



Land at Longsight Road

Balderstone

Blackburn BB2 7HZ

Proposed Residential Development

**Flood Risk Assessment
Surface Water Drainage Strategy
Foul Water Drainage Strategy**

For: Specialist Diesels Ltd.

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Environmental

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Civil

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1. **INTRODUCTION**

1.1 Integra Consulting has been commissioned by Specialist Diesels Ltd to undertake a Flood Risk Assessment (FRA) & Outline Drainage Strategy for the site at Longsight Road, Balderstone BB2 7HZ. This report has been prepared to accompany the outline planning application with all matters reserved for a low-rise residential housing development (refer to Appendix 4 for details).

1.2 The objective of the FRA is to identify potential flooding issues and any consequential implications on the proposed site development. Proposed surface water drainage for the development site is also considered.

1.3 The FRA has been undertaken in accordance with the pro-forma guidance contained in:

- Department for Communities and Local Government document 'National Planning Practice Guidance: Flood Risk and Coastal Change'
- DEFRA Flood Risk Assessments: Climate Change Allowances
- Ribble Catchment Flood Management Plan – Summary Report dated December 2009
- Ribble Valley Borough Council Strategic Flood Risk Assessment Level 1 dated April 2017
- DEFRA / Environment Agency publication SC030219 'Rainfall Runoff Management for Developments' dated October 2013.
- DEFRA Non-Statutory Technical Standards for Sustainable Drainage Systems.
- The SuDS Manual Ciria Report C753.

1.4 A foul water drainage strategy is also included.

1.5 To date, consultations have been undertaken with United Utilities.

2. STANDARDS AND LIMITATIONS

This report has been prepared solely for use by Specialist Diesels Limited.

It shall not be relied upon or transferred to any other party without the prior written permission of Integra Consulting.

The findings and opinions in the report are based on information derived from a variety of different sources. Integra Consulting do not accept any liability for the accuracy or otherwise of any information provided by third parties.

It should be noted that some of the aspects considered in this study may be subject to change with time. Therefore, if the development is delayed or postponed, consideration may need to be given to reviewing such issues to confirm that no changes have taken place, either at the site or within relevant legislation.

Further consultations with statutory bodies are likely as the scheme progresses. It should be noted that even where responses have been received from Regulators, these could be subject to change at a later date.

3. CURRENT SITUATION

3.1 Site Location and Description

The approximately 4.1-hectare site is located in Balderstone at National Grid reference 364555E, 431450N, approximately 1km northwest of Mellor and as shown on the site plans in Appendix 1.

Longsight Road forms the northwestern boundary to this greenfield site with open fields to the southwest and northeast and the tributary to the River Ribble extending along the southwestern site boundary flowing from northeast to southwest (refer to Appendix 3). This tributary is designated as ordinary watercourse and hence comes under the jurisdiction of Lancashire County Council Lead Local Flood Authority. The River Ribble itself lies approximately 3km north of the site.

The site broadly falls towards its western boundary / southwestern corner with levels varying from approximately 110.0m AOD in the centre of the site to approximately 105.7m AOD in the southwestern corner of the site adjacent to the tributary to the River Ribble (refer to Appendix 3 for details). The existing topographical survey drawings can be found in Appendix 2.

3.2 Flooding

Current Environment Agency flood data indicates the site to lie wholly within Flood Zone 1 and therefore above any 1 in 1000 year risk.

EA / DEFRA flood mapping indicates a minimal extent of surface water flooding with small areas of high-risk surface water flooding identified in the northern and southern boundary areas of the site. This presumably is shed from the higher central area of the site currently.

The Ribble Valley Borough Council Strategic Flood Risk Assessment Level 1 dated April 2017 confirms there is no evidence of groundwater flooding in the vicinity of the site.

EA / DEFRA flood mapping does not indicate any areas of the site at elevated risk of reservoir flooding.

Refer to Appendix 3 for maps and details.

3.3 Existing Drainage

The only adopted sewer infrastructure local to the site is a 150mm diameter combined rising main that crosses the site, broadly from northeast to southwest emanating from a sewage pumping station at Commons Lane approximately 500m north of the site (refer to Appendix 6 for details).

Following liaison with United Utilities through their formal pre application wastewater inquiry process it has been confirmed that the rising main has a 6m easement (3 metre either side of the centre line of the main) - refer to Appendix 6 for details.

4. PROPOSED DEVELOPMENT

4.1 Development Proposals

It is proposed to undertake the construction of a low-rise housing development that seeks to deliver up to 85 residential units with access from Longsight Road (refer to Appendix 4 for details).

4.2 Surface Water Drainage

The issue of surface water drainage to the proposed development has been considered with reference to the hierarchy of surface water disposal as noted in the Building Regulations H3:

- i) Sustainable Urban Drainage Systems (SUDS)
- ii) Discharge of surface water off site direct to watercourse
- iii) Discharge to adopted sewer

SUDS are made up of one or more structures built to manage surface water runoff. They are used in conjunction with good management of the site to prevent flooding and pollution. There are four general methods of control:

- Filter strips and swales
- Filter drains and permeable surfaces
- Infiltration devices
- Basins and Ponds

A review of the phase 1 ground investigation report for the site produced by Integra Consulting indicates that the site is underlain by Devensian till (predominantly boulder clay) drift deposits. On the basis of this review of the ground investigation records on the site, it is evident that the underlying soils at the site offer a low to very low permeability and as such soakaway

drainage design is unlikely to be viable. Local BGS boreholes indicate that the depth of this clay based till extends to at least 4 metres minimum below ground level at the northwestern site boundary. The presence of two on site ponds is further compelling evidence the shallow ground conditions are not suitable for post development soak away drainage. Refer to Appendix 5 for ground investigation references, full reports are included in the planning submission.

A tributary to the River Ribble extends along the southwestern site boundary and flows from northeast to southwest. This tributary is designated as “ordinary watercourse” and hence comes under the jurisdiction of Lancashire County Council Lead Local Flood Authority. On this basis it is evidently viable to discharge post development site surface water directly to the on-site tributary to the River Ribble adjacent to the southern point of the site boundary.

It is proposed to limit surface water flow rates from the development area to the equivalent pre-development greenfield run off rate Q_{bar} for all rainfall events at the site up to and including the 1 in 100 year event plus 50% climate change factor derived from the DEFRA climate change allowances web site (see Appendix 7). The discharge rate from the developed site area of 2.5 hectares is calculated to be 30 litres per second (refer to Appendix 8 for details). A pond structure has been indicated in order to provide the necessary on-site surface water storage capacity (refer to Appendix 4 for location details).

UK SuDS tool modelling has been undertaken for the development site in line with LLFA requirements including provision of details on proposed discharge rates, simulating storms through the whole drainage system, with results of critical storms demonstrating that any above-ground flooding for the 1 in 100 year storm is limited to areas designated and safe to flood away from buildings. These storms also include an allowance for climate change. It is noted that the critical storm duration for each element of the drainage network has been determined by considering a full range of summer and

winter storm durations from 15 minutes up to a 4 day (5760 minute) duration
- refer to Appendix 8 for details.

Accordingly, the estimated preliminary on site storage volume to cater for a 1 in 100 year plus 50% climate change event on a developed area of 2.5 hectares with a 70% / 30% split of hard and soft landscaped surfaces is approximately 1700 m³ (refer to Appendix 8 for details). Please note that this estimated figure is subject to finalisation of soil type following any further detailed ground investigation on infiltration rates.

The overland flow route plan in Appendix 9 indicates the direction of overland flow route through the residential site in an extreme event with flows to the southwest and southeast to the ordinary watercourse in line with the existing/proposed topography which will ultimately be intercepted by the existing network of ditches and watercourses.

Ultimately the final design of the drainage system will be subject to the finalised site arrangement, further targeted site investigation and subsequent development of a detailed drainage scheme.

The post development surface water drainage system will be designed to ensure that:

- Surface water flows up to a 1 in 100 year + 50% climate change event remain in onsite attenuation storage.
- Sufficient surface water storage and shallow ponding volume will be available to ensure there is no risk to property.
- Surface water flows up to 1 in 30 year also remain below ground and in the attenuation storage.

4.3 National Planning Policy Framework and Technical Guidance

The residential site development proposals are classed as 'More vulnerable' in Annex 3 of the National Planning Policy Framework.

'More vulnerable' developments in Flood Zone 1 are classed as appropriate according to Table 2 of the Flood Risk and Coastal Change guidance.

Proposed post development levels will be engineered in order to protect the development and not provide any increased flood risk elsewhere.

Types of flooding that could affect the site are:

River- the site predominantly lies in Flood Zone 1

Sea – there is no risk of flooding from the sea

Land – there are no undrained land slopes towards the site

Groundwater – there are no springs or weep areas on the site

Sewers – there have been no local reports of sewer surcharge

4.4 Strategic Flood Risk Assessment & EA Mapping Review

- From our review of the Ribble Valley Borough Council Strategic Flood Risk Assessment Level 1 dated April 2017, the site does not lie in a Critical Drainage Catchment.

There are no groundwater protection zones in the vicinity of the site and there is negligible residual fluvial risk. The site is not noted to lie within a flood warning area.

4.5 Safe Access and Egress

Safe access / egress from the site in extreme conditions will be via the entrance on Longsight Road.

4.6 Foul Water Drainage

Based on the United utilities requirements we would propose to discharge foul drainage from the post development site to the existing adopted 150mm diameter foul gravity drainage system on Albert Brow located to the North East of the proposed site (refer to Appendix 6 for UU plans and details).

The foul drainage network will naturally comply with the building regulations 2010 dash approved document H1 and the calculations proposed development foul water discharge will be based on sewers for adoption 8th edition.

5.0 SuDS DESIGN STATEMENT

5.1 SuDS Requirements

SuDS measures are required on the proposed development to comply with the National Planning Policy Framework (NPPF), DEFRA Non-Statutory Technical Standards for Sustainable Drainage Systems and the SuDS guidance in the SuDS Manual Ciria Report C753.

The key conceptual SUDS design criteria for the development are covered in Non-Statutory Technical Standards for Sustainable Drainage, under sections S1 to S9.

Peak Flow Control

S2 of the DEFRA Technical Standards notes that for greenfield developments, the peak runoff from the development for the 1 in 1 year and 1 in 100 year rainfall event should never exceed the peak greenfield runoff rate for the same rainfall event.

Volume Control

Requirement S4 or S6 are deemed applicable to the site, which stipulates that the runoff volume in the 1 in 100 year, 6 hour rainfall event should never exceed the greenfield runoff volume for the same event.

Flood Risk within the Development

S7 notes that the drainage system shall be designed such that no flooding shall occur on any part of the site during a 1 in 30 year storm event.

S8 requirement stipulates that during a 1 in 100 year enhanced rainfall event, no flooding of any building shall occur.

S9 also stipulates that site levels shall be designed such that flows which are as a result of rainfall events exceeding the 1 in 100 year enhanced rainfall

event, are managed in exceedance routes that minimise the risks to people and property.

In complying with the above standard for water quantity improvement measures, the design for a 1 in 100 year event will make due allowance for 50% climate change (see section 4.2 above).

Water Quality

In addition to the above measures contained within the DEFRA guidance addressing water quantity issues, designing for water quality is also a requirement of the on-site SUDS measures. Reference is made to CIRIA Report 'C753 – The SUDS Manual', specifically Chapters 4 and 26.

5.2 Proposed SUDS Methodology & Drainage Design Principles

As detailed in section 4.2, discharge of surface water direct to the ground in the form of infiltration measures is deemed unfeasible due to the underlying impermeability of the natural strata. Accordingly, controlled discharge to the Tributary to the River Ribble via an attenuation pond is the proposed method of surface water discharge.

Peak Flow Control

Flow from the proposed development site shall be limited to a greenfield runoff rate Q_{bar} of 30 litres per second for all events. This limiting surface water flow rate is derived from the www.uksuds.com Surface water storage volume estimation tool, as contained within Appendix 8.

Volume Control

The proposed Q_{bar} 30 litres per second discharge flow rate will apply for all flood events from the 1 in 1 year to the 1 in 100 year (enhanced) event. This is deemed to match the existing greenfield runoff volume for the same events hence complies with requirement S6.

Flood Risk within the Development

To cater for excess surface water runoff, the proposed method of attenuation on the site is to utilise a new storage pond in the southwestern area of the site with a downstream length of drain discharging site surface water into the Tributary to the River Ribble via a purpose constructed outfall structure.

The maximum storage depth in the proposed pond will be limited to 1.5m and the pond side slopes will be set to 1 in 3 in line with CIRIA Guidance in order to satisfactorily demonstrate that the risk created by flood water storage is low.

The site is to discharge post-development surface water into the 'SuDS pond' which in turn will discharge through a flow control chamber to limit the discharge to greenfield run off rates to Tributary to the River Ribble.

Appendix 8 contains calculations of an in-principle surface water storage volume of approximately 1700m³ for the development. It is proposed to accommodate the 1 in 100 year (enhanced) event storage volume within the storage pond. Accordingly, this will ensure that criteria S7 and S8 are met.

The overland flow route plan in Appendix 9 indicates the direction of overland flow route through the residential site in an extreme event with flows to the southwest and southeast to the ordinary watercourse in line with the existing/proposed topography which will ultimately be intercepted by the existing network of ditches and watercourses. This ensures that criteria S9 is met.

Water Quality

In assessing the level of treatment required to ensure sufficient water quality improvement prior to discharge to watercourse, reference is made to Chapter 26 of CIRIA C753 – The SuDS manual. Specifically, Table 26.2 details the pollution hazard indices for different site uses:

Based on the proposed development (the closest suitable development definition in Table 26.2 is a mix of ‘Residential Roofs’ and ‘Individual Property Driveways’), the pollution hazard level is noted as Very Low and ‘low’ respectively, with pollution hazard indices being: Total Suspended Solids 0.2-0.5, Metals 0.2-0.4, Hydrocarbons 0.05-0.4.

Land use	Pollution hazard level	Total suspended solids (TSS)	Metals	Hydrocarbons
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

As noted in the section 5.2, it is proposed to utilise a surface water storage pond in order to address water quantity and quality improvements on the site. With reference to Table 26.3, this details the mitigation indices for various SUDS measures:

It is noted that the pond achieves mitigation indices as follows: Total Suspended Solids 0.7, Metals 0.7, Hydrocarbons 0.5.

The mitigation indices for a pond in all three categories are therefore considered to greater than or equal to the respective pollution hazard indices for the site therefore the proposed system is considered satisfactory.

Accordingly, the proposed use of the storage pond is deemed to provide a sufficient level of treatment without the need for further SUDS measures being employed on the site. This is on the condition that the pond is designed and detailed in accordance with section 23 of CIRIA C753.

5.3 Management and Maintenance of SuDS Drainage System

The management and maintenance of the above noted SuDS measures to serve the proposed development will be undertaken by a maintenance management company to be appointed for the project. The appointment of the maintenance and management company is to be confirmed at the completion of the build phase. All parts of the drainage network are to be accessible and are to be constructed from materials that are suitable and robust for the lifetime of the development.

The maintenance activities required for the drainage network are as follows:

5.3.1 Pond

The maintenance for the pond is as follows:

Maintenance Schedule	Required action	Frequency
Regular maintenance	Remove litter and debris	Monthly
	Cut the grass	Monthly (during growing season)
	Inspect marginal and bankside vegetation and remove nuisance plants (for first three years)	Monthly (at start, then as required)
	Inspect inlet, outlet, banksides, structures, pipework etc for evidence of blockage and/or physical damage	Monthly
	Inspect water body for signs of poor water quality	Monthly (May-October)
	Inspect silt accumulation in the pond and establish appropriate removal frequencies	Six monthly
	Check any mechanical devices i.e. penstocks	Six monthly
	Hand cut submerged and emergent aquatic plants (at minimum of 0.1m above pond base; include max 25% of pond surface)	Annually
	Tidy all dead growth (scrub clearance) before start of growing season	Annually
Remedial actions	Repair erosion or other damage	As required
	Replant, where necessary	As required
	Aerate pond when signs of eutrophication are detected	As required
	Re-align rip-rap or repair other damage	As required
	Repair / re-habilitate inlet and outlet	As required

5.3.2 Flow Control

The maintenance for the flow control is as follows:

Operation	Frequency
Inspect and identify any areas that are not operating correctly, if required take remedial actions	Monthly for three months then at six monthly intervals
Debris removal from catchment surface (where it may cause risk to performance)	Monthly
Check control chamber for blockage or silt, algae or other matter by jetting	As required, but at least four times a year
Remove sediment from upstream drainage network and sediment from within manhole by jetting	As required, but at least twice a year
Repair / check all inlets and control mechanics	As required
Inspect / check all inlets and control mechanics to ensure that they are operating as designed	Twice a year as a minimum and after severe storm events

5.3.3 Flow Control Chamber Design Criteria

In addition to the above maintenance methods, the flow control chamber will be designed so it works effectively throughout the lifespan of the development and will have precautionary features to ensure maintenance work can be carried out promptly and efficiently to ensure no control failure which may otherwise subsequently lead to flooding.

Details of the flow control chamber are as follows:

- High Water Level Alarm: Alarm installed and directed to site maintenance team
- Spares: Control spares to be kept on site for efficient maintenance

5.3.4 Flood Routes

A visual monthly inspection of flood routes should be made in order to check that routes are not blocked by new fences, walls, soil or other rubbish with removal undertaken as necessary.

5.3.5 Spillage – Emergency Action

Most spillages on development sites are of compounds that do not pose a serious risk to the environment as they enter the drainage system in a slow and controlled manner with time available for natural breakdown in a treatment system. Therefore, small spillages of oil, milk or other known organic substances should be removed where possible using soak mats as recommend by the Environment Agency with residual spillage allowed to bio-remediate in the drainage system.

In the event of a serious spillage, either by volume or of unknown or toxic compounds, then the spillage should be isolated using soil, turf or fabric and outlet pipes from chambers downstream of the spillage blocked with bungs. Bungs for blocking pipes may be made by wrapping soil or turf in a plastic sheet or close woven fabric. The Environment Agency should be contacted immediately.

5.3.6 Linked and Further Maintenance

The maintenance of the drainage network and SuDS features is to be linked with the landscape maintenance plan for the proposed development.

5.3.7 Maintenance Activities

A log of all maintenance activities is to be kept and made available to the Local Planning Authority (LPA) and / or the Lead Local Flood Authority (LLFA) on request.

6. CONCLUSIONS

6.1 Flooding

Following review of the Environment Agency flood maps and data, it has been confirmed that the site lies wholly in Flood Zone 1.

There are to be no off-site surface water flood routes generated by the development during a climate change enhanced 1 in 100 year storm. All surface water run-off will remain on site in the 1 in 100 year + 50% climate change event and be contained in the proposed storm water attenuation pond.

6.2 Site Surface Water Drainage

Following the hierarchy of surface water discharge, it is proposed that post-development attenuated surface water from the development discharges to the on-site tributary to the River Ribble.

It is proposed to discharge all post-development surface water from the proposed areas of new build / hard surfaced external works at greenfield run off rates.

6.3 Flood Risk Management Measures

There will be a site management Health and Safety document prepared in respect of the site.

6.4 Off Site Impacts

All roofed and paved areas are to be drained into the site surface water drainage system. The design of the site surface water system will ensure that no off-site flood flows are generated by the proposed development in the 1% plus climate change event.

6.5 Residual Risk

With careful design of the drainage elements as described above, there will be no residual flood related risks remaining after the development has been completed.

The proposed building envelopes will naturally fully lie in Flood Zone 1.

A post-development safe emergency access can be maintained at all times during a flood event with emergency access from Longsight Road.

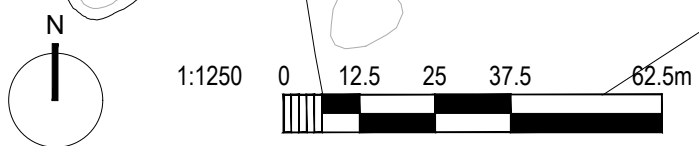
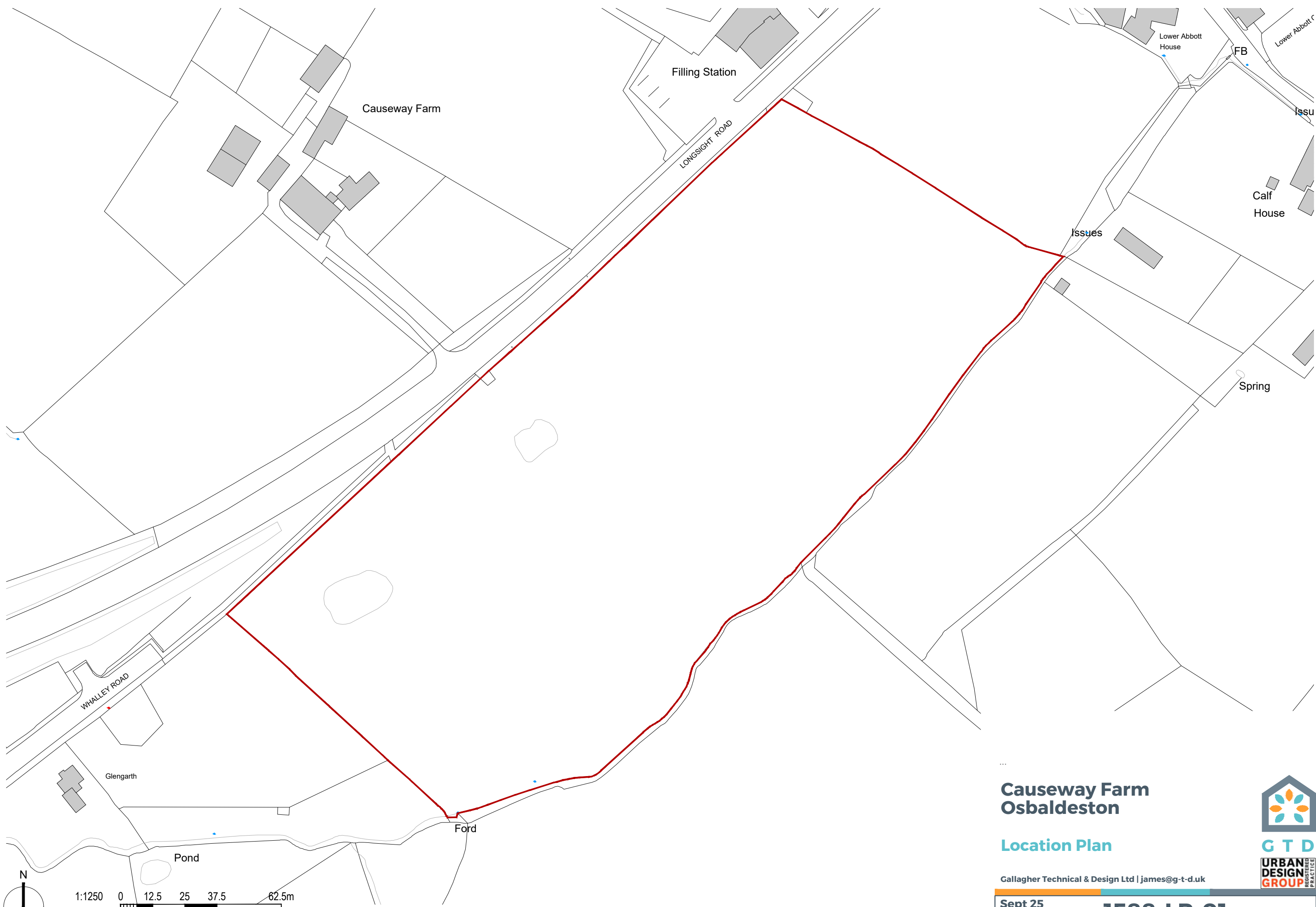
6.6 Foul Drainage

Based on United Utilities requirements, it is proposed to discharge foul drainage from the post-development site to the existing adopted 150mm diameter foul gravity drainage system on Abbot Brow located to the north east of the proposed site (refer to Appendix 6 for details).

APPENDICES

APPENDIX 1

SITE LOCATION PLAN



Causeway Farm Osbaldeston

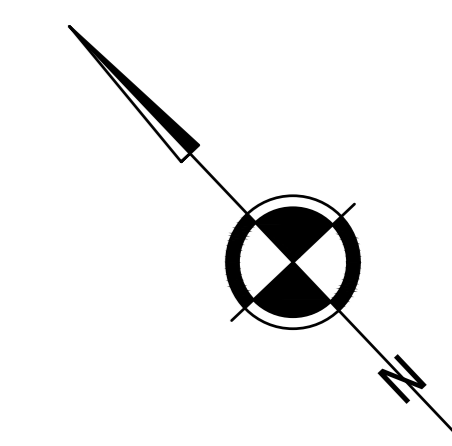
Location Plan

Gallagher Technical & Design Ltd | james@g-t-d.uk



APPENDIX 2

TOPOGRAPHICAL SURVEY



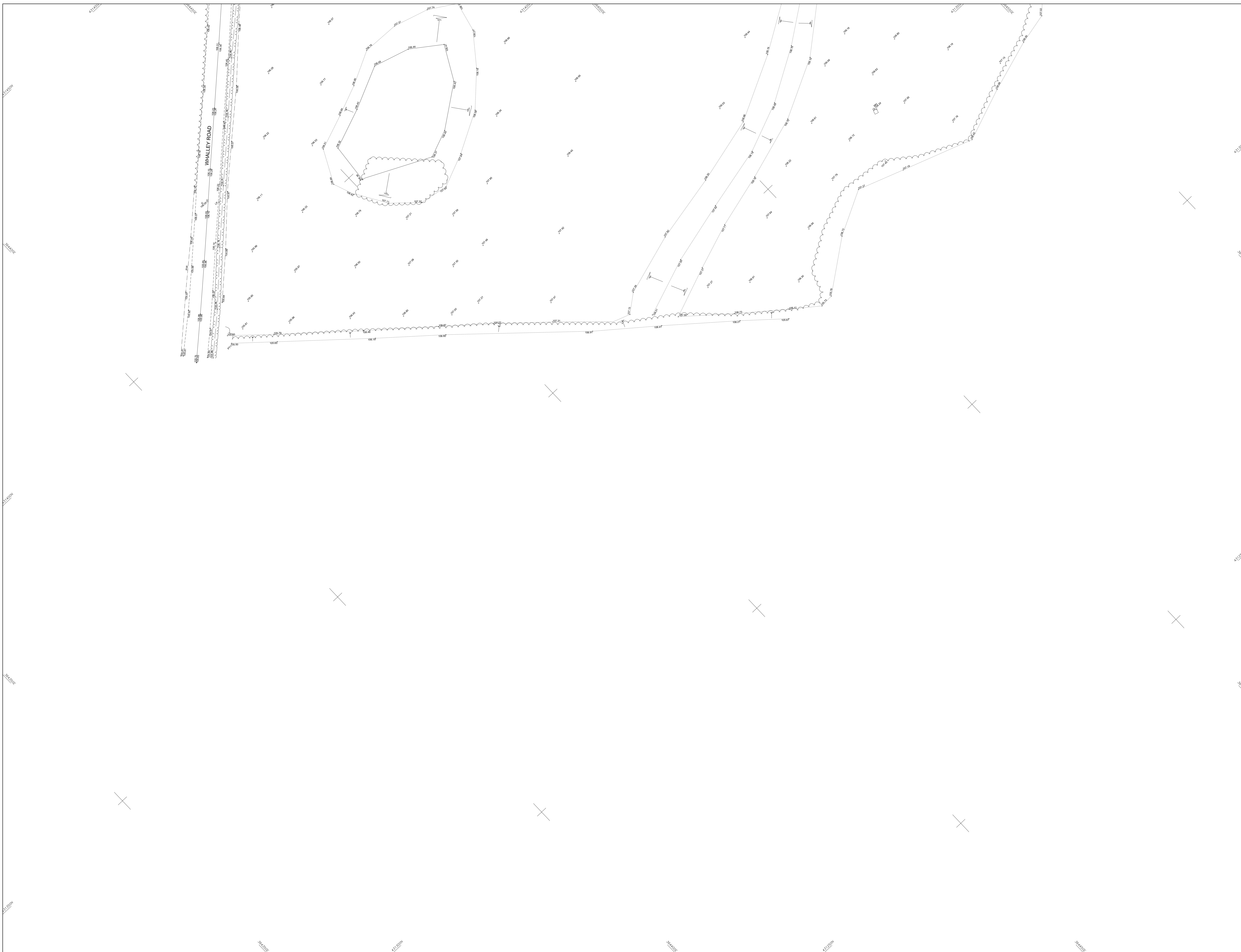
Note:
The survey is plotted on a plane local Grid. Orientation to National Grid. All levels relate to Ordnance Datum, achieved using the OS National GPS Network.

Survey Control Markers established for Mapping purposes only and should not be used for Construction without the written approval of Survey Operations Ltd.

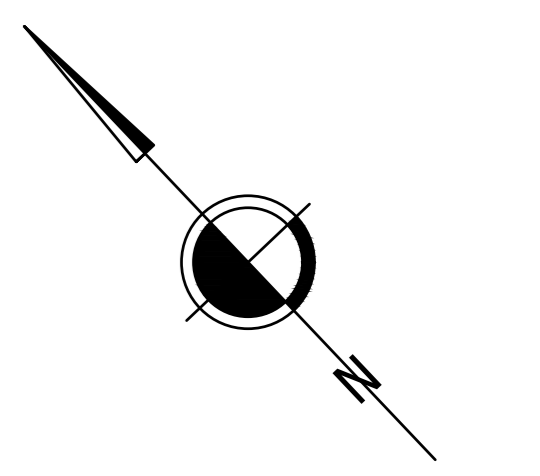
SURVEY STATIONS			
Name	Existing	Not Found	Height
S01	364571.32	431649.24	103.97
S02	364628.87	431609.52	108.57
S03	364593.48	431536.23	108.30
S04	364541.90	431529.04	107.71
S05	364572.69	431455.24	106.32
S06	364575.48	431488.20	109.11
S07	364513.21	431433.23	108.74
S08	364539.81	431364.94	100.52

STANDARD REFERENCE & ABBREVIATIONS

AW	Asphalt	BL	Born Level
BR	Brick	BR	Born Pipe
BS	Born	CB	Cable Box
BT	Born	CF	Cable Foot
BU	Born	CH	Chimney
BV	Born	CI	Cable
CA	Cable	CM	Cable
CB	Cable	CO	Cable
CC	Cable	CP	Cable
CD	Cable	CQ	Cable
CE	Cable	CR	Cable
CF	Cable	CS	Cable
CG	Cable	CT	Cable
CH	Cable	CU	Cable
CI	Cable	CV	Cable
CJ	Cable	CW	Cable
CK	Cable	CL	Cable
CM	Cable	CO	Cable
CN	Cable	CP	Cable
CO	Cable	CQ	Cable
CR	Cable	CS	Cable
CT	Cable	CU	Cable
CV	Cable	CV	Cable
CW	Cable	CX	Cable
CX	Cable	CA	Cable
CA	Cable	CB	Cable
CB	Cable	CC	Cable
CC	Cable	CD	Cable
CD	Cable	CE	Cable
CE	Cable	CF	Cable
CF	Cable	CG	Cable
CG	Cable	CH	Cable
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CK	Cable	CL	Cable
CL	Cable	CM	Cable
CM	Cable	CN	Cable
CN	Cable	CO	Cable
CO	Cable	CP	Cable
CP	Cable	CQ	Cable
CQ	Cable	CR	Cable
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CX	Cable	CA	Cable
CA	Cable	CB	Cable
CB	Cable	CC	Cable
CC	Cable	CD	Cable
CD	Cable	CE	Cable
CE	Cable	CF	Cable
CF	Cable	CG	Cable
CG	Cable	CH	Cable
CH	Cable	CI	Cable
CI	Cable	CJ	Cable
CJ	Cable	CK	Cable
CK	Cable	CL	Cable
CL	Cable	CM	Cable
CM	Cable	CN	Cable
CN	Cable	CO	Cable
CO	Cable	CP	Cable
CP	Cable	CQ	Cable
CQ	Cable	CR	Cable
CR	Cable	CS	Cable
CS	Cable	CT	Cable
CT	Cable	CU	Cable
CU	Cable	CV	Cable
CV	Cable	CW	Cable
CW	Cable	CX	Cable
CX	Cable	CA	Cable
CA	Cable	CB	Cable
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CC	Cable	CD	Cable
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Note:
 The survey is plotted on a plane local Grid. Orientation to National Grid.
 All levels relate to Ordnance Datum, achieved using the OS National GPS Network.

Survey Control Markers established for Mapping purposes only and should not be used for Construction without the written approval of Survey Operations Ltd.

SURVEY STATIONS			
Name	Easting	Northing	Height
S01	364571.32	431645.24	107.27
S02	364628.87	431659.52	108.57
S03	364583.48	431635.23	108.32
S04	364541.95	431529.04	107.71
S05	364572.69	431455.24	108.32
S06	364575.48	431488.20	109.11
S07	364512.21	431432.22	108.74
S08	364539.81	431364.94	109.52

STANDARD REFERENCE & ABBREVIATIONS			
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AR	Asphalt	AR	Asphalt
AS	Asphalt	AS	Asphalt
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MG	Asphalt	MG	

APPENDIX 3

ENVIRONMENT AGENCY FLOOD MAPPING

Flood map for planning

Your reference
Causeway Farm

Location (easting/northing)
364595/431451

Created
9 Oct 2022 17:23

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

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

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

Notes

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

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

Flood risk data is covered by the Open Government Licence **which** sets out the terms and conditions for using government data. <https://www.nationalarchives.gov.uk/doc/open-government-licence/version/3/>

Use of the address and mapping data is subject to Ordnance Survey public viewing terms under Crown copyright and database rights 2021 OS 100024198. <https://flood-map-for-planning.service.gov.uk/os-terms>

Flood map for planning



Your reference
Causeway Farm

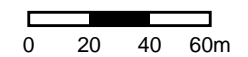
Location (easting/northing)
364595/431451

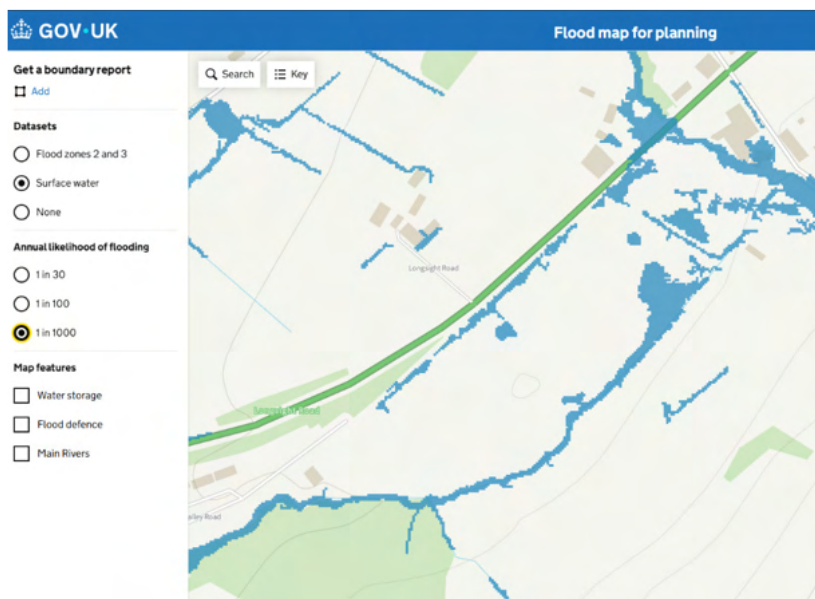
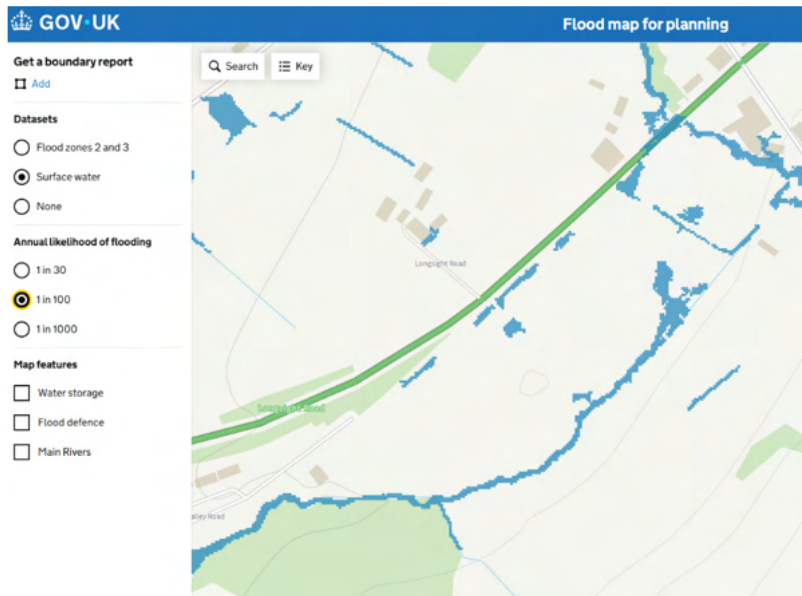
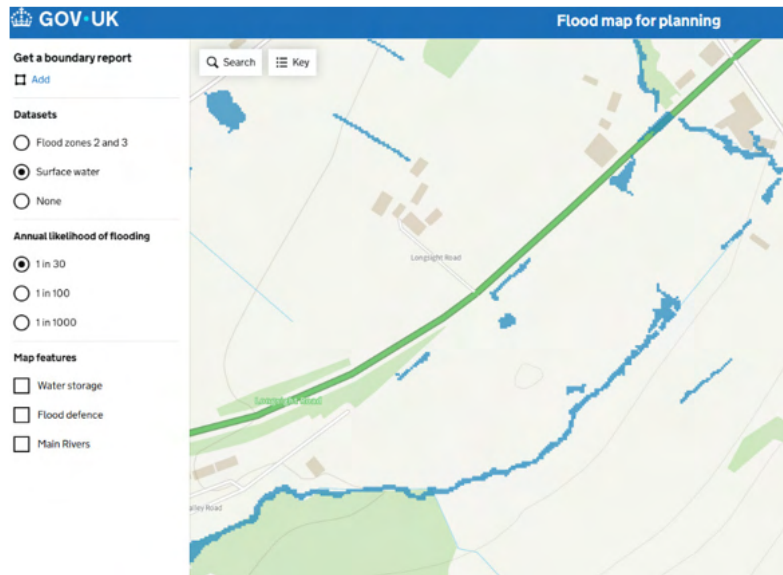
Scale
1:2500

Created
9 Oct 2022 17:23



-  Selected point
-  Flood zone 3
-  Flood zone 3: areas benefitting from flood defences
-  Flood zone 2
-  Flood zone 1
-  Flood defence
-  Main river
-  Water storage area





APPENDIX 4

PROPOSED SITE PLAN

Illustrative Masterplan (for indicative purposes only)
 This plan illustrates one possible arrangement of development within the parameters defined on the submitted Parameters Plans.



Causeway Farm Osbaldeston

Illustrative Masterplan

Gallagher Technical & Design Ltd | james@g-t-d.uk

Sept 25
1:1250@A3

1588-MP-01



APPENDIX 5

GROUND INVESTIGATION REFERENCES



Land at Longsight Road,

Balderstone BB2 7HZ

Proposed Residential Development

Phase 1 Site Investigation Report

For: Specialist Diesels Ltd.

Integra Consulting
Suite 4
14-32 Hewitt Street
Manchester
M15 4GB

Ref: 3356-SI
Job: 3356
Rev: -
By: CH
Date: Oct 25

Environmental

Geotechnical

Highways

Structural

Civil

APPENDIX 6

UNITED UTILITIES CORRESPONDENCE

Neville Shaw

From: wastewaterdeveloperservices@uuplc.co.uk
Sent: 01 February 2023 21:41
To: Neville Shaw
Subject: RE: Re: Our reference - 02885214

Hi Neville,

After assessing the site, it appears the 150mm diameter foul sewer on Abbot Brow is the nearest point of connection for the foul to connect to.

Therefore you have the right to connect to this sewer - if you wish to discuss further just let me know.

Kind Regards,



Ben Scott BEng (Hons)
Developer Engineer
Developer Services & Metering
Customer Services
M: 07554 416296
unitedutilities.com

If you have received a great service today why not tell us?
Visit: unitedutilities.com/wow

----- Original Message -----

From: Neville Shaw [nevilleshaw@integraconsulting.co.uk]
Sent: 28/10/2022 09:36
To: wastewaterdeveloperservices@uuplc.co.uk
Subject: RE: Re: Our reference - 02885214

EXTERNAL EMAIL This email originated outside of the organisation. Do not click links or open attachments unless you recognise the sender and know the content is safe.

Hi Alistair / Sue,

With regard to post-development foul water discharge, would it be acceptable to connect to the 150mm foul water sewer on Abbott Brow to the north east of the site?

Kind regards,

Neville

Neville Shaw BSc (Hons) ACGI MBA CEng MICE MIStructE
Director
Integra Consulting

M: +447740 723 258

W: integraconsulting.co.uk

A: Suite 4, 14-32 Hewitt Street, Manchester, M15 4GB



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Integra Consulting (Engineers) Ltd, Suite 4, 14-32 Hewitt Street, Manchester, M15 4GB Registered in England No. 4086459

From: wastewaterdeveloperservices@uuplc.co.uk <wastewaterdeveloperservices@uuplc.co.uk>
Sent: 27 October 2022 12:01
To: Neville Shaw <nevilleshaw@integraconsulting.co.uk>
Subject: FW: Re: Our reference - 02885214

Hi Neville

Please see email response below sent on 12/10/22

Thanks Sue King

----- Forwarded Message -----

From: wastewaterdeveloperservices@uuplc.co.uk [wastewaterdeveloperservices@uuplc.co.uk]
Sent: 12/10/2022 17:10
To: nevilleshaw@integraconsulting.co.uk
Subject: Re: Our reference - 02885214

Good afternoon Neville,

Pre Development Enquiry for: Long Sight road, Blackburn, Lancashire, BB2 7HZ UU Reference Number : 02885214

We have carried out an assessment of your application which is based on the information provided. This pre-development advice on your drainage strategy will be valid for 12 months. Your drainage strategy will need to be reviewed by other competent authorities as part of the planning process, and we advise that you carry out the necessary site investigations to confirm the viability of your proposals.

If your investigations require access to our public sewer network, we ask that you contact our network engineers with a request for an access certificate via our main contact telephone number 0345 6723 723 or refer to the link below:

<https://www.unitedutilities.com/builders-developers/working-near-our-assets/>

Foul Water

Foul flow from this site will be allowed to drain into the public foul water/combined sewer system.

Our preferred point of discharge would be to the 150mm diameter public combined sewer within Whalley Road located to the south west of your proposed development at an unrestricted rate. This assume there will be no trade effluent waste for this commercial development.

If you are able to identify an alternative, more suitable point of discharge, we request that you contact us at your earliest convenience so that we can assess suitability.

In accordance with our infrastructure plans we may ask you to change your point of connection. Therefore please contact us when you are ready to formalise your drainage proposals, we would suggest before you submit for Full Planning.

Surface Water

All surface water flow from the proposed development should drain in-line with the drainage hierarchy, as outlined in Paragraph 80, (Reference ID: 7-080-20150323), of the National Planning Practice Guidance. We also recommend you prioritise the use of multi-functional sustainable drainage systems for the management of surface water in accordance with national planning policy.

Generally, the aim should be to discharge surface run off as high up the following hierarchy of drainage options as reasonably practicable.

This is outlined as follows, in order of priority:

1. **into the ground (infiltration);**
2. **to a surface waterbody;**
3. **to a surface water sewer or highway drain;**
4. **to a combined sewer.**

For guidance, The [North West SuDS Pro-Forma](#) provides information on the appropriate evidence required at each stage of the hierarchy, to demonstrate how each level has been discounted.

The Lead Local Flood Authority has responsibility for all surface water drainage concerns and their input to your proposal is critical. You should also consider whether it is necessary to discuss your proposal with the Environment Agency, or Internal Drainage Board (if operating in your area).

The Local Planning Authority are the determining authority for any application for planning permission and the appropriate authority for determining cost viability of a proposed drainage scheme, such assessments are outside of the jurisdiction of United Utilities.

Infiltration

Surface water runoff generated from this development should discharge to the ground via infiltration system where feasible.

A detailed evidence based feasibility assessment must be carried out in line with Chapter 25 of the CIRIA SuDS Manual 2015 to determine whether infiltration is a suitable method of surface water disposal.

Particular attention must be paid to Ground Water Source Protection Zones to ensure that the risk of pollution to these valuable resources is not compromised. Details can be obtained from the government website:

<https://www.gov.uk/guidance/groundwater-source-protection-zones-spzs#find-groundwater-spzs>

If your site is in a Groundwater Source Protection Zone, you should have regard to the Environment Agency's approach to Groundwater Protection. Information on this is available via the link below:

<https://www.gov.uk/government/publications/groundwater-protection-position-statements>

Please note that such a location could have implications for the principle of your development and the need for additional mitigating measures to protect the groundwater environment and public water supply in the detailed design of your site.

Waterbody

If an evidence based assessment has been carried out and confirms that infiltration is not feasible, we recommend that you contact the Lead Local Flood Authority and/or Environment Agency to discuss a point of discharge to the watercourse located on the southern site boundary.

We would encourage you to identify and engage with any third party landowner and riparian owner to agree access and discharge rights to the water body if this is not in your ownership.

Highway Drainage

If an evidence based assessment has been carried out and confirms that infiltration is not feasible, we recommend that you investigate the possibility of draining surface water to the highway drain where this ultimately discharges to a watercourse, by contacting the relevant Highway Authority.

Public Sewer

In accordance with the hierarchy of drainage options within the National Planning Practice Guidance, both discharge to ground via infiltration and discharge to a waterbody should be discounted prior to consideration of discharging surface water to the public sewer system. Evidence should be provided to demonstrate how these have been discounted, as outlined in the North West SuDS pro-forma.

As there are no public sewer in the vicinity of the site but there is a watercourse, it is not proposed that any surface water will discharge to the public sewers.

As a Water Company, we have no obligation to accept highway drainage into our public sewer network. However, should your proposals include runoff from highways, we would request that consideration is given to SuDS components that deliver source control are incorporated within the design of the scheme to reduce the volume and frequency of discharges of these flows to the public sewer.

Levels

For low-lying sites, (where the ground level of the site or the level of a basement is below the ground level at the point where the drainage connects to the public sewer), care should be taken to ensure that the property is not at increased risk of flooding. If these circumstances exist, we recommend that you contact us to discuss further. It could affect the detailed design of your site and result in the need to incorporate appropriate mitigating measures in your drainage scheme.

Land drainage / Overland flows / track drainage

United Utilities have no obligation, and furthermore we do not accept land drainage, overland flows or track drainage into the public sewerage network under any circumstances

Existing Wastewater Assets Crossing the Site

According to our public sewer records there are public sewers located within your site boundary. We will require unrestricted access to the raising main for maintenance purposes, we would ask that you maintain a minimum clearance of 6m which is measured 3m from the centre line of the pipe unless there happens to be a formal easement agreement in place, in which case the specified easement width would apply. If you cannot achieve this then you may wish to consider diverting and or abandoning the public sewer. We note from the indicative site layout units A & C in the south and middle of the site are in close proximity to the sewer, we would request that the site layout is amended or the rising main is diverted if the buildings are encroaching on the easement.

Please be aware that any proposed diversion may require modelling. This process may take up to 6 months in order to reach an acceptable design.

Please refer to the link below to obtain full details of the processes involved with sewer diversions:

<https://www.unitedutilities.com/builders-developers/larger-developments/wastewater/sewer-diversions/>

Existing Water Assets Crossing the Site

It is the developer responsibility to identify utilities on-site. Where clean water assets are shown on our records, we recommend that you contact our Water Pre-Development Team, via the following email address:

DeveloperServicesWater@uuplc.co.uk. Further information for this service can be found on our website via the link below:

<https://www.unitedutilities.com/builders-developers/larger-developments/pre-development/water-pre-dev/>

Connection Application

Although we may discuss and agree discharge points and rates in principle, please be aware that you will have to apply for a formal sewer connection. This is so that we can assess the method of construction, Health & Safety requirements and to ultimately inspect the connection when it is made. Details of the application process and the form itself can be obtained from our website by following the link below:

<https://www.unitedutilities.com/builders-developers/wastewater-services/sewer-connections/sewer-connection/>

We recommend that the detailed design should confirm the locations of all utilities in the area and ensure that any proposed drainage solution considers routing and clash checks where required.

If we can be of any further assistance please don't hesitate to contact us further.

Kind regards,



Alistair Graham
Wastewater Developer Engineer
Developer Services & Metering
Customer Services
M: 07765941555
unitedutilities.com

----- Original Message -----

From: Neville Shaw [nevilleshaw@integraconsulting.co.uk]
Sent: 03/10/2022 13:58
To: wastewaterdeveloperservices@uuplc.co.uk
Subject: Re: Our reference - 02885214

EXTERNAL EMAIL This email originated outside of the organisation. Do not click links or open attachments unless you recognise the sender and know the content is safe.

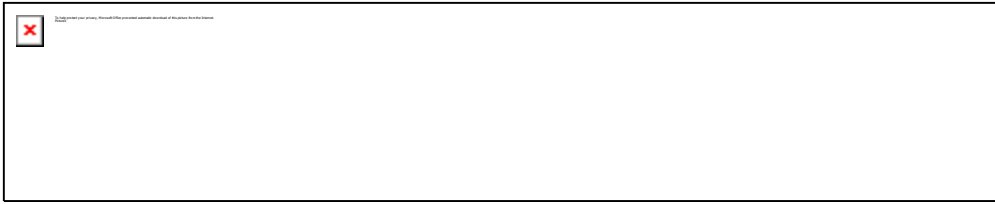
Many thanks Casey.

Kind regards,

Neville

Sent from [Outlook for iOS](#)

From: wastewaterdeveloperservices@uuplc.co.uk <wastewaterdeveloperservices@uuplc.co.uk>
Sent: Monday, October 3, 2022 1:54:27 PM
To: Neville Shaw <nevilleshaw@integraconsulting.co.uk>
Subject: Our reference - 02885214



Dear Neville

**PRE DEVELOPMENT APPLICATION AT: Longsight Road, BB2 7HZ – UU Ref
02885214**

Please accept this email as receipt of your application received on 01/01/22 for the above development. This has now been logged on our system and the job reference is 02885214 we would ask that you quote this reference in all future correspondence.

I have reviewed your application (and attachments) and can confirm this is suitable to be passed to an engineer for technical assessment. You will receive their response within 8 working days.

Kind regards,
Casey



Casey Dand
Customer Advisor Advanced
Developer Services & Metering
Customer Services
T: 03450726067
unitedutilities.com

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Did you know we now have a live chat facility available to you Mon to Friday 8 -5pm. You just click on the orange live chat box on our webpage and one of our advisors will be ready to chat to you and help you with your enquiry <https://www.unitedutilities.com/builders-developers/> or you can email us at WastewaterDeveloperServices@uuplc.co.uk



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<http://www.unitedutilities.com/subsidiaries>



Integra Consulting

14-32
Hewitt Street,
Manchester,
M15 4GB

FAO:

How to contact us:

**United Utilities Water Limited
Property Searches
Haweswater House
Lingley Mere Business Park
Great Sankey
Warrington
WA5 3LP**

Telephone: 0370 7510101

E-mail: propertysearches@uuplc.co.uk

Your Ref: Preston
Our Ref: UUPS-ORD-434658
Date: 01/10/2022

Dear Sirs

Location: Preston

I acknowledge with thanks your request dated 25/09/2022 for information on the location of our services.

Please find enclosed plans showing the approximate position of United Utilities' apparatus known to be in the vicinity of this site.

The enclosed plans are being provided to you subject to the United Utilities terms and conditions for both the wastewater and water distribution plans which are shown attached.

If you are planning works anywhere in the North West, please read United Utilities' access statement before you start work to check how it will affect our network. <http://www.unitedutilities.com/work-near-asset.aspx>.

I trust the above meets with your requirements and look forward to hearing from you should you need anything further.

If you have any queries regarding this matter please [contact us](#).

Yours Faithfully,



Karen McCormack
Property Searches Manager

TERMS AND CONDITIONS - WASTEWATER AND WATER DISTRIBUTION PLANS

These provisions apply to the public sewerage, water distribution and telemetry systems (including sewers which are the subject of an agreement under Section 104 of the Water Industry Act 1991 and mains installed in accordance with the agreement for the self construction of water mains) (UUWL apparatus) of United Utilities Water Limited "(UUWL)".

TERMS AND CONDITIONS:

- This Map and any information supplied with it is issued subject to the provisions contained below, to the exclusion of all others and no party relies upon any representation, warranty, collateral contract or other assurance of any person (whether party to this agreement or not) that is not set out in this agreement or the documents referred to in it.
- This Map and any information supplied with it is provided for general guidance only and no representation, undertaking or warranty as to its accuracy, completeness or being up to date is given or implied.
- In particular, the position and depth of any UUWL apparatus shown on the Map are approximate only. UUWL strongly recommends that a comprehensive survey is undertaken in addition to reviewing this Map to determine and ensure the precise location of any UUWL apparatus. The exact location, positions and depths should be obtained by excavation trial holes.
- The location and position of private drains, private sewers and service pipes to properties are not normally shown on this Map but their presence must be anticipated and accounted for and you are strongly advised to carry out your own further enquiries and investigations in order to locate the same.
- The position and depth of UUWL apparatus is subject to change and therefore this Map is issued subject to any removal or change in location of the same. The onus is entirely upon you to confirm whether any changes to the Map have been made subsequent to issue and prior to any works being carried out.
- This Map and any information shown on it or provided with it must not be relied upon in the event of any development, construction or other works (including but not limited to any excavations) in the vicinity of UUWL apparatus or for the purpose of determining the suitability of a point of connection to the sewerage or other distribution systems.
- No person or legal entity, including any company shall be relieved from any liability howsoever and whensoever arising for any damage caused to UUWL apparatus by reason of the actual position and/or depths of UUWL apparatus being different from those shown on the Map and any information supplied with it.
- If any provision contained herein is or becomes legally invalid or unenforceable, it will be taken to be severed from the remaining provisions which shall be unaffected and continue in full force and affect.
- This agreement shall be governed by English law and all parties submit to the exclusive jurisdiction of the English courts, save that nothing will prevent UUWL from bringing proceedings in any other competent jurisdiction, whether concurrently or otherwise.



Reho	Cover	Func	Invert	Size x	Size y	Shape	Matl	Length	Grad
7901	161.45	CO	160.07	150			VC	54.8072	1 in 12
5001	161.45	CO	160.07	150			VC	42.1554	
9005	172.16	FO	169.63	225			VC	37.0746	
9012	164.09	SW	163.42	225			VC	19.9724	
8010	167.5	SW	166.19	225			VC	21.1379	
8011	167.5	SW	166.19	225			VC	147.4916	
8900	163.13	CO	161.63	150			VC	45.943	1 in 30
8907	164.09	SW	163.42	225			VC	26.8217	
8910	167.5	CO	166.19	225			VC	12.42673	
8000	167.5	CO	166.19	225			VC	12.5044	
8910	167.5	CO	166.19	225			VC	7.28481	
8902	164.1	CO	163.06	225			VC	2.93399	1 in 6
8912	164.1	CO	163.06	225			VC	7.28209	
8901	143.02	CO	141.62	150			VC	94.59009	1 in 13
8900	148.83	CO	144.85	150			VC	63.57423	1 in 20
8900	134.91	CO	133.48	150			VC	32.67119	
9000	171.51	FO	170.81	150			VC	14.15283	1 in 71
9006	171.52	SW	170.79	150			VC	5.07343	1 in 28
9000	172.09	SW	170.67	225			VC	29.87789	1 in 39
9014	167.69	SW	166.99	225			VC	14.44473	
9009	169.86	SW	166.62	225			VC	15.88874	1 in 10
9002	171.57	FO	169.91	225			VC	62.31102	1 in 20
9001	171.58	SW	169.85	225			VC	52.96777	1 in 28
9011	171.58	SW	169.85	225			VC	7.769794	
9003	171.58	SW	169.85	225			VC	23.00108	
8906	164.71	CO	163.8	225			VC	3.692005	1 in 123
8908	166.24	FO	164.42	225			VC	21.91075	1 in 16
8004	167.5	CO	166.19	225			VC	28.21167	
9016	171.6	CO	171.04	225			VC	16.16281	
8901	165.96	SW	164.86	225			VC	27.38558	1 in 28
9002	171.6	SW	170.9	225			VC	21.11296	
9007	171.58	SW	170.59	225			VC	5.18282	
8501	115.56	FO	114.19	150			VC	79.28777	1 in 21
8501	115.56	FO	114.19	150			VC	79.28777	1 in 21
9013	169.6	FO	167.4	225			VC	11.1172	
9008	169.6	SW	167.43	225			VC	10.53128	
9004	169.53	FO	167.4	225			VC	17.18247	
9001	170.74	CO	169.27	150			VC	4.656291	1 in 14
9905	170.74	CO	169.27	150			VC	66.62466	
9906	170.74	CO	169.27	150			VC	9.265749	
8901	163.03	CO	162.21	150			VC	30.70786	
8916	164.89	CO	163.67	225			VC	13.8841	1 in 26
8904	164.89	CO	163.67	225			VC	3.018625	1 in 151
9015	167.41	SW	165.91	225			VC	34.65369	1 in 54
8903	172.8	CO	171.04	225			PVC	57.61573	
9900	157.09	CO	155.59	150			VC	26.1646	
7900	157.09	CO	155.59	150			VC	81.73408	1 in 8
9904	157.09	CO	155.59	150			VC	70.82575	
9901	157.09	CO	155.59	150			VC	6.79768	
9904	126.31	CO	124.91	100			UN	31.29982	
5000	126.31	CO	124.91	150			VC	59.77161	1 in 7
5000	126.31	CO	124.91	150			VC	59.77161	1 in 7
9003	169.86	FO	166.19	225			VC	8.760203	
9001	171.6	FO	170.8	225			VC	33.08594	
9907	171.6	SW	170.9	225			VC	8.501865	
9900	166.27	CO	164.6	150			VC	50.72829	1 in 22
8905	164.04	CO	163.75	225			VC	5.447366	1 in 91
8903	164.7	CO	163.85	225			VC	19.93059	1 in 40
9902	171.86	CO	170.07	150			VC	22.26054	1 in 29

LEGEND

Abandoned Foul Surface Water Combined Public Sewer

Private Sewer Section 104 Rating Main Sludge Main Overflow Water Course Highway Drain

All point assets follow the standard colour convention:
 red - combined blue - surface water
 brown - foul purple - overflow

- Manhole
- Head of System
- Extent of Survey
- Rotting Eye
- Inlet
- Discharge Point
- Vortex
- Penstock
- Washout Chamber
- Valve
- Air Valve
- Non Return Valve
- Soakaway
- Gully
- Cascade
- Flow Meter
- Hatch Box
- Oil Interceptor
- Summit
- Drop Shaft
- Orifice Plate
- Side Entry Manhole
- Outfall
- Screen Chamber
- Inspection Chamber
- Bifurcation Chamber
- Lamp Hole
- T Junction / Saddle
- Catchpit
- Valve Chamber
- Vent Column
- Vortex Chamber
- Penstock Chamber
- Network Storage Tank
- Sewer Overflow
- Ww Treatment Works
- Ww Pumping Station
- Septic Tank
- Control Kiosk
- Change of Characteristic

MANHOLE FUNCTION

FO Foul
 SW Surface Water
 CO Combined
 OV Overflow

SEWER SHAPE

CI Circular TR Trapezoidal
 EG Egg AR Arch
 OV Oval BA Barrel
 FT Flat Top HO HorseShoe
 RE Rectangular UN Unspecified
 SQ Square

SEWER MATERIAL

AC Asbestos Cement
 BR Brick
 PE Polyethylene
 RP Reinforced Plastic Matrix
 CO Concrete
 CSB Concrete Segment Bolted
 CSU Concrete Segment Unbolted
 CC Concrete Box Culverted
 PSC Plastic / Steel Composite
 GRC Glass Reinforced Plastic
 DI Ductile Iron
 PVC Polyvinyl Chloride
 CI Cast Iron
 SI Spun Iron
 ST Steel
 VC Vitrified Clay
 PP Polypropylene
 PF Pitch Fibre
 MAC Masonry, Coursed
 MAR Masonry, Random
 U Unspecified

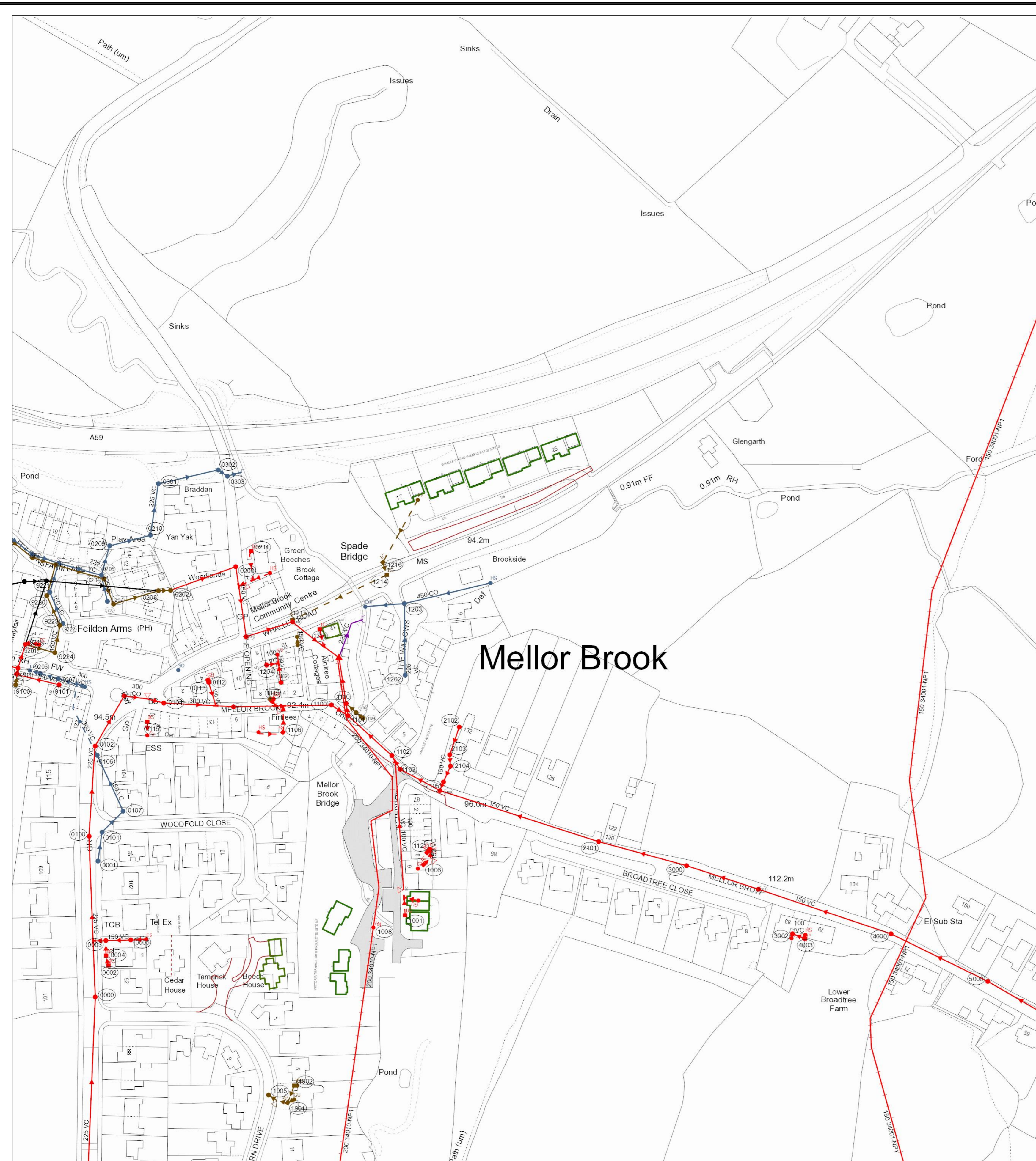
Address or Site Reference:
 Preston,

OS sheet SD6431SE
 Number: 1:1250 Date: 01/10/2022
 Nodes: 60
 Sheet: 1 of 4
 Printed by: Property Searches

SEWER RECORDS **United Utilities**
 Water for the North West

The position of the underground apparatus shown on this plan is approximate only and is given in accordance with the best information currently available. United Utilities Water will not accept liability for any loss or damage caused by the actual position being different from those shown.

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Reho	Cover	Func	Invert	Size x	Size y	Shape	Matt	Length	Grad
9100	92.88	FO	91.03	150			VC	5.682189	1 in 40
9101	92.89	CO	91.3	150			VC	23.93669	
9204	92.89	CO	91.3	150			VC	13.75419	
9206	92.95	SW	90.29	300			VC	5.888812	
9207	93.05	SW	91.75	300			VC	10.38445	1 in 81
9220	92.76	FO	90.28	150			VC	17.88112	1 in 223
0204	91.99	FO	89.91	150			VC	14.84708	1 in 212
0103	94.48	CO	92.21	150			VC	13.58582	
0206	92.21	FO	89.84	150			VC	26.08748	1 in 145
0208	91.89	FO	88.46	225			VC	23.51715	1 in 25
0303	83.98	SW	82.84	225			VC	6.545343	1 in 8
2100	93.02	CO	91.12	150			VC	25.04474	
0101	97.56	SW	96.95	150			VC	16.50468	
0102	95.39	CO	0	225			VC	32.30884	
2102	92.36	CO	0	150			VC	16.48911	
8225	92.5	FO	90.55	150			VC	16.84509	1 in 141
0202	92.36	CO	0	150			VC	38.49411	
0210	91.8	SW	88.51	225			VC	28.88637	1 in 14
0302	88.51	SW	83.08	225			VC	6.143761	1 in 26
0200	88.96	CO	88.26	150			VC	39.37314	1 in 106
1202	89.88	SW	88.11	225			VC	39.84113	1 in 17
1104	89.46	FO	88.31	300			VC	5.081781	1 in 127
0000	101.2	CO	99.55	225			VC	89.52964	1 in 22
0106	99.52	SW	98.25	300			VC	42.83821	
3002		CO	190				VC	2.598445	
4000	118.18	CO	116.5	150			VC	77.78597	1 in 13
0005		CO	150				VC	13.97571	
9216	91.73	FO	90.2	150			VC	28.18521	1 in 97
9217	91.61	SW	89.98	225			VC	13.50174	1 in 225
0207	92.19	SW	90.98	225			VC	15.58058	1 in 173
0301	90.36	SW	88.41	225			VC	14.80338	1 in 30
1204		CO	150				VC	34.13671	1 in 10
1200	91.64	CO	87.34	150			VC	6.789206	
1110	89.62	CO	88.03	300			VC	32.84769	
1203	91.24	SW	0	450			VC	25.91727	
1103	90.32	CO	88.07	150			VC	21.81402	
1102		CO	88.07	150			VC	8.731053	
1101	89.52	CO	87.22	300			VC	33.11919	
1100	89.61	CO	88.3	300			VC	6.785588	
0001	98.04	SW	97.22	150			VC	10.53709	1 in 7
0107	97.41	SW	0	150			VC	16.2947	1 in 68
0104	84.34	CO	82.11	300			VC	34.73955	
5000	126.31	CO	124.91	150			VC	38.77759	1 in 129
5000	126.31	FO	124.91	150			VC	59.77161	1 in 7
4003		CO	100				VC	59.77161	1 in 7
3001	111.79	CO	110.33	150			VC	6.971498	
2104		CO	150				VC	42.19821	1 in 14
3000	108.68	CO	107.21	150			VC	50.83344	1 in 10
2103		CO	150				VC	8.911352	
0001		CO	150				VC	6.21555	
0003		CO	150				VC	42.1554	
0003		CO	150				VC	7.080203	
9221	92.89	SW	90.99	150			VC	16.83011	1 in 15
0205	91.96	SW	89.58	225			VC	16.93937	1 in 141
9219	91.69	SW	89.89	225			VC	24.69893	1 in 80
9222	93.87	FO	90.37	150			VC	17.88984	1 in 200
9223	93.7	SW	92.31	150			VC	18.86728	1 in 14
9224	93.67	FO	90.43	150			VC	15.48213	1 in 258
0208	92.36	FO	89.66	150			VC	6.88791	1 in 53
0201	92.59	FO	87.87	150			VC	26.95057	1 in 53
1112		CO	150				VC	15.79956	
1109	89.82	FO	88.27	300			VC	7.45952	1 in 7
0105	94.21	CO	91.71	300			VC	54.38712	1 in 20
1115		CO	100				VC	4.20265	
0100	97.53	CO	95.53	225			VC	50.21389	
2101	108.69	CO	101.92	150			VC	92.71838	1 in 9
2105		CO	150				VC	5.163918	

LEGEND

Abandoned Foul Surface Water Combined Public Sewer

----- Private Sewer
----- Section 104
----- Raising Main
----- Sludge Main
----- Overflow
----- Water Course
----- Highway Drain

All point assets follow the standard colour convention:
red - combined blue - surface water
brown - foul purple - overflow

- Manhole
- Head of System
- Extent of Survey
- Rodding Eye
- Inlet
- Discharge Point
- Vortex
- Penstock
- Washout Chamber
- Valve
- Air Valve
- Non Return Valve
- Soakaway
- Gully
- Cascade
- Flow Meter
- Hatch Box
- Oil Interceptor
- Summit
- Drop Shaft
- Orifice Plate
- Side Entry Manhole
- Outfall
- Screen Chamber
- Inspection Chamber
- Bifurcation Chamber
- Lamp Hole
- T Junction / Saddle
- Catchpit
- Valve Chamber
- Vent Column
- Vortex Chamber
- Penstock Chamber
- Sewer Overflow
- Network Storage Tank
- Ww Treatment Works
- Septic Tank
- Control Kiosk
- Change of Characteristic

MANHOLE FUNCTION

FO Foul
SW Surface Water
CO Combined
OV Overflow

SEWER SHAPE

CI Circular TR Trapezoidal
EG Egg AR Arch
OV Oval BA Barrel
FT Flat Top HO Horse Shoe
RE Rectangular UN Unspecified
SQ Square

SEWER MATERIAL

AC Asbestos Cement
BR Brick
PE Polyethylene
RP Reinforced Plastic Matrix
CO Concrete
CSB Concrete Segment Bolted
CSU Concrete Segment Unbolted
CC Concrete Box Culvert
PSC Plastic / Steel Composite
GRC Glass Reinforced Plastic
DI Ductile Iron
PVC Polyvinyl Chloride
CI Cast Iron
SI Spun Iron
ST Steel
VC Vitrified Clay
PP Polypropylene
PF Pitch Fibre
MAC Masonry, Coursed
MAR Masonry, Random
U Unspecified

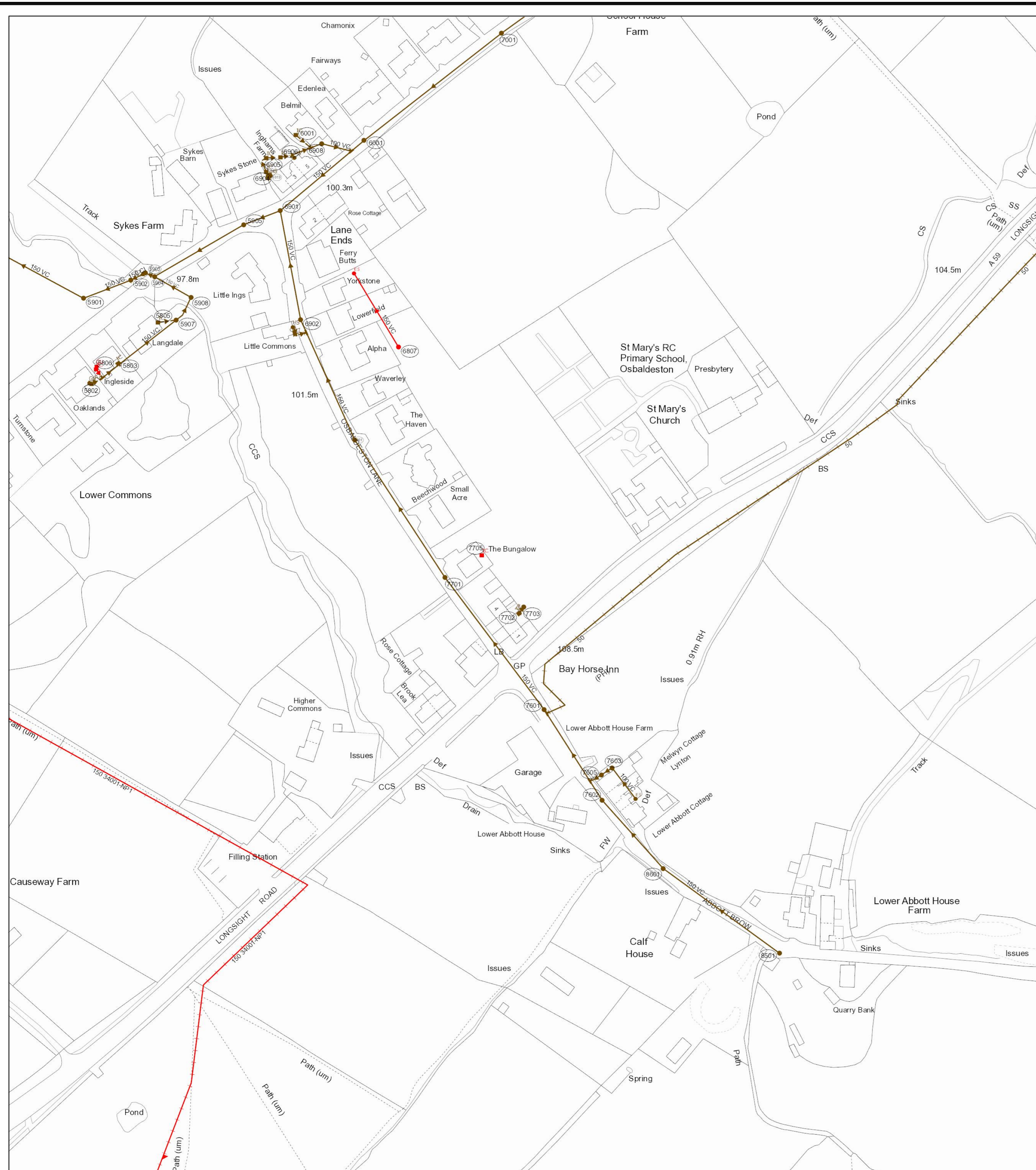
Address or Site Reference:
Preston,

OS sheet SD6431SW
Number:
Scale: 1:1250 **Date:** 01/10/2022
Nodes: 67
Sheet: 2 of 4

Printed by: Property Searches

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Refno	Cover	Func	Invert	Size x	Size y	Shape	Matl	Length	Grad
6908	FO	FO	97.45	100		VC	16.82963	1 in 151	
6001	99.97	FO	97.45	150		VC	60.22614		
6907	FO	FO	109.02	150		VC	15.22969		
7602	110.43	FO	109.02	150		VC	59.32489	1 in 46	
7801	109.16	FO	107.71	150		VC	90.93402	1 in 26	
7701	106.06	FO	104.14	150		VC	50.69604	1 in 25	
6807	CO	CO	95.61	150		VC	47.38819		
5905	99.37	FO	96.68	150		VC	56.84316	1 in 70	
5902	96.98	FO	95.74	150		VC	27.88557	1 in 82	
5902	96.98	FO	95.74	150		VC	27.88557	1 in 82	
5903	97.15	FO	95.61	150		CI	4.487873	1 in 149	
5904	97.46	FO	95.94	150		VC	5.422324	1 in 45	
6902	101.16	FO	99.26	150		VC	61.02754	1 in 69	
8501	115.56	FO	114.19	150		VC	79.28777	1 in 21	
8501	115.56	FO	114.19	150		VC	79.28777	1 in 21	
8601	111.85	FO	110.32	150		VC	50.51599	1 in 39	
7605	FO	FO	100			VC	7.236976		
6901	100.03	FO	97.03	150		VC	21.66369	1 in 66	
5901	98.45	FO	95.38	150		VC	75.96242		
6901	98.45	FO	95.38	150		VC	75.96242		
6801	102.25	FO	100.55	150		VC	72.66243	1 in 57.8844669	
7001	101.21	FO	96.14	150		VC	96.10204	1 in 141	
5908	FO	FO	100			VC	23.14797		
7603	FO	FO	100			VC	7.081401		

Refno	Cover	Func	Invert	Size x	Size y	Shape	Matl	Length	Grad
-------	-------	------	--------	--------	--------	-------	------	--------	------

LEGEND

Abandoned Foul Surface Water Combined Public Sewer

Section 104
Rising Main
Sludge Main
Overflow
Water Course
Highway Drain

All point assets follow the standard colour convention:
red - combined blue - surface water
brown - foul purple - overflow

- Manhole
- Head of System
- Extent of Survey
- Rodding Eye
- Inlet
- Discharge Point
- Vortex
- Penstock
- Washout Chamber
- Valve
- Air Valve
- Non Return Valve
- Soakaway
- Gully
- Cascade
- Flow Meter
- Hatch Box
- Oil Interceptor
- Summit
- Drop Shaft
- Orifice Plate
- Side Entry Manhole
- Outfall
- Screen Chamber
- Inspection Chamber
- Bifurcation Chamber
- Lamp Hole
- T Junction / Saddle
- Catchpit
- Valve Chamber
- Vent Column
- Vortex Chamber
- Penstock Chamber
- Network Storage Tank
- Sewer Overflow
- Ww Treatment Works
- Ww Pumping Station
- Septic Tank
- Control Kiosk
- Change of Characteristic

MANHOLE FUNCTION

FO Foul
SW Surface Water
CO Combined
OV Overflow

SEWER SHAPE

CI Circular TR Trapezoidal
EG Egg AR Arch
OV Oval BA Barrel
FT Flat Top HO HorseShoe
RE Rectangular UN Unspecified
SQ Square

SEWER MATERIAL

AC Asbestos Cement
BR Brick
PE Polyethylene
RP Reinforced Plastic Matrix
CO Concrete
CSB Concrete Segment Bolted
CSU Concrete Segment Unbolted
CC Concrete Box Culverted
PSC Plastic / Steel Composite
GRC Glass Reinforced Plastic
DI Ductile Iron
PVC Polyvinyl Chloride
CI Cast Iron
SI Spun Iron
ST Steel
VC Vitrified Clay
PP Polypropylene
PF Pitch Fibre
MAC Masonry, Coursed
MAR Masonry, Random
U Unspecified

Address or Site Reference:
Preston,

OS sheet SD6431NE
Number:
Scale: 1:1250 Date: 01/10/2022
Nodes: 24
Sheet: 3 of 4
Printed by: Property Searches

SEWER RECORDS **United Utilities**
Water for the North West

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Reho	Cover	Func	Invert	Size x	Size y	Shape	Matl	Length	Grad
2902	92.97	OV	92.25	225		CO	22.1044		
3901	93.61	CO	92	225		CO	9.175766	1 in 102	
4801		FO	0	150		VC	74.20826		
3701		FO	0	150		VC	73.81706		
3905	93.6	OV	92.3	225		CO	9.375714	1 in 188	
5901	98.45	FO	95.38	150		VC	75.96242		
5901	98.45	FO	95.38	150		VC	75.96242		
2801	94.43	FO	92.85	150		VC	53.59857	1 in 67	
3801	95.95	FO	94.38	150		VC	38.83739	1 in 26	
3804	93.61	CO	91.9	250		CO	8.841587	1 in 11	
3902	95.76	FO	93.64	150		VC	57.42757	1 in 36	
3702	98.75	FO	96.92	150		VC	48.65532		
5902	96.98	FO	95.74	150		VC	27.88957	1 in 82	
5902	96.98	FO	95.74	150		VC	27.88957	1 in 82	
4801		FO	0	150		VC	96.66037		
2701	96.28	FO	94.82	150		VC	91.71258	1 in 229	

Reho	Cover	Func	Invert	Size x	Size y	Shape	Matl	Length	Grad
5901		FO	0	150		VC	96.66037		
5902		FO	0	150		VC	96.66037		
5903		FO	0	150		VC	96.66037		
5904		FO	0	150		VC	96.66037		
5905		FO	0	150		VC	96.66037		
5906		FO	0	150		VC	96.66037		
5907		FO	0	150		VC	96.66037		
5908		FO	0	150		VC	96.66037		
5909		FO	0	150		VC	96.66037		
5910		FO	0	150		VC	96.66037		
5911		FO	0	150		VC	96.66037		
5912		FO	0	150		VC	96.66037		
5913		FO	0	150		VC	96.66037		
5914		FO	0	150		VC	96.66037		
5915		FO	0	150		VC	96.66037		
5916		FO	0	150		VC	96.66037		
5917		FO	0	150		VC	96.66037		
5918		FO	0	150		VC	96.66037		
5919		FO	0	150		VC	96.66037		
5920		FO	0	150		VC	96.66037		

LEGEND

Abandoned Foul Surface Water Combined Public Sewer

Private Sewer Section 104 Raising Main Sludge Main Overflow Water Course Highway Drain

All point assets follow the standard colour convention:
 red - combined blue - surface water
 brown - foul purple - overflow

- Manhole
- Head of System
- Extent of Survey
- Rodding Eye
- Inlet
- Discharge Point
- Vortex
- Penstock
- Washout Chamber
- Valve
- Air Valve
- Non Return Valve
- Soakaway
- Gully
- Cascade
- Flow Meter
- Hatch Box
- Oil Interceptor
- Summit
- Drop Shaft
- Orifice Plate
- Side Entry Manhole
- Outfall
- Screen Chamber
- Inspection Chamber
- Bifurcation Chamber
- Lamp Hole
- T Junction / Saddle
- Catchpit
- Valve Chamber
- Vent Column
- Vortex Chamber
- Penstock Chamber
- Network Storage Tank
- Sewer Overflow
- Ww Treatment Works
- Ww Pumping Station
- Septic Tank
- Control Kiosk
- Change of Characteristic

MANHOLE FUNCTION

FO Foul
 SW Surface Water
 CO Combined
 OV Overflow

SEWER SHAPE

CI Circular TR Trapezoidal
 EG Egg AR Arch
 OV Oval BA Barrel
 FT Flat Top HO HorseShoe
 RE Rectangular UN Unspecified
 SQ Square

SEWER MATERIAL

AC Asbestos Cement
 BR Brick
 PE Polyethylene
 RP Reinforced Plastic Matrix
 CO Concrete
 CSB Concrete Segment Bolted
 CSU Concrete Segment Unbolted
 CC Concrete Box Culvert
 PSC Plastic / Steel Composite
 GRC Glass Reinforced Plastic
 DI Ductile Iron
 PVC Polyvinyl Chloride
 CI Cast Iron
 SI Spun Iron
 ST Steel
 VC Vitrified Clay
 PP Polypropylene
 PF Pitch Fibre
 MAC Masonry, Coursed
 MAR Masonry, Random
 U Unspecified

Address or Site Reference:
 Preston,

OS sheet SD6431NW
Number:
Scale: 1:1250 **Date:** 01/10/2022
Nodes: 16
Sheet: 4 of 4

Printed by: Property Searches

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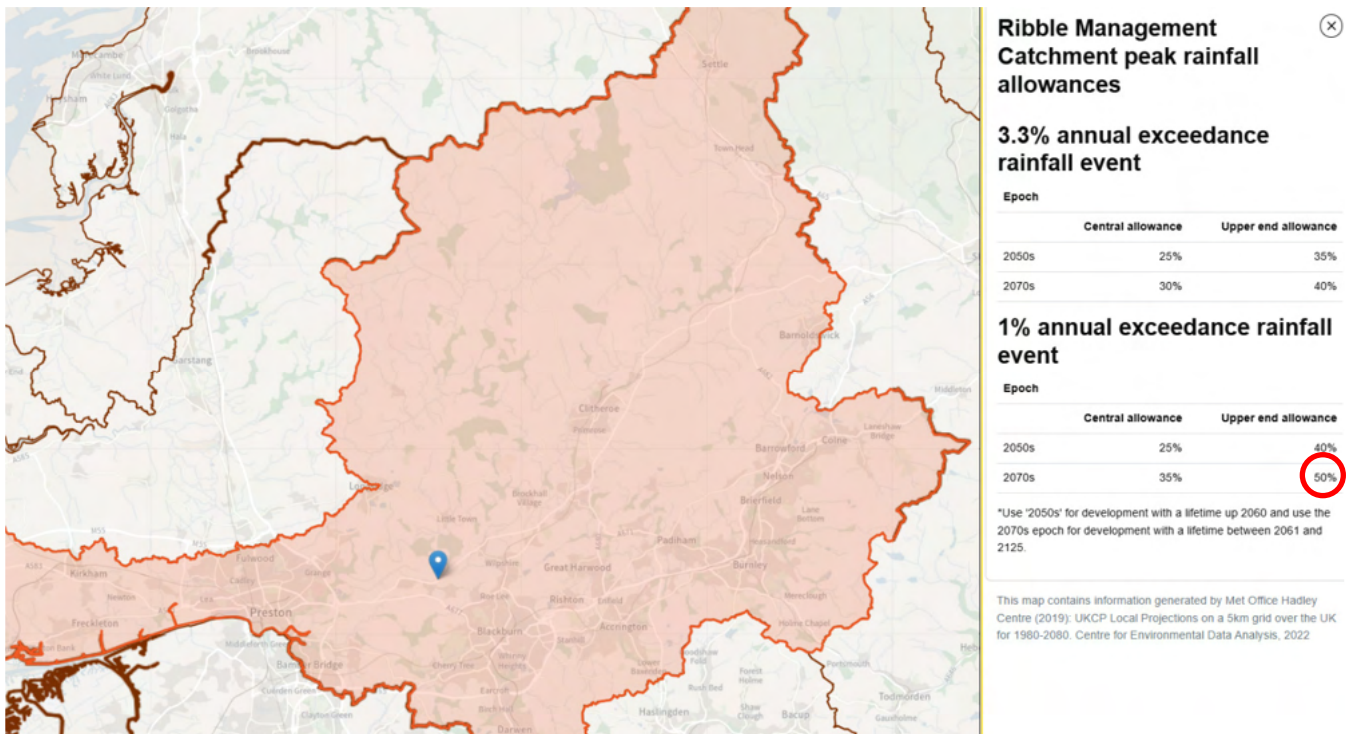
APPENDIX 7

CLIMATE CHANGE ALLOWANCE

Development with a lifetime beyond 2100

This includes development proposed in applications or local plan allocations.

For flood risk assessments and strategic flood risk assessments assess the upper end allowances. You must do this for both the 1% and 3.3% annual exceedance probability events for the 2070s epoch (2061 to 2125).



APPENDIX 8

UKSUDS HYDRAULIC CALCULATIONS

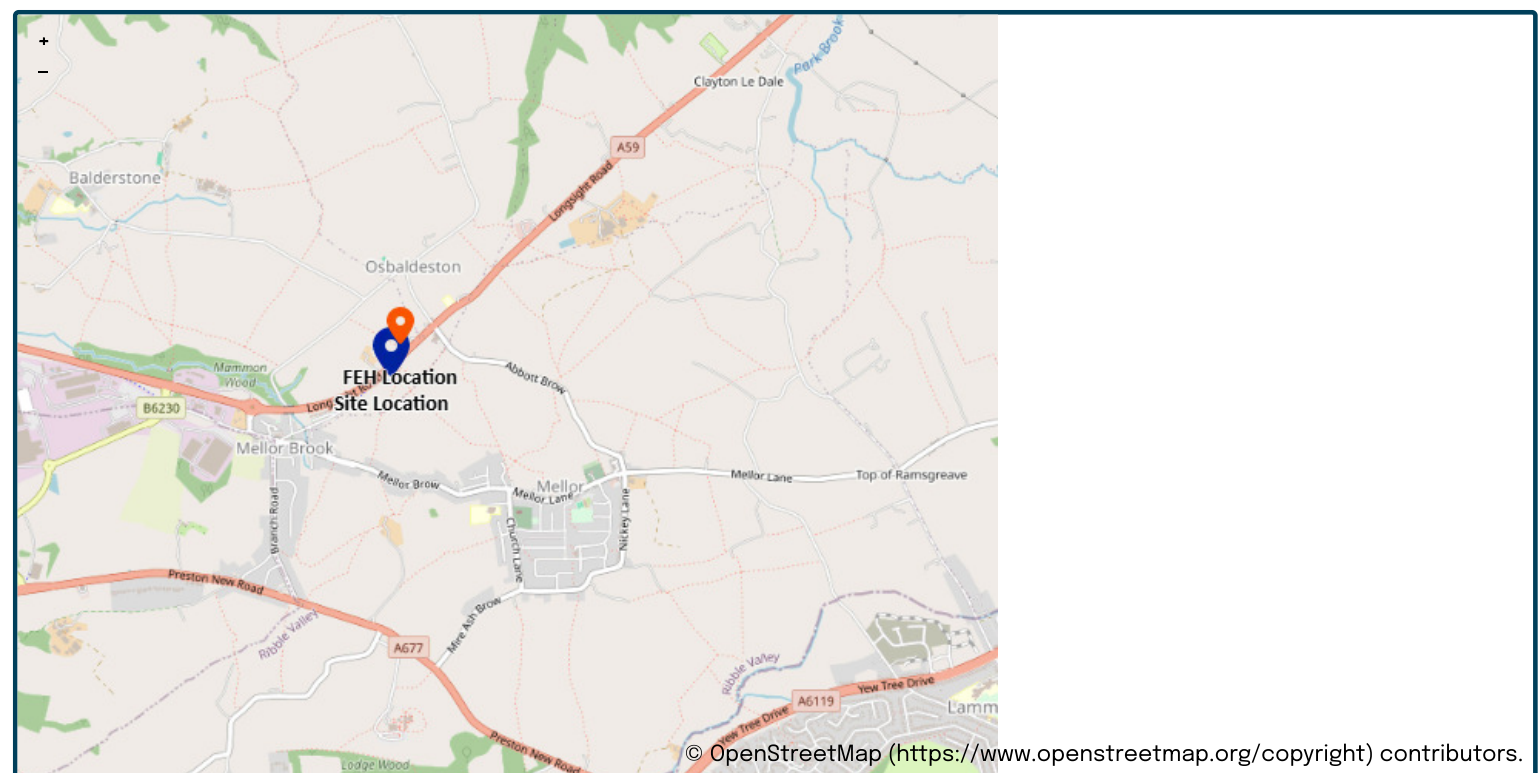
This is an estimation of the storage volume requirements that are needed to meet normal best practice criteria in line with Environment Agency guidance “Rainfall runoff management for developments”, SC030219 (2013), the SuDS Manual C753 (CIRIA, 2015) and the non-statutory standards for SuDS (Defra, 2015). It is recommended that the total storage volume for the site is distributed across the site using multiple SuDS and that hydraulic modelling software is used to undertake and finalise the detailed design of the drainage system.

Project details

Date	<input type="text" value="13/10/2025"/>
Calculated by	<input type="text" value="CH"/>
Reference	<input type="text" value="Balderstone"/>
Model version	<input type="text" value="2.2.1"/>

Location

Site name	<input type="text" value="Causeway Farm"/>
Site location	<input type="text" value="Balderstone"/>



Site easting (British National Grid)	<input type="text" value="364551"/>
Site northing (British National Grid)	<input type="text" value="431384"/>

Site areas

Total site area (ha) ha

Roof area

Total roof area (ha) ha

Contributing roof area (ha) ha

Non-contributing roof area (ha) ha

Paved area

Total paved area (ha) ha

Contributing paved area (ha) ha

Non-contributing paved area (ha) ha

Grass / vegetated area

Total grass / vegetated area (ha) ha

Contributing grass / vegetated area (ha) ha

Non-contributing grass / vegetated area (ha) ha

Total area

Total contributing area (ha) ha

Contributing areas with urban creep allowance

Urban creep allowance factor

Contributing roof area (adjusted for urban creep) (ha) ha

Contributing paved area (adjusted for urban creep) (ha) ha

Contributing grass / vegetated area (adjusted for urban creep) (ha) ha

Storage design parameters

Storage base shape

Storage base length to width ratio

Storage design depth (m) m

Storage side slope (1 in x)

Storage voids ratio (%)

Storage volume design return period (years)

Discharge flow rate from the site

Method

Type of site

Specify the method

FEH statistical (2008)

	<u>My value</u>		<u>Map/default value</u>
SAAR6190 (mm)	<input type="text" value="1078"/>		<input type="text" value="mm"/>
BFIHOST19	<input type="text" value="0.348"/>		
QMed (l/s)	<input type="text" value="27.9"/>	<input type="text" value="l/s"/>	
QMed-QBar conversion	<input type="text" value="1.075"/>	<input type="radio"/>	<input type="text" value="1.075"/>
Total area for greenfield runoff calculation (ha)	<input type="text" value="2.5"/>	<input type="radio"/>	<input type="text" value="2.5"/>
QBar (l/s)	<input type="text" value="30"/>	<input type="text" value="l/s"/>	
Hydrological region	<input type="text" value="10"/>	<input type="radio"/>	<input type="text" value="10"/>
Return period (years)	<input type="text" value="Qbar (1:2.3 years)"/>		
Growth curve factor	<input type="text" value="1"/>		

Final discharge rate

Runoff calculation method

Design flow rate (l/s)

Blockage risk

Specify the method

Minimum orifice diameter to prevent blockage (mm)

	<u>My value</u>		<u>Calculated value</u>
Design orifice diameter (mm)	<input type="text" value="109"/>	<input type="radio"/>	<input type="text" value="109"/>
Flow rate of orifice (l/s)	<input type="text" value="29.87"/>	<input type="text" value="l/s"/>	

Rainfall and runoff

Rainfall input type

FEH_Point_Rainfall_FEH22_AM_364590_431472.csv

Distance from FEH location to site (km)

Climate change allowance factor

Specify the runoff method from grass / vegetated areas

	<u>My value</u>		<u>Map value</u>
How should SPR be derived?	<input type="text" value="Estimate using BFI"/>		
BFIHOST19	<input type="text" value="0.348"/>		
SPR	<input type="text" value="0.489"/>		

Model results

- **Maximum discharge flow rate:** 29.9 (l/s)
- **Outflow orifice diameter:** 109 (mm)
- **Storage base length:** 49 (m)
- **Storage base width:** 16 (m)
- **Storage base area:** 816 (m²)
- **Storage total volume:** 1709 (m³)
- **Storage total water volume:** 1709 (m³)
- **Storm return periods run:** 1, 2, 10, 30, 100, 200 (years)
- **Storm durations run:** 15, 30, 60, 120, 180, 240, 360, 540, 720, 900, 1080, 1440, 1800, 2160, 2880, 3600, 4320, 5040, 5760 (minutes)

Return Period (years)	Critical Duration (minutes)	Peak Flow Rate (l/s)	Max Depth (m)	Max water volume (m ³)	Max storage volume (m ³)
1	900	18.5	0.61	572	572
2	720	19.9	0.70	668	668
10	720	24.6	1.04	1070	1070
30	720	27.1	1.25	1348	1348
<u>100</u>	<u>720</u>	<u>29.9</u>	<u>1.50</u>	<u>1709</u>	<u>1709</u>
200	900	31.6	1.67	1974	1974

Please note runoff estimation and storage volume estimation are subject to uncertainty. Storage volume results are therefore reported to the nearest 1 m³ value, unless storage volumes are less than 10 m³, in which case, storage volumes are provided to 1 decimal place.

Disclaimer

This report was produced using the surface water storage volume design tool (2.2.1) developed by HR Wallingford and available at [uksuds.com](https://www.uksuds.com/) (<https://www.uksuds.com/>). The use of this tool is subject to the UK SuDS terms and conditions and licence agreement, which can both be found at [uksuds.com/terms-conditions](https://www.uksuds.com/terms-conditions) (<https://www.uksuds.com/terms-conditions>). The outputs from this tool have been used to estimate surface water storage volumes for the whole site based on a limiting discharge rate from the site. The use of these results is the responsibility of the users of this tool. No liability will be accepted by HR Wallingford, the Environment Agency, Centre for Ecology and Hydrology, Wallingford Hydrosolutions or any other organisation for the use of these data in the design or operational characteristics of any drainage scheme.

HR Wallingford are not responsible for any rainfall data shared that is subject to licensing terms imposed by UK Centre for Ecology & Hydrology's Flood Estimation Handbook web service (<https://fehweb.ceh.ac.uk/Home/Terms> (<https://fehweb.ceh.ac.uk/Home/Terms>)).

Appendix A - Rainfall Depths

Rainfall depths (mm) with climate change

Duration (minutes)	Duration (hours)	1 years	2 years	10 years	30 years	100 years	200 years
15	0.25	7.81	10.35	20.02	26.22	32.88	36.96
30	0.5	10.43	13.83	27.00	35.45	45.11	50.91
60	1	13.56	17.88	34.88	46.21	59.20	67.20
120	2	20.25	25.05	43.80	55.95	70.03	78.81
180	3	24.90	30.00	49.84	62.61	77.49	86.95
240	4	28.51	33.83	54.49	67.77	83.32	93.39
360	6	34.00	39.62	61.44	75.51	92.30	103.38
540	9	39.84	45.78	68.89	83.89	102.24	114.69
720	12	44.18	50.39	74.50	90.25	110.00	123.68
900	15	47.67	54.09	79.02	95.46	116.44	131.28
1080	18	50.64	57.24	82.86	99.90	122.06	137.94
1440	24	55.71	62.56	89.32	107.41	131.69	149.31
1800	30	59.97	67.06	94.78	113.77	139.74	158.72
2160	36	63.82	71.11	99.66	119.43	146.85	166.91
2880	48	70.64	78.31	108.30	129.38	159.24	180.99
3600	60	76.93	84.91	116.13	138.24	170.07	192.99
4320	72	82.84	91.08	123.38	146.38	179.93	203.82
5040	84	88.45	96.93	130.20	154.02	189.09	213.83
5760	96	93.82	102.54	136.74	161.30	197.76	223.23

Rainfall depths (mm) without climate change

Duration (minutes)	Duration (hours)	1 years	2 years	10 years	30 years	100 years	200 years
15	0.25	5.21	6.90	13.35	17.48	21.92	24.64
30	0.5	6.95	9.22	18.00	23.63	30.07	33.94
60	1	9.04	11.92	23.25	30.81	39.47	44.80
120	2	13.50	16.70	29.20	37.30	46.69	52.54
180	3	16.60	20.00	33.23	41.74	51.66	57.97
240	4	19.01	22.55	36.33	45.18	55.55	62.26
360	6	22.67	26.41	40.96	50.34	61.53	68.92
540	9	26.56	30.52	45.93	55.93	68.16	76.46
720	12	29.45	33.59	49.67	60.17	73.33	82.45
900	15	31.78	36.06	52.68	63.64	77.63	87.52
1080	18	33.76	38.16	55.24	66.60	81.37	91.96
1440	24	37.14	41.71	59.55	71.61	87.79	99.54
1800	30	39.98	44.71	63.19	75.85	93.16	105.81

Duration (minutes)	Duration (hours)	1 years	2 years	10 years	30 years	100 years	200 years
2160	36	42.54	47.41	66.44	79.62	97.90	111.27
2880	48	47.10	52.21	72.20	86.25	106.16	120.66
3600	60	51.29	56.61	77.42	92.16	113.38	128.66
4320	72	55.23	60.72	82.25	97.59	119.95	135.88
5040	84	58.97	64.62	86.80	102.68	126.06	142.55
5760	96	62.55	68.36	91.16	107.53	131.84	148.82

APPENDIX 9

OVERLAND FLOOD ROUTE



**Causeway Farm
Osbaldeston
PWA**

Masterplan
Gallagher Technical & Design Ltd | james@g-t-d.uk

GT D
URBAN DESIGN GROUP

Sept 25
1:1250@A3

1588-MP-01