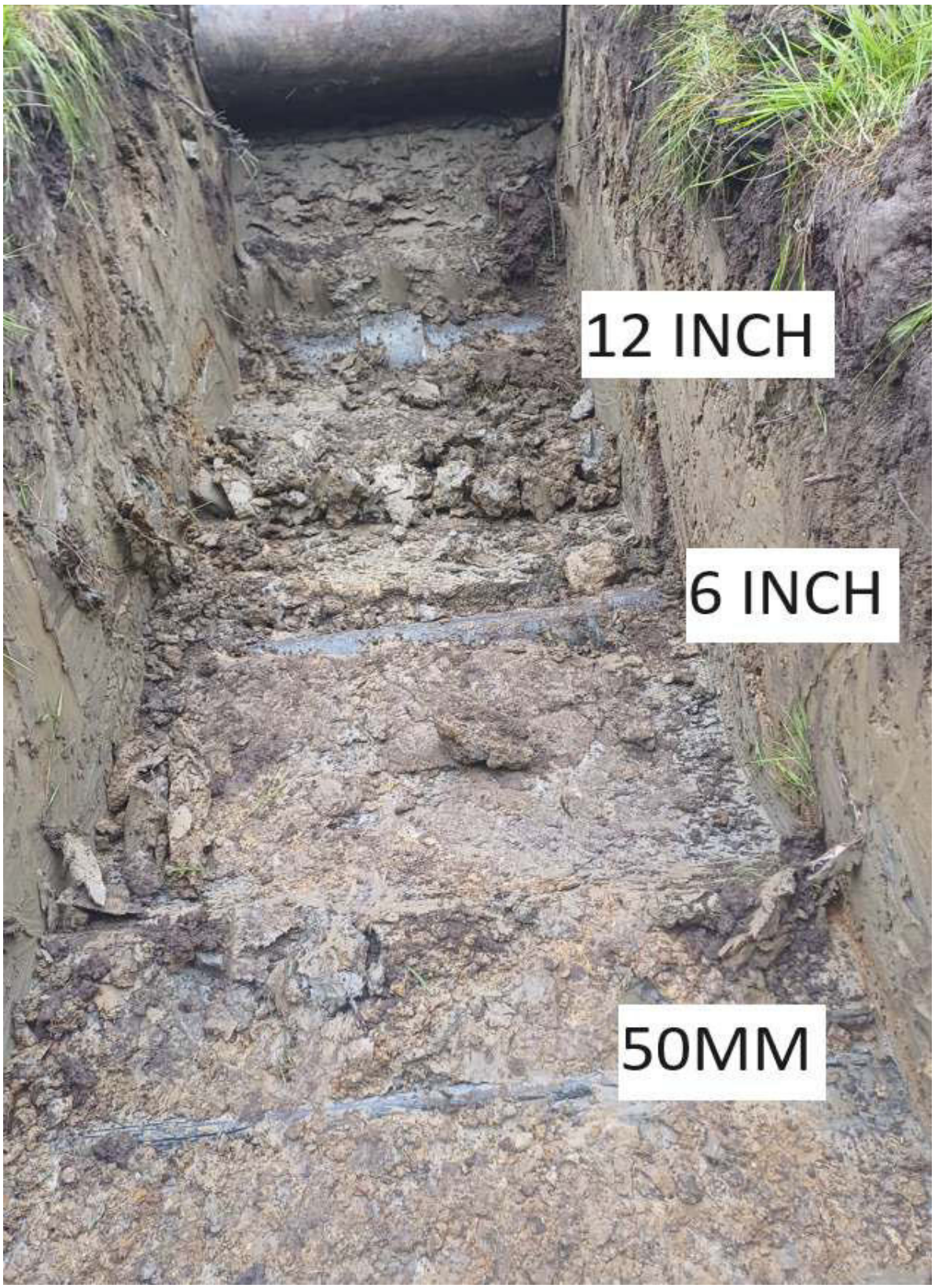
Safe Dig Surveys

subsurface utility mapping

Service Verification Dig Card

Job Number:	1594	Site Name:	MELKSHAM	
Trial Hole Number:	TRIAL TRENCH 5	Date/Time/Surveyor:	2.4.23	ADAM HUDSON
DETAIL	Size/Material:	Colour:	Type:	
Water main	12 INCH	BLACK	WATER	
Water main	6 INCH	BLACK	WATER	
Water main	50MM PE	BLACK	FOUL PUMP MAIN	
DETAIL	X	Y	Z- pipe crown	Average Ground Level
12 INCH	392047.6906	164296.7954	42.07	43.26
6 INCH	392048.22	164295.03	42.19	43.2
50MM	392049.3188	164294.1489	42.34	43.18



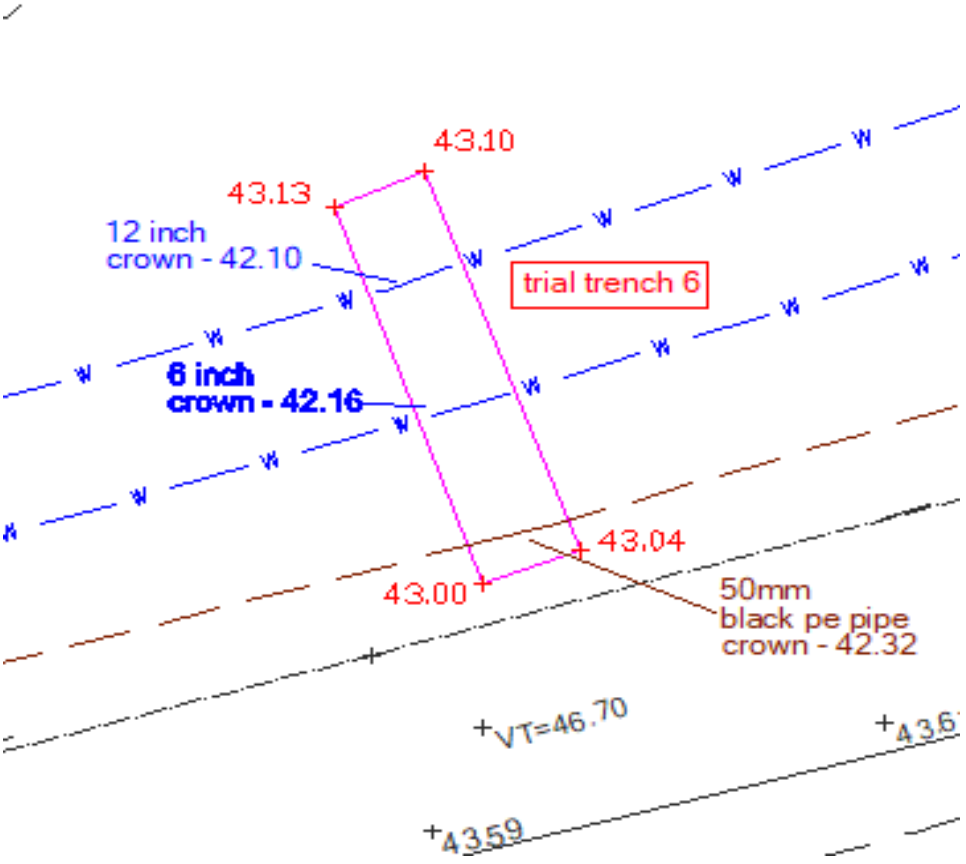

12 INCH
6 INCH
50MM

Safe Dig Surveys

subsurface utility mapping

Service Verification Dig Card

Job Number:	1594	Site Name:	MELKSHAM	
Trial Hole Number:	TRIAL TRENCH 6	Date/Time/Surveyor:	21.05.24	Michael Rowe
DETAIL	Size/Material:	Colour:	Type:	
Water main	12"	BLACK	WATER	
Water main	6"	BLACK	WATER	
Rising Main	50MM PE	BLACK	FOUL PUMP MAIN	Abandoned
DETAIL	X	Y	Z- pipe crown	Average Ground Level
12 INCH	392080.94	164306.98	42.1	43.13
6 INCH	392081.615	164305.17	42.16	43.13
50MM	392082.24	164303.335	42.32	43



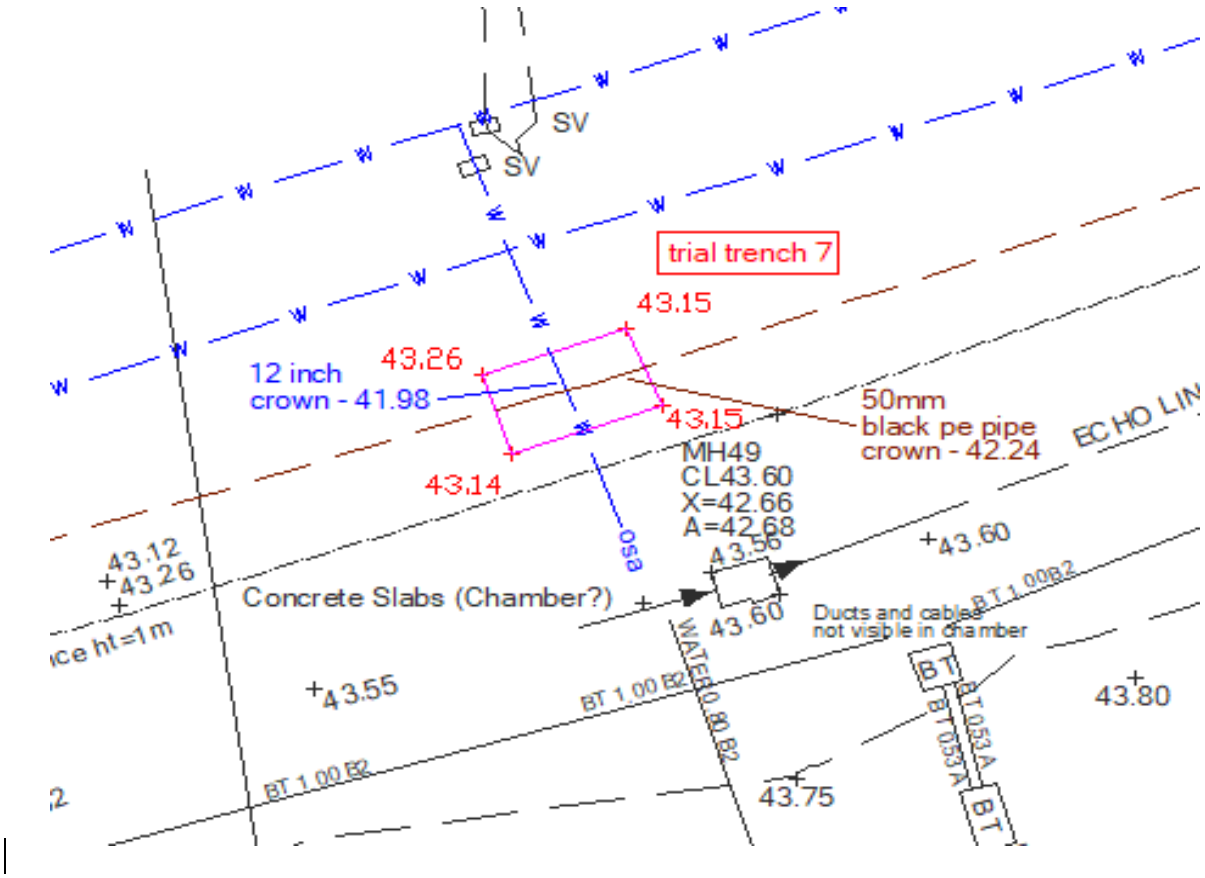

TT05

Safe Dig Surveys

subsurface utility mapping

Service Verification Dig Card

Job Number:	1594	**Site Name:**	MELKSHAM	
Trial Hole Number:	TRIAL TRENCH 7	**Date/Time/Surveyor:**	21.05.24	Michael Rowe
DETAIL	**Size/Material:**	**Colour:**	**Type:**	
Water main	12" PE	BLUE	WATER	
Rising Main	50MM PE	BLACK	FOUL PUMP MAIN	Abandoned
DETAIL	**X**	**Y**	**Z- pipe crown**	**Average Ground Level**
12 INCH	392106.38	164311.185	41.98	43.26
50MM	392106.545	164311.126	42.24	43.15



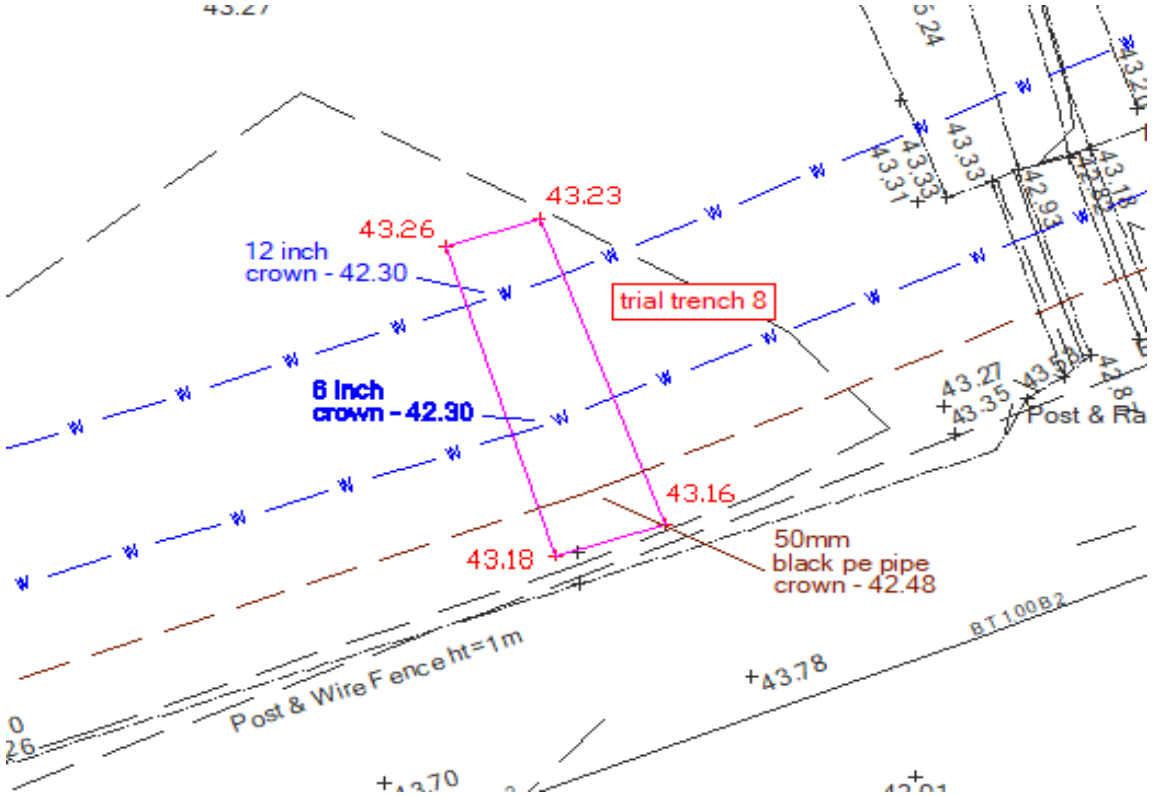


Safe Dig Surveys

subsurface utility mapping

Service Verification Dig Card

Job Number:	1594	**Site Name:**	MELKSHAM	
Trial Hole Number:	TRIAL TRENCH 8	**Date/Time/Surveyor:**	22.05.24	Michael Rowe
DETAIL	**Size/Material:**	**Colour:**	**Type:**	
Water main	12"	BLACK	WATER	
Water main	6"	BLACK	WATER	
Rising Main	50MM PE	BLACK	FOUL PUMP MAIN	Abandoned
DETAIL	**X**	**Y**	**Z- pipe crown**	**Average Ground Level**
12 INCH	392154.436	164332.334	42.3	43.26
6 INCH	392155.206	164330.166	42.3	43.16
50MM	392155.351	164328.748	42.48	43.16



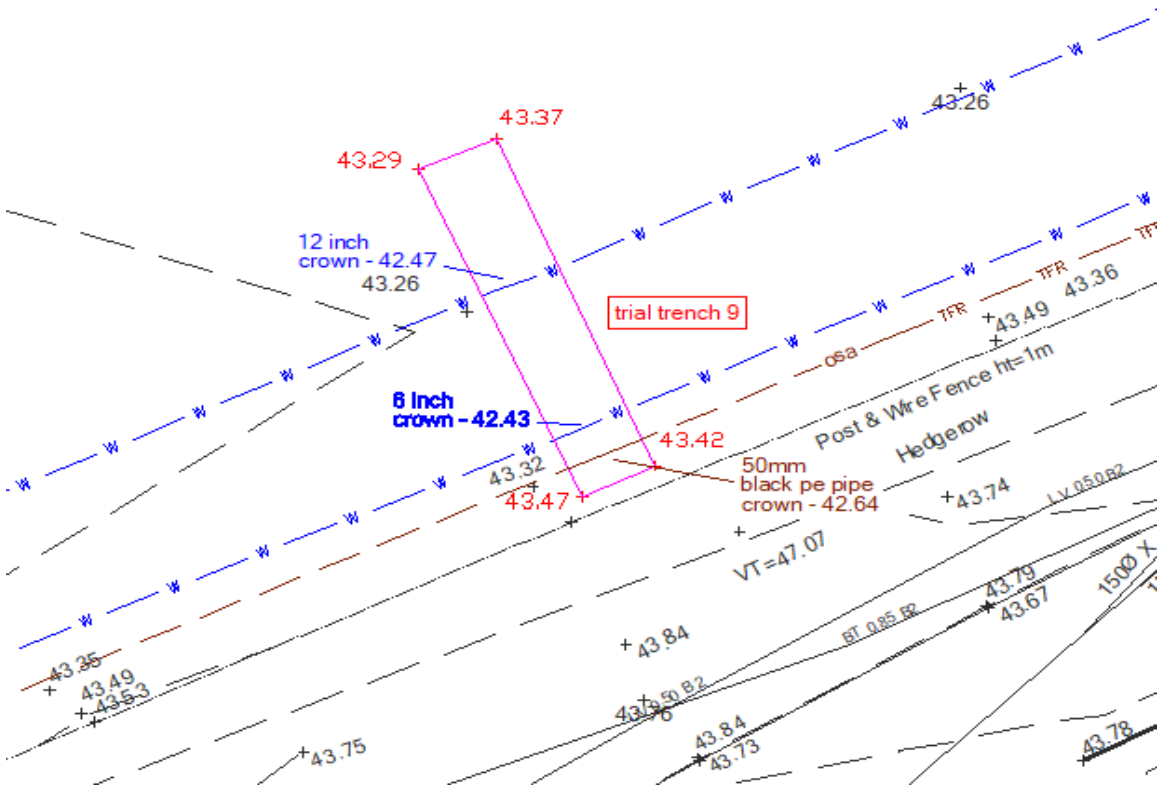

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Safe Dig Surveys

subsurface utility mapping

Service Verification Dig Card

Job Number:	1594	**Site Name:**	MELKSHAM	
Trial Hole Number:	TRIAL TRENCH 9	**Date/Time/Surveyor:**	22.05.24	Michael Rowe
DETAIL	**Size/Material:**	**Colour:**	**Type:**	
Water main	12"	BLACK	WATER	
Water main	6"	BLACK	WATER	
Rising Main	50MM PE	BLACK	FOUL PUMP MAIN	Abandoned
DETAIL	**X**	**Y**	**Z- pipe crown**	**Average Ground Level**
12 INCH	392195.566	164351.055	42.47	43.29
6 INCH	392196.886	164348.155	42.43	43.16
50MM	392155.351	164328.748	42.48	43.44



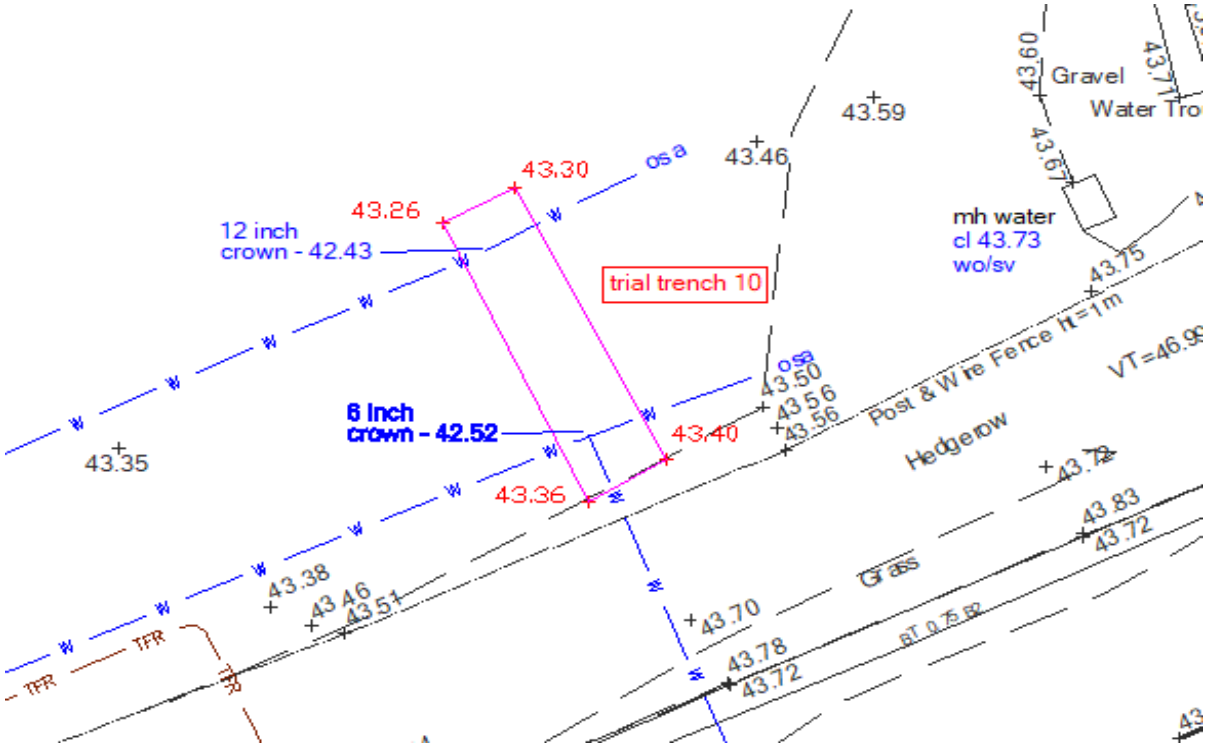


Safe Dig Surveys

subsurface utility mapping

Service Verification Dig Card

Job Number:	1594	Site Name:	MELKSHAM	
Trial Hole Number:	TRIAL TRENCH 4	Date/Time/Surveyor:	23.05.24	Michael Rowe
DETAIL	Size/Material:	Colour:	Type:	
Water main	12"	BLACK	WATER	
Water main	6"	BLACK	WATER	
DETAIL	X	Y	Z- pipe crown	Average Ground Level
12 INCH	392238.692	164371.233	42.47	42.43
6 INCH	492240.472	164367.746	42.52	43.38




12"

Appendix 9 – Modelling Reports

enzygo
environmental consultants



Hydraulic Modelling Report

New Farm, Melksham

Bloor Homes Limited

SHF.102.003.HY.R.004.C

'Experience and expertise working in union'

enzygo.com

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New Farm, Melksham

Project:	SHF.102.003.HY.R.004.C - Hydraulic Modelling Report
For:	Bloor Homes Limited
Status:	Issued
Date:	October 2025
Author:	Dani Lister BA (Hons), MA, GradCIWEM - Consultant Hydrologist
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Executive Summary

This report presents the process undertaken and the findings of a 1D2D ESTRY-TUFLOW hydraulic modelling study for the onsite and bounding watercourses based on 1m DTM LiDAR Data and detailed topographic survey. The model objective is to refine and establish associated baseline flood extents to inform the mitigation measures for the proposed development.

The model was run for a range of return periods to establish the baseline fluvial flood extents and parameters. Sensitivity analysis was carried out to understand the seasonal effects of vegetation, impact of increased flows on downstream boundary levels and blockage scenarios within the Site. An up-to-date climate change allowance of +26%, +39%, and +71% representing the Avon Bristol and North Somerset Streams Management Catchment (Central, Higher Central and Upper End Estimate [2070 - 2115]) has also been applied to the 100-year event.

A hydrological assessment, inclusive of a desk-based assessment of catchment descriptors, was undertaken, which considered recognised methodologies such as ReFH2, to provide hydrological inputs, in the form of hydrographs for use in the hydraulic model. The hydrological assessment determined that peak flows and hydrographs from the ReFH2 method (plot scale calculations) were most appropriate for the contributing catchment.

The model results show that all return events exceed the banks of the Watercourse 1 channel as well as Watercourse 2, Ditches D, E, H, F and G. Flows remain in channel for Ditch C.

The model extent displays minimal sensitivity to Manning's roughness changes, with minimal changes to flood outlines shown when blockages are simulated within the model domain. Changes are as expected and result in minor changes to flood extents with no significant changes to flow pathways, i.e. the creation of new or removal of baseline pathways.

The exercise has demonstrated that the modelled flood extent, when compared to the Environment Agency online flood mapping varies due to the use of a detailed channel survey and up to date hydrological inputs.

1.0 Introduction

1.1 Background

1.1.1 Enzygo Ltd were commissioned by Bloor Homes Limited to undertake a hydraulic modelling exercise to determine, and refine, mapped flood extents associated with onsite and bounding watercourses. The study area is centred at NGR 391963, 164531 and is proposed to be a residential development.

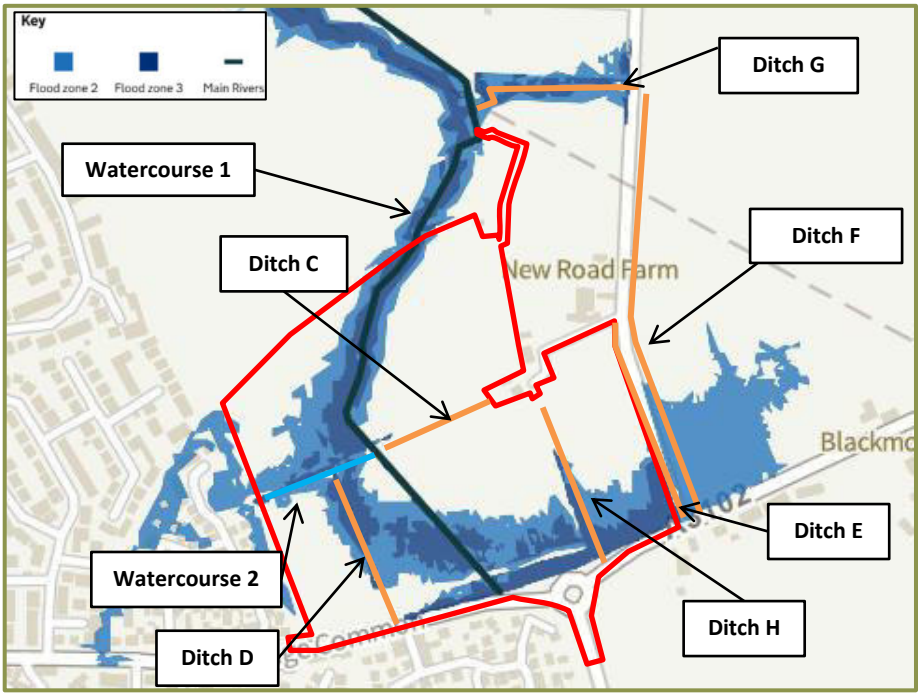
1.1.2 To aid the design of the proposed development, and assess modelled parameters against national flood risk guidance, a hydraulic modelling assessment was undertaken. This hydraulic modelling report has been prepared as a stand-alone report.

1.1.3 An initial desktop study identified multiple watercourses located inside the chosen model domain. The watercourses and their relation to the development Site is shown on Figure 1.1. The watercourse is detailed below:

- Watercourse 1 - Located in the centre of the model domain; this watercourse flows from south to north through the centre of the proposed development Site.
- Watercourse 2 - Located in the western extent of the model domain; this watercourse flows from west to east through the centre of the proposed development and outfalls to Watercourse 1.
- Ditch C - Located in the mid-eastern extent of the model domain; this watercourse flows from east to west through the mid-eastern extent of the proposed development and outfalls to Watercourse 1.
- Ditch D - Located in the southwestern extents of the model domain; this watercourse flows from south to north through the southwestern extent of the proposed development and outfalls to Watercourse 2.
- Ditch E - Located in the eastern extent of the model domain; this watercourse flows from south to north just east of the proposed development.
- Land Drain 1 - Located in the eastern extent of the model domain; this watercourse flows from south to north just east of the proposed development.
- Ditch G - Located in the northeastern extent of the model domain; this watercourse flows from east to west northeast of the proposed development and outfalls to the downstream extents of Watercourse 1.
- Ditch H - Located in the mid-eastern extent of the model domain; this watercourse flows from south to north along the eastern boundary of the proposed development.

1.1.4 Environment Agency Flood Map for Planning was updated during March 2025 (Figure 1.1) and shows the Site is in Flood Zone 1, 2 and 3 (low - high risk). Even though Watercourse 1 is shown to be a 'main river', the influence catchment is ≤3km^2 and as such, is not covered by the Environment Agency's nationalised flood mapping.

Figure 1.1: Environment Agency Flood Map for Planning Map (October 2025)



Contains Environment Agency information © Environment Agency and database right [2025].

1.2 Purpose

1.2.1 The purpose of this hydraulic modelling exercise is to refine and confirm the flood outlines associated with onsite and bounding watercourses, which will be used to inform the proposed layout and mitigation measures for the development. This report will:

- Present the methodologies to build/run the baseline hydraulic model.
- Report the results in tabular and mapping format.
- Seek to address the Environment Agency comments dates 29th May 2025 (REF: WX/2024/138581/03-L01).

1.3 Scope

1.3.1 The scope of works includes the following:

- Undertake a hydrological assessment to produce peak flows, which will be used as input boundaries within the new model (detailed within Section 2).
- Build a 1D2D linked model using a detailed topographical survey and new hydrological peak flows to provide baseline flood outlines in order to refine existing mapped flood extents and also allow the modelling of proposed flood risk mitigation measures to inform a development masterplan of the Site.

2.0 Baseline Model Methodology

2.1 Introduction

2.1.1 Hydraulic modelling is used to convert the hydrological modelling outputs (peak flows) into flow and water levels within a watercourse and its associated floodplain areas.

2.1.2 A 1D2D linked hydraulic model of the onsite and bounding watercourses were constructed by Enzygo Ltd during November and December 2023 and further updated in October 2025, utilising ESTRY-TUFLOW modelling software (Version 2025.0.0-iSP-w64).

2.1.3 The model files and a modelling log, which includes a model file schedule (list of all files used in the modelling), are included in Appendix 1.

2.2 Model Extent

2.2.1 A detailed topographic survey of the Site was undertaken during June 2023. KeyTERRA-FIRMA (KTF) software was utilised to understand and map cross sections and in-channel structures for the below extents:

- Watercourse 1 - 800m survey reach length.
  - From the northern edge of Sandridge Common (NGR) 392061, 164297 to 800m downstream of Sandridge Common (NGR) 391900, 164933.
- Watercourse 2 - 100m survey reach length.
  - From 100m east of Gladstone Road (NGR) 391798, 164391 to 100m downstream of Gladstone Road (NGR) 391918, 164453.
- Ditch C - 130m survey reach length.
  - From 160m west of New Road (NGR) 392040, 164511 to the centre of Watercourse 1 at (NGR) 391925, 164456.
- Ditch D - 180m survey reach length.
  - From the northern edge of Sandridge Common (NGR) 391943, 164265 to the centre of Watercourse 2 (NGR) 391887, 164436.
- Ditch E - 220m survey reach length.
  - At the intersection of New Road and Sandridge Common (NGR) 392255, 164373 to the southeastern corner of New Farm (NGR) 392188, 164585.
- Land Drain 1 - 500m survey reach length.
  - From the eastern side of New Road (NGR) 392264, 164377 to 500m downstream of Sandridge Common (NGR) 392213, 164847.
- Ditch G - 200m survey reach length.
  - From the northern extents of New Road (NGR) 392194, 164846 to the northerly extents of Watercourse 1 (NGR) 392028, 164826.
- Ditch H - 180m survey reach length.
  - From 100m north of Sandridge Common (NGR) 392163, 164335 to 100m west of New road (NGR) 392102, 164500.

2.2.2 A copy of the detailed topographic survey is included in Appendix 2. Inflows for Watercourses 1 and 2 and Ditch F are represented by a 1D flow input within the model.

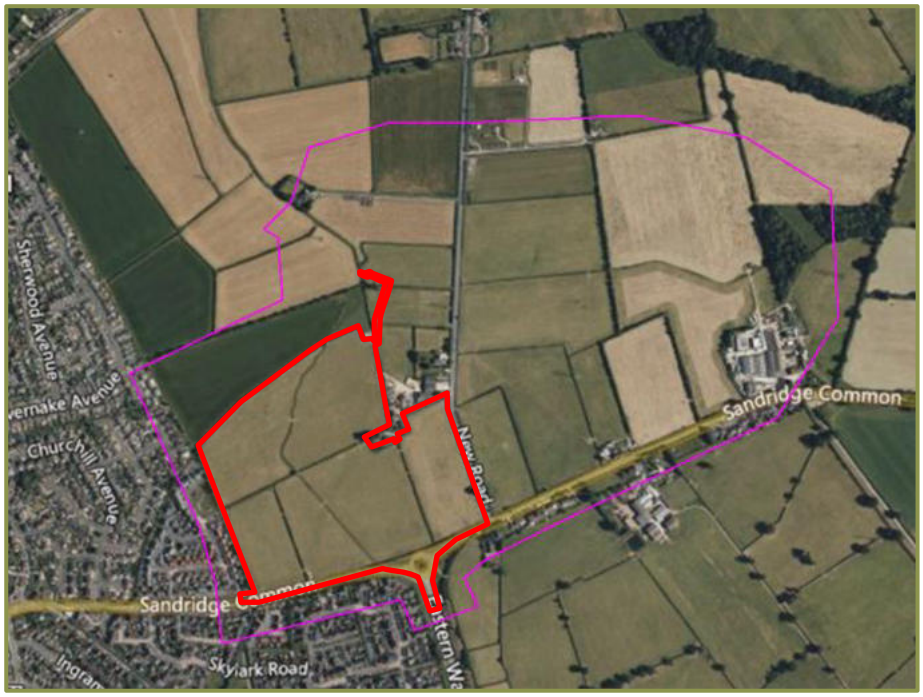
2.2.3 The overall model extent is from (NGR) 392851, 164944 to 391793, 164161. This encompasses a total reach of 800m for Watercourse 1 and all other watercourses within the full model domain. The majority of the model reach is covered by the topographic survey, except for the final 200m of the downstream extents of Watercourse 1 and Ditch G. Cross-sections for the model were generated from the topographical survey using KTF software for all cross-sections of the associated watercourses. The aforementioned downstream sections of Watercourse 1 and Ditch G were obtained from 1m DTM LiDAR.

2.2.4 Scrutiny of aerial imagery in Google Earth Pro software for the period of 2002 to 2023 confirms that the watercourse has not spatially changed, indicating a stable channel network.

2.2.5 The detailed topographical survey includes 11 in-channel structures and described the type, size (diameter, width, height, length), invert and soffit level. These details are outlined in Section 2 of this report. Images of the watercourses and associated structures are included in Table 2.1.

2.2.6 A summary of the Site boundary, modelled extent, and survey extent is included in Figure 2.1.

Figure 2.1: Model Extent



***Pink**: Model extent **Red**: Site boundary*

2.3 Cross-Sections

2.3.1 Cross-sections were obtained across the watercourses within the model domain at ~25m intervals, as well as upstream and downstream of in-channel structures. Where additional cross-sections were required, this was obtained from 1m DTM LiDAR data.

2.3.2 A total of 105 cross-sections were obtained of the onsite and bounding watercourses throughout the model. 38 of these cross-sections were for Watercourse 1, 6 for Watercourse 2, and 21 for Land Drain 1. 7 cross-sections were taken for Ditch C, 9 were taken for Ditch D, 11 for Ditch E, 6 for Ditch G, and 7 for Ditch H.

2.3.3 Of the 105 cross sections used within the model, 20 are representative of the upstream and downstream faces of structures.

Figure 2.2: Location of Modelled Cross-Sections



Blue: *Open channel*

2.3.4 All cross-sections have been trimmed (between right and left bank top) to include only in-channel data representative of the in-channel 1D domain.

2.3.5 Modelled left and right bank levels and locations were based on the cross-section survey data obtained from the detailed topographic survey of the Site and watercourses.

2.3.6 All cross-sections have been modelled looking downstream (left bank to right bank).

2.3.7 All cross-sections have been modelled through layer '1d_xs_MEL_001' which links to associated cross-section csv files. The .csv files also contain varying 1D Manning's 'n' roughness values linking to .tmf file 'MEL_001.tmf' through an 'M' flag attribute.

2.4 Structures

2.4.1 The survey picked up 11 in-channel structures along the extent of the surveyed watercourse.

2.4.2 Identified structures comprise bridges and circular culverts the details of which are summarised in Table 2.1.

Table 2.1: In-channel Structure Photos and Descriptions

Structure 1 (WC01_007 – Circular Culvert)
 *Looking downstream to the upstream face of Structure 1* • Modelled as a 'C' (Circular culvert modelled in the 2D domain) • Losses: as per TUFLOW manual • Opening Dimensions: Ø150mm • u/s invert: 42.45mAOD (informed from topographic survey) • d/s invert: 42.44mAOD (informed from topographic survey) • Length: 4.83m • Manning's: 0.012 (representative of concrete).
Structure 2 (WC01_016 – Circular Culvert)
 *Looking stream to the downstream face of Structure 2* • Modelled as a 'C' (Circular culvert modelled in the 2D domain)) • Opening Dimensions: 1.43m width • u/s invert: 92.78mAOD (informed from bounding cross sections) • d/s invert: 92mAOD (informed from bounding cross sections) • Weir calibration factor – default of 1.0

Structure 3 (WC01_025 – Circular Culvert)
• Modelled as a 'C' (Circular Culvert modelled in the 2D domain) • Losses: as per TUFLOW manual • Opening Dimensions: Ø300mm • u/s invert: 41.44mAOD (informed from topographic survey) • d/s invert: 41.28mAOD (informed from topographic survey) • Length: 7.33m • Manning's: 0.012 (representative of concrete).
Structure 4 (WC_C_002 – Circular Culvert)
• Modelled as a 'C' (Circular Culvert modelled in the 2D domain) • Losses: as per TUFLOW manual • Opening Dimensions: Ø150mm • u/s invert: 41.66mAOD (informed from topographic survey) • d/s invert: 41.61mAOD (informed from topographic survey) • Length: 4.71m • Manning's: 0.012 (representative of concrete).
Structure 5 (WC_C_005 – Circular Culvert)
• Modelled as a 'C' (Circular Culvert modelled in the 2D domain) • Losses: as per TUFLOW manual • Opening Dimensions: Ø300mm • u/s invert: 43.09mAOD (informed from topographic survey) • d/s invert: 43.02mAOD (informed from topographic survey) • Length: 6.56m • Manning's: 0.012 (representative of concrete)
Structure 6 (WC_D_002 – Circular Culvert)
• Modelled as a 'C' (Circular Culvert modelled in the 2D domain) • Losses: as per TUFLOW manual • Opening Dimensions: Ø300mm • u/s invert: 42.99mAOD (informed from topographic survey) • d/s invert: 42.92mAOD (informed from topographic survey)

- Length: 4.92m
- Manning's: 0.012 (representative of concrete)

Structure 7 (WC_D_006 – Circular Culvert)

- Modelled as a 'C' (Circular Culvert modelled in the 2D domain)
- Losses: as per TUFLOW manual
- Opening Dimensions: Ø300mm
- u/s invert: 42.41mAOD (informed from topographic survey)
- d/s invert: 42.41mAOD (informed from topographic survey)
- Length: 6.134m
- Manning's: 0.012 (representative of concrete)

Structure 8 (WC_F_009 – Circular Culvert)

- Modelled as a 'C' (Circular Culvert modelled in the 2D domain)
- Losses: as per TUFLOW manual
- Opening Dimensions: Ø150mm
- u/s invert: 44mAOD (informed from topographic survey)
- d/s invert: 44mAOD (informed from topographic survey)
- Length: 5.95m
- Manning's: 0.012 (representative of concrete)

Structure 9 (Ditch_003 – Circular Culvert) along Ditch H

- Modelled as a 'C' (Circular Culvert modelled in the 2D domain)
- Losses: as per TUFLOW manual
- Opening Dimensions: Ø300mm
- u/s invert: 42.93mAOD (informed from topographic survey)
- d/s invert: 42.94mAOD (informed from topographic survey)
- Length: 6.22m
- Manning's: 0.012 (representative of concrete)

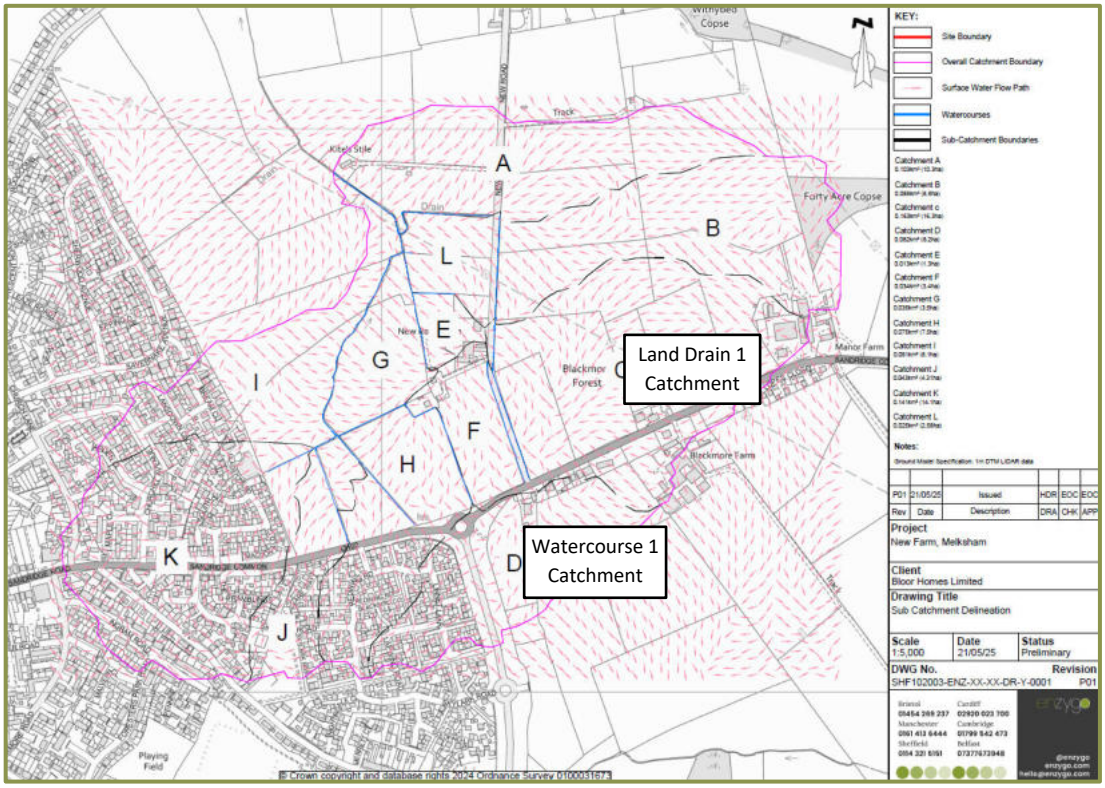
Structure 10 (Ditch_005 – Circular Culvert) along Ditch H
• Modelled as a 'C' (Circular Culvert modelled in the 2D domain) • Losses: as per TUFLOW manual • Opening Dimensions: Ø300mm • u/s invert: 43.31mAOD (informed from topographic survey) • d/s invert: 43.34mAOD (informed from topographic survey) • Length: 4.668m • Manning's: 0.012 (representative of concrete)
Structure 11 (Culvert_004 – Circular Culvert)
• Modelled as a 'C' (Circular Culvert modelled in the 2D domain) • Losses: as per TUFLOW manual • Opening Dimensions: Ø300mm • u/s invert: 42.59mAOD (informed from topographic survey) • d/s invert: 42.59mAOD (informed from topographic survey) • Length: 8.08m • Manning's: 0.012 (representative of concrete)

2.5 Hydrology Inflow Boundaries

2.5.1 The FEH Webservice was used to establish if catchments were available for Watercourses 1 and Land Drain 1; however, due to their nominal size none were available. As such, due to the lack of an available catchment for the modelled watercourse extent (Figure 2.3) this has been derived by using KTF software (using 1m DTM LiDAR). This is where analysis of available LiDAR data has been undertaken to generate watershed catchments. The watershed catchment and associated sub-catchments are shown in Figure 2.3.

2.5.2 During the Site walkover Watercourse 2 was observed to originate at the balancing pond from the adjacent development to the west of the Site. The balancing pond of the adjacent development has been sized to attenuate the 1 in 100-year storm event with discharge at the QBAR rate of 15.4l/s.

Figure 2.3: Catchment Delineation



2.6 Inflow Boundaries

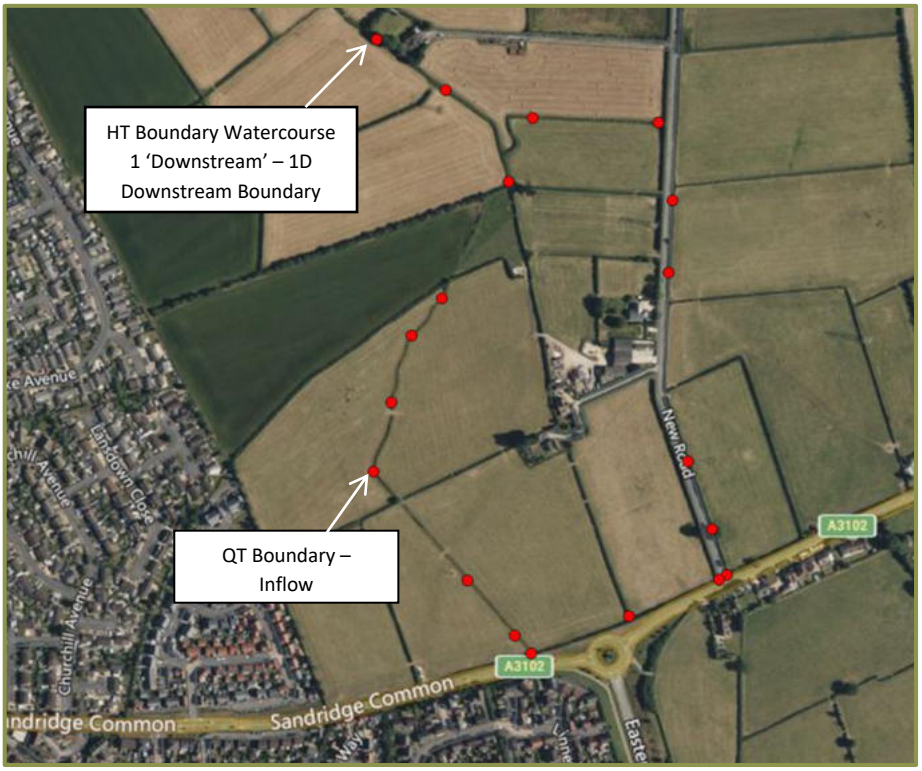
2.6.1 A detailed hydrological assessment was undertaken by Enzygo Ltd (Report Reference: SHF.102.003.HY.R.006.C) which can be viewed in Appendix 3.

2.6.2 A hydrological assessment was undertaken to derive peak flow inputs and hydrographs for multiple flow calculation locations on Watercourses 1 and 2, Ditch H, Ditch E, Ditch F, Ditch G (Figure 2.4).

2.6.3 The hydrograph for Catchment J (which accounts for the highway catchment) has been scaled based on the storm duration obtained from the ReFH2 outputs used for the wider catchment. The peak flow for the catchment has been derived based on the averaged highway inlet pipe size output size being the main point of construction (~Ø160mm).

2.6.4 Hydrological peak flows have been input into the model at multiple lumped locations, at the upstream extent of the 1D model domain using layer '1d_bc_MEL_FLOWS_101'. Flows have been input as 'QT' boundaries (Flow Time).

Figure 2.4: Peak Flow Calculation and Input Locations



Red Points: Various Inflow Locations

2.6.5 A climate change allowance of 26%, 39%, and 71% has been added to the 100-year flow estimate representing the 'Higher Central' and 'Upper End' estimate for the Total Potential Change for the 2080s (2070 to 2115) for the Avon Bristol and North Somerset Streams Management Catchment.

2.6.6 For the purpose of the modelling exercise the catchment has been split down into a number of sub catchments. This will be used to apply lumped inflows to the model domain. The entire flow for the catchment will be prorated for each sub catchment and then applied at the locations shown. Flows are detailed in Table 2.2 with a percentage split of each sub catchment detailed below.

- Catchment A – 11.70%
- Catchment B – 9.66%
- Catchment C – 18.52%
- Catchment D – 9.32%
- Catchment E – 1.48%
- Catchment F – 3.86%
- Catchment G – 3.98%
- Catchment H – 8.52%
- Catchment I – 9.20%
- Catchment J – 4.89%
- Catchment K – 16.02%
- Catchment L – 2.84%

2.6.7 In terms of Catchment K, this is ultimately served by a detention basin at the downstream extent of the catchment and released at a controlled rate into the catchment at Point K. Based on available planning documents an inflow of 0.0154m3/s has obtained and has been added to account for the discharge from the basin within the catchment. This flow replaces part of the original Catchment K flows i.e. the flows generated within Gladstone Road development (0.032km2).

2.6.8 Due to the limited size of the Gladstone Road development, it is proposed that the ReFH2 hydrograph for the wider catchment are scaled to the maximum discharge rate for the 1 in 100-year released at Gladstone Road development (QBAR ~ 15.4 l/s), as an approach of establishing the contribution from the development.

2.6.9 A summary of the peak flows for all return periods and catchments is included in Table 2.2.

Table 2.2: Sub-catchment Flows (m^3/s) – Amended

Return Period	A	B	C	D	E	F	G	H	I	J	K	L
30	0.18	0.15	0.28	0.14	0.02	0.06	0.06	0.13	0.14	0.07	0.18	0.06
100	0.23	0.19	0.37	0.18	0.03	0.08	0.08	0.17	0.18	0.10	0.25	0.06
1000	0.38	0.31	0.60	0.30	0.05	0.13	0.13	0.28	0.30	0.16	0.40	0.09
*100+26%CC	0.29	0.24	0.46	0.23	0.04	0.10	0.10	0.21	0.23	0.12	0.31	0.07
*100+39%CC	0.32	0.27	0.51	0.26	0.04	0.11	0.11	0.23	0.25	0.13	0.34	0.08
*100+71%CC	0.40	0.33	0.63	0.31	0.05	0.13	0.13	0.29	0.31	0.17	0.42	0.10

*Climate change Peak flow allowance for Avon Briston and North Streams Chilterns Management Catchment: Higher, Central, and Upper End (2070 – 2115)

2.7 Downstream Boundary

2.7.1 The downstream 1D boundary has been input via layer '2d_bc_MEL_BNDY_101', as a 'HT' (Level Time) boundary.

2.7.2 At the downstream model extent, a weir channel (DS_Weir) has been created with an upstream invert of 40.79mAOD (corresponding to XS_A33), downstream invert of 37.79mAOD and a Manning's roughness of 0.02. The weir channel conveys to the downstream HT boundary with a fixed water level of 39.79mAOD. Utilisation of a weir channel at the downstream extent of the 1D network is an efficient and stable method to allow in channel flow to exit the model. Any drawdown impacts as a result of critical depth are limited to the downstream extent of the model.

2.7.3 The use of a weir ensures that impacts of an arbitrary fixed water level do not impact upon modelled outlines or in channel levels.

2.7.4 As per the TUFLOW Classic/HPC User Manual (Boundaries and Initial Conditions - 8.1 Recommended BC Arrangements) the downstream boundary ('outflow') for a river/creek can be defined as a HT or HQ (stage discharge) boundary.

2.7.5 Additional 2D boundaries have been applied through layer '2d_bc_MEL_BNDY_101' to allow overland flow to freely exit the 2D model domain without glass walling. 2D boundaries have been applied at the following locations:

- **Location:** (NGR) 391914, 164923 to 391877, 164888: **Type:** HQ **'b' Attribute/slope factor:** 0.004.
- **Location:** (NGR) 391914, 164923 to 391942, 164957: **Type:** HQ **'b' Attribute/slope factor:** 0.0026.

2.8 Hydraulic Roughness

2.8.1 Hydraulic roughness represents the conveyance capacity of, vegetation growth, bed and bank material, channel sinuosity and structures and land use within the floodplain. Within ESTRY-TUFLOW, the hydraulic roughness is defined using the Manning's 'n' roughness coefficient values. Table 2.3 contains photographs showing typical channel roughness within the model extent.

2.8.2 Manning's 'n' roughness values were assigned from survey and photographs, modelling judgement and through industry standard literature including Chow, Hicks & Mason and USGS. Chow (1959) contains reference tables to match observed bed conditions with a value for Manning's 'n'. These reference tables are the most widely used method in 2D hydraulic modelling.

2.8.3 Manning's roughness values have been input through use of the 'M' flag in the 'XS' layer, multiplier in the 'nwke' layer and .tmf (MEL_101.tmf) Manning's codes applied in the XS.csv files. Use of this method allows application of varying Manning's values to represent in changes in roughness within a cross section.

Table 2.3: Watercourse Network Manning's Roughness

Watercourse 1 Manning's Roughness
 
Left: *Looking downstream along WC01 (Manning's of 0.04 banks and 0.045 channel)*
Right: *Looking downstream along WC02 (Manning's of 0.04 banks and 0.045 channel)*
 
Left: *Looking upstream along Ditch C (Manning's of 0.06 left bank, 0.04 right bank and 0.06 channel)*
Right: *Looking upstream along Ditch D (Manning's of 0.06 left bank, 0.04 right bank and 0.06 channel)*



Left: *Looking downstream along Ditch F (Manning's of 0.040 left bank, 0.06 left bank and 0.045 channel)*

Right: *Looking upstream along Ditch E (Manning's of 0.06 left bank and 0.06 right bank and 0.06 channel)*

2.8.4 Most of the watercourse network comprises of vegetated banks, with varying density, and natural bed with increased weeds and pools. The watercourse channel (bed) generally comprises a natural bed with a roughness of between 0.045 and 0.06 which is representative of a '*natural stream – increased weeds, pools and shoals'* and *'natural stream – sluggish reaches, weedy, deep pools'*.

2.8.5 The Manning's 'n' roughness coefficient value for the left and right banks in the 1D domain ranged between 0.04 (*vegetated bank, materials based on grass and light brush*) and 0.06 (*thickly vegetated banks consisting of scrub and weeds*).

2.8.6 Scrutiny of the model extent using OS mapping, aerial photographs and walkover photographs showed that significant areas were grassed. As such, a base value of 0.045 representing 'General Surface Natural' was utilised within the model. Further layers representing roughness for various land uses have been added, namely:

- 2d_MAT_MEL_Roads_Tracks_Hardstanding_101 (Manning's value of 0.025)
- 2d_MAT_MEL_Gardens_101 (Manning's value of 0.05)
- 2d_MAT_MEL_ Trees_and_Shrubs_101 (Manning's value of 0.10)

2.9 Flow Constrictions

2.9.1 Buildings have been represented in layer '2d_MAT_MEL_Buildings_101' as flow constrictions, with a 90% constriction value. Use of a 90% constriction is considered a default value, representative of typical buildings. Building representation as 'flow constrictions' is considered to better replicate overland flow paths in and around built-up areas when compared to using increased Manning's 'n' roughness values[1].

2.10 Topographic Changes

2.10.1 Layer '2d_zsh_MEL_Decks_101' has been used to define decks levels where structures have been represented in the 2D domain. This layer applies levels from the topographical survey to reinstate structure decks that have been 'filtered' from the DTM LiDAR.

[1] Flooding in Urban Areas – 2D Modelling Approaches for Buildings and Fences, W J Syme

2.10.2 Layer '2d_zsh_MEL_Patch_101' has been used to define ground levels where they may need reinforcing in the 2D domain. This layer applies levels observed to 'flatten' out the ground when they have been 'filtered' incorrectly from the 1m DTM LiDAR.

2.11 Model Layers

1D Model Layers

- 1d_xs_MEL_101; defines cross-section locations
- 1d_cs_MEL_101; defines the end of channel weir
- 1d_nwke_MEL_101; defines in-channel network
- 1d_bc_MEL_Flows_101; defines fluvial inflows and HT downstream boundary
- 1d_WLL_MEL_101; defines in-channel water level lines

2D Model Layers

- 2d_bc_hx_MEL_101; defines 1D2D linking cells
- 2d_code_MEL_101; defines model extent
- 2d_bc_MEL_BNDY_101; defines 2D flow inputs and floodplain boundaries to prevent glass walling
- 2d_code_1d_MEL_101; defines 1d channel domain

2D Topographical Layers

- 2d_MAT_MEL_Roads_Tracks_Hardstanding 101; defines 2D roughness for roads, tracks and hardstanding
- 2d_MAT_MEL_Trees_and_Shrubs_101; defines 2D roughness for wooded areas
- 2d_MAT_MEL_Gardens_101; defines 2D roughness for gardens
- 2d_fcsh_MEL_Buildings_101; defines buildings through flow constriction layer. A 90% constriction has been applied.

2.12 Model Runs

2.12.1 The 1D2D linked ESTRY-TUFLOW hydraulic model was run for a range of return periods, using the peak flows as detailed within this report.

2.12.2 TUFLOW HPC GPU has ben used to run the model. HPC GPU is inherently stable and is associated with a variable timestep based on stability criteria, which improves run times in comparison to TUFLOW Classic. In terms of GPU vs CPU, GPU is typically faster for high resolution models, with significant number of cells in floodplains. A simulation time of 8 hours was selected to allow the flood peak to pass through the model and ensure the maximum extent of flooding was captured.

2.12.3 The model was run for the following return periods; 30-year, 100-year, and 1000-year to define Flood Zones 1, 2 and 3 ('3a' and '3b').

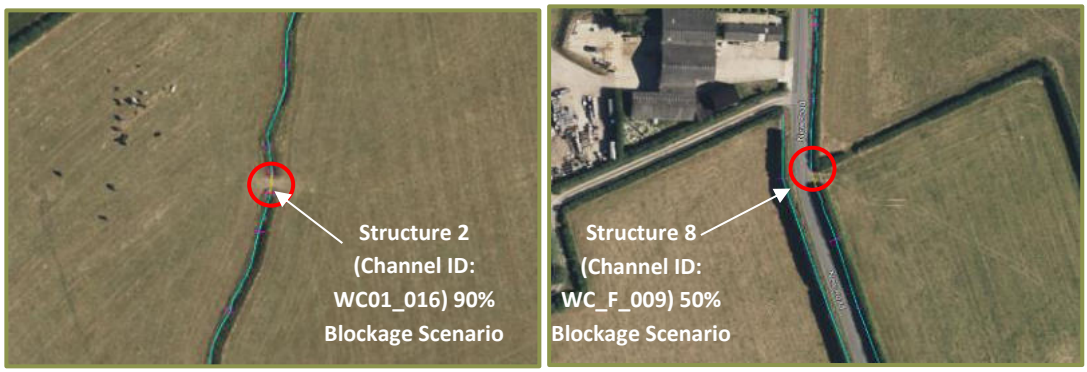
2.12.4 The model also was run with a 26%, 39%, and 71% allowance for climate change for the 100-year event, representative of the Upper End estimate for the Avon Bristol and North Somerset Management Catchment (2070 - 2115).

2.12.5 Blockage analysis was carried out using the 100-year event in which a blockage was applied to the following Structures:

- Structure 2 (Channel ID: WC01_016). This is a circular 'C' culvert opening. A 'pBlockage' value of 80 was applied to represent an 80% blockage of the culvert.
- Structure 8 (Channel ID: WC_F_009). This is a circular 'C' culvert opening. A 'pBlockage' value of 80 was applied to represent an 80% blockage of the culvert.

2.12.6 Blockage locations have been chosen based on the likely impact upon the development Site. A blockage of Structures 2 and 8 would assess any potential flooding that may occur near to the Site. The blockage locations are shown in Figure 2.5.

Figure 2.5: Structure Blockage Locations



2.12.7 Sensitivity analysis was carried out using the 100-year event (for all but Run 003a), which includes +/-20% Manning's 'n' (to allow for seasonal changes in vegetation), increases to inflows (+10%), and an 80% blockage of Structures 2 and 8.

2.12.8 Table 2.4 and the modelling log (Appendix 1) provide a summary of all model runs undertaken.

Table 2.4: Run Identifiers and Description (Baseline)

Model Run ID	Scenario Name	Scenario Description
~e~_001	Q_BAS	Existing free-flowing structures (Baseline)
~e~_001	Nplus20	20% Manning's Increase
~e~_001	Nminus20	20% Manning's Decrease
~e~_001	Block90	90% Blockage of Structure 2
~e~_001	Block50	50% Blockage of Structure 8
~e~_001	DSBC_plus200mm	Downstream boundary plus 200mm
~e~_001	DSBC_minus200mm	Downstream boundary minus 200mm

3.0 Analysis of Results

3.1 Summary of Model Outputs

Baseline Scenario (001)

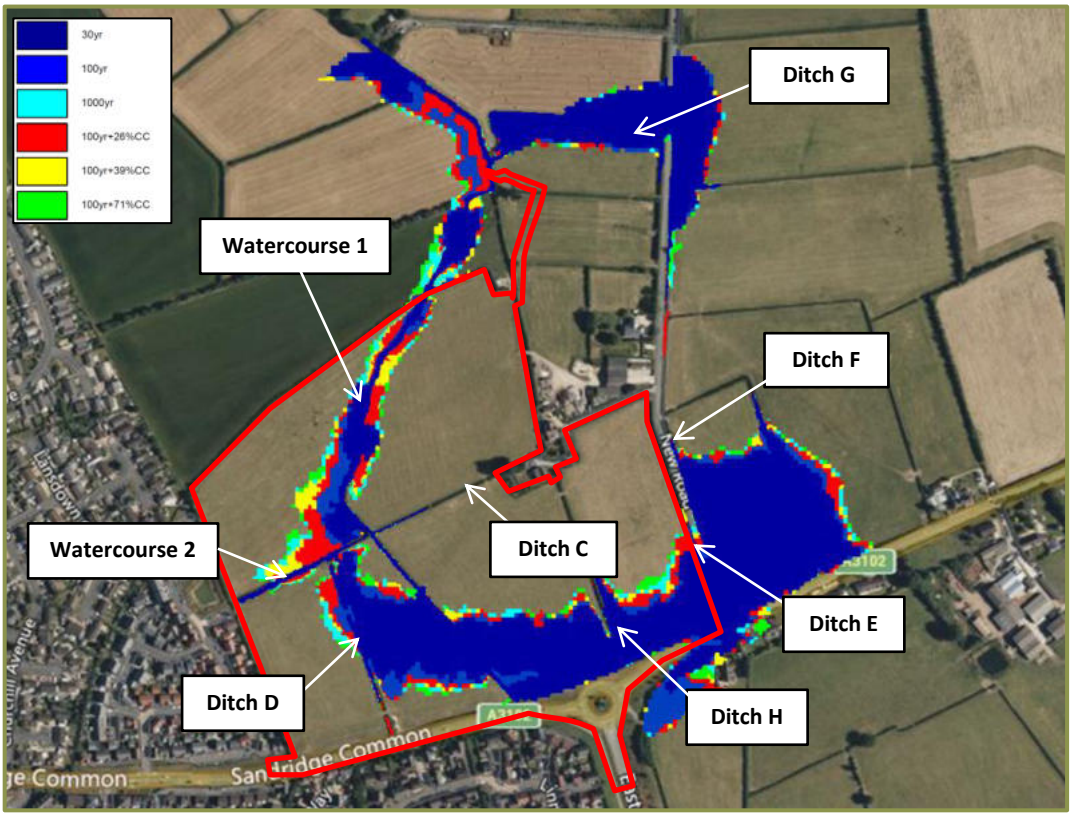
3.1.1 Figure 3.1 shows the maximum flood extents for the whole model domain and the Site. The baseline flood extents are also provided as Drawing 0002. Maximum water levels for all baseline model runs can be viewed in Appendix 4.

3.1.2 The model results show that all return events exceed the banks of the Watercourse 1 channel as well as Watercourse 2, Ditches D, E, H, F and G. Flows remain in channel for Ditch C.

3.1.3 Ditch E exceeds via the left bank and continue to exceed ditches to the west along the southern boundary of the Site until Watercourse 1 is reached. Flows also exceed the right bank and follow the local topography before entering the wider ditch network.

3.1.4 Ditch H exceeds the capacity of the channel during all return events within the upstream extent of the watercourse and inundates the low-lying land to the east.

Figure 3.1: Baseline Flood Outlines



***Red**: Development Site Boundary*

Manning's 'n' Sensitivity (Nplus20 and Nminus20)

3.1.5 When Manning's 'n' roughness values are increased by 20%, in-channel water levels within the model exhibit have an average increase of 0.01m, with a maximum increase of 0.09m at WC01_001.1 to WC01_006.2 (Figure 3.2 and Appendix 4).

3.1.6 When Manning's 'n' roughness values are decreased by 20%, in-channel water levels within the model exhibit have an average decrease of -0.01m, with a maximum decrease of -0.03m at WC01_016.2 and WC01_020.2 (Figure 3.2and Appendix 4).

3.1.7 In-channel water level increases and decreases results in a variation in flow pathway extents. As such, the model behaves as expected with minor increases and decreases to in-channel flood level and pathway extent. However, model results are largely insensitive to Manning's roughness increase.

Figure 3.2: Modelled Flood Extents +/-20% Manning's 'n' (Overview)



***Red**: Development Site Boundary.*

Downstream Boundary Sensitivity (DSBC_plus_200mm and DSBC_minus_200mm)

3.1.8 This section provides a summary of the modelled water levels when the downstream boundary is increased by 200mm and decreased by 200mm.

3.1.9 When the downstream boundary is increased and decreased by 200mm the flood outlines and associated water levels do not change.

3.1.10 It should be noted that on Figure 3.3 all flood outlines are the same and as such, they overlap each other and only the DSBC_minus_200mm is visible.

Figure 3.3: Downstream Boundary Sensitivity



***Red**: Development Site Boundary*

Blockage Scenarios (Structure 2 [80%] and Structure 8 [80%])

3.1.11 Figures 3.4, 3.5 and Appendix 4, provide a summary of the maximum flood levels and extents for the structure blockage scenario.

3.1.12 When an 90% blockage is applied to Structure 2, the following impacts are seen:

- Structure 2: An 90% blockage causes flows to exceed Watercourse 1 from both banks of the channel, before re-entering the Watercourse 1 channel downstream of the structure.
- This location was chosen for a blockage scenario due to its location within the Site boundary.

3.1.13 When an 50% blockage is applied to Structure 8, the following impacts are seen:

- Structure 8: Flows are shown to not reach Structure 8. As such, there is no impact on Structure 8 when a blockage is applied.
- This blockage location is located outside of the Site boundary, though exceedance of this structure could impact the overland flows into the Site earlier than expected.

3.1.14 The 100-year is overlaid by the Structure 8 blockage outline and therefore overlays the other scenario which is why the outline is not visible.

Figure 3.4: Blockage Scenario Overview

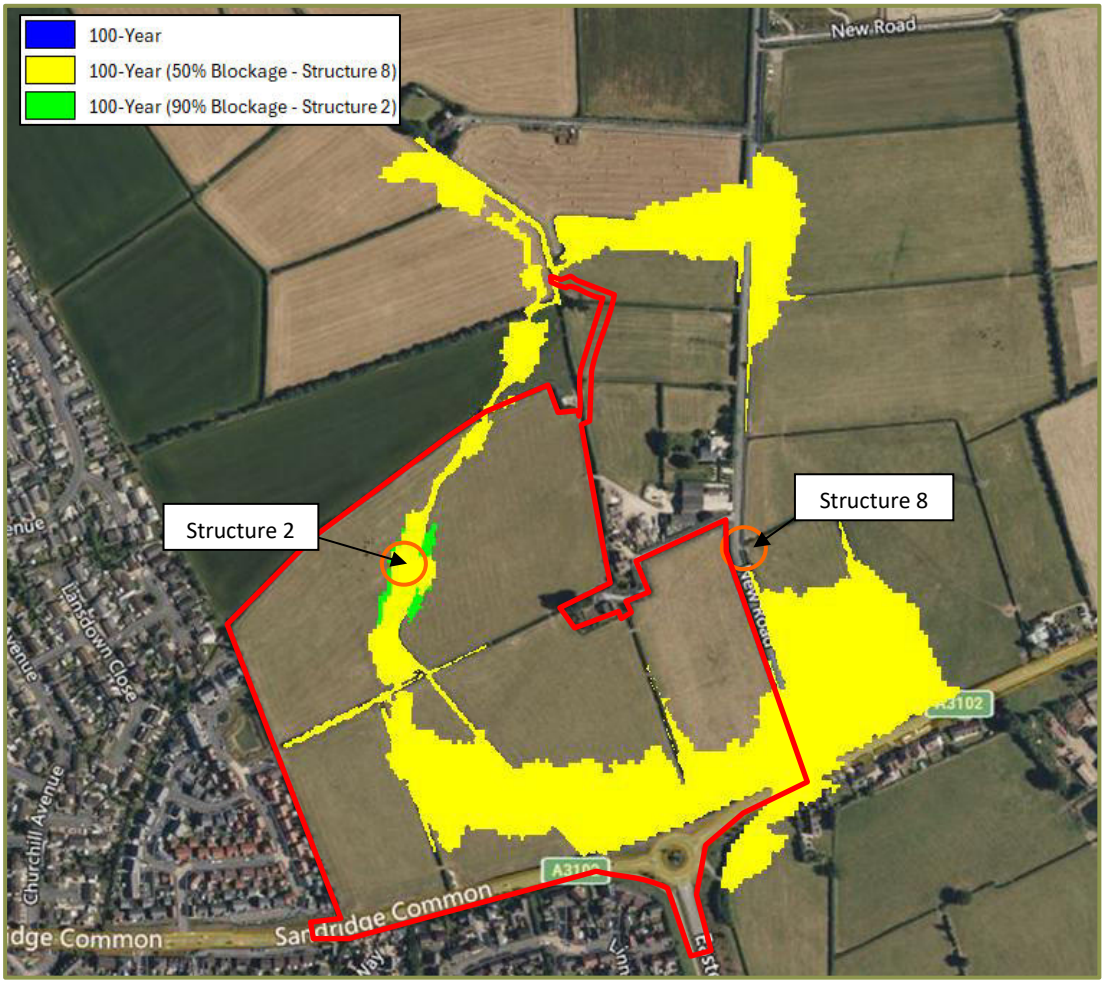
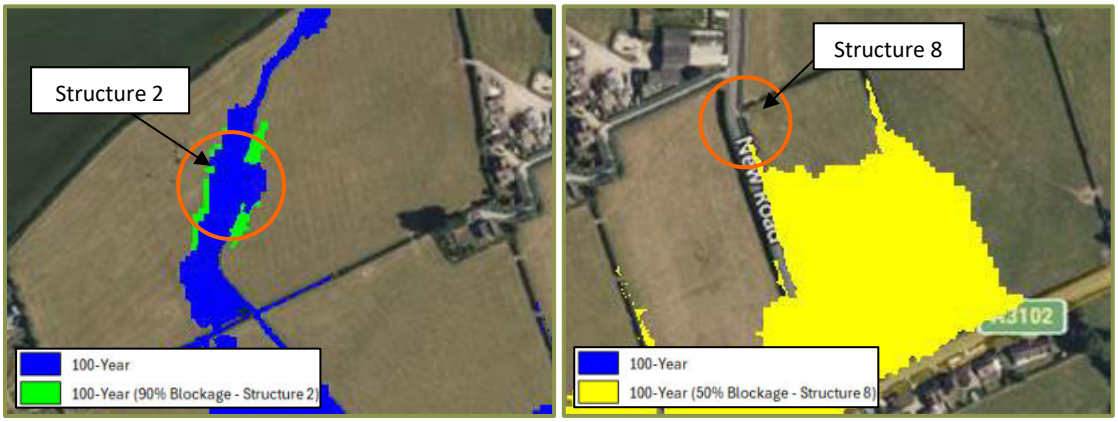


Figure 3.5: Blockage Scenario Structures 2 and 8



Sensitivity Analysis Summary

3.1.15 The model extent displays minimal sensitivity to Manning's roughness changes, with minimal changes to flood outlines shown when blockages are simulated within the model domain. Changes are as expected and result in minor changes to flood extents with no significant changes to flow pathways, i.e. the creation of new or removal of baseline pathways.

3.1.16 The choosing of hydraulic parameters can often be subjective and parameters such as Manning's roughness can undergo seasonal change through vegetation growth. The sensitivity analysis increases confidence in the modelled results through identifying those changes in subjective parameters are limited.

Message Layers

3.1.17 No negative depth warnings are present during the entirety of all model runs. The model is considered to be healthy and stable (Figure 3.6).

Figure 3.6: Model Warning Messages Short Summary (All Baseline model runs)

WARNING 2583 - Material ID 6 has a manning's n value (0.500) greater than Wu n limit (0.100) - n value will be limited in Wu formulation
WARNING 2583 - Material ID 12 has a manning's n value (0.120) greater than Wu n limit (0.100) - n value will be limited in Wu formulation
CHECK 3548 - Setting SGS Sample Distance Target to minimum grid zpt resolution of 1.
CHECK 3505 - SGS TIN outside model domain. Skipping...
CHECK 1152 - For channel WC01_021, using centre cross-section and ignoring end cross-section(s).
CHECK 1152 - For channel DS_Weir, using centre cross-section and ignoring end cross-section(s).
WARNING 1317 - WLL does not cross (2 point WLL only) or snap to 1D channel
CHECK 2109 - Raised HX ZC Zpt by 0.05m to 1D bed level.
WARNING 1100 - Structure DITCH_003 crest/invert (42.940) is below bed (43.451) of primary downstream channel DITCH_004.

3.1.18 An assessment of the warning and check messages is included below:

- Warning 2583: this is related with a higher Manning's used at certain locations (including buildings, 0.5). Manning's is limited in the Wu formulation when estimating the eddy viscosity, but the higher value is still used in the momentum equations.
- Check 3548: an automatic value of 1 has been assigned to the SGS Sample Distance Target
- Check 3505: a node has been skipped. This has been checked and does not affect the model results.
- Check 1152: this refers to the use of the CS layers to culvert openings. All messages have been checked and are as expected.
- Warning 1317: a WLL is being ignored due to being located over an X connector. This location has been checked and it does not affect the model results.
- Warning 1100: this message relates to the crest/invert of a structure being below the bed of the upstream and downstream bed of the channel. The messages have been checked against the 'nwke' layer and detailed survey and are as intended.
- Check 2109: this message relates to the use of a 'z' flag within the 2d_bc_hx layer. This is to allow water to transfer between the 1D and 2D domain. This message has been checked and is per intended and will not affect the model results.

3.2 Mass Balance Error

3.2.1 The TUFLOW User Manual states that a healthy model should display less than a ±1% error or 2 or 3% depending on the objectives of the modelling. On all runs, cumulative and 1D and 2D mass error is above +/-2.0% . Mass balance error is within the acceptable threshold for all model runs (Table 3.1).

Table 3.1: Mass Balance Error

Model Run	Maximum Cumulative Error (%)	Maximum 1D Error (%)	Maximum 2D Error (%)
30yr	Once this initial wetting period of the model has finished, error is between -1.9% and 2.5% for all model run	Once this initial wetting period of the model has finished, error is between -1.7% and 1.8% for all model run	Once this initial wetting period of the model has finished, error is between -0% and 0% for all model run
100yr	Once this initial wetting period of the model has finished, error is between -1.8% and 2.7% for all model run	Once this initial wetting period of the model has finished, error is between -1.7% and 1.6% for all model run	Once this initial wetting period of the model has finished, error is between -0% and 0% for all model run
100yr+26%CC	Once this initial wetting period of the model has finished, error is between -1.2% and 2.5% for all model run	Once this initial wetting period of the model has finished, error is between -1.7% and 1.5% for all model run	Once this initial wetting period of the model has finished, error is between -0% and 0% for all model run
100yr+39%CC	Once this initial wetting period of the model has finished, error is between -1.9% and 2.4% for all model run	Once this initial wetting period of the model has finished, error is between -1.7% and 1.4% for all model run	Once this initial wetting period of the model has finished, error is between -0% and 0% for all model run
100yr+71%CC	Once this initial wetting period of the model has finished, error is between -1.8% and 2.6% for all model run	Once this initial wetting period of the model has finished, error is between -1.7% and 1.6% for all model run	Once this initial wetting period of the model has finished, error is between -0% and 0% for all model run
1000yr	Once this initial wetting period of the model has finished, error is between -1.9% and 2.5% for all model run	Once this initial wetting period of the model has finished, error is between -1.7% and 1.5% for all model run	Once this initial wetting period of the model has finished, error is between -0% and 0% for all model run

3.2.2 The TSMB1D2D results file, which represents error within linking cells, can be used to spatially locate cumulative mass error in situations where areas of instability are not evident. TSMB1D2D files were checked for all model runs. No error was shown within the files for all model runs.

3.2.3 The model is stable, with no fluctuation in ‘Qi’, ‘Qo’ or ‘Dvol’, which represents the variation between inflow and outflow volumes.

3.2.4 It is considered that the constructed model is healthy and representative.

4.0 Baseline Flood Mapping

4.1 Methodology

4.1.1 Flood depth mapping was undertaken within MapInfo software. As the model is a 1D2D linked model, results are produced for the out-of-bank floodplain based upon the underlying 2m grid derived from 1m DTM LiDAR data. Results were produced in 'xmdf' format and imported into MapInfo, where the results were mapped and contoured.

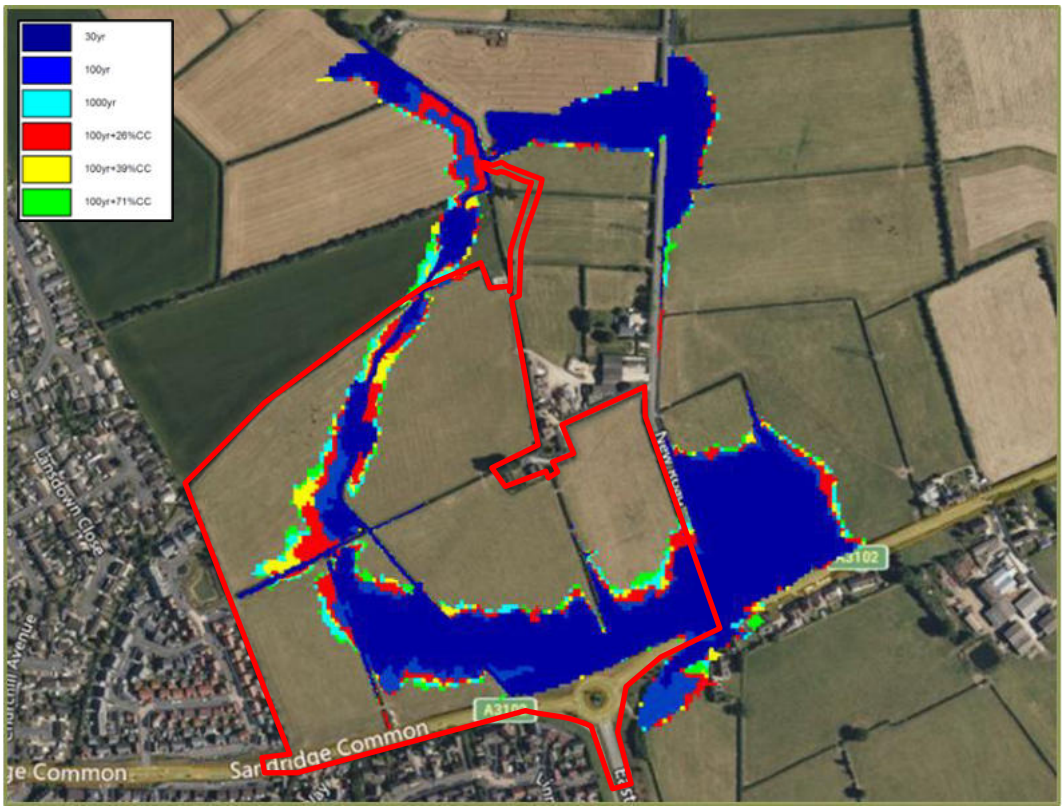
4.1.2 The purpose of this modelling exercise is to refine and confirm surface water flood outlines, representative of fluvial flooding from the identified watercourses to confidently determine fluvial flood extents in the development Site. Contouring of the results allows the production of Flood Zones; 3a (100-year), 3b (functional floodplain based upon the 30-year results) and 2 (1000-year).

4.1.3 Flood Zone 3 outlines were also produced to represent flood risk to the Site for the lifetime of the development for the 100-year. The contoured and mapped results are presented in Figure 4.1 and Drawing 0002.

4.1.4 Model flood extents were cleaned by using the following criteria:

- Dry islands and polygons smaller than 200m^2 were removed from the outlines.
- Polygons disconnected from the watercourse or surrounding the flood outline where there is no flow path were removed.

Figure 4.1: Baseline Flood Outlines - Overview



***Red**: Development Site Boundary*

4.2 Reality Check

4.2.1 Figures 4.2 and 4.3 present the Environment Agency Flood Map for Planning and Enzygo modelled flood outlines for the 100-year ('medium' risk) and 1000-year events ('low' risk).

4.2.2 Figures 4.4 and 4.5 present the Environment Agency Surface Water Flood Map and Enzygo modelled flood outlines for the 100-year ('medium' risk) and 1000-year events ('low' risk).

Environment Agency Flood Map for Planning

4.2.3 The upstream extents of Watercourse 1 and surrounding ditch network had not previously been modelled. It was established that creating a new 1D2D model would allow for updated hydrology, new survey data and the integration of a 2D domain would be more representative of onsite flooding, when compared to the nationalised mapping.

4.2.4 Based on the above, Environment Agency Flood Zones 2 and 3 should be superseded by the Enzygo Ltd modelled outlines.

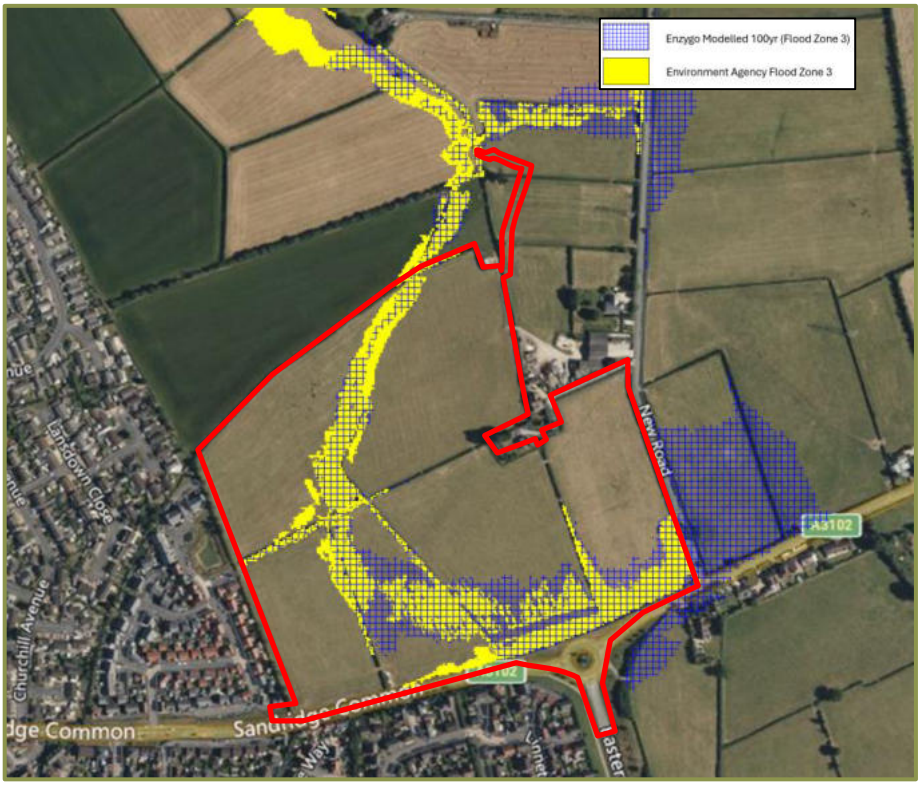
4.2.5 The Environment Agency Flood Zone 2 mapping (Figure 4.2) shows fluvial flooding for the same extents as the Enzygo modelling, located in the southeastern extents of the Site and along the route of Watercourse 1. The Enzygo modelling shows greater flood extents along Ditch F and Ditch G. The outlines in the southeastern extents of the Site are very similar with the Environment Agency outlines larger in some areas and the Enzygo outlines larger in others. The Environment Agency downstream flood extents along Watercourse 1 are reduced when compared with the Enzygo modelled outlines.

4.2.6 The Environment Agency Flood Zone 3 mapping (Figure 4.3) also displays similar flood extents to the Enzygo modelling as mentioned above. During the upstream extents of the model the Enzygo outlines are larger than the Environment Agency outlines, surrounding Ditches F, G, and H. However, the Enzygo outline are smaller than the Environment Agency outlines along the route of Watercourse 1 and 2 and in the downstream reaches of the model.

Figure 4.2: Environment Agency Flood Map for Planning (Flood Zone 2)



Figure 4.3: Environment Agency Flood Map for Planning (Flood Zone 3)



Environment Agency Surface Water Flood Map

4.2.7 When the Enzygo modelled, outlines are compared to the Environment Agency surface water outlines, the Environment Agency outlines are again smaller in the upper reaches of the model at Ditches F, E and H. The Enzygo modelled extents are smaller in the downstream reaches of the model along the reach of Watercourse 1.

4.2.8 As the majority of Environment Agency surface water mapping is modelled as rain falling on a large-scale, low resolution, fixed grid, which lacks structure and survey information. Enzygo derived flood outlines are therefore more detailed when compared to the flood map for planning (Figure 4.4).

4.2.9 During the 1 in 1000-year period the Environment Agency outlines are larger than the Enzygo outlines in all reaches of the model (Figure 4.5).

4.2.10 During the 100-year period the Environment Agency outlines and Enzygo outlines are similar in the southeastern extents of the Site, with the Environment Agency outlines being slightly larger. Along Watercourse 1 and into the downstream reaches of the model, the Environment Agency outlines are larger than the Enzygo modelled outlines.

4.2.11 Based on the above, Environment Agency surface water flood mapping should be superseded by the Enzygo Ltd modelled outlines.

Figure 4.4: Environment Agency Mapping (100-year event)

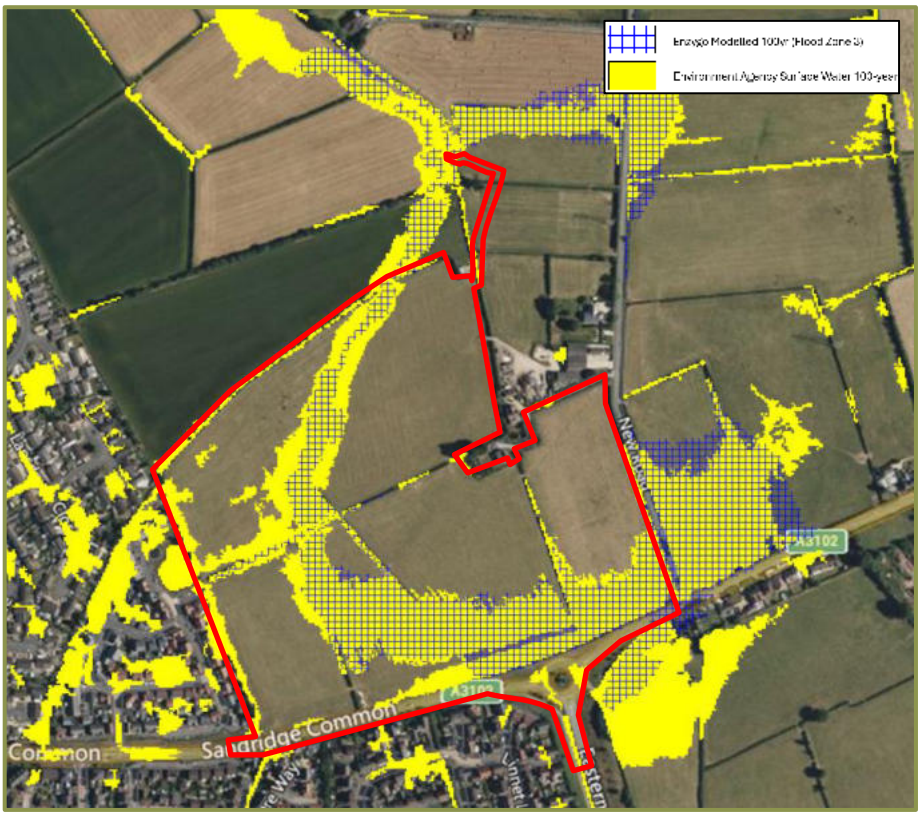


Figure 4.5: Environment Agency Mapping (Flood Zone 2 – 1000-year event)



4.2.12 The variation between the modelled flood extents for Watercourse 1 and associated watercourses/ditches and the available Environment Agency flood mapping is likely due to the inclusion of details such as channel cross sections, structure conveyance, as well as landforms representative of the present day.

5.0 Summary and Conclusions

5.1 Introduction

5.1.1 This report presents a Hydraulic Modelling Exercise for a 1D2D ESTRY-TUFLOW model associated with onsite and bounding watercourses based on 1m DTM LiDAR Data and detailed topographical survey to refine fluvial flood mapping and provide baseline for flood extents to inform development and drainage strategy.

5.1.2 The model was run for a range of return periods to establish the baseline fluvial flood extents and parameters. Sensitivity analysis was carried out to understand the seasonal effects of vegetation, impact of increased flows on the downstream boundary levels and blockage scenarios within the Site. An up-to-date climate change allowance of +26%, +39%, and +71% representing the Avon Bristol and North Streams Management Catchment (Higher, Central and Upper End Estimate) has also been applied to the 100-year event.

5.2 Existing Flood Risk

5.2.1 A 1D2D ESTRY-TUFLOW hydraulic model has been constructed using a detailed topographical survey and up to date input hydrology for the ordinary watercourses included in the model.

5.2.2 The baseline model was run for a range of return periods to establish the baseline fluvial flood extents and parameters. Up-to-date climate change allowances of +26%, +39%, and +71% (representing the Avon Bristol and North Somerset Management Catchment: Higher, Central and Upper End (2070 - 2115) have also been applied to the 100-year event following Environment Agency guidance.

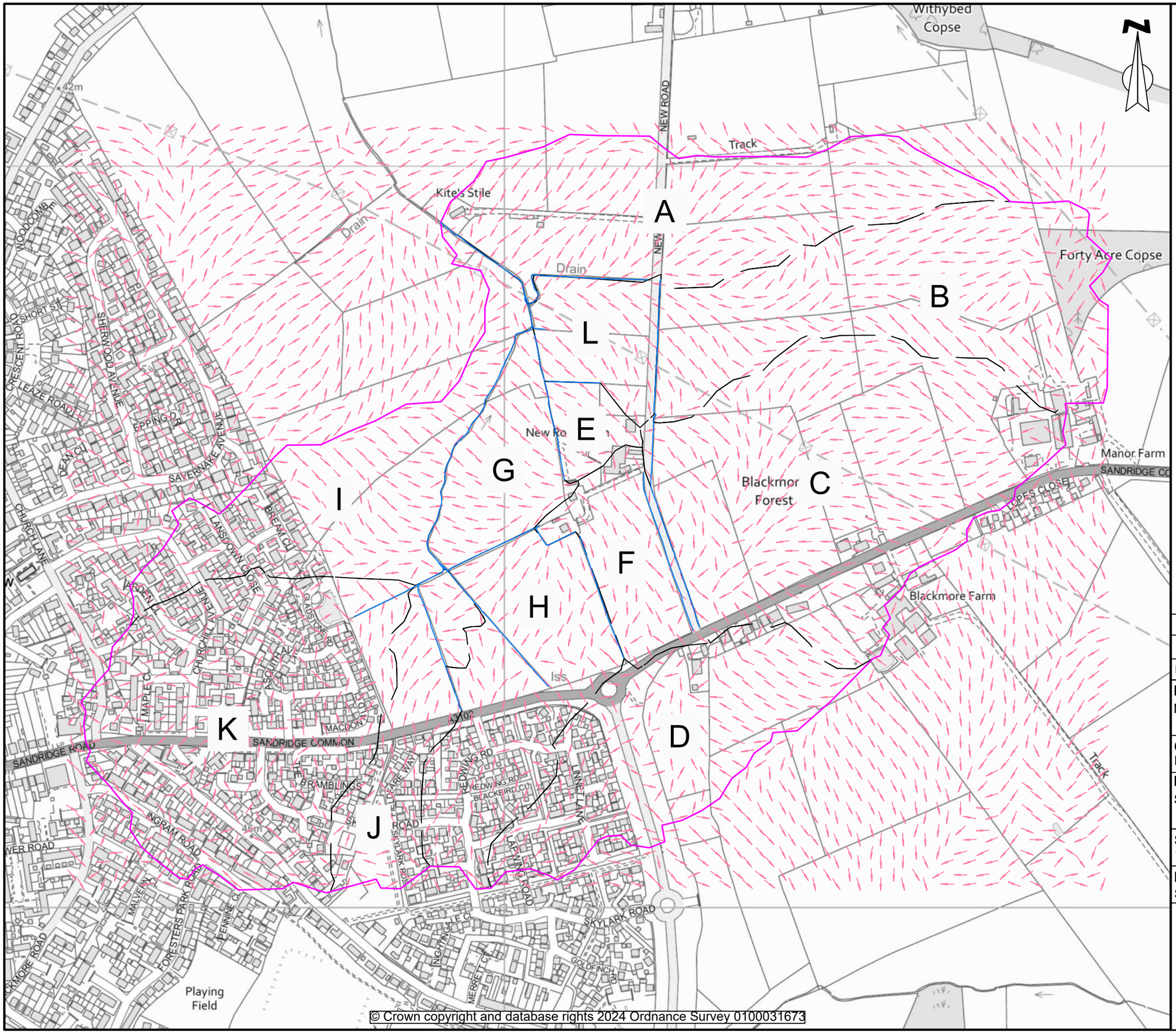
5.2.3 The model results show that all return events exceed the banks of the Watercourse 1 channel as well as Watercourse 2, Ditches D, E, H, F and G. Flows remain in channel for Ditch C.

5.2.4 The model extent displays minimal sensitivity to Manning's roughness changes, with minimal changes to flood outlines shown when blockages are simulated within the model domain. Changes are as expected and result in minor changes to flood extents with no significant changes to flow pathways, i.e. the creation of new or removal of baseline pathways.

5.3 Conclusion

5.3.1 The 1D2D ESTRY TUFLOW hydraulic modelling has utilised detailed channel survey and up to date hydrological inputs. The exercise has demonstrated a marked variation in the flood extent when compared to the Environment Agency surface water flood mapping, due to no Environment Agency fluvial mapping being available for comparison.

DRAWINGS



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KEY:

- Site Boundary
- Overall Catchment Boundary
- Surface Water Flow Path
- Watercourses
- Sub-Catchment Boundaries

Catchment A
0.103km² (10.3ha)

Catchment B
0.085km² (8.5ha)

Catchment c
0.163km² (16.3ha)

Catchment D
0.082km² (8.2ha)

Catchment E
0.013km² (1.3ha)

Catchment F
0.034km² (3.4ha)

Catchment G
0.035km² (3.5ha)

Catchment H
0.075km² (7.5ha)

Catchment I
0.081km² (8.1ha)

Catchment J
0.043km² (4.31ha)

Catchment K
0.141km² (14.1ha)

Catchment L
0.025km² (2.58ha)

Notes:

Ground Model Specification: 1m DTM LIDAR data

Rev	Date	Description			
P01	21/05/25	Issued	HDR	EOC	EOC

Project
New Farm, Melksham

Client
Bloor Homes Limited

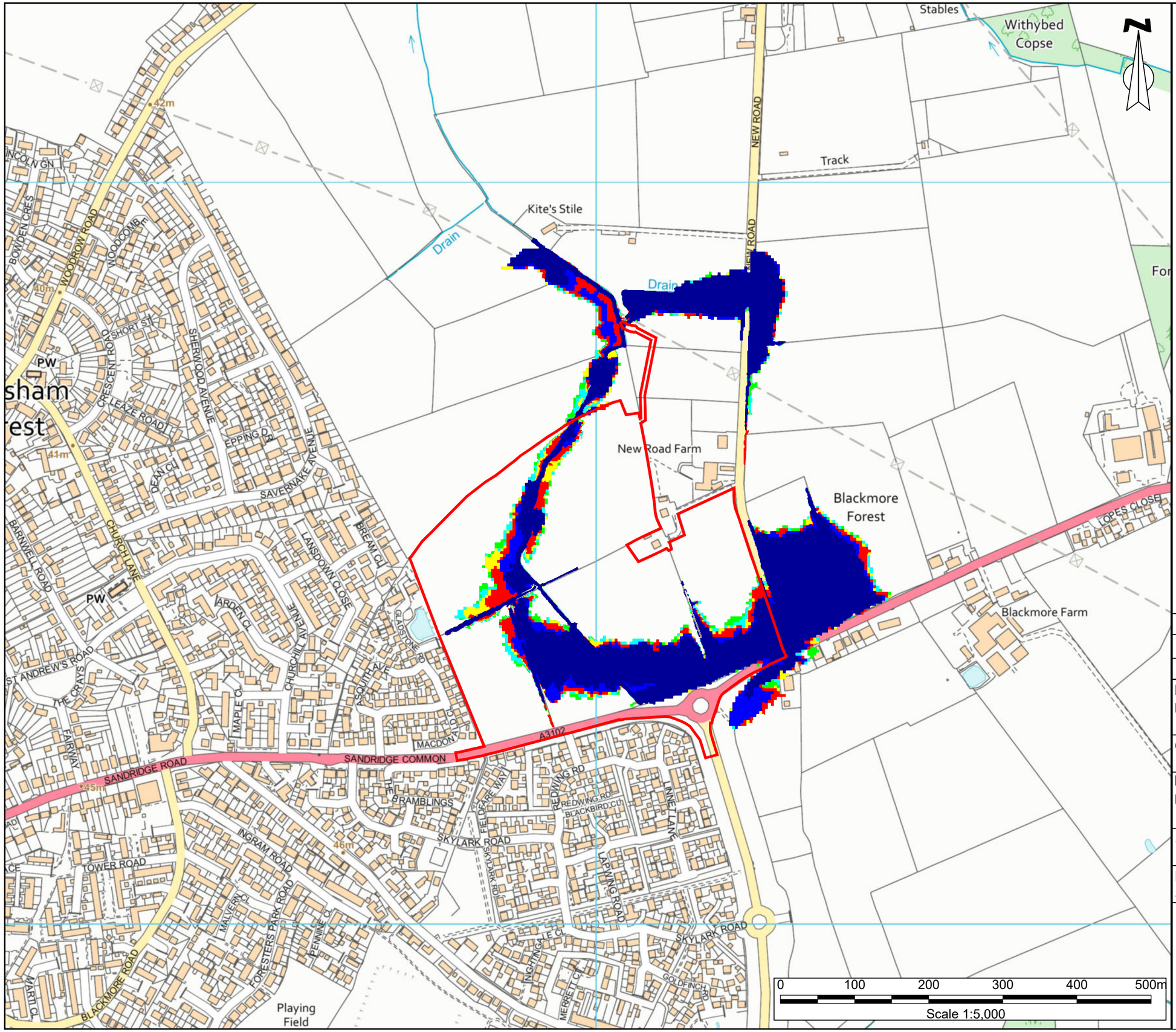
Drawing Title
Sub Catchment Delineation

Scale	Date	Status
1:5,000	21/05/25	Preliminary

DWG No. SHF102003-ENZ-XX-XX-DR-Y-0001 **Revision** P01

Bristol 01454 269 237
Cardiff 02920 023 700
Manchester 0161 413 6444
Cambridge 01799 542 473
Sheffield 0114 321 5151
Belfast 07377673948

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KEY:

- Site Boundary
- 30yr
- 100yr
- 1000yr
- 100yr+26%CC
- 100yr+39%CC
- 100yr+71%CC

Rev	Date	Description			
P01	07/10/25	Issued for comment / approval	DL	HDR	EOC

Project
New Farm, Melksham

Client
Bloor Homes Limited

Drawing Title
Baseline Flood Outlines

Scale	Date	Status
1:5000@A3	07/10/25	Preliminary

DWG No. SHF102003-ENZ-XX-XX-DR-Y-0002 **Revision** P01

Bristol 01454 269 237
Cardiff 02920 023 700
Manchester 0161 413 6444
Cambridge 01799 542 473
Sheffield 0114 321 5151
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APPENDICES

Appendix 1 – Model Files and Modelling Log

River/Catchment Name		New Farm, MELksham
Code		MEL
Modeller		Helena Du-Roe
Reviewer		Helena Du-Roe

Redundant Model Runs
Active Model Runs

Model Run ID	Secnario (~s1~)	Scenario Description	Setup	Run	Events (~e1~)	TUFLOW Control File	Geometry Control File	Boundary Condtion control file	Boundary Conditions Database	Estry Control File	Stability/ Health	Mannings
001	RF_BAS	Baseline Model Run. Rainfall 2d_bc added wihtin site (interime catchment). Lumped flows added to the u/s ends of the ditches within the site, to account for flows from off-site i.e. to the south of A3102 and in urban areas. Flows from the attenuation in the adjacent development considered as a lumped flows at a peak rate of 15.4 l/s.	Yes	Yes	RF0001 RF0030 RF0100 RF0100CC25 RF0100CC40 RF0100CC45 RF1000	MEL_~e~_101.tcf	MEL_101.tgc	MEL_101.tbc	bc_dbase_rf.csv	MEL_~e~_101.ecf	OK	MEL_001.tmf
001	RF_DES	In comparison to RF_BAS, the rainfall polygon was removed within the site footprint, to account for the drainage strategy. Basins proposed as part of the draiange strategy were taken in account by adding a lumped hydrograph scaled to the peak flows provided by the client. LUmped hydrographs at the u/s end of the ditches were kept to account for flows from off-site. Development platforms and roads were added to the model to account for poroposed levels, where required.	Yes	Yes	RF0001 RF0030 RF0100 RF0100CC25 RF0100CC40 RF0100CC45 RF1000	MEL_~e~_101.tcf	MEL_101.tgc	MEL_101.tbc	bc_dbase_rf.csv	MEL_~e~_101.ecf	OK	MEL_001.tmf
001	Q_BAS	Baseline Model Run. Rainfall 2d_bc added wihtin site (interime catchment). Lumped flows added to the u/s ends of the ditches within the site, to account for flows from off-site i.e. to the south of A3102 and in urban areas. Flows from the attenuation in the adjacent development considered as a lumped flows at a peak rate of 15.4 l/s.	Yes	Yes	Q0001 Q0030 Q0100 Q0100CC25 Q0100CC40 Q0100CC45 Q1000	MEL_~e~_101.tcf	MEL_101.tgc	MEL_101.tbc	bc_dbase_q.csv	MEL_~e~_101.ecf	OK	MEL_001.tmf
001	Q_DES	In comparison to Q_BAS, lumped hydrographs wihtin the site were removed and replaced by hydrographs that represent the discharge from basins - also as lumped hydrogprahs. LUmped hydrographs at the u/s end of the ditches were kept to account for flows from off-site. Development platforms and roads were added to the model to account for poroposed levels, where required.	Yes	Yes	Q0001 Q0030 Q0100 Q0100CC25 Q0100CC40 Q0100CC45 Q1000	MEL_~e~_101.tcf	MEL_101.tgc	MEL_101.tbc	bc_dbase_q.csv	MEL_~e~_101.ecf	OK	MEL_001.tmf

Model Revision
Rev B Model updated to include latest hydrology input, dated from Sept 2025

Appendix 2 – Topographic Survey

392020E 392040E 392060E 392080E 392100E 392120E 392140E 392160E 392180E 392200E 392220E

164880N 164860N 164840N 164820N 164800N 164780N 164760N 164740N

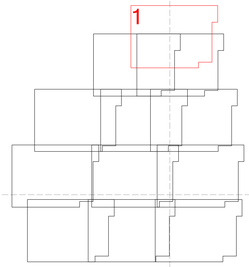
NORTH

W E

S

SCALE

0m 5m 10m 20m



Hedgerow Post & Wire Fence 1m+1m Post & Rail Fence 1m+1.1m Post & Rail Fence 1m+1.7m Post & Rail Fence 1m+1.5m Post & Wire Fence 1m+1m Post & Rail Fence 1m+1.7m Triangular Post & Rail Structure over Ditch 1mH-2.5m Post & Rail Fence 1m+1.1m 300mm Pipe 300mm Pipe Gate Grass Asphalt Hedgerow Ditch Direction Arrow Water Riser Water Trough New Road

SURVEY STATIONS

Name	Cooding	Northing	Height	Remark
PG#1	392022.975	164879.284	43.68	Trig
PG#2	392035.553	164762.426	43.687	POW
PG#3	391942.450	164819.140	43.940	POW
PG#4	392053.121	164819.785	43.208	POW
PG#5	392053.513	164836.769	43.208	POW
PG#6	392130.619	164811.889	43.049	POW
PG#7	392152.021	164812.465	43.061	POW
PG#8	392152.021	164812.465	43.061	POW
PG#9	391939.835	164823.733	43.943	POW
PG#10	392075.511	164852.497	44.115	POW
PG#11	392075.511	164852.497	44.115	POW
PG#12	392126.402	164835.261	43.267	POW
PG#13	392126.402	164835.261	43.267	POW
PG#14	392154.081	164784.162	43.858	POW
PG#15	392154.081	164784.162	43.858	POW
PG#16	392063.682	164868.668	41.977	POW
T1	392159.455	164836.249	43.821	Trig
T2	392159.455	164836.249	43.821	Trig
T3	392218.972	164841.207	43.871	Trig
T4	392218.972	164841.207	43.871	Trig
T5	392152.208	164801.212	44.001	Trig
T6	392152.208	164801.212	44.001	Trig
T7	391929.193	164831.183	44.141	Trig
T8	391929.193	164831.183	44.141	Trig
T9	391902.021	164832.234	44.972	Trig
T10	391914.083	164762.399	44.067	Trig
T11	391914.083	164762.399	44.067	Trig
T12	391756.738	164815.221	43.853	Trig
T13	392050.382	164832.606	43.009	Trig
T14	392050.382	164832.606	43.009	Trig
T15	392151.955	164800.123	43.305	Trig
T16	392058.345	164854.090	43.045	Trig
T17	392058.345	164854.090	43.045	Trig
T18	392205.674	164811.283	44.063	Trig
T19	392205.674	164811.283	43.890	Trig

UNDERGROUND UTILITIES LEGEND

SW	STORM WATER SEWER (SWS)
FW	FOUL WATER SEWER (FWS)
CW	COMBINED SEWER (CWS)
S	SEWER
E	ELECTRIC CABLE
HV	HIGH VOLTAGE CABLE
LV	LOW VOLTAGE CABLE
TT	TELECOMS CABLE
TV	CABLE TELEVISION
TS	TRAFFIC LIGHT SIGNAL CABLE
WATER	UNDERGROUND WATER SUPPLY
GAS (MP)	GAS: MEDIUM PRESSURE
GAS (IP)	GAS: INTERMEDIATE PRESSURE
GAS (HP)	GAS: HIGH PRESSURE
OIL	OIL PIPE
UNK	UNKNOWN SERVICE METALLIC
UNP	UNKNOWN SERVICE POLYMER PIPE/ DUCT
CABLE	UNKNOWN SERVICE CABLE
OHL	OVERHEAD LINE
OH (TYPE)	OVERHEAD CABLE
SA	CCTV NOTES - SURVEY ABANDONED
Note attached eg. BT 5.6 /62	Type Depth Quality

UNDERGROUND UTILITY SURVEY NOTES:
This survey has been carried out to the standard, as described by The Survey Association (TSA), for a Level 4 Survey. (PAS128 Type B). Utilities on this drawing have been detected using non invasive technologies. The performance of these technologies can be affected by many factors including conductivity of soil and the control of Ground Surveys. Consequently some utilities may be undetectable and therefore, whilst Brunel Surveys uses best endeavours to detect all utilities we cannot guarantee that 100% detection can always be achieved.
Before any excavation is undertaken by a utility survey and statutory plans, any groundworks should be undertaken with extreme caution and in accordance with health and safety executive guidelines HSG 47 AVOIDING DANGER FROM UNDERGROUND SERVICES

LEGEND

AV	Air Valve	GV	Gas Valve	SVP	Soil Vent Pipe
BL	Bollard	GY	Gulley	THL	Threshold Level
BH	Borehole	HY	Hydrant	TK	Tank (Type)
BS	Bus Stop	IC	Invert/Bot Cover	TP	Telegraph Pole
BT	Telecom Cover	IL	Invert Level	TS	Traffic Sign
CH	Chimney	LB	Letter Box	TR	Traffic Signal Box
CP	Down Pipe	LC	Lamp Column	TT	Tree Trunk
ET	Electricity Cover	MH	Manhole	TV	Cable TV Cover
EO	Electricity Outlet	MK	Marker Post	UP	Unknown Pipe
EOT	End of Fence	OH	Overhead Cable	UTL	Unable to Lift
EP	Electricity Pole	PB	Post Box	UTS	Unable to Survey
FH	Fire Hydrant	PD	Pedestal	UT	Unidentified Trace
FFL	Finished Floor Level	RM	Road Marker Plate	VT	Vent Pipe
FH	Fire Hydrant	SC	Stop Cock (Water)	VT	Vegetation Top
GP	Fence Post	SL	Silt Level	WL	Water Level
GP	Gate Post	SP	Sign Post	WM	Water Meter
GPR	Ground Penetrating Radar	SV	Stop Valve	WO	Watch Out

KEY

STN1 SURVEY STATION | GATE | BANK | FOLIAGE | CLIFF

50m MAJOR CONTOUR

MINOR CONTOUR (0.25m Interval)

NOTES

Level Datum: OS National Grid OSGM15

Grid Orientation: OS National Grid OSTN15

Scale Factor: Scale Factor 0.99960203

The contractor is to check and verify all critical dimensions and levels before work starts.

Every effort is made to identify all visible above ground features. However, it may be possible that certain features are obscured at the time of survey.

Brunel Surveys Ltd
Land, Building and Utility Surveyors

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Watchfield, Swindon, Wiltshire, SN6 8TY
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TEL : 01793 784700

CLIENT

Bloor Homes South West

Unit 7
Latham Road
Swindon
Wiltshire
SN25 4DL

JOB TITLE

Topographical / Drainage / Underground Utilities Survey

New Farm
New Road
Melksham
SN12 7QY

REVISIONS

Sheet 1 of 12

SCALE: A0 Sheet @ 1 to 200

DATE: Feb 2023 SURVEYED BY: LB

DRAWN BY: LB CHECKED BY: PJW

DRAWING No.: 25297-200-01

Underground Utility Surveys - PAS 128 - Quality Levels

Survey Type	Quality Level	Post Processing	Location Accuracy Horizontal	Location Accuracy Vertical	Supporting Data
D Desktop Utility Records Search	D	-	Undefined	Undefined	-
C Site Reconnaissance	C	-	Undefined	Undefined	Location demonstrated by Topographical Features or Reinstatement Scar
B Detection	B4	No	Undefined	Undefined	Suspected to exist, but undetected. Shown as "ASSUMED"
	B3	No	+/-500mm	Undefined - Not Reliable	Horizontal Position Only One location method only /used
	B3P	Yes			
	B2	No	+/-250mm or +/-40% of Detected Depth, Whichever is Greatest	+/-40% of Detected Depth	Horizontal and Vertical Detection One Detection Method Used
	B2P	Yes			
	B1	No	+/-150mm or+/-15% of Detected Depth, Whichever is Greater	+/-15% of Detected Depth	Horizontal and Vertical Detection Multiple Detection Methods Used
	B1P	Yes			
A Verification	A	-	+/-50mm	+/-25mm	Horizontal and Vertical Location of the top, and/or bottom of the utility

391920E 391940E 391960E 391980E 392000E 392020E 392040E 392060E 392080E 392100E 392120E

164800N 164780N 164760N 164740N 164720N 164700N 164680N 164660N

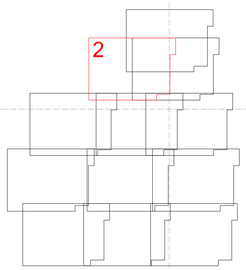
NORTH

W E

S

SCALE

0m 5m 10m 20m



SURVEY STATIONS				
Name	Coords	Northing	Height	Remark
PGM1	391922.000	164755.000	43.000	Peg
PGM2	391922.000	164755.000	43.000	Peg
PGM3	391942.450	164618.140	43.060	PGM
PGM4	391942.450	164618.140	43.060	PGM
PGM5	392053.113	164536.168	43.208	PGM
PGM6	392130.619	164411.889	43.048	PGM
PGM7	392130.619	164411.889	43.048	PGM
PGM8	392133.007	164522.065	44.260	PGM
PGM9	392133.007	164522.065	44.260	PGM
PGM10	391930.835	164622.733	43.343	PGM
PGM11	392075.511	164592.697	44.765	PGM
PGM12	392075.511	164592.697	44.765	PGM
PGM13	392130.492	164608.267	43.067	PGM
PGM14	392130.492	164608.267	43.067	PGM
PGM15	392130.492	164608.267	43.067	PGM
PGM16	392063.682	164668.668	41.977	PGM
T1	392130.619	164411.889	43.048	Tie
T2	392159.452	164438.249	43.821	Tie
T3	392218.972	164341.207	43.811	Tie
T4	392130.492	164608.267	43.067	Tie
T5	392152.208	164581.412	44.051	Tie
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T7	391978.193	164541.193	44.141	Tie
T8	391978.193	164541.193	44.141	Tie
T9	391852.621	164632.248	44.872	Tie
T10	391914.063	164562.399	44.067	Tie
T11	391778.218	164472.225	43.853	Tie
T12	391778.218	164472.225	43.853	Tie
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T14	392050.382	164672.699	43.009	Peg
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T100	392208.045	164654.066	45.045	Peg

UNDERGROUND UTILITIES LEGEND

- STORM WATER SEWER (SWS)
- FOUL WATER SEWER (FWS)
- COMBINED SEWER (CWS)
- SEWER
- ELECTRIC CABLE
- HV HIGH VOLTAGE CABLE
- LV LOW VOLTAGE CABLE
- TELECOMS CABLE
- CABLE TELEVISION
- TRAFFIC TRAFFIC SIGNAL CABLE
- WATER UNDERGROUND WATER SUPPLY
- GAS
- GAS (MP) GAS MEDIUM PRESSURE
- GAS (IP) GAS INTERMEDIATE PRESSURE
- GAS (HP) GAS HIGH PRESSURE
- OIL OIL PIPE
- UNK UNKNOWN SERVICE METALLIC
- UNK UNKNOWN SERVICE FOUND WITH GPR
- CABLE UNKNOWN SERVICE CABLE
- DRAIN DRAIN
- OH (TYPE) OVERHEAD CABLE
- SA CCTV NOTES - SURVEY ABANDONED

Note attached eg. BT 5.6 .62 Type Depth Quality

UNDERGROUND UTILITY SURVEY NOTES:
This survey has been carried out to the standard, as described by The Survey Association (TSA), for a Level 4 Survey. (PAS128 Type B) Utilities on this drawing have been detected using non-invasive technologies. The performance of these technologies can be affected by many factors including ground and site conditions and the control of Brunel Surveys. Consequently some utilities may be undetectable and therefore, whilst Brunel Surveys uses best endeavours to detect all utilities we cannot guarantee that 100% detection can always be achieved.
Before any excavation is commenced by a utility survey and statutory plans, any groundworks should be undertaken with extreme caution and in accordance with health and safety executive guidelines HSG 47 AVOIDING DANGER FROM UNDERGROUND SERVICES

LEGEND

AV	Air Valve	GV	Gas Valve	SVP	Soil Vent Pipe
BL	Bollard	GY	Gulley	THL	Threshold Level
BH	Bore Hole	HL	Hedge	TOB	Top of Bank
BT	Bus Stop	IC	Inspection Cover	TP	Traffic Light Pole
ST	Telecom Cover	IL	Invert Level	TS	Traffic Sign
CL	Cover Level	VI	Kerb Inlet	BTB	Illuminated TS
DS	Down Pipe	MH	Manhole	TV	Cable TV Box
EM	Electricity Cover	MH	Manhole	TVL	Cable TV Cover
EOS	End of Survey	MKA	Spec Marker Post	TWL	Top of Wall level
EP	Electric Pole	MP	Meter Pit / Gas Gate	UCO	Unknown Cover
EP	Electricity Pole	PB	Post Box	UTS	Unsafe to Survey
ER	Earth Rod	RE	Rodding Eye	UTT	Unsafe to Trace
FL	Fence Post Level	SC	Stop Cock (Gas)	VC	Vent Cover
FH	Fire Hydrant	SC	Stop Cock (Water)	VT	Vegetation Top
FP	Fence Post	SL	SB Level	WL	Water Level
GL	Ground Level	SP	Soil Pipe	WO	Waste Out
GPR	Ground Penetrating Radar	SV	Stop Valve	WO	Wash Out

KEY

STN1 SURVEY STATION | GATE | BANK | FOLIAGE | CLIFF

50m MAJOR CONTOUR

MINOR CONTOUR (0.25m Interval)

NOTES

Level Datum: OS National Grid OSGM15

Grid Orientation: OS National Grid OSTN15

Scale Factor: Scale Factor 0.99960203

The contractor is to check and verify all critical dimensions and levels before work starts.

Every effort is made to identify all visible above ground features, however, it may be possible that certain features are obscured at the time of survey.

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CLIENT

Bloor Homes South West
Unit 7
Latham Road
Swindon
Wiltshire
SN25 4DL

JOB TITLE

Topographical / Drainage / Underground Utilities Survey

New Farm
New Road
Melksham
SN12 7QY

REVISIONS

Sheet 2 of 12

SCALE: A0 Sheet @ 1 to 200

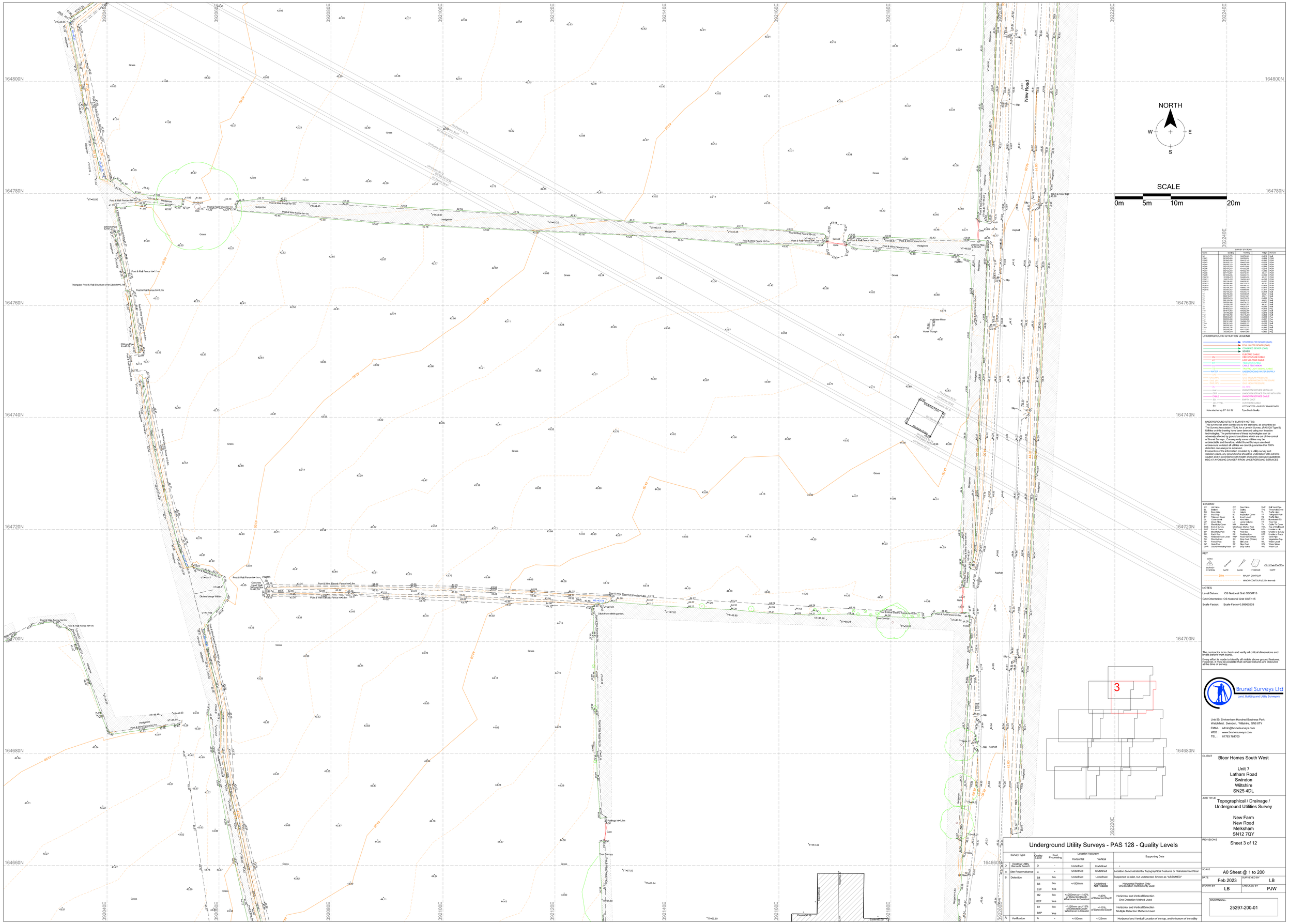
DATE: Feb 2023 SURVEYED BY: LB

DRAWN BY: LB CHECKED BY: PJW

DRAWING No.: 25297-200-01

Underground Utility Surveys - PAS 128 - Quality Levels

	Survey Type	Quality Level	Post Processing	Location Accuracy: Horizontal	Location Accuracy: Vertical	Supporting Data
D	Desktop Utility Records Search	D	-	Undefined	Undefined	-
C	Site Reconnaissance	C	-	Undefined	Undefined	Location demonstrated by Topographical Features or Reinstatement Scar
B	Detection	B4	No	Undefined	Undefined	Suspected to exist, but undetected. Shown as "ASSUMED"
		B3	No	+/-500mm	Undefined - Not Reliable	Horizontal Position Only One location method only used
		B3P	Yes			
		B2	No	+/-250mm or +/-40% of Detected Depth Whichever is Greatest	+/-40% of Detected Depth	Horizontal and Vertical Detection One Detection Method Used
		B2P	Yes			
		B1	No	+/-150mm or+/-15% of Detected Depth Whichever is Greater	+/-15% of Detected Depth	Horizontal and Vertical Detection Multiple Detection Methods Used
		B1P	Yes			
A	Verification	A	-	+/-50mm	+/-25mm	Horizontal and Vertical Location of the top, and/or bottom of the utility


392060E
392080E
392100E
392120E
392140E
392160E
392180E
392200E
392220E
392240E
164800N
164780N
164760N
164740N
164720N
164700N
164680N
164660N
NORTH
W
E
S
SCALE
0m 5m 10m 20m
New Road
Grass
Hedgerow
Asphalt
Gate
Water Trough
Water Fiber
Ditch from within garden.
Ditches Merge Within
Triangular Post & Rail Structure over Ditch trim0.7m
Post & Rail Fence h/e1.1m
Post & Rail Fence h/e1.5m
Post & Wire Fence h/e1.0m
Post & Wire Electric Fence h/e0.9m
Post & Rail Fence h/e1.1m
Post & Wire Fence h/e1.1m
Railings h/e1.1m
Tree Canopy
Overhead Power Line
Electricity Pylon
Concrete Yard With Steel Gate
Gravel
Ground
Kerb
Dry Ditch
Dry Ditch Invert 42.57
Dry Ditch Invert 42.54
Dry Ditch Invert 42.52
Dry Ditch Invert 42.50
Dry Ditch Invert 42.48
Dry Ditch Invert 42.46
Dry Ditch Invert 42.44
Dry Ditch Invert 42.42
Dry Ditch Invert 42.40
Dry Ditch Invert 42.38
Dry Ditch Invert 42.36
Dry Ditch Invert

391760E 391780E 391800E 391820E 391840E 391860E 391880E 391900E 391920E 391940E 391960E 391980E

164660N 164640N 164620N 164600N 164580N 164560N 164540N 164520N

NORTH

W E S

SCALE

0m 5m 10m 20m

4

SURVEY STATIONS

Name	Easting	Northing	Height	Remark
TP1	391922.551	164574.284	43.818	Trig
TP2	391922.551	164574.284	43.818	Trig
PSM2	391942.450	164618.140	43.940	PSM
PSM3	391955.112	164636.488	43.958	PSM
PSM4	392053.121	164784.168	43.958	PSM
PSM5	392130.619	164911.889	43.948	PSM
PSM6	392152.027	164932.469	44.060	PSM
PSM7	392152.027	164932.469	44.060	PSM
PSM8	391938.835	164633.733	43.943	PSM
PSM10	391938.835	164633.733	43.943	PSM
PSM11	392075.521	164852.847	44.060	PSM
PSM12	392126.402	164928.267	44.067	PSM
PSM13	392126.402	164928.267	44.067	PSM
PSM14	392150.282	164784.168	43.958	PSM
PSM15	392053.121	164784.168	43.958	PSM
PSM16	392063.682	164668.668	41.977	PSM
T1	392159.452	164826.049	43.821	Trig
T2	392159.452	164826.049	43.821	Trig
T3	392218.972	164541.207	43.811	Trig
T4	392218.972	164541.207	43.811	Trig
T5	392152.438	164561.213	44.001	Trig
T6	392152.438	164561.213	44.001	Trig
T7	391929.193	164541.193	44.141	Trig
T8	391929.193	164541.193	44.141	Trig
T9	391902.621	164632.248	44.917	Trig
T10	391914.063	164562.399	44.957	Trig
T11	391902.621	164632.248	44.917	Trig
T12	391756.738	164415.221	43.803	Trig
T13	392250.382	164672.699	43.938	Trig
T14	392250.382	164672.699	43.938	Trig
T15	392151.955	164692.123	44.103	Trig
T16	392208.345	164654.066	44.045	Trig
T17	392208.345	164654.066	44.045	Trig
T18	392255.674	164711.063	44.063	Trig
T19	392255.674	164647.066	43.890	Trig

UNDERGROUND UTILITIES LEGEND

- STORM WATER SEWER (SWS)
- FOUL WATER SEWER (FWS)
- COMBINED SEWER (CWS)
- SEWER
- ELECTRIC CABLE
- HIGH VOLTAGE CABLE
- LOW VOLTAGE CABLE
- TELECOMS CABLE
- CABLE TELEVISION
- TRAFFIC LIGHT SIGNAL CABLE
- WATER — UNDERGROUND WATER SUPPLY
- GAS (MP) — GAS MEDIUM PRESSURE
- GAS (IP) — GAS INTERMEDIATE PRESSURE
- GAS (HP) — GAS HIGH PRESSURE
- OIL PIPE
- UNKNOWN SERVICE METALLIC
- UNKNOWN SERVICE PLANE WITH GPR
- UNKNOWN SERVICE CABLE
- DRAIN
- DISTRIBUTED CABLE
- SA — CCTV NOTES - SURVEY ABANDONED
- Note attached eg. BT. 5.6 .62 — Type Depth Quality

UNDERGROUND UTILITY SURVEY NOTES:

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LEGEND

GV	Gate Valve	GV	Gas Valve	SVP	Soil Vent Pipe
BL	Bollard	CV	Gulley	THL	Threshold Level
BH	Bore Hole	CP	Cattle Grid	TP	Test Pit
BS	Bus Stop	KC	Kissing/Box Cover	TP	Telegraph Pole
ST	Telecom Cover	IL	Invert Level	TS	Traffic Sign
CH	Chimney Stack	LP	Lamp Post	TRV	Trial Hole/Pit
CP	Down Pipe	LC	Lamp Column	TT	Tree Top
EY	Electricity Cover	MH	Manhole	TV	Cable TV Cover
EOT	End of Footway	OHL	Overhead Line	UC	Unable to Lift
EOT	End of Grass	OH	Overhead Cable	UTL	Unable to Lift
EP	Electricity Pole	PB	Post Box	UTS	Unable to Survey
FH	Fire Hydrant	PP	Private Pole	UP	Utility Pole/Post
FTL	Finished Floor Level	RNP	Road Name Plate	VP	Vent Pipe
FH	Fire Hydrant	SC	Stop Cock (Water)	VT	Vegetation Top
GM	Gas Marker	SP	Sign Post	WC	Water Course
GP	Gate Post	SP	Stay Post	WM	Water Meter
GPR	Ground Penetrating Radar	SV	Stop Valve	WO	Wash Out

KEY

ETN1 — SURVEY STATION; GATE; BANK; FOLIAGE; CLIFF

50m — MAJOR CONTOUR

MINOR CONTOUR (0.25m Interval)

NOTES

Level Datum: OS National Grid OSGM15

Grid Orientation: OS National Grid OSTN15

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REVISIONS

Sheet 4 of 12

SCALE: A0 Sheet @ 1 to 200

DATE: Feb 2023 — SURVEYED BY: LB

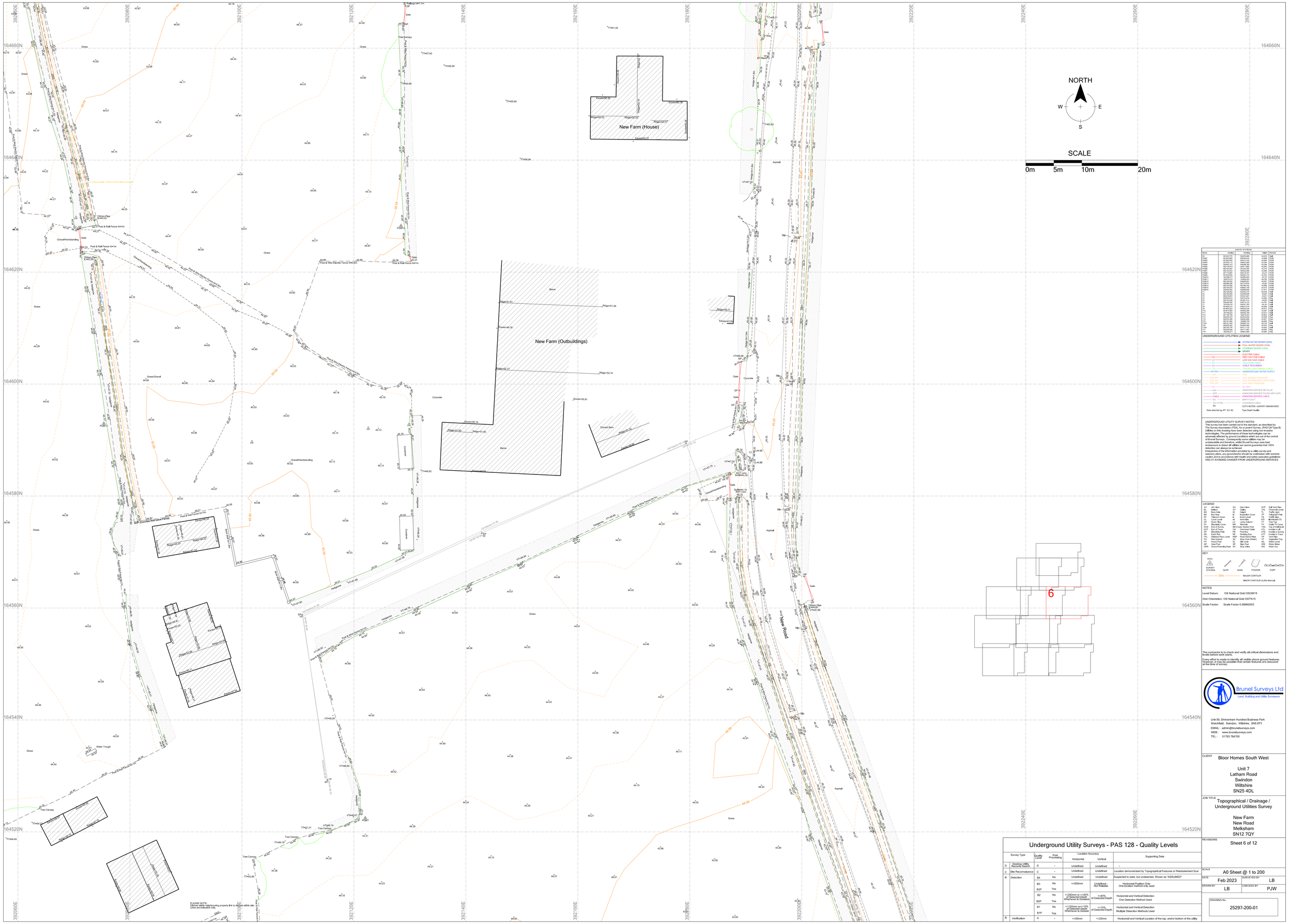
DRAWN BY: LB — CHECKED BY: PJW

DRAWING No.: 25297-200-01

Underground Utility Surveys - PAS 128 - Quality Levels

Survey Type		Quality Level	Post Processing	Location Accuracy: Horizontal	Location Accuracy: Vertical	Supporting Data
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		B3	No	+/-500mm	Undefined - Not Reliable	Horizontal Position Only - One location method only used
		B3*	Yes			
		B2	No	+/-250mm or +/-40% of Detected Depth Whichever is Greatest	+/-40% of Detected Depth	Horizontal and Vertical Detection - One Detection Method Used
		B2*	Yes			
		B1	No	+/-150mm or +/-15% of Detected Depth Whichever is Greatest	+/-15% of Detected Depth	Horizontal and Vertical Detection - Multiple Detection Methods Used
		B1*	Yes			
A	Verification	A	-	+/-50mm	+/-125mm	Horizontal and Vertical Location of the top, and/or bottom of the utility


391940E
391960E
391980E
392000E
392020E
392040E
392060E
392080E
392100E
392120E
392140E
164660N
164640N
164620N
164600N
164580N
164560N
164540N
164520N
NORTH
W
E
S
SCALE
0m
5m
10m
20m
Post & Rail Fence 1m
Post & Wire Fence 1m
Post & Rail Fence 1m
Post & Wire Electric Fence 1m
Post & Rail Fence 1m
Post & Rail Fence 1m
Post & Rail Fence 1m
Post & Rail Fence 1m
Post & Wire Electric Fence 1m
Post & Rail Fence 1m
Post & Rail Fence 1m
Post & Rail Fence 1m
Post & Rail


New Farm (House)
New Farm (Outbuildings)
New Road
Barns
Domed Barn
Asphalt
Concrete
Gravel/Hardstanding
Grass
Grass/Gravel
Water Trough
Tree Canopy
Hedgerow
Post & Wire Electric Fence top=1m
Post & Rail Fence top=1m
Post & Wire Fence top=1m
Post & Wire Electric Fence top=1.2m
Post & Rail Fence top=1.2m
Post & Wire Fence top=1.2m
Post & Rail Fence top=1.5m
Post & Wire Fence top=1.5m
Post & Wire Electric Fence top=1.5m
Post & Rail Fence top=1.6m
Post & Wire Fence top=1.6m
Post & Wire Electric Fence top=1.6m
Post & Rail Fence top=1.8m
Post & Wire Fence top=1.8m
Post & Wire Electric Fence top=1.8m
Post & Rail Fence top=2m
Post & Wire Fence top=2m
Post & Wire Electric Fence top=2m
Post & Rail Fence top=2.1m
Post & Wire Fence top=2.1m
Post & Wire Electric Fence top=2.1m
Post & Rail Fence top=2.2m
Post & Wire Fence top=2.2m
Post & Wire Electric Fence top=2.2m
Post & Rail Fence

NORTH

SCALE
0m 5m 10m 20m

Gloucester Road

Childrens Play Park

Attenuation Basin

Grass

Asphalt

Block Paving

Tree Canopy

Hedgerow

Post & Rail Fence

Railings

Concrete Head Wall

Gate

Water Trough

Bollards

Ditch

Kerb

Footway

Verge

Carriageway

Embankment

Retaining Wall

Building

Fence

Hedge

Wall

Manhole

Gully

Catchpit

Inspection Chamber

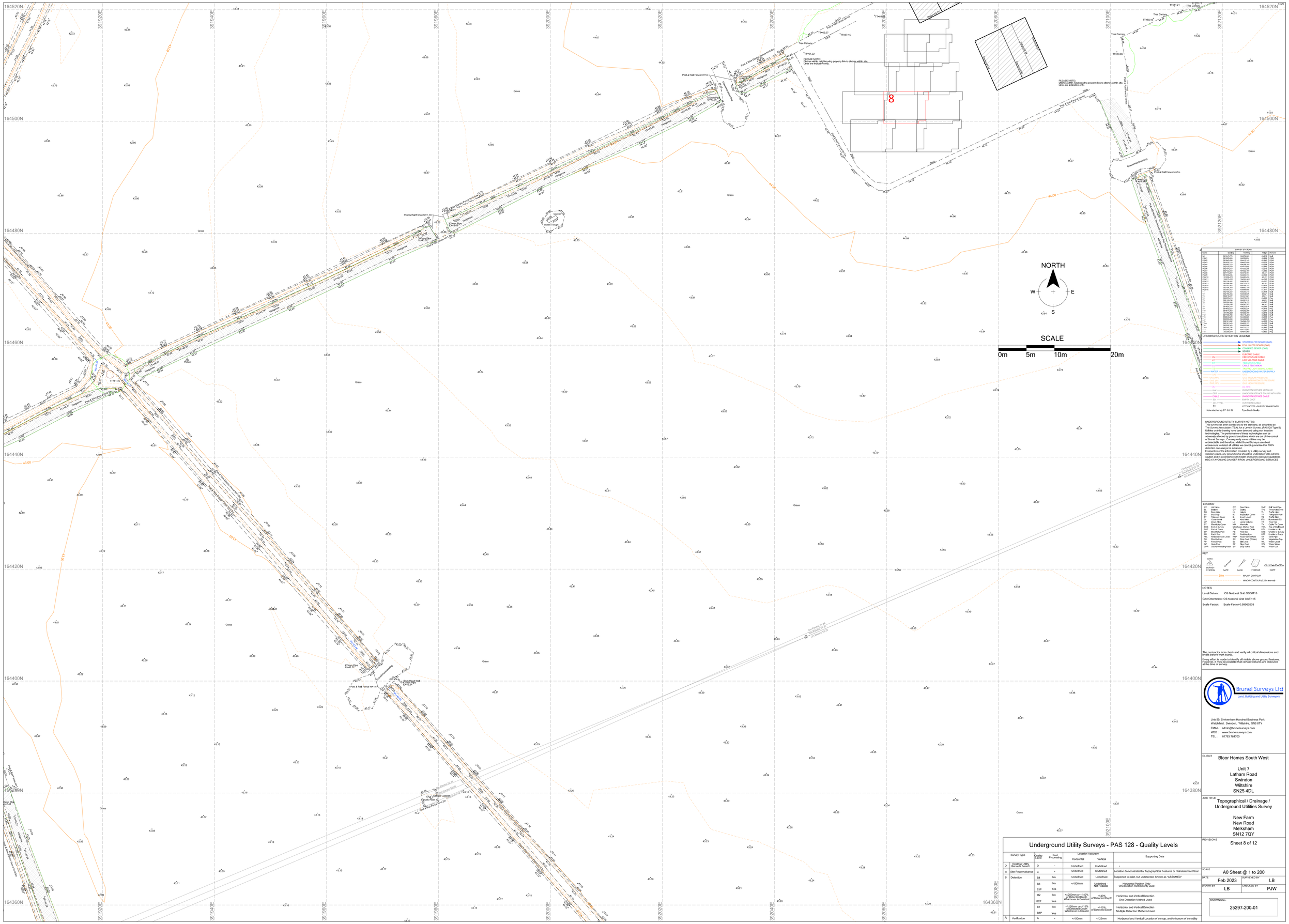
Soakaway

Pipe Outfall

Culvert

Pond

Stream


164520N
164500N
164480N
164460N
164440N
164420N
164400N
164380N
164360N
391920E
391940E
391960E
391980E
392000E
392020E
392040E
392060E
392080E
392100E
392120E
8
NORTH
W
E
S
SCALE
0m
5m
10m
20m
PLEASE NOTE:
Ditches within neighbouring property &/or to ditches within site.
Lines are indicative only.
Post & Rail Fence NW1.1m
Post & Wire Electric Fence NW1.5m
Hedgerow
Grass
Water Trough
Gravel Pit
Brick Head Wall
Post & Rail Fence NW1m
Post & Rail Fence NW1.5m
Electric Fence
Electric Fence NW1.5m
Electric Meter
Electric Cabinet
Overhead Cables
Tree Canopy
Tree Canopy
Tree Canopy

PLEASE NOTE:
Ditches within neighbouring property link to ditches within site.
Levels are indicative only.

Post & Rail Fence h=1m

Post & Rail Fence h=1.2m

Post & Rail Fence h=1.5m

Post & Rail Fence h=1.8m

Post & Rail Fence h=1.8m

Post & Rail Fence h=1m

Post & Rail Fence h=1m

Post & Rail Fence h=1

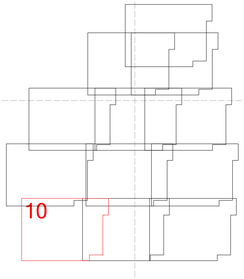
391740E 391760E 391780E 391800E 391820E 391840E 391860E 391880E 391900E 391920E 391940E 391960E

164360N 164340N 164320N 164300N 164280N 164260N 164240N 164220N

NORTH

SCALE
0m 5m 10m 20m

Gladstone Road
Macdonald Close
Sandridge Common (A3102)



SURVEY STATIONS

Name	Easting	Northing	Height	Remark
PG01	391922.970	164376.245	43.818	Pvmt
PG02	391922.970	164376.245	43.818	Pvmt
PG03	391942.450	164416.140	43.940	PGM
PG04	391953.113	164436.788	43.958	PGM
PG05	391953.113	164436.788	43.958	PGM
PG06	392130.619	164411.889	43.949	PGM
PG07	392130.619	164411.889	43.949	PGM
PG08	392122.027	164522.369	44.060	PGM
PG09	392122.027	164522.369	44.060	PGM
PG10	391930.835	164623.733	43.943	PGM
PG11	391930.835	164623.733	43.943	PGM
PG12	392075.521	164552.697	44.165	PGM
PG13	392126.402	164635.267	43.957	PGM
PG14	392126.402	164635.267	43.957	PGM
PG15	392150.280	164766.162	43.958	PGM
PG16	392150.280	164766.162	43.958	PGM
PG17	392063.662	164668.668	43.977	PGM
PG18	392063.662	164668.668	43.977	PGM
T1	392159.450	164838.249	43.821	Tre
T2	392218.972	164941.207	43.811	Tre
T3	392218.972	164941.207	43.811	Tre
T4	392162.438	164981.212	44.001	Tre
T5	392162.438	164981.212	44.001	Tre
T6	391929.193	164541.393	44.141	Tre
T7	391929.193	164541.393	44.141	Tre
T8	391902.621	164632.234	44.872	Tre
T9	391914.063	164652.399	44.997	Tre
T10	391914.063	164652.399	44.997	Tre
T11	391778.738	164415.225	43.802	Tre
T12	392250.382	164652.399	43.939	Tre
T13	392250.382	164652.399	43.939	Tre
T14	392250.382	164652.399	43.939	Tre
T15	392268.345	164658.066	44.045	Tre
T16	392268.345	164658.066	44.045	Tre
T17	392235.676	164771.283	44.063	Tre
T18	392235.676	164771.283	43.892	Tre

UNDERGROUND UTILITIES LEGEND

- STORM WATER SEWER (SWS)
- FOUL WATER SEWER (FWS)
- COMBINED SEWER (CWS)
- SEWER
- ELECTRIC CABLE
- HV HIGH VOLTAGE CABLE
- LV LOW VOLTAGE CABLE
- TELECOMS CABLE
- CABLE TELEVISION
- TRAFFIC LIGHT SIGNAL CABLE
- WATER UNDERGROUND WATER SUPPLY
- GAS (MP) GAS MEDIUM PRESSURE
- GAS (IP) GAS INTERMEDIATE PRESSURE
- GAS (HP) GAS HIGH PRESSURE
- OIL PIPE
- UNKN UNKNOWN SERVICE METALLIC
- UNKN UNKNOWN SERVICE FOUND WITH GPR
- CABLE UNKNOWN SERVICE CABLE
- DRAIN DRAINAGE
- OH (CYTR) OVERHEAD CABLE
- SA CCTV NOTES - SURVEY ABANDONED
- Note attached eg. BT 5.6 /52 Type Depth Quality

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LEGEND

AV	Air Valve	CV	Gas Valve	SVP	Soil Vent Pipe
BB	Bus Box	EL	Electric	TBM	Temporary Bench Mark
BH	Bore Hole	HI	Height	TL	Traffic Light
BS	Bus Stop	IC	Inspection Cover	TP	Telegraph Pole
CC	Communal Cover	IL	Invert Level	TR	Trial Hole
CL	Cover Level	KI	Kerb Inlet	BTS	Illuminated TS
DP	Down Pipe	LC	Lamp Column	TT	Toss Toy
EOF	End of Fence	MH	Manhole	UC	Unknown Cover
EOS	End of Survey	MKr/Cyst	Marker Post	THL	Top of Hill Level
EOT	End of Trave	OH	Overhead Cable	UTL	Unsafe to Lift
ER	Earthing Rode	PC	Pedestal	UTS	Unsafe to Survey
ER	Earth Rod	RE	Rodding Eye	UTT	Unsafe to Trave
FFL	Fiddeford Floor Level	RNP	Road Name Plate	VP	Vent Pipe
FH	Fire Hydrant	SA	Survey Abandoned	WC	Water Course Slip
FP	Fence Post	SL	SM Level	WL	Water Level
GP	Gate Post	SP	Sign Post	WM	Water Meter
GPR	Ground Penetrating Rader	SV	Stop Valve	WO	Wash Out

KEY

STN1 SURVEY STATION · GATE · BANK · FOLIAGE · CLIFF
50m MAJOR CONTOUR
MINOR CONTOUR (0.25m Interval)
(Area covered in more detail)

NOTES

Level Datum: OS National Grid OSGM15

Grid Orientation: OS National Grid OSTN15

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REVISIONS
Sheet 10 of 12

SCALE A0 Sheet @ 1 to 200

DATE Feb 2023 SURVEYED BY LB

DRAWN BY LB CHECKED BY PJW

DRAWING No. 25297-200-01

Underground Utility Surveys - PAS 128 - Quality Levels

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		B3	No	+/-500mm	Undefined - Not Reliable	Horizontal Position Only One location method only used
		B3P	Yes			
		B2	No	+/-250mm or +/-40% of Detected Depth Whichever is Greatest	+/-40% of Detected Depth	Horizontal and Vertical Detection One Detection Method Used
		B2P	Yes			
		B1	No	+/-150mm or +/-15% of Detected Depth Whichever is Greater	+/-15% of Detected Depth	Horizontal and Vertical Detection Multiple Detection Methods Used
		B1P	Yes			
A	Verification	A	-	+/-50mm	+/-25mm	Horizontal and Vertical Location of the top, and/or bottom of the utility

391900E 391920E 391940E 391960E 391980E 392000E 392020E 392040E 392060E 392080E 392100E 392120E

164360N 164340N 164320N 164300N 164280N 164260N 164240N 164220N

Sandridge Common (A3102)

Post & Rail Fence 1m Hi

Post & Wire Fence 1m Hi

Hedgerow

Grass

Asphalt

Concrete

Concrete Slabs (Chamber)

Water Trough

Water Riser

Electric Cabinet

Gas

Gully

Manhole

Inspection Cover

Kerb

Sign

Post

Gate

Fence

Retaining Wall

Boundary

Ditch

Bollard

Tree

Hedge

Bush

Shrub

Kerb Line

Edge of Road

Footway

Carriageway

Centre Line

Lamp Post

Telegraph Pole

Traffic Light

Traffic Sign

Bollard


392080E
392100E
392120E
392140E
392160E
392180E
392200E
392220E
392240E
392260E
392280E
164360N
164340N
164320N
164300N
164280N
164260N
164240N
164220N
Sandridge Common (A3102)
Eastern Way
Post & Rail Fence 1m high
Triangular Post & Rail Structure over Ditch 1mH 2.7m
Post & Wire Fence 1.5m
Pipe with In Hedgerow 225mm
Concrete Slabs (Chamber)
Chainlink Fence 1.5m
Hedgerow
Grass
Asphalt
Trees & Bushes
Overhead Line
Block Paving
Building 1
Building 2
Building 3
Building 4
Building 5
Building 6
Building 7
Building 8
Building 9
Building 10
Building 11
Building 12
Building 13
Building 14
Building 15
Building 16
Building 17
Building 18
Building 19
Building 20
Building

Appendix 3 – Hydrological Assessment

New Farm, Melksham - Onsite and Bounding Watercourse Hydrological Assessment

Project:	SHF.102.003.HY.R.006.C - New Farm, Melksham
For:	Bloor Homes Limited
Status:	Issued as Final
Date:	September 2025
Author:	Joao Gil BSc, MSc, GMICE - Civil Engineer
Reviewer:	Helena Du-Roe BSc [Hons], MSc, MCIWEM, C.WEM - Principal Hydrologist
Approver:	Eric O'Connor BSc [Hons], MSc, MCIWEM, C.WEM - Associate Director

Non-Technical Summary

This Technical Note details the baseline hydrological inflows to be applied to the Enzygo Ltd 1D2D hydraulic model for New Farm, Melksham, which has been used to determine the baseline flood risk to the Site. The model has subsequently been used to run a number of proposed scenarios for the Site with amended flows to account for Site drainage.

This Technical Note should be read in conjunction with Enzygo Ltd Report: SHF.102.003.HY.R.004.B: New Farm, Melksham - Hydraulic Modelling Report, which details the results of the baseline model runs.

This Technical Note details the delineation of the catchment, confirmation of catchment descriptors and derivation of flows from the ReFH2 method.

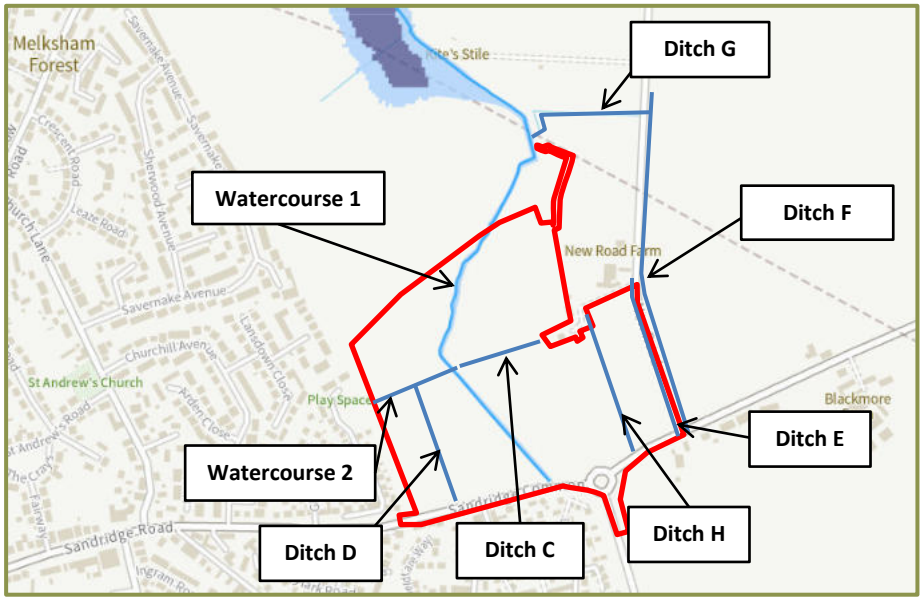
1. Introduction

Background

Enzygo Ltd was commissioned by Bloor Homes Limited to undertake a hydraulic modelling exercise to determine, and refine, mapped flood extents associated with onsite and bounding watercourses (Figure 1.1). The study area is centred at NGR 391963, 164531 and is proposed to be a residential development.

A network of watercourses in located onsite and bounding the Site. The location of which are shown in Figure 1.1.

Figure 1.1: Modelled Watercourses



Site Flooding History

As part of the Flood Risk Assessment works for the Site, a consultation was undertaken with the Environment Agency and Lead Local Flood Authority (Wiltshire Council) and there is no history of flooding within the Site boundary (Appendix 1).

2. Purpose of the Technical Note

The purpose of this Technical Note (SHF.102.003.HY.R.006.A, April 2025) details the methodology and results of a hydrological assessment, which represent the peak flow inputs to the model.

The Environment Agency Flood Estimation Calculation Report Template (LIT 65087) has been reviewed and been used to influence this hydrological assessment. This report discusses the following methos of flood estimation due to the small scale of the catchment:

- The FEH statistical method - An "improved" set of procedures has replaced most of the original 1999 FEH statistical methods for ungauged sites; and
- The Revitalised Flood Hydrograph (ReFH2) method - This has replaced the original 1999 FEH rainfall-runoff method for most applications. ReFH2 uses a similar rainfall-runoff model as ReFH1 but with improved procedures for estimating model parameters and defining the design storm.

3. Initial Choice of Approach

Based off modeller experience the methodology assumed to provide the most representative flows will be those derived from the FEH statistical method. This is due to being able to introduce a donor gauging station to assist with flow derivation, while taking into account a number of catchment descriptors (these will be checked to ensure they are representative of the catchment).

Hydrograph shapes will be derived from ReFH2, given that observed data is not available for this catchment at the detailed inflow locations.

The ReFH2 method will also be used to derive peak flow estimate for comparison against the FEH statistical flows.

It should be noted that the most conservative flows will be used for the modelling exercise to account for a worst case scenario.

4. Catchment Hydrology

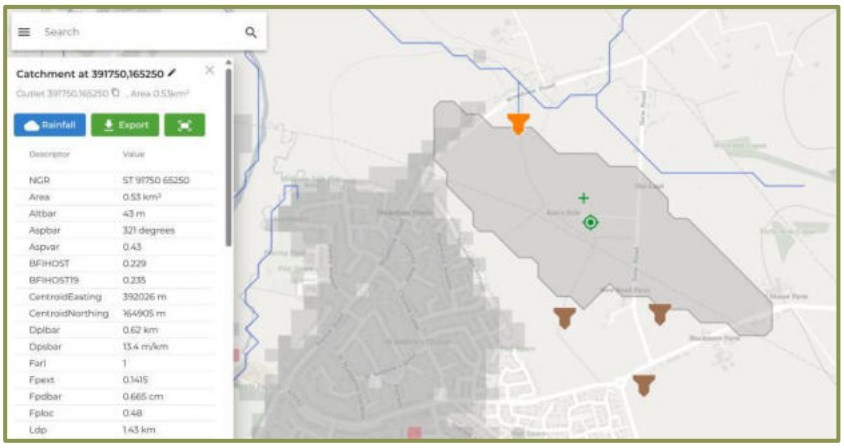
River Basin District

The Site resides within the Severn River Basin District (RBD) and the Avon Bristol and North Somerset Streams Management Catchment. The climate change allowances within the Avon Bristol and North Somerset Streams Management Catchment are 26% ('Central' estimate), 39% ('Higher End' estimate) and 71% ('Upper End' estimate) for the Total Potential Change anticipated by the 2080's[1].

Catchment Boundary

The FEH Webservice was used to establish if catchments were available for the model domain. It was established that a catchment was not available at the downstream extent of the model. The nearest available catchment was at NGR 391750, 165250 (Figure 4.1).

Figure 4.1: FEH Catchment at NGR 391750, 165250



As such, due to the lack of an available catchment for the modelled watercourse extent (Figure 4.2) this has been derived by using KTF software (using 1m DTM LiDAR). This is where analysis of available LiDAR data has been undertaken to generate watershed catchments. The watershed catchment and associated sub-catchments are shown in Figure 4.3 and Drawing 001.

It was assessed that the catchment and sub catchments were representative at the time this assessment was undertaken.

Hydrological understanding of the catchment

The catchment is relatively small (0.88km^2) and shown to be drained by a comprehensive network of drains and watercourses. The length of drains is relatively extensive in proportion to the size of the catchment and therefore a rapid rainfall-runoff response is expected. In addition to this, the bottom urban areas of the catchment (to the south of the A3102) do not appear to have any form of formal attenuation, which will inevitably sharpen the hydrographs that reach the natural network of drains.

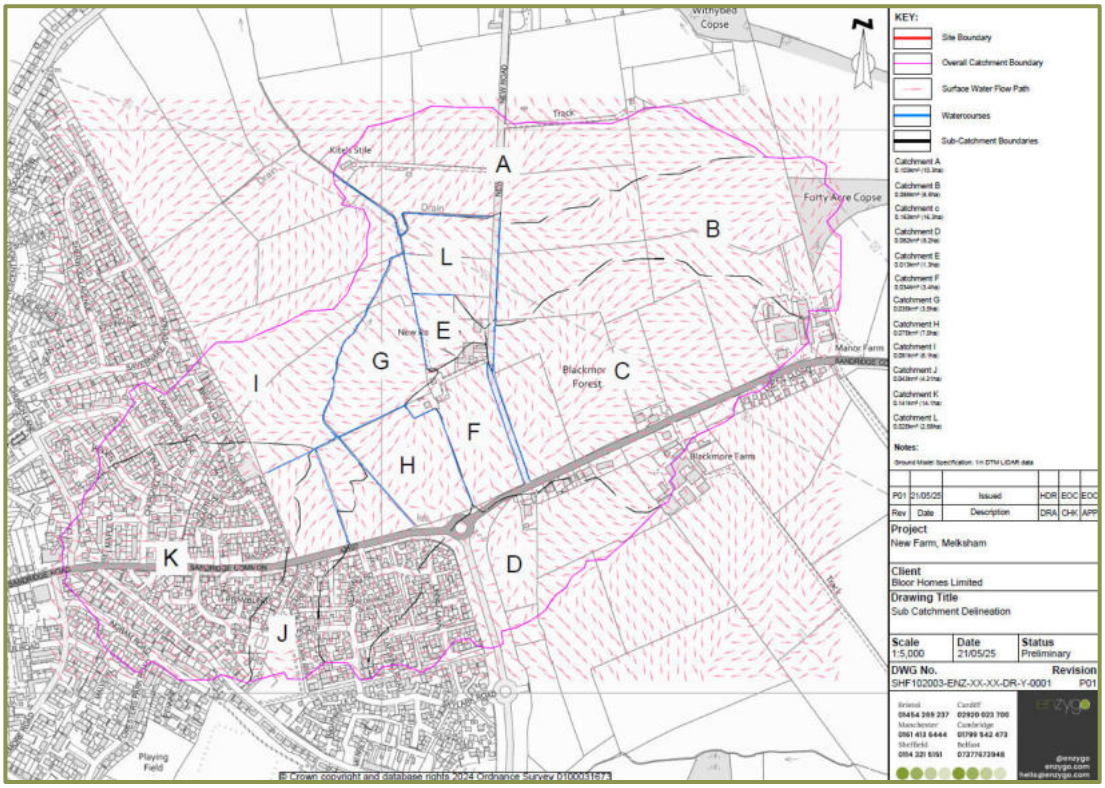
Given the size of the catchment, it is unlikely that baseflow has a significant impact on the overall flood mechanism. Model inflows will be added at appropriate locations within the model domain wherein it is assumed that all flows have made it to the inflow locations (to present a worst-case scenario).

[1] https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances

Figure 4.2: Modelled Watercourse Extent



Figure 4.3: Catchment Delineation



Catchment Watercourse Network

OS mapping (Figure 4.4) shows an unnamed watercourse originating from issues in the south of the Site hereafter referred to as 'Watercourse 1'. Watercourse 1 is a 'Main River' under the authority of the Environment Agency. The presence of Watercourse 1 was confirmed during the Site walkover with walkover observations described below.

i. Watercourse 1

Watercourse 1 conveys flow north through the centre of the Site, originating through a Ø600mm culvert along the central southern boundary.

The channel was uniform in shape throughout its reach with approximately 1m bed width, 3.5m top of bed, 1.5m depth and approximately 1:3 side slopes.

Watercourse 1 was observed to be dry and heavily vegetated which is considered normal for the time of year (June 2023).

ii. Watercourse 2

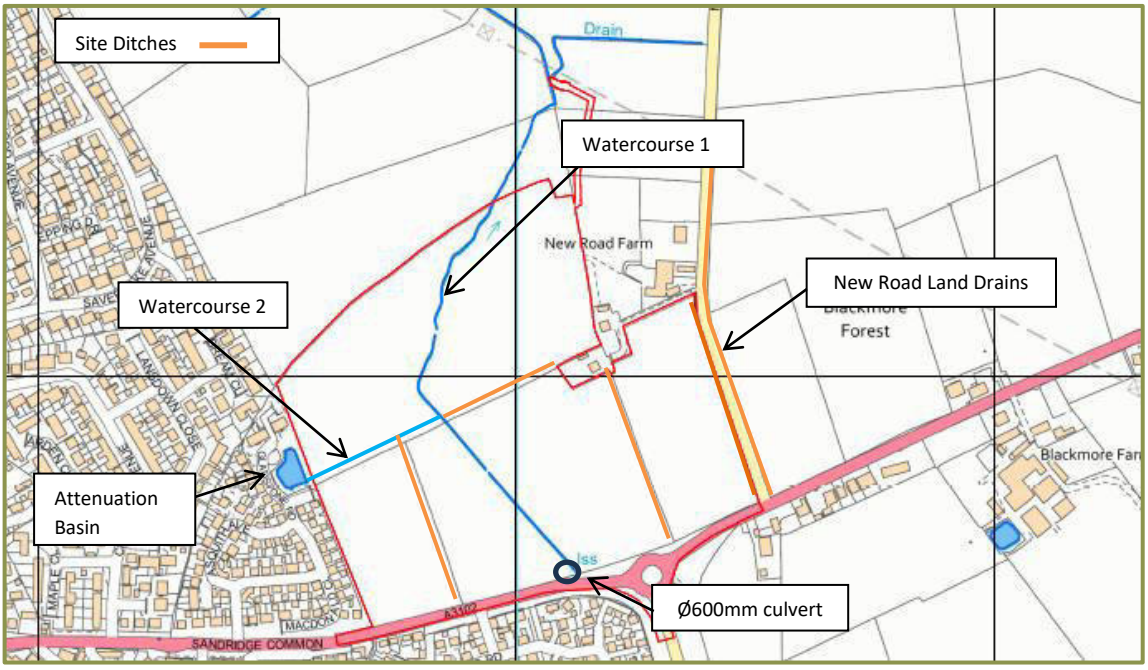
A second watercourse was observed conveying flows east through the centre of the Site ('Watercourse 2'). The watercourse was observed to originate at the balancing pond from the adjacent development to the west of the Site. The balancing pond of the adjacent development has been sized to attenuate the 1 in 100-year storm event with discharge at the QBAR rate of 15.4l/s. Watercourse 2 joins Watercourse 1 within the centre of the Site.

iii. Land Drains

Two land drains were also observed along the Site's eastern boundary along New Road. The land drain conveyed flows north along New Road.

There were several ditches acting as informal field boundary ditches within the hedgerows. They were dry and contained grass at the time of the walkover.

Figure 4.4: Map of Watercourses



Unusual Catchment FeaturesCatchment Descriptors

It was not possible to delineate the catchments shown in Figure 4.4 using the FEH Webservice to derive catchment descriptors. As such, the nearest catchment at NGR 391750, 165250 has been used as a 'donor catchment' for its descriptors. These descriptors have been reviewed (as detailed below) and updated accordingly for the model catchment upstream, which is to be carried forward for this assessment.

The revised catchment descriptor is shown in Table 4.1.

Table 4.1: Revised Catchment Descriptors from the FEH Webservice Catchment

Catchment Descriptor	Value	Catchment Descriptor	Value	Catchment Descriptor	Value
AREA	0.53 **(0.8869)**	PROPWET	0.34	D1	0.36182
ALTBAR	43	RMED-1H	10.2	D2	0.41297
ASPBAR	321	RMED-1D	32.3	D3	0.24758
ASPVAR	0.43	RMED-2D	44.4	E	0.288
BFIHOST	0.229	SAAR	710	F	2.44449
BFIHOST19	0.235	SPRHOST	52.28	C(1 km)	-0.026
DPLBAR	0.62	URBCONC1990	-99999	D1(1 km)	0.361
DPSBAR	13.4	URBEXT1990	0.0024 **(0.09)**	D2(1 km)	0.414
FARL	1	URBLOC1990	-99999	D3(1 km)	0.247
FPEXT	0.1415	URBCONC2000	0	E(1 km)	0.288
FPDBAR	0.665	URBEXT2000	0.0071**(0.18)**	F(1 km)	2.445
FPLOC	0.48	URBLOC2000	0.588		
LDP	1.43	C	-0.026		

*Adjusted values are shown in **red***

BFIHOST

BFIHOST is the baseflow index developed using the Hydrology of Soil Types (HOST) classification and is the baseflow proportion of the flow on average. It is estimated based on daily mean flow data. Baseflow comprises water entering the watercourse through shallow subsurface flow and groundwater flow; hence permeable soils and geology tend to yield a higher baseflow. The National Soils Resources Institute (Cranfield University) mapping (Figure 4.5) and British Geological Survey mapping (Geology of Britain Viewer [Figure 4.6]) were reviewed to verify the BFIHOST value.

Figure 4.5: Soilscapes Mapping



Figure 4.6: Geology of Britain Mapping



The National Soils Resources Institute (Cranfield University) Soilscapes map shows a single soil type across all catchments; 'Soilscapes 18: Slowly permeable, seasonally wet, slightly acid but base-rich loamy and clayey soils.'. It should be noted that the area of white on Figure 4.5 is due to WMS data not working in this area. This area is the same as the remainder of the catchment.

The bedrock underlaying the catchment is the Oxford Clay Formation – Mudstone.

Based on the above the BFIHOST and BFIHOST19 value is considered representative of the catchment.

PROPWET

PROPWET describes the proportion of time that soils are wet. PROPWET values for the UK range from approximately 0.80 in Northern Scotland where there is high annual rainfall, to 0.20 in East Anglia where annual rainfall is much lower.

Low PROPWET values tend to inhibit flooding, as the catchment is not saturated prior to a flood event and there is higher capacity for infiltration, the opposite is true for catchments with higher PROPWET values. The PROPWET value of 0.34 for the catchment is moderate to high, and may be explained by the following factors:

- Wet spells only occur at a moderate frequency and tend to be of a relatively short duration (supported by the SAAR figures below);

The PROPWET values taken from the FEH Webservice are considered reasonable for the catchment.

FARL

The FARL value is a measure of flow attenuation caused by reservoirs and lakes, and ranges from 0 (total attenuation) to 1.0 (no discernible attenuation). The FARL value of 1 indicates no attenuation due to reservoirs or lakes. Scrutiny of OS mapping and the FEH webservice map did not highlight any waterbodies within the catchment.

Albeit there is an attenuation basin serving the residential estate at Gladstone Road, this area will be removed from the FEH Statistical and ReFH2 calculations. This approach is described in further detail in the section 8 of the present report.

The FARL value of 1 taken from the FEH Webservice data is therefore considered representative of the catchment.

URBEXT

The URBEXT values are currently representative of the donor catchment. These have been updated to reflect the URBEXT1990 and URBEXT2025 values to the derived catchment. The areas of urbanisation within the catchment are shown in Figure 4.7.

The Urban Extent URBEXT1990 (the oldest aerial imagery is from 2002 and has been the most appropriate for this segment of the assessment) output of 0.09 (equivalent to 0.123km^2 of urban area) indicates a 'moderately urbanised' catchment. The FEH catchment descriptor URBEXT2000 (inclusive of an uplift to 2025) was calculated to be 0.15 (equivalent to 0.253km^2 of urban area), which also indicates a 'heavily urbanised' catchment. The latest aerial imagery is from 2023 and has been deemed the most appropriate for this segment of the assessment. URBEXT was calculated by estimating the URBAN parameter for the year of 2025, which was then converted into an updated version of URBEXT2000.

The urbanisation model in ReFH2 is based upon the basic urbanisation model by Kjeldsen[2]. It is assumed that the urban influence is captured by the revised URBEXT2000 parameter.

[2] Kjeldsen, T.R., Miller, J.D., & Packman, J.C. 2013. Modelling design flood hydrographs in catchments with mixed urban and rural land cover. Hydrology Research, 44(6), 1040-1057.

Figure 4.7: Areas of Urbanisation



***Top**: '1990' URBEXT1990 Urban Areas **Bottom**: 'Latest' URBEXT2000 Urban Areas. Urban Areas can be identified by the yellow polygons on the figure*

SAAR

SAAR values within the FEH represent standard average annual rainfall data for the standard period 1961-1990.

The catchment is in the centre of England where rainfall levels are moderate when compared to the remainder of the country.

Values of 710 is indicate of a moderately wet catchment. Given the catchment location within the country, the SAAR values taken from the FEH Webservice are considered conservative and will be carried forward in this assessment.

DPSBAR

The Drainage Path Slope (DPSBAR) shows a value of 13.4 m/km, which indicates a moderately steep catchment. This is supported by a review of OS mapping and LiDAR. The DPSBAR value taken from the FEH Webservice is considered representative of the catchment.

Given the small dimension of the catchment, a thorough assessment of the DPSBAR was undertaken. A total of 7 watercourses were assessed, and the average slope of the various streams (averaged by the length) was estimated as 6.74 m/km. This value will be taken forward in this assessment.

DPLBAR

The DPLBAR shows a value of 0.62km, typical of small catchments. This parameter was however reviewed by weighing the length of each watercourse to the respective catchment area, with the revised DPLBAR estimated as 0.49km.

FPEXT

The FPEXT parameter translates the fraction of the catchment estimated to be inundated by the 1 in 100-year return period. The catchment descriptors show a FPEXT of 0.1415.

This parameter was revised and estimated as 0.073, by comparing the Environment Agency's Flood Map for Planning dataset with the total area of the catchment.

5. FEH Statistical Method (Adjusted Catchment)

Introduction

To determine the most appropriate hydrological methodology for the adjusted catchment, the peak flood flows from FEH Statistical and ReFH2 methodologies were assessed for the catchment, inclusive of adjustments to BFIHOST, SPRHOST and AREA.

Following the FEH Statistical and ReFH2 assessments, justification will be provided for the carry forward method to be utilised for peak flow assessments for the compartmentalised catchment.

The FEH Statistical Method is based on an Index Flood, which is the median annual maximum flood from Catchment Descriptors and then improving this using data from an appropriate Gauging Station (if available). This reduces the error associated with the estimation of QMED using only Catchment Descriptors. QMED is formally defined as the middle-ranking value in the series of annual maximum floods, where the annual maximum series comprises, the largest flow observed in each year. QMED is the flood that is exceeded on average "every other year" and can therefore loosely be attributed a return period of 1 in 2-years.

QMED Estimation using Donor Stations

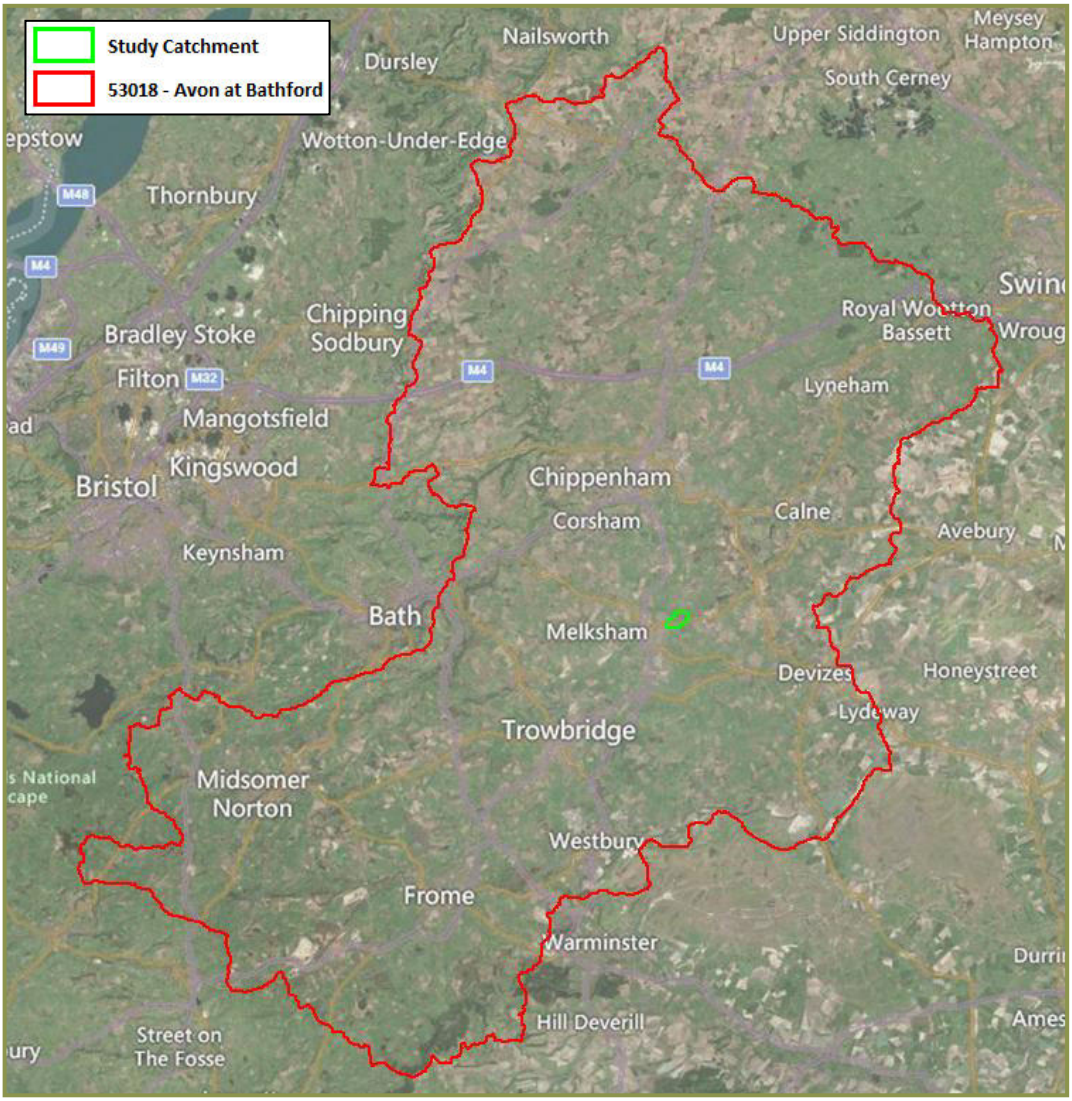
The study catchment is not directly gauged at the catchment outlet (or upstream/downstream of the adjusted catchment); however, WINFAP-FEH v5 identified the following gauging stations as being suitable for QMED estimation.

- **53018 – Avon at Bathford**: The station has a catchment area of 1552km^2 and is listed as being suitable for QMED [3], with a 54-year record.

The study catchment and its proximity to those listed above are shown in Figure 5.1.

[3] https://nrfa.ceh.ac.uk/data/station/info/53018

Figure 5.1: Gauging Station Catchment Location Comparisons



A comparison of key catchment descriptors for the study catchment against the gauging station that are deemed suitable for QMED estimation (obtained from the NRFA webpage [4]) are presented in Table 5.1.

Table 5.1: Catchment Descriptor Comparison - Avon at Bathford

Catchment Descriptor	Study Catchment Descriptors	Avon at Bathford Gauging Station
AREA	0.53 **(0.88)**	1552
BFIHOST	0.229	0.575
BFIHOST19	0.235	0.586
FARL	1	0.985
PROPWET	0.34	0.34
SAAR	710	817
SPRHOST	52.28	31.1
URBEXT2000	0.0071 **(0.18)**	0.0298

*Adjusted values are shown in **red***

[4] https://nrfa.ceh.ac.uk/data/station/peakflow/530148

FEH statistical software provided a number of additional donor stations to consider for the flow calculations for the catchment. All stations are listed below with reasons for acceptance or refusal also detailed:

- 53018 – Avon at Bathford – **Rejected**. Removed as AREA, FARL and URBEXT2000 values are not comparable.
- 53002 – Simington Brook at Semington – **Rejected**. Removed as FARL, BFIHOST and URBEXT2000 values are not comparable.
- 53013 – Marden at Stanley – **Rejected**. Removed as FARL and URBEXT2000 values are not comparable.
- 53029 – Biss at Trowbridge – **Rejected**. Removed as FARL and URBEXT2000 values are not comparable.
- 53028 – By Brook at Middlehill – **Rejected**. Removed as FARL and URBEXT2000 values are not comparable.
- 43017 – West Avon at Upavon – **Rejected**. Removed as BFIHOST and URBEXT2000 values are not comparable.
- 43028 – Chitterne Brook at Codford – **Rejected**. Removed as BFIHOST and URBEXT2000 values are not comparable.
- 39037 – Kennet at Marlborough – **Rejected**. Removed as BFIHOST and URBEXT2000 values are not comparable.
- 53008 – Avon at Great Somerford – **Rejected**. Removed as FARL and URBEXT2000 values are not comparable.
- 53023 – Sherston Avon at Fosseway – **Rejected**. Removed as FARL and URBEXT2000 values are not comparable.

QMED Comparison

Figure 5.2 shows the comparison for QMED from donor stations and catchment descriptors for the catchment.

Figure 5.2: QMED Comparison

Method	QMED (m^3/s)	
	Rural	Urban
Method 1 Donor adjustment	0.470	0.528
Method 2 Catchment Descriptors	0.452	0.508

QMED Choice Going Forwards

Based on the above QMED and flows for the catchment will be derived from catchment descriptors.

Pooling Group Analysis

The pooling group analysis and QMED estimation (based on catchment descriptors) is described below. WINFAP FEH v5 software (Version 5.2.9046 [25885]) and the NRFA Peak Flow v13.0.2 dataset was used the undertake the assessment. Outputs from FEH statistical can be viewed in Appendix 2.

To estimate the magnitude of the statistical flood events occurring within the ungauged (adjusted) catchment, it is necessary to determine a flood growth curve and a flood frequency curve. This is done by forming a pooling group, which is a group of hydrologically similar catchments across the UK which have gauged records covering a statistically adequate number of years to obtain reliable flood estimates and subjecting this group to statistical analysis.

To calculate reliable flood estimates, the FEH recommends that a pooling group should contain five times as many station-years as the target return period (5T) however, the 'Improved Statistical Method' (2008) recommends that a fixed pooling group size of at least 500 annual maxima events should be used for all return period events. This revised advice has been adopted in this instance.

The FEH Webservice catchment descriptors in Table 2.1 were imported into the WINFAP-FEH v5 and a pooling group with 552 years of data was created (Figure 5.3).

It should be noted that URBEXT has been applied as per default to the pooling groups, as per available Environment Agency guidance. With the default Urban Adjustment Factor (UAF) being applied as per that calculated in the FEH statistical software. The urban adjustment procedures in WINFAP are based on those published by Kjeldsen[5] (2010).

The initial pooling group was identified as 'heterogeneous' and a review of the pooling group is 'desirable'.

Upon review of the discordancy parameters, station ref. '49005 – Bolingey Stream at Bolingey' was found to present the only discordancy number above 3.0. Upon review of the catchment descriptor graphs, this station did not apparently present any descriptor abnormally "distant" from the study catchment and therefore it was kept in the pooling group.

Catchments ref. '26016 – Gypsey Race at Kirby Grindalythe' and '47002 – Tory Brook at Newnham Park' were found to have BFIHOST19 values above 0.9 and high discordances, close to 3.0. Therefore, these sites were removed from the pooling group in an attempt to improve heterogeneity. However, upon replacement of these two stations by two stations with similar SDM's, it was found that the heterogeneity worsened with no obvious benefit to the pooling group. Therefore, both stations were reintroduced in the pooling group, which was kept unchanged.

Figure 5.3: Initial/Final Pooling Group

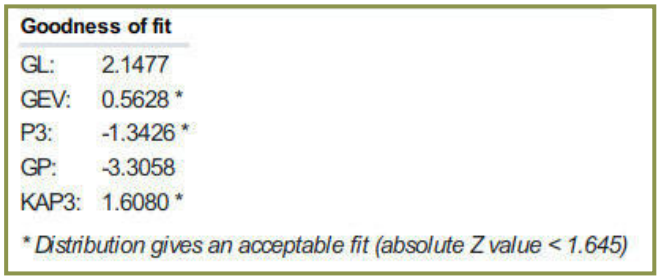
Pooling group AM data							
Station	Distance	Years of data	QMED AM	L-CV Observed	L-CV Deurbanised	L-SKEW Observed	L-SKEW Deurbanised
76011 (Coal Burn @ Coalburn)	1.334	46	1.826	0.170	**0.170**	0.296	**0.296**
27073 (Brompton Beck @ Snainton Ings)	1.747	43	0.812	0.212	**0.213**	0.033	**0.032**
27051 (Crimple @ Burn Bridge)	1.836	51	4.564	0.217	**0.217**	0.142	**0.141**
45816 (Haddeo @ Upton)	2.221	30	3.352	0.288	**0.289**	0.408	**0.407**
25019 (Leven @ Easby)	2.286	45	5.090	0.341	**0.342**	0.373	**0.372**
26016 (Gypsey Race @ Kirby Grindalythe)	2.288	26	0.100	0.318	**0.318**	0.253	**0.253**
28033 (Dove @ Hollinsclough)	2.521	48	4.138	0.235	**0.235**	0.367	**0.367**
49005 (Bolingey Stream @ Bolingey Cocks Bridge)	2.545	13	4.072	0.274	**0.275**	0.295	**0.294**
27010 (Hodge Beck @ Bransdale Weir)	2.595	41	9.420	0.224	**0.224**	0.293	**0.293**
44008 (South Winterbourne @ Winterbourne Steepleton)	2.673	32	0.572	0.405	**0.406**	0.254	**0.254**
7009 (Mosset Burn @ Wardend Bridge)	2.762	25	7.053	0.365	**0.365**	0.329	**0.329**
36010 (Bumpstead Brook @ Broad Green)	2.771	56	7.855	0.348	**0.350**	0.107	**0.106**
26014 (Water Forlornes @ Driffield)	2.847	25	0.424	0.318	**0.319**	0.205	**0.204**
47022 (Tory Brook @ Newnham Park)	2.904	28	6.134	0.243	**0.245**	0.163	**0.160**
Total		509					

[5] Kjeldsen, T.R. 2010. Modelling the impact of urbanization on flood frequency relationships in the UK. Hydrology Research, Volume 41, Issue 5, 391-405

The pooling group is classed as 'heterogenous' and a review of the pooling group is 'desirable'. However, no further stations were identified with abnormal parameters or with a total number of years below 8. Where sensitivity testing was undertaken, the replacement of a station meant an increase in SDM, which does not lead to an improvement in the overall heterogeneity of the pooling group. As such, the reviewed pooling group (Figure 5.3) has been carried forward with no further reviews.

Generalised Logistic (GL), Generalised Extreme Value (GEV), Pearson Type III (PTIII), Generalised Pareto (GP) and Kappa 3 fittings were used to determine goodness of fit (Figure 5.4).

Figure 5.4: Goodness of Fit



The FEH identifies the Gen Logistic (GL) distribution as the standard distribution in the UK. The results do however suggest the GEV is the best fit distribution, and will be carried forward in this assessment. The Pooling Group growth curve fittings and flood frequency curve fittings are included below in Table 5.2.

Table 5.2: Pooled Group Growth Fittings and Flood Frequency (GEV)

Return period	Growth Fittings	Peak Flow (m^3/s)
2	1.000	0.508
5	1.469	0.743
10	1.827	0.924
30	2.454	1.242
50	2.779	1.407
100	3.260	1.652
200	3.793	1.924
1000	5.271	2.685

6. ReFH2 Method

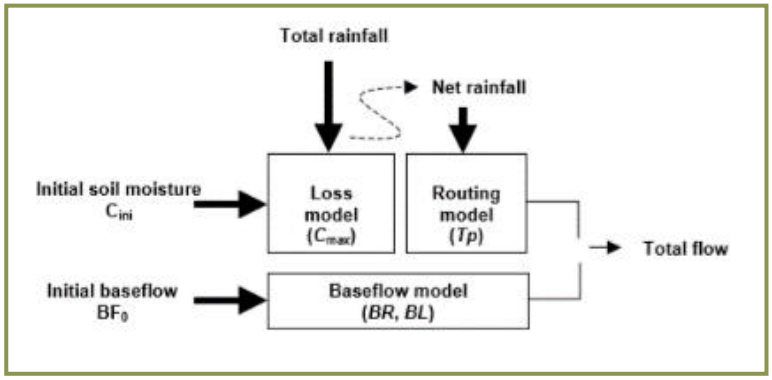
Introduction

The Revitalised Rainfall-runoff (ReFH) model was first published in 2005 as an update to the previous FEH rainfall-runoff method, the FSR/FEH rainfall-runoff method. ReFH was based on robust hydrological modelling techniques and was an improvement over the FEH/FSR Rainfall Runoff method (FEH), as described in the FEH. The method uses Catchment Descriptors from the FEH Webservice, to generate design flood events of specific return periods.

ReFH2 was released in early 2015, with a significant update (Version 2.1), published in November 2015. ReFH2 includes an extension of the ReFH model to represent urban catchments and is compatible with FEH2013 rainfall frequency statistics.

The ReFH model has three components: a loss model (Cmax), a routing model (Tp) and a base flow model (BR, BL) (Table 6.1). The loss model uses a soil moisture accounting approach to define the amount of rainfall occurring over the catchment that is converted to direct runoff. The rainfall losses are derived as the event unfolds, rather than being defined by a fixed value of percentage runoff. The routing component of ReFH uses the unit hydrograph concept, adopting a 'kinked' triangle as the standard shape. Finally, the base flow model is based on the linear reservoir concept with its characteristic recession defined by an exponential decay controlled by the recession constant termed base flow lag (Figure 6.1).

Figure 6.1: Schematic Representation of the ReFH Model



Source: Wallingford HydroSolutions Ltd 2016. The Revitalised Flood Hydrograph Model ReFH2.2: Technical Guidance.

Table 6.1: Summary of the Six ReFH Model Parameters

Name	Parameter or Initial Condition	Description
T_p	Model parameter	Unit hydrograph time to peak (hours)
B_L	Model parameter	Baseflow recession constant or lag (hours)
B_R	Model parameter	Baseflow recharge
C_{Max}	Model parameter	Maximum soil moisture capacity (mm)
C_{ini}	Initial condition	Initial moisture content (mm)
BF_0	Initial condition	Initial baseflow (m^3s^{-1})

Source: Wallingford HydroSolutions Ltd 2016. The Revitalised Flood Hydrograph Model ReFH2.2: Technical Guidance.

The ReFH2 calculations were undertaken within the ReFH2 standalone software to calculate peak flow estimates from catchment descriptors as provided in Table 6.1. The default rainfall

parameters derived by the FEH 2022 rainfall model were applied for the catchment. Calculation extracts for events run through the ReFH2 methodology are included in Appendix 3.

Storm Duration Estimation

The default rainfall parameters derived by ReFH2 from the FEH 2022 rainfall model were applied. A storm duration of 3.50-hours and a timestep of 0.50-hours were used. A Seasonal Correction Factor (SCF) of 0.66 and Areal Reduction Factor (ARF) of 0.98 were also applied. Calculation extracts are included in Appendix 3.

Peak Flow Estimation

In line with ReFH2 Method guidance, a winter seasonality (default storm profile) was selected, and flows were estimated for each required return period.

The default analysis for storm seasonality is as follows:

- Summer storms are selected by default if:
    - URBEXT2000 is ≥ 0.30, or
    - 0.15 ≤ URBEXT2000 < 0.30 and BFIHOST19 is ≥ 0.65.
- Winter storms are selected by default in all other cases.

The model parameters for the ReFH2 method should ideally be based on actual flood event data comprising rainfall and flow records rather than catchment descriptors alone. However, due to the lack of available flow data for the catchment, the ReFH2 design standards have been adopted in this instance based on the technical guidance. The key ReFH2 model parameter values are provided in Table 6.2. The peak flows calculated using the ReFH2 Method are summarised in Table 6.3. The plot-scale equations option was selected due to the presence of an intervening catchment.

Table 6.2: ReFH2 Parameters

Parameter	Unit	Value
BFIHOST19	-	0.225
BFIHOST	-	0.229
DPLBAR	km	0.49
DPSBAR	m/km	6.74
SAAR	mm	710
PROPWET		0.34
AREA	km^2	0.8869
Seasonality	-	Winter
T_p	Hours (hrs)	2.228
B_L	Hours (hrs)	25.404
B_R	-	0.22
C_{Max}	Millimetres (mm)	205.21
C_{ini}	Millimetres (mm)	154.13
BF_0	m^3/s	0.054
IRF	-	0.7
IF	-	0.4
T_p scaling Factor	-	0.75
Depression Storage Depth	mm	0.5

A climate change allowance of 26%, 39% and 71% has been added to the 1 in 100-year flow estimate representing the 'Central', 'Higher Central' and 'Upper End' estimate for the Total Potential Change for the 2080s (2070 to 2115) for the Avon Bristol and North Somerset Streams Management Catchment[6]. The inflows and hydrographs to be used for the hydraulic modelling exercise are detailed in Table 6.3.

Table 6.3: ReFH2 Method Peak Flows (Winter Profile)

Return Period	ReFH2 Flows (m^3/s)
2	0.667
5	0.942
10	1.143
30	1.482
50	1.659
100	1.927
200	2.239
1000	3.155

*Climate change Peak flow allowances for Avon Bristol and North Somerset Streams Management Catchment: Central, Higher Central and Upper End (2070 – 2115)

Summary of Results

Table 6.4 summarise the findings of the two hydrological methodologies. Figure 6.2 details a comparison of FEH statistical and ReFH2 flows, alongside the hydrographs for the ReFH2 calculations (full ReFH2 hydrographs can viewed in Appendix 4 and Figure 6.3).

Table 6.4: Summary of Results

Return Period	FEH Statistical method (Pooled Group Analysis –QMED Catchment Descriptors) (m^3/s)	ReFH2 Method (m^3/s)
2	0.508	0.667
5	0.743	0.942
10	0.924	1.143
30	1.242	1.482
50	1.407	1.659
100	1.652	1.927
200	1.924	2.239
1000	2.685	3.155
*100 +26%CC	2.082	2.472
*100 +39%CC	2.296	2.753
*100 +71%CC	2.825	3.460

* Climate change Peak flow allowances for Avon Bristol and North Somerset Streams Management Catchment: Central, Higher Central and Upper End (2070 – 2115[7])

[6] https://environment.data.gov.uk/hydrology/climate-change-allowances/river-flow?mgmtcatid=3005
[7] https://environment.data.gov.uk/hydrology/climate-change-allowances/river-flow

Figure 6.2: Graph Summary of Results

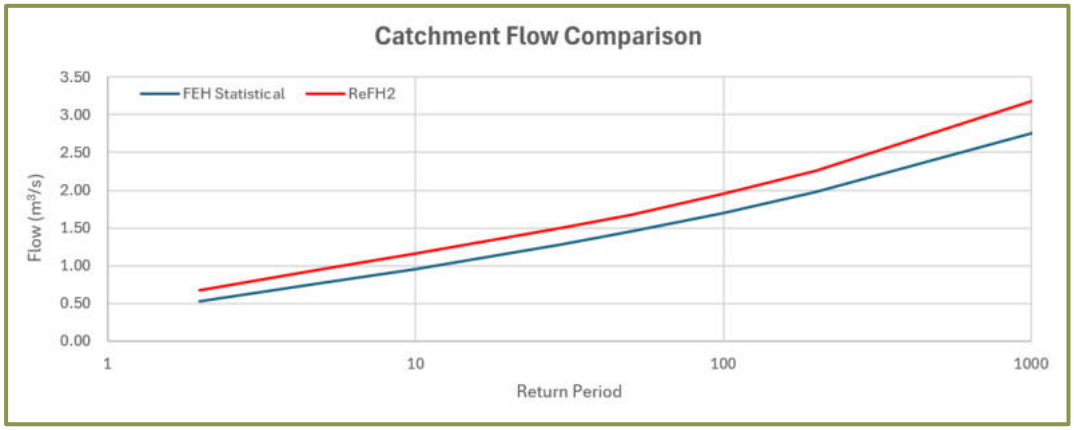
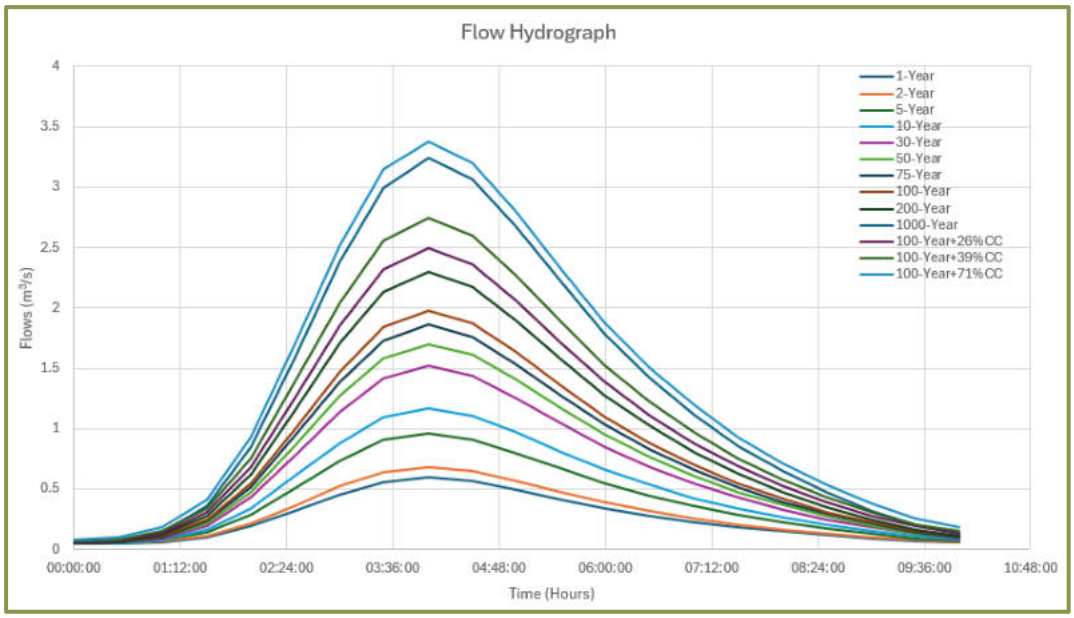


Figure 6.3: Peak Flow Hydrographs



7. Advantages and Limitations

The following advantages and limitations are associated with this study:

- Pooling groups are representative of study catchments.
- Catchments included in pooling groups are statistically homogeneous so that their (standardised) AMAX flows can be fitted by a single distribution. For pooling group analysis undertaken for permeable catchments, a number of stations included in the pooling group were less permeable and therefore may differ in their flood generating characteristics.
- There is no catchment flow data for catchment to verify the peak flow estimates generated by this assessment.

8. Conclusion

Choice of method and reasons

The chosen flows for the catchment are derived from the ReFH2 method due to:

- The presence of a highly urbanised catchment, where ReFH2 has the significant advantage of introducing an urban model for losses; and
- It is the most conservative estimate flows for the catchment.

In addition to this, ReFH2 provides hydrographs that can be used in hydraulic modelling and preserves the link between peak flows and volume. The flows carried forward are presented in Table 8.1.

As stated within the Flood Estimation Guidelines (LIT 11832) produced by the Environment Agency (December 2022) '*By its very nature, flood estimation is an uncertain science, and this uncertainty is probably greater than many hydrologists realise. Even many weeks of work won't produce a definitive statement on the magnitude of a 1% probability flood or the rarity of an observed event. These guidelines offer advice on identifying sources of uncertainty. They provide methods for calculating confidence limits for flood estimates derived using standard FEH methods.*'. As such, the methods used within this report are deemed to be the most suitable at the time the document was completed and deemed to be appropriate for the study that is being undertaken.

Table 8.1: Summary of Flows

Return Period	Input Flows (m^3/s)
30	1.48
100	1.93
1000	3.16
*100+26%CC	2.47
*100+39%CC	2.75
*100+71%CC	3.46

**Climate change Peak flow allowances for Avon Bristol and North Somerset Streams Management Catchment: Central, Higher Central and Upper End (2070 – 2115)*

How will the 0.1%AEP flows be estimated?

ReFH2 was tested up to a return period of 10,000 years and therefore the 1000-year peak flows were estimated directly via ReFH2.

How will the flows be applied to a hydraulic model?

For the purpose of the modelling exercise the catchment has been split down into a number of sub catchments, as shown in Figure 8.1. This will be used to apply lumped inflows to the model domain. The entire flow for the catchment will be prorated for each sub catchment and then applied at the locations shown in Figure 8.2. Flows are detailed in Table 8.2 with a percentage split of each sub catchment detailed below.

- Catchment A – 11.70%
- Catchment B – 9.66%
- Catchment C – 18.52%
- Catchment D – 9.32%
- Catchment E – 1.48%
- Catchment F – 3.86%

- Catchment G – 3.98%
- Catchment H – 8.52%
- Catchment I – 9.20%
- Catchment J – 4.89%
- Catchment K – 16.02%
- Catchment L – 2.84%

Figure 8.1: Sub Catchment Delineation

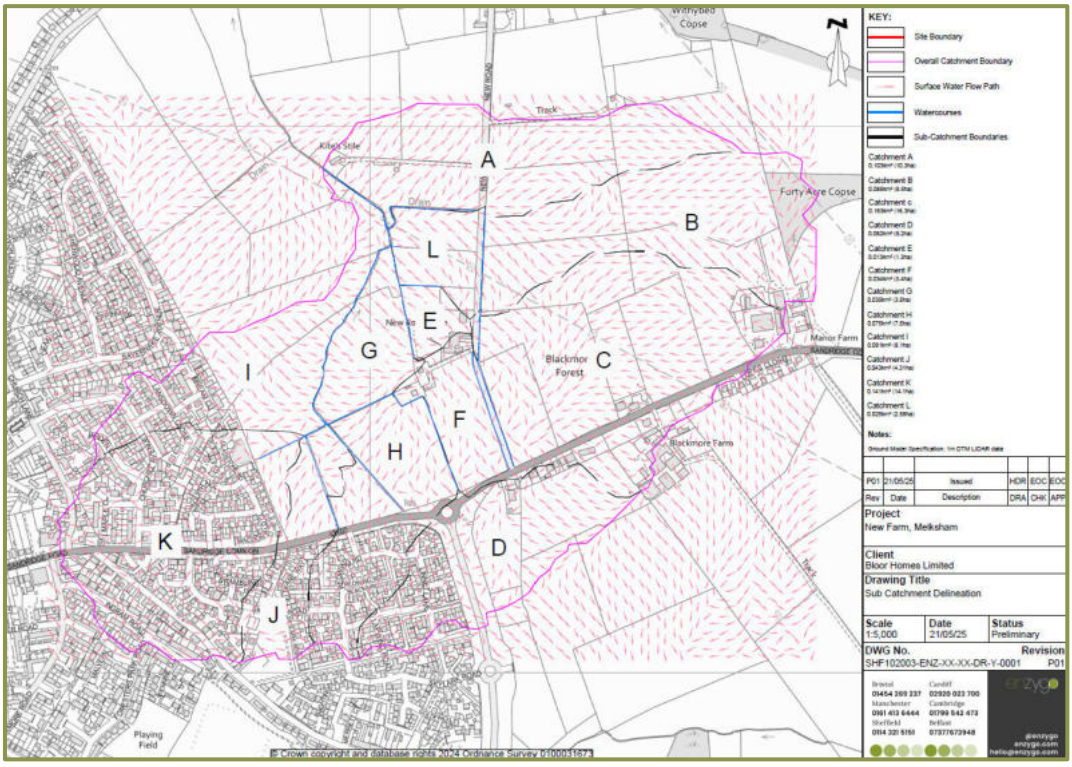
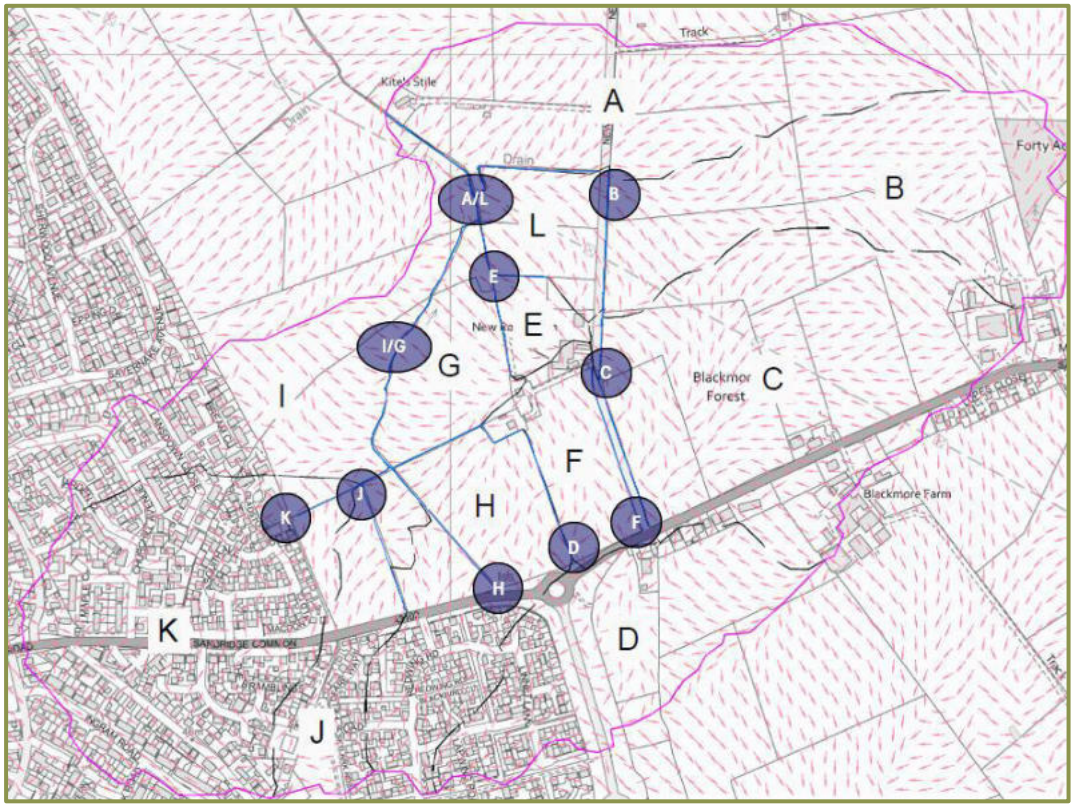


Figure 8.2: Sub Catchment Inflow Locations



Lumped inflow locations shown by blue circles

In terms of Catchment K, this is ultimately served by a detention basin at the downstream extent of the catchment and released at a controlled rate into the catchment a point K on Figure 8.2. Based on available planning documents an inflow of 0.0154m^3/s has obtained and has been added to account for the discharge from the basin within the catchment. This flow replaces part of the original Catchment K flows i.e. the flows generated within Gladstone Road development (0.032km^2), as shown in Table 8.2. Table 8.3 contains the amended flows for Catchment K for an area of 0.107km^2.

Due to the limited size of the Gladstone Road development, it is proposed that the ReFH2 hydrograph for the wider catchment are scaled to the maximum discharge rate for the 1 in 100-year released at Gladstone Road development (QBAR ~ 15.4 l/s), as an approach of establishing the contribution from the development.

Table 8.2: Sub-catchment Flows (m^3/s)

Return Period	A	B	C	D	E	F	G	H	I	J	K	L
30	0.18	0.15	0.28	0.14	0.02	0.06	0.06	0.13	0.14	0.07	0.24	0.06
100	0.23	0.19	0.37	0.18	0.03	0.08	0.08	0.17	0.18	0.10	0.32	0.06
1000	0.38	0.31	0.60	0.30	0.05	0.13	0.13	0.28	0.30	0.16	0.52	0.09
*100+26%CC	0.29	0.24	0.46	0.23	0.04	0.10	0.10	0.21	0.23	0.12	0.40	0.07
*100+39%CC	0.32	0.27	0.51	0.26	0.04	0.11	0.11	0.23	0.25	0.13	0.44	0.08
*100+71%CC	0.40	0.33	0.63	0.31	0.05	0.13	0.13	0.29	0.31	0.17	0.54	0.10

Table 8.3: Sub-catchment Flows (m^3/s) – Amended

Return Period	A	B	C	D	E	F	G	H	I	J	K	L
30	0.18	0.15	0.28	0.14	0.02	0.06	0.06	0.13	0.14	0.07	0.18	0.06
100	0.23	0.19	0.37	0.18	0.03	0.08	0.08	0.17	0.18	0.10	0.25	0.06
1000	0.38	0.31	0.60	0.30	0.05	0.13	0.13	0.28	0.30	0.16	0.40	0.09
*100+26%CC	0.29	0.24	0.46	0.23	0.04	0.10	0.10	0.21	0.23	0.12	0.31	0.07
*100+39%CC	0.32	0.27	0.51	0.26	0.04	0.11	0.11	0.23	0.25	0.13	0.34	0.08
*100+71%CC	0.40	0.33	0.63	0.31	0.05	0.13	0.13	0.29	0.31	0.17	0.42	0.10

Checks

Various checks were undertaken to ensure results are sensible. The 1%AEP growth factor of 3.26 is in line with the growth factors presented in the Flood Studies Report No. 1 (1977), which are shown to vary between 1.9 and 3.5, depending on the region. It is also worth noting the proximity between the 1%AEP/0.1%AEP ratios between the FEH Statistical and ReFH2 methods. The results are included in Table 8.4.

Table 8.4: Growth Factor and 1%AEP/0.1%AEP ratio checks

FEH Statistical		REFH2	
1%AEP Growth Factor	1%AEP/0.1%AEP ratio	1%AEP Growth Factor	1%AEP/0.1%AEP ratio
3.26	1.62	-	1.64

The specific discharge rates for the return periods between the 2-year and 1,000-years are presented in Table 8.5. Albeit relatively moderate-high, the flows are compatible with loamy and clayey soils with slowly permeable soils.

There are no historic flood records in the area or other relevant studies for comparison of peak flows.

Table 8.5: Growth Factor and 1%AEP/0.1%AEP ratio checks

Return Period	Specific Discharge rate (l/s/ha)
2	7.60
5	10.72
10	13.01
30	16.87
50	18.89
100	21.94
200	25.50
1000	35.92

Assumptions and limitations

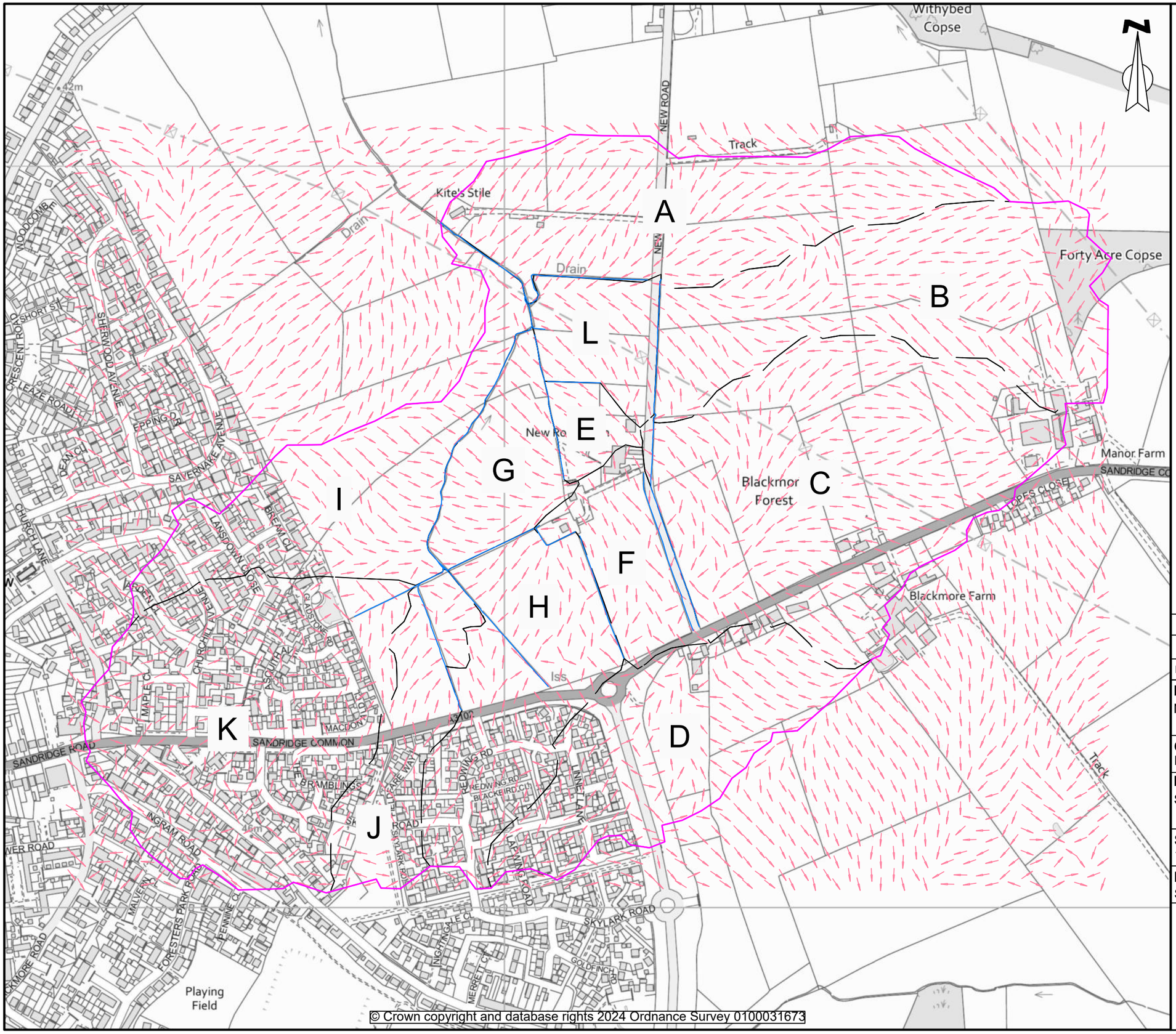
The main limitations of the study are:

- The relatively small nature of the catchment; and

- Its moderate-high urbanisation. Small catchments are not normally gauged, which introduces challenges in terms of model calibration, whilst moderate to high urbanised catchments may depend on topographic features and artificial control structures, harder to incorporate in statistical and rainfall-runoff models.

The lumped introduction of flows in small catchments is also a significant limitation that may artificially skew results. In an attempt to overcome this issue, peak flows were estimated at various locations, by sub-dividing the catchment in various sub-catchments (a total of 12 no. sub-catchments). This is to show a worst-case scenario in terms of fluvial flood risk for the Site.

DRAWINGS



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KEY:

- Site Boundary
- Overall Catchment Boundary
- Surface Water Flow Path
- Watercourses
- Sub-Catchment Boundaries

Catchment A
0.103km² (10.3ha)

Catchment B
0.085km² (8.5ha)

Catchment c
0.163km² (16.3ha)

Catchment D
0.082km² (8.2ha)

Catchment E
0.013km² (1.3ha)

Catchment F
0.034km² (3.4ha)

Catchment G
0.035km² (3.5ha)

Catchment H
0.075km² (7.5ha)

Catchment I
0.081km² (8.1ha)

Catchment J
0.043km² (4.31ha)

Catchment K
0.141km² (14.1ha)

Catchment L
0.025km² (2.58ha)

Notes:

Ground Model Specification: 1m DTM LIDAR data

Rev	Date	Description			
P01	21/05/25	Issued	HDR	EOC	EOC

Project
New Farm, Melksham

Client
Bloor Homes Limited

Drawing Title
Sub Catchment Delineation

Scale	Date	Status
1:5,000	21/05/25	Preliminary

DWG No. SHF102003-ENZ-XX-XX-DR-Y-0001 **Revision** P01

Bristol 01454 269 237
Cardiff 02920 023 700
Manchester 0161 413 6444
Cambridge 01799 542 473
Sheffield 0114 321 5151
Belfast 07377673948

enzygo
@enzygo
enzygo.com
hello@enzygo.com

APPENDICES

Appendix 1 – Regulator Correspondence

creating a better place

Environment Agency

Eric O'Connor
Enzygo
eric.oconnor@enzygo.com

Our ref: 306272-WX
Your ref: SHF.102.003
Date: 28 April 2023

Dear Eric

Thank you for your enquiry which was received on 29th March 2023. We respond to requests under the Freedom of Information Act 2000 and Environmental Information Regulations 2004.

Abstract

Name	Product 4
Description	Flood Risk Information for land at **New Farm, Sandridge Common, Melksham, SN12 7QY** NGR: ST9216664608
Licence	Open Government Licence
Information Warnings	*The mapping of features provided as a background in this product is © Ordnance Survey. It is provided to give context to this product. The Open Government Licence does not apply.*
Attribution	Contains Environment Agency information © Environment Agency and/or database rights. Contains Ordnance Survey data © Crown copyright 2020 Ordnance Survey 100024198.

Open Data

The following Environment Agency published datasets are now available on the weblink below as part of the Government's 'Open Data' project and are available for you to download free of charge.

Environment Agency published datasets: https://data.gov.uk/data/search?publisher=environment-agency&unpublished=false

You will need to search and select the name of the following datasets to take you directly to the weblink to enable you to download the data:

- Flood Map for Planning (Rivers and the Sea) – Flood Zones 2 and 3
- Flood Map for Planning (Rivers and Sea) – Areas Benefiting from Defences
- Flood Map for Planning (Rivers and Sea) Spatial Flood Defences
- Flood Map for Planning (Rivers and Sea) Flood Storage Areas
- Recorded Flood Outlines
- Historic Flood Map
- Risk of Flooding from Surface Water Extent for:
  - → 3 percent annual chance
  - → 1 percent annual chance
  - → 0.5 percent annual chance

You can also access the Flood Map for Planning here: https://flood-map-for-planning.service.gov.uk/

You can also access the Risk of Flooding from Surface Water maps and Risk of Flooding from Reservoirs information here: https://flood-warning-information.service.gov.uk/long-term-flood-risk/map

Recorded Historic Flood Events

We do not have any record of the area flooding from the river or sea. Please note, however, that this could mean either that the site has not flooded, or that the site has flooded, and we are not aware of the fact that the site has flooded.

Please note - we cannot guarantee that this is an exhaustive list of all past flood events in this location. All reasonable care has been taken to ensure that the historical flood event data is as accurate as possible. The Environment Agency will update its records if new evidence emerges.

2D Modelled Flood Plain Water Levels

The current flood map for planning has been informed by the S105 modelling from the S105 Level B study carried out by Posford Haskoning in 1997. We do not have any water level information available from this 1997 study. The Environment Agency plans to carry out improvements to its understanding of the flood risk in Melksham over the next few years. This will include updates to the existing flood hydrology which is outdated and updated flood outlines to inform the Flood Map for Planning.

For more information on climate change allowances please see the guidance on the Gov.UK website here: Flood risk assessments: climate change allowances - GOV.UK. **Please be aware that this information is subject to change, please check the guidance regularly.**

Environmental Permit for Flood Risk Activities

In addition to any other permission(s) that you may have already obtained e.g. planning permission, you may need an environmental permit for flood risk activities (formerly known as Flood Defence Consent prior to 06 April 2016) if you want to do work:

- in, under, over or near a main river (including where the river is in a culvert)
- on or near a flood defence on a main river
- in the flood plain of a main river
- on or near a sea defence

For further information and to check whether a permit is required please visit: https://www.gov.uk/guidance/flood-risk-activities-environmental-permits.

For any further advice, please email Blandford.frap@environment-agency.gov.uk.

Flood Asset Information

Please find enclosed details of Flood Assets within the area. This information has been taken from our Asset Information Management System database (AIMS).

Please note that flood defences can increase water levels elsewhere eg through channels being restricted by defences, or because defences prevent flood water flowing back into the river channel.

Planning

If you have questions regarding the planning nature of your enquiry, or require advice on floor levels, please contact our Sustainable Places team on SWX.SP@environment-agency.gov.uk.

Customer & Engagement, Wessex
Rivers House, East Quay, Bridgwater, Somerset, TA6 4YS
Email: wessexenquiries@environment-agency.gov.uk
www.environment-agency.gov.uk

Please be aware that we now charge for planning advice when consulted on pre-application enquiries. This new approach provides advice to developers in two ways. Firstly, there is the provision of 'free' advice available to everyone where we give a preliminary opinion on a proposed development. This sets out the environmental constraints together with any issues this raises for us. Should you wish us to review in detail any of these issues then we can do this through a chargeable scheme aimed at recovering our costs.

Strategic Flood Risk Assessment (SFRA)

When preparing a FRA to support a development proposal in this location you should refer to Wiltshire Council's SFRA Reports Level 1 which is available to download via the following link: https://www.wiltshire.gov.uk/media/5691/Strategic-Flood-Risk-Assessment-Level-1/pdf/Wiltshire_Council_Level_1_SFRA_v5.0.pdf?m=637459765054370000

The Wiltshire Council Local Plan is available via this link: https://www.wiltshire.gov.uk/planning-policy-local-plan-review-consultation

Further Information

We advise that you also contact the drainage engineer/ flood risk management team at Wiltshire Council by email: drainage@wiltshire.gov.uk, or by phone: 0300 456 0105, based at: Bythesea Road, Trowbridge, Wiltshire, BA14 8JN, as they may be able to provide further advice with respect to localised flooding and drainage issues.

Further details about the Environment Agency information supplied can be found on our website: https://www.gov.uk/browse/environment-countryside/flooding-extreme-weather

We hope you find this information helpful. It is provided subject to the attached notice 'Use of Environment Agency Information for Flood Risk Assessments', which we strongly recommend you read.

Yours sincerely

Corinne Moyse

Customer & Engagement, Wessex
Rivers House, East Quay, Bridgwater, Somerset, TA6 4YS
Email: wessexenquiries@environment-agency.gov.uk

Enc: Use of Environment Agency Information for Flood Risk Assessments (below)
306272-WX Defence Map
306272-WX Defence Data

Use of Environment Agency Information for Flood Risk Assessments (FRAs)

Important
Use of Environment Agency data: you should note that

1. Information supplied by the Environment Agency may be used to assist in producing a Flood Risk Assessment (FRA) where one is required, but the use of Environment Agency information does not constitute such an assessment on its own.

2. As part of your data request, we have provided all of the modelled data we hold for your location. Please note that some of our modelled information may have been produced for purposes other than for flood zone generation. This may mean that some of the modelled data you have been provided with has a lower confidence level, and has not been used in producing our flood map, nor definitively reflects the predicted flood water level at the property/development site scale. To check the suitability of the use of this information in your FRA please contact your local Partnership & Strategic Overview (PSO) team.

3. This information covers flood risk from main rivers and the sea, and you will need to consider other potential sources of flooding, such as groundwater or surface water runoff. The information produced by the Local Planning Authority and the Lead Local Flood Authority (LLFA) may assist in assessing other sources of flood risk.

4. Where a planning application requires a FRA and this is not submitted or deficient, the Environment Agency may well raise an objection.

5. For more significant proposals in higher flood risk areas, we would be pleased to discuss details with you ahead of making any planning application, and you should also discuss the matter with your Local Planning Authority.

Pre-Planning Advice from the Environment Agency
If you have requested this information to help inform a development proposal, then we recommend that you undertake a formal pre-application enquiry using the form available from our website:

Pre-application Preliminary Opinion:
https://www.gov.uk/government/publications/pre-planning-application-enquiry-form-preliminary-opinion

Pre-application Charged Service:
https://www.gov.uk/government/publications/planning-advice-environment-agency-standard-terms-and-conditions

Depending on the enquiry we may also provide advice on other issues related to our responsibilities, including flooding, waste, land contamination, water quality, biodiversity, navigation, pollution, water resources, foul drainage or Environmental Impact Assessment.

Flood Risk Assessment (FRA) Guidance
You should refer to the Planning Practice Guidance of the National Planning Policy Framework (NPPF) and the Environment Agency's Flood Risk Standing Advice for information about Flood Risk Assessment (FRA) for new development in the different Flood Zones. These documents can be accessed via:

National Planning Policy Framework Planning Practice Guidance:
http://planningguidance.planningportal.gov.uk/

Customer & Engagement, Wessex
Rivers House, East Quay, Bridgwater, Somerset, TA6 4YS
Email: wessexenquiries@environment-agency.gov.uk
www.environment-agency.gov.uk

Environment Agency advice on FRAs:
https://www.gov.uk/flood-risk-assessment-for-planning-applications#when-to-follow-standing-advice

https://www.gov.uk/government/publications/planning-applications-assessing-flood-risk

Customer & Engagement, Wessex
Rivers House, East Quay, Bridgwater, Somerset, TA6 4YS
Email: wessexenquiries@environment-agency.gov.uk
www.environment-agency.gov.uk

Eric O'Connor

From: Wilding, Ben <Ben.Wilding@atkinsrealis.com>
Sent: 24 July 2024 11:49
To: Eric O'Connor
Subject: RE: LAND AT NEW ROAD FARM, 240 NEW ROAD, MELKSHAM, SN12 7QY

Hi Eric
I would be in agreement that the below would be acceptable for the easement

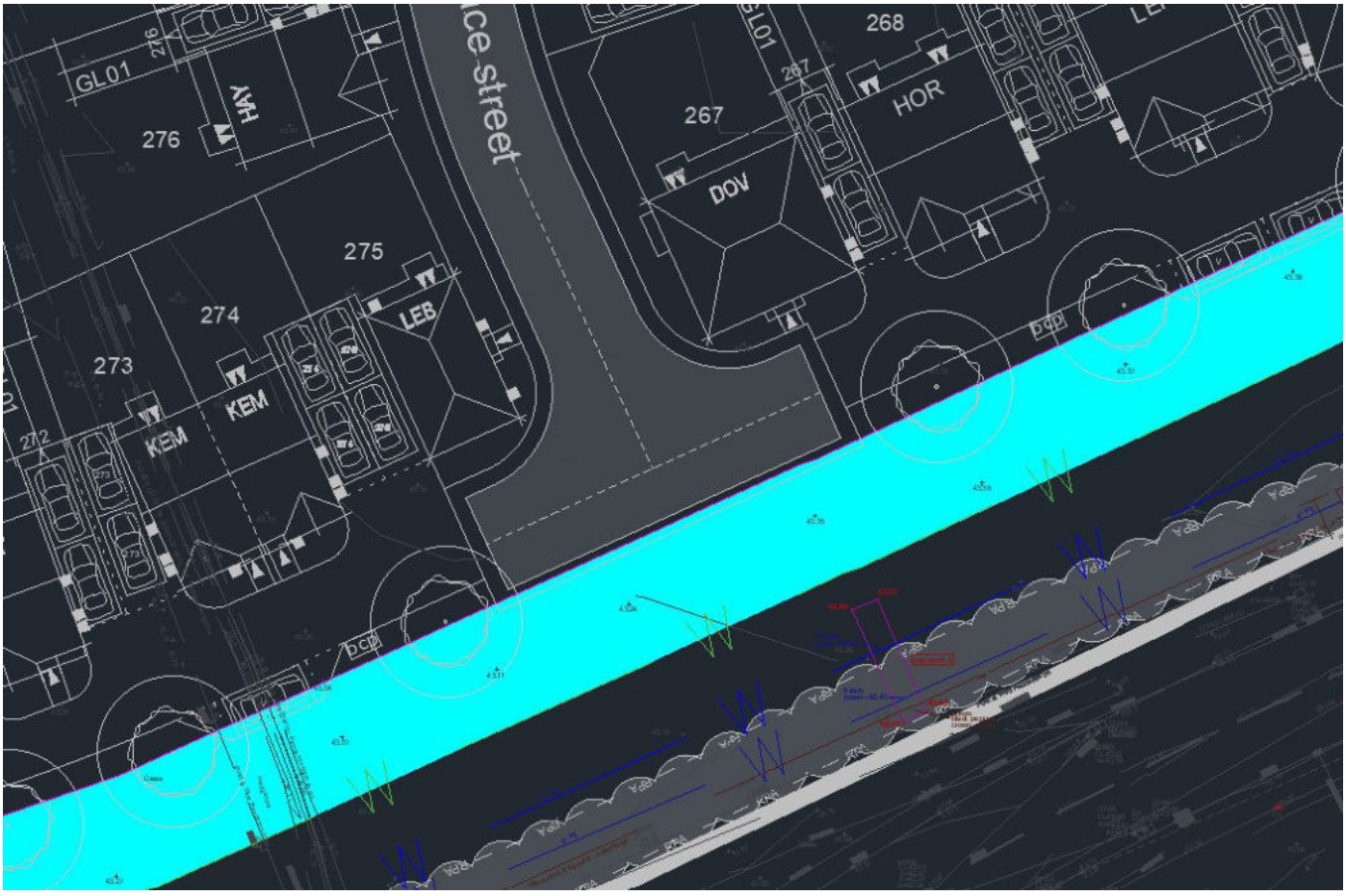
Kind Regards

Ben Wilding *MEng (Hons) CEng MICE*
Principal Civil Engineer

From: Eric O'Connor <eric.oconnor@enzygo.com>
Sent: Wednesday, July 24, 2024 11:40 AM
To: Wilding, Ben <Ben.Wilding@atkinsrealis.com>
Subject: RE: LAND AT NEW ROAD FARM, 240 NEW ROAD, MELKSHAM, SN12 7QY

Ben,

Thanks for the speedy response, very helpful. I have attached the masterplan which shows what would be in the swale easement. Some tree planting but sporadic so accessible, some car parking spaces and a road. There needs to be a minor shift of this north to make sure the car parking spaces etc are fully out of the designed swale but was wondering if you seek clarification on whether the attached would be acceptable in the swale easement.



Many thanks, and any questions let me know.

Kind Regards,

Eric

Eric O'Connor BSc (Hons), MSc, MCIWEM, C.WEM
Principal Hydrologist

Phone: 0114 321 5151
Mobile: 07710549218
Email: eric.oconnor@enzygo.com
Web: enzygo.com

From: Wilding, Ben <Ben.Wilding@atkinsrealis.com>
Sent: Tuesday, July 23, 2024 2:15 PM
To: Eric O'Connor <eric.oconnor@enzygo.com>
Subject: RE: LAND AT NEW ROAD FARM, 240 NEW ROAD, MELKSHAM, SN12 7QY

Hi Eric
I would suggest the pavement would be acceptable as per your below example. My understanding of an easement is that this is to ensure maintenance access for the future, and therefore you are correct that we would want to avoid buildings, fencing and significant planting which would impact on this.

Kind Regards

Ben Wilding MEng (Hons) CEng MICE

Principal Engineer
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Two Chamberlain Square
Birmingham, West Midlands, B3 3AX, GB
Annual Leave: 15 - 26 August 2024

From: Eric O'Connor <eric.oconnor@enzygo.com>
Sent: Tuesday, July 23, 2024 2:04 PM
To: Wilding, Ben <Ben.Wilding@atkinsrealis.com>
Subject: RE: LAND AT NEW ROAD FARM, 240 NEW ROAD, MELKSHAM, SN12 7QY

Hi Ben,

Just looking to bottom out what would be acceptable in this easement. I was wondering if pavement would be okay (such as below)? I'm assuming you're just looking to avoid buildings, fencing and significant planting that would restrict access to the feature for inspection and maintenance purposes?



Kind Regards,

Eric

Eric O'Connor BSc (Hons), MSc, MCIWEM, C.WEM
Principal Hydrologist

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Email: eric.oconnor@enzygo.com
Web: enzygo.com

From: Wilding, Ben <Ben.Wilding@atkinsrealis.com>
Sent: Wednesday, June 19, 2024 10:17 AM
To: Eric O'Connor <eric.oconnor@enzygo.com>
Cc: Helena Du-Roe <helena.du-roe@enzygo.com>
Subject: RE: LAND AT NEW ROAD FARM, 240 NEW ROAD, MELKSHAM, SN12 7QY

Hi Eric
Happy for the easement to be provided on one side as it will be routed on the perimeter – the easements are there to provide maintenance access. It makes sense therefore as long as maintenance can be provided, that it is only needed on the one side in this case

Kind Regards

Ben Wilding MEng (Hons) CEng MICE

Principal Engineer
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Birmingham, West Midlands, B3 3AX, GB
Annual Leave: -

From: Eric O'Connor <eric.oconnor@enzygo.com>
Sent: Wednesday, June 19, 2024 9:58 AM
To: Wilding, Ben <Ben.Wilding@atkinsrealis.com>
Cc: Helena Du-Roe <helena.du-roe@enzygo.com>
Subject: RE: LAND AT NEW ROAD FARM, 240 NEW ROAD, MELKSHAM, SN12 7QY

Hi Ben,

No problem, that's helpful. The ditch/swale wouldn't be offered for adoption so therefore we will design it based on safely managing flood risk rather than to their design guidance.

Just finally regarding the easement question below – '*it is our intention to route it round the permitter of the Site and then into the watercourse within the centre of the Site. We are placing easements on this but were wondering if it would need to be either side or just the Site side, given its on the perimeter and would still be accessible for maintenance purposes.*'

If you could clarify the position on this that would be really appreciated as it will let us know the land take required.

Kind Regards,

Eric

Eric O'Connor BSc (Hons), MSc, MCIWEM, C.WEM
Principal Hydrologist

Phone: 0114 321 5151
Mobile: 07710549218
Email: eric.oconnor@enzygo.com
Web: enzygo.com

From: Wilding, Ben <Ben.Wilding@atkinsrealis.com>
Sent: Wednesday, June 19, 2024 9:50 AM
To: Eric O'Connor <eric.oconnor@enzygo.com>
Subject: RE: LAND AT NEW ROAD FARM, 240 NEW ROAD, MELKSHAM, SN12 7QY

Hi Eric
Apologies if I had not responded – multiple Planning Inspectorate Inquiries going on with proofs of evidence needing to be submitted etc.
I would agree that the 300mm flow depth would relate to the provision of new swales, whereas you are realistically diverting an ordinary watercourse, so it would not apply to your case.
For the proposed "diversion swale" I would assume that this will be maintained by riparian duties, rather than offered for adoption via WW (I am not convinced based on the purpose of the feature that they would adopt it) – if so we would not look to strictly apply Wessex Water's design guidance.
Obviously the diversion would still need to be designed to safely manage flood risk and not cause additional flow restrictions

Hope that helps clarify?

Kind Regards

Ben Wilding *MEng (Hons) CEng MICE*
Principal Civil Engineer

AtkinsRéalis

AtkinsRéalis on behalf of Wiltshire Council Drainage

E: ben.wilding@atkinsrealis.com
T: 0121 483 5490

From: Eric O'Connor <eric.oconnor@enzygo.com>
Sent: Wednesday, June 19, 2024 9:37 AM
To: Wilding, Ben <Ben.Wilding@atkinsrealis.com>
Subject: FW: LAND AT NEW ROAD FARM, 240 NEW ROAD, MELKSHAM, SN12 7QY

Hi Ben,

Apologies if I have missed a response but if not just wondering if you'd managed to get an answer on the below questions?

Kind Regards,

Eric

Eric O'Connor BSc (Hons), MSc, MCIWEM, C.WEM
Principal Hydrologist

Phone: 0114 321 5151
Mobile: 07710549218
Email: eric.oconnor@enzygo.com
Web: enzygo.com

From: Eric O'Connor
Sent: Thursday, May 9, 2024 9:05 AM
To: Wilding, Ben <Ben.Wilding@atkinsrealis.com>
Cc: Drainage <Drainage@wiltshire.gov.uk>
Subject: RE: LAND AT NEW ROAD FARM, 240 NEW ROAD, MELKSHAM, SN12 7QY

Hi Ben,

Sorry to bother you further but also in the Wessex guidance it states no depth greater than 300mm in the 1 in 30-year storm. To me this is referring to a drainage system swale rather than a interception / diversion swale for surface water flooding and therefore would not apply to the interception swale. If you are able to confirm this is the case as well that would be great.

Thanks,

Eric

Eric O'Connor BSc (Hons), MSc, MCIWEM, C.WEM
Principal Hydrologist

Phone: 0114 321 5151
Mobile: 07710549218
Email: eric.oconnor@enzygo.com
Web: enzygo.com

From: Wilding, Ben <Ben.Wilding@atkinsrealis.com>
Sent: Thursday, May 9, 2024 8:30 AM
To: Eric O'Connor <eric.oconnor@enzygo.com>
Cc: Drainage <Drainage@wiltshire.gov.uk>
Subject: RE: LAND AT NEW ROAD FARM, 240 NEW ROAD, MELKSHAM, SN12 7QY

You don't often get email from ben.wilding@atkinsrealis.com. Learn why this is important

Morning Eric
Thanks for your email – I will ask the questions and come back to you.

Kind Regards

Ben Wilding MEng (Hons) CEng MICE

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Birmingham, B3 3AX, UK
Annual Leave: 17 May 2024

From: Eric O'Connor <eric.oconnor@enzygo.com>
Sent: Thursday, May 9, 2024 8:25 AM
To: Wilding, Ben <Ben.Wilding@atkinsrealis.com>
Cc: Drainage <Drainage@wiltshire.gov.uk>
Subject: RE: LAND AT NEW ROAD FARM, 240 NEW ROAD, MELKSHAM, SN12 7QY

Hi Ben,

Given the below you may not be able to answer this but I have been requested to ask for masterplanning purposes. Regarding the interception swale for surface water flooding as you may recall, it is our intention to route it round the permitter of the Site and then into the watercourse within the centre of the Site. We are placing easements on this but were wondering if it would need to be either side or just the Site side, given its on the perimeter and would still be accessible for maintenance purposes. If you are able to get me a response on this for the evolving masterplan that would be great.

Kind Regards,

Eric

Eric O'Connor BSc (Hons), MSc, MCIWEM, C.WEM
Principal Hydrologist

Phone: 0114 321 5151
Mobile: 07710549218
Email: eric.oconnor@enzygo.com
Web: enzygo.com

From: Wilding, Ben <Ben.Wilding@atkinsrealis.com>
Sent: Monday, March 4, 2024 9:05 AM
To: Eric O'Connor <eric.oconnor@enzygo.com>
Cc: Drainage <Drainage@wiltshire.gov.uk>
Subject: RE: LAND AT NEW ROAD FARM, 240 NEW ROAD, MELKSHAM, SN12 7QY

You don't often get email from ben.wilding@atkinsrealis.com. Learn why this is important

Hi Eric
Apologies for not coming back to you on Friday
Currently there is nothing within Wiltshire's own standards regarding easements. I have noted that for previous developments Wiltshire have deferred to Wessex Water's standards for SuDS adoption sudsguide.pdf (wessexwater.co.uk); where it is stated that a 3m easement would be required.

I would suggest that best practice would be for you to provide a 3m easement.

Kind Regards

Ben Wilding MEng (Hons) CEng MICE

Principal Engineer
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AtkinsRéalis
T: +44 121 483 5490 LinkedIn
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Birmingham, B3 3AX, UK
Annual Leave: -

From: Eric O'Connor <eric.oconnor@enzygo.com>
Sent: Friday, March 1, 2024 8:50 AM
To: Wilding, Ben <Ben.Wilding@atkinsrealis.com>
Subject: RE: LAND AT NEW ROAD FARM, 240 NEW ROAD, MELKSHAM, SN12 7QY

Hi Ben,

Thanks again for your time on this one. Just had a quick follow up question regarding the swale we have designed. Do you have a minimum easement requirement from top of bank for management and maintenance of these features?

Kind Regards,

Eric

Eric O'Connor BSc (Hons), MSc, MCIWEM, C.WEM
Principal Hydrologist

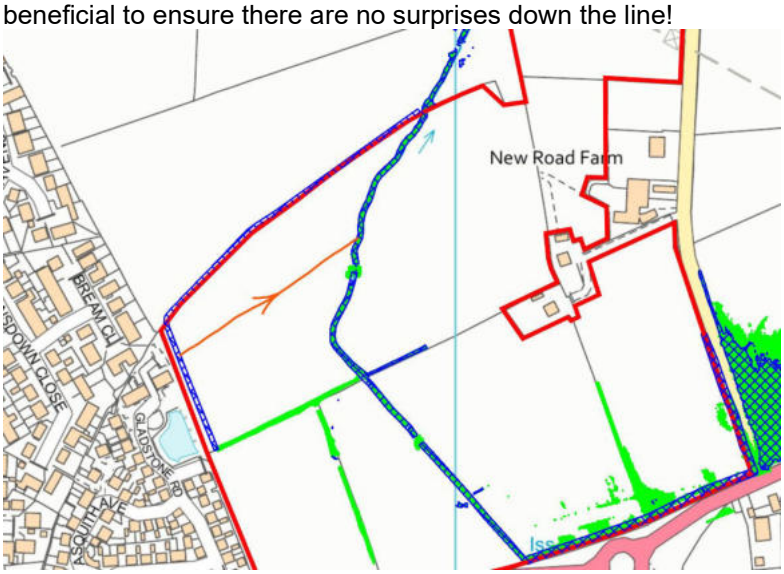
Phone: 0114 321 5151
Mobile: 07710549218
Email: eric.oconnor@enzygo.com
Web: enzygo.com

From: Wilding, Ben <Ben.Wilding@atkinsrealis.com>
Sent: Tuesday, February 13, 2024 8:49 AM
To: Eric O'Connor <eric.oconnor@enzygo.com>
Cc: Nick Jordan <Nick.Jordan@bloorhomes.com>; Matt Travis <matt.travis@enzygo.com>; Rory Brown <Rory.Brown@enzygo.com>; Drainage <Drainage@wiltshire.gov.uk>
Subject: RE: LAND AT NEW ROAD FARM, 240 NEW ROAD, MELKSHAM, SN12 7QY

Eric
Thanks for your time yesterday to talk me through the drainage proposals and pluvial flood modelling that has been completed to date for the above site.
As I mentioned yesterday, it is good to see an applicant proactively completing pluvial modelling where the site has been identified to potentially be at risk of surface water flooding on the EA maps to more accurately account for local small ditches / watercourses etc.

Pluvial Flood Risk:
We discussed the pluvial modelling completed to date (comparison of baseline scheme, and the proposed scheme incorporating additional swales on the perimeter to manage flood risk). We discussed that your "with scheme" modelling indicates that there is a net decrease in pluvial flood risk across the site, and that the proposed interventions will help in managing SW flood risk. Please ensure that the modelling approach, and the outputs presented are included within your FRA at submission so as we can refer to it in our response for how you have assessed flood risk, and considered the site within the sequential test for pluvial flood risk

You mentioned that a highways drain currently crosses the site (very rough snip below to illustrate what we discussed), and that you would be seeking to divert this into your perimeter swale on the NW side of the site; ultimately this would still discharge to the OWC (as per current arrangement), there would be no increase in flows, and there would be additional water quality benefit provided. Whilst I would be satisfied that as long as this is included within any detailed design models for the site's drainage and that I did not see a detriment to this approach, that early discussion on the principles with Wiltshire's highways drainage officers (Daniel.Everett@wiltshire.gov.uk) would be beneficial to ensure there are no surprises down the line!



Surface Water Drainage Plan

We spoke through your current SW Drainage Plans for the site, which have been modelled within Microdrainage (assuming 55% impermeable area at this stage, which can be refined as part of detailed design). Key points of note are:

- Ponds / Basins and swales are provided around the site in order to manage water quality and quantity
- The northern attenuation basin may become a hybrid feature of a basin and a geocellular tank (although preference would be for this to just be an open basin feature for ease of future maintenance)
- Exceedance routes, including from the proposed attenuation features will be shown
- A SW pumping station is proposed on site – this was deemed by yourselves to be the most holistically sustainable solution when considering the impact of level raising across the site (which would also have a significant impact on flood risk elsewhere). I advised that we would expect to see Duty Standby pumps and would want to see a sensitivity analysis for potential flooding in case of pump failure.
- Discharge to be limited in line with Wiltshire Council's betterment policy to the Ordinary Watercourse – this will require LDC (which will need to be applied for separately and outside of the planning process)

Hope that is an accurate representation of the key discussion points from yesterday's call.

Kind Regards

Ben Wilding *MEng (Hons) CEng MICE*
Principal Civil Engineer

AtkinsRéalis

AtkinsRéalis on behalf of Wiltshire Council Drainage

From: Eric O'Connor <eric.oconnor@enzygo.com>
Sent: Friday, February 9, 2024 4:24 PM
To: Wilding, Ben <Ben.Wilding@atkinsrealis.com>
Cc: Nick Jordan <Nick.Jordan@bloorhomes.com>; Matt Travis <matt.travis@enzygo.com>; Rory Brown <Rory.Brown@enzygo.com>
Subject: LAND AT NEW ROAD FARM, 240 NEW ROAD, MELKSHAM, SN12 7QY

Hi Ben,

Please find attached proposed agenda with supporting information ahead of Monday.

Monday 12th February with Wiltshire Council / Enzygo / Bloor Homes

1. Presentation and discussion of pluvial flooding modelling undertaken to date.
2. Presentation of proposed drainage strategy.
3. Views of LLFA on items 1 and 2.

Kind Regards,

Eric

Eric O'Connor BSc (Hons), MSc, MCIWEM, C.WEM
Principal Hydrologist

Phone: 0114 321 5151
Mobile: 07710549218
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Appendix 2 – FEH Statistical Outputs

UK Design Flood Estimation

Summary of ESS/Pooled Estimation Analysis using the Flood Estimation Handbook Statistical Method

Date of creation:	15-09-2025 15:42:54
Software:	WINFAP Version: 5.2.9046 (25885)
Peak Flow dataset:	Peak Flow Dataset 13.0.3
Supplementary data used:	No

Site details

Site number:	3501475452
Site name:	Adjusted_FEH_Catchment_Descriptors_391750_165250_v5_0_1
Site location:	ST 91750 65250
Easting:	391750
Northing:	165250
Catchment area:	0.89 km²
SAAR:	710 mm
BFIHOST19:	0.235
FPEXT:	0.073
FARL:	1.000
URBEXT2000:	0.1549

Site data

At-site data

At-site data present: No

UK Design Flood Estimation

Summary of ESS/Pooled Estimation Analysis using the Flood Estimation Handbook Statistical Method

Analysis settings

Urbanisation settings

User defined:	No
Urban area:	0.22 km²
PRimp:	70.00%
Impervious Factor:	0.300
UAF:	1.12346

Growth curve settings

Distance Measure Method:	Small catchment
Pooling group URBEXT2000 Threshold:	0.030
Deurbanise Pooling Group L-moments:	Yes

QMED settings

Use at-site data:	No
Method:	Catchment Descriptors

Growth curve data and results

Pooling group AM data

Station	Distance	Years of data	QMED AM	L-CV Observed	L-CV Deurbanised	L-SKEW Observed	L-SKEW Deurbanised
76011 (Coal Burn @ Coalburn)	1.334	46	1.826	0.170	**0.170**	0.296	**0.296**
27073 (Brompton Beck @ Snainton Ings)	1.747	43	0.812	0.212	**0.213**	0.033	**0.032**
27051 (Crimple @ Burn Bridge)	1.836	51	4.564	0.217	**0.217**	0.142	**0.141**
45816 (Haddeo @ Upton)	2.221	30	3.352	0.288	**0.289**	0.408	**0.407**
25019 (Leven @ Easby)	2.286	45	5.090	0.341	**0.342**	0.373	**0.372**
26016 (Gypsey Race @ Kirby Grindalythe)	2.288	26	0.100	0.318	**0.318**	0.253	**0.253**
28033 (Dove @ Hollinsclough)	2.521	48	4.138	0.235	**0.235**	0.367	**0.367**
49005 (Bolingey Stream @ Bolingey Cocks Bridge)	2.545	13	4.072	0.274	**0.275**	0.295	**0.294**
27010 (Hodge Beck @ Bransdale Weir)	2.595	41	9.420	0.224	**0.224**	0.293	**0.293**
44008 (South Winterbourne @ Winterbourne Steepleton)	2.673	32	0.572	0.405	**0.406**	0.254	**0.254**
7009 (Mosset Burn @ Wardend Bridge)	2.762	25	7.053	0.365	**0.365**	0.329	**0.329**
36010 (Bumpstead Brook @ Broad Green)	2.771	56	7.855	0.348	**0.350**	0.107	**0.106**
26014 (Water Forlornes @ Driffield)	2.847	25	0.424	0.318	**0.319**	0.205	**0.204**
47022 (Tory Brook @ Newnham Park)	2.904	28	6.134	0.243	**0.245**	0.163	**0.160**
Total		**509**					

UK Design Flood Estimation

Summary of ESS/Pooled Estimation Analysis using the Flood Estimation Handbook Statistical Method

Pooling group suitability

Station	Suitability for QMED	Suitability for pooling	Years	Non-flood years	Percentage non-flood years	Mann Kendall (MK)	MK significance (%)	Discordancy	Comments
76011 (Coal Burn @ Coalburn)	Yes	Yes	46	0	0.00			1.274	
27073 (Brompton Beck @ Snainton Ings)	Yes	Yes	43	2	4.65	0.92	None	1.618	
27051 (Crimple @ Burn Bridge)	Yes	Yes	51	3	5.88	1.34	None	0.608	
45816 (Haddeo @ Upton)	Yes	Yes	30	1	3.33	-0.45	None	0.753	
25019 (Leven @ Easby)	Yes	Yes	45	3	6.67			0.715	
26016 (Gypsey Race @ Kirby Grindalythe)	Yes	Yes	26	4	15.38			0.228	
28033 (Dove @ Hollinsclough)	Yes	Yes	48	1	2.08			0.948	
49005 (Bolingey Stream @ Bolingey Cocks Bridge)	Yes	Yes	13	0	0.00			3.065	
27010 (Hodge Beck @ Bransdale Weir)	Yes	Yes	41	1	2.44	-2.10	5	0.475	
44008 (South Winterbourne @ Winterbourne Steepleton)	Yes	Yes	32	9	28.12	1.17	None	1.222	
7009 (Mosset Burn @ Wardend Bridge)	Yes	Yes	25	3	12.00			0.613	
36010 (Bumpstead Brook @ Broad Green)	Yes	Yes	56	12	21.43	0.10	None	1.746	
26014 (Water Forlornes @ Driffield)	Yes	Yes	25	3	12.00			0.248	
47022 (Tory Brook @ Newnham Park)	Yes	Yes	28	1	3.57			0.488	

Pooling group catchment descriptors

Station	Area	SAAR	FPEXT	FARL	URBEXT2000	BFIHOST19
76011 (Coal Burn @ Coalburn)	1.630	1096	0.074	1.000	0.000	0.274
27073 (Brompton Beck @ Snainton Ings)	8.060	721	0.237	1.000	0.008	0.811
27051 (Crimple @ Burn Bridge)	8.172	855	0.013	1.000	0.006	0.329
45816 (Haddeo @ Upton)	6.808	1210	0.011	1.000	0.005	0.535
25019 (Leven @ Easby)	15.088	830	0.019	1.000	0.004	0.495
26016 (Gypsey Race @ Kirby Grindalythe)	15.850	757	0.030	1.000	0.000	0.927
28033 (Dove @ Hollinsclough)	7.915	1346	0.007	1.000	0.000	0.347
49005 (Bolingey Stream @ Bolingey Cocks Bridge)	16.080	1044	0.023	0.991	0.006	0.562
27010 (Hodge Beck @ Bransdale Weir)	18.820	987	0.009	1.000	0.001	0.303
44008 (South Winterbourne @ Winterbourne Steepleton)	20.183	1012	0.015	1.000	0.004	0.848
7009 (Mosset Burn @ Wardend Bridge)	28.295	803	0.060	0.998	0.000	0.606
36010 (Bumpstead Brook @ Broad Green)	27.547	588	0.045	0.999	0.007	0.367
26014 (Water Forlornes @ Driffield)	32.415	721	0.016	1.000	0.007	0.924
47022 (Tory Brook @ Newnham Park)	13.432	1403	0.023	0.942	0.014	0.353

Pooling Group Rejected Stations

Station	Distance	Years of data	QMED AM	L-CV Observed	L-CV Deurbanised	L-SKEW Observed	L-SKEW Deurbanised	Comments

UK Design Flood Estimation

Summary of ESS/Pooled Estimation Analysis using the Flood Estimation Handbook Statistical Method

Growth curve L-moments

Rural L-CV:	0.279	Urban L-CV:	0.255
Rural L-Skewness:	0.248	Urban L-Skewness:	0.276

Rural fitted parameters

Distribution	Location	Scale	Shape	H	Bound
GL	1.000	0.283	-0.248		-0.142
GEV	0.848	0.405	-0.118		-2.592
KAP3	0.923	0.337	-0.189	-0.400	-0.855

Urban fitted parameters

Distribution	Location	Scale	Shape	H	Bound
GL	1.000	0.252	-0.276		0.086
GEV	0.867	0.352	-0.158		-1.356
KAP3	0.932	0.296	-0.223	-0.400	-0.393

Goodness of fit

GL:	2.1762
GEV:	0.5851 *
P3:	-1.3277 *
GP:	-3.2987
KAP3:	1.6344 *

** Distribution gives an acceptable fit (absolute Z value < 1.645)*

Heterogeneity

Standardised test value H2: 3.7640

The pooling group is heterogeneous and a review of the pooling group is desirable.

Standardised growth curves

Rural

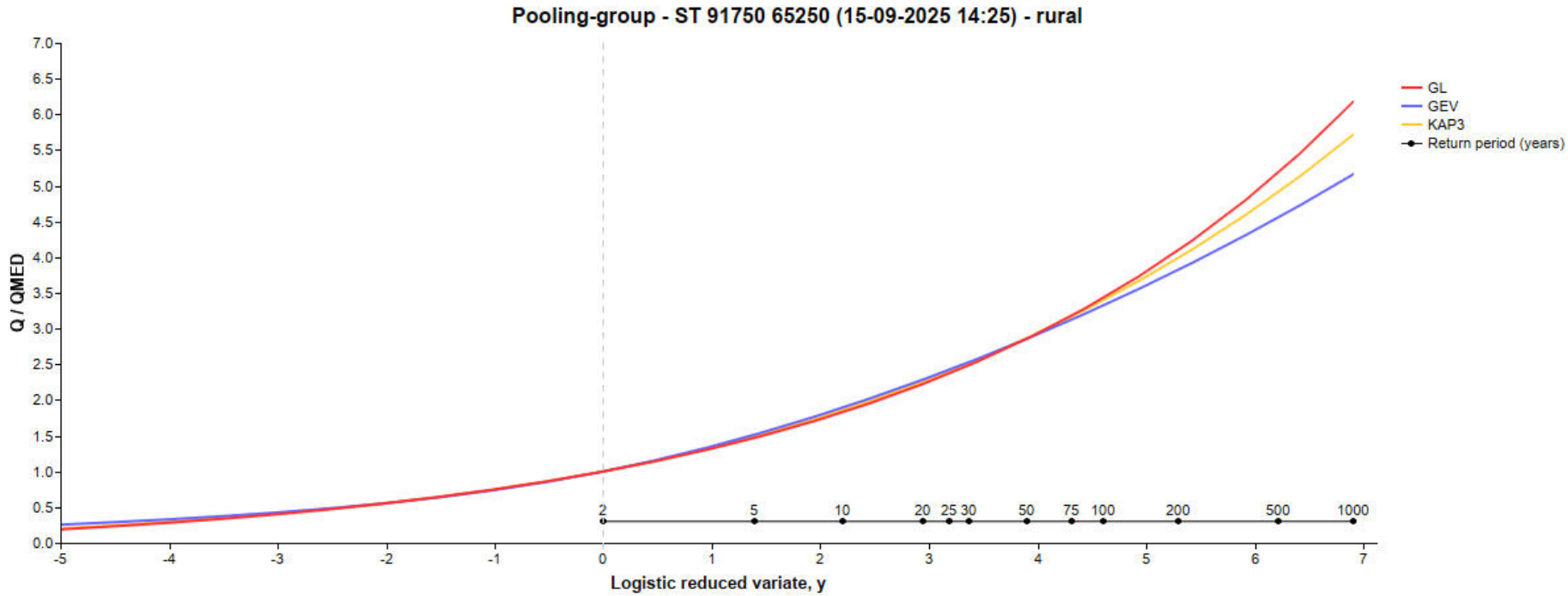
Return period	GL	GEV	KAP3
2	1.000	1.000	1.000
5	1.468	1.513	1.487
10	1.826	1.891	1.856
20	2.227	2.288	2.259
25	2.368	2.421	2.398
30	2.488	2.531	2.515
50	2.853	2.853	2.864
75	3.176	3.122	3.164
100	3.424	3.320	3.391
200	4.097	3.824	3.990
500	5.182	4.555	4.910
1000	6.181	5.163	5.720

Urban

Return period	GL	GEV	KAP3
2	1.000	1.000	1.000
5	1.426	1.463	1.441
10	1.761	1.819	1.788
20	2.145	2.203	2.174
25	2.282	2.334	2.310
30	2.400	2.444	2.426
50	2.760	2.769	2.773
75	3.082	3.045	3.077
100	3.332	3.252	3.310
200	4.022	3.789	3.934
500	5.158	4.594	4.920
1000	6.229	5.285	5.811

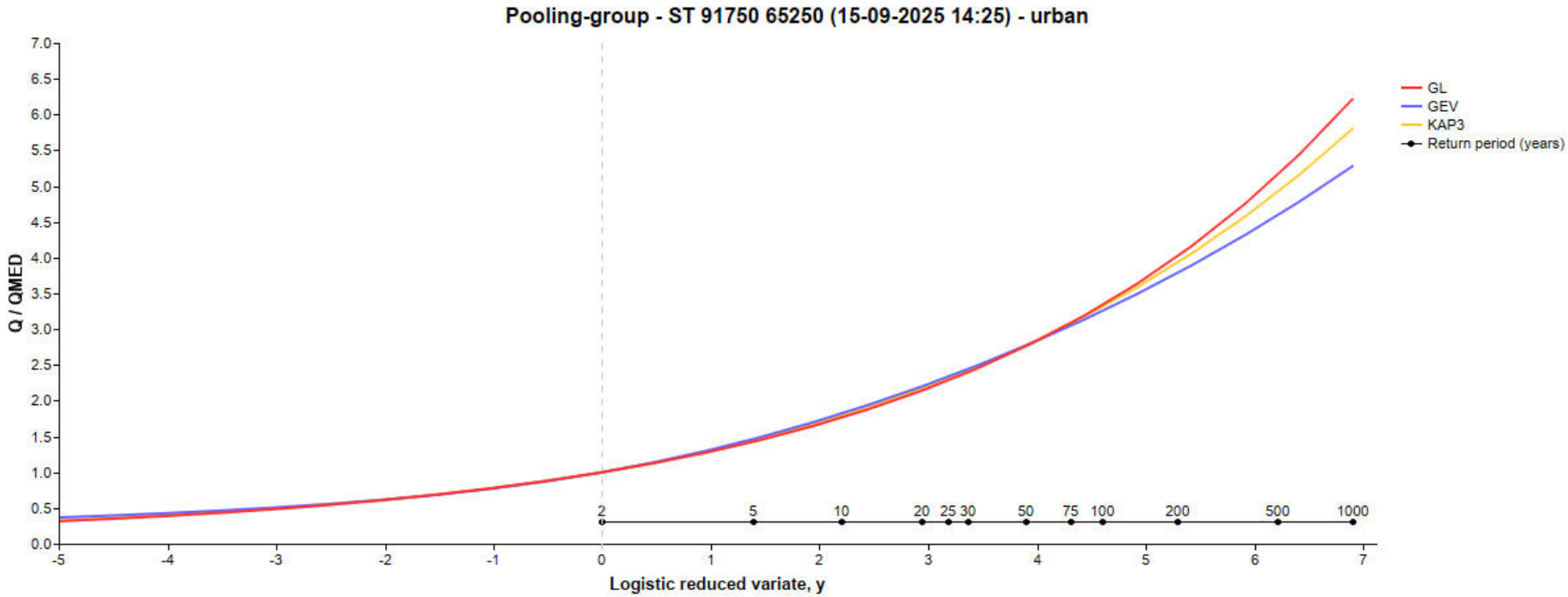
UK Design Flood Estimation

Summary of ESS/Pooled Estimation Analysis using the Flood Estimation Handbook Statistical Method



UK Design Flood Estimation

Summary of ESS/Pooled Estimation Analysis using the Flood Estimation Handbook Statistical Method



UK Design Flood Estimation

Summary of ESS/Pooled Estimation Analysis using the Flood Estimation Handbook Statistical Method

QMED data and results

QMED	
Rural:	0.452 m³/s
Urban:	0.508 m³/s

UK Design Flood Estimation

Summary of ESS/Pooled Estimation Analysis using the Flood Estimation Handbook Statistical Method

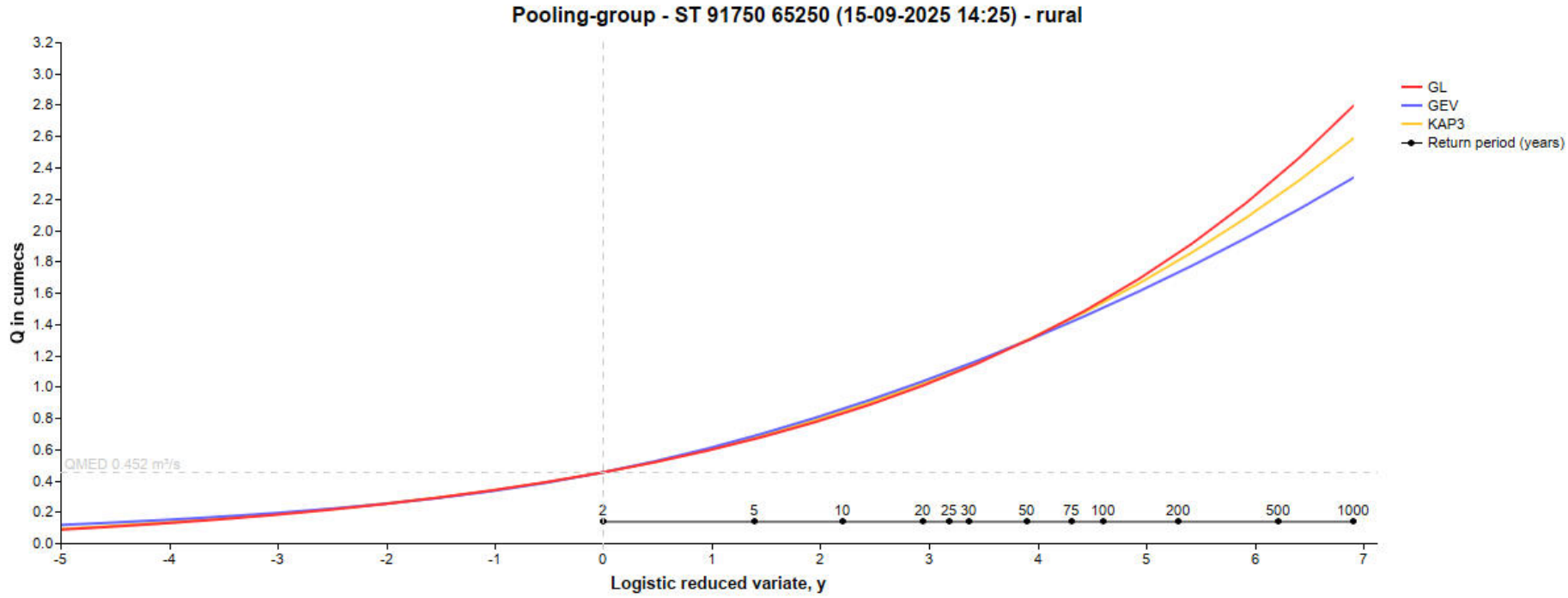
Flood Frequency Curve

Rural Flood Frequency Curve

Return period	GL (m³/s)	GEV (m³/s)	KAP3 (m³/s)
2	0.452	0.452	0.452
5	0.664	0.684	0.672
10	0.826	0.855	0.839
20	1.007	1.034	1.021
25	1.071	1.094	1.084
30	1.125	1.145	1.137
50	1.290	1.290	1.295
75	1.436	1.411	1.431
100	1.548	1.501	1.533
200	1.852	1.729	1.804
500	2.343	2.060	2.220
1000	2.795	2.335	2.586

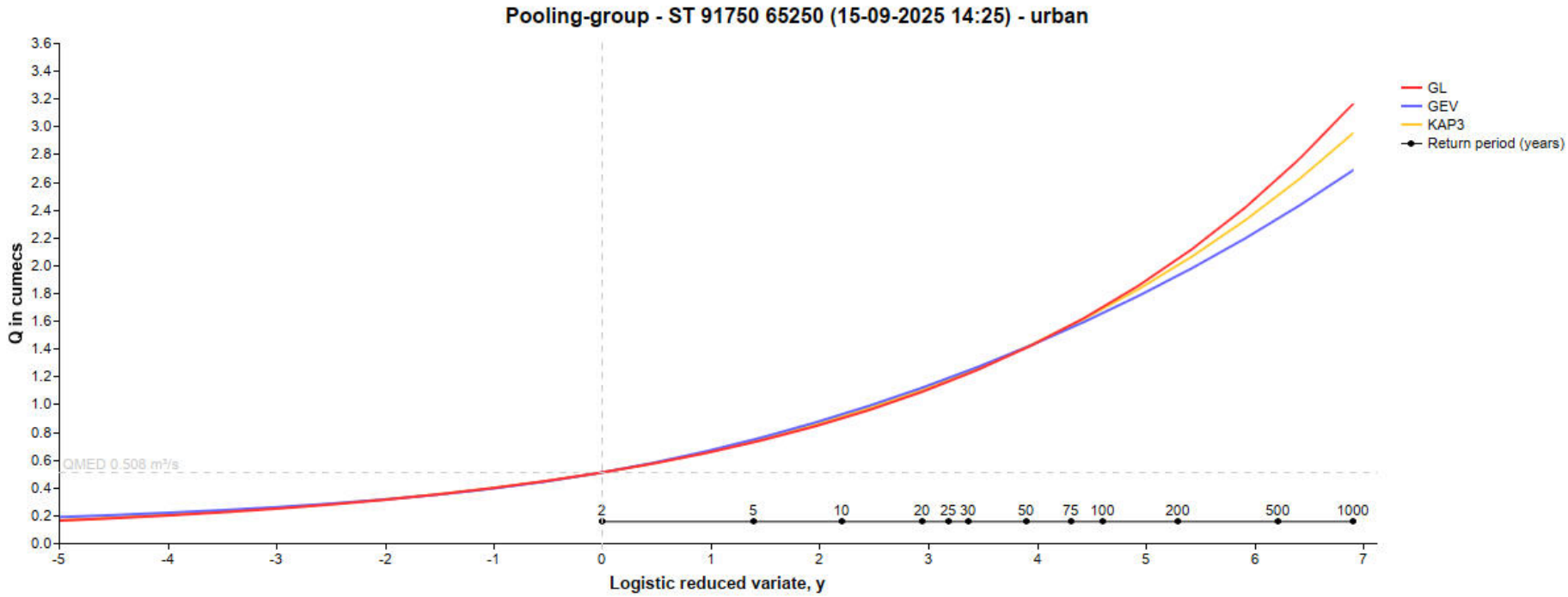
Urban Flood Frequency Curve

Return period	GL (m³/s)	GEV (m³/s)	KAP3 (m³/s)
2	0.508	0.508	0.508
5	0.724	0.743	0.732
10	0.895	0.924	0.908
20	1.090	1.119	1.105
25	1.159	1.186	1.173
30	1.219	1.242	1.232
50	1.402	1.407	1.409
75	1.565	1.547	1.563
100	1.693	1.652	1.681
200	2.043	1.924	1.998
500	2.620	2.333	2.499
1000	3.164	2.685	2.952



UK Design Flood Estimation

Summary of ESS/Pooled Estimation Analysis using the Flood Estimation Handbook Statistical Method



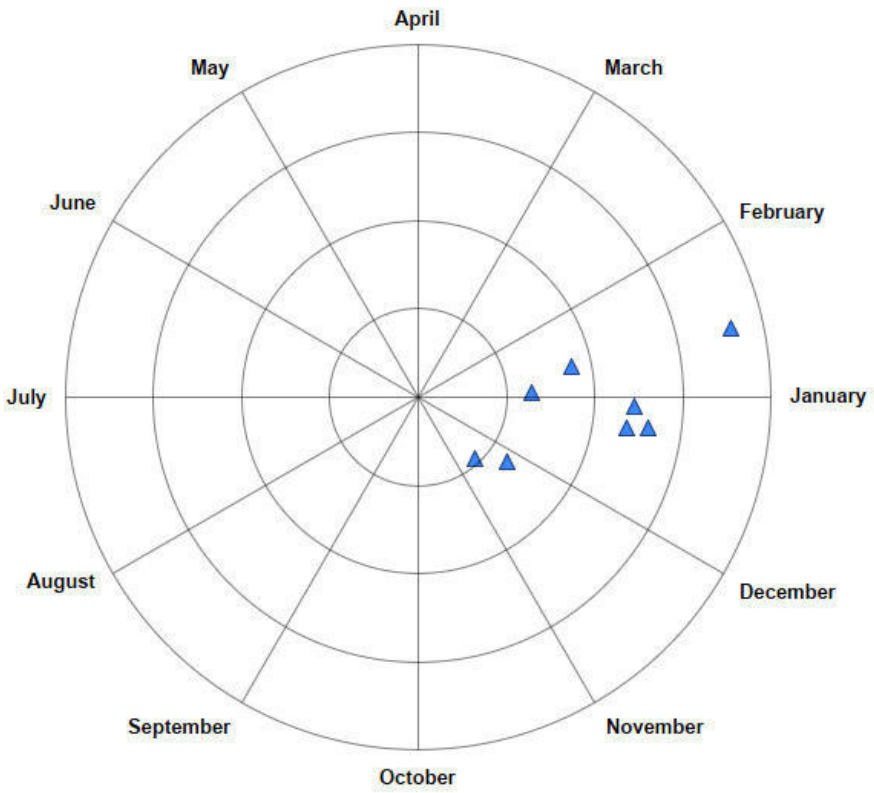
UK Design Flood Estimation

Summary of ESS/Pooled Estimation Analysis using the Flood Estimation Handbook Statistical Method

Appendix

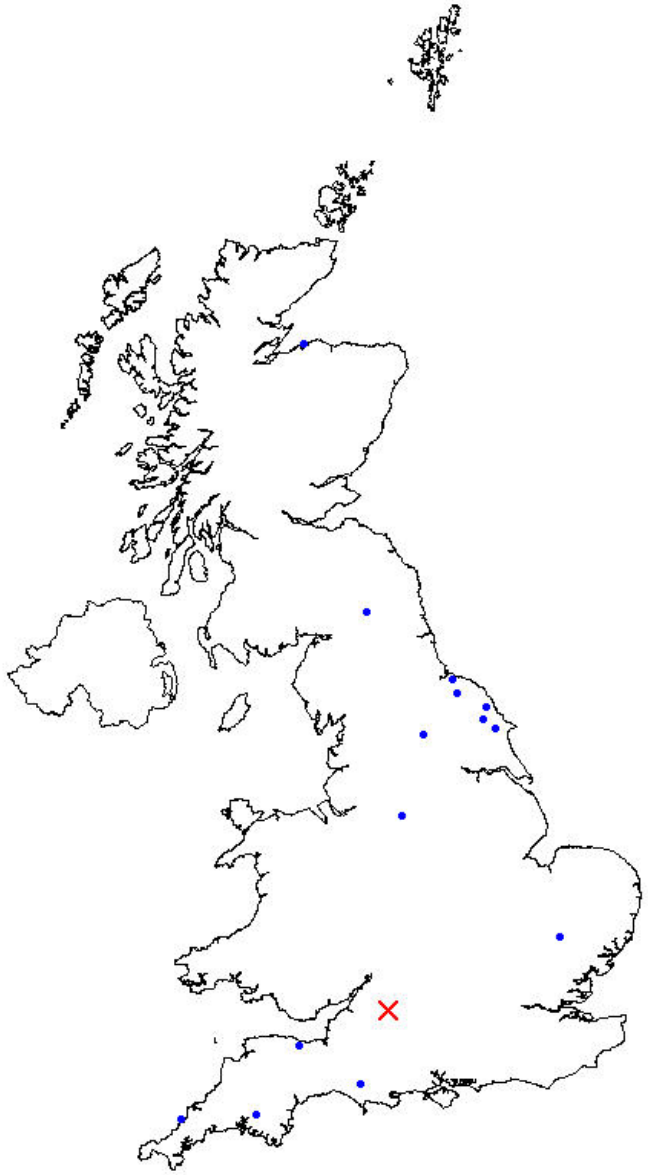
Station record parameters

Flood seasonality: ST 91750 65250 (15-09-2025 14:25) - urban



UK Design Flood Estimation

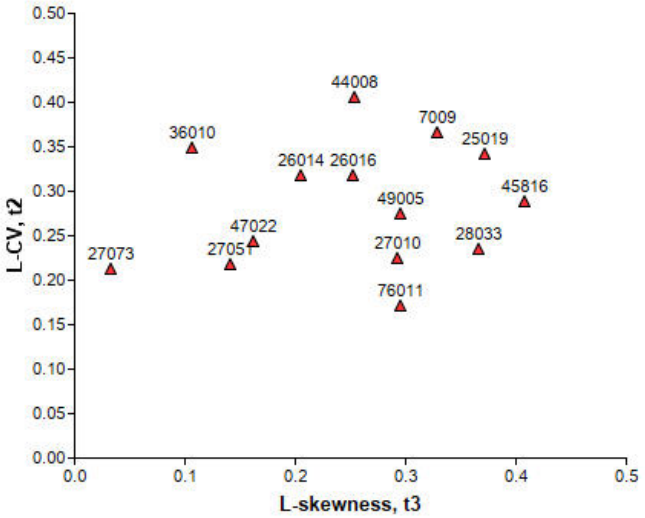
Summary of ESS/Pooled Estimation Analysis using the Flood Estimation Handbook Statistical Method

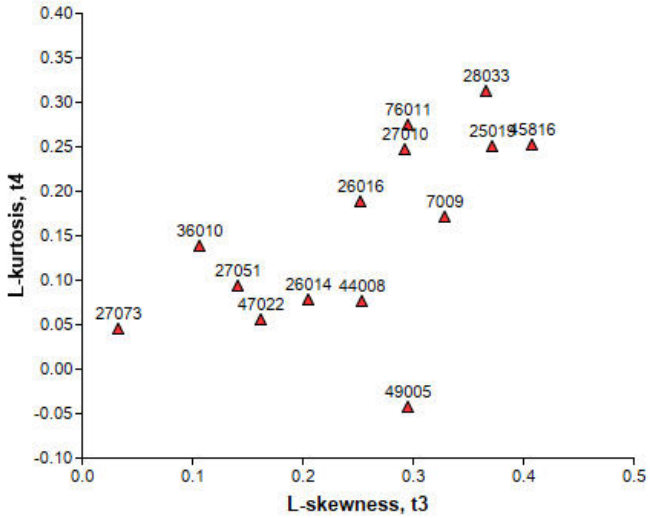


UK Design Flood Estimation

Summary of ESS/Pooled Estimation Analysis using the Flood Estimation Handbook Statistical Method

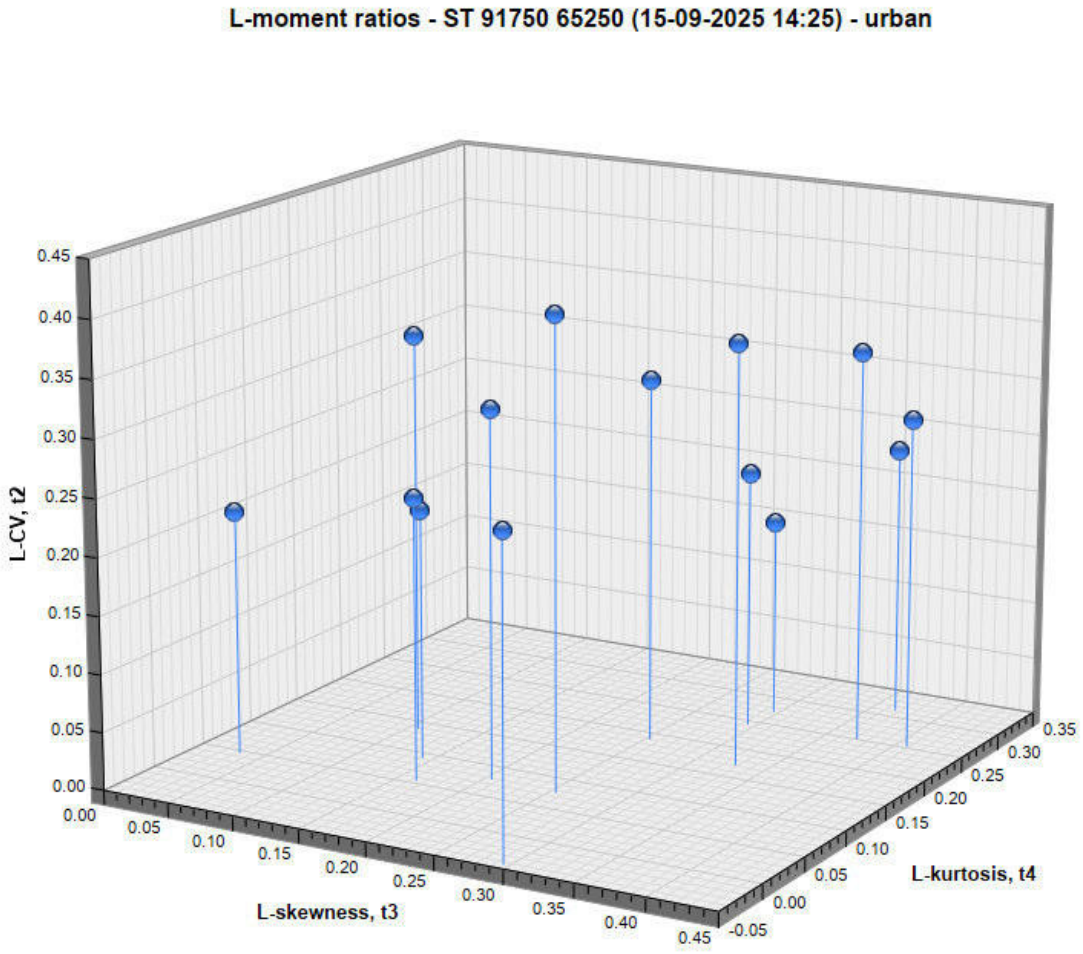
L-moment ratios - ST 91750 65250 (15-09-2025 14:25) - urban





UK Design Flood Estimation

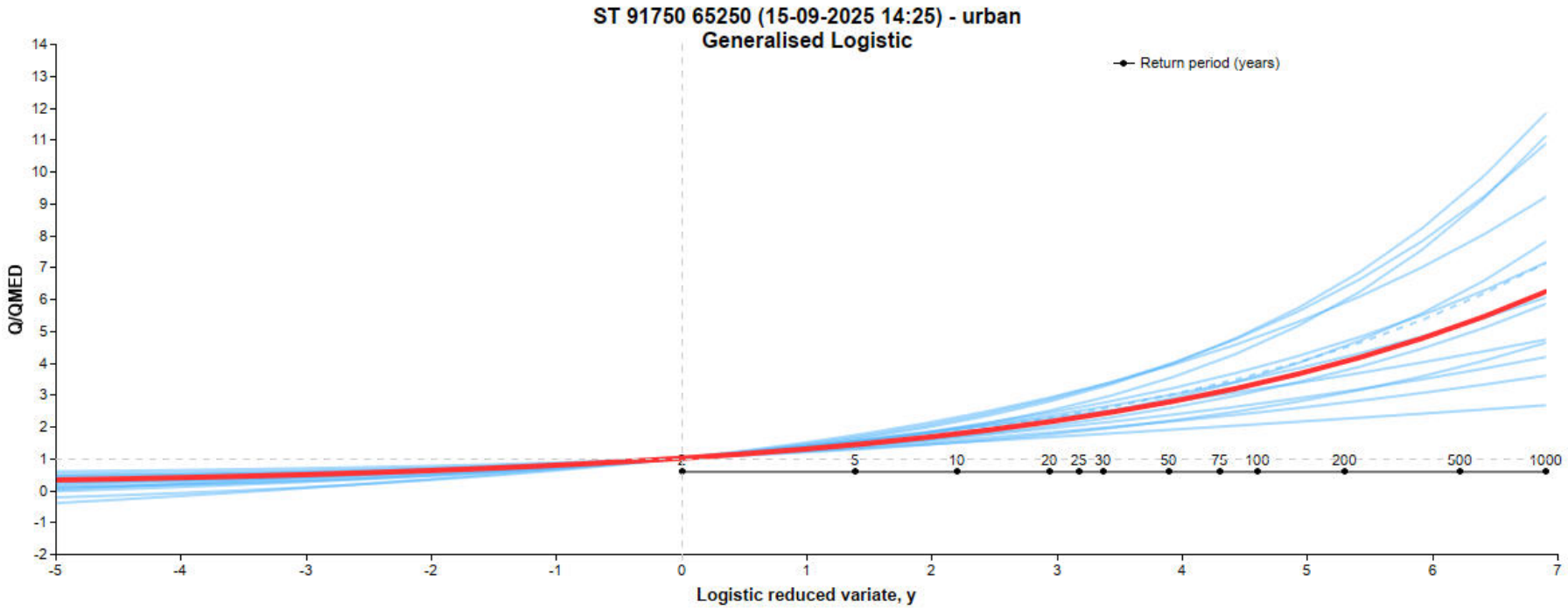
Summary of ESS/Pooled Estimation Analysis using the Flood Estimation Handbook Statistical Method



UK Design Flood Estimation

Summary of ESS/Pooled Estimation Analysis using the Flood Estimation Handbook Statistical Method

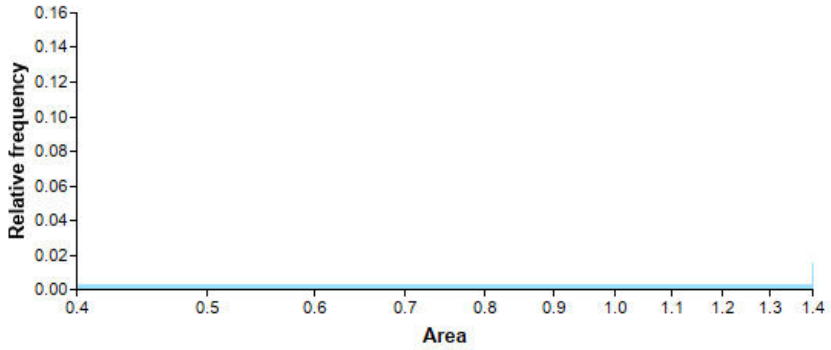
Pooling group growth curves

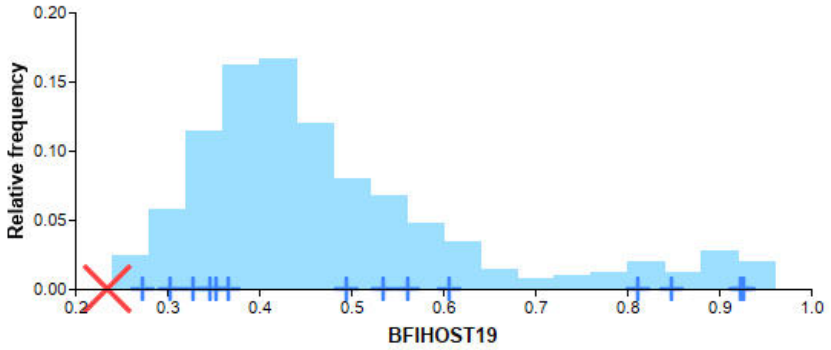


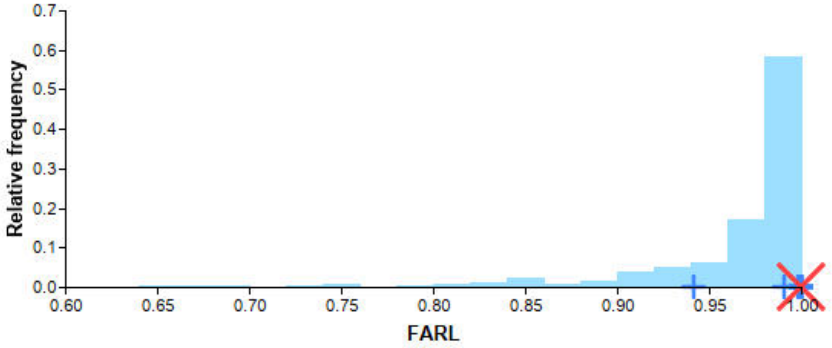
UK Design Flood Estimation

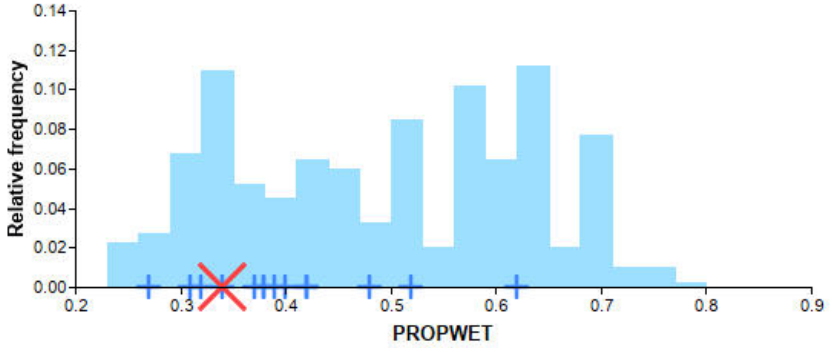
Summary of ESS/Pooled Estimation Analysis using the Flood Estimation Handbook Statistical Method

Catchment descriptors



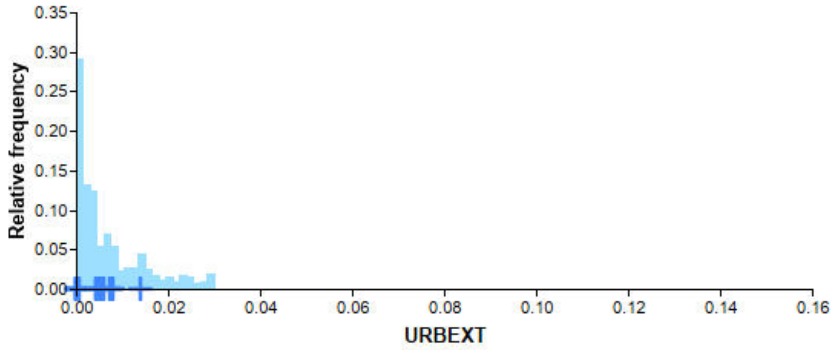


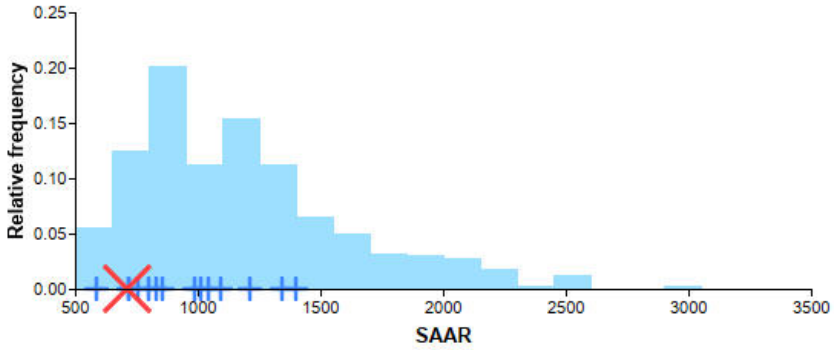


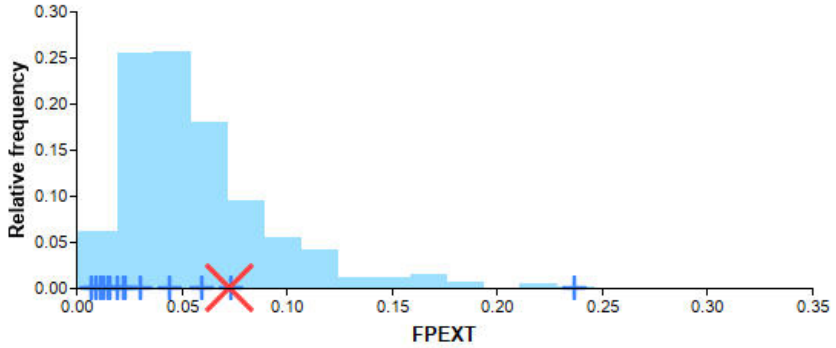


UK Design Flood Estimation

Summary of ESS/Pooled Estimation Analysis using the Flood Estimation Handbook Statistical Method







UK Design Flood Estimation

Summary of ESS/Pooled Estimation Analysis using the Flood Estimation Handbook Statistical Method

Date of creation:	15-09-2025 15:43:48
Software:	WINFAP Version: 5.2.9046 (25885)
Peak Flow dataset:	Peak Flow Dataset 13.0.3
Supplementary data used:	No

Site details

Site number:	3501475452
Site name:	Adjusted_FEH_Catchment_Descriptors_391750_165250_v5_0_1
Site location:	ST 91750 65250
Easting:	391750
Northing:	165250
Catchment area:	0.89 km²
SAAR:	710 mm
BFIHOST19:	0.235
FPEXT:	0.073
FARL:	1.000
URBEXT2000:	0.1549

Site data

At-site data

At-site data present: No

UK Design Flood Estimation

Summary of ESS/Pooled Estimation Analysis using the Flood Estimation Handbook Statistical Method

Analysis settings

Urbanisation settings

User defined:	No
Urban area:	0.22 km²
PRimp:	70.00%
Impervious Factor:	0.300
UAF:	1.12346

Growth curve settings

Distance Measure Method:	Small catchment
Pooling group URBEXT2000 Threshold:	0.030
Deurbanise Pooling Group L-moments:	Yes

QMED settings

Use at-site data:	No
Method:	Donor Station(s)

Growth curve data and results

Pooling group AM data

Station	Distance	Years of data	QMED AM	L-CV Observed	L-CV Deurbanised	L-SKEW Observed	L-SKEW Deurbanised
76011 (Coal Burn @ Coalburn)	1.334	46	1.826	0.170	**0.170**	0.296	**0.296**
27073 (Brompton Beck @ Snainton Ings)	1.747	43	0.812	0.212	**0.213**	0.033	**0.032**
27051 (Crimple @ Burn Bridge)	1.836	51	4.564	0.217	**0.217**	0.142	**0.141**
45816 (Haddeo @ Upton)	2.221	30	3.352	0.288	**0.289**	0.408	**0.407**
25019 (Leven @ Easby)	2.286	45	5.090	0.341	**0.342**	0.373	**0.372**
26016 (Gypsey Race @ Kirby Grindalythe)	2.288	26	0.100	0.318	**0.318**	0.253	**0.253**
28033 (Dove @ Hollinsclough)	2.521	48	4.138	0.235	**0.235**	0.367	**0.367**
49005 (Bolingey Stream @ Bolingey Cocks Bridge)	2.545	13	4.072	0.274	**0.275**	0.295	**0.294**
27010 (Hodge Beck @ Bransdale Weir)	2.595	41	9.420	0.224	**0.224**	0.293	**0.293**
44008 (South Winterbourne @ Winterbourne Steepleton)	2.673	32	0.572	0.405	**0.406**	0.254	**0.254**
7009 (Mosset Burn @ Wardend Bridge)	2.762	25	7.053	0.365	**0.365**	0.329	**0.329**
36010 (Bumpstead Brook @ Broad Green)	2.771	56	7.855	0.348	**0.350**	0.107	**0.106**
26014 (Water Forlornes @ Driffield)	2.847	25	0.424	0.318	**0.319**	0.205	**0.204**
47022 (Tory Brook @ Newnham Park)	2.904	28	6.134	0.243	**0.245**	0.163	**0.160**
Total		**509**					

UK Design Flood Estimation

Summary of ESS/Pooled Estimation Analysis using the Flood Estimation Handbook Statistical Method

Pooling group suitability

Station	Suitability for QMED	Suitability for pooling	Years	Non-flood years	Percentage non-flood years	Mann Kendall (MK)	MK significance (%)	Discordancy	Comments
76011 (Coal Burn @ Coalburn)	Yes	Yes	46	0	0.00			1.274	
27073 (Brompton Beck @ Snainton Ings)	Yes	Yes	43	2	4.65	0.92	None	1.618	
27051 (Crimple @ Burn Bridge)	Yes	Yes	51	3	5.88	1.34	None	0.608	
45816 (Haddeo @ Upton)	Yes	Yes	30	1	3.33	-0.45	None	0.753	
25019 (Leven @ Easby)	Yes	Yes	45	3	6.67			0.715	
26016 (Gypsey Race @ Kirby Grindalythe)	Yes	Yes	26	4	15.38			0.228	
28033 (Dove @ Hollinsclough)	Yes	Yes	48	1	2.08			0.948	
49005 (Bolingey Stream @ Bolingey Cocks Bridge)	Yes	Yes	13	0	0.00			3.065	
27010 (Hodge Beck @ Bransdale Weir)	Yes	Yes	41	1	2.44	-2.10	5	0.475	
44008 (South Winterbourne @ Winterbourne Steepleton)	Yes	Yes	32	9	28.12	1.17	None	1.222	
7009 (Mosset Burn @ Wardend Bridge)	Yes	Yes	25	3	12.00			0.613	
36010 (Bumpstead Brook @ Broad Green)	Yes	Yes	56	12	21.43	0.10	None	1.746	
26014 (Water Forlornes @ Driffield)	Yes	Yes	25	3	12.00			0.248	
47022 (Tory Brook @ Newnham Park)	Yes	Yes	28	1	3.57			0.488	

Pooling group catchment descriptors

Station	Area	SAAR	FPEXT	FARL	URBEXT2000	BFIHOST19
76011 (Coal Burn @ Coalburn)	1.630	1096	0.074	1.000	0.000	0.274
27073 (Brompton Beck @ Snainton Ings)	8.060	721	0.237	1.000	0.008	0.811
27051 (Crimple @ Burn Bridge)	8.172	855	0.013	1.000	0.006	0.329
45816 (Haddeo @ Upton)	6.808	1210	0.011	1.000	0.005	0.535
25019 (Leven @ Easby)	15.088	830	0.019	1.000	0.004	0.495
26016 (Gypsey Race @ Kirby Grindalythe)	15.850	757	0.030	1.000	0.000	0.927
28033 (Dove @ Hollinsclough)	7.915	1346	0.007	1.000	0.000	0.347
49005 (Bolingey Stream @ Bolingey Cocks Bridge)	16.080	1044	0.023	0.991	0.006	0.562
27010 (Hodge Beck @ Bransdale Weir)	18.820	987	0.009	1.000	0.001	0.303
44008 (South Winterbourne @ Winterbourne Steepleton)	20.183	1012	0.015	1.000	0.004	0.848
7009 (Mosset Burn @ Wardend Bridge)	28.295	803	0.060	0.998	0.000	0.606
36010 (Bumpstead Brook @ Broad Green)	27.547	588	0.045	0.999	0.007	0.367
26014 (Water Forlornes @ Driffield)	32.415	721	0.016	1.000	0.007	0.924
47022 (Tory Brook @ Newnham Park)	13.432	1403	0.023	0.942	0.014	0.353

Pooling Group Rejected Stations

Station	Distance	Years of data	QMED AM	L-CV Observed	L-CV Deurbanised	L-SKEW Observed	L-SKEW Deurbanised	Comments

UK Design Flood Estimation

Summary of ESS/Pooled Estimation Analysis using the Flood Estimation Handbook Statistical Method

Growth curve L-moments

Rural L-CV:	0.279	Urban L-CV:	0.255
Rural L-Skewness:	0.248	Urban L-Skewness:	0.276

Rural fitted parameters

Distribution	Location	Scale	Shape	H	Bound
GL	1.000	0.283	-0.248		-0.142
GEV	0.848	0.405	-0.118		-2.592
KAP3	0.923	0.337	-0.189	-0.400	-0.855

Urban fitted parameters

Distribution	Location	Scale	Shape	H	Bound
GL	1.000	0.252	-0.276		0.086
GEV	0.867	0.352	-0.158		-1.356
KAP3	0.932	0.296	-0.223	-0.400	-0.393

Goodness of fit

GL:	2.2336
GEV:	0.5592 *
P3:	-1.4538 *
GP:	-3.5280
KAP3:	1.6635

** Distribution gives an acceptable fit (absolute Z value < 1.645)*

Heterogeneity

Standardised test value H2: 3.5577

The pooling group is heterogeneous and a review of the pooling group is desirable.

Standardised growth curves

Rural

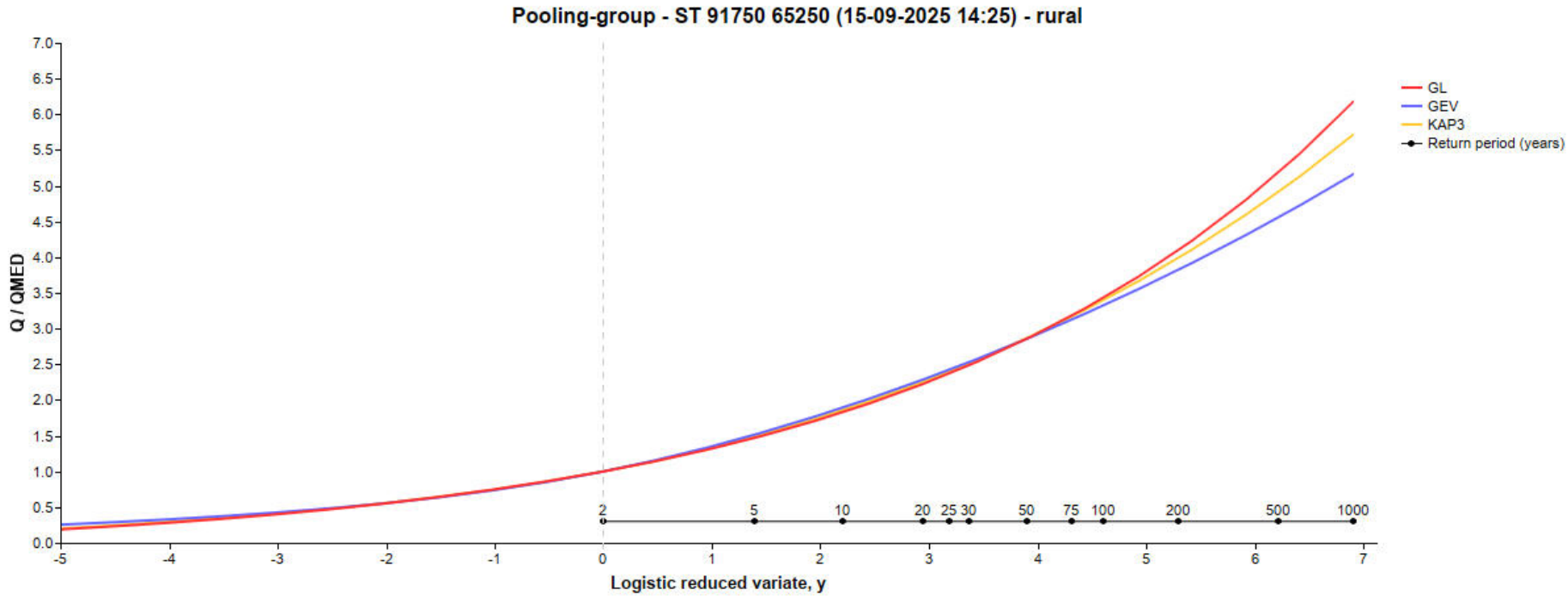
Return period	GL	GEV	KAP3
2	1.000	1.000	1.000
5	1.468	1.513	1.487
10	1.826	1.891	1.856
20	2.227	2.288	2.259
25	2.368	2.421	2.398
30	2.488	2.531	2.515
50	2.853	2.853	2.864
75	3.176	3.122	3.164
100	3.424	3.320	3.391
200	4.097	3.824	3.990
500	5.182	4.555	4.910
1000	6.181	5.163	5.720

Urban

Return period	GL	GEV	KAP3
2	1.000	1.000	1.000
5	1.426	1.463	1.441
10	1.761	1.819	1.788
20	2.145	2.203	2.174
25	2.282	2.334	2.310
30	2.400	2.444	2.426
50	2.760	2.769	2.773
75	3.082	3.045	3.077
100	3.332	3.252	3.310
200	4.022	3.789	3.934
500	5.158	4.594	4.920
1000	6.229	5.285	5.811

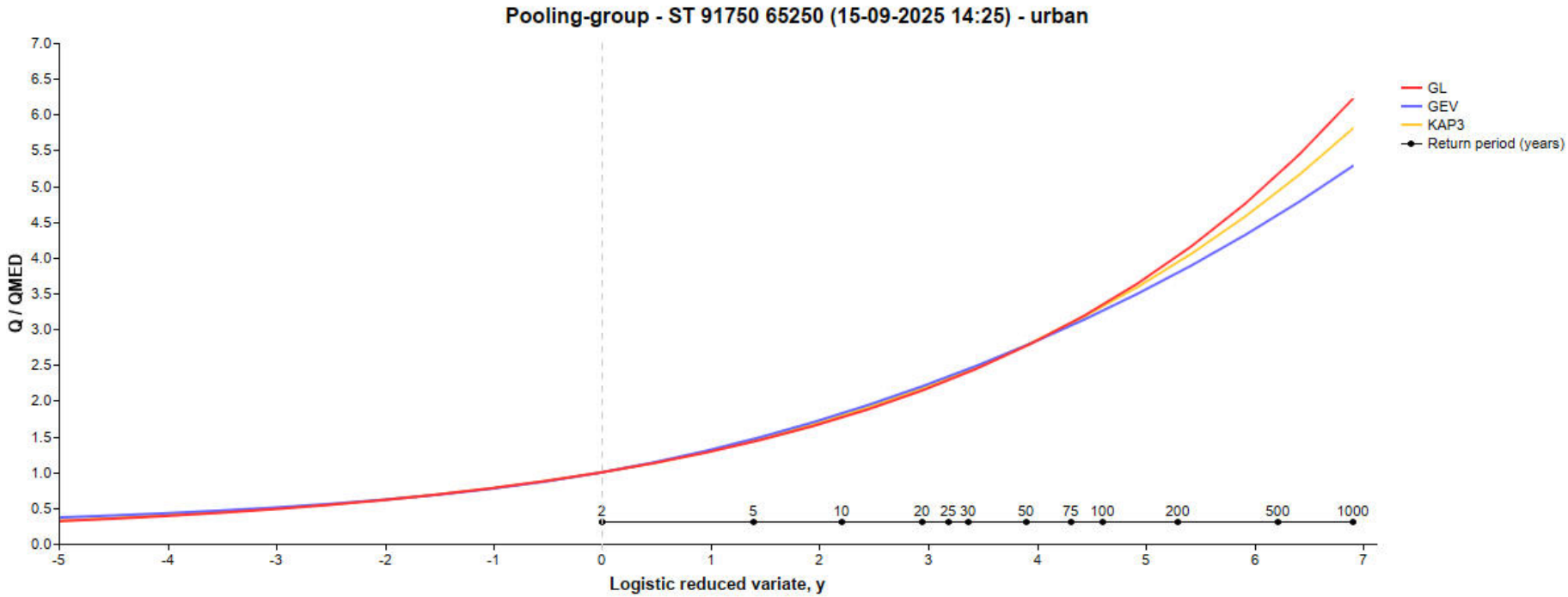
UK Design Flood Estimation

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UK Design Flood Estimation

Summary of ESS/Pooled Estimation Analysis using the Flood Estimation Handbook Statistical Method



UK Design Flood Estimation

Summary of ESS/Pooled Estimation Analysis using the Flood Estimation Handbook Statistical Method

QMED data and results

Donor selection criteria

Only sites suitable for QMED:	Yes
URBEXT2000:	<0.030
Donor adjusted FSE:	1.382
No. of donors:	1

Donor stations

Station	Distance	Use QMED obs deurbanised	QMED obs	QMED deurbanised	QMED CDs urban	QMED CDs rural
53018 (Avon @ Bathford)	6.29	Yes	165.317	**158.709**	144.975	144.975

Donor suitability

Station	Suitability for QMED	Suitability for pooling	Years	Non-flood years	Percentage non-flood years	Mann Kendall (MKZ)	MKZ significance (%)	Comments
53018 (Avon @ Bathford)	Yes	Yes	54	0	0.00	-0.25	None	

Donor catchment descriptors

Station	Area	Centroid X	Centroid Y	SAAR	FPEXT	FARL	URBEXT2000	BFIHOST19
Adjusted_FEH_Catchment_Descriptors_391750_165250_v5_0_1 @ ST 91750 65250)	0.887	392026	164905	710	0.073	1.000	0.155	0.235
53018 (Avon @ Bathford)	1569.345	385923	166415	817	0.096	0.985	0.030	0.586

Unused Donor stations

Station	Distance	URBEXT	Use QMED obs deurbanised	QMED obs	QMED deurbanised	QMED CDs urban	QMED CDs rural	Centroid X	Centroid Y	Area	SAAR	BFIHOST19	FARL	Years of data	QMED suitability	Pooling suitability
53002 (Semington Brook @ Semington)	8.92	0.030	Yes	16.779	**16.130**	15.281	15.281	397341	157744	153.335	712	0.569	0.987	16	Yes	No
53013 (Marden @ Stanley)	12.06	0.028	Yes	13.580	**13.072**	10.107	10.107	401464	172406	99.460	724	0.587	0.980	51	Yes	Yes
53028 (By Brook @ Middlehill)	14.71	0.014	Yes	10.698	**10.398**	8.416	8.416	380979	174611	99.485	835	0.733	0.999	42	Yes	Yes
43017 (West Avon @ Upavon West)	15.45	0.011	Yes	5.439	**5.248**	3.129	3.129	406845	160525	84.630	744	0.852	1.000	53	Yes	No
43028 (Chitterne Brook @ Codford)	18.18	0.001	Yes	2.332	**2.321**	1.991	1.991	396071	147185	67.998	807	0.936	1.000	28	Yes	No
39037 (Kennet @ Marlborough)	19.48	0.006	Yes	3.080	**2.978**	3.317	3.317	410749	170292	136.433	772	0.932	1.000	51	Yes	No
53008 (Avon @ Great Somerford)	22.13	0.009	Yes	38.187	**37.658**	28.915	28.915	388258	186712	305.168	804	0.637	0.988	60	Yes	Yes
53023 (Sherston Avon @ Fosseway)	22.48	0.009	Yes	7.386	**7.262**	7.103	7.103	381553	184796	77.728	835	0.724	0.999	47	Yes	Yes
43008 (Wylye @ South Newton)	22.64	0.010	Yes	12.754	**12.154**	10.771	10.771	396264	142665	448.168	830	0.918	0.976	51	Yes	Yes

QMED

Rural:	0.470 m³/s
Urban:	0.528 m³/s

UK Design Flood Estimation

Summary of ESS/Pooled Estimation Analysis using the Flood Estimation Handbook Statistical Method

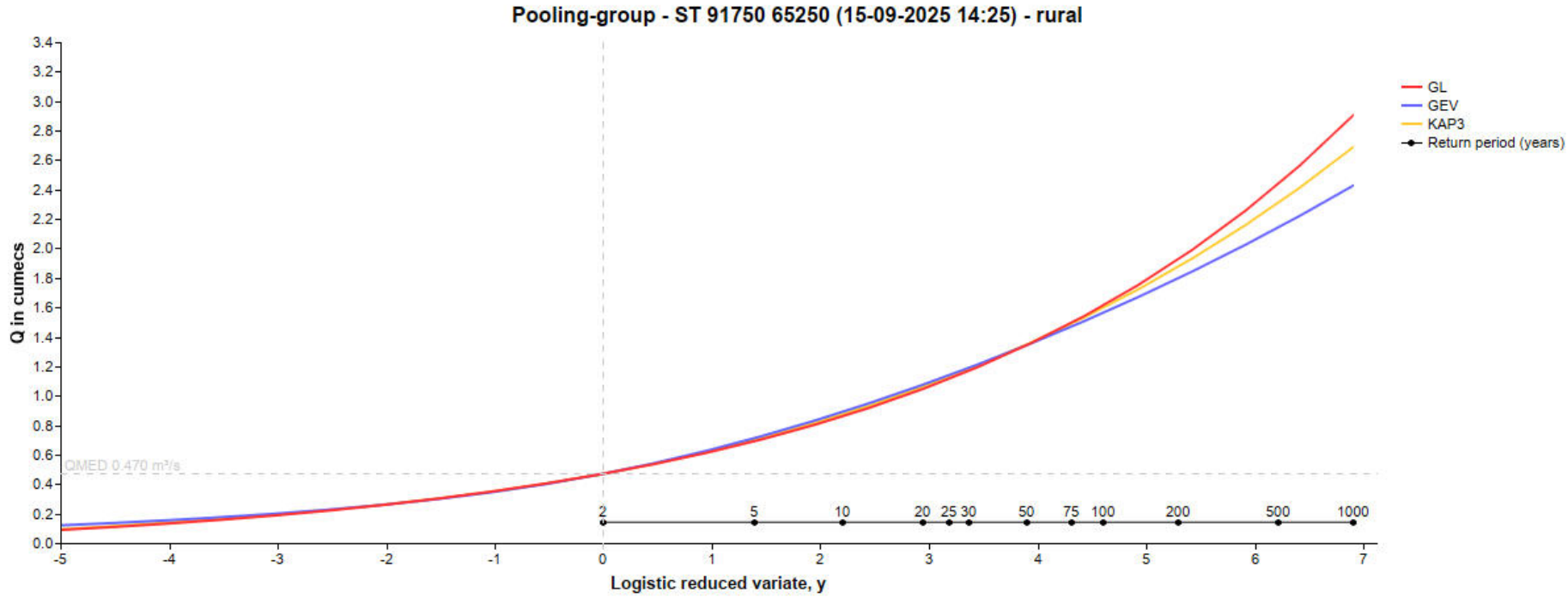
Flood Frequency Curve

Rural Flood Frequency Curve

Return period	GL (m³/s)	GEV (m³/s)	KAP3 (m³/s)
2	0.470	0.470	0.470
5	0.690	0.711	0.699
10	0.859	0.889	0.873
20	1.047	1.076	1.062
25	1.113	1.138	1.127
30	1.170	1.190	1.182
50	1.342	1.341	1.347
75	1.493	1.468	1.488
100	1.610	1.561	1.594
200	1.926	1.798	1.876
500	2.436	2.142	2.309
1000	2.906	2.428	2.689

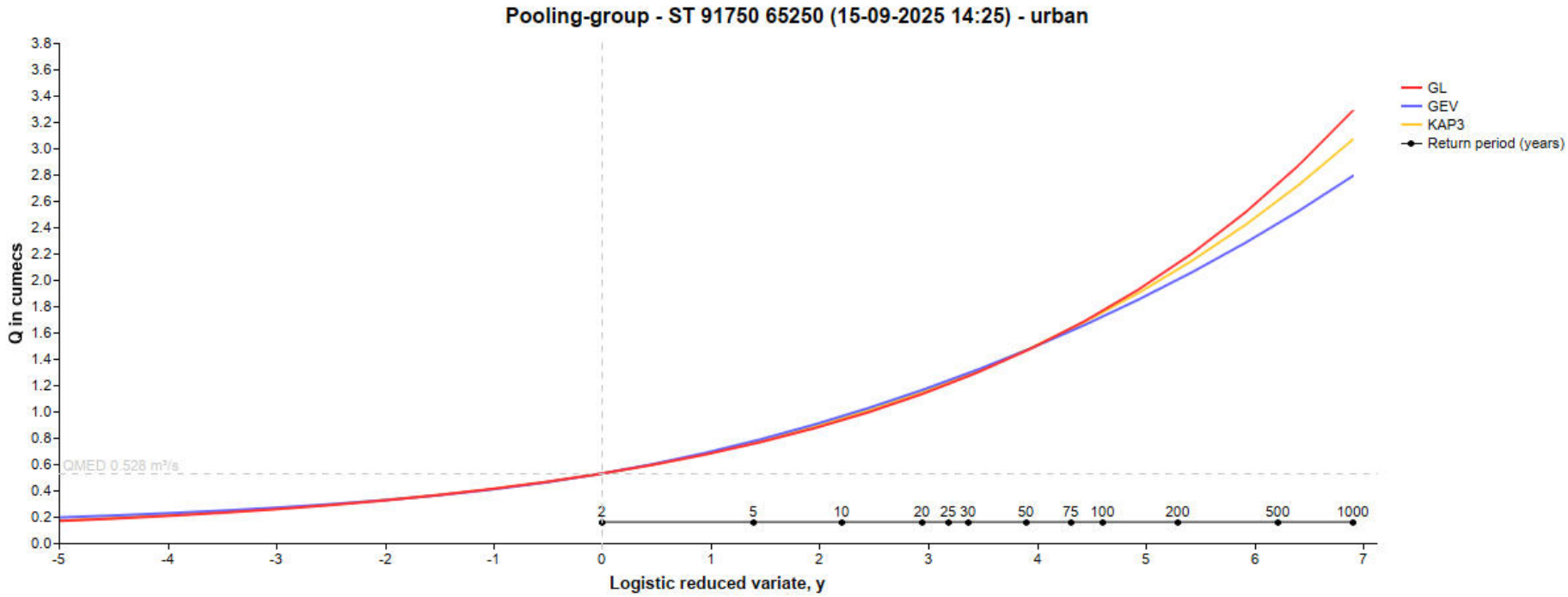
Urban Flood Frequency Curve

Return period	GL (m³/s)	GEV (m³/s)	KAP3 (m³/s)
2	0.528	0.528	0.528
5	0.753	0.773	0.761
10	0.930	0.961	0.944
20	1.133	1.164	1.149
25	1.205	1.233	1.220
30	1.268	1.291	1.281
50	1.458	1.463	1.465
75	1.628	1.609	1.626
100	1.760	1.718	1.748
200	2.124	2.001	2.078
500	2.725	2.427	2.599
1000	3.290	2.792	3.069



UK Design Flood Estimation

Summary of ESS/Pooled Estimation Analysis using the Flood Estimation Handbook Statistical Method



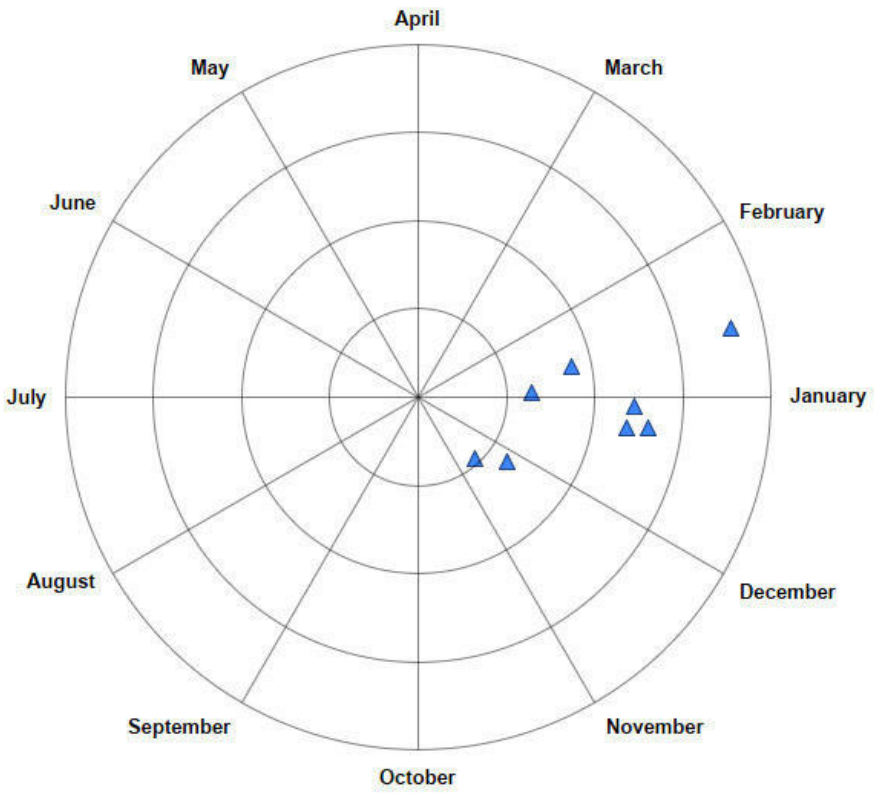
UK Design Flood Estimation

Summary of ESS/Pooled Estimation Analysis using the Flood Estimation Handbook Statistical Method

Appendix

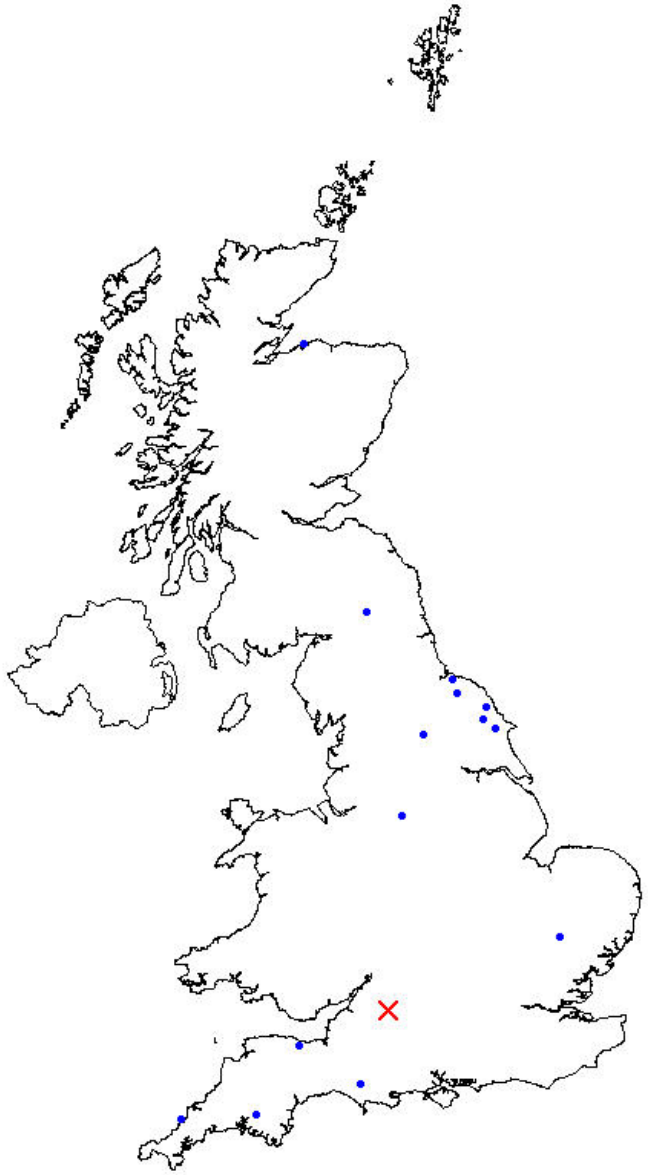
Station record parameters

Flood seasonality: ST 91750 65250 (15-09-2025 14:25) - urban



UK Design Flood Estimation

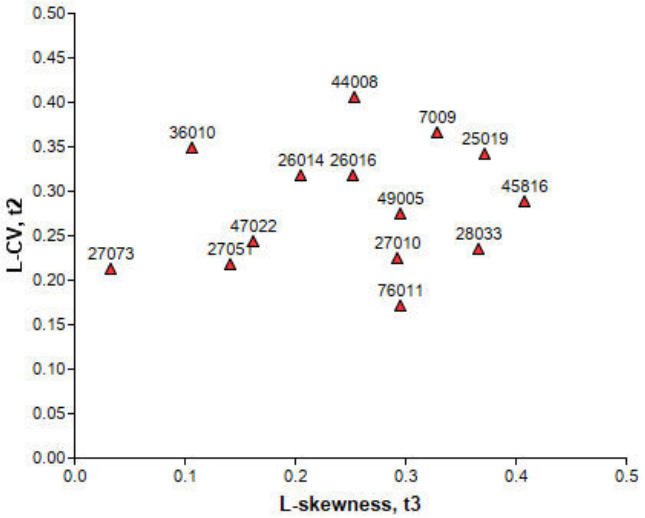
Summary of ESS/Pooled Estimation Analysis using the Flood Estimation Handbook Statistical Method

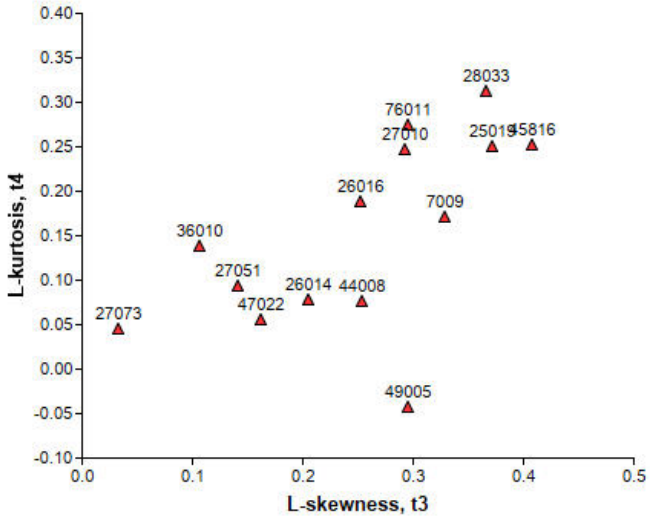


UK Design Flood Estimation

Summary of ESS/Pooled Estimation Analysis using the Flood Estimation Handbook Statistical Method

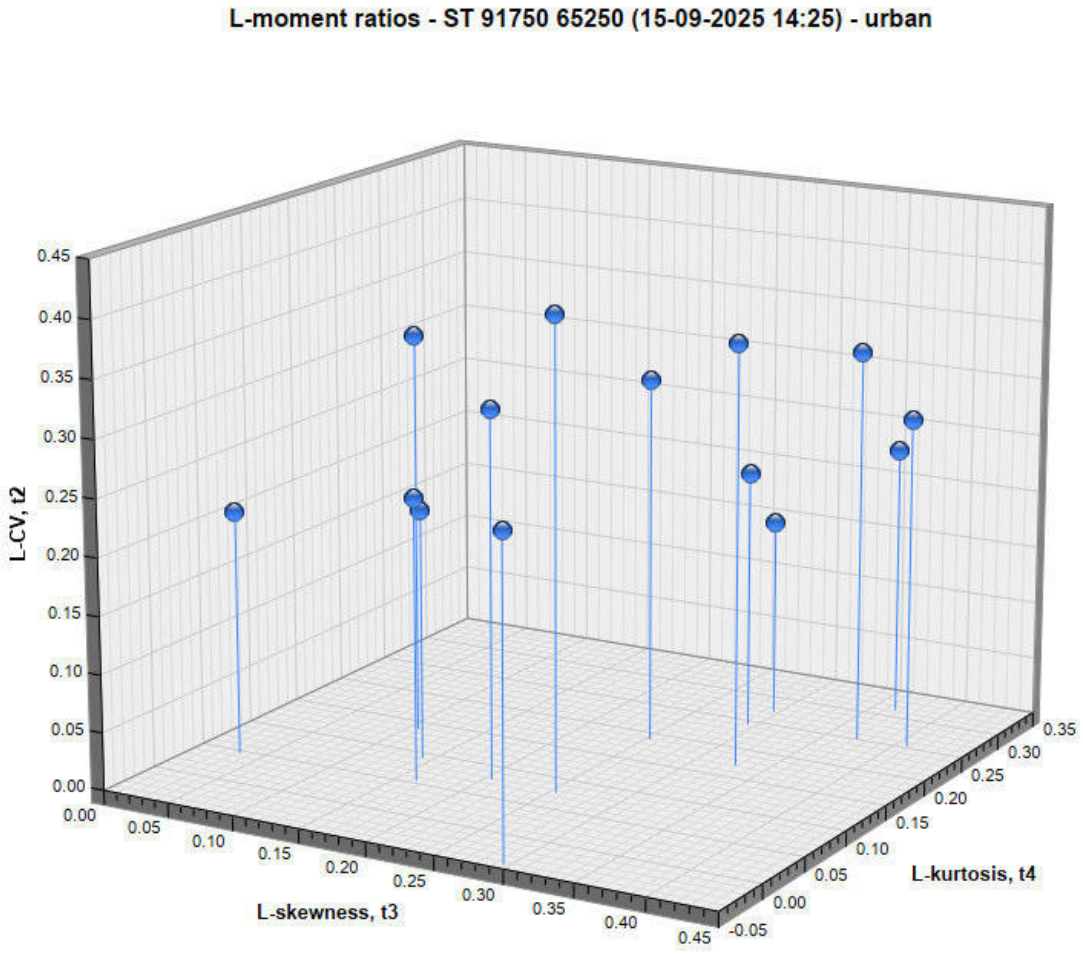
L-moment ratios - ST 91750 65250 (15-09-2025 14:25) - urban





UK Design Flood Estimation

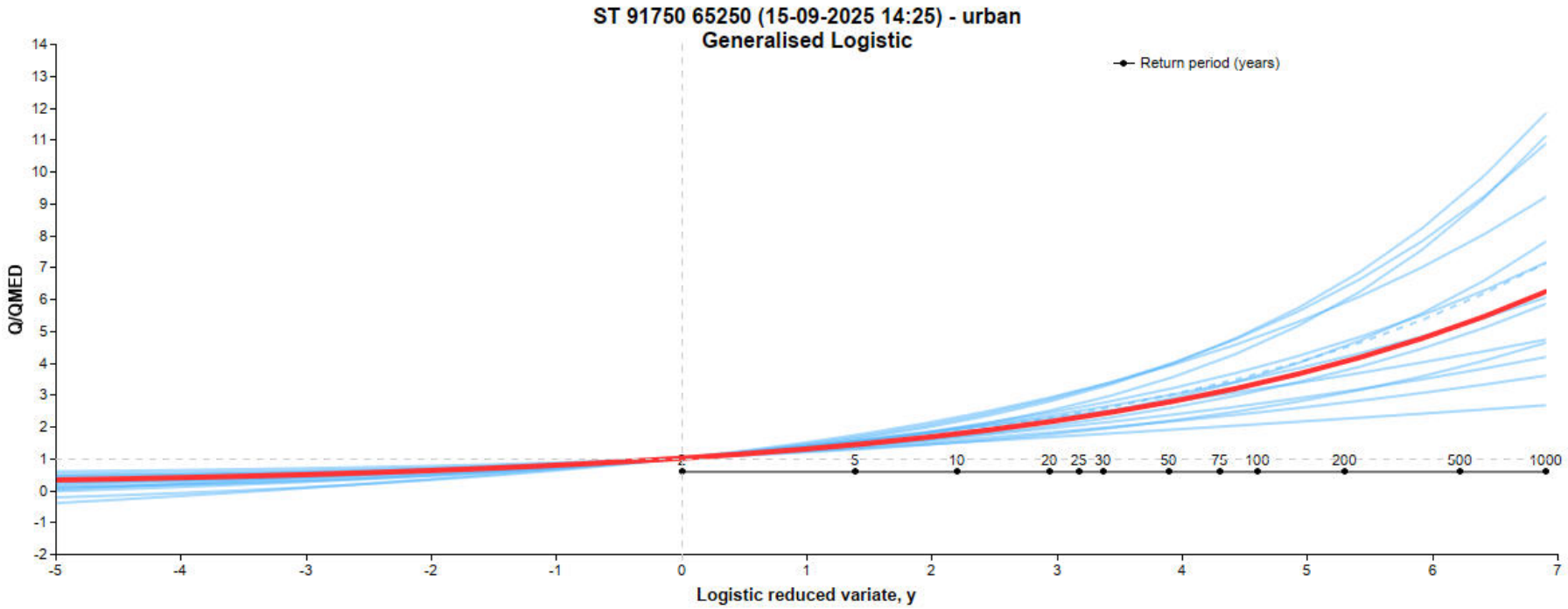
Summary of ESS/Pooled Estimation Analysis using the Flood Estimation Handbook Statistical Method



UK Design Flood Estimation

Summary of ESS/Pooled Estimation Analysis using the Flood Estimation Handbook Statistical Method

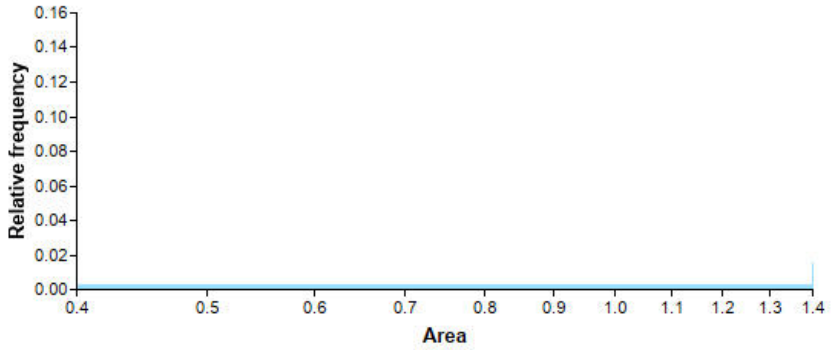
Pooling group growth curves

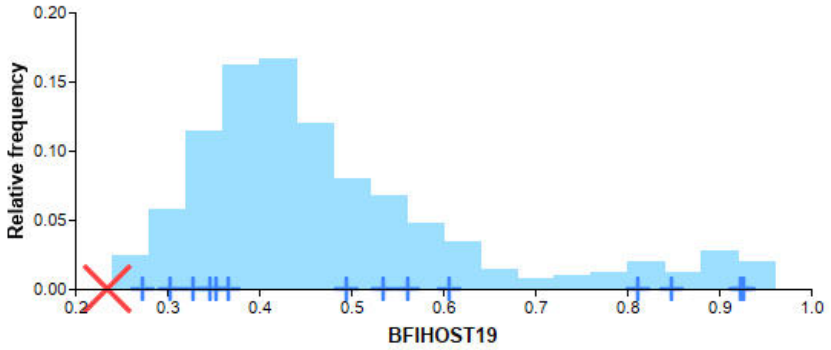


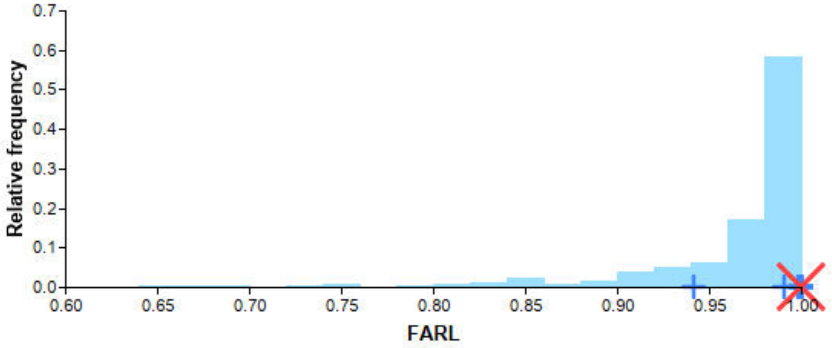
UK Design Flood Estimation

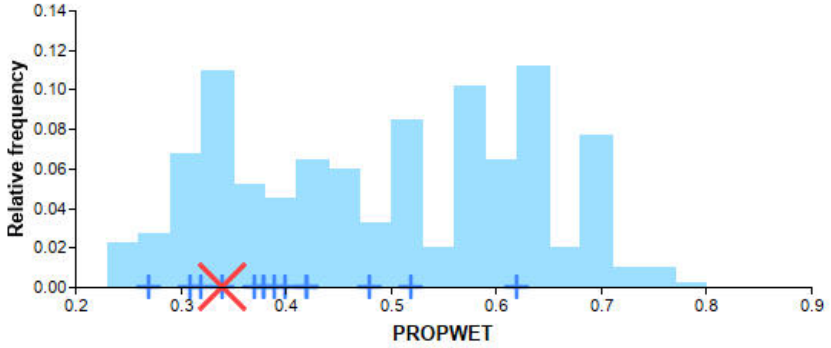
Summary of ESS/Pooled Estimation Analysis using the Flood Estimation Handbook Statistical Method

Catchment descriptors



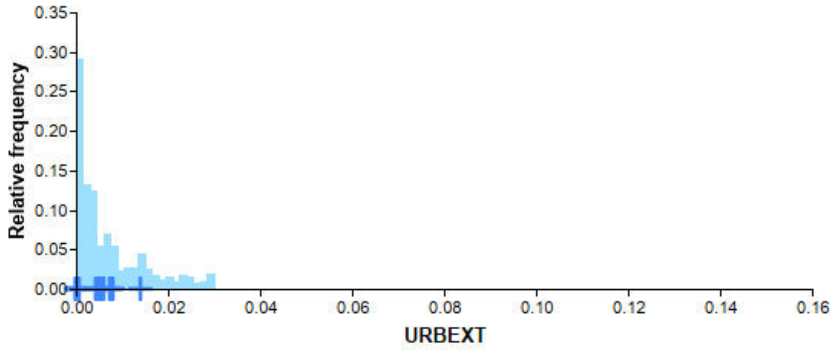


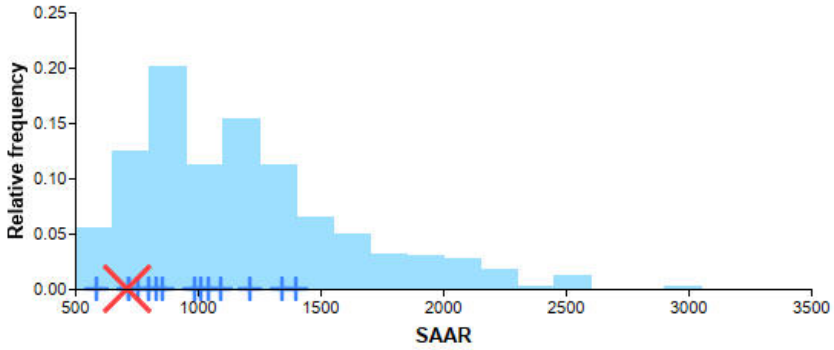


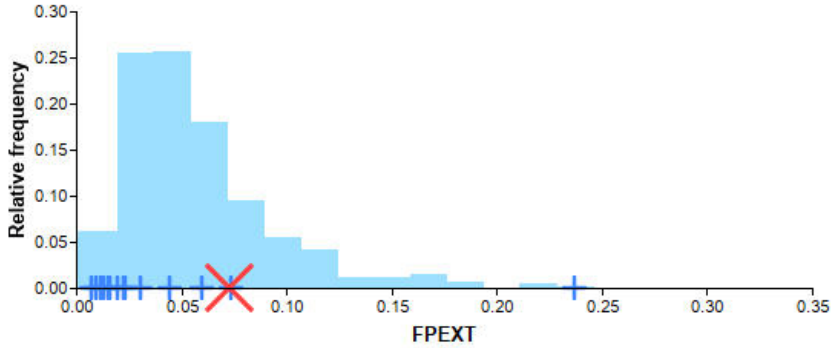


UK Design Flood Estimation

Summary of ESS/Pooled Estimation Analysis using the Flood Estimation Handbook Statistical Method







Appendix 3 – ReFH2 Calculation Logs

UK Design Flood Estimation

Generated on 15 September 2025 15:04:11 by jpdsg
Printed from the ReFH2 Flood Modelling software package, version 4.0.8560.23190

Summary of estimate using the Flood Estimation Handbook revitalised flood hydrograph method (ReFH2)

Site details Checksum: C911-FF9A

Site name: Adjusted_FEH_Catchment_Descriptors_391750_165250_v5_0_1

Easting: 391750

Northing: 165250

Country: England, Wales or Northern Ireland

Catchment Area (km²): 0.89

Using plot scale calculations: Yes

Model: 2.3

Site description: None

Model run: 30 year

Summary of results

Rainfall - FEH22 (mm):	43.86	Total runoff (ML):	20.77
Total Rainfall (mm):	28.16	Total flow (ML):	24.97
Peak Rainfall (mm):	9.51	Peak flow (m³/s):	1.48

Parameters

Where the user has overriden a system-generated value, this original value is shown in square brackets after the value used.
** Indicates that the user locked the duration/timestep*

Rainfall parameters (Rainfall - FEH22)

Name	Value	User-defined?
Duration (hh:mm:ss)	03:30:00	No
Timestep (hh:mm:ss)	00:30:00	No
SCF (Seasonal correction factor)	0.66	No
ARF (Areal reduction factor)	0.98	No
Seasonality	Winter	No

Loss model parameters

Name	Value	User-defined?
Cini (mm)	154.13	No
Cmax (mm)	205.21	No
Use alpha correction factor	No	No
Alpha correction factor	n/a	No

Routing model parameters

Name	Value	User-defined?
Tp (hr)	2.23	No
Up	0.65	No
Uk	0.8	No

Baseflow model parameters

Name	Value	User-defined?
BF0 (m^3/s)	0.05	No
BL (hr)	25.4	No
BR	0.22	No

Urbanisation parameters

Name	Value	User-defined?
Sewer capacity (m^3/s)	0	No
Exporting drained area (km^2)	0	No
Urban area (km^2)	0.22	No
Urbext 2000	0.15	No
Impervious runoff factor	0.7	No
Imperviousness factor	0.4	No
Tp scaling factor	0.75	No
Depression storage depth (mm)	0.5	No

Time series data

Time (hh:mm:ss)	Rain (mm)	Sewer Loss (m^3/s)	Net Rain (mm)	Runoff (m^3/s)	Baseflow (m^3/s)	Total Flow (m^3/s)
00:00:00	1.1445	0.0000	0.8709	0.0000	0.0485	0.0485
00:30:00	2.5616	0.0000	1.9955	0.0084	0.0476	0.056
01:00:00	5.6166	0.0000	4.4796	0.0445	0.0468	0.0912
01:30:00	9.5128	0.0000	7.9139	0.1433	0.0461	0.189
02:00:00	5.6166	0.0000	4.8655	0.3597	0.0461	0.406
02:30:00	2.5616	0.0000	2.2666	0.6847	0.0469	0.732
03:00:00	1.1445	0.0000	1.0223	1.0315	0.0489	1.08
03:30:00	0.0000	0.0000	0.0000	1.3083	0.0521	1.36
04:00:00	0.0000	0.0000	0.0000	1.4255	0.056	1.48
04:30:00	0.0000	0.0000	0.0000	1.3603	0.0603	1.42
05:00:00	0.0000	0.0000	0.0000	1.1907	0.0641	1.25
05:30:00	0.0000	0.0000	0.0000	0.9886	0.0673	1.06
06:00:00	0.0000	0.0000	0.0000	0.7928	0.0697	0.863
06:30:00	0.0000	0.0000	0.0000	0.6277	0.0714	0.699
07:00:00	0.0000	0.0000	0.0000	0.4923	0.0724	0.565
07:30:00	0.0000	0.0000	0.0000	0.3767	0.073	0.45
08:00:00	0.0000	0.0000	0.0000	0.2787	0.0732	0.352
08:30:00	0.0000	0.0000	0.0000	0.1959	0.073	0.269
09:00:00	0.0000	0.0000	0.0000	0.1243	0.0724	0.197
09:30:00	0.0000	0.0000	0.0000	0.0656	0.0714	0.137
10:00:00	0.0000	0.0000	0.0000	0.0270	0.0703	0.0973
10:30:00	0.0000	0.0000	0.0000	0.0086	0.069	0.0777
11:00:00	0.0000	0.0000	0.0000	0.0017	0.0677	0.0694
11:30:00	0.0000	0.0000	0.0000	0.0000	0.0664	0.0664
12:00:00	0.0000	0.0000	0.0000	0.0000	0.0651	0.0651
12:30:00	0.0000	0.0000	0.0000	0.0000	0.0638	0.0638
13:00:00	0.0000	0.0000	0.0000	0.0000	0.0626	0.0626
13:30:00	0.0000	0.0000	0.0000	0.0000	0.0614	0.0614
14:00:00	0.0000	0.0000	0.0000	0.0000	0.0602	0.0602
14:30:00	0.0000	0.0000	0.0000	0.0000	0.059	0.059
15:00:00	0.0000	0.0000	0.0000	0.0000	0.0578	0.0578
15:30:00	0.0000	0.0000	0.0000	0.0000	0.0567	0.0567
16:00:00	0.0000	0.0000	0.0000	0.0000	0.0556	0.0556
16:30:00	0.0000	0.0000	0.0000	0.0000	0.0545	0.0545
17:00:00	0.0000	0.0000	0.0000	0.0000	0.0535	0.0535

Printed from the ReFH2 Flood Modelling software package, version 4.0.8560.23190

Time (hh:mm:ss)	Rain (mm)	Sewer Loss (m^3/s)	Net Rain (mm)	Runoff (m^3/s)	Baseflow (m^3/s)	Total Flow (m^3/s)
17:30:00	0.0000	0.0000	0.0000	0.0000	0.0524	0.0524
18:00:00	0.0000	0.0000	0.0000	0.0000	0.0514	0.0514
18:30:00	0.0000	0.0000	0.0000	0.0000	0.0504	0.0504
19:00:00	0.0000	0.0000	0.0000	0.0000	0.0494	0.0494

Printed from the ReFH2 Flood Modelling software package, version 4.0.8560.23190

Appendix

Catchment descriptors

Name	Value	User-defined value used?
Area (km^2)	0.89	No
ALTBAR	43	No
ASPBAR	321	No
ASPVAR	0.43	No
BFIHOST	0.23	No
BFIHOST19	0.24	No
DPLBAR (km)	0.49	No
DPSBAR (mkm^{-1})	6.74	No
FARL	1	No
LDP	1.43	No
PROPWET	0.34	No
RMED1H	10.2	No
RMED1D	32.3	No
RMED2D	44.4	No
SAAR (mm)	710	No
SAAR4170 (mm)	742	No
SPRHOST	52.28	No
Urbext2000	0.15	No
Urbext1990	0	No
URBCONC	0	No
URBLOC	0.59	No
DDF parameter C	-0.03	No
DDF parameter D1	0.36	No
DDF parameter D2	0.41	No
DDF parameter D3	0.25	No
DDF parameter E	0.29	No
DDF parameter F	2.44	No
DDF parameter C (1km grid value)	-0.03	No
DDF parameter D1 (1km grid value)	0.36	No
DDF parameter D2 (1km grid value)	0.41	No
DDF parameter D3 (1km grid value)	0.25	No
DDF parameter E (1km grid value)	0.29	No
DDF parameter F (1km grid value)	2.45	No

Printed from the ReFH2 Flood Modelling software package, version 4.0.8560.23190

UK Design Flood Estimation

Generated on 15 September 2025 15:09:43 by jpdsg
Printed from the ReFH2 Flood Modelling software package, version 4.0.8560.23190

Summary of estimate using the Flood Estimation Handbook revitalised flood hydrograph method (ReFH2)

Site details Checksum: C911-FF9A

Site name: Adjusted_FEH_Catchment_Descriptors_391750_165250_v5_0_1

Easting: 391750

Northing: 165250

Country: England, Wales or Northern Ireland

Catchment Area (km²): 0.89

Using plot scale calculations: Yes

Model: 2.3

Site description: None

Model run: 100 year

Summary of results

Rainfall - FEH22 (mm):	56.30	Total runoff (ML):	27.24
Total Rainfall (mm):	36.15	Total flow (ML):	32.07
Peak Rainfall (mm):	12.21	Peak flow (m³/s):	1.93

Parameters

Where the user has overriden a system-generated value, this original value is shown in square brackets after the value used.
** Indicates that the user locked the duration/timestep*

Rainfall parameters (Rainfall - FEH22)

Name	Value	User-defined?
Duration (hh:mm:ss)	03:30:00	No
Timestep (hh:mm:ss)	00:30:00	No
SCF (Seasonal correction factor)	0.66	No
ARF (Areal reduction factor)	0.98	No
Seasonality	Winter	No

Loss model parameters

Name	Value	User-defined?
Cini (mm)	154.13	No
Cmax (mm)	205.21	No
Use alpha correction factor	No	No
Alpha correction factor	n/a	No

Routing model parameters

Name	Value	User-defined?
Tp (hr)	2.23	No
Up	0.65	No
Uk	0.8	No

Baseflow model parameters

Name	Value	User-defined?
BF0 (m^3/s)	0.05	No
BL (hr)	25.4	No
BR	0.19	No

Urbanisation parameters

Name	Value	User-defined?
Sewer capacity (m^3/s)	0	No
Exporting drained area (km^2)	0	No
Urban area (km^2)	0.22	No
Urbext 2000	0.15	No
Impervious runoff factor	0.7	No
Imperviousness factor	0.4	No
Tp scaling factor	0.75	No
Depression storage depth (mm)	0.5	No

Time series data

Time (hh:mm:ss)	Rain (mm)	Sewer Loss (m^3/s)	Net Rain (mm)	Runoff (m^3/s)	Baseflow (m^3/s)	Total Flow (m^3/s)
00:00:00	1.4692	0.0000	1.1222	0.0000	0.0485	0.0485
00:30:00	3.2884	0.0000	2.5719	0.0108	0.0476	0.0584
01:00:00	7.2102	0.0000	5.8111	0.0574	0.0468	0.104
01:30:00	12.2119	0.0000	10.3808	0.1850	0.0462	0.231
02:00:00	7.2102	0.0000	6.4471	0.4663	0.0462	0.513
02:30:00	3.2884	0.0000	3.0188	0.8907	0.0473	0.938
03:00:00	1.4692	0.0000	1.3646	1.3457	0.0497	1.4
03:30:00	0.0000	0.0000	0.0000	1.7113	0.0534	1.76
04:00:00	0.0000	0.0000	0.0000	1.8690	0.0581	1.93
04:30:00	0.0000	0.0000	0.0000	1.7869	0.063	1.85
05:00:00	0.0000	0.0000	0.0000	1.5660	0.0676	1.63
05:30:00	0.0000	0.0000	0.0000	1.3011	0.0714	1.37
06:00:00	0.0000	0.0000	0.0000	1.0438	0.0742	1.12
06:30:00	0.0000	0.0000	0.0000	0.8267	0.0762	0.903
07:00:00	0.0000	0.0000	0.0000	0.6486	0.0776	0.726
07:30:00	0.0000	0.0000	0.0000	0.4966	0.0784	0.575
08:00:00	0.0000	0.0000	0.0000	0.3679	0.0787	0.447
08:30:00	0.0000	0.0000	0.0000	0.2590	0.0785	0.338
09:00:00	0.0000	0.0000	0.0000	0.1647	0.0779	0.243
09:30:00	0.0000	0.0000	0.0000	0.0872	0.077	0.164
10:00:00	0.0000	0.0000	0.0000	0.0360	0.0758	0.112
10:30:00	0.0000	0.0000	0.0000	0.0116	0.0744	0.086
11:00:00	0.0000	0.0000	0.0000	0.0023	0.073	0.0752
11:30:00	0.0000	0.0000	0.0000	0.0000	0.0716	0.0716
12:00:00	0.0000	0.0000	0.0000	0.0000	0.0702	0.0702
12:30:00	0.0000	0.0000	0.0000	0.0000	0.0688	0.0688
13:00:00	0.0000	0.0000	0.0000	0.0000	0.0675	0.0675
13:30:00	0.0000	0.0000	0.0000	0.0000	0.0661	0.0661
14:00:00	0.0000	0.0000	0.0000	0.0000	0.0649	0.0649
14:30:00	0.0000	0.0000	0.0000	0.0000	0.0636	0.0636
15:00:00	0.0000	0.0000	0.0000	0.0000	0.0624	0.0624
15:30:00	0.0000	0.0000	0.0000	0.0000	0.0611	0.0611
16:00:00	0.0000	0.0000	0.0000	0.0000	0.0599	0.0599
16:30:00	0.0000	0.0000	0.0000	0.0000	0.0588	0.0588
17:00:00	0.0000	0.0000	0.0000	0.0000	0.0576	0.0576

Printed from the ReFH2 Flood Modelling software package, version 4.0.8560.23190

Time (hh:mm:ss)	Rain (mm)	Sewer Loss (m^3/s)	Net Rain (mm)	Runoff (m^3/s)	Baseflow (m^3/s)	Total Flow (m^3/s)
17:30:00	0.0000	0.0000	0.0000	0.0000	0.0565	0.0565
18:00:00	0.0000	0.0000	0.0000	0.0000	0.0554	0.0554
18:30:00	0.0000	0.0000	0.0000	0.0000	0.0543	0.0543
19:00:00	0.0000	0.0000	0.0000	0.0000	0.0533	0.0533
19:30:00	0.0000	0.0000	0.0000	0.0000	0.0522	0.0522
20:00:00	0.0000	0.0000	0.0000	0.0000	0.0512	0.0512
20:30:00	0.0000	0.0000	0.0000	0.0000	0.0502	0.0502
21:00:00	0.0000	0.0000	0.0000	0.0000	0.0492	0.0492

Printed from the ReFH2 Flood Modelling software package, version 4.0.8560.23190

Appendix

Catchment descriptors

Name	Value	User-defined value used?
Area (km^2)	0.89	No
ALTBAR	43	No
ASPBAR	321	No
ASPVAR	0.43	No
BFIHOST	0.23	No
BFIHOST19	0.24	No
DPLBAR (km)	0.49	No
DPSBAR (mkm^{-1})	6.74	No
FARL	1	No
LDP	1.43	No
PROPWET	0.34	No
RMED1H	10.2	No
RMED1D	32.3	No
RMED2D	44.4	No
SAAR (mm)	710	No
SAAR4170 (mm)	742	No
SPRHOST	52.28	No
Urbext2000	0.15	No
Urbext1990	0	No
URBCONC	0	No
URBLOC	0.59	No
DDF parameter C	-0.03	No
DDF parameter D1	0.36	No
DDF parameter D2	0.41	No
DDF parameter D3	0.25	No
DDF parameter E	0.29	No
DDF parameter F	2.44	No
DDF parameter C (1km grid value)	-0.03	No
DDF parameter D1 (1km grid value)	0.36	No
DDF parameter D2 (1km grid value)	0.41	No
DDF parameter D3 (1km grid value)	0.25	No
DDF parameter E (1km grid value)	0.29	No
DDF parameter F (1km grid value)	2.45	No

Printed from the ReFH2 Flood Modelling software package, version 4.0.8560.23190

UK Design Flood Estimation

Generated on 15 September 2025 15:10:01 by jpdsg
Printed from the ReFH2 Flood Modelling software package, version 4.0.8560.23190

Summary of estimate using the Flood Estimation Handbook revitalised flood hydrograph method (ReFH2)

Site details Checksum: C911-FF9A

Site name: Adjusted_FEH_Catchment_Descriptors_391750_165250_v5_0_1

Easting: 391750

Northing: 165250

Country: England, Wales or Northern Ireland

Catchment Area (km²): 0.89

Using plot scale calculations: Yes

Model: 2.3

Site description: None

Model run: 1000 year

Summary of results

Rainfall - FEH22 (mm):	88.54	Total runoff (ML):	45.16
Total Rainfall (mm):	56.85	Total flow (ML):	50.46
Peak Rainfall (mm):	19.20	Peak flow (m³/s):	3.16

Parameters

Where the user has overriden a system-generated value, this original value is shown in square brackets after the value used.
** Indicates that the user locked the duration/timestep*

Rainfall parameters (Rainfall - FEH22)

Name	Value	User-defined?
Duration (hh:mm:ss)	03:30:00	No
Timestep (hh:mm:ss)	00:30:00	No
SCF (Seasonal correction factor)	0.66	No
ARF (Areal reduction factor)	0.98	No
Seasonality	Winter	No

Loss model parameters

Name	Value	User-defined?
Cini (mm)	154.13	No
Cmax (mm)	205.21	No
Use alpha correction factor	No	No
Alpha correction factor	n/a	No

Routing model parameters

Name	Value	User-defined?
Tp (hr)	2.23	No
Up	0.65	No
Uk	0.8	No

Baseflow model parameters

Name	Value	User-defined?
BF0 (m^3/s)	0.05	No
BL (hr)	25.4	No
BR	0.13	No

Urbanisation parameters

Name	Value	User-defined?
Sewer capacity (m^3/s)	0	No
Exporting drained area (km^2)	0	No
Urban area (km^2)	0.22	No
Urbext 2000	0.15	No
Impervious runoff factor	0.7	No
Imperviousness factor	0.4	No
Tp scaling factor	0.75	No
Depression storage depth (mm)	0.5	No

Time series data

Time (hh:mm:ss)	Rain (mm)	Sewer Loss (m^3/s)	Net Rain (mm)	Runoff (m^3/s)	Baseflow (m^3/s)	Total Flow (m^3/s)
00:00:00	2.3105	0.0000	1.7755	0.0000	0.0485	0.0485
00:30:00	5.1714	0.0000	4.0864	0.0172	0.0476	0.0647
01:00:00	11.3387	0.0000	9.3850	0.0910	0.0468	0.138
01:30:00	19.2043	0.0000	17.2274	0.2951	0.0462	0.341
02:00:00	11.3387	0.0000	10.9580	0.7512	0.0463	0.798
02:30:00	5.1714	0.0000	5.1714	1.4481	0.0475	1.5
03:00:00	2.3105	0.0000	2.3105	2.2037	0.0502	2.25
03:30:00	0.0000	0.0000	0.0000	2.8195	0.0542	2.87
04:00:00	0.0000	0.0000	0.0000	3.0959	0.0594	3.16
04:30:00	0.0000	0.0000	0.0000	2.9721	0.0649	3.04
05:00:00	0.0000	0.0000	0.0000	2.6110	0.07	2.68
05:30:00	0.0000	0.0000	0.0000	2.1719	0.0743	2.25
06:00:00	0.0000	0.0000	0.0000	1.7436	0.0775	1.82
06:30:00	0.0000	0.0000	0.0000	1.3815	0.0798	1.46
07:00:00	0.0000	0.0000	0.0000	1.0850	0.0813	1.17
07:30:00	0.0000	0.0000	0.0000	0.8323	0.0823	0.915
08:00:00	0.0000	0.0000	0.0000	0.6181	0.0827	0.701
08:30:00	0.0000	0.0000	0.0000	0.4366	0.0826	0.519
09:00:00	0.0000	0.0000	0.0000	0.2789	0.0821	0.361
09:30:00	0.0000	0.0000	0.0000	0.1486	0.0811	0.23
10:00:00	0.0000	0.0000	0.0000	0.0618	0.0798	0.142
10:30:00	0.0000	0.0000	0.0000	0.0198	0.0784	0.0982
11:00:00	0.0000	0.0000	0.0000	0.0039	0.0769	0.0808
11:30:00	0.0000	0.0000	0.0000	0.0000	0.0754	0.0754
12:00:00	0.0000	0.0000	0.0000	0.0000	0.0739	0.0739
12:30:00	0.0000	0.0000	0.0000	0.0000	0.0725	0.0725
13:00:00	0.0000	0.0000	0.0000	0.0000	0.0711	0.0711
13:30:00	0.0000	0.0000	0.0000	0.0000	0.0697	0.0697
14:00:00	0.0000	0.0000	0.0000	0.0000	0.0683	0.0683
14:30:00	0.0000	0.0000	0.0000	0.0000	0.067	0.067
15:00:00	0.0000	0.0000	0.0000	0.0000	0.0657	0.0657
15:30:00	0.0000	0.0000	0.0000	0.0000	0.0644	0.0644
16:00:00	0.0000	0.0000	0.0000	0.0000	0.0632	0.0632
16:30:00	0.0000	0.0000	0.0000	0.0000	0.0619	0.0619
17:00:00	0.0000	0.0000	0.0000	0.0000	0.0607	0.0607

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Time (hh:mm:ss)	Rain (mm)	Sewer Loss (m^3/s)	Net Rain (mm)	Runoff (m^3/s)	Baseflow (m^3/s)	Total Flow (m^3/s)
17:30:00	0.0000	0.0000	0.0000	0.0000	0.0596	0.0596
18:00:00	0.0000	0.0000	0.0000	0.0000	0.0584	0.0584
18:30:00	0.0000	0.0000	0.0000	0.0000	0.0573	0.0573
19:00:00	0.0000	0.0000	0.0000	0.0000	0.0561	0.0561
19:30:00	0.0000	0.0000	0.0000	0.0000	0.055	0.055
20:00:00	0.0000	0.0000	0.0000	0.0000	0.054	0.054
20:30:00	0.0000	0.0000	0.0000	0.0000	0.0529	0.0529
21:00:00	0.0000	0.0000	0.0000	0.0000	0.0519	0.0519
21:30:00	0.0000	0.0000	0.0000	0.0000	0.0509	0.0509
22:00:00	0.0000	0.0000	0.0000	0.0000	0.0499	0.0499
22:30:00	0.0000	0.0000	0.0000	0.0000	0.0489	0.0489

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Appendix

Catchment descriptors

Name	Value	User-defined value used?
Area (km^2)	0.89	No
ALTBAR	43	No
ASPBAR	321	No
ASPVAR	0.43	No
BFIHOST	0.23	No
BFIHOST19	0.24	No
DPLBAR (km)	0.49	No
DPSBAR (mkm^{-1})	6.74	No
FARL	1	No
LDP	1.43	No
PROPWET	0.34	No
RMED1H	10.2	No
RMED1D	32.3	No
RMED2D	44.4	No
SAAR (mm)	710	No
SAAR4170 (mm)	742	No
SPRHOST	52.28	No
Urbext2000	0.15	No
Urbext1990	0	No
URBCONC	0	No
URBLOC	0.59	No
DDF parameter C	-0.03	No
DDF parameter D1	0.36	No
DDF parameter D2	0.41	No
DDF parameter D3	0.25	No
DDF parameter E	0.29	No
DDF parameter F	2.44	No
DDF parameter C (1km grid value)	-0.03	No
DDF parameter D1 (1km grid value)	0.36	No
DDF parameter D2 (1km grid value)	0.41	No
DDF parameter D3 (1km grid value)	0.25	No
DDF parameter E (1km grid value)	0.29	No
DDF parameter F (1km grid value)	2.45	No

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Appendix 4 – Full ReFH2 Hydrographs

Time	1-Year	2-Year	5-Year	10-Year	30-Year	50-Year	75-Year	100-Year	200-Year	1000-Year	100-Year+26%CC	100-Year+39%CC	100-Year+71%CC
00:00:00	0.049	0.049	0.049	0.049	0.049	0.049	0.049	0.049	0.049	0.049	0.049	0.049	0.049
00:30:00	0.051	0.051	0.053	0.054	0.056	0.057	0.058	0.058	0.060	0.065	0.061	0.063	0.066
01:00:00	0.064	0.066	0.075	0.081	0.091	0.096	0.101	0.104	0.113	0.138	0.119	0.127	0.146
01:30:00	0.101	0.110	0.137	0.157	0.189	0.206	0.220	0.231	0.260	0.341	0.281	0.306	0.368
02:00:00	0.183	0.205	0.273	0.323	0.406	0.448	0.485	0.513	0.586	0.798	0.640	0.705	0.868
02:30:00	0.306	0.347	0.478	0.573	0.732	0.814	0.885	0.938	1.081	1.496	1.187	1.314	1.634
03:00:00	0.437	0.498	0.695	0.839	1.080	1.206	1.314	1.395	1.615	2.254	1.778	1.974	2.468
03:30:00	0.540	0.618	0.869	1.052	1.360	1.521	1.660	1.765	2.047	2.874	2.258	2.511	3.150
04:00:00	0.583	0.667	0.942	1.143	1.482	1.659	1.811	1.927	2.239	3.155	2.472	2.753	3.460
04:30:00	0.558	0.639	0.902	1.095	1.421	1.591	1.738	1.850	2.152	3.037	2.376	2.648	3.330
05:00:00	0.495	0.566	0.798	0.968	1.255	1.405	1.535	1.634	1.900	2.681	2.099	2.339	2.937
05:30:00	0.420	0.480	0.674	0.816	1.056	1.182	1.290	1.372	1.595	2.246	1.761	1.961	2.459
06:00:00	0.348	0.396	0.553	0.669	0.863	0.964	1.051	1.118	1.297	1.821	1.431	1.592	1.992
06:30:00	0.287	0.326	0.452	0.544	0.699	0.780	0.850	0.903	1.046	1.461	1.152	1.280	1.597
07:00:00	0.237	0.268	0.368	0.442	0.565	0.629	0.684	0.726	0.839	1.166	0.923	1.024	1.273
07:30:00	0.193	0.218	0.296	0.354	0.450	0.500	0.542	0.575	0.662	0.915	0.727	0.805	0.996
08:00:00	0.157	0.175	0.235	0.279	0.352	0.390	0.422	0.447	0.512	0.701	0.561	0.619	0.762
08:30:00	0.125	0.139	0.184	0.216	0.269	0.296	0.320	0.338	0.385	0.519	0.420	0.461	0.562
09:00:00	0.098	0.108	0.138	0.160	0.197	0.215	0.231	0.243	0.274	0.361	0.297	0.324	0.388
09:30:00	0.076	0.082	0.101	0.115	0.137	0.148	0.157	0.164	0.182	0.230	0.195	0.210	0.244
10:00:00	0.061	0.065	0.077	0.085	0.097	0.103	0.108	0.112	0.121	0.142	0.127	0.133	0.147
10:30:00	0.053	0.056	0.064	0.070	0.078	0.081	0.084	0.086	0.090	0.098	0.093	0.096	0.100
11:00:00	0.050	0.052	0.059	0.063	0.069	0.072	0.074	0.075	0.078	0.081	0.079	0.080	0.081
11:30:00	0.048	0.050	0.057	0.061	0.066	0.069	0.070	0.072	0.074	0.075	0.075	0.075	0.075
12:00:00	0.000	0.049	0.056	0.060	0.065	0.067	0.069	0.070	0.072	0.074	0.073	0.074	0.074
12:30:00	0.000	0.000	0.055	0.058	0.064	0.066	0.068	0.069	0.071	0.073	0.072	0.072	0.073
13:00:00	0.000	0.000	0.053	0.057	0.063	0.065	0.066	0.067	0.070	0.071	0.071	0.071	0.071
13:30:00	0.000	0.000	0.052	0.056	0.061	0.064	0.065	0.066	0.068	0.070	0.069	0.070	0.070
14:00:00	0.000	0.000	0.051	0.055	0.060	0.062	0.064	0.065	0.067	0.068	0.068	0.068	0.068
14:30:00	0.000	0.000	0.050	0.054	0.059	0.061	0.063	0.064	0.066	0.067	0.067	0.067	0.067
15:00:00	0.000	0.000	0.049	0.053	0.058	0.060	0.061	0.062	0.064	0.066	0.065	0.066	0.066
15:30:00	0.000	0.000	0.000	0.052	0.057	0.059	0.060	0.061	0.063	0.064	0.064	0.064	0.064
16:00:00	0.000	0.000	0.000	0.051	0.056	0.058	0.059	0.060	0.062	0.063	0.063	0.063	0.063
16:30:00	0.000	0.000	0.000	0.050	0.055	0.056	0.058	0.059	0.061	0.062	0.061	0.062	0.062
17:00:00	0.000	0.000	0.000	0.049	0.053	0.055	0.057	0.058	0.059	0.061	0.060	0.061	0.061
17:30:00	0.000	0.000	0.000	0.000	0.052	0.054	0.056	0.057	0.058	0.060	0.059	0.060	0.060
18:00:00	0.000	0.000	0.000	0.000	0.051	0.053	0.055	0.055	0.057	0.058	0.058	0.058	0.058
18:30:00	0.000	0.000	0.000	0.000	0.050	0.052	0.053	0.054	0.056	0.057	0.057	0.057	0.057
19:00:00	0.000	0.000	0.000	0.000	0.049	0.051	0.052	0.053	0.055	0.056	0.056	0.056	0.056
19:30:00	0.000	0.000	0.000	0.000	0.000	0.050	0.051	0.052	0.054	0.055	0.055	0.055	0.055
20:00:00	0.000	0.000	0.000	0.000	0.000	0.049	0.050	0.051	0.053	0.054	0.054	0.054	0.054
20:30:00	0.000	0.000	0.000	0.000	0.000	0.000	0.049	0.050	0.052	0.053	0.053	0.053	0.053
21:00:00	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.049	0.051	0.052	0.052	0.052	0.052
21:30:00	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.050	0.051	0.051	0.051	0.051
22:00:00	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.049	0.050	0.050	0.050	0.050
22:30:00	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.049	0.000	0.049	0.049

Appendix 4 – Tabulated 1D Model Results

Melksham Watercourses in Channel Flood Levels						
Model Node	Baseline (001) (Elevation in mAOD)					
	1 in 30-year	1 in 100-year	1 in 100-year (+26%CC)	1 in 100-year (+39%CC)	1 in 100-year (+71%CC)	1 in 1000-year
Culvert_003.1	43.59	43.59	43.59	43.59	43.59	43.59
Culvert_003.2	43.42	43.42	43.42	43.42	43.42	43.42
Culvert_004.1	42.59	42.59	42.59	42.59	42.59	42.59
Culvert_004.2	41.48	41.57	41.64	41.66	41.71	41.69
DITCH_001.1	43.46	43.47	43.49	43.49	43.51	43.50
DITCH_001.2	43.46	43.47	43.49	43.50	43.51	43.51
DITCH_002.2	43.46	43.47	43.49	43.50	43.51	43.51
DITCH_003.2	43.46	43.47	43.49	43.49	43.51	43.50
DITCH_004.2	43.31	43.31	43.31	43.31	43.31	43.31
DITCH_005.2	43.34	43.34	43.34	43.34	43.34	43.34
DITCH_006.2	44.14	44.14	44.14	44.14	44.14	44.14
DS_Weir.1	41.20	41.20	41.20	41.20	41.20	41.20
DS_Weir.2	40.79	40.79	40.79	40.79	40.79	40.79
WC01_001.1	43.24	43.27	43.30	43.31	43.33	43.32
WC01_001.2	43.24	43.27	43.29	43.30	43.32	43.31
WC01_002.2	43.24	43.27	43.28	43.29	43.31	43.30
WC01_003.2	43.24	43.26	43.28	43.29	43.31	43.30
WC01_004.2	43.24	43.26	43.28	43.29	43.30	43.30
WC01_005.2	43.23	43.26	43.28	43.28	43.30	43.29
WC01_006.2	43.23	43.26	43.27	43.28	43.30	43.29
WC01_007.2	42.96	42.99	43.01	43.02	43.04	43.03
WC01_008.2	42.95	42.98	43.00	43.01	43.03	43.02
WC01_009.2	42.93	42.96	42.98	42.99	43.01	43.00
WC01_010.2	42.92	42.94	42.96	42.97	42.99	42.98
WC01_011.2	42.89	42.92	42.94	42.95	42.97	42.96
WC01_012.2	42.74	42.79	42.83	42.85	42.89	42.87
WC01_013.2	42.73	42.79	42.82	42.84	42.87	42.86
WC01_014.2	42.74	42.78	42.81	42.83	42.86	42.84
WC01_015.2	42.96	42.95	42.96	42.95	42.95	42.95
WC01_016.2	42.58	42.60	42.67	42.71	42.76	42.74
WC01_017.2	42.58	42.59	42.66	42.70	42.76	42.74
WC01_018.2	42.45	42.51	42.57	42.63	42.69	42.66
WC01_019.2	42.43	42.45	42.52	42.57	42.62	42.60
WC01_020.2	42.41	42.43	42.50	42.54	42.58	42.56
WC01_021.2	42.37	42.40	42.48	42.51	42.55	42.54
WC01_022.2	42.37	42.40	42.44	42.45	42.49	42.48
WC01_023.2	42.15	42.20	42.25	42.28	42.33	42.31
WC01_024.2	42.11	42.13	42.15	42.16	42.18	42.17
WC01_025.2	41.70	41.77	41.83	41.86	41.91	41.89
WC01_026.2	41.68	41.75	41.81	41.84	41.90	41.88
WC01_027.2	41.56	41.63	41.68	41.70	41.74	41.72
WC01_029.2	41.46	41.55	41.62	41.64	41.68	41.66
WC01_030.2	41.45	41.52	41.58	41.60	41.64	41.63
WC01_031.2	41.45	41.46	41.51	41.53	41.55	41.54

Melksham Watercourses in Channel Flood Levels						
Model Node	Baseline (001) (Elevation in mAOD)					
	1 in 30-year	1 in 100-year	1 in 100-year (+26%CC)	1 in 100-year (+39%CC)	1 in 100-year (+71%CC)	1 in 1000-year
WC01_032.2	41.43	41.44	41.46	41.46	41.48	41.48
WC01_033.2	41.39	41.39	41.42	41.43	41.44	41.43
WC01_034.2	41.37	41.37	41.40	41.39	41.40	41.39
WC01_035.2	41.30	41.32	41.34	41.35	41.35	41.35
WC01_036.2	41.33	41.33	41.33	41.33	41.33	41.33
WC02_001.1	42.90	42.94	42.99	43.00	43.04	43.02
WC02_001.2	42.90	42.94	42.99	43.00	43.03	43.02
WC02_002.2	42.90	42.94	42.98	43.00	43.03	43.02
WC02_003.2	42.90	42.94	42.98	43.00	43.03	43.02
WC02_004.2	42.90	42.94	42.98	43.00	43.03	43.01
WC02_005.2	42.89	42.92	42.94	42.95	42.97	42.97
WC_C_001.1	43.43	43.43	43.43	43.43	43.43	43.43
WC_C_001.2	43.44	43.44	43.44	43.44	43.44	43.44
WC_C_002.2	43.40	43.40	43.40	43.40	43.40	43.40
WC_C_003.2	43.18	43.18	43.18	43.18	43.18	43.18
WC_C_004.2	43.09	43.09	43.09	43.09	43.09	43.09
WC_C_005.2	42.89	42.92	42.94	42.95	42.97	42.96
WC_C_006.2	42.89	42.92	42.94	42.95	42.97	42.96
WC_D_001.1	43.36	43.36	43.36	43.36	43.36	43.36
WC_D_001.2	42.92	42.92	43.10	43.12	43.15	43.14
WC_D_002.2	42.92	42.92	43.10	43.12	43.15	43.14
WC_D_003.2	42.99	43.06	43.10	43.12	43.15	43.14
WC_D_004.2	42.99	43.06	43.10	43.12	43.15	43.14
WC_D_005.2	43.01	43.05	43.10	43.11	43.14	43.13
WC_D_006.2	42.99	43.04	43.08	43.09	43.12	43.11
WC_D_007.2	42.90	42.94	42.99	43.00	43.04	43.03
WC_E_001.1	44.42	44.43	44.43	44.43	44.43	44.43
WC_E_001.2	43.99	43.99	43.99	43.99	44.00	44.00
WC_E_002.2	44.00	44.01	44.01	44.01	44.02	44.02
WC_E_003.2	43.56	43.57	43.60	43.60	43.62	43.61
WC_E_004.2	43.65	43.65	43.65	43.65	43.65	43.65
WC_E_005.2	43.49	43.49	43.49	43.49	43.49	43.49
WC_E_006.2	43.51	43.51	43.51	43.51	43.51	43.51
WC_E_007.2	43.30	43.30	43.30	43.30	43.30	43.30
WC_E_008.2	44.12	44.12	44.12	44.12	44.12	44.12
WC_E_009.2	43.26	43.26	43.26	43.26	43.26	43.26
WC_E_010.2	43.25	43.25	43.25	43.25	43.25	43.25
WC_F_001.1	43.91	43.93	43.95	43.96	43.97	43.97
WC_F_001.2	43.91	43.93	43.95	43.96	43.97	43.97
WC_F_002.2	43.91	43.93	43.95	43.96	43.98	43.97
WC_F_003.2	43.91	43.93	43.95	43.96	43.97	43.97
WC_F_004.2	43.91	43.93	43.95	43.96	43.97	43.97
WC_F_005.2	43.91	43.93	43.95	43.96	43.97	43.97
WC_F_006.2	43.91	43.93	43.95	43.96	43.97	43.97
WC_F_007.2	43.95	43.95	43.97	43.96	43.97	43.97

Melksham Watercourses in Channel Flood Levels						
Model Node	Baseline (001) (Elevation in mAOD)					
	1 in 30-year	1 in 100-year	1 in 100-year (+26%CC)	1 in 100-year (+39%CC)	1 in 100-year (+71%CC)	1 in 1000-year
WC_F_008.2	44.00	44.00	44.00	44.00	44.00	44.00
WC_F_009.2	44.00	44.00	44.00	44.00	44.00	44.00
WC_F_010.2	44.28	44.28	44.28	44.28	44.28	44.28
WC_F_011.2	44.90	44.90	44.90	44.90	44.90	44.90
WC_F_012.2	44.72	44.72	44.73	44.72	44.72	44.72
WC_F_013.2	44.86	44.86	44.86	44.86	44.86	44.86
WC_F_014.2	44.50	44.53	44.56	44.57	44.60	44.59
WC_F_015.2	44.22	44.24	44.27	44.28	44.30	44.29
WC_F_016.2	44.07	44.08	44.09	44.09	44.10	44.10
WC_F_017.2	44.00	44.00	44.01	44.01	44.02	44.02
WC_F_018.2	43.75	43.75	43.76	43.76	43.77	43.77
WC_F_019.2	43.72	43.73	43.73	43.74	43.74	43.74
WC_F_020.2	43.72	43.73	43.73	43.74	43.74	43.74
WC_F_021.2	43.72	43.73	43.73	43.74	43.74	43.74
WC_G_001.1	43.29	43.30	43.32	43.32	43.33	43.33
WC_G_001.2	42.59	42.60	42.60	42.61	42.62	42.61
WC_G_002.2	42.00	42.01	42.01	42.02	42.02	42.02
WC_G_003.2	41.66	41.67	41.69	41.71	41.75	41.73
WC_G_004.2	41.63	41.64	41.67	41.69	41.72	41.71

Model Node	Melksham Watercourses in Channel Flood Levels							Melksham Watercourses in Channel Flood Levels					
	Sensitivity and Blockage Runs (Elevation in mAOD)							Difference compared to Baseline (m)					
	Baseline (001)	Nplus20	Nminus20	Block90 (Structure 8)	Block50 (Structure 2)	DSBC_plus200mm	DSBC_minus200mm	Nplus20	Nminus20	Block90 (Structure 8)	Block50 (Structure 2)	DSBC_plus200mm	DSBC_minus200mm
	1 in 100-year	1 in 100-year	1 in 100-year	1 in 100-year	1 in 100-year	1 in 100-year	1 in 100-year	1 in 100-year	1 in 100-year	1 in 100-year	1 in 100-year	1 in 100-year	1 in 100-year
Culvert_003.1	43.59	43.59	43.59	43.59	43.59	43.59	43.59	0.00	0.00	0.00	0.00	0.00	0.00
Culvert_003.2	43.42	43.42	43.42	43.42	43.42	43.42	43.42	0.00	0.00	0.00	0.00	0.00	0.00
Culvert_004.1	42.59	42.59	42.59	42.59	42.59	42.59	42.59	0.00	0.00	0.00	0.00	0.00	0.00
Culvert_004.2	41.57	41.60	41.53	41.57	41.57	41.57	41.57	-0.03	0.03	0.03	0.00	0.00	0.00
DITCH_001.1	43.47	43.48	43.47	43.47	43.47	43.47	43.47	0.00	0.00	0.00	0.00	0.00	0.00
DITCH_001.2	43.47	43.48	43.47	43.47	43.47	43.47	43.47	0.00	0.00	0.00	0.00	0.00	0.00
DITCH_002.2	43.47	43.48	43.47	43.47	43.47	43.47	43.47	0.00	0.00	0.00	0.00	0.00	0.00
DITCH_003.2	43.47	43.48	43.47	43.47	43.47	43.47	43.47	0.00	0.00	0.00	0.00	0.00	0.00
DITCH_004.2	43.31	43.31	43.31	43.31	43.31	43.31	43.31	0.00	0.00	0.00	0.00	0.00	0.00
DITCH_005.2	43.34	43.34	43.34	43.34	43.34	43.34	43.34	0.00	0.00	0.00	0.00	0.00	0.00
DITCH_006.2	44.14	44.14	44.14	44.14	44.14	44.14	44.14	0.00	0.00	0.00	0.00	0.00	0.00
DS_Weir.1	41.20	41.16	41.25	41.20	41.20	41.20	41.20	0.04	-0.05	-0.04	0.00	0.00	0.00
DS_Weir.2	40.79	40.79	40.79	40.79	40.79	40.79	40.79	0.00	0.00	0.00	0.00	0.00	0.00
WC01_001.1	43.27	43.28	43.27	43.27	43.27	43.27	43.27	-0.01	0.00	0.01	0.00	0.00	0.00
WC01_001.2	43.27	43.27	43.27	43.27	43.27	43.27	43.27	-0.01	0.00	0.01	0.00	0.00	0.00
WC01_002.2	43.27	43.27	43.17	43.27	43.27	43.27	43.27	0.00	0.09	0.00	0.00	0.00	0.00
WC01_003.2	43.26	43.27	43.17	43.26	43.26	43.26	43.26	0.00	0.09	0.00	0.00	0.00	0.00
WC01_004.2	43.26	43.27	43.17	43.26	43.26	43.26	43.26	0.00	0.09	0.00	0.00	0.00	0.00
WC01_005.2	43.26	43.26	43.16	43.26	43.26	43.26	43.26	0.00	0.09	0.00	0.00	0.00	0.00
WC01_006.2	43.26	43.26	43.16	43.26	43.26	43.26	43.26	0.00	0.09	0.00	0.00	0.00	0.00
WC01_007.2	42.99	43.01	42.93	42.99	42.99	42.99	42.99	-0.02	0.05	0.02	0.00	0.00	0.00
WC01_008.2	42.98	43.00	42.93	42.98	42.98	42.98	42.98	-0.02	0.05	0.02	0.00	0.00	0.00
WC01_009.2	42.96	42.97	42.92	42.96	42.96	42.96	42.96	-0.02	0.04	0.02	0.00	0.00	0.00
WC01_010.2	42.94	42.96	42.91	42.94	42.94	42.94	42.94	-0.01	0.03	0.01	0.00	0.00	0.00
WC01_011.2	42.92	42.93	42.90	42.92	42.91	42.92	42.92	-0.01	0.02	0.01	0.00	0.00	0.00
WC01_012.2	42.79	42.80	42.77	42.79	42.82	42.79	42.79	-0.01	0.02	0.01	-0.03	0.00	0.00
WC01_013.2	42.79	42.80	42.77	42.79	42.81	42.79	42.79	-0.01	0.02	0.01	-0.03	0.00	0.00
WC01_014.2	42.78	42.79	42.76	42.78	42.81	42.78	42.78	-0.01	0.02	0.01	-0.03	0.00	0.00
WC01_015.2	42.95	42.94	42.99	42.95	42.97	42.95	42.95	0.02	-0.03	-0.02	-0.02	0.00	0.00
WC01_016.2	42.60	42.63	42.62	42.60	42.58	42.60	42.60	-0.03	-0.02	0.03	0.02	0.00	0.00
WC01_017.2	42.59	42.62	42.59	42.59	42.57	42.59	42.59	-0.03	-0.01	0.03	0.02	0.00	0.00
WC01_018.2	42.51	42.53	42.49	42.51	42.48	42.51	42.51	-0.03	0.01	0.03	0.03	0.00	0.00
WC01_019.2	42.45	42.48	42.47	42.45	42.45	42.45	42.45	-0.02	-0.01	0.02	0.00	0.00	0.00
WC01_020.2	42.43	42.45	42.44	42.43	42.43	42.43	42.43	-0.02	-0.01	0.02	0.00	0.00	0.00
WC01_021.2	42.40	42.42	42.39	42.40	42.40	42.40	42.40	-0.01	0.02	0.01	0.00	0.00	0.00
WC01_022.2	42.40	42.42	42.39	42.40	42.40	42.40	42.40	-0.01	0.01	0.01	0.00	0.00	0.00
WC01_023.2	42.20	42.22	42.18	42.20	42.20	42.20	42.20	-0.02	0.02	0.02	0.00	0.00	0.00
WC01_024.2	42.13	42.13	42.12	42.13	42.13	42.13	42.13	0.00	0.00	0.00	0.00	0.00	0.00
WC01_025.2	41.77	41.80	41.73	41.77	41.77	41.77	41.77	-0.03	0.03	0.03	0.00	0.00	0.00
WC01_026.2	41.75	41.78	41.72	41.75	41.75	41.75	41.75	-0.03	0.03	0.03	0.00	0.00	0.00
WC01_027.2	41.63	41.67	41.61	41.63	41.63	41.63	41.63	-0.03	0.03	0.03	0.00	0.00	0.00
WC01_029.2	41.55	41.58	41.51	41.55	41.55	41.55	41.55	-0.03	0.04	0.03	0.00	0.00	0.00
WC01_030.2	41.52	41.55	41.50	41.52	41.52	41.52	41.52	-0.03	0.02	0.03	0.00	0.00	0.00
WC01_031.2	41.46	41.48	41.53	41.46	41.47	41.46	41.46	-0.02	-0.07	0.02	-0.01	0.00	0.00
WC01_032.2	41.44	41.43	41.51	41.44	41.44	41.44	41.44	0.01	-0.07	-0.01	-0.01	0.00	0.00
WC01_033.2	41.39	41.39	41.46	41.39	41.40	41.39	41.39	0.00	-0.06	0.00	-0.01	0.00	0.00
WC01_034.2	41.37	41.36	41.48	41.37	41.38	41.37	41.37	0.01	-0.11	-0.01	-0.01	0.00	0.00
WC01_035.2	41.32	41.33	41.43	41.32	41.32	41.32	41.32	-0.01	-0.11	0.01	0.00	0.00	0.00
WC01_036.2	41.33	41.32	41.35	41.33	41.33	41.33	41.33	0.01	-0.02	-0.01	0.00	0.00	0.00
WC02_001.1	42.94	42.96	42.93	42.94	42.94	42.94	42.94	-0.02	0.01	0.02	0.00	0.00	0.00
WC02_001.2	42.94	42.96	42.93	42.94	42.94	42.94	42.94	-0.01	0.01	0.01	0.00	0.00	0.00
WC02_002.2	42.94	42.96	42.93	42.94	42.94	42.94	42.94	-0.01	0.01	0.01	0.00	0.00	0.00
WC02_003.2	42.94	42.95	42.93	42.94	42.94	42.94	42.94	-0.01	0.01	0.01	0.00	0.00	0.00
WC02_004.2	42.94	42.95	42.93	42.94	42.94	42.94	42.94	-0.01	0.01	0.01	0.00	0.00	0.00
WC02_005.2	42.92	42.93	42.91	42.92	42.92	42.92	42.92	-0.01	0.01	0.01	0.00	0.00	0.00

Model Node	Melksham Watercourses in Channel Flood Levels Sensitivity and Blockage Runs (Elevation in mAOD)							Melksham Watercourses in Channel Flood Levels Difference compared to Baseline (m)					
	Baseline (001)	Nplus20	Nminus20	Block90 (Structure 8)	Block50 (Structure 2)	DSBC_plus200mm	DSBC_minus200mm	Nplus20	Nminus20	Block90 (Structure 8)	Block50 (Structure 2)	DSBC_plus200mm	DSBC_minus200mm
	1 in 100-year	1 in 100-year	1 in 100-year	1 in 100-year	1 in 100-year	1 in 100-year	1 in 100-year	1 in 100-year	1 in 100-year	1 in 100-year	1 in 100-year	1 in 100-year	1 in 100-year
WC_C_001.1	43.43	43.43	43.43	43.43	43.43	43.43	43.43	0.00	0.00	0.00	0.00	0.00	0.00
WC_C_001.2	43.44	43.44	43.44	43.44	43.44	43.44	43.44	0.00	0.00	0.00	0.00	0.00	0.00
WC_C_002.2	43.40	43.40	43.40	43.40	43.40	43.40	43.40	0.00	0.00	0.00	0.00	0.00	0.00
WC_C_003.2	43.18	43.18	43.18	43.18	43.18	43.18	43.18	0.00	0.00	0.00	0.00	0.00	0.00
WC_C_004.2	43.09	43.09	43.09	43.09	43.09	43.09	43.09	0.00	0.00	0.00	0.00	0.00	0.00
WC_C_005.2	42.92	42.93	42.92	42.92	42.91	42.92	42.92	-0.01	0.00	0.01	0.00	0.00	0.00
WC_C_006.2	42.92	42.93	42.90	42.92	42.91	42.92	42.92	-0.01	0.02	0.01	0.00	0.00	0.00
WC_D_001.1	43.36	43.36	43.36	43.36	43.36	43.36	43.36	0.00	0.00	0.00	0.00	0.00	0.00
WC_D_001.2	42.92	42.92	42.92	42.92	42.92	42.92	42.92	0.00	0.00	0.00	0.00	0.00	0.00
WC_D_002.2	42.92	42.92	42.92	42.92	42.92	42.92	42.92	0.00	0.00	0.00	0.00	0.00	0.00
WC_D_003.2	43.06	43.07	43.07	43.06	43.06	43.06	43.06	-0.01	-0.01	0.01	0.00	0.00	0.00
WC_D_004.2	43.06	43.07	43.07	43.06	43.06	43.06	43.06	-0.01	-0.01	0.01	0.00	0.00	0.00
WC_D_005.2	43.05	43.06	43.07	43.05	43.05	43.05	43.05	-0.01	-0.01	0.01	0.00	0.00	0.00
WC_D_006.2	43.04	43.05	43.05	43.04	43.04	43.04	43.04	-0.01	-0.01	0.01	0.00	0.00	0.00
WC_D_007.2	42.94	42.96	42.93	42.94	42.94	42.94	42.94	-0.01	0.01	0.01	0.00	0.00	0.00
WC_E_001.1	44.43	44.43	44.42	44.43	44.43	44.43	44.43	0.00	0.00	0.00	0.00	0.00	0.00
WC_E_001.2	43.99	43.99	43.99	43.99	43.99	43.99	43.99	0.00	0.00	0.00	0.00	0.00	0.00
WC_E_002.2	44.01	44.01	44.01	44.01	44.01	44.01	44.01	0.00	0.00	0.00	0.00	0.00	0.00
WC_E_003.2	43.57	43.58	43.56	43.57	43.57	43.57	43.57	-0.01	0.01	0.01	0.00	0.00	0.00
WC_E_004.2	43.65	43.65	43.65	43.65	43.65	43.65	43.65	0.00	0.00	0.00	0.00	0.00	0.00
WC_E_005.2	43.49	43.49	43.49	43.49	43.49	43.49	43.49	0.00	0.00	0.00	0.00	0.00	0.00
WC_E_006.2	43.51	43.51	43.51	43.51	43.51	43.51	43.51	0.00	0.00	0.00	0.00	0.00	0.00
WC_E_007.2	43.30	43.30	43.30	43.30	43.30	43.30	43.30	0.00	0.00	0.00	0.00	0.00	0.00
WC_E_008.2	44.12	44.12	44.12	44.12	44.12	44.12	44.12	0.00	0.00	0.00	0.00	0.00	0.00
WC_E_009.2	43.26	43.26	43.26	43.26	43.26	43.26	43.26	0.00	0.00	0.00	0.00	0.00	0.00
WC_E_010.2	43.25	43.25	43.25	43.25	43.25	43.25	43.25	0.00	0.00	0.00	0.00	0.00	0.00
WC_F_001.1	43.93	43.94	43.92	43.93	43.93	43.93	43.93	-0.01	0.01	0.01	0.00	0.00	0.00
WC_F_001.2	43.93	43.94	43.92	43.93	43.93	43.93	43.93	-0.01	0.01	0.01	0.00	0.00	0.00
WC_F_002.2	43.93	43.94	43.92	43.93	43.93	43.93	43.93	-0.01	0.01	0.01	0.00	0.00	0.00
WC_F_003.2	43.93	43.94	43.92	43.93	43.93	43.93	43.93	-0.01	0.01	0.01	0.00	0.00	0.00
WC_F_004.2	43.93	43.94	43.92	43.93	43.93	43.93	43.93	-0.01	0.01	0.01	0.00	0.00	0.00
WC_F_005.2	43.93	43.94	43.92	43.93	43.93	43.93	43.93	-0.01	0.01	0.01	0.00	0.00	0.00
WC_F_006.2	43.93	43.94	43.92	43.93	43.93	43.93	43.93	-0.01	0.01	0.01	0.00	0.00	0.00
WC_F_007.2	43.95	43.95	43.96	43.95	43.95	43.95	43.95	0.00	0.00	0.00	0.00	0.00	0.00
WC_F_008.2	44.00	44.00	44.00	44.00	44.00	44.00	44.00	0.00	0.00	0.00	0.00	0.00	0.00
WC_F_009.2	44.00	44.00	44.00	44.00	44.00	44.00	44.00	0.00	0.00	0.00	0.00	0.00	0.00
WC_F_010.2	44.28	44.28	44.28	44.28	44.28	44.28	44.28	0.00	0.00	0.00	0.00	0.00	0.00
WC_F_011.2	44.90	44.90	44.90	44.90	44.90	44.90	44.90	0.00	0.00	0.00	0.00	0.00	0.00
WC_F_012.2	44.72	44.72	44.72	44.72	44.72	44.72	44.72	0.00	0.00	0.00	0.00	0.00	0.00
WC_F_013.2	44.86	44.86	44.86	44.86	44.86	44.86	44.86	0.00	0.00	0.00	0.00	0.00	0.00
WC_F_014.2	44.53	44.55	44.50	44.53	44.53	44.53	44.53	-0.02	0.03	0.02	0.00	0.00	0.00
WC_F_015.2	44.24	44.26	44.23	44.24	44.24	44.24	44.24	-0.01	0.02	0.01	0.00	0.00	0.00
WC_F_016.2	44.08	44.08	44.07	44.08	44.08	44.08	44.08	-0.01	0.01	0.01	0.00	0.00	0.00
WC_F_017.2	44.00	44.01	43.99	44.00	44.00	44.00	44.00	-0.01	0.01	0.01	0.00	0.00	0.00
WC_F_018.2	43.75	43.75	43.75	43.75	43.75	43.75	43.75	0.00	0.00	0.00	0.00	0.00	0.00
WC_F_019.2	43.73	43.73	43.73	43.73	43.73	43.73	43.73	0.00	0.00	0.00	0.00	0.00	0.00
WC_F_020.2	43.73	43.73	43.73	43.73	43.73	43.73	43.73	0.00	0.00	0.00	0.00	0.00	0.00
WC_F_021.2	43.73	43.73	43.73	43.73	43.73	43.73	43.73	0.00	0.00	0.00	0.00	0.00	0.00
WC_G_001.1	43.30	43.31	43.29	43.30	43.30	43.30	43.30	-0.01	0.01	0.01	0.00	0.00	0.00
WC_G_001.2	42.60	42.60	42.59	42.60	42.60	42.60	42.60	-0.01	0.01	0.01	0.00	0.00	0.00
WC_G_002.2	42.01	42.01	42.00	42.01	42.01	42.01	42.01	0.00	0.00	0.00	0.00	0.00	0.00
WC_G_003.2	41.67	41.68	41.66	41.67	41.67	41.67	41.67	-0.02	0.01	0.02	0.00	0.00	0.00
WC_G_004.2	41.64	41.65	41.63	41.64	41.64	41.64	41.64	-0.02	0.01	0.02	0.00	0.00	0.00
Average Change								-0.01	0.01	0.01	0.00	0.00	0.00



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New Farm, Melksham – Proposed Hydraulic Modelling Technical Note

Project:	SHF.102.003.HY.R.005.B – New Farm, Melksham
For:	Bloor Homes Limited
Status:	Issued
Date:	October 2025
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Approver:	Eric O'Connor BSc [Hons], MSc, MCIWEM, C.WEM - Associate Director

Non-Technical Summary

This Technical Note details the overview of amendments made to the Enzygo Ltd New Farm, Melksham hydraulic model, which has been used to determine the baseline flood risk to the Site. The proposed model run has looked at introducing watercourses around the Site to intercept flows from outside the Site boundary.

This Technical Note should be read in conjunction with Enzygo Ltd Report: SHF.102.003.HY.R.004.C: New Farm, Melksham – Hydraulic Modelling Report, which details the results of the baseline model runs.

Results from the proposed modelling exercise shows that flows mainly stay in channel. Where flows exceed the channel they affect areas of greenspace. It can be determined that the inclusion of the proposed development within the model domain causes a betterment to the flood risk to the Site, due to flows within the Site being attenuated and discharged at a predetermined rate.

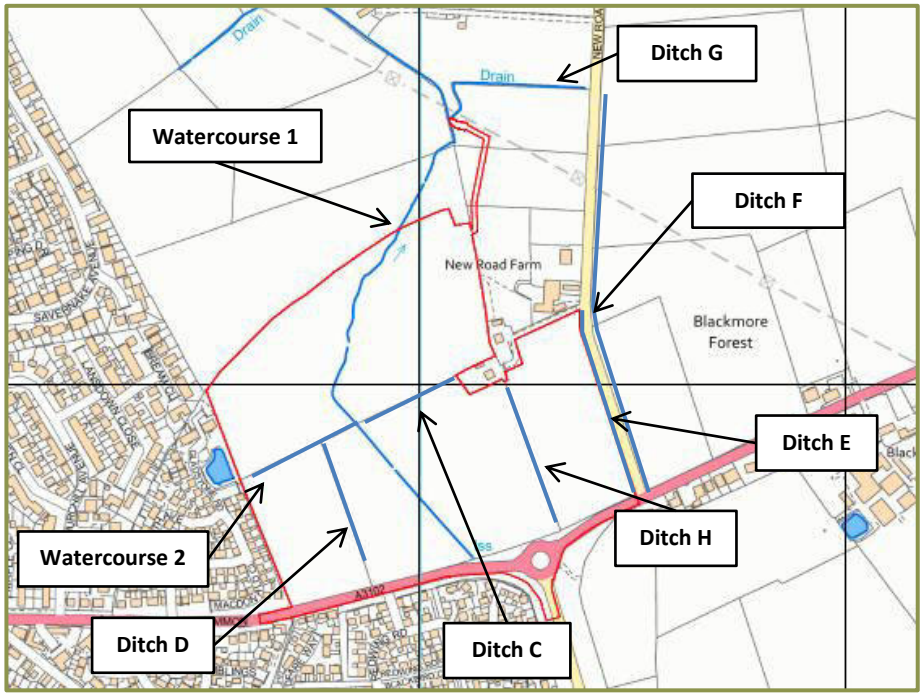
1. Introduction

Background

Enzygo Ltd was commissioned by Bloor Homes Limited to undertake a hydraulic modelling exercise to determine, and refine, mapped flood extents associated with onsite and bounding watercourses (Figure 1.1). The study area is centred at NGR 391963, 164531 and is proposed to be a residential development.

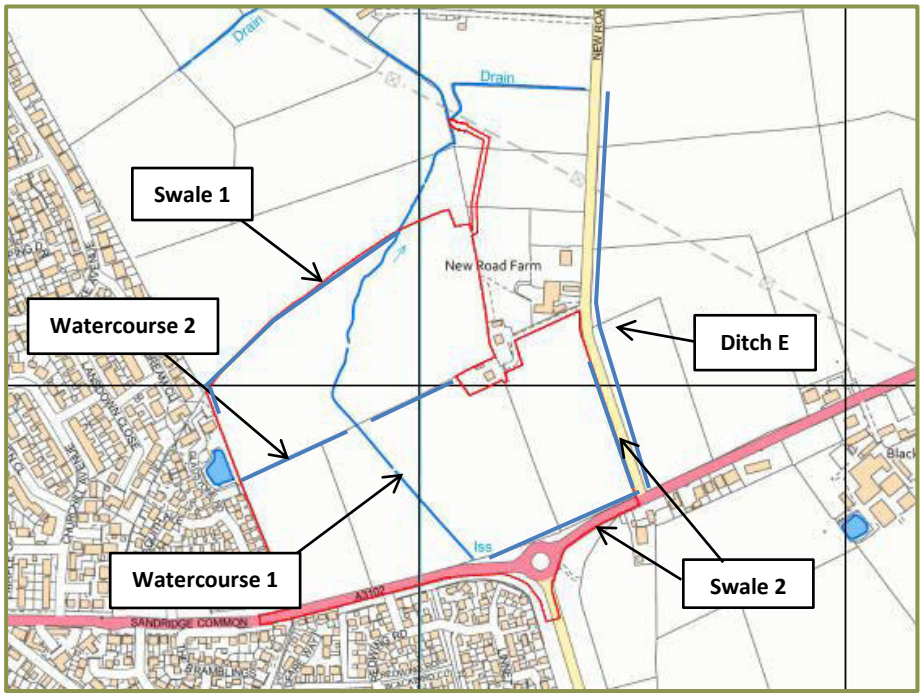
To aid the design of the design of the development, and assess modelled parameters against national flood risk guidance, a hydraulic modelling assessment was undertaken. This Technical Note should be read in conjunction with Enzygo Ltd Report: SHF.102.003.HY.R.004.C: New Farm, Melksham – Hydraulic Modelling Report, which has been prepared as a stand-alone report and details the results of the baseline model runs.

Figure 1.1: Modelled Watercourses



This Technical Note provides an overview of the flood extents and parameters for a model run which details changes to the model to include the following (Figure 1.2):

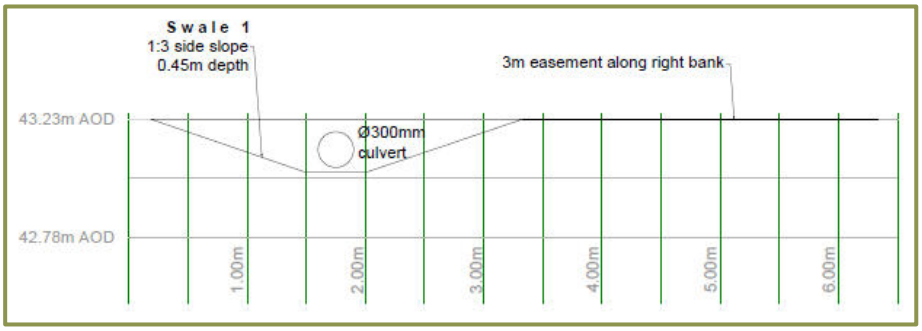
Figure 1.2: Proposed Watercourse Changes



- Removal Ditch D from the model.
- Introduction of new swale (Swale 1), designed to intercept the highway drainage at the western development boundary. This would improve maintenance and water quality of the asset. The swale was sized based on the highway drainage discharging at full bore

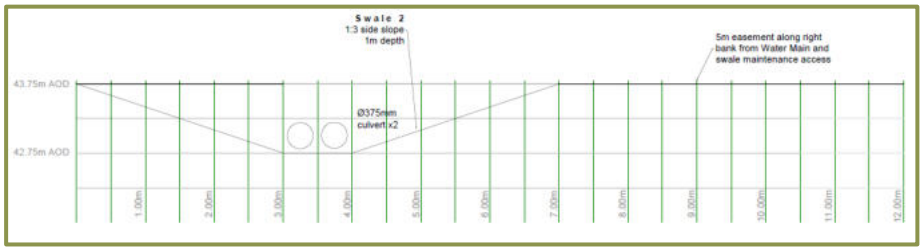
from the Ø450mm asset. The designed swale has a 1:3 side slope, with a 0.45m depth and an easement of 3m along the right-hand bank.

Figure 1.3: Swale 1 – Example Dimensions



- Removal of Ditch C and H.
- Shortening of Ditch E.
- A new channel ('Swale 2') is to be routed along the southern boundary of the Site to covey intercepted flows from Ditch E to Watercourse 1. Ditch E has been regraded with a 3m easement along the western bank. Swale 2 has a 1:3 side slope, with a 1.00m depth and an easement of 5m along the southern bank for the existing water main and to allow maintenance access (Figure 1.4). 2 x Ø375mm culverts have been added to Swale 2 to convey flows (1000yr) under the proposed access to the Site.

Figure 1.4: Swale 2 – Example Dimensions



Purpose of Technical Note

This Technical Note describes the proposed model run undertaken for the Site. This Technical Notes provides an addendum to Enzygo Ltd Report: SHF.102.003.HY.R.004.C: New Farm, Melksham – Hydraulic Modelling Report detailing the results from the model runs.

2. Analysis of Results

Introduction

Flood depth mapping was undertaken within MapInfo software. As the model is a 1D2D linked model, results are produced for the out-of-bank floodplain based upon the underlying 1m grid derived from 1m DRM LiDAR data. Results were produced in 'xmdf' format and imported into MapInfo, where results were mapped and contoured.

The purpose of the modelling exercise is to define the flood outlines and depths associated with the proposed model run detailed in Section 1. The resultant outputted run (MEL_DES_Q01000) will be compared against the baseline models runs to ascertain any changes to the flood outlines that the proposed model changes may have.

Modelled flood extents were cleaned by using the following criteria:

- Dry islands and polygons smaller than 200m^2 were removed from the outlines:
- Polygons disconnected from the watercourse surrounding the flood outlines where there is no flow path were removed.

The following additional layers (that are different to the original proposed model layers) were created for the model runs:

Model Design Run

- 1d_nwke_MEL_DES_201; defined in-channel network, inclusive of watercourse diversion
- 1d_cs_MEL_DES_201; defines structure openings
- 1d_xs_MEL_DES_201; defines cross-section locations
- 1d_bc_MEL_Flows_ DES_201; defines model inflow locations
- 1d_WLL_MEL_DES_201; defines in-channel water level lines
- 2d_bc_hx_MEL_DES_201_L and 2d_bc_hx_MEL_DES_201_P; defines 1D2D linking cells
- 2d_code_1d_MEL_DES_201_R ; defines 1D channel domain
- 2d_qnl_MEL_DES_1m_201_R; defines grid scaling for the 1m grid.
- 2d_qnl_MEL_DES_2m_201_R; defines grid scaling for the 2m grid

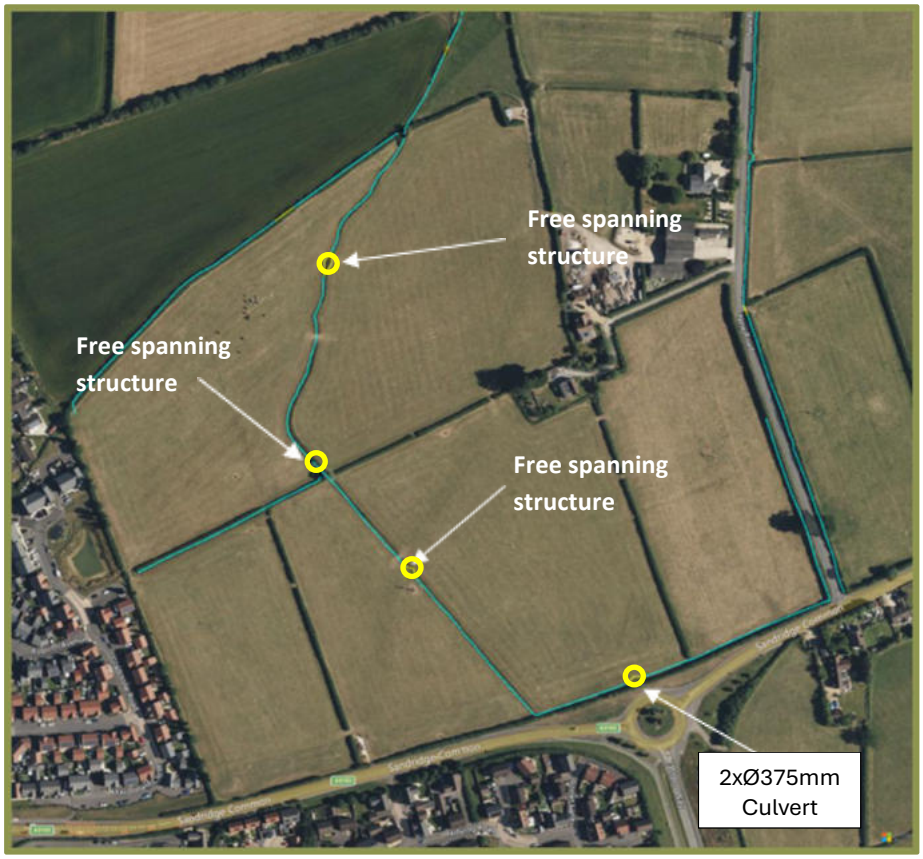
The model layers described above, are presented in Figure 2.1.

Figure 2.1: Model Layers - Run 025



The model has included for proposed structures which have been designed to convey flow for the 100-year+71%CC event (i.e. worst-case scenario). The proposed structures are outlined in Figure 2.2.

Figure 2.2: Proposed Structures



Following submission of the initial modelling report the Environment Agency they requested culverts were replaced with free spanning bridges, these have been included in the updated design. The proposed free spanning structures include a +600mm freeboard above the 100-year+71%CC return period.

Details of each of the free spanning structures are included in Figures 2.3, 2.4 and 2.5 below. Full bridge details are included in Appendix 1.

Figure 2.3: Proposed Southern Vehicular Crossing

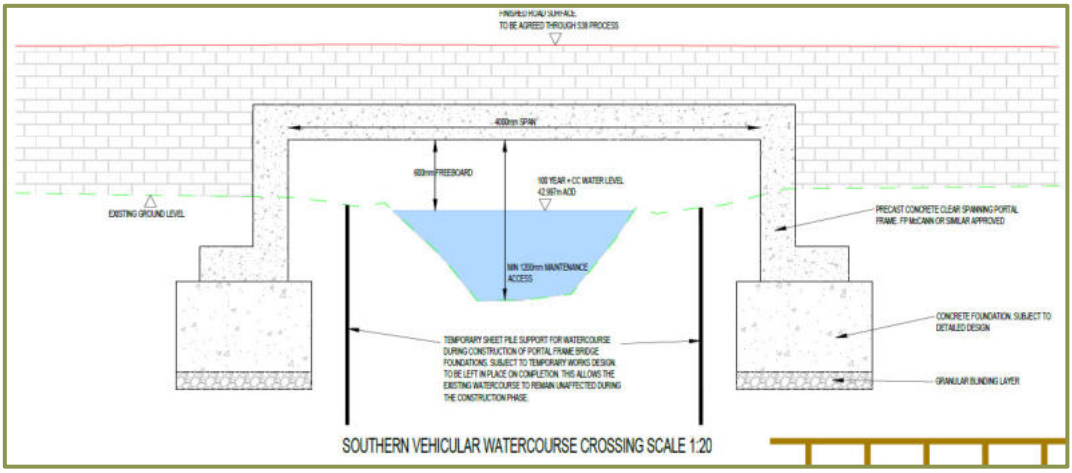


Figure 2.4 Proposed Northern Vehicular Crossing

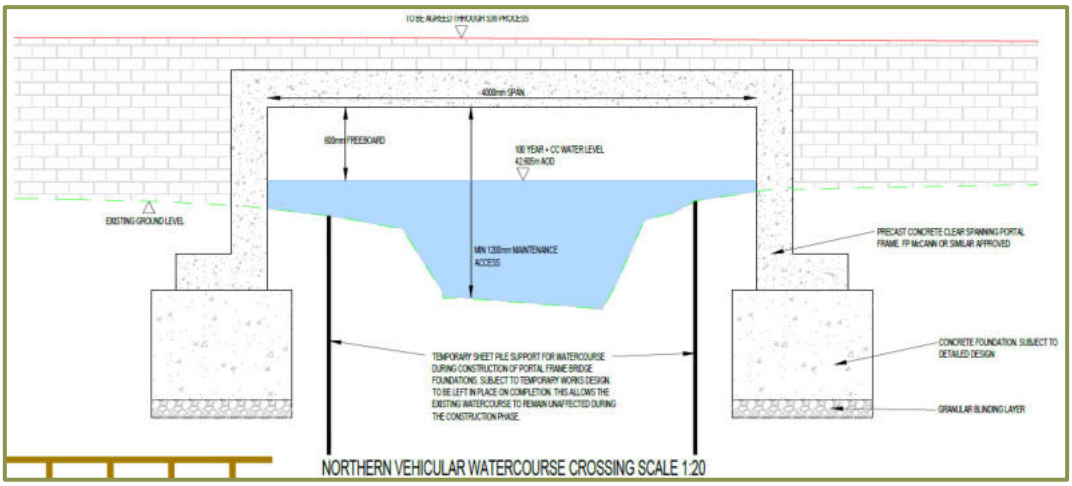
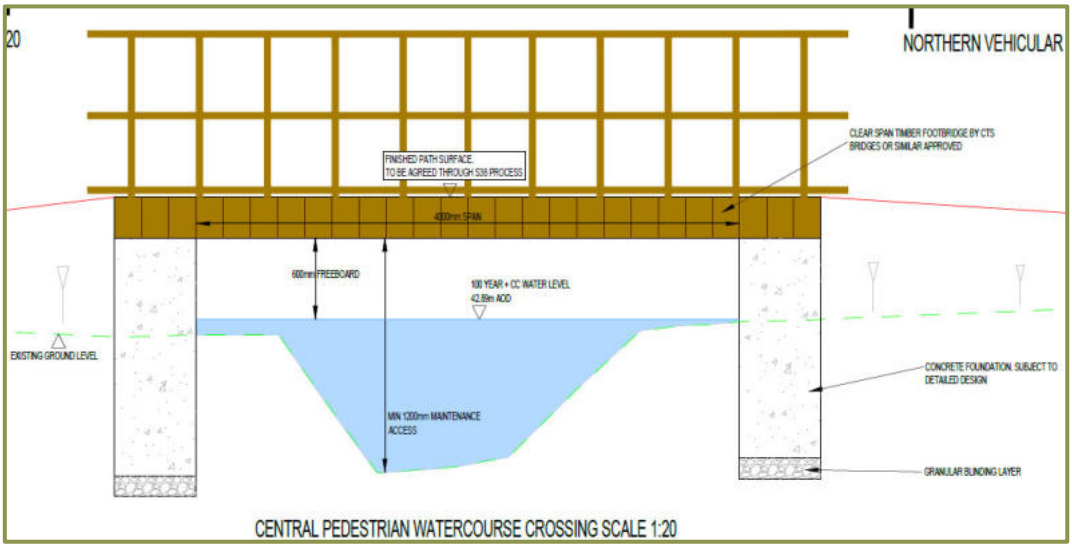


Figure 2.5: Proposed Pedestrian Crossing.

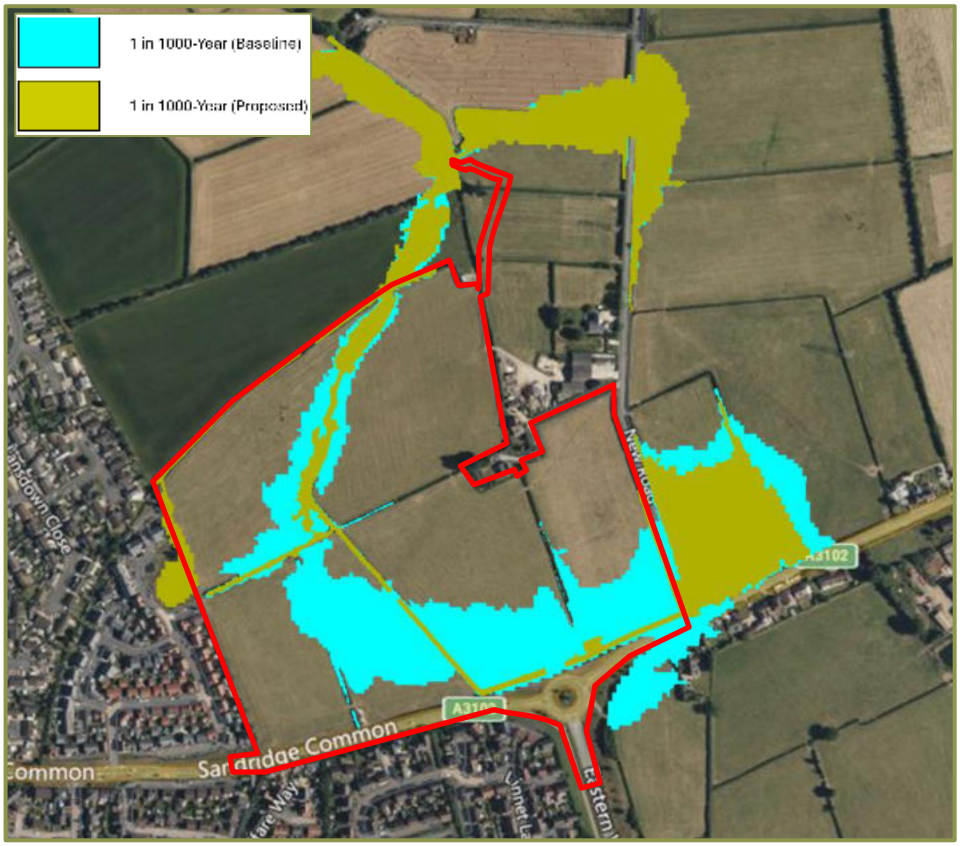


3. Proposed Model Run Results

This section provides the results of the baseline (Run 001) for the 1 in 1000-year (design scenario [Drawing 0001]) (Figure 3.1) and compares against the proposed model run (Figure 3.2) [Drawing 0002]. The screenshot shows the comparison of baseline and proposed outlines.

Available Environment Agency guidance [1] details the proposed development as a 'more vulnerable' development. This defines that the climate change allowance used for peak river flows is the 'Central' allowance (which in this instance is +26%CC). As the 1000-year return period is greater in flows than the 100-year+26%CC then the 1000-year outlines have been carried forward for this assessment.

Figure 3.1: Model Run Comparison – Baseline Vs Design Runs (1000-Year)



[1] https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances

Figure 3.2: Modelled Flood Outlines – Proposed

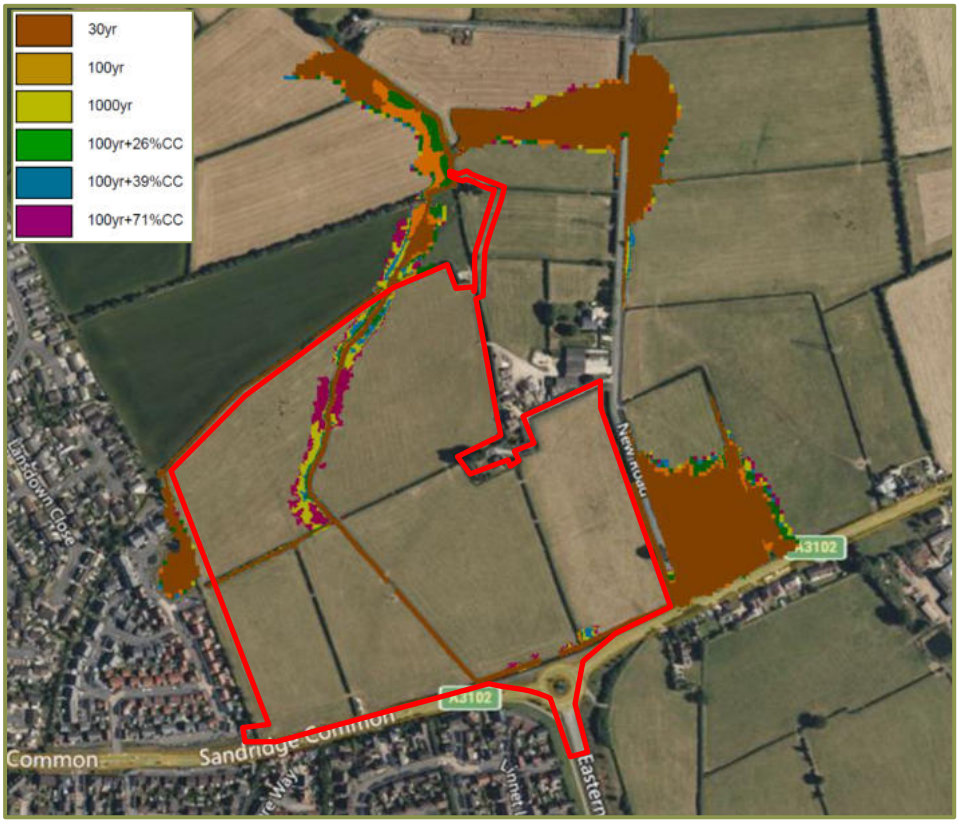
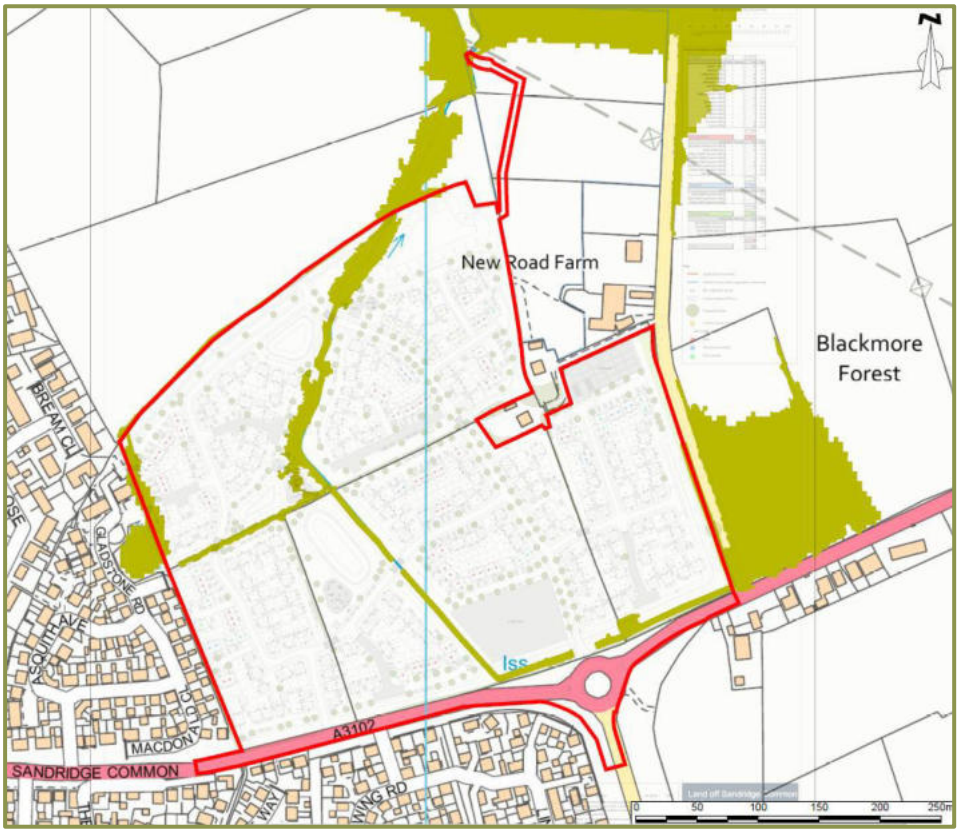


Figure 3.3: Modelled Flood Outlines – Planning Layout



Results from the modelling exercise shows that flows for all return periods remain in channel, apart from some negligible areas on the left bank of Watercourse 1, in open greenspace. The second small area of flooding is shown to be to the north of Swale 2. Though it should be noted that all dwellings within the Site boundary are located outside the mapped extent of flooding. Development would therefore be safe for its lifetime.

4. Method of Construction of Proposed Structures

The developer has engaged with a structural contractor to establish the likely method of constructing the proposed structures crossing the Melksham main river. These would be approved through a FRAP after detailed design, but the principles of the below will be followed:

1. Install temporary sheet pile wall away from the top of bank to maintain integrity of the watercourse during the construction works.
2. Excavate to the rear of the sheet piles down to formation level of the proposed structure. The excavation is to be undertaken from both sides of watercourse via agreed access routes.
3. Lay 150mm granular blinding layer to form a firm base for the foundation.
4. Shutter and pour foundation with reinforcement.
5. Backfill between foundation and sheet piles with Type 6N material, suitably compacted in accordance with SHW. With suitable benching into existing ground.
6. Crane frame units into place with no encroachment into watercourse corridor from machinery.
7. Backfill between structure frame and sheet pile wall with site won material and 150mm topsoil. Topsoil to be seeded with suitable grass mix, With suitable benching into existing ground.
8. Surface to be made back up to predevelopment existing ground level.
9. Road and footway construction above to be completed with mitigation taken to avoid any spillage of materials into the watercourse.

This methodology has been designed to maintain the geometry of the watercourse during construction, with no adverse impact.

5. Conclusion

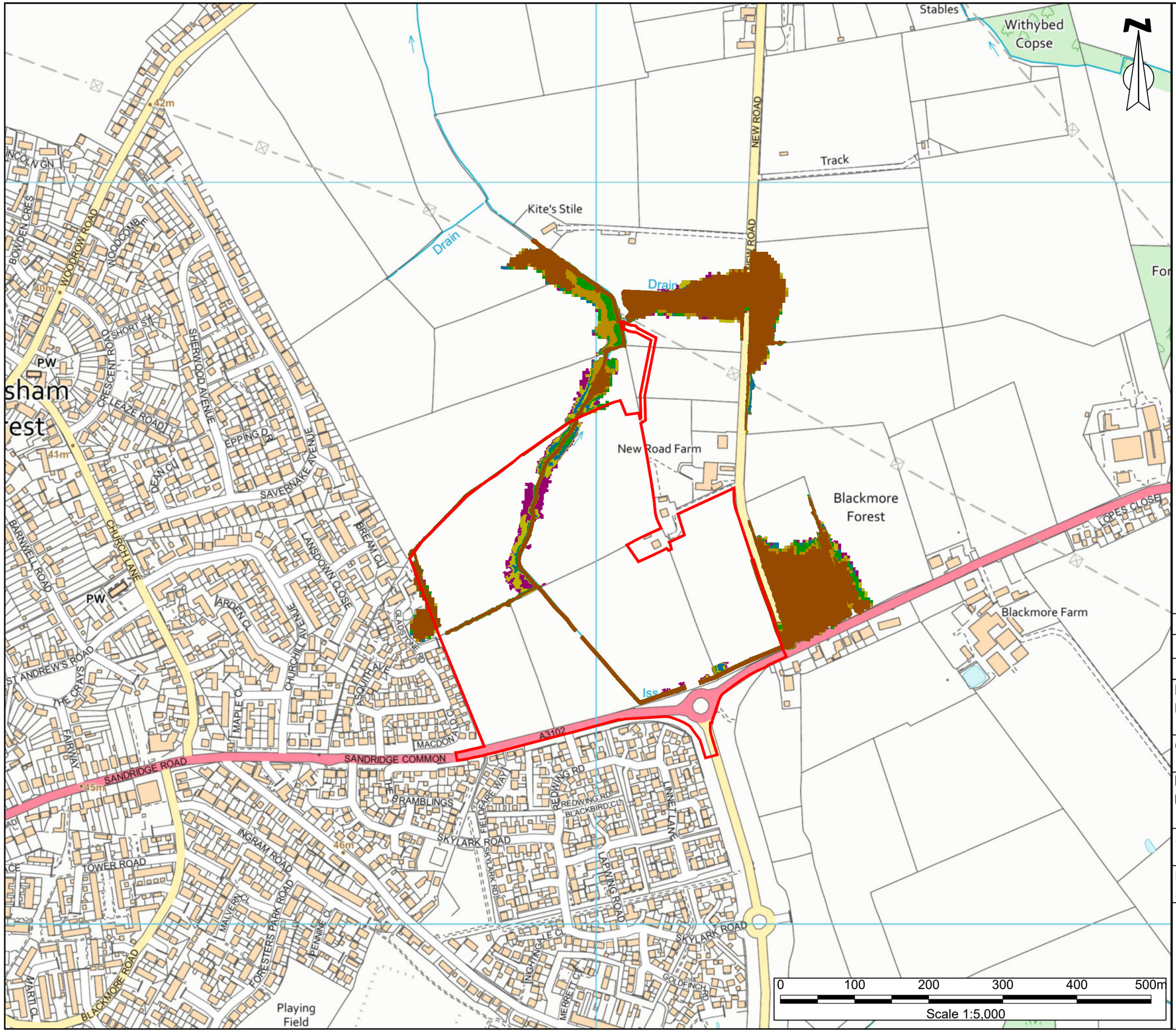
A hydraulic model has been created for onsite and bounding watercourses for the Site of New Farm, Melksham, which is detailed in the Enzygo Ltd Report: SHF.102.003.HY.R.004.C: New Farm, Melksham – Hydraulic Modelling Report. The hydraulic model has been run for a proposed scenario to reroute ditches and flows around the Site has been presented within this Technical Note.

A number of changes to the model have been undertaken which involve the removal of Ditches C, D and H and the shortening of Ditch C.

The flows from Watercourse 2 and Ditch D have been routed north and then east along the western and northern boundary of the Site, for flows to discharge to Watercourse 1 in the northern extent of the Site (via ‘Swale 1’). A new channel (‘Swale 2’) is to be routed along the southern boundary of the Site to covey intercepted flows from Ditch E to Watercourse 1.

The modelling results show that the inclusion of the proposed development causes a betterment to flood risk to the Site and downstream. This is due to restricted runoff rates being developed within the Site, the removal of flooding across the Site with the inclusion of conveyance features and the introduction of free spanning bridges across the Main River vs current culverted arrangement.

Results from the modelling exercise shows that flows for all return periods remain in channel, apart from some negligible areas on the left bank of Watercourse 1 in open greenspace. The second small area of flooding is shown to be to the north of Swale 2. Though it should be noted that all dwellings within the Site boundary are located outside the mapped extent of flooding.



KEY:

- Site Boundary
- 30yr
- 100yr
- 1000yr
- 100yr+26%CC
- 100yr+39%CC
- 100yr+71%CC

Rev	Date	Description			
P01	10/10/25	Issued for comment / approval	DL	HDR	EOC

Project
New Farm, Melksham

Client
Bloor Homes Limited

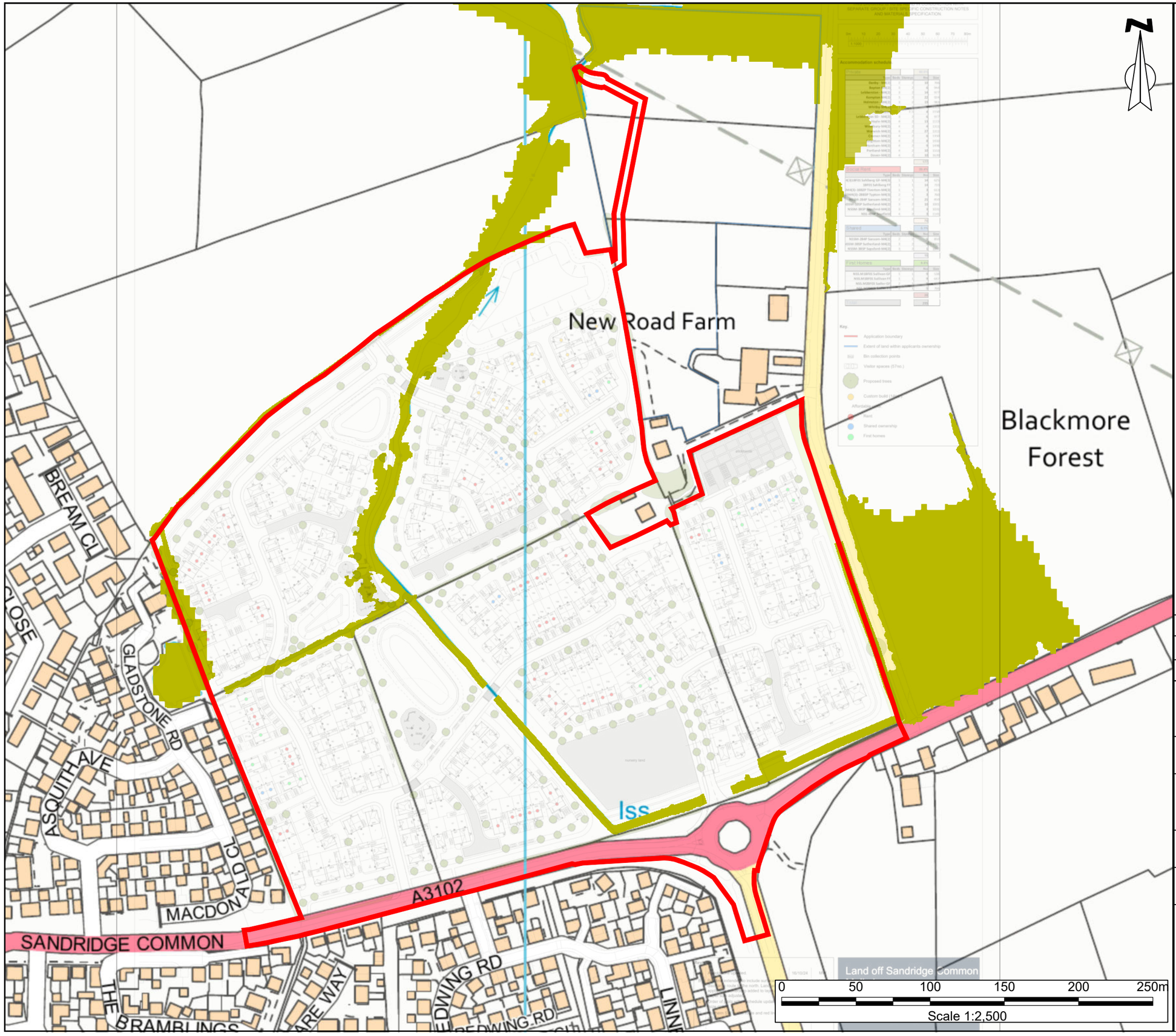
Drawing Title
Proposed Flood Outlines

Scale	Date	Status
1:5000@A3	10/10/25	Preliminary

DWG No. SHF102003-ENZ-XX-XX-DR-Y-0001 **Revision** P01

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KEY:

- Site Boundary
- 1000yr

Rev	Date	Description	DRA	CHK	APP
P01	10/10/25	Issued for comment / approval	DL	HDR	EOC

Project
New Farm, Melksham

Client
Bloor Homes Limited

Drawing Title
1000-Year Proposed Flood Outline

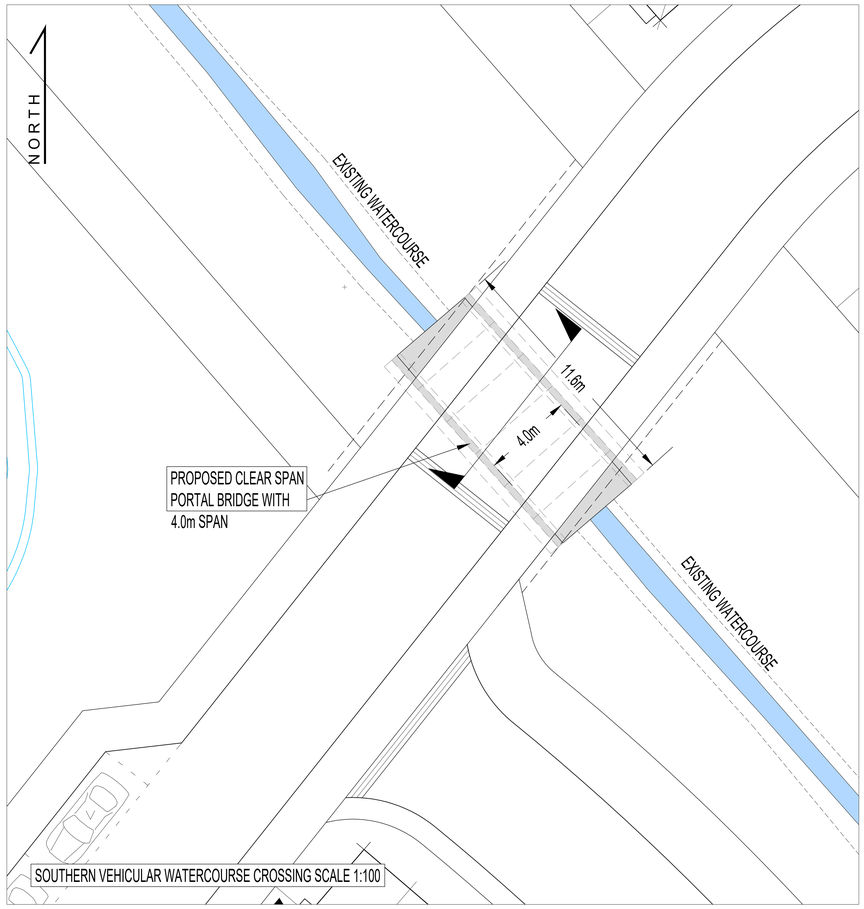
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DWG No. SHF102003-ENZ-XX-XX-DR-Y-0002 **Revision** P01

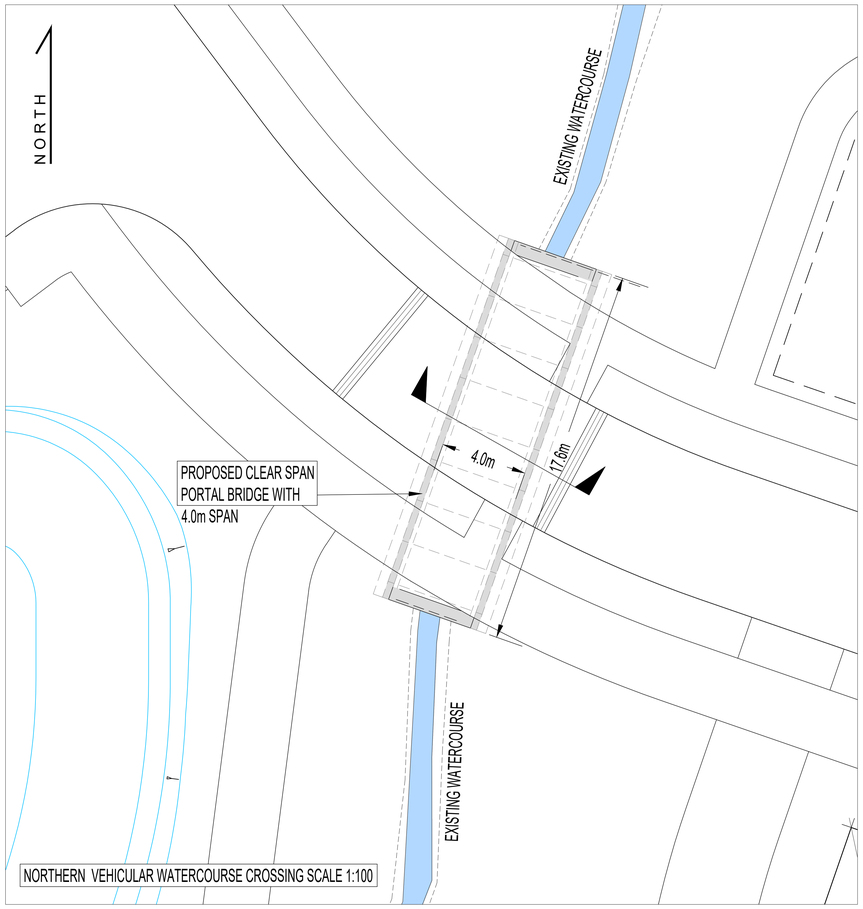
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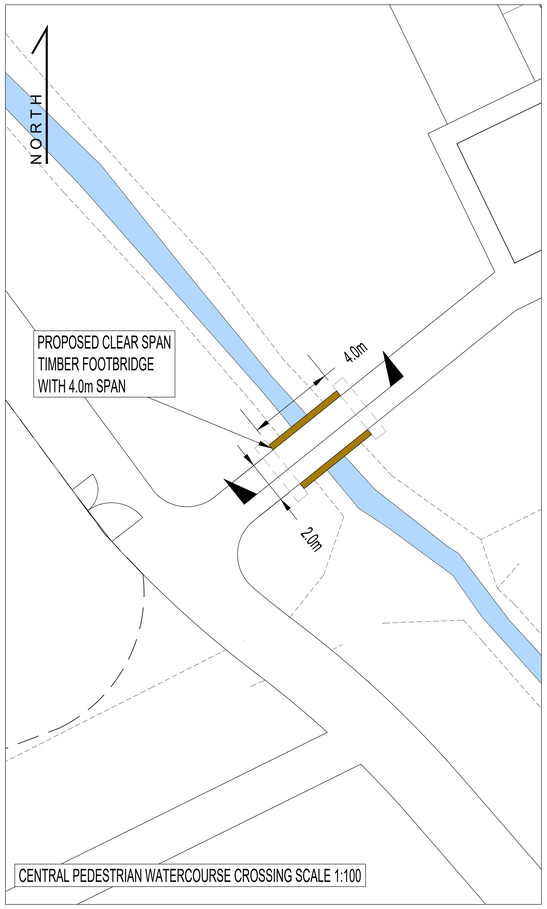
Appendix 1 – Typical Bridge Details



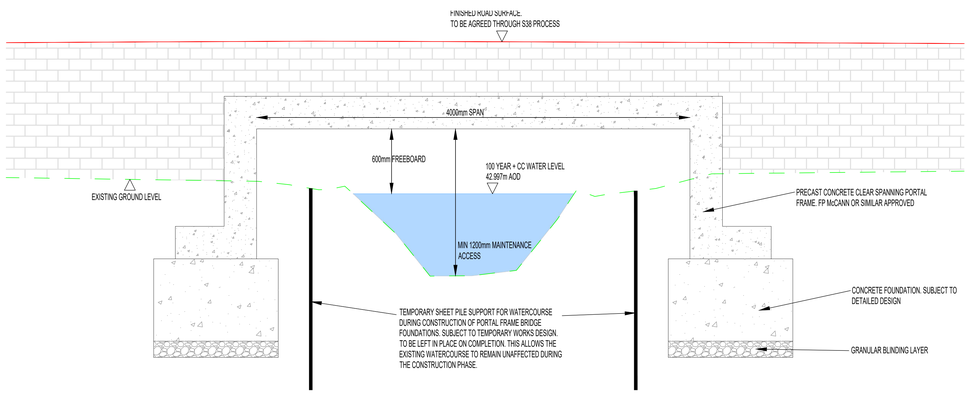
SOUTHERN VEHICULAR WATERCOURSE CROSSING SCALE 1:100



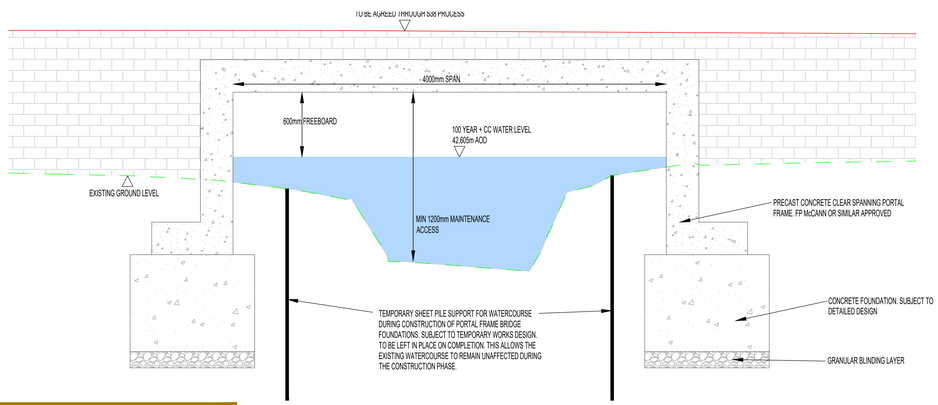
NORTHERN VEHICULAR WATERCOURSE CROSSING SCALE 1:100



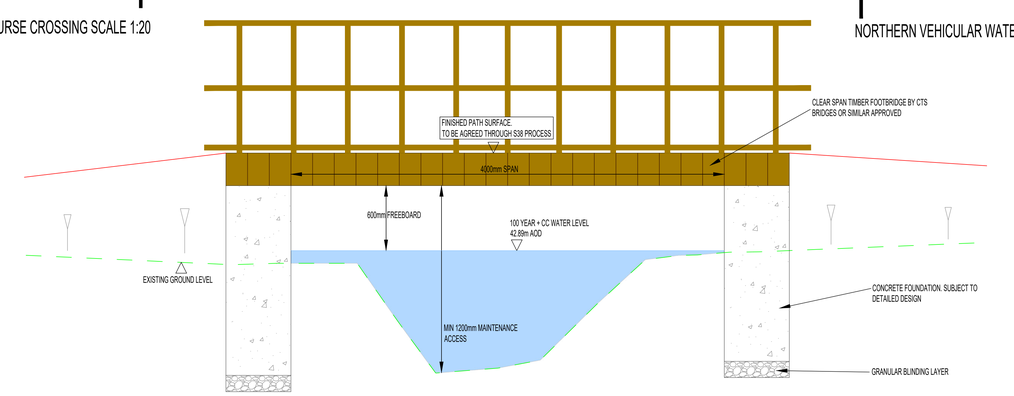
CENTRAL PEDESTRIAN WATERCOURSE CROSSING SCALE 1:100



SOUTHERN VEHICULAR WATERCOURSE CROSSING SCALE 1:20



NORTHERN VEHICULAR WATERCOURSE CROSSING SCALE 1:20



CENTRAL PEDESTRIAN WATERCOURSE CROSSING SCALE 1:20

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NOTES:

1. THIS IS A PRELIMINARY DESIGN TO SET THE DIMENSIONS AND PRINCIPLE OF THE PROPOSED STRUCTURES. TO BE APPROVED THROUGH STRUCTURAL APPROVAL WITH WILTS CC STRUCTURES TEAM.
2. THE STRUCTURE WILL ULTIMATELY BE MAINTAINED BY WILTS CC.

Revision.

A	Amended in line with updated flood modelling.	09/10/25	KLW

SANDRIDGE COMMON
MELKSHAM

TYPICAL BRIDGE DETAILS

DATE: **03.10.25**
SCALE: **AS SHOWN @ A1**
DRAWN: **KLW**
CHECKED: **AR**

BLOOR HOMES

Drawing No. SW164-EN-501 A

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