Yorkshire Water

BALK FARM COURT

Flood Risk Assessment & Surface Water Drainage Strategy

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JANUARY 2026

PUBLIC

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Flood Risk Assessment & Surface Water Drainage Strategy

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1 INTRODUCTION

1.1 CONTEXT

1.1.1. WSP UK Ltd (WSP) was commissioned by Yorkshire Water Services Limited (hereafter referred to as 'the Client') to prepare a Flood Risk Assessment (FRA) and Surface Water Drainage Strategy (SWDS) to support a planning application for full planning permission for the construction of an access track and fencing associated with the construction of a new Sewage Pumping Station (SPS) on land at Balk Farm Court, Birdwell ('the Proposed Development').

1.1.2. This planning application is submitted in retrospect as development at the Site commenced on 29 September 2025. The SPS was connected on 22 December 2025; however, some ancillary works including elements of the access arrangements and power infrastructure are still in the process of being completed.

1.1.3. The SPS was constructed to replace the existing private septic tanks serving adjacent residential development at Balk Farm Court. The Environment Agency (EA) has determined that the existing septic tanks at this location are unsuitable, resulting in environmental and amenity issues, necessitating the provision of a new SPS. Under Section 101A of the Water Industry Act 1991, Yorkshire Water have a duty to provide a public sewer where private drainage (e.g. septic tanks) is causing environmental or amenity issues. It was also observed that the septic tanks were overflowing into the surrounding fields, resulting in flooding of a public footpath located to the south of the Site and the A61 Sheffield Road to the west.

1.1.4. The SPS and associated kiosks are being delivered under Permitted Development rights, in accordance with the Town and Country Planning (General Permitted Development) (England) Order 2015 (as amended). These elements do not require full planning permission but are subject to relevant environmental and technical assessments, including flood risk.

1.1.5. The access track and fencing require full planning permission. This report considers the entire Proposed Development as a single entity to ensure a comprehensive assessment of flood risk in line with national and local planning policy.

1.1.6. This report has been carried out with reference to the National Planning Policy Framework (NPPF) (2025), Flood Risk and Coastal Change Planning Practice Guidance (PPG) (2025), the CIRIA Sustainable Drainage Systems (SuDS) Manual (C753, 2015) and the National SuDS Standards (DeFRA, 2025).

1.1.7. The outcomes of pre-application consultation with key flood risk stakeholders, namely the EA, Yorkshire Water (YW) and Barnsley Metropolitan Borough Council (BMBC) as the Lead Local Flood Authority (LLFA), are referenced throughout as appropriate. The EA, BMBC as Lead Local Flood Authority (LLFA) and YW were consulted as part of this study to obtain historic flood records along with any flood risk and drainage information.

1.2 SCOPE

1.2.1. This Flood Risk Assessment (FRA) evaluates the potential for flooding at the Site and assesses all possible sources of flood risks posed to and arising from the Proposed Development throughout its operational lifespan. It involves a review of relevant policies, baseline site information,

flood data and identifies necessary mitigation measures and strategies to manage any risks identified.

1.2.2. This Surface Water Drainage Strategy (SWDS) manages surface water runoff from the Proposed Development, ensuring compliance with relevant standards. It reviews relevant site-specific and public data, evaluates sustainable drainage options, assesses the current drainage regimes, estimates new impermeable areas and storage needs, and defines maintenance responsibilities. Exceedance overland flow routes were assessed to demonstrate the potential impacts on third-party landowners.

1.3 DATA SOURCES

1.3.1. This report draws upon a range of data sources, including:

- Barnsley Metropolitan Borough Council (BMBC) Strategic Flood Risk Assessment Level 1 (SFRA) (2010)[1];
- BMBC Preliminary Flood Risk Assessment (PFRA) (2011)[2];
- British Geological Survey (BGS) GeoIndex Onshore viewer[3];
- BGS Geology Viewer[4];
- Department for Environment, Food and Rural Affairs (DEFRA) Flood Defence Map[5];
- DEFRA MAGIC Mapping[6];
- Environment Agency Catchment Data Explorer[7];
- Environment Agency Flood Map for Planning[8];
- Environment Agency LiDAR Digital Terrain Model[9] ;
- Environment Agency's online Long Term Flood Risk map[10];
- Google Maps, Aerial Imagery[11];
- Ordnance Survey Mapping (OSM)[12];
- UK Centre for Ecology and Hydrology's Flood Estimation Handbook (FEH) Web Service[13];
- Percolation Testing results by Grange Geo Consulting Ltd (2023);
- Topographic & Utility Survey by Cloud Conversion (2025);

[1] https://www.barnsley.gov.uk/media/18125/barnsley-strategic-flood-risk-assessment-level-1-report-sept-2010.pdf
[2] https://www.barnsley.gov.uk/media/16269/barnsley-pfra-report.pdf
[3] https://www.bgs.ac.uk/map-viewers/bgs-geology-viewer/
[4] http://mapapps.bgs.ac.uk/geologyofbritain/home.html
[5] https://environment.data.gov.uk/explore/8e5be50f-d465-11e4-ba9a-f0def148f590
[6] https://magic.defra.gov.uk/magicmap.aspx
[7] https://environment.data.gov.uk/catchment-planning/
[8] https://flood-map-for-planning.service.gov.uk/
[9] https://environment.data.gov.uk/DefraDataDownload/?Mode=survey
[10] https://check-long-term-flood-risk.service.gov.uk/map
[11] https://www.google.com/maps
[12] https://osmaps.ordnancesurvey.co.uk
[13] https://fehweb.ceh.ac.uk/

- Connectivity Survey by Dene-Tech Services Ltd (2025);
- Land Drainage Proposal Plan (as-built) by Land Drainage Services Ltd (2025).

1.4 LIMITATIONS

1.4.1. WSP UK Ltd. has prepared this report in accordance with the instructions of our Client, Yorkshire Water Services Limited, for their sole and specific use relating to the above Site. Any person who uses any information contained herein does so at their own risk and shall hold WSP UK Ltd. harmless in any event. The conclusions and recommendations contained herein are limited by the availability of background information and the planned use for the Site.

1.4.2. Third party information has been used in the preparation of this report which WSP UK Ltd. by necessity assumes is correct at the time of writing. While reasonable checks have been made on data sources and the accuracy of the data, WSP UK Ltd. accepts no liability in relation to the report should any data, information or condition be incorrect or have been concealed, withheld, misrepresented, or otherwise not fully disclosed to WSP UK Ltd. In any event, WSP UK Ltd. shall not be liable for any loss or damages arising under, or in connection to, the use of this report.

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1.4.4. WSP UK Ltd. makes no warranties or guarantees, actual or implied, in relation to this report, or the ultimate commercial, technical, economic, or financial effect on the project to which it relates, and bears no responsibility or liability related to its use other than as set out in the contract under which it was supplied.

2 SITE BACKGROUND

2.1 SITE LOCATION

2.1.1. The Site is located north of Balk Farm Court in Birdwell village, within the Metropolitan Borough of Barnsley, South Yorkshire. The National Grid reference for the approximate centre of the Site is SE 34418 02218 and the nearest postcode is S70 5XJ. A Site Location Plan is provided in **Figure 2-1** below and in **Appendix A**.

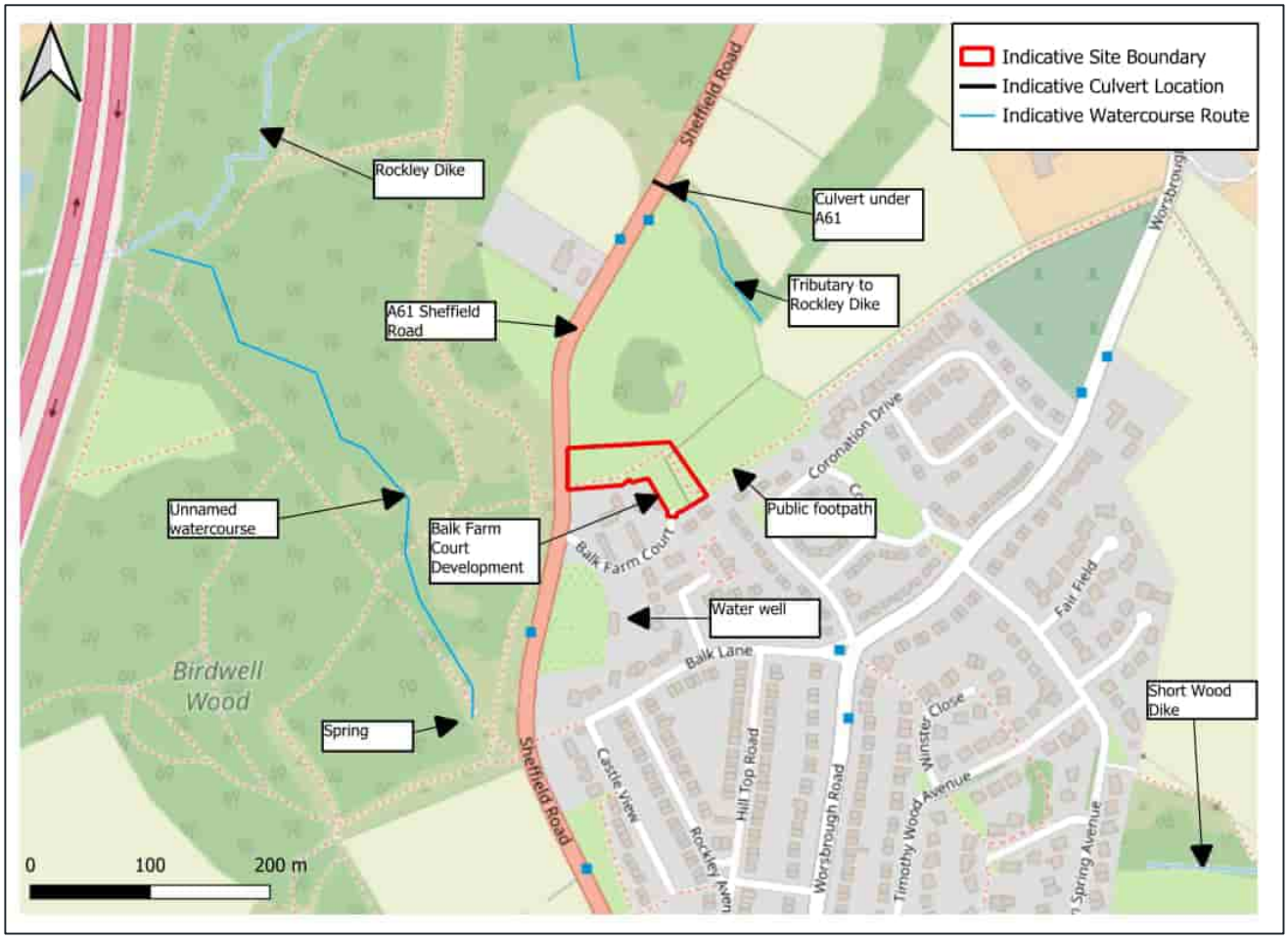


Figure 2-1 - Site Location Plan

2.2 SITE DESCRIPTION

2.2.1. The Site comprises an area of undeveloped greenfield land adjacent to a residential development. Public Rights of Way (PRoW) footpath runs along the southern Site boundary. Further Site characteristics are described in **Table 2-1** below. The site development plan is presented in **Appendix B.**

Table 2-1 – General Site Characteristics

Characteristic		Description
Site Area		The overall Site covers an area of approximately 0.31 hectares (ha).
Boundaries	North	The Site is bounded to the north by undeveloped agricultural land and woodland.
	South	The Site is bounded to the south by the residential developments of Balk Farm Court.
	East	The Site is bounded to the east by greenfield land and residential developments.
	West	The A61 Sheffield Road boarders the western boundary of the Site. Birdwell Wood is located approximately 40 m to the west of the Site.

2.3 TOPOGRAPHY

2.3.1. Cloud Conversion undertook a topographical survey of the Site and surrounding area in 2025. The survey indicated that ground levels range from approximately 122.67 metres Above Ordnance Datum (m AOD) to 115.28 m AOD, generally sloping from the east to the west. The lowest ground level of 115.28 m AOD is shown towards the west and the highest ground level of 122.67 m AOD is shown towards the east of the Site.

2.3.2. The elevations along A61 Sheffield Road are lower than those of the Site, with road levels being approximately 114.7 to 114.9 m AOD. A copy of the topographical survey can be found in **Appendix C**.

2.3.3. The Environment Agency's (EA) Light Detection and Ranging (LiDAR) 1 m Digital Terrain Model (DTM) 2022 data concur with the results from the topographical survey, as shown in **Figure 2-2** below.

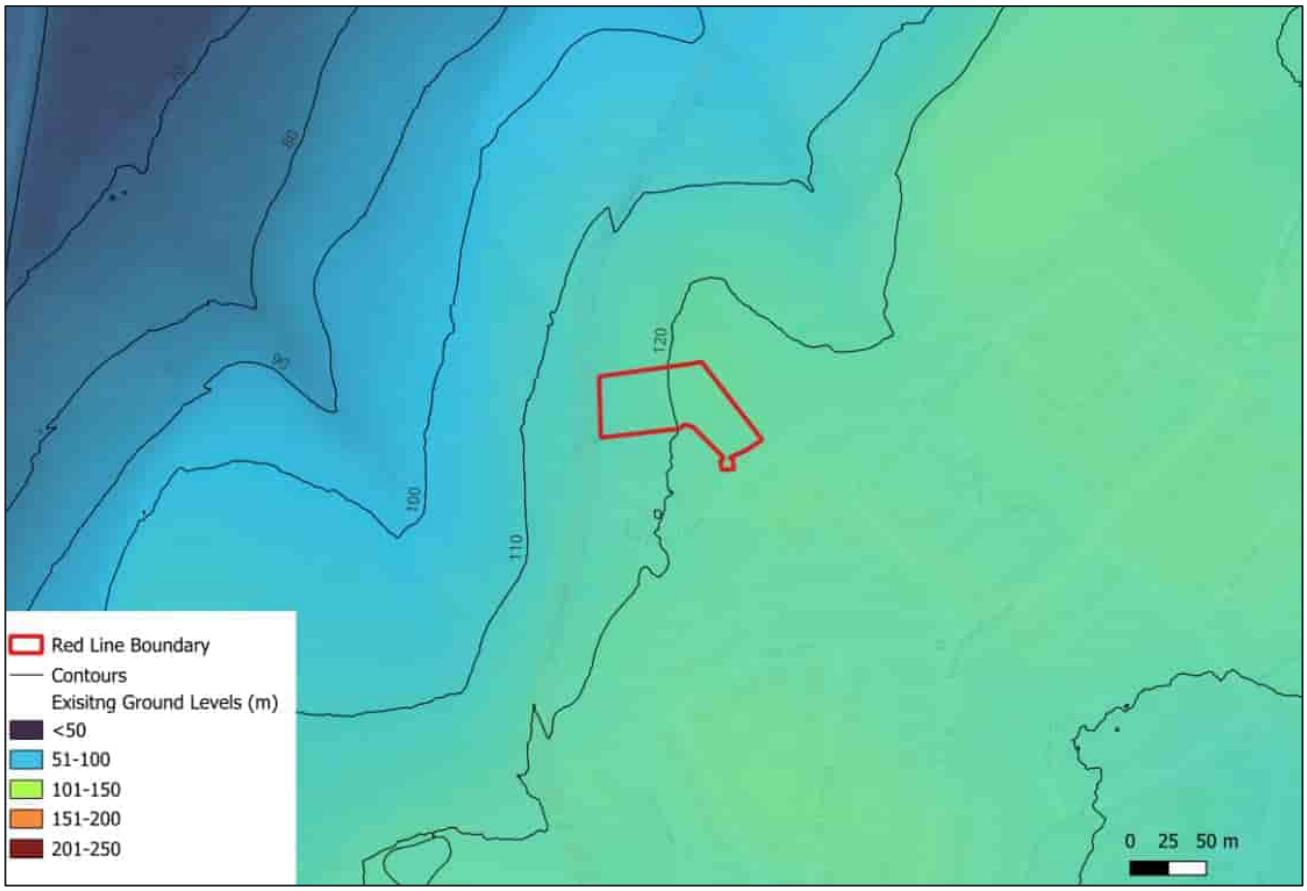


Figure 2-2– LiDAR Data (reviewed January 2026)

2.4 GEOLOGY AND HYDROGEOLOGY

GEOLOGY

2.4.1. The British Geological Survey (BGS) Geology of Britain Viewer indicated that the entirety of the Site is underlain by Pennine Middle Coal Measures Formation (bedrock). The central and western areas of the Site comprise of mudstone, siltstone and sandstone, whereas the eastern portion of the Site comprises exclusively of sandstone.

2.4.2. The BGS Geology of Britain Viewer also indicated that the Site is not underlain by superficial deposits.

2.4.3. The BGS borehole records are not available in the vicinity of the Site.

HYDROGEOLOGY

2.4.4. DEFRA's Magic Map indicated that the Site is not located within a groundwater source protection zone (SPZ), with the nearest being located approximately 6.5 km to the south.

2.4.5. The mapping indicated that the Site lies within a High Groundwater Vulnerability Zone.

2.4.6. DEFRA's Magic Map indicated the bedrock underlying the Site is classified as a Secondary A aquifer. These are aquifers comprising of permeable layers that can support local water supplies and may form an important source of base flow to rivers.

2.4.7. Ordnance Survey mapping identifies two springs in close proximity: one located approximately 200 m to the southwest and another approximately 390 m to the northwest of the Site. Additionally, a water well is situated approximately 100 m to the south of the Site. These features are associated with the underlying Secondary A aquifer.

ONSITE PERCOLATION TESTS

2.4.8. In March 2023, Grange Geo conducted four percolation tests to evaluate the ground's suitability for a septic tank installation. Two of the trial pit locations were situated within the Site. Refusal was encountered at depths between 0.95 m below ground level (bgl) and 1.05 m bgl, indicating the presence of dense or obstructive stratum. The results indicated that no groundwater was encountered during the testing period at those shallow depths. The percolation tests and the location of the tests taken are presented in **Appendix C.**

2.5 HYDROLOGY

2.5.1. There are no watercourses within the Site boundary. Rockley Dike ordinary watercourse is located approximately 350 m northwest of the Site. It flows in a northeasterly direction and ultimately discharges into Worsborough Reservoir, which lies approximately 930 m to the north.

2.5.2. A tributary to Rockley Dike runs approximately 225 m north of the Site and is culverted under the A61 Sheffield Road. It is classified as an ordinary watercourse and for the purpose of this report is called a “Tributary to Rockley Dike 1”. Another tributary to Rockley Dike runs approximately 100 m west of the Site, which is annotated as “Tributary to Rockley Dike 2” in **Figure 2-3** below.

2.5.3. Short Wood Dike, also classified as an ordinary watercourse, is located approximately 490 m southeast of the Site. It flows in a northeasterly direction, away from the Site.

2.5.4. The local hydrology is shown in **Figure 2-3** in this report.

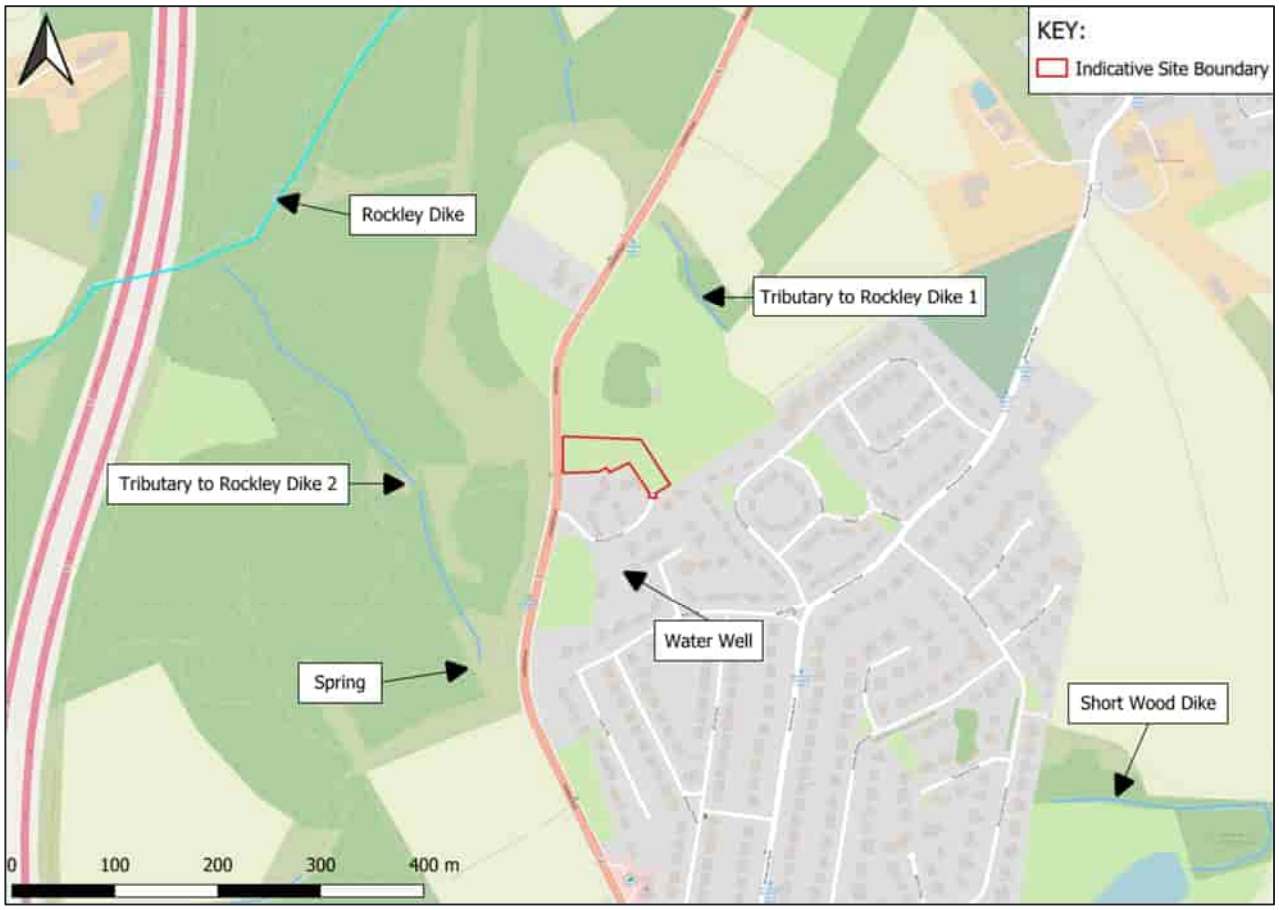


Figure 2-3 – Hydrology of the Site and Surrounding Area

2.6 EXISTING DRAINAGE INFRASTRUCTURE

PRIVATE DRAINAGE SYSTEM

2.6.1. A review of available surveys for the Site has been conducted to identify existing drainage infrastructure at the Site location. **Figure 2-4** presents an excerpt from a Connectivity Survey by Dene-Tech Services Ltd, which indicates that a private combined drain and associated septic tank are situated within the southern portion of the Site and connect to the highway drainage network along Shefield Road. This combined network, along with a surface water drainage network shown outside of the Site boundary, serve the residential development at Balk Farm Court. The thick red line delineates the southern boundary of the Site.

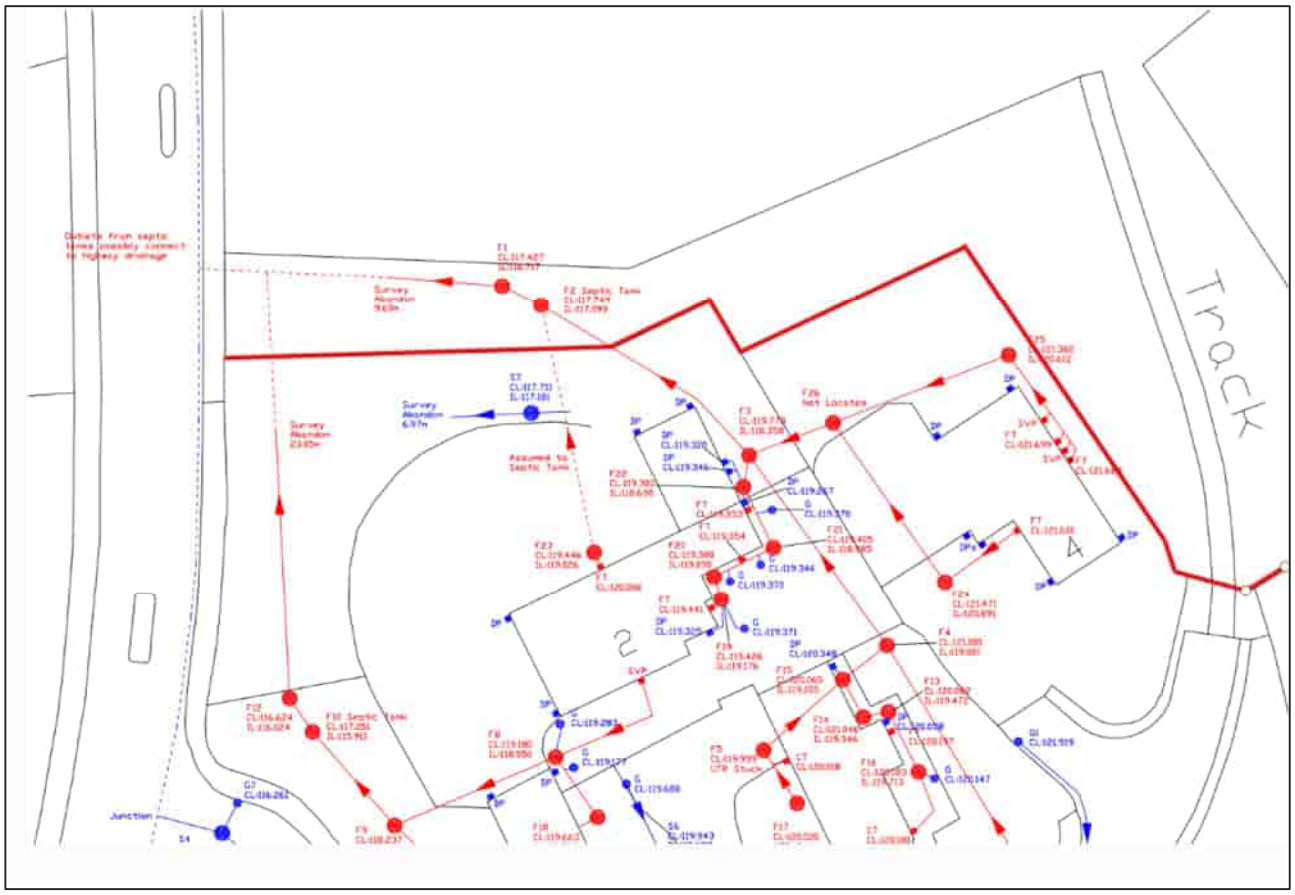


Figure 2-4 - Connectivity Survey (Dene-Tech Services Ltd, February 2025)

FIELD DRAINAGE SYSTEM

2.6.2. **Figure 2-5** illustrates the current layout of field drainage recently installed for YW after BMBC approval (Ref. OWC-003 2025/2026). This field drainage system is intended to drain the Proposed Development and will be discussed later in this report. This drainage system connects to a culvert under Sheffield Road; this culvert forms part of the Tributary to Rockley Dike watercourse, annotated in **Figure 2-1**.

2.6.3. All relevant site surveys are presented in **Appendix C.**

Figure 2-5 - As-build Field Drainage Plan (Land Drainage Services Ltd, October 2025)

2.7 EXISTING PUBLIC SEWERS

2.7.1. YW sewer records indicate the presence of several sewers surrounding the Site, including those serving the residential area towards the southeast.

2.7.2. Two surface water sewers are located approximately 65 m south near Balk Farm Court road, and approximately 85 m south of the Site, respectively. A foul water sewer is located approximately 35 m southeast, while multiple combined sewers are approximately 100 m southeast of the Site, towards Coronation Drive.

2.7.3. According to the Cloud Conversion topographical survey, the cover levels of the surface water sewers near Balk Farm Court are approximately 121 m AOD, and according to EA LiDAR, the cover levels of the sewers serving the residential developments towards the southeast are situated approximately between 123 – 124 m AOD.

2.7.4. A copy of the YW sewer records can be found in **Appendix C** of this report.

2.8 EXISTING FLOOD DEFENCES AND OTHER STRUCTURES

2.8.1. There are no spatial flood defences from any of the local watercourses within close proximity to the Site.

2.8.2. A range of structural and operational measures are in place to reduce the risk of flooding from Worsborough Reservoir. These include the replacement of draw-off valves, spillway underdrainage investigations, banking repairs and regular vegetation management and are located away from the Site boundary.

3 PROPOSED DEVELOPMENT

3.1 DEVELOPMENT PROPOSALS

DEVELOPMENT COMPONENTS

3.1.1. The Proposed Development involves a new SPS to replace the existing private septic tanks serving the nearby residential area. It also includes construction of a new access track to the SPS, along with earthworks and fencing surrounding the new facilities. Details of the Proposed Development is presented in **Appendix B.**

3.1.2. The SPS is contained within a compound and comprises below-ground infrastructure, such as wet well, valve chamber and associated pipework, as well as two kiosks and hardstanding slab measuring 14x10m for vehicle access.

3.1.3. The extents of the development has been kept to the minimum necessary to meet operational requirements.

ACCESS

3.1.4. A new access track is proposed towards the SPS compound from Balk Farm Court.

3.1.5. This access track measures 91.0 m in length and 5 metres in width at the entrance and 4.7 m in width towards the SPS compound.

3.1.6. The access track would be surfaced in Grasscrete, allowing vegetation to grow through the structure, thereby maintaining a natural appearance while providing a stable surface for maintenance vehicles. Filter drains would run along either side of the track to manage surface water runoff effectively. Low embankments are proposed towards access track on either side of the track.

3.1.7. Pedestrian access for operational staff would be via a secure gated entrance to the SPS compound.

PROPOSED DEVELOPMENT LEVELS

3.1.8. The SPS compound is constructed on a level platform, elevated between 1.2 and 1.8 m above the existing ground level along the western section of the Site. Additionally, a low embankment of approximately 0.4-0.5 m high is proposed on either side of the access track, sloping towards the track at a gradient of 1 in 3. Cross sections through the Proposed Development, provided by the Client, are also presented in **Appendix B.**

OPERATIONAL AND MAINTENANCE

3.1.9. The Proposed Development would be operated and maintained by Yorkshire Water Services Limited.

3.1.10. Routine maintenance visits would be infrequent and undertaken by small service vehicles. No continuous staffing or external lighting is proposed, ensuring minimal operational disturbance to the surrounding area.

DEVELOPMENT LIFESPAN

3.1.11. The typical operational lifespan of an SPS is approximately 50 years. The access road leading to the SPS provides indirect service to the adjacent residential development, which is understood to have been built in 2002. Accordingly, the design life of the access road is set at 75 years.

3.1.12. As a conservative approach in line with the NPPF and Coastal Change PPG, the Proposed Development will have a design life of 75 years, however, the SPS may need to be replaced after 20 – 50 years.

3.2 VULNERABILITY CLASSIFICATION

3.2.1. Based on Annex 3 (Flood risk vulnerability classification) of the NPPF Flood Risk and Coastal Change PPG, the most vulnerable proposed land-use within the Proposed Development (i.e. the SPS) would be classified as being ‘Water Compatible’. Therefore, the access road which is proposed to serve the SPS can also be considered as being ‘Water Compatible’.

4 CONSULTATION, POLICY AND GUIDANCE

4.1 CONSULTATION

4.1.1. The EA, BMBC as Lead Local Flood Authority (LLFA) and YW were consulted as part of this study to obtain historic flood records along with any flood risk and drainage information pertinent to the Proposed Development.

4.1.2. A summary of the consultation is found in **Table 4-1** below; full consultation responses are contained within **Appendix D**. Where relevant, details from the responses have been used within this report.

Table 4-1 – Summary of Consultation Correspondence

Stakeholder	Response
EA	The EA confirmed on 12th September 2025 that they have no records of flooding affecting the Site (although this does not necessarily mean that no flooding has occurred in the past) and that no flood defences are present within the Site's vicinity. The EA did not provide any modelled flood levels close to the Site; however, they provided Product 4 data. This includes mapping showing surface water flood risk and flood zones. No detailed hydraulic modelling has been done at the Site. The EA confirmed that there is no record of historical flooding or flood defences at the Site. The EA have recommended to use the *"Flood risk assessments: climate change* *Allowances website for climate change allowances".* The EA have recommended to use the "*Risk of Flooding from Reservoirs Map to identify risks from reservoirs."* The EA have recommended to use the Open Data LiDAR for LiDAR data.
BMBC	The BMBC confirmed on 18th September 2025 that there are no flood defences at the Site or surrounding areas. The BMBC confirmed that they do not have any specific records on flooding for the Site as it falls under the jurisdiction of the EA. The BMBC stated that there should be no increase in surface water runoff from the new development. Any balancing facility should be designed to accommodate a 1 in 30-year flow from the Site and a 1 in 100-year flow retained within the Site (including an allowance of 30% for climate change), without causing any flooding to buildings. The BMBC also requested that a 10% allowance for Urban Creep was incorporated into the design to meet the LLFA and National SuDS Standards requirements.
YW	YW confirmed on 29th September 2025 that the surface water from the SPS compound area will drain into a foul water wet well to ensure that compound drainage remains onsite due to the risk of spillage from tankers and the work that is undertaken within the compound for maintenance of the pumps. As part of the email correspondence, YW confirmed that there are historical records of sewer flooding from a septic tank.

4.2 POLICY AND GUIDANCE

4.2.1. This report has been developed with reference to the relevant policies and guidance documents where applicable.

NATIONAL POLICIES AND GUIDANCE

- NPPF, Ministry of Housing, Communities & Local Government (2025)[14];
- PPG, Flood Risk and Coastal Change, Ministry of Housing, Communities & Local Government and Department for Levelling Up, Housing and Communities. (2025)[15];
- National Standards for Sustainable Drainage, Department for Environment, Food and Rural Affairs (DEFRA) (2025)[16];
- Environment Agency Flood Risk Assessments: Climate Change Allowances guidance (2022)[17];
- Flood and Water Management Act (2010)[18];
- Sustainable Drainage Systems Written Statement HCWS161 (2014)[19];
- The SuDS Manual (C753), CIRIA, (2015)[20];
- Building Regulations Approved Document H, Ministry of Housing, Communities and Local Government (2015)[21],
- Sewerage Sector Guidance Appendix C – Design and Construction Guidance (v2-2, 2022)[22].

LOCAL/REGIONAL POLICIES AND GUIDANCE

- Barnsley Local Plan (2019)[23];
- Barnsley Metropolitan Borough Council PFRA (2011)[24];
- Barnsley Local Flood Risk Management Strategy (2017)[25];
- Barnsley SFRA Level 1 (2010)[26];
- Barnsley Council Arrangements to Deal with Sustainable Drainage Systems (2016)[27];

[14] https://assets.publishing.service.gov.uk/media/67aafe8f3b41f783cca46251/NPPF_December_2024.pdf
[15] https://www.gov.uk/government/collections/planning-practice-guidance
[16] https://www.gov.uk/government/publications/national-standards-for-sustainable-drainage-systems/national-standards-for-sustainable-drainage-systems-suds
[17] https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances
[18] https://www.legislation.gov.uk/ukpga/2010/29/contents
[19] https://www.parliament.uk/globalassets/documents/commons-vote-office/December-2014/18-December/6.-DCLG-sustainable-drainage-systems.pdf
[20] https://www.ciria.org/CIRIA/CIRIA/Item_Detail.aspx?iProductCode=C753F
[21] https://assets.publishing.service.gov.uk/media/5a80cf9ded915d74e33fc8ae/BR_PDF_AD_H_2015.pdf
[22] SSG Appendix C - Design and Construction Guidance v2-3_0.pdf
[23] https://www.barnsley.gov.uk/services/planning-and-buildings/local-planning-and-development/our-local-plan/barnsleys-local-plan/
[24] https://www.barnsley.gov.uk/media/16269/barnsley-pfra-report.pdf
[25] Flood risk management strategy
[26] https://www.barnsley.gov.uk/media/18125/barnsley-strategic-flood-risk-assessment-level-1-report-sept-2010.pdf
[27] https://barnsleymbc.moderngov.co.uk/documents/s17663/Arrangements%20for%20Sustainable%20Drainage%20Systems%20SUDs%20Associated%20with%20new%20Major%20Developments.pdf

- Standard Details for Adoptable Pump Station Design, Yorkshire Water (2024)[28].

[28] standard-details-for-adoptable-pump-station-design-april-2024.pdf

5 CLIMATE CHANGE

5.1 CLIMATE CHANGE GUIDANCE

5.1.1. The EA's guidance on climate change allowances provides up to date predictions on the changes in peak river flows, peak rainfall intensities and sea levels that are expected to occur as a result of climate change.

5.1.2. The allowances are considered as part of this assessment to ensure that the Proposed Development would remain safe and would not increase flood risk elsewhere over its intended design life in accordance with the requirements of the National Planning Policy Framework (NPPF).

5.1.3. The anticipated impact of climate change on sea levels is not relevant to this assessment as the Site is not located in the vicinity of the coast or tidal estuary.

PEAK RIVER FLOW ALLOWANCES

5.1.4. The EA's allowances for peak river flow detail the anticipated changes to peak flow by sub-catchments of river basin districts known as management catchments.

5.1.5. The latest allowances for peak river flow for the Don and Rother management catchment, in which the Site is located, are summarised in **Table 5-1**.

5.1.6. The EA's climate change guidance advises that the central allowance should be used for Water Compatible (i.e. the Proposed Development) within Flood Zone 2 and Flood Zone 3a. Specific guidance is not stated for developments within Flood Zone 1, and therefore, the central allowance will be used as a conservative approach.

5.1.7. As a conservative approach, in line with the NPPF and the Flood Risk and Coastal Change Planning Practice Guidance (PPG), the Proposed Development is considered to have a design life of 75 years, however the Sewage Pumping Station (SPS) may need to be replaced after 20 – 50 years. Therefore, the 2080s epoch would be appropriate.

Table 5-1 – Don and Rother Management Catchment Peak River Flow Allowances

	Central	Higher	Upper
2020s	11%	15%	25%
2050s	15%	21%	36%
2080s	28%	38%	60%

PEAK RAINFALL INTENSITY ALLOWANCES

5.1.8. The EA's climate change allowances for peak rainfall intensity are used for the design of the surface water drainage infrastructure and for the assessment of surface water flood risk in small catchments with an area of less than five square kilometres.

5.1.9. The latest allowances for peak rainfall intensity for the Don and Rother management catchment, of which the Proposed Development is located, are summarised in **Table 5-2**.

5.1.10. The EA's climate change guidance provides advice on the application for peak rainfall intensity for developments with a lifetime beyond 2100, stating that developments should use the upper end allowances for both the 3.3% and 1.0% annual exceedance probability for the 2070s epoch (2061 to 2125).

5.1.11. BMBC has requested that 30% climate change allowance is used in the surface water drainage design, therefore the 30% has been used to inform this SWDS.

Table 5-2 – Don and Rother Management Catchment Peak Rainfall Allowances

	3.3% Annual Exceedance Rainfall Event		1.0% Annual Exceedance Rainfall Event	
	Central Allowance	**Upper End Allowance**	**Central Allowance**	**Upper End Allowance**
2050s	20%	35%	20%	40%
2070s	25%	35%	25%	40%

6 SEQUENTIAL AND EXCEPTION TESTS

6.1.1. The Sequential Test is a risk-based planning tool that seeks to steer new development to areas with the lowest probability of flooding to minimise flood risk to people, property and infrastructure.

6.1.2. The Sequential Test is mandated by the National Planning Policy Framework (NPPF), paragraphs 173–176 and is further supported by the Government's Planning Practice Guidance on Flood Risk and Coastal Change.

6.1.3. The purpose of the Sequential Test is to ensure that land use planning takes due regard of all sources of flood risks, to ensure that areas at low or no risk of flooding are developed in preference to areas at higher risk. The Sequential Test aims to steer development, if possible, towards areas at the lowest risk of flooding.

6.1.4. The Exception Test is a two-part test which may be applied after the Sequential Test has been passed and there is no reasonable alternative to locate the development in an area of lower flood risk where the development is within Flood Zone 2 or 3. The Exception Test is required by the NPPF Paragraph 177–179 and explained further in national guidance.

6.1.5. Table 2 (Flood risk vulnerability and flood zone 'incompatibility') of the NPPF Flood Risk and Coastal Change PPG identifies different land use vulnerabilities that are appropriate within each of the Flood Zones; this has been replicated in **Table 6-1** below. This shows that 'Water Compatible' development is permitted within Flood Zone 1, where the Proposed Development is located.

6.1.6. Consequently, the Proposed Development meets the requirements of the Sequential Test and does not require an Exception Test.

Table 6-1 - Flood risk vulnerability and flood zone incompatibility

Flood Risk Vulnerability Classification	Flood Zone 1	Flood Zone 2	Flood Zone 3a	Flood Zone 3b
Water Compatible	Exception test is not required	Exception test is not required	Exception test is not required	Exception test is not required

**For Water Compatible developments, the Proposed Development should be designed and constructed to:*

- *remain operational and safe for users in times of flood;*
- *result in no net loss of floodplain storage;*
- *not impede water flows and not increase flood risk elsewhere*

7 ASSESSMENT OF FLOOD HAZARD

7.1 INTRODUCTION

7.1.1. The following section provides an overview of flood risk to the Site and risk arising to and from the Proposed Development. An assessment has been undertaken for each source that could affect the Proposed Development in accordance with the NPPF and Flood Risk and Coastal Change PPG.

7.2 METHODOLOGY

7.2.1. This FRA and SWDS uses a source-pathway-receptor led approach for assessing flood risk, with the individual parts of that chain being defined as follows:

- Sources – the potential source of flood risk to be assessed, such as direct rainfall, watercourses, the sea, groundwater or infrastructure (i.e. flood defence structures).
- Pathways – how the source of flood risk can impact potential receptors. A specific combination of sources and pathways is referred to as a flood mechanism, such as tidal overtopping of sea defences because of high tides and storm surge.
- Receptors – comprise those persons or assets that could be vulnerable to the flood mechanisms identified.

7.2.2. The flood sources that have been assessed in this FRA include potential flooding from fluvial, tidal/coastal, surface water, groundwater, sewer and drainage infrastructure and artificial sources (reservoirs and canals).

7.2.3. The receptors that have been assessed are the Proposed Development, including the access road and the components of the SPS (i.e. the wet well, manholes, valve chambers, pipework connections, buried ducts, cable entries, two electrical kiosks and control equipment), users of the Proposed Development, and other developments and people within the surrounding area.

7.3 FLOODING HISTORY

7.3.1. Review of the BMBC PFRA, SFRA and Product 4 provided by the EA, showed that there were no records of historical flooding in the area. Product 4 is presented in **Appendix D.**

7.3.2. Flooding has been identified from the existing private septic tanks serving the residential development south of the Site; however, the proposed SPS is intended to address this issue**.** The overflow from the septic tanks has impacted a public footpath running within the south of the Site and also the A61 Sheffield Road.

7.4 FLOODING FROM TIDAL AND FLUVIAL SOURCES

FLOOD MAP FOR PLANNING

7.4.1. The Environment Agency's (EA) Flood Map for Planning presents the indicative flood risk to the Proposed Development from fluvial and tidal sources for an undefended, present-day scenario.

The flood zones are defined as follows:

- Flood Zone 1 comprises land assessed as having a less than 1 in 1000-year annual exceedance probability (AEP) of river or sea flooding in any year (<0.1%);

- Flood Zone 2 comprises land assessed as having between a 1 in 100-year (1%) and 1 in 1000-year (0.1%) AEP of river flooding; or between a 1 in 200-year (0.5%) and 1 in 1000-year (0.1%) AEP of sea flooding in any year; and
- Flood Zone 3 comprises land assessed as having a 1 in 100-year (1%) or greater AEP of river flooding; or a 1 in 200-year (0.5%) or greater AEP of sea flooding in any year.

7.4.2. An extract of the Flood Map for Planning is shown in **Figure 7-1** below.

The mapping shows that the entire Site lies within Flood Zone 1, which denotes a low probability of flooding from fluvial sources.

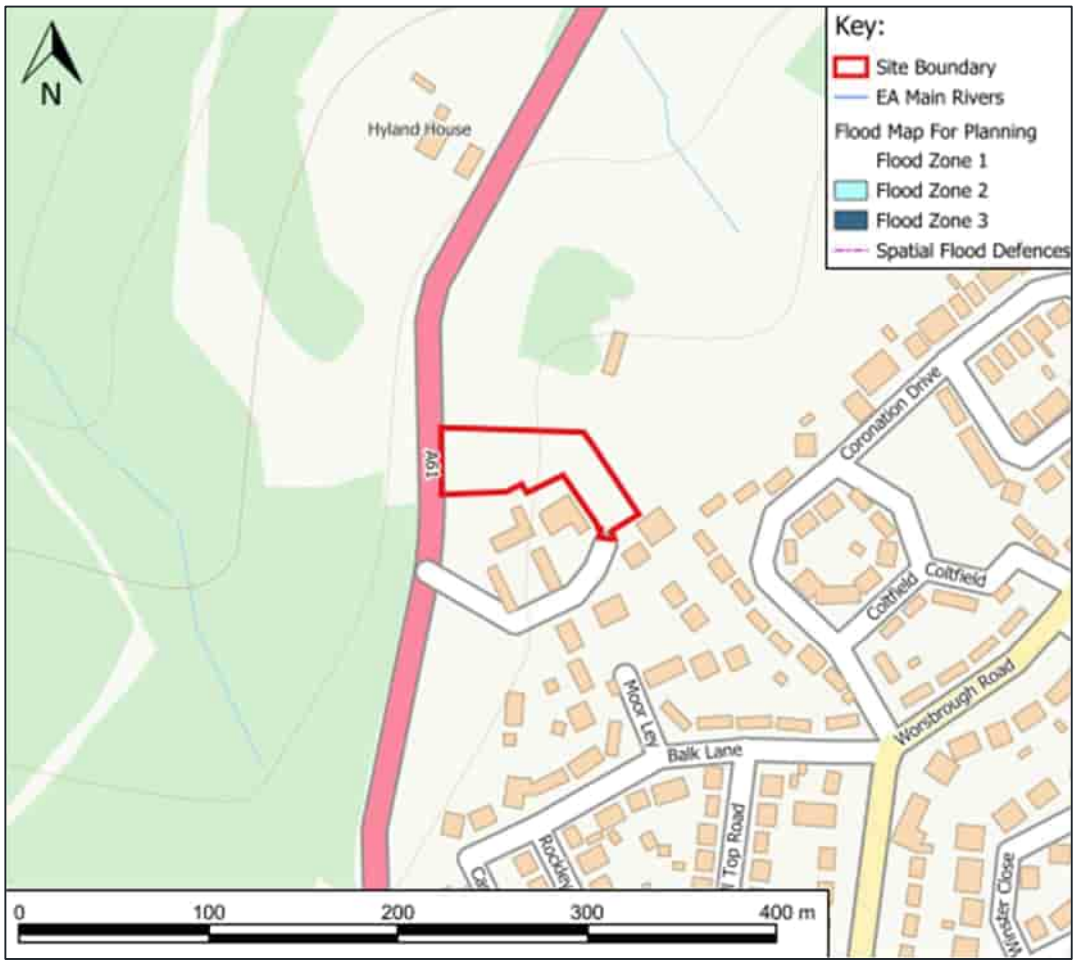


Figure 7-1 - Environment Agency Flood Map for Planning (reviewed January 2026)

RISK OF FLOODING FROM RIVERS AND SEA

7.4.3. The EA's Risk of Flooding from Rivers and Sea mapping shows the chance of flooding from rivers and the sea to the Proposed Development, taking into account the presence and condition of flood defences.

The level of risk is displayed as one of four likelihood categories:

- **High** – greater than or equal to 1 in 30-year (3.3%) chance of flooding in any year

- **Medium** – Less than 1 in 30-year (3.3%) but greater than or equal to 1 in 100-year (1%) chance of river flooding in any given year; or less than 1 in 30-year (3.3%) but greater than or equal to 1 in 200-year (0.5%) chance of sea flooding in any given year;
- **Low** – Less than 1 in 100-year (1%) chance of river flooding or less than in 200 (0.5%) chance of sea flooding, but greater than or equal to 1 in 1000-year (0.1%) chance of flooding from rivers or sea in any given year; and
- **Very low** – less than 1 in 1000-year (0.1%) chance of flooding in any given year.

7.4.4. Extracts of the EA's Risk of Flooding from Rivers and Sea mapping for the present-day scenario and the future baseline are provided in **Figure 7-2** and **Figure 7-3**, respectively.

7.4.5. As the Site is not within the vicinity of the coast or tidally influenced watercourses there is a negligible risk of flooding from tidal sources and any flood risk is related to fluvial sources.

7.4.6. Based on the below mapping, the entirety of the Site is shown to be at a very low risk of flooding from fluvial sources for both a present day and future scenario. Therefore, mitigation from fluvial risks is not required.

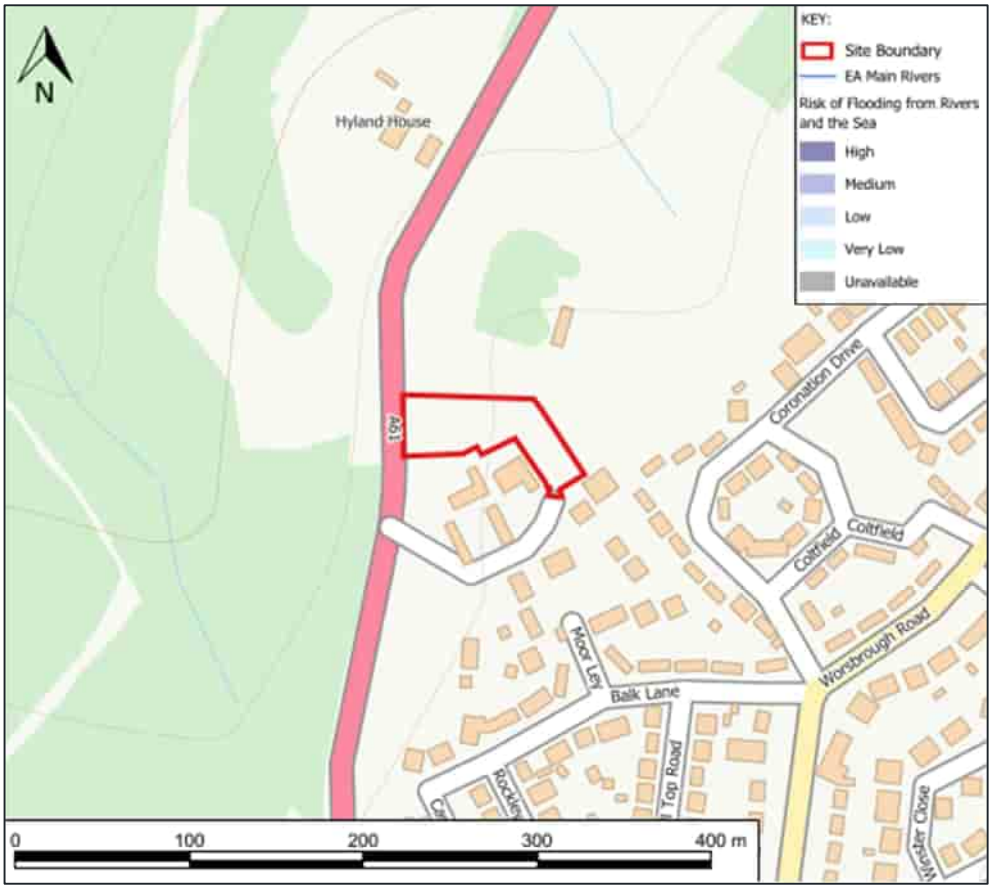


Figure 7-2 - Environment Agency Risk of Flooding from Rivers and Sea (Present Day) - (reviewed January 2026)

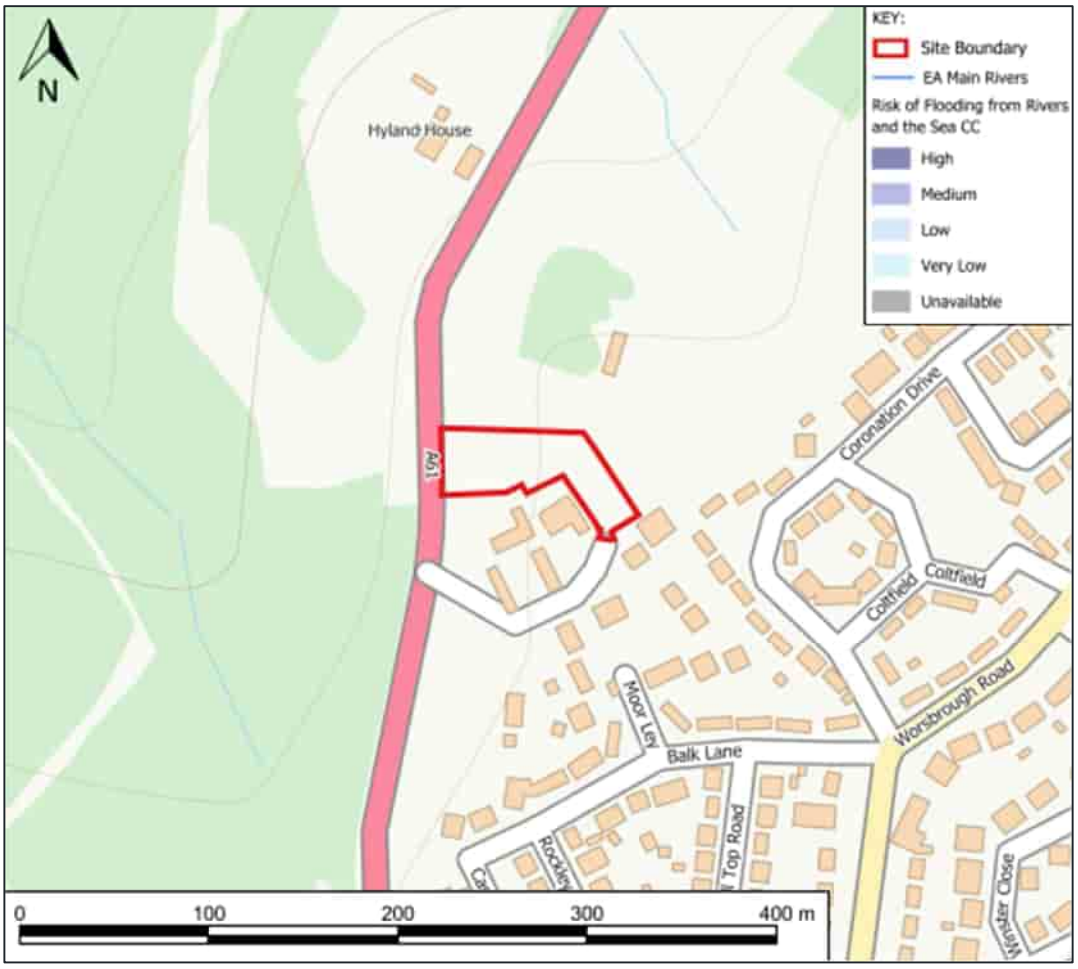


Figure 7-3 - Environment Agency Risk of Flooding from Rivers and Sea (2036 and 2069) (reviewed January 2026)

7.5 FLOODING FROM PLUVIAL / OVERLAND FLOW SOURCES

7.5.1. During extreme storm events the ground may become saturated and the overland flows that arise from such conditions may lead to pluvial (surface water) flooding.

7.5.2. The EA's Risk of Flooding from Surface Water mapping categorises the results of their surface water modelling into one of four likelihood categories:

- **High** - greater than or equal to 1 in 30-year (3.3%) chance of flooding in any year;
- **Medium** – Less than 1 in 30-year (3.3%) but greater than or equal to 1 in 100-year (1%) chance of flooding in any given year;
- **Low** – Less than 1 in 100-year (1%) but greater than or equal to 1 in 1000-year (0.1%) chance of flooding in any given year; and
- **Very low** – less than 1 in 1000-year (0.1%) chance of flooding in any given year (not mapped).

7.5.3. An excerpt from the EA's Risk of Flooding from Surface Water mapping for a present-day scenario and the 2040 and 2060 scenario are provided below in **Figure 7-4** and **Figure 7-5**.

7.5.4. The mapping indicates that the entirety of the Site has a very low risk of surface water flooding for both a present-day scenario and the 2040 and 2060 scenario.

7.5.5. The proposed surface water drainage strategy (SWDS) (as discussed in **Section 8**) will manage flows within the Site, including exceedance flow routes. A new field drainage network will be constructed in order to manage runoff across the fields to the north of the Site, and onsite overland flow routes will be managed through the provision of new onsite drainage. Further information relating to these mitigation measures are outlined in **Section 9** of this report.

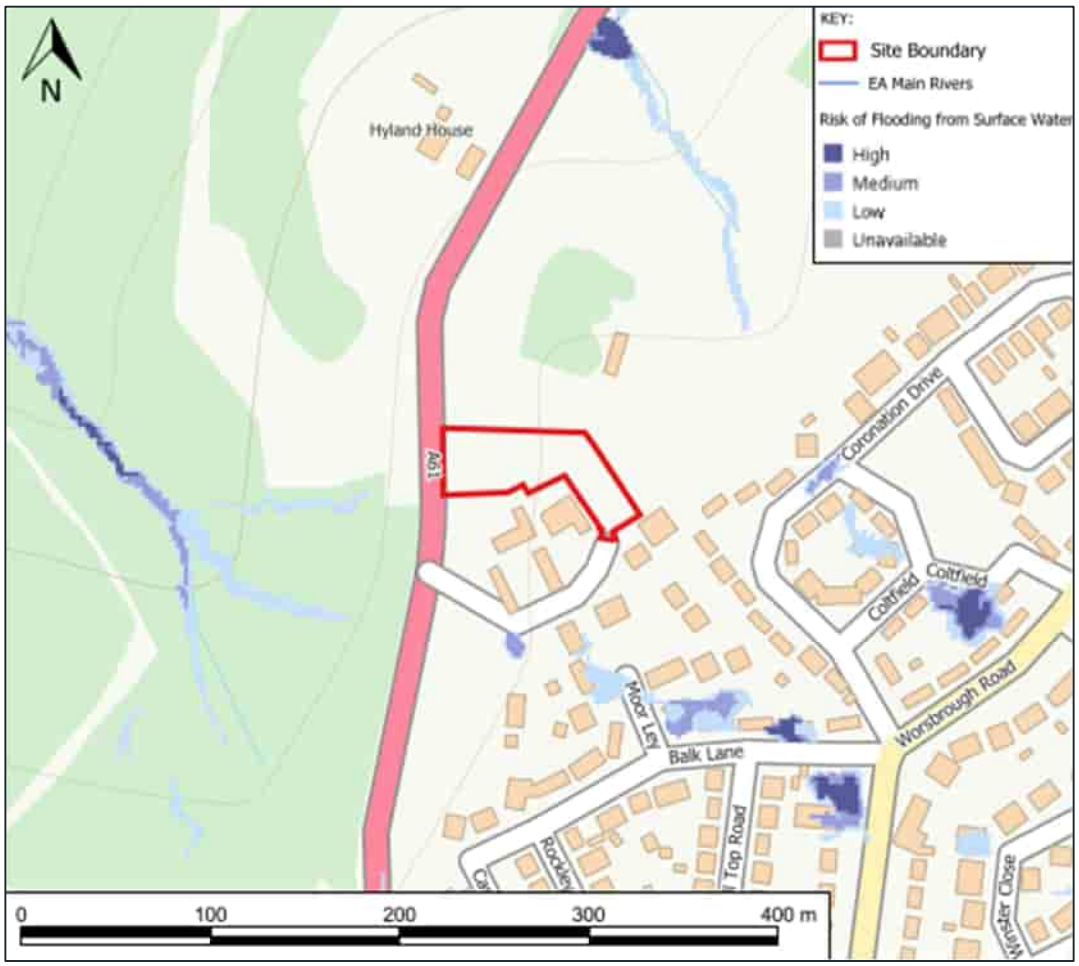


Figure 7-4 - Environment Agency Risk of Flooding from Surface Water (Present Day) (reviewed January 2026)

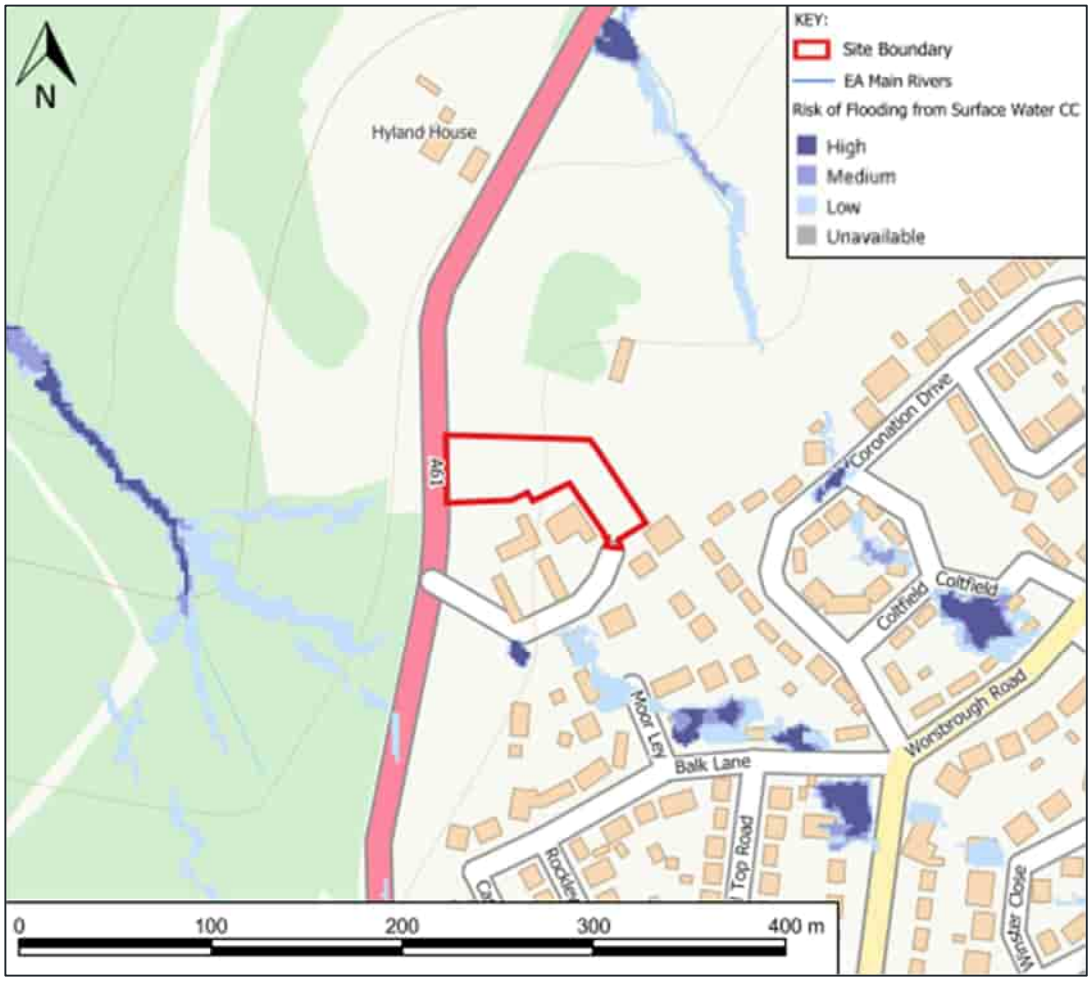


Figure 7-5 - Environment Agency Risk of Flooding from Surface Water (2040-2060) (reviewed January 2026)

7.6 FLOODING FROM GROUNDWATER SOURCES

7.6.1. Groundwater flooding occurs when water emerges from underground, either at specific points or diffuse locations. Groundwater flooding typically happens after prolonged rainfall, which leads to increased infiltration and recharge into local aquifers, causing the water table to rise above normal levels.

7.6.2. As previously stated in **Section 2.4**, Grange Geo carried out four trial pits to undertake percolation tests in March 2023. During the investigation groundwater was not observed in any of the trial pits, including the two located within the Site which were excavated at depths of 1.2 - 1.5 m.

7.6.3. The mudstone and siltstone underlying the central and western sections of the Site have low permeability and serve as aquitards, limiting both vertical and lateral groundwater flow. In contrast, the sandstone is moderately to highly permeable and facilitates groundwater accumulation and movement. As a result, the risk of groundwater emergence is reduced in central and western areas. The eastern section of the Site has a higher potential for groundwater emergence, particularly following extended periods of rainfall.

7.6.4. The Secondary A aquifer beneath the Site may also influence groundwater flood risk due to its capacity to store and transmit water through permeable layers such as sandstone and fractured rock.

Secondary A aquifers support local groundwater flow and respond to recharge events, especially after prolonged rainfall events. Groundwater levels can rise seasonally or following substantial precipitation, which may lead to groundwater emergence at the surface.

7.6.5. Additionally, the presence of two springs nearby suggests that groundwater is already discharging at specific geological boundaries or fault zones. These springs could become more active or expand in response to increased recharge or changes in subsurface flow. However, as the springs are at a significantly lower elevation to the Site, it can be assumed that the groundwater table is significantly below the Site level, reducing the likelihood of groundwater emergence at the Site.

7.6.6. The BMBC's PFRA indicates that there are no known incidences of groundwater flooding or groundwater rebound across Barnsley. The BMBC's SFRA states that only Kingstone area of Barnsley; Kingwell area of Worsbrough; Millhouses area of Hoyland; and Upperwood area of Darfield are candidates for groundwater flooding. As the Site is not within any of these areas, there is a low groundwater flood risk at the Site.

7.6.7. The geological conditions mentioned above indicate that localised groundwater emergence, particularly in the eastern part of the Site under prolonged rainfall, should be a relevant design consideration.

7.6.8. The primary receptors in this context are the access road, including areas surfaced with Grasscrete or partially infiltrating pavement, and the proposed SPS, including the wet well, manholes, pipework, and buried ducts/services.

7.6.9. Partial-infiltration surfacing (such as Grasscrete) may be sensitive to increases in groundwater levels or soil saturation. If groundwater rises closer to the surface in the more permeable sandstone zone, this may reduce infiltration capacity and lead to softening or waterlogging of the road structure.

7.6.10. The SPS, and the wet well in particular, is more sensitive to groundwater emergence due to its below-ground construction. Even with a low risk of emergence, hydrostatic pressure and uplift forces must be accounted for in the design of pumping station wet wells.

7.6.11. Based on the information above, the risk of groundwater flooding has been assessed to be low with a medium groundwater emergence risk.

7.6.12. **Section 9** of this report details the strategies and measures that will be implemented to address and mitigate these identified risks.

7.7 FLOOD RISK FROM ARTIFICIAL SOURCES

7.7.1. Artificial flooding can originate from canals, ponds and reservoirs where the water is retained, in some cases above ground level. It can also originate from public sewers, drainage systems and highway drainage networks.

FLOOD RISK FROM CANALS

7.7.2. There are no canals located within the Site's vicinity, therefore the flood risk from canals is considered to be negligible, and no mitigation measures are required.

FLOOD RISK FROM RESERVOIRS

7.7.3. Flood events can occur from a sudden release of large volumes of water from reservoirs.

7.7.4. Worsborough Reservoir is situated approximately 930m to the north of the Site. The reservoir has the capacity of 266,000 m^3 and is considered a Category A 'High Risk' reservoir under the Reservoirs Act 1975, due to its size and potential to flood 20 properties and businesses downstream. The reservoir average level is at approximately 60 m AOD. The Site is located between 122 m AOD and 115 m AOD being approximately 55 – 62 m above the reservoir levels, therefore it is unlikely that the flooding from this risk will affect the Site.

7.7.5. Additionally, the EA risk of flooding from reservoirs – maximum flood extent, shown in **Figure 7-6** indicates that the Site is identified as not being susceptible to flooding from reservoirs.

7.7.6. Therefore, based on the information available, the overall flood risk from reservoirs is considered to be negligible. No mitigation measures are required.

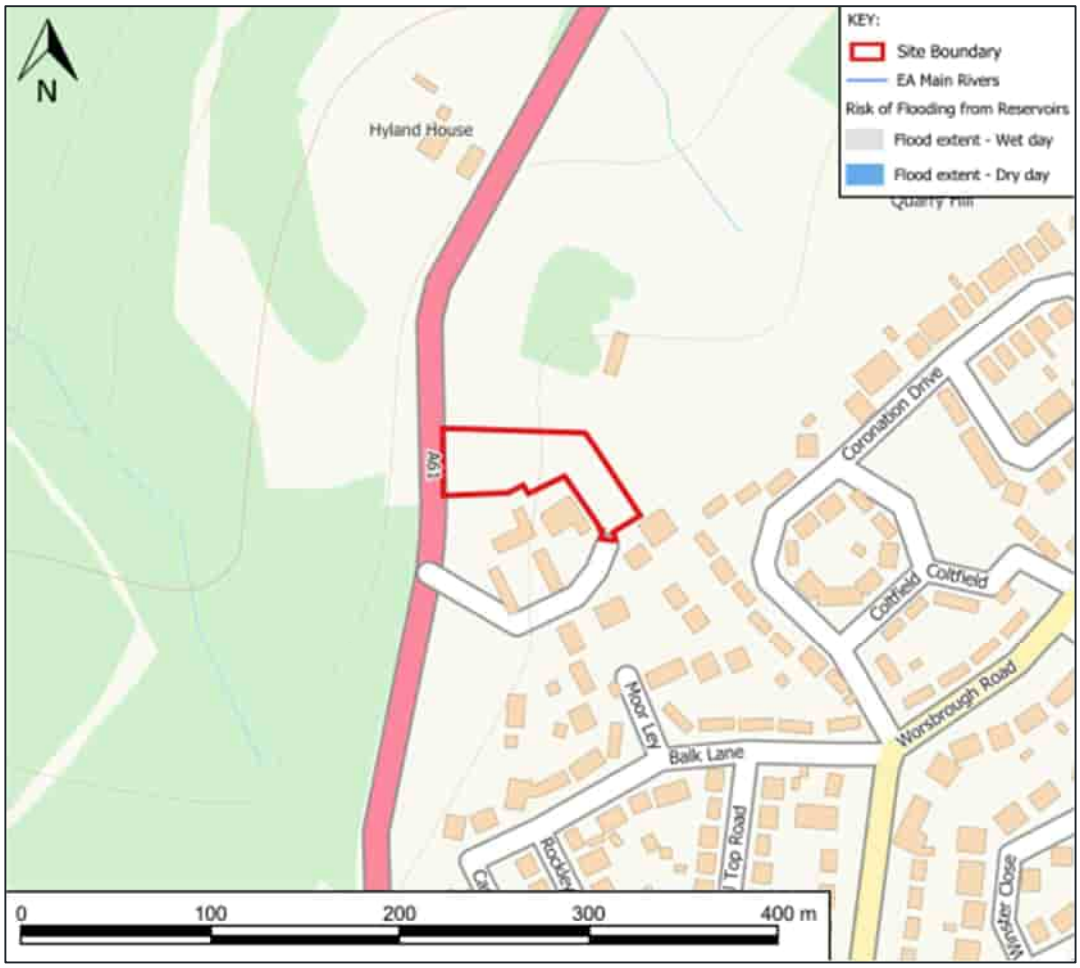


Figure 7-6 - Environment Agency Risk of Flooding from Reservoirs (reviewed January 2026)

FLOODING FROM PUBLIC SEWERS

7.7.7. As previously mentioned in **Section 2,** the cover levels of surface water sewers near Balk Farm Court are at approximately 121 m AOD; the cover levels of the sewers serving the residential developments towards the southeast are situated between approximately 123 – 124 m AOD.

7.7.8. The Site falls from approximately 123 m AOD to 115 m AOD, and while this topography could theoretically create a potential convergence route towards the western, lower-lying areas of the Site, the presence of residential properties, hedge lines and boundary fencing along this route

significantly restricts any overland flow towards the Site. As a result, even in the event of a sewer failure or surcharge within the nearby network, floodwaters are unlikely to reach the Site.

7.7.9. Furthermore, no flooding from the sewer network was recorded during consultation with YW.

7.7.10. Given the distance of the SPS from the Site along this constrained pathway and noting that the SPS compound is specifically designed to manage foul water, the likelihood of sewer-related flooding affecting the Site is therefore considered to be very low. No mitigation measures are required.

FLOODING FROM PRIVATE DRAINAGE INFRASTRUCTURE

7.7.11. Flooding from private drainage infrastructure occurs when flow entering a system exceeds the conveyance or discharge capacity. Exceeding the capacity of drainage infrastructure can cause surcharging or flooding from the system, therefore by leading to ponding or overland surface water flow.

Private Combined Drain

7.7.12. As stated in **Section 2**, a private combined drain and associated septic tank are located within the southern portion of the Site. Should this system become obstructed, fails, or exceeds its storage capacity, there is a potential for flooding to occur.

7.7.13. As combined systems convey both foul and surface water, any blockage or structural failure within the pipework or septic tank could lead to surcharge and result in sewage and/or surface water emerging at ground level. In such circumstances, exceedance flows would follow natural topography towards the lower-lying areas of the Site.

7.7.14. Information provided by YW confirmed that there are local flood risk issues relating to the existing foul drainage infrastructure to the south of the Site, which has extended within the boundary of the Site. The Proposed Development aims to address and limit the risk of flooding from this source, as detailed in **Section 9**.

New Field Drainage Network

7.7.15. As outlined in **Section 2**, a new field drainage network is located to the north of the Site, which discharges into a culvert running beneath the A61 Sheffield Road and forms part of a tributary to the Rockley Dike watercourse. Should this field drainage system become obstructed or reach capacity, floodwater could potentially back up towards the Site. In such a scenario, exceedance flows may enter the proposed surface water drainage network within the Site, indicating that appropriate mitigation measures are required to ensure that any surcharge can be safely managed.

7.7.16. Based on the information above, the potential risk from drainage infrastructure is considered to be medium. Further information regarding specific mitigation measures is provided in **Section 9**.

FLOOD RISK FROM HIGHWAY DRAINAGE NETWORKS

7.7.17. As indicated in the Connectivity Survey presented in **Figure 2-4** earlier in this report, a highway drainage network is situated along Sheffield Road to the west of the Site. The elevation of the highway is at least 0.1 meters lower than that of the Site, with a low boundary wall a hedge line between the highway and the Site. It is therefore unlikely that flooding from the highway drainage infrastructure at this location would affect the Site or the SPS compound, which is elevated by approximately 1.2 to 1.8 meters above existing ground levels on its western side.

7.7.18. Balk Farm Court road is positively drained by gullies and a surface water drainage network. The highway and associated gullies are positioned at a slightly higher elevation—approximately one meter—than the Site near the junction with Sheffield Road and are located at least 50 meters from the Site. In the event of obstruction or surcharge of the gullies, any exceedance flows would be expected to drain naturally towards both the Site and Sheffield Road. However, considering the separation distance, the presence of residential properties, and multiple hedgerows between Balk Farm Court and the Site, it is considered unlikely that flooding from these sources would impact the Site boundary. Furthermore, the SPS compound in this area is also raised above the current ground level.

7.7.19. Accordingly, the risk of flooding from these sources is assessed to be very low and no mitigation measures are deemed necessary.

7.8 FLOOD RISK SUMMARY

7.8.1. A summary of flood risk to the Proposed Development from the sources mentioned above can be found in **Table 7-1**.

Table 7-1 – Summary of Flood Risk to the Proposed Development

Source	Risk	Mitigation Required (YES/NO)
Tidal	Negligible	NO
Fluvial	Low	NO
Pluvial	Very low	NO
Groundwater	Low with medium groundwater emergence risk	YES
Canals	Negligible	NO
Reservoirs	Negligible	NO
Public Sewers	Very low	NO
Private drainage infrastructure	Medium	YES
Highway Drainage	Very low	NO

8 SURFACE WATER DRAINAGE STRATEGY

8.1 INTRODUCTION

8.1.1. In accordance with the National Standards for SuDS and Building Regulations Approved Document H, the surface water drainage strategy seeks to implement a SuDS hierarchy that aspires to achieve reductions in surface water runoff rates.

8.1.2. As set out in the NPPF, a development should demonstrate that it incorporates sustainable drainage systems, unless there is clear evidence this would be inappropriate.

8.1.3. The SWDS in this section explains how surface water runoff from the Proposed Development will be managed using sustainable drainage solutions in the design. Drainage modelling was conducted to evaluate the performance of the proposed drainage network under various scenarios including the 1 in 100-year event with an additional 30% allowance for climate change. This was used to present a conceptual surface water drainage design for the Proposed Development.

8.2 CURRENT ON-SITE DRAINAGE REGIME

8.2.1. Surface water runoff from this greenfield site follows the natural topography and has currently drained into the onsite land drainage network connected to the tributary of Rockley Dike, culverted under A61 Sheffield Road. This drainage network was currently replaced by a new land drain that has the same outfall arrangements into the culvert under Sheffield Road. Partially the runoff from the Site might also drain to the west into the existing highway drainage network along Sheffield Road.

8.3 STANDARDS FOR SUDS

8.3.1. It is essential for any new development that surface water is managed effectively to mitigate against any flood risk on the Site as well as off the Site. A surface water drainage strategy aims to focus on the efficient capture and management of surface water whilst ensuring compliance with the requirements and guidance noted in National Standards for SuDS as follows:

- Standard 1: Runoff Destinations
- Standard 2: Management of Everyday Rainfall (Interception)
- Standard 3: Management of Extreme Rainfall And Flooding
- Standard 4: Water Quality
- Standard 5: Amenity
- Standard 6: Biodiversity
- Standard 7: Design of Drainage For Construction, Operation, Maintenance, Decommissioning And Structural Integrity

8.4 STANDARD 1: RUNOFF DESTINATIONS

PRIORITY HIERARCHY

8.4.1. **National SuDS Standard 1**: runoff destinations give criteria for prioritising the choice of final runoff destination. Runoff from any development shall be discharged to the following final destinations, in

accordance with the below hierarchy of priority. Water should be discharged to as high a priority as possible, the maximum extent practicable. The suitability of these discharge options will be informed by a desk-based assessment, undertaken as part of this drainage strategy. The hierarchy of options is as follows:

1. Priority 1: Collected for Non-Potable Use
2. Priority 2: Infiltrated to Ground (Infiltration)
3. Priority 3: Discharged to an Above Ground Surface Water Body
4. Priority 4: Discharged to a Surface Water Sewer, or another Piped Surface Water Drainage System
5. Priority 5: Discharged to a Combined Sewer

8.4.2. It is necessary to identify the most appropriate method of controlling and discharging surface water. The five priority options of the hierarchy above have been reviewed below in terms of their feasibility for discharging water from the Proposed Development.

Priority 1: Collected for non-potable use

8.4.3. Water reuse has been deemed unsuitable for this development, due to the Site being unmanned and therefore low demands for water supply on Site. No facilities are included in the development proposal.

Priority 2: Infiltrated to Ground

8.4.4. The geology underlying the Proposed Development area is described in **Section 2.4**. It consists of mudstone, siltstone and sandstone and has no superficial deposits recorded. Mudstone and siltstone have low infiltration potential whereas sandstone has a medium to high infiltration potential; therefore, overall, it appears that the local geology and hydrogeology will not support infiltration into the ground as a primary method of surface water disposal.

8.4.5. Percolation testing has been undertaken to inform the SPS design in four locations within and near the Site boundary. Although the tests were undertaken to BS 6297:2007 and not BRE Digest 365, it is notable that all four tests produced negative infiltration rates. This outcome corresponds with the presence of silty clay soils found up to about one meter bgl, as well as the low-permeability siltstone bedrock located beneath. Results are presented in **Appendix C.**

8.4.6. Based on the current understanding of the underlying geology, infiltration has been excluded as a primary method for surface water disposal.

Priority 3: Discharged to an above ground surface water body

8.4.7. Discharge to a surface water body is the next preferred method of surface water disposal. As noted in **Section 2.5**, the closest watercourse to the Site is an ordinary watercourse located approximately 225 m north of the Site boundary (Tributary to Rockley Dike 1).

8.4.8. It is proposed that surface water disposal will be managed by discharging into this watercourse via the newly constructed field drainage network located directly north of the Site boundary, as outlined in **Section 2.6**.

Priority 4: Discharged to a surface water sewer, or another piped surface water drainage system

8.4.9. The option to discharge to a surface water body via improved land drainage network has been deemed as feasible option, as discussed above.

8.4.10. Discharging to a surface water sewer or a combined sewer have therefore been discounted as they are lower down the hierarchy and therefore are not appropriate.

8.4.11. Therefore, based on the assessment above, discharge via a **piped surface water drainage** to the nearest open watercourse is deemed most suitable option as per the drainage hierarchy.

8.5 STANDARD 2: MANAGEMENT OF EVERYDAY RAINFALL (INTERCEPTION)

8.5.1. National Standards for SuDS, paragraph 2.6 notes that *'Evidence shall be provided to demonstrate that the runoff from each positively drained surface, for at least 5mm of rainfall, is either collected for use, infiltrated into the ground, or else captured, conveyed and stored within SuDS features. These features shall naturally absorb or retain runoff and from these the runoff will be 'lost' to soils or the atmosphere and will not discharge off the site.'*

8.5.2. It also notes that "*All permeable surfaces, whether lined or not, shall be assumed to comply provided there is no additional area drained to the permeable pavement*."

8.5.3. Given that the proposed access track will utilise permeable surfaces such as Grasscrete, and the access track embankment will be vegetated with grass, it is anticipated that interception of the initial 5mm of rainfall will be achieved, meeting the criteria outlined in Standard 2.

8.5.4. Further details of the proposed drainage network, SuDS elements and calculations supported by hydraulic model undertaken in Causeway Flow software are outlined further in this report.

8.6 STANDARD 3: MANAGEMENT OF EXTREME RAINFALL AND FLOODING

Drainage Methodology

8.6.1. The drainage modelling was undertaken using Causeway Flow and the most up to date FEH rainfall data (FEH22). The elevations (cover levels) used within the model have been generated using the elevation information as provided in drawings in **Appendix B** and a contour provided in CAD format.

8.6.2. As the Proposed Development area is relatively small, the greenfield runoff rate has been calculated for the entire development area of 0.1374 ha resulting in QBAR runoff rate of 0.2 l/s. This rate has been used in the Causeway Flow drainage model to limit flows for all storms up to and including 1 in 100 year storm event, including 30% climate change uplift. Greenfield runoff rates calculated using SuDS UK Tool[29] are summarised in **Table 8-1** below and are presented in **Appendix E**.

29 https://www.uksuds.com/tools/greenfield-runoff-rate-estimation

Table 8-1 –Greenfield Runoff Rate Estimates

Return Period	Greenfield Runoff Rate
QBAR	0.2
1 in 1	0.2
1 in 30	0.4
1 in 100	0.5

8.6.3. The internal access road to the pumping station is proposed to be constructed of Grasscrete, which typically has runoff efficiency value of 90-95%, depending on the supplier. An example of Grasscrete construction details can be found in **Appendix G**. A conservative road permeability value of 70% was used in the model. This is so that the model does not overestimate infiltration and also provides a safety margin. The lower permeability of 70% also accounts for likely future reductions in infiltration of the surface due to silting and therefore helps safeguard against exceedance of drainage. Based on this assumptions an impermeable area of 0.016 ha has been used in the model for the access track.

8.6.4. The permeability rate of the engineered road embankment has also been assumed to be 70%, as the embankments will comprise of a grass surface. Based on this assumptions an impermeable area of 0.09 ha has been used in the model for the embankments within the drained catchment.

8.6.5. The surface water from the SPS compound area will drain via a new gully into a foul water wet well at unrestricted rate, as confirmed by the YW to ensure that compound drainage remains onsite due to the risk of spillage from tankers and the work that is undertaken within the compound for maintenance of the pumps. This follows the requirements of the YW's Standard Details for Adoptable Pump Station Design[26]. **Table 8-2** below provides further details of the above calculations.

Table 8-2 - Drained Catchment Impermeable Area

Catchment	Total Area (ha)	Permeability Value (%)	Impermeable Area (ha)
Access road	0.053	70	0.016
Embankment	0.030	70	0.009
Total	**0.083**	**n/a**	**0.025**

8.6.6. The drainage modelling incorporated climate change allowances to ensure the long-term resilience of the system. This allows the model to test the drainage system's capacity under future climate scenarios, including the 100-year return period with an additional climate change allowance. The model was tested under a 1-year event, 30-year event and a 100-year+30% climate change allowance event. The 100-year+30% climate change event is as expected by the BMBC.

8.6.7. A 10% urban creep value has been applied to meet the BMBC and the National Standards for SuDS and future-proof the development.

8.6.8. For the total contributing impermeable area of 0.025 ha, an initial attenuation volume of 23 m^3 was estimated for the 1 in 100-year plus 30% climate change event. The quick storage estimations were undertaken using SuDS UK storage volume calculation tool[30] to inform the design and are presented in **Appendix E**. The proposed drainage system is aimed to provide the attenuation capacity within its below ground piped systems; filter drain media and inspection chambers to minimise the need for proprietary attenuation systems such as below ground tanks.

8.6.9. The proposed drainage system, designed in Causeway Flow, is based on a filter drain system with integrated flow controls in form of check dams, sized orifice plates and a final flow control at the end of network to control the discharge rate to 0.2 l/s. The drainage system also incorporates Grasscrete and a vegetated track embankment. The model results are presented in **Appendix E** and described further int this section.

8.6.10. Standard details of filter drain and cross-sectional views through access track and drainage features are presented in a drawing in **Appendix F**.

Model Results

8.6.11. The drainage network and proposed flow controls are presented in a drawing in **Appendix F** and also detailed below:

- The access road will be drained into two 600 mm wide filter drains containing 150 mm diameter perforated carrier pipes
- The filter drains will have check dams with orifices along their lengths to maximise the amount of surface water storage within. The optimum location of these check dams will be subject to detail design to ensure there are no clashes and to minimise the risk of blockages
- A final orifice plate will restrict flows to 0.2 l/s prior to discharge from the Site
- The standard (solid, non-perforated) pipes located at the downstream section of the surface water network have been upsized to 225-300 mm diameter, providing sufficient storage volume within the pipework to store surplus water during peak flow events

8.6.12. The results indicate that the proposed drainage system is capable of conveying surface water runoff effectively under all design rainfall events. The design rainfall events were under a 1-year event, 30 year event and a 100 year+30% climate change allowance event, as mentioned earlier in this section. The upsized pipes will provide sufficient storage for surplus water during peak rainfall and will comply with discharge rate requirements. The drainage model demonstrated that the system could function at the required discharge rate of 0.2 l/s without a proprietary storage tank.

30 https://www.uksuds.com/tools/surface-water-storage-volume-estimation

8.6.13. For all simulated events, the drainage system operates within its design capacity and flows are conveyed efficiently through the filter drain and pipe system. The model indicates that for all scenarios, the system does not surcharge or flood up to and including the 100-year event.

Residual Risk and Exceedance Flow

8.6.14. The model indicates a residual flood risk during the 100-year event, including projected climate change impacts, originating from the proposed drainage network at around SW1 manhole location. The anticipated overflow volume is approximately 0.1037 m^3. The proposed Site levels presented in cross-sectional drawings in **Appendix B** indicate that the access road and the area around SW1 manhole will fall towards the SPS compound and the wet well. In the extreme events this volume will be captured by the compound gully, located at the lowest spot within the compound and it will be directed into the wet well. The kiosk with the associated electric equipment is placed on a raised slab within the compound; therefore, it is not anticipated to be impacted by the exceedance from the onsite drainage in the 100 year and climate change scenario.

8.6.15. Consequently, any exceedance flows will be managed within the Site boundary, thereby eliminating offsite risks to third parties and ensuring uninterrupted operation of the SPS. The exceedance flow route is presented in **Appendix F**.

8.7 STANDARD 4: WATER QUALITY

ASSESSMENT OF THE POLLUTION HAZARD LEVEL

8.7.1. The SuDS Manual sets out a common approach to managing the quality of surface water runoff, referred to as Simple Index Approach (SIA). It describes risks posed by surface water runoff to the receiving environment as a function of:

- The pollution hazard at a particular Site (i.e. the pollution source)
- The effectiveness of SuDS treatment components in reducing levels of pollutants to environmentally acceptable levels (i.e. the pollutant pathway)
- The sensitivity of the receiving environment (the environment receptor)

8.7.2. The SIA assesses the selected arrangements of SuDS components and corresponding treatment trains, provide a total pollution mitigation index at least equal to, or greater than, the pollution hazard index.

8.7.3. Table 26.2 of the SuDS Manual assigns pollution hazard indices for different land use classifications (shown in **Figure 8-1** below).

TABLE 26.2 Pollution hazard indices for different land use classifications

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

Figure 8-1 - Environment Table 26.2 of the SuDS Manual – Pollution hazard indices for different land use classifications (Source: CIRIA SuDS Manual C753)

8.7.4. The proposed access track to the SPS will be infrequently used during its operation and routine maintenance visits would also be infrequent, therefore it can be considered a low traffic road / general access road. The embankment is being given the same classification for the purpose of the assessment. Low pollution hazard level is indicated for the low traffic roads with the pollution hazard indices of 0.5, 0.4 and 0.4 for the TSS, Metals and Hydrocarbons respectively, as shown in **Figure 8-1** above.

8.7.5. Table 26.3 of the SuDS Manual gives the mitigation indices that refer to performance in pollutant removal by different treatment options / SuDS features. Those are outlined in **Figure 8-2** below.

TABLE 26.3 Indicative SuDS mitigation indices for discharges to surface waters

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

Notes

1 SuDS components only deliver these indices if they follow design guidance with respect to hydraulics and treatment set out in the relevant technical component chapters.

2 Filter drains can remove coarse sediments, but their use for this purpose will have significant implications with respect to maintenance requirements, and this should be taken into account in the design and Maintenance Plan.

Figure 8-2 – Indicative SuDS mitigation indices for discharges to surface water (Source: CIRIA SuDS Manual C753)

8.7.6. The SuDS components proposed as part of this SWDS are:

- Filter Drains, and
- Permeable Pavement (Grasscrete)

8.7.7. The impact of these mitigation indices in relation to the pollution indices created on Site have been summarised in **Table 8-3** below.

Table 8-3 - Treatment train for the Proposed Development (Source: CIRIA SuDS Manual C753)

SuDS Component	Pollution Hazard Level (Pollution Indices)	Mitigation Indices		
		Total Suspended Soils (TSS)	Metals	Hydrocarbons
Grasscrete*	Low (0.5, 0.4 and 0.4 for the TSS, Metals and Hydrocarbons respectively)	0.7	0.6	0.7
Fiter Drain x 0.5 **		0.2	0.2	0.2
	Total	0.9	0.8	0.9
	Sufficient Mitigation?	Sufficient	Sufficient	Sufficient

* *It has been assumed that a grass paving solutions such as Grasscrete system can provide a similar performance in pollution removal as the one indicated in SuDS Manual for permeable pavements*

***A factor of 0.5 has been used to account for the reduced performance of this secondary component associated with already reduced inflow concentrations*

8.7.8. Therefore, as shown by the SIA assessment above, there is sufficient pollution mitigation to provide adequate level of water quality before discharging into a water body.

8.8 STANDARD 5-6: BIODIVERSITY AND AMENITY

8.8.1. This section evaluates whether the proposed SuDS features can deliver biodiversity and amenity benefits.

8.8.2. The provision of a grass paving solution, such as Grasscrete and the adjacent grassed embankments will offer biodiversity benefits by creating grass and soil environments that serve as micro-habitats for insects and microbes.

8.8.3. Given that the Site is privately owned, access will be limited exclusively to employees during operational and maintenance activities. Grass paving solution will offer some amenity benefits, compared to the use of a traditional hard surfaced track.

8.9 STANDARD 7: DESIGN OF DRAINAGE FOR CONSTRUCTION, OPERATION, MAINTENANCE, DECOMMISSIONING AND STRUCTURAL INTEGRITY

8.9.1. Regular inspection and maintenance are required to ensure the effective long-term operation of SuDS and drainage network, including filter drains, pipework, chambers and associated flow control components.

8.9.2. These requirements are detailed in the SuDS Manual and DCG. Maintenance activities will be undertaken by YW for adopted assets, or by the appointed site management party for any private or unadopted drainage features. Maintenance activities will be made available in the operation manual of the SPS compound.

GENERAL MAINTENANCE OF FILTER DRAINS

8.9.3. Maintenance of the filter drains and drainage networks will be carried out in accordance with the methods and frequency specified in the SuDS Manual. SuDS Maintenance checklist in accordance with the SuDS Manual is presented in **Appendix G**.

8.9.4. The general maintenance obligations associated with filter drains are included in Table 16.1 of the SuDS Manual. They include regular inspections for the removal of litter/debris from the drain, access chamber and pre-treatment devices. Inspection/removal of surface, inlets/outlets, control systems, pre-treatment devices for blockages/siltation. An overview of this is shown in **Figure 8-3** below.

TABLE 16.1 Operation and maintenance requirements for filter drains

Maintenance schedule	Required action	Typical frequency
Regular maintenance	Remove litter (including leaf litter) and debris from filter drain surface, access chambers and pre-treatment devices	Monthly (or as required)
	Inspect filter drain surface, inlet/outlet pipework and control systems for blockages, clogging, standing water and structural damage	Monthly
	Inspect pre-treatment systems, inlets and perforated pipework for silt accumulation, and establish appropriate silt removal frequencies	Six monthly
	Remove sediment from pre-treatment devices	Six monthly, or as required
Occasional maintenance	Remove or control tree roots where they are encroaching the sides of the filter drain, using recommended methods (eg NJUG, 2007 or BS 3998:2010)	As required
	At locations with high pollution loads, remove surface geotextile and replace, and wash or replace overlying filter medium	Five yearly, or as required
	Clear perforated pipework of blockages	As required

Figure 8-3 - Operation and maintenance requirements for filter drains (Source: CIRIA SuDS Manual C753)

GENERAL MAINTENANCE OF GRASSCRATE

8.9.5. Other SuDS elements, such as grass paving solutions, will follow the maintenance regime set out by the manufacturers. Grasscrete® Design and Maintenance Guidance in **Appendix G** sets out specific requirements for grass cutting, soil infill management and fertiliser use to maintain functionality and surface integrity. It includes the following main activities:

- Routine visual inspection to check surface condition, grass coverage and signs of rutting, erosion or settlement
- Grass management through mowing of lightly trafficked areas to maintain even growth and prevent excessive vegetation height

- Top-up of soil infill where settlement occurs within pockets, avoiding over-compaction to maintain permeability and grass health
- Fertiliser application, where required, using liquid-based products in accordance with manufacturer recommendations; granular fertilisers should be avoided to prevent scorching of grass and accumulation on concrete ribs
- Monitoring of drainage performance to ensure infiltration is maintained and ponding does not occur, consistent with SuDS principles for permeable pavements
- Repair or reinstatement of damaged areas where grass loss or surface degradation is identified

GENERAL MAINTENANCE OF DRAINAGE NETWORK ELEMENTS

8.9.6. Pipes and pipework

- Routine inspection to identify blockages, siltation, root ingress, structural defects or misconnections
- Cleaning of pipework using water jetting or vacuum techniques where silt or debris accumulation is observed
- Removal of obstructions to maintain hydraulic capacity and prevent surcharging
- Repair or replacement of damaged pipe sections where defects are identified
- Verification that gradients, joints and connections remain intact and operational

8.9.7. Manholes and inspection chambers

- Visual inspection from ground level to check for debris, sediment build-up, standing water or signs of surcharge
- Inspection of covers, frames and locking mechanisms to ensure safe and secure access
- Cleaning of chambers where sediment accumulation is identified (by competent contractors)
- Monitoring for structural damage, infiltration or leakage
- Confined-space entry avoided unless undertaken by suitably qualified personnel

8.9.8. Catch pits / catchpits / silt traps

- Regular inspection for accumulation of silt, debris, oils or floating material
- Emptying and cleaning using vacuumation or jetting to maintain sediment storage capacity
- Reinstatement of silt buckets or sumps following cleaning
- Increased inspection frequency following heavy rainfall events
- Safe disposal of removed material in accordance with waste regulations

8.9.9. Gullies, channels and surface drainage features

- Removal of debris, litter and leaf fall from inlets and gratings

- Flushing or jetting of gullies and channels to prevent blockage
- Inspection of gratings, joints and concrete surrounds for damage or misalignment
- Repair or replacement of damaged components as required
- Monitoring for evidence of ponding or reduced conveyance

8.9.10. Flow control devices and attenuation controls

- Routine inspection to ensure devices are free from silt, debris and obstructions
- Cleaning of flow control units to maintain design discharge rates
- Inspection of chambers housing flow controls for sediment accumulation
- Repair or replacement of damaged or malfunctioning components

9 FLOOD RISK MANAGEMENT MEASURES

9.1 BRIEF CONSIDERATIONS

9.1.1. Following a review of the flood risks to and arising from the Proposed Development, the following section discusses the mitigation measures necessary to ensure the Proposed Development remains safe over its lifetime and does not exacerbate flood risk to neighbouring property (including allowances for the effects of climate change).

9.2 MITIGATION MEASURES

9.2.1. Based on the assessment of flood risk provided in **Section 7**, mitigation measures have been outlined below to help mitigate flooding associated with the private drainage infrastructure, surface water and groundwater.

PRIVATE DRAINAGE INFRASTRUCTURE FLOOD MANAGEMENT

9.2.2. Regular maintenance of the private land drainage network to the north of the Site, including the culvert beneath the A61 Sheffield Road, will be required and should be undertaken by the relevant asset owner or other appropriate parties, subject to agreement responsibilities between landowners and Site operators.

9.2.3. The replacement of the septic tank by the SPS will eliminate the risk of future foul flooding on-site and in close proximity to the Site, by providing improved conveyance and resilience within the foul drainage system.

SURFACE WATER MANAGEMENT

9.2.4. The model indicates a residual flood risk during the 100-year event, including projected climate change impacts, originating from the proposed drainage network at around SW1 manhole location. The anticipated overflow volume is approximately 0.1037 m^3. The proposed Site levels presented in the cross-sectional drawings in **Appendix B** indicate that the access road and the area around SW1 manhole will fall towards the SPS compound and the wet well. In the extreme events this volume will be captured by the SPS compound gully and directed into the wet well.

9.2.5. Consequently, any exceedance flows will be managed within the Site boundary, thereby eliminating offsite risks to third parties and ensuring uninterrupted operation of the SPS. The concept design will therefore comply with the SuDS Manual and National Standards for SuDS.

GROUNDWATER MANAGEMENT

9.2.6. To mitigate the risk of groundwater emergence, the following measures will be implemented. These will be mitigated by adherence to the design requirements specified by YW's Standard Details for Adoptable Pump Station Design and DCG's Sewerage Sector Guidance for adoptable pumping stations, as well as supplementary enhancements where existing guidance does not provide explicit direction. These will include the following:

- Access road construction will be designed with a stable capping layer and subbase capable of tolerating elevated moisture, with suitable edge or lateral drainage to divert groundwater.
- The SPS structure will incorporate waterproofing measures compliant with YW requirements, including sealed ducts and penetrations, protective internal/external coatings, and structural

measures such as a reinforced base or increased foundation mass to resist buoyancy under high groundwater conditions.

- Groundwater sump pumps will be provided where necessary to remove any seepage into ancillary chambers or dry-well areas.
- Electrical and control equipment will be installed on raised plinths within watertight kiosks in accordance with YW Standard Details, with sealed ducts and raised or gasketed access covers to limit water ingress.

9.3 SAFE ACCESS AND EGRESS

9.3.1. Primary vehicular access to the Proposed Development will be provided via Balk Farm Court, which connects to the A61 Sheffield Road, located to the west of the Site. The designated access point lies within Flood Zone 1 and presents a minimal risk of fluvial flooding (less than 0.1% AEP). Therefore, both access and egress between the Site and A61 Sheffield Road will remain viable during all flood events up to a 1 in 1000-year (0.1% AEP) fluvial flood event.

9.3.2. The access road will incorporate permeable paving in the form of Grasscrete systems, with filter drains installed along both sides to effectively manage runoff from the embankment. These measures are designed to prevent flooding under the 1 in 100 flow event, including allowance for climate change, with any residual risk managed within the Site.

10 CONCLUSIONS

10.1.1. The following conclusions have been made following the assessment:

Flood Risk Assessment

10.1.2. The assessment of flood risk confirms that the Proposed Development at Balk Farm Court is located within Flood Zone 1 and is therefore at low risk from fluvial flooding.

10.1.3. Review of the available mapping, site-specific investigations and consultation with statutory bodies indicate negligible to low risk from the following sources: rivers and sea, surface water, canals, reservoirs, public sewers and highway drainage networks.

10.1.4. There is a medium risk from the private combined drainage infrastructure and the new field drainage network, as well as groundwater emergence.

10.1.5. Measures to address flood risks from private drainage and groundwater emergence include:

- Raising the SPS by 1.2–1.8 meters above ground to guard against flooding or surcharging from surrounding drainage systems, as included in the current SPS design;
- Regular maintenance for both new and existing drainage infrastructure including the field drainage network and culvert under the A61, to maintain their capacity and prevent water from backing up towards the Site.
- Groundwater risks should be mitigated through YW/DCG-compliant design for adoptable pumping stations including waterproofing and protected kiosk design, constructing anti-floatation foundations and wet well design, sealing all penetrations, engineering the road sub-base and installing sump pumps if required.
- Access to the Site will remain safe during extreme flood events, with permeable paving and filter drains ensuring effective management of runoff.

10.1.6. This FRA demonstrates that the Proposed Development will not increase flood risk elsewhere and satisfies the requirements of the Sequential Test. The Exception Test is not required.

Surface Water Drainage

- The proposed SWDS demonstrates that surface water runoff from the development can be managed sustainably, with discharge rates limited to greenfield conditions and appropriate climate change allowances incorporated.
- The drainage strategy utilises SuDS features, including filter drains and permeable paving which is compliant with the NPPF and National Standards for SuDS.
- The SWDS proposes to discharge surface water flows to a newly constructed field drainage network adjacent to the Site, which has been deemed the most sustainable and practical option for surface water disposal.
- Drainage modelling confirms that the drainage network will operate within its design capacity for all relevant storm events with residual flood risk managed onsite.

- The SWDS has been developed in accordance with national and local standards, and all technical requirements have been addressed.
- The SWDS should be reviewed by the LLFA and is subject to their formal approval.

Compliance with Standards and Priorities

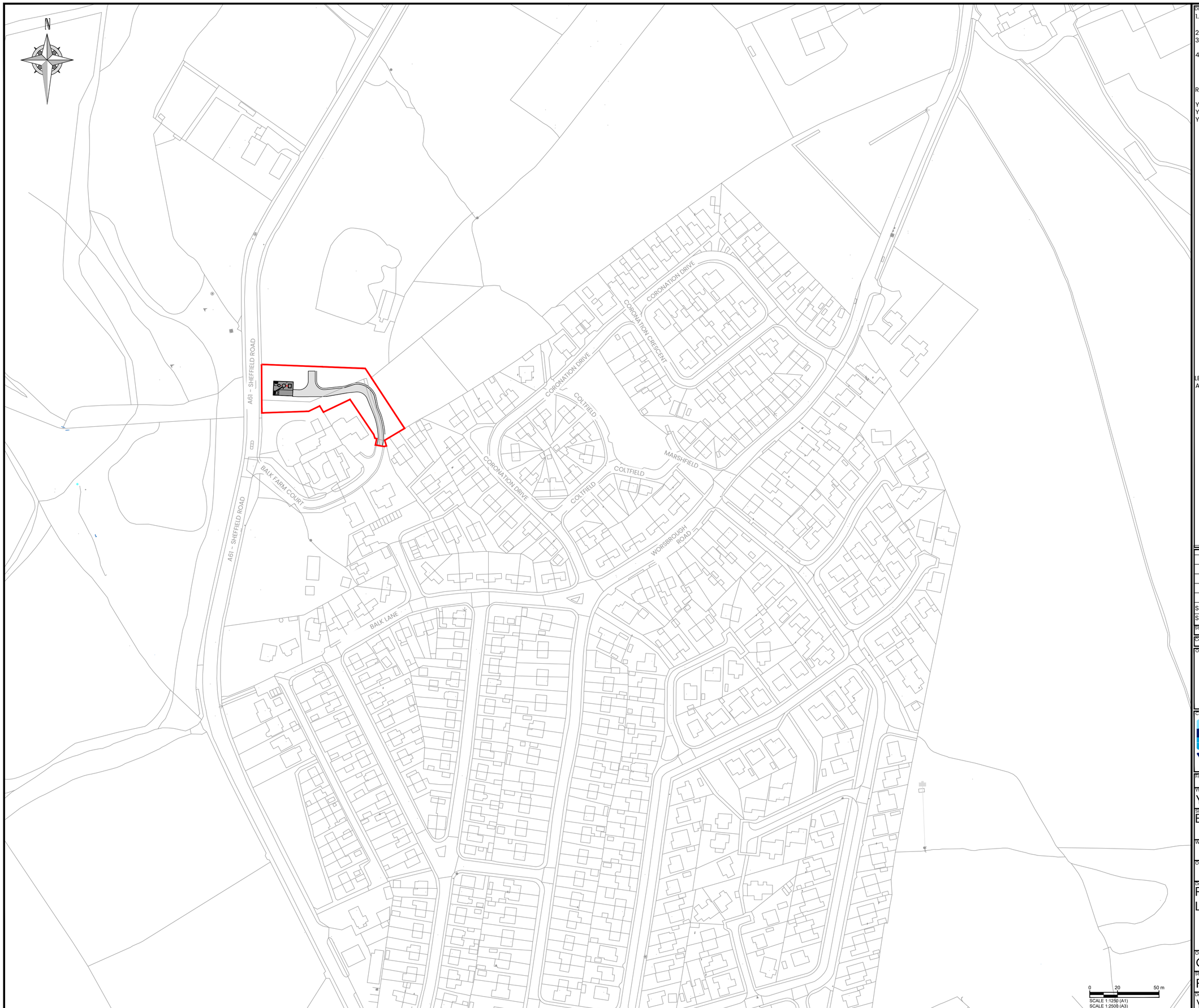
- Destination of Runoff: Surface water will be managed through SuDS features in the form of a filter drains system and permeable paving in the form of Grasscrete in accordance with the drainage hierarchy.
- Quality: The SWDS incorporates SuDS to improve water quality and meet the National Standards for SuDS.
- Quantity: The proposed discharge rate is limited to greenfield conditions and all volumes will be managed within the Site for all events including allowance for climate change allowances, which complies with national and local requirements.
- Biodiversity and Amenity: Grass paving solution will offer biodiversity benefits while enhancing overall Site amenity through its visual appearance.

10.1.7. Further stages of detailed design may be required following LLFA feedback and as part of the planning process.

10.1.8. In summary, the assessment confirms that the Proposed Development will remain safe for its lifetime, will not increase flood risk elsewhere, and meets all relevant planning and technical requirements for flood risk and drainage. The strategy provides a robust framework for managing flood risk and surface water sustainably, thereby, supporting the delivery of the Proposed Development.

Appendix A

SITE LOCATION PLAN



DISCLAIMERS & NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETERS (mm) AND ALL LEVELS ARE IN METERES ABOVE ORDNANCE DATUM (mAOD) UNLESS OTHERWISE STATED.
2. DO NOT SCALE FROM DRAWING.
3. MAPPING IS BASED UPON ORDINANCE SURVEY AND PRODUCED ON BEHALF OF YORKSHIRE WATER.
4. RED LINE DENOTES STRUCTURES THAT REQUIRE PLANNING APPLICATION AND ACCESS TO THESE STRUCTURES.

REFERENCE DRAWINGS:

YW.205642-GAL-WTN-NCS-DR-Z-0101 - PLANNING DRAWING -BLOCK PLAN
YW.205642-GAL-WTN-NCS-DR-Z-0102 - PLANNING DRAWING - ELEVATIONS
YW.205642-GAL-WTN-NCS-DR-Z-0103 - PLANNING DRAWING - SECTIONS

LEGEND:
AREA REQUIRED FOR PROPOSED WORKS (0.31 Ha)

Status.Rev:	Description:	DB:	CB:	AB:	Output Date:
S3.P02	FOR REVIEW AND COMMENT	AD	CH	KR	05/09/25
S5.P01	ISSUED FOR CLIENT REVIEW	NC	GvD	KR	13/08/25

Construction Date: CONSTRUCTION COMPLETE DATE?

Originator / Partner / OEM Ref:

GallifordTry

Our five Life Saving Rules

Client:

YorkshireWater

Yorkshire Water Services Ltd
Western House,
Western Way,
Halifax Road,
Bradford,
BD6 2SZ

Framework: AMP8 WASTE SOLUTIONS
Work Stream: INFRASTUCTURE
YW Batch ID / Project Code: YW.205642
YW Solution ID: 446065
Site: BALK FARM COURT S101A
What three words: CHAIR - BRAVE - TONE
OS Grid Reference: E434411, N402205
DAZ or DMA References: 303
Drawing Title: PLANNING DRAWING - LOCATION PLAN

Original Design / OEM Reference:	Size:	Scale:
GALLIFORD TRY	A1	1:1250
Status Description:	Status:	Revision:
FOR REVIEW AND COMMENT	S3	P02

Drawing Number: YW.205642 GAL WTN NCS DR Z 0100

Appendix B

DEVELOPMENT MASTERPLAN

N

NEW DRAIN TO TIE-IN WITHIN EXISTING LAND DRAINAGE

FILTER DRAIN

NEW VALVE CHAMBER

NEW WET WELL

NEW 2.2x0.5m STORAGE KIOSK

NEW INLET MANHOLE MH05

NEW 2.2x0.5 MCC KIOSK

PROPOSED BURIED PIPEWORK

A61 - SHEFFIELD ROAD

NEW GULLY

NEW 14x10 SLAB

D 0022

B 0022

A 0022

C 0022

E 0022

PROPOSED FILTER DRAIN ALONG ACCESS ROAD

1m EASEMENT ZONE

4.7m

PROPOSED FILTER DRAIN ALONG ACCESS ROAD

FARMHOUSE

PLOT 3

PLOT 4

BARN

BALK FARM COURT

HORSE PADDOCKS

PROPOSED BURIED PIPEWORK

TRACK

5m

NEW AIR VALVE

EXISTING FIELD GATE

Z030 C

0 5 10 m

SCALE 1:200 (A1)
SCALE 1:400 (A3)

DISCLAIMERS & NOTES:

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2. DO NOT SCALE FROM DRAWING.
3. MAPPING IS BASED ON ORDINANCE SURVEY (OS) MAP AND IS PRODUCED ON BEHALF OF YORKSHIRE WATER.

REFERENCE DRAWINGS:

YW.205642-GAL-WTN-NCS-DR-Z-0100 - PLANNING DRAWING -LOCATION PLAN
YW.205642-GAL-WTN-NCS-DR-Z-0102 - PLANNING DRAWING - SECTIONS
YW.205642-GAL-WTN-NCS-DR-Z-0103 - PLANNING DRAWING - ELEVATIONS

LEGEND:
NEW BURIED PIPEWORK
MANHOLE CHAMBER
CHAMBER
APPLICATION BOUNDARY

BOUNDARY AREA = 0.31ha

ACCESS TRACK
TREES
DENSE VEGETATION
HEDGES
PUBLIC RIGHT OF WAY

S3.P01	FOR REVIEW AND COMMENT	AD	CH	KR	05/09/25
Status.Rev:	Description:	DB:	CB:	AB:	Output Date:

Construction Date:

Originator / Partner / OEM Ref:

GallifordTry

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Work Stream: INFRASTRUCTURE
YW Batch ID / Project Code: YW.205642
YW Solution ID: 446065
Site: BALK FARM COURT S101A
What three words: CHAIR - BRAVE - TONE
OS Grid Reference: E434411, N402205
DAZ or DMA References: 303
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Original Design / OEM Reference: GALLIFORD TRY
Size: A1
Scale: 1:200
Status Description: FOR REVIEW AND COMMENT
Status: S3
Revision: P01
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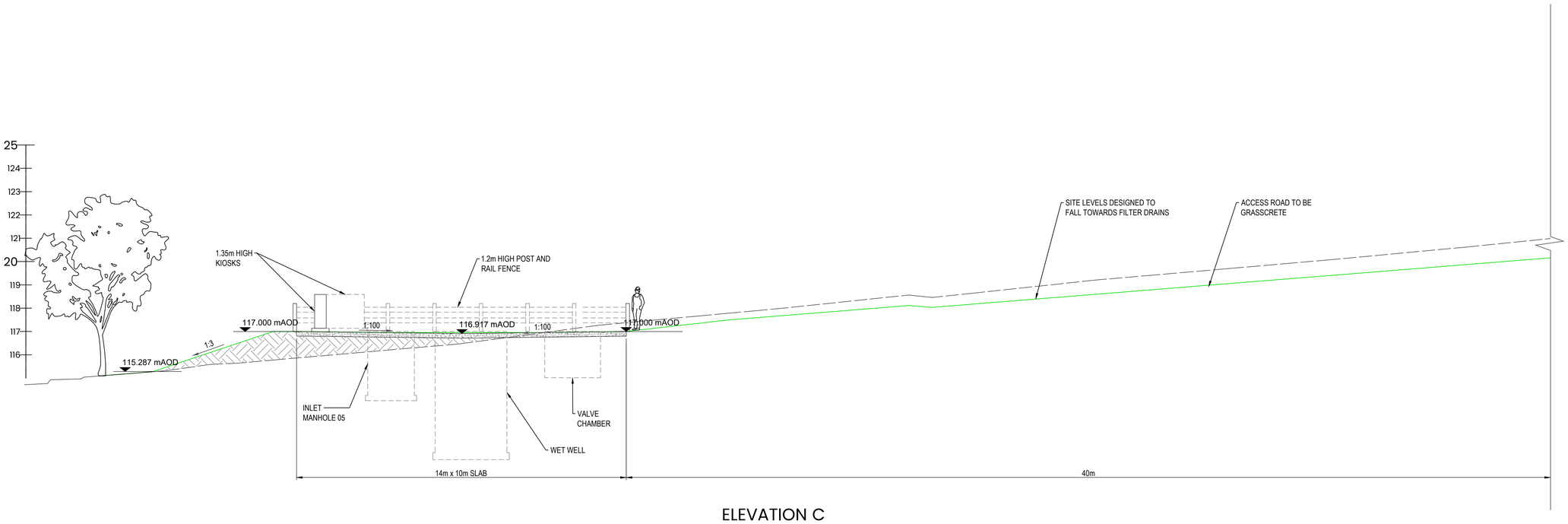

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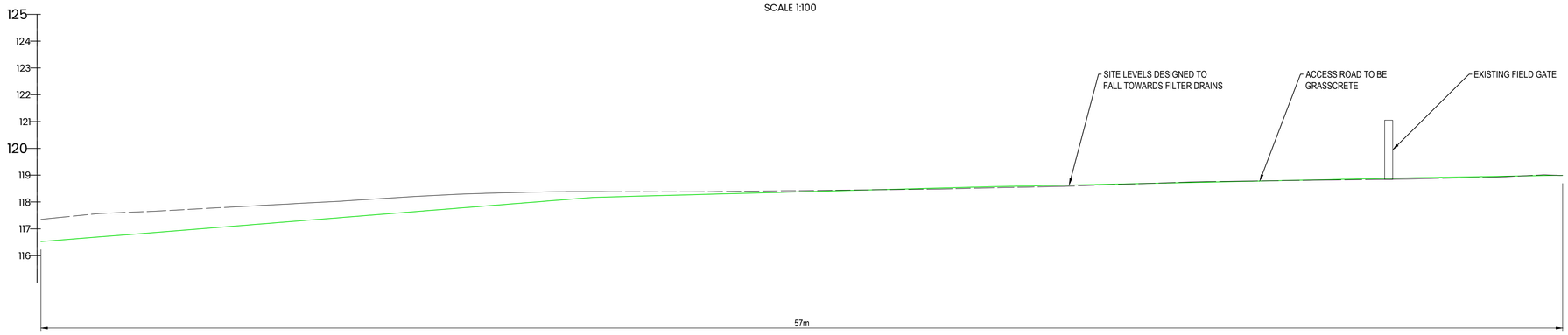
SCALE 1:100



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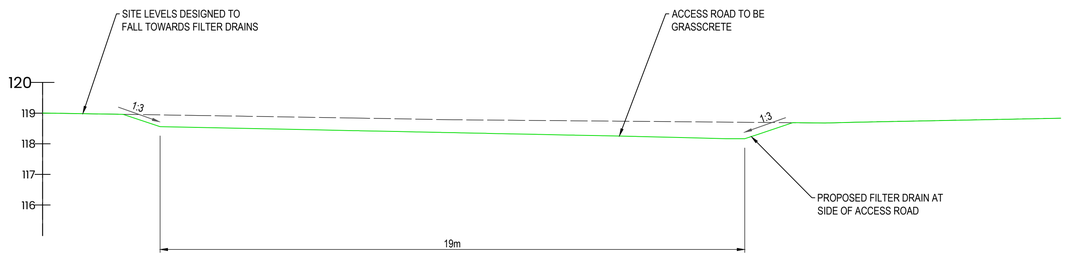

ELEVATION D
SCALE 1:100

0 2 5 m
SCALE 1:100 (A1)
SCALE 1:200 (A3)

DISCLAIMERS & NOTES:

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3. MAPPING IS BASED ON ORDINANCE SURVEY (OS) MAP AND IS PRODUCED ON BEHALF OF YORKSHIRE WATER.

REFERENCE DRAWINGS:

YW.205642-GAL-WTN-NCS-DR-Z-0100 - PLANNING DRAWING -LOCATION PLAN
YW.205642-GAL-WTN-NCS-DR-Z-0101 - PLANNING DRAWING -BLOCK PLAN
YW.205642-GAL-WTN-NCS-DR-Z-0103 - PLANNING DRAWING - SECTIONS

LEGEND:

EXISTING GROUND LEVEL

PROPOSED GROUND LEVEL

S3.P01	FOR REVIEW AND COMMENT	AD	CH	KR	05/09/25
Status.Rev:	Description:	DB:	CB:	AB:	Output Date:

Construction Date: CONSTRUCTION COMPLETE DATE?

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Site: BALK FARM COURT S101A

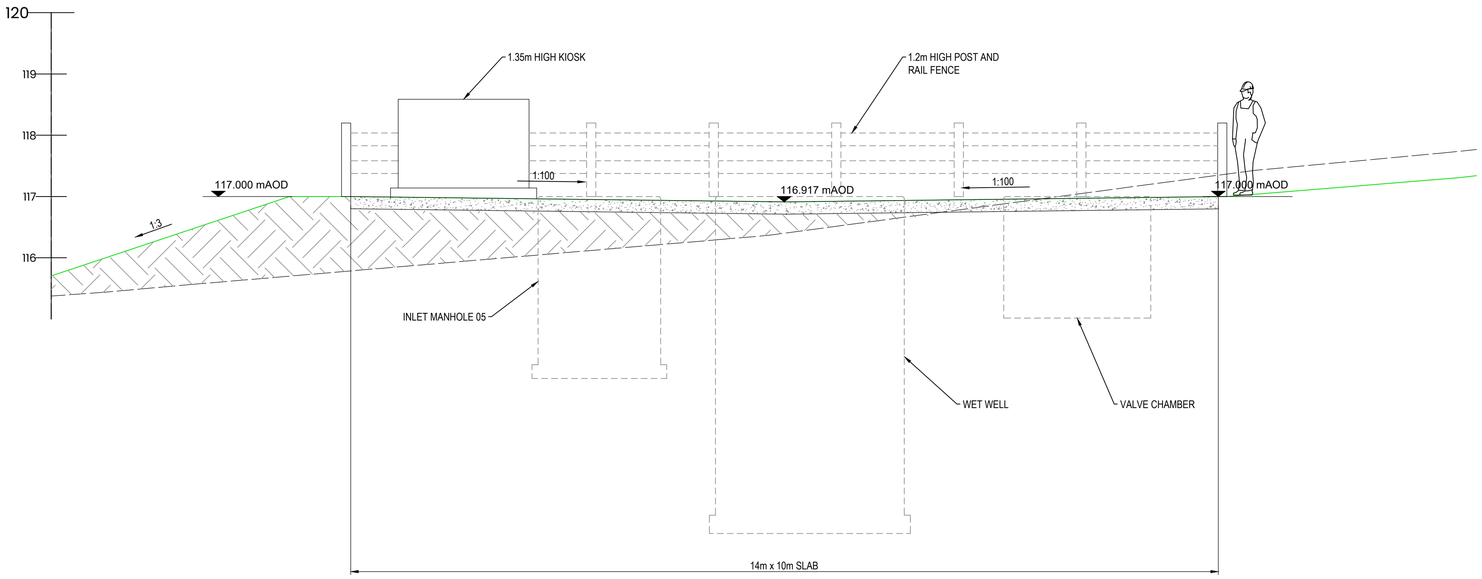
What three words: CHAIR - BRAVE - TONE

OS Grid Reference: E434411, N402205	DAZ or DMA References: 303

Drawing Title:
PLANNING DRAWING
ELEVATIONS

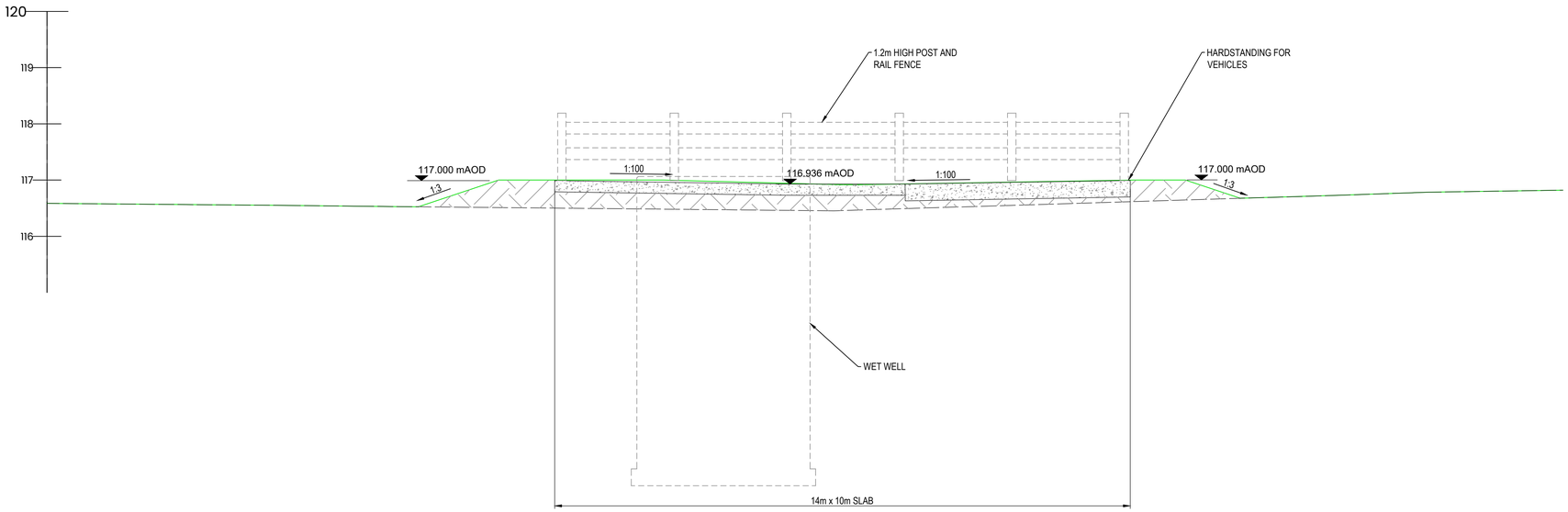
Original Design / OEM Reference: GALLIFORD TRY	Size: A1	Scale: 1:100
Status Description: FOR REVIEW AND COMMENT	Status: S3	Revision: P01

Drawing Number: YW205642 GAL WTN NCS DR Z 0102



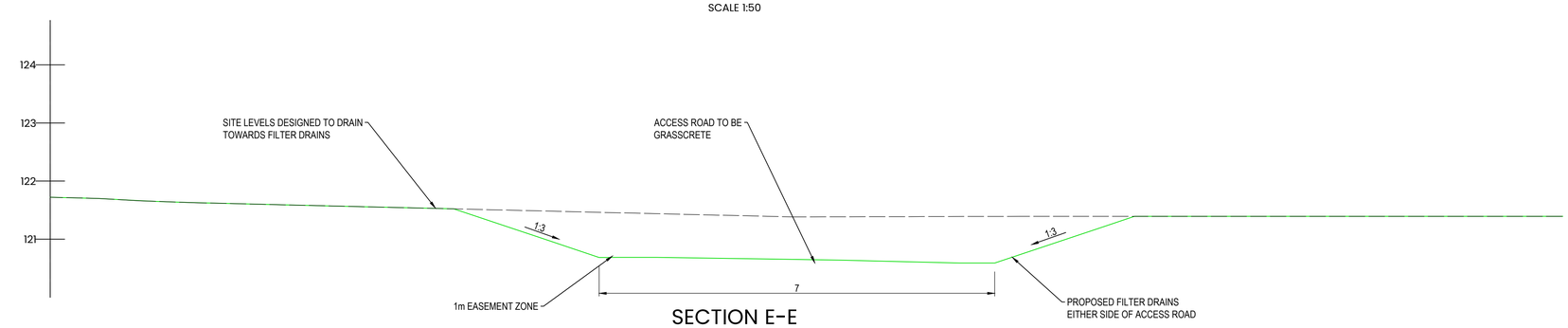
SECTION A-A

SCALE 1:50



SECTION B-B

SCALE 1:50



SECTION E-E

SCALE 1:50

0 1 2 m

SCALE 1:50 (A1)
SCALE 1:100 (A3)

DISCLAIMERS & NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETERS (mm) AND ALL LEVELS ARE IN METERES ABOVE ORDNANCE DATUM (mAOD) UNLESS OTHERWISE STATED.
2. DO NOT SCALE FROM DRAWING.
3. MAPPING IS BASED ON ORDINANCE SURVEY (OS) MAP AND IS PRODUCED ON BEHALF OF YORKSHIRE WATER.

REFERENCE DRAWINGS:

YW.205642-GAL-WTN-NCS-DR-Z-0100 - PLANNING DRAWING -LOCATION PLAN
YW.205642-GAL-WTN-NCS-DR-Z-0101 - PLANNING DRAWING -BLOCK PLAN
YW.205642-GAL-WTN-NCS-DR-Z-0102 - PLANNING DRAWING - ELEVATIONS

LEGEND:

EXISTING GROUND LEVEL

PROPOSED GROUND LEVEL

S3.P01	FOR REVIEW AND COMMENT	AD	CH	KR	05/09/25
Status.Rev:	Description:	DB:	CB:	AB:	Output Date:

Construction Date: CONSTRUCTION COMPLETE DATE?

Originator / Partner / OEM Ref:

Our five Life Saving Rules

Client:

Yorkshire Water Services Ltd
Western House,
Western Way,
Halifax Road,
Bradford,
BD6 2SZ

Framework: AMP6 WASTE SOLUTIONS

Work Stream: INFRASTRUCTURE

YW Batch ID / Project Code: YW.205642

YW Solution ID: 446065

Site: BALK FARM COURT S101A

What three words: CHAIR - BRAVE - TONE

OS Grid Reference: E434411, N402205

DAZ or DMA References: 303

Drawing Title: PLANNING DRAWING SECTIONS

Original Design / OEM Reference: GALLIFORD TRY

Size: A1

Scale: 1:50

Status Description: FOR REVIEW AND COMMENT

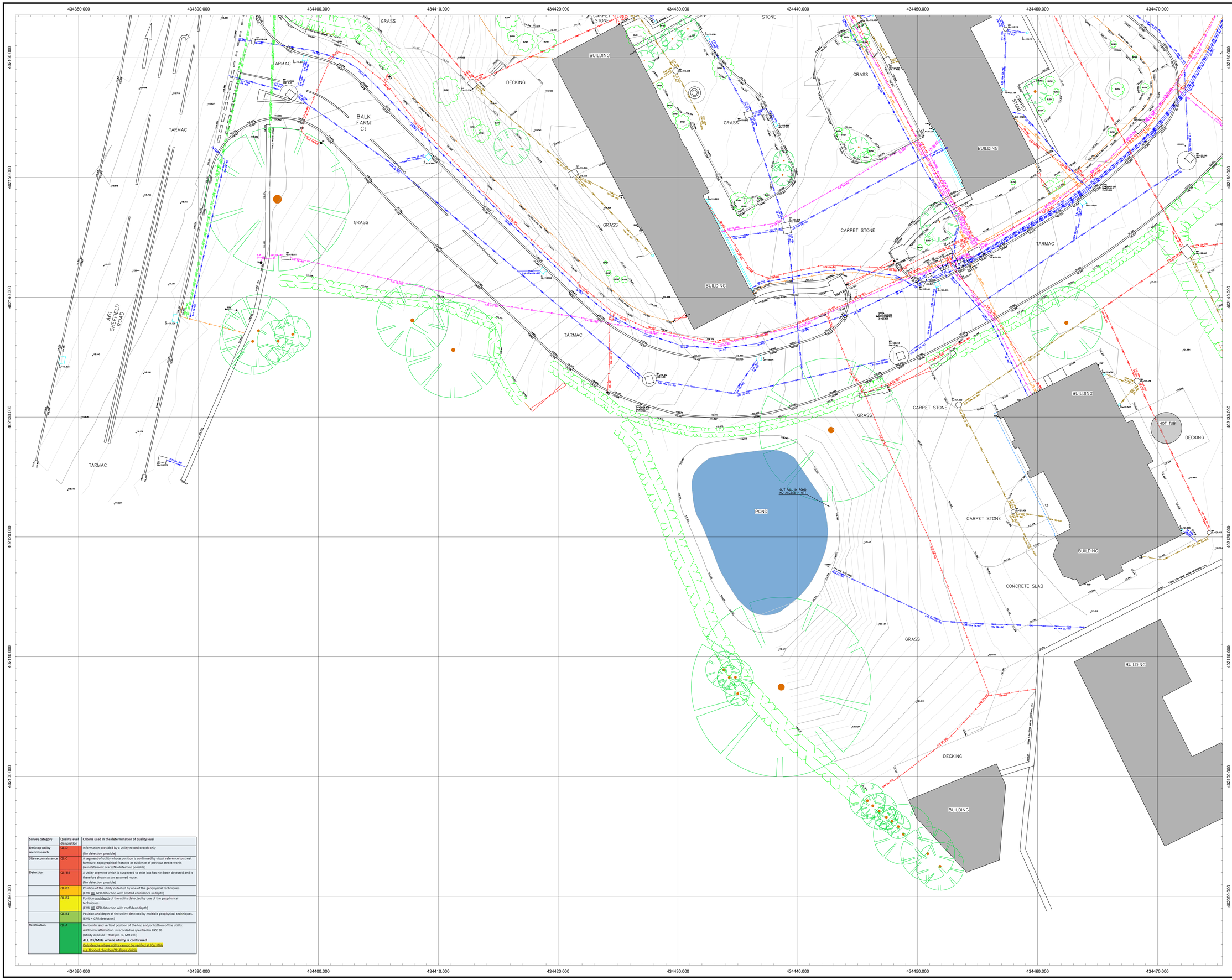
Status: S3

Revision: P01

Drawing Number: YW205642 GAL WTN NCS DR Z 0103

Appendix C

SITE INFORMATION



Survey category	Quality level designation	Criteria used in the determination of quality level
Desktop utility record search	QL-D	Information provided by a utility record search only (No detection possible)
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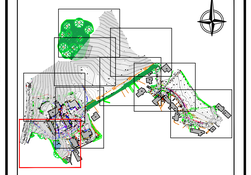
SHEET LAYOUT



TOPOGRAPHIC ABBREVIATIONS

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BK	Brick	MH	Man Hole
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IL	Invert Level	WM	Water Meter
IR	Iron Rail	WO	Wash Out
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LB	Litter Bin		

TOPOGRAPHIC LEGEND

- Gate
- Fenceline
- Building/Wall
- Concrete
- Kerb
- Bottom of Bank
- Top of Bank
- Hard/Hard Surface Change
- Hard/Soft Surface Change
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- Vegetative Border
- Overhead Canopy
- Building Canopy
- OHL — Overhead Power Line
- OHTL — Overhead Telecom Line
- Railing
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- Bore Hole
- Tree
- Bush

UTILITY ABBREVIATIONS

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B/D	Back Drop	N/P	No Visible Pipe
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D.T.B	Depth to Bottom	S/A	Soakaway
D.T.L	Depth to Landing	T/R	Taken From Records
D.T.S	Depth to Silt	T.L.S	Traffic Light Sensor
D.T.W	Depth to Water	U/K/B	Unobtainable
E/S	End of Sonde	U/L	Unable to Lift
E/O/T	End of Trace	U/T/S	Unable to Sonde
E/U/D	Empty Utility Duct	U/T/T	Unable to Trace

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- VM — Virgin Media
- PMS — Pumped Sewer Main
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- U-P — Unknown - Pipe
- U-R — Unknown - Radio
- U-I — Unknown - Induction
- GPR — Unknown - GPR
- SE — Survey Extent
- Chamber Extent
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Rev	Details	Name	Date

Client:

GALLIFORD TRY

Project:

BALK FARM

Title:

Topographic & Utility Survey
(Sheet 1 of 9)

Surveyed: AB - MS	CAD: MS
Checked by: ABR	Approved by: JT
Date: 24/02/2025	Scale: 1:100@A0

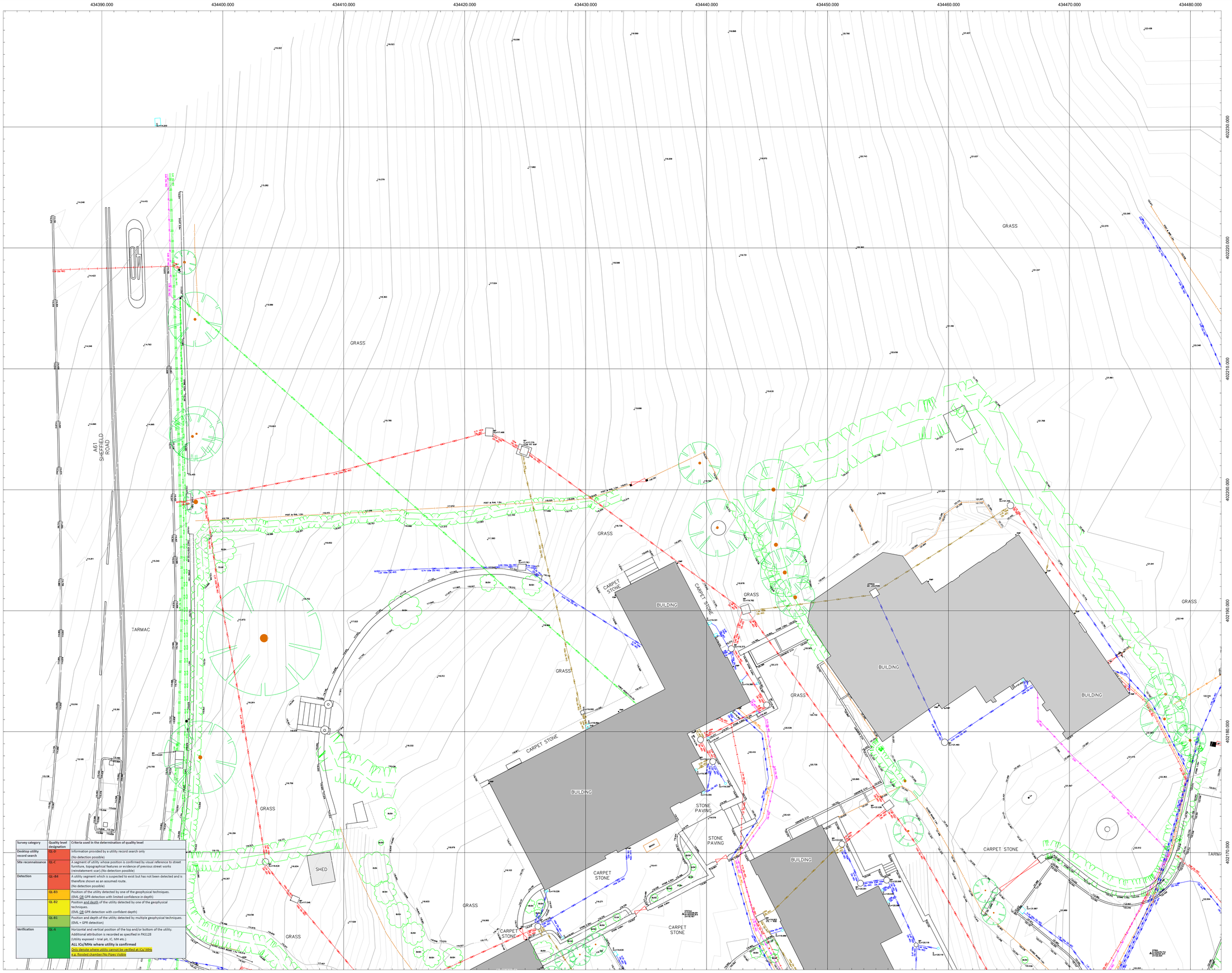
CLOUD CONVERSION

Unit 9, Phase 2, Spring Park
Clayburn Road, Barnsley
South Yorkshire,
S72 7FD

T: 01226 447239
W: www.cloud-conversion.com
M: enquiries@cloud-conversion.com
Company Number: 08240326
VAT Reg No: 261066033

No. CCG-456920

Rev: P01



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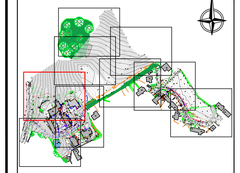

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CAB	Cabinet	P&W	Post & Wire
CB	Closed Board	PPL	Parapet Level
CCTV	Closed Circuit Television	RE	Rodding Eye
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E/OS	End of Sonde	U/TL	Unable to Lift
E/O/T	End of Trace	U/TS	Unable to Sonde
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Rev	Details	Name	Date

Client:

GALLIFORD TRY

Project:

BALK FARM

Title:

Topographic & Utility Survey
(Sheet 2 of 9)

Surveyed:	AB - MS	CAD:	MS
Checked by:	ABR	Approved by:	JT
Date:	24/02/2025	Scale:	1:100@A0

CLOUD CONVERSION

Unit 9, Phase 2, Spring Park
Clayburn Road, Barnsley
South Yorkshire,
S72 7FD

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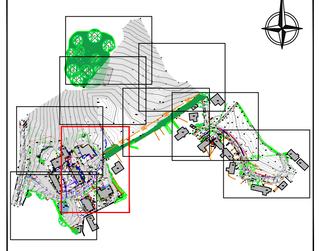
W: www.cloud-conversion.com
M: enquiries@cloud-conversion.com
Company Number: 08240326
VAT Reg No: 261066033

No. CCG-456920

Rev: P01

SHEET LAYOUT



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Client: GALLIFORD TRY

Project: BALK FARM

Title: Topographic & Utility Survey (Sheet 3 of 9)

Surveyed:	AB - MS	CAD:	MS
Checked by:	ABR	Approved by:	JT
Date:	24/02/2025	Scale:	1:100@A0

CLOUD CONVERSION
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434440.000 434450.000 434460.000 434470.000 434480.000 434490.000 434500.000 434510.000

402210.000 402200.000 402190.000 402180.000 402170.000 402160.000 402150.000 402140.000 402130.000 402120.000

BUILDING
GRASS
CARPET STONE
STONE PAVING
TARMAC
BALK FARM Ct
DECKING
HOT TUB
POND
OUT FALL IN POND NO ACCESS - UTT
EDGE OF WATER
STONE 1.45m FENCE ABOVE ADDITIONAL 1.4m

LAND DRAINAGE

SIZE	METRES
80mm DRAINS	
80mm DRAINS FILTER WRAPPED	
100mm DRAINS	
100mm DRAINS FILTER WRAPPED	
160mm DRAINS	320
160mm DRAINS FILTER WRAPPED	
200mm DRAINS	----
200mm DRAINS FILTER WRAPPED	
PERMEABLE FILL AS DIRECTED	
AVERAGE 30 CMS FROM GROUND	
LEVEL ON ALL DRAINS	
AS DIRECTED	320
APPROXIMATE TONNAGE	
AVERAGE DEPTH OF DRAINS	1.2m
SPACING OF DRAINS	
LEVELS ARE METRIC REDUCED	YES

PERMISSION TO OUTFALL INTO I.D.B. DRAIN IS THE RESPONSIBILITY OF THE CLIENT

Contractor:

LINCOLNSHIRE DRAINAGE CO LTD
FEN ROAD
FRAMPTON FEN
BOSTON, LINCS, PE20 1SD
TEL: 01205 311800

Drainage Designer:

LAND DRAINAGE SERVICES LTD.
TAYMAR
Hill Lane, Stickney
LINCOLNSHIRE, PE22 8BA
TEL: 07725 867821

Client:

For The attension of Mr J Close
C/o Galliford Try
Rotherham Yard & Office
Pawson Transport
Fieldhouses
Ashton Lane
Rotherham
S66 7RL

Rev	Date	Drawn	Description	Ch'k'd	App'd
A	03.10.25	NW	AS BUILT	GF	-
					-

PARISH: Birdwell
O.S. GRID REFERENCE: 434422 402263

WHAT 3 WORDS GRAVEL LOCATION REF: Select Organ Tower

Title: LAND DRAINAGE PROPOSAL PLAN

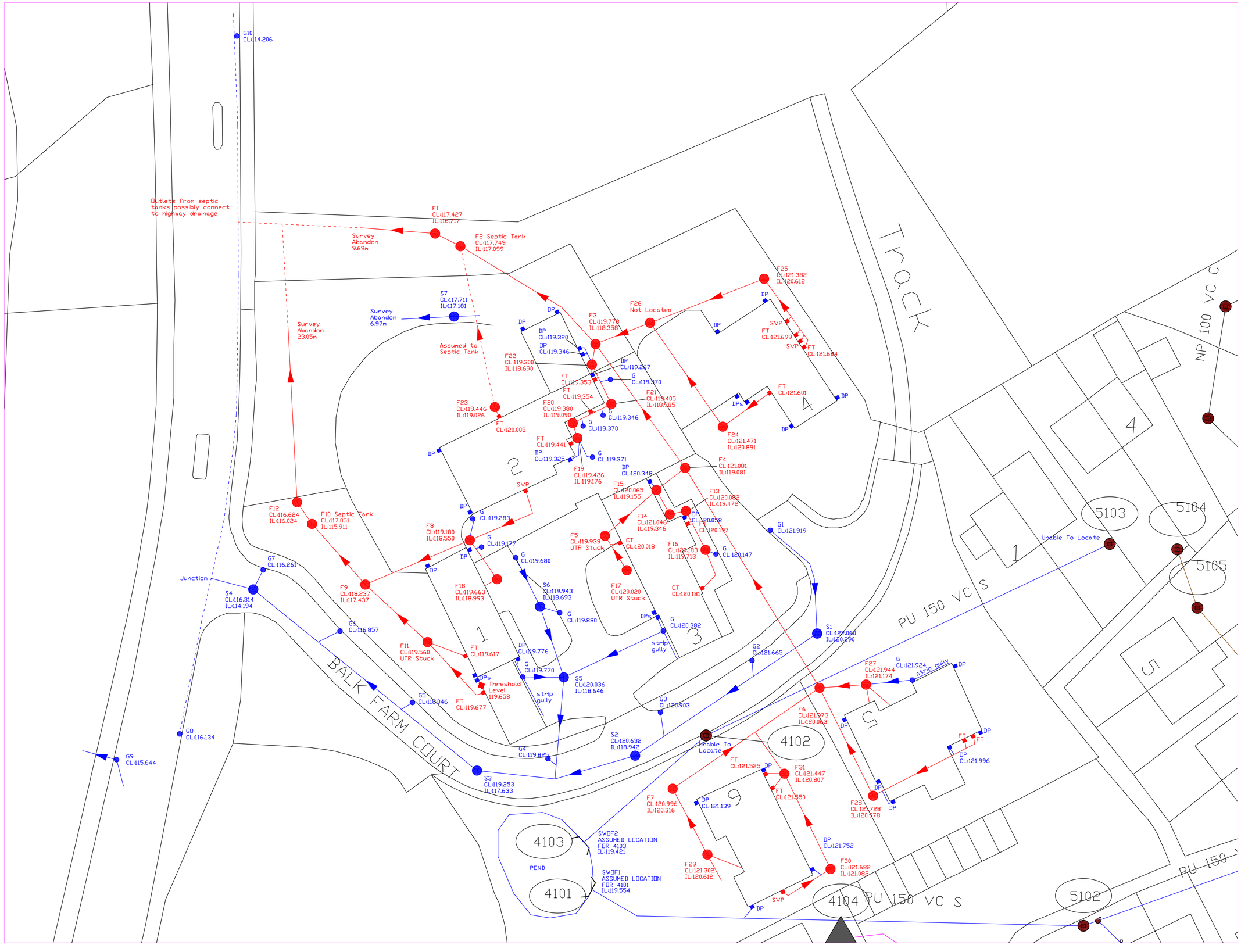
Drawn	NW
Checked	GF
Approved	-

Drawing No.: LDS 0886

Scale at A3: 1:2500

Ordnance Survey Licence Number 100040684

Rev	Status
A	AB



Legend:

- Surface Water Manhole
- Foul / Combined Manhole
- Road Gully
- Rainwater Down Pipe
- Soil Vent Pipe
- Foul Trap
- Combined Trap
- Threshold Level
- Surface Water Drain
- Surface Water Drain (assumed route)
- Combined Drain
- Combined Drain (assumed route)

DENE-TECH SERVICES LIMITED

Unit 10 Lymington Barn, Lymington Bottom Road
Medstead Nr Alton Hants GU34 5EW
Telephone No: 01420 562569

Client
Galliford Try - Water
Unit 2 Ripley Drive
Normanton
WF6 1QT

Drawing Title
Balk Farm Court
Birdwell, Barnsley
Connectivity Survey

Scale(s)	Surveyor
NTS	CL
Date: Feb 2025	Drawn: AP
Job Number: DT8512	Checked: EH

Sheet Size & Drg Number & Revision
A1 DT8512/BFC/001

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www.grangegeo.co.uk

Geotechnical & Environmental Specialists

6th March 2023,

For the attention of Matt Brown

Dear Matt,

Re: soakaway testing at land off Sheffield Road, Barnsley

The following investigation was carried out at the above location in accordance with our quotation and emailed instruction from Matt Brown of Galliford Try Ltd to proceed. Initial background information for the site indicated the site to be directly underlain by the solid geology of the Pennine Middle Coal Measures.

Site Works

The purpose of the investigation was to undertake percolation tests to assess the suitability of the ground for a septic tank or package treatment plant. The works were undertaken in accordance with the method set out in BS6297:2007.

The appended drawing (R23029-DWG2) illustrates the position of the 4 test pits, which were excavated on 03/03/2023 to depths of 0.95m to 1.05 mbgl (metres below ground level). The trial pits were found to comprise topsoil or made ground at the surface, underlain by a layer of clay, which was in turn underlain by the solid geology of the Pennine Middle Coal Measures.

In accordance with BS6297:2007 the 4 trial pits were excavated 300mm square to depths of 0.95 to 1.05m bgl. The local soil was then saturated by filling each hole to a depth of around 500mm. As the water did not drain completely within 6 hours in any of the trial pits it was deemed that the ground was not suitable.

Yours sincerely,

for **Grange GeoConsulting Ltd**

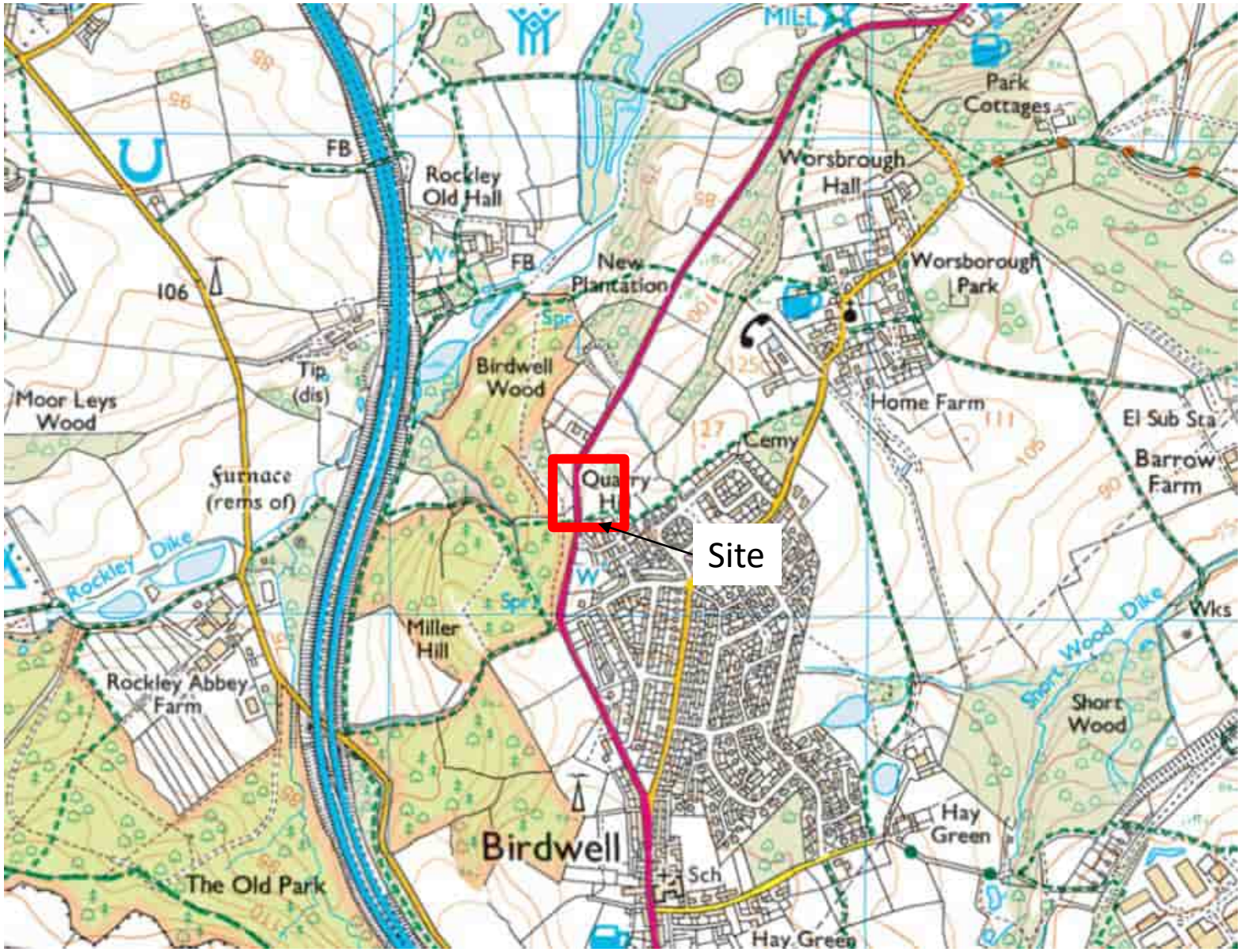
Andrew Hare

Andrew Hare
Director
MSc DIC FGS

APPENDICES

Appendix A

SITE LOCATION PLAN



Grange Geo	Site Location, Sheffield Rd, Barnsley	Client- Galliford Try Date- March 2023	North	Drawing- R23029-1

Appendix B

TRIAL PIT PHOTOGRAPHS

TP1 prior to testing

TP2 prior to testing

Grange Geo	Percolation Test Photos, Sheffield Road	Client- Galliford Try Date- March 2023		

TP1

TP1

Grange Geo	Percolation Test Photos, Sheffield Road	Client- Galliford Try Date- March 2023		

TP2

Grange Geo	Percolation Test Photos, Sheffield Road	Client- Galliford Try Date- March 2023		

TP3 filled with water

TP4 filled with water

Grange Geo	Percolation Test Photos, Sheffield Road	Client- Galliford Try Date- March 2023		

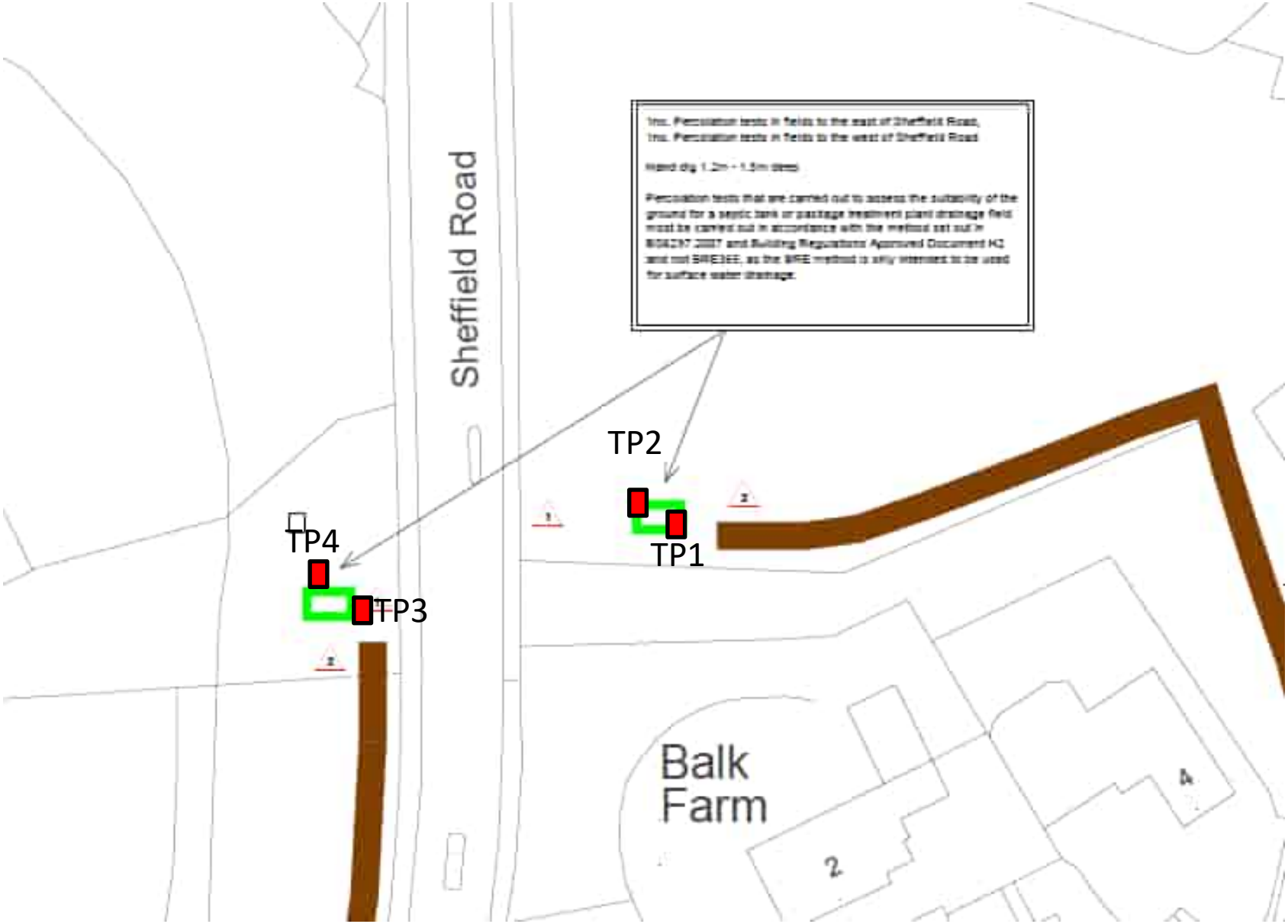
TP1 on completion

TP2 on completion

Grange Geo	Percolation Test Photos, Sheffield Road	Client- Galliford Try Date- March 2023		

Appendix C

GROUND INVESTIGATION PLAN, EXPLORATORY HOLE LOGS



Grange Geo	Percolation Test Locations, Sheffield Road	Client- Galliford Try Date- March 2023	North	Drawing- R23029-2

Trial Pit Log

TP No: 1

Client: Galliford Try

Sheet: 1 of 1

Project: Sheffield Road, Barnsley

Method: Hand excavation

Sample Depth (m)	Sample Type	S. Vane kN/m^2	Description	Depth mBGL	Legend
			Topsoil/Made Ground, dark brown, slightly sandy, slightly gravelly, CLAY. Gravels of Siltstone and rare brick.		
0.50			Firm, light brown and grey brown mottled, silty CLAY. (Weathered Pennine Middle Coal Measures)	0.50	
1.00			Weak, grey brown SILTSTONE. (Pennine Middle Coal Measures)	1.00	
			Refusal on bedrock.		
1.50				1.50	
2.00				2.00	
2.50				2.50	
3.00				3.00	

General Comments:

1. Pit walls stable.
2. No groundwater encountered.
3.

Date: 03/03/2023

Logged by: AH

Checked: AH

Job No: R23029

Grange Geo Consulting Ltd, 43 Winchilsea Avenue, Newark, NG24 4AD

Tel: 07773529385

Trial Pit Log

TP No: 2

Client: Galliford Try

Sheet: 1 of 1

Project: Sheffield Road, Barnsley

Method: Hand excavation

Sample Depth (m)	Sample Type	S. Vane kN/m^2	Description	Depth mBGL	Legend
			Topsoil/Made Ground, dark brown, slightly sandy, slightly gravelly, CLAY. Gravels of Siltstone and rare brick.		
0.50			Firm, light brown and grey brown mottled, silty CLAY. (Weathered Pennine Middle Coal Measures)	0.50	
1.00			Weak, grey brown SILTSTONE. (Pennine Middle Coal Measures)	1.00	
			Refusal at 1.05m bgl.		
1.50				1.50	
2.00				2.00	
2.50				2.50	
3.00				3.00	

General Comments:

1. Pit walls stable.
2. No groundwater encountered.
3.

Date: 03/03/2023

Logged by: AH

Checked: AH

Job No: R23029

Grange Geo Consulting Ltd, 43 Winchilsea Avenue, Newark, NG24 4AD

Tel: 07773529385

Trial Pit Log

TP No: 3

Client: Galliford Try

Sheet: 1 of 1

Project: Sheffield Road, Barnsley

Method: Hand excavation

Sample Depth (m)	Sample Type	S. Vane kN/m^2	Description	Depth mBGL	Legend
			Topsoil, dark brown, slightly sandy, slightly gravelly, CLAY. Gravels of Siltstone.		
0.50			Firm, light brown and grey brown mottled, silty CLAY with bands of weak Siltstone. (Weathered Pennine Middle Coal Measures)	0.50	
1.00			Refusal at 0.95m on Siltstone bedrock.	1.00	
1.50				1.50	
2.00				2.00	
2.50				2.50	
3.00				3.00	

General Comments:

1. Pit walls stable.
2. No groundwater encountered.
3.

Date: 03/03/2023

Logged by: AH

Checked: AH

Job No: R23029

Grange Geo Consulting Ltd, 43 Winchilsea Avenue, Newark, NG24 4AD

Tel: 07773529385

Trial Pit Log

TP No: 4

Client: Galliford Try

Sheet: 1 of 1

Project: Sheffield Road, Barnsley

Method: Hand excavation

Sample Depth (m)	Sample Type	S. Vane kN/m^2	Description	Depth mBGL	Legend
			Topsoil, dark brown, slightly sandy, slightly gravelly, CLAY. Gravels of Siltstone.		
0.50			Firm, light brown and grey brown mottled, silty CLAY with bands of weak Siltstone. (Weathered Pennine Middle Coal Measures)	0.50	
1.00			Refusal at 1.0m bgl on bedrock.	1.00	
1.50				1.50	
2.00				2.00	
2.50				2.50	
3.00				3.00	

General Comments:

1. Pit walls stable.
2. No groundwater encountered.
3.

Date: 03/03/2023

Logged by: AH

Checked: AH

Job No: R23029

Grange Geo Consulting Ltd, 43 Winchilsea Avenue, Newark, NG24 4AD

Tel: 07773529385

Appendix D

Percolation Testing

Results

Hole Number	Test Date	Test No.	Start Time	Finish Time	Hours	Minutes	Seconds	VP (s/mm)
TP1	03/03/2023	1	9.48	16.05	6.07	367	21,600	Ground not suitable
TP2	03/03/2023	1	10.11	16.11	6	360	21,600	Ground not suitable
TP3	03/03/2023	1	11.07	16.15	5.08	308	20,400	Ground not suitable
TP4	03/03/2023	1	11.07	16.15	5.08	308	20,400	Ground not suitable