Queensberry
DESIGN LIMITED
RESIDENTIAL AND COMMERCIAL DESIGN CONSULTANTS

Gleeson Homes

Harras Moor, Whitehaven

FLOOD RISK ASSESSMENT

22nd April 2026

Head Office: 5 The Staithes, The Watermark, Gateshead, NE11 9SN

ISSUE SHEET

Prepared	Date		Checked	Date
FA	22.04.26		AL	22.04.26
-	Initial Issue			
A	Appendix 3 & 4 updated			28 05 26

This document has been prepared solely as a Flood Risk Assessment for Gleeson Homes regarding the proposed scheme at Harras Moor, Whitehaven. Queensberry Design Ltd accepts no responsibility or liability for any use that is made of this document other than by the Client for which it was originally commissioned and prepared.

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CONTENTS

1. Introduction 4
2. Site Description 4
3. Strategic Flood Risk Documentation 6
4. Flood Risk Assessment 6
5. Summary of Flood Risk 10
6. Proposed Development 10
7. Management of Surface Water 12
8. Preferred Drainage Solution 13
9. Conclusion 14

APPENDICES

Appendix 1 – Topographical Survey

Appendix 2 – United Utilities Correspondence

Appendix 3 – Drainage Strategy

Appendix 4 – Microdrainage Calculations

Appendix 5 – Greenfield Runoff Calculations

1. Introduction

1.1 Queensberry Design Ltd has been commissioned by Gleeson Homes to undertake a Flood Risk Assessment (FRA) for a proposed residential development at Harras Moor, Whitehaven.

1.2 This FRA has been produced to demonstrate how flood risk from all sources of flooding, and flood risk to others from the development will be managed, to satisfy the requirements, set out in *'National Planning Policy Framework, and Technical Guidance to the National Planning Policy Framework'.*

1.3 A full assessment of the flood risk to the site and consideration of the surface water management as a result of the development is to be considered in this investigation.

1.4 Consultation has been undertaken with United Utilities, Environment Agency (EA) and Cumbria County Council including inspection of their Strategic Flood Risk Assessment (SFRA). Data has also been gathered from several other sources including aerial photographs, Ordnance Survey (OS), the British Geological Society (BGS), National Soil Resources Institute (NSRI), Sewerage Sector Guidance, SuDS Manual (C753) and anecdotal evidence from the internet.

2. Site Description

2.1 The greenfield site occupies an irregularly shaped parcel of land with an approximate developable area of 20.76 hectares. The site is located at approximately National Grid Reference E298669, N518190.

2.2 The site is located within the civil parish of Whitehaven, in the Cumberland district of Cumbria.

2.3 The site can be divided into two main sections. The northern section is broadly rectangular in shape and is situated between Harras Road and Loop Road South. To the north of this section lies predominantly existing residential dwellings.

2.4 The southern section of the site is irregular in shape and is located to the south of the northern section. It is bounded by residential dwellings to the west and south, Red Lonning to the east, and it encloses (but does not include) Red Lonning Industrial Estate.

2.5 The location of the development is shown in Figure 1.

Site Levels

2.6 A topographical survey was carried out by Pell Frischmann Ltd, in September 2024 and can be viewed in Appendix 1 of this report.

2.7 The survey indicates that, within the northern rectangular parcel, site levels generally fall from Harras Road in the north-west towards Loop Road South in the south-east, with ground levels ranging from approximately 143.50m AOD to 84.00m AOD.

2.8 Within the southern parcel, the predominant gradient is also from north-east to south-west, with levels ranging from approximately 142.35m AOD to 134.50m AOD. However, additional localised gradients are present, including a southward fall along Caldbeck Road. A notable low point is located along the site boundary to the south of Red Lonning Industrial Estate, situated to the rear of residential properties on Winchester Drive.

Hydrology

2.9 Two ordinary watercourses are located beyond the boundary of the northern part of the site. One is positioned to the rear of properties along Laurel Bank, and the other runs through a wooded area behind properties on Standing Rise. Both features generally convey flows in a south-easterly direction towards Loop Road South.

2.10 The watercourse within the wooded area behind Standing Rise is identified further downstream as Midgey Gill, which ultimately outfalls to the Irish Sea approximately 1 km to the south-east of the site.

2.11 In addition, a 1050mm diameter culverted watercourse is located around 100m to the south of the site boundary. This culvert discharges into Sebra Beck, which is situated approximately 1 km to the south-east of the site

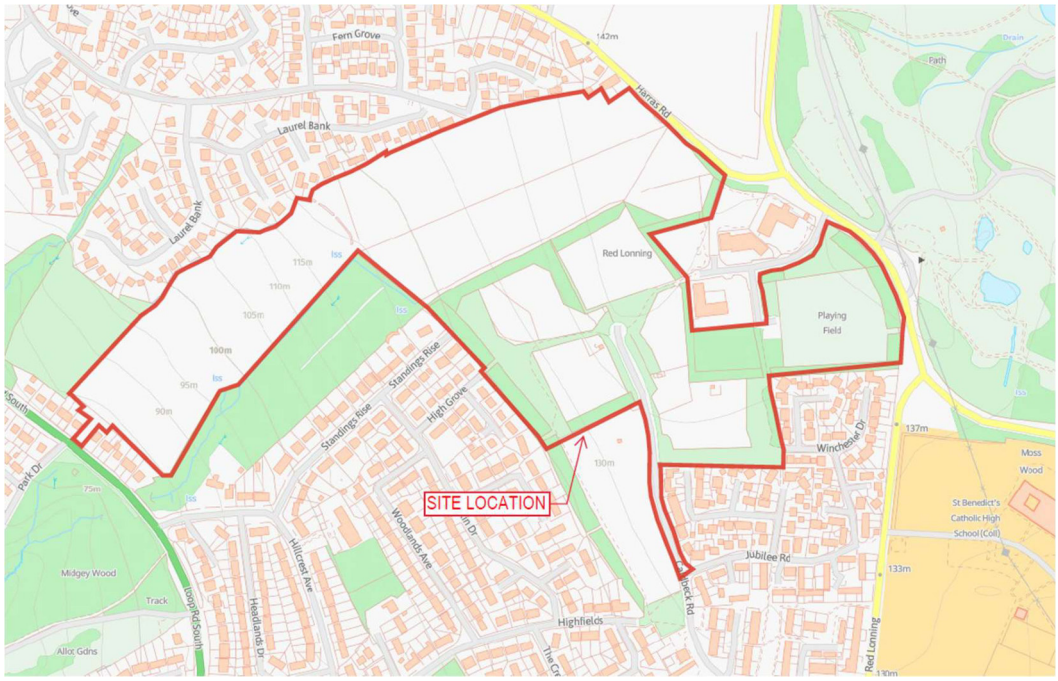
Existing Drainage Infrastructure

2.12 Details of the existing public sewerage infrastructure within and surrounding the site are summarised below and illustrated in Appendix 2.

2.13 Records indicate the presence of a 1050mm diameter culverted watercourse approximately 100m to the south of the site, flowing in a southerly direction. The culvert passes beneath Caldbeck Road at a point around 300m south of the site and is understood to ultimately discharge into Sebra Beck, located approximately 1 km to the south-east.

2.14 The records also identify several existing foul sewers in the vicinity that may provide potential connection points for the proposed development. These include a 225mm diameter foul sewer originating from Red Lonning Industrial Estate and running along the site boundary towards Sandhurst Drive, as well as a 225mm diameter foul sewer within Highlands and a 150mm diameter foul sewer within Laurel Bank, both located to the north of the site.

2.15 In addition, a 225mm diameter combined sewer is shown to originate within Loop Road South and continue in a south-easterly direction along Park Drive.



2.16 *Figure 1 –Site Location*

3. Strategic Flood Risk Documentation

Cumbria County Council Strategic Flood Risk Assessment (2018)

3.1 The Strategic Flood Risk Assessment (SFRA) for Cumbria has been prepared to support planning policy and development management across the county. The document provides a strategic overview of flood risk from all sources and is intended to inform the application of the Sequential and Exception Tests, as well as guiding site-specific Flood Risk Assessments.

3.2 The SFRA identifies that flood risk within Cumbria arises from a combination of sources, including fluvial flooding from main rivers, tidal influences along the coast, and local sources such as surface water runoff, groundwater emergence, and sewer flooding. The assessment highlights that, in urban areas such as Whitehaven, surface water flooding and local drainage exceedance can represent more significant constraints than fluvial flooding, particularly where topography directs runoff through developed areas.

3.3 The site at Harras Road, Whitehaven, is not identified within the SFRA as being at significant risk of fluvial or tidal flooding. The SFRA mapping indicates that areas of highest flood risk are generally associated with main river corridors and coastal zones, which are located away from the site. The document therefore provides a strategic context indicating that flood risk to the site is likely to be associated primarily with local sources, including surface water runoff and existing drainage infrastructure.

Cumberland Council Preliminary Flood Risk Assessment (2011)

3.4 The Preliminary Flood Risk Assessment (PFRA) prepared for Cumberland (formerly Cumbria authorities) provides a high-level review of flood risk from local sources across the area, including surface water, groundwater, and ordinary watercourses. The PFRA identifies that historic flooding within the region has frequently been associated with intense rainfall events, resulting in surface water runoff overwhelming drainage systems.

3.5 The PFRA highlights that areas with varied topography and urban development, such as Whitehaven, may be susceptible to localised surface water flooding where overland flow routes coincide with existing infrastructure and residential areas. It also notes that smaller watercourses and culverted systems can contribute to flood risk where capacity is exceeded or blockages occur.

3.6 Although Harras Road is not specifically identified within the PFRA as a location of recorded significant flooding, the document confirms that surface water flooding remains a key consideration across the wider area. As such, any proposed development should incorporate appropriate surface water management measures to ensure runoff is controlled and that flood risk is not increased elsewhere.

4. Flood Risk Assessment

4.1 When determining any planning applications, local planning authorities should ensure that flood risk is not increased elsewhere. Where appropriate, applications should be supported by a site-specific flood-risk assessment.

4.2 A site-specific flood risk assessment should be provided for all development in Flood Zones 2 and 3. In Flood Zone 1, an assessment should accompany all proposals involving: sites of 1 hectare or more; land which has been identified by the Environment Agency as having critical drainage problems; land identified in a strategic flood risk assessment as being at increased flood risk in future; or land that may be subject to other sources of flooding, where its development would introduce a more vulnerable use.

4.3 The Planning Practice Guidance was published in March 2014. The new Guidance is intended to reflect and support (but not replace) the National Planning Policy Framework (the NPPF), the Ministry of Housing, Communities & Local Government, released an updated version of the National Planning Policy Framework in February 2025.

4.4 In respect of flood risk, the NPPF was amended to clarify that all plans should apply a sequential, risk-based approach to the location of development, taking into account 'all sources of flood risk' and the current and future impacts of climate change.

4.5 If it is not possible for development to be located in zones with a lower risk of flooding, an application for the development should be considered having regard to the vulnerability of the site and development proposed. A new 'Flood Risk Vulnerability Classification' has been added to the NPPF that categorises those types of development particularly vulnerable to flood risk.

Sources of Flooding

4.6 In accordance with NPPF all forms of flood risk need to be considered in relation to any development. Flood risk has been assessed from the following sources: tidal and fluvial, surface water and flooding from the land, groundwater, sewer flooding and artificial sources (i.e. canals, reservoirs etc.)

Tidal and Fluvial Flooding

4.7 EA flood zone maps indicates that the entire site is located within flood zone 1 and so is considered to have the lowest probability of flooding from rivers and the sea, with a flooding probability of 1 in 1000 in any one year (0.1%). The watercourse within the wooded area behind Standing Rise is located within Flood zone 2 and 3. The site is illustrated in the EA flood map in Figure 2.

4.8 The Environment Agency have been contacted regarding any known flooding on site or in its immediate vicinity. A response is still awaited at the time of writing this report.

4.9 Based on the available information flood risk from this source is considered LOW.

4.10 *Figure 2 – Environment Agency Flood Zone Map*

Groundwater

4.11 Groundwater flooding is caused by water originating from beneath the ground surface from permeable strata through a natural process, usually after periods of higher than average rainfall.

4.12 A geotechnical investigation was undertaken by AECOM Ltd in July 2019.

4.13 Information from available ground investigation and mapping indicates that the site is underlain by slightly acidic, freely draining loamy soils in some areas, which are typically associated with groundwater and surface water interaction. Other parts of the site comprise slowly permeable, seasonally wet clay soils, which can restrict infiltration and give rise to localised perched groundwater conditions.

4.14 Underlying bedrock is identified as the Pennine Middle Coal Measures and the Whitehaven Sandstone Formation, both classified as Secondary A aquifers. These are described as permeable strata capable of supporting water supplies at a local scale and contributing to baseflow in nearby watercourses.

4.15 Superficial deposits across the site are mapped as Secondary (undifferentiated) aquifers, likely comprising glacial till deposits with variable permeability. These deposits are generally of limited permeability; however, the potential for perched groundwater is indicated by local ground conditions.

4.16 The site is not located within a groundwater Source Protection Zone, and no licensed groundwater abstractions have been identified within 1 km of the site.

4.17 Based on the available information significant flood risk from this source is considered LOW.

Sewer Flooding

4.18 A review of available sewer records indicates that a single 225mm diameter foul sewer is present within the site boundary. There are no recorded incidents of foul sewer flooding affecting the site.

4.19 Furthermore, the surrounding topography suggests that any exceedance or surcharge from off-site sewers would be directed away from the development area.

4.20 Based on the information available, the flood risk from this source is considered LOW.

Overland Flow

4.21 Flooding from overland flow can become a risk to any development if flooding occurs at a higher level than the development site.

4.22 The EA provide surface water flood risk information which quantifies the level of flood risk. An extract of the surface water flooding extent is illustrated in Figure 3.

4.23 Surface water flood mapping indicates that the majority of the site is at low risk of surface water flooding, with higher risk areas generally confined to the site periphery.

4.24 Notable flow routes are evident along the western boundary of the site, where surface water appears to follow the watercourse in a south-westerly direction towards Loop Road South. This aligns with a topographic low and an existing drainage pathway, with areas of medium to high risk shown adjacent to the boundary.

4.25 Further areas of elevated surface water flood risk are present along the eastern boundary, particularly adjacent to residential areas and along the corridor associated with Red Lonning. Here, mapping indicates a continuous north–south flow path with localised ponding, including areas of higher risk in close proximity to existing development.

4.26 Additional isolated pockets of surface water ponding are shown within the southern and south-eastern parts of the site, including near the playing field and adjacent to existing residential properties. These appear to be associated with local depressions and overland flow routes.

4.27 The central and higher parts of the site remain largely unaffected by surface water flooding, indicating that risk is primarily associated with boundary flow paths and topographic low points rather than being widespread across the site.

4.28 Overall, while the site is predominantly at low risk of surface water flooding, the identified overland flow routes and localised ponding areas should be carefully considered in the design of the proposed development. Appropriate mitigation measures, such as maintaining exceedance flow paths and incorporating sustainable drainage systems, will be required to manage runoff and ensure flood risk is not increased elsewhere.

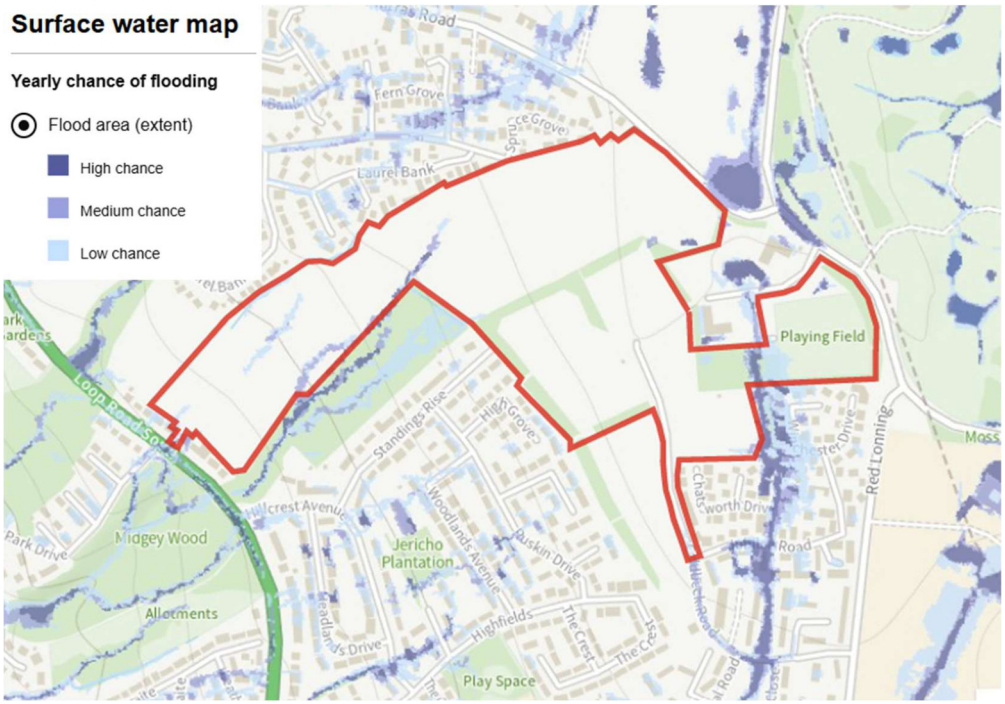
4.29 Based on the available information and given the largely limited extent of surface water flooding within the site, flood risk from this source can be considered LOW.

4.30 NPPF requires that any development should not increase flood risk to others but should aim to contribute towards a reduction. Developing the site and introducing a positive drainage network – collecting rainwater and attenuating it on site will provide significant betterment.

4.31 Best practice measures will be applied to the development:

1) Any land drainage encountered during the development should be repaired and diverted.
2) Additional land drainage / infiltration trenches can be installed at site boundaries to collect any overland flow and protect the properties at a lower level.
3) Proposed floor levels should be a minimum of 150mm above external ground level.
4) Construction of new 'Sewerage Sector Guidance' compliant drainage network.

4.32 With appropriate mitigation measures flood risk from this source can be considered LOW.



4.33 *Figure 3 – Environment Agency Surface Water Flood Risk Map*

Land Drainage

4.34 Any land drainage discovered during excavations on site, should be repaired or diverted. Should this not be possible due to layout constraints, then it is recommended that the land drain is further investigated by the development engineer, to determine if the drain is still required post development.

4.35 Based on the available information flood risk from this source is considered LOW.

5. Summary of Flood Risk

5.1

5.2 The table below summarises the sources of possible flooding which have been investigated and indicates any mitigation requirements.

Flood Risk Source	Current Risk Level	Mitigation Requirement during detailed design	Risk Level following Mitigation
Tidal & Fluvial Flooding	LOW	Proposed development located in Flood Zone 1	LOW
Groundwater	LOW	Construction stage dewatering may be required.	LOW
Sewer Flooding	LOW	No evidence to suggest risk of sewer flooding on site or in the immediate vicinity.	LOW
Overland Flow	LOW	Overland flow paths will be diverted though the site. Any land drainage encountered during construction is to be repaired. Best practice measures will be applied to the development. See section 4.21	LOW
Land Drainage	LOW	Any land drainage encountered is to be repaired.	LOW

5.3 *Summary of Flood Risk*

6. Proposed Development

6.1 Gleeson Homes propose to develop the site for residential use for 300 dwellings, with landscaping, access and infrastructure works. The proposed layout can be viewed in Appendix 3 as part of the drainage strategy.

Planning Context

6.2 The EA flood maps for the region show that the proposed development area sits within FLOOD ZONE 1, which has a low probability of flooding 1 in 1000 in any one year (0.1%). This is illustrated in Table 1.

6.3 The proposed development will comprise residential dwellings and, therefore, in accordance with NPPF Tables 1 and 2, the residential development is classified as 'more vulnerable'.

6.4 The classification parameters are illustrated in Table 3.

6.5 Thus, given that the proposed development area of site is situated in FLOOD ZONE 1 and the vulnerability classification in accordance with the NPPF compatibility matrix, the scheme is classified as appropriate for development.

Table 1 Flood Risk Probability

Flood Zone	Probability	Explanation
Flood Zone 1	Low Probability	This zone comprises land assessed as having a less than 1 in 1,000 annual probability of river or sea flooding (<0.1%).
Flood Zone 2	Medium Probability	This zone comprises land assessed as having between a 1 in 100 and 1 in 1,000 annual probability of river flooding (1% – 0.1%), or between a 1 in 200 and 1 in 1,000 annual probability of sea flooding (0.5% – 0.1%) in any year.
Flood Zone 3a	High Probability	This zone comprises land assessed as having a 1 in 100 or greater annual probability of river flooding (>1%), or a 1 in 200 or greater annual probability of flooding from the sea (>0.5%) in any year.
Flood Zone 3b	Functional Floodplain	This zone comprises land where water has to flow or be stored in times of flood

Table 2 Flood Risk Vulnerability

Category	Explanation
Essential Infrastructure	• Essential transport infrastructure (including mass evacuation routes) which has to cross the area at risk, and strategic utility infrastructure, including electricity generating power stations and grid and primary substations.
Highly Vulnerable	• Police stations, Ambulance stations and Fire stations and Command Centres and telecommunications installations required to be operational during flooding. • Emergency dispersal points. • Basement dwellings. • Caravans, mobile homes and park homes intended for permanent residential use. • Installations requiring hazardous substances consent.
More Vulnerable	• Hospitals. • Residential institutions such as residential care homes, children's homes, social services homes, prisons and hostels. • Buildings used for: dwelling houses; student halls of residence; drinking establishments; nightclubs; and hotels. • Non–residential uses for health services, nurseries and educational establishments. • Landfill and sites used for waste management facilities for hazardous waste. • Sites used for holiday or short-let caravans and camping, subject to a specific warning and evacuation plan.
Less Vulnerable	• Buildings used for: shops; financial, professional and other services; restaurants and cafes; hot food takeaways; offices; general industry; storage and distribution; non–residential institutions not included in 'more vulnerable'; and assembly and leisure. • Land and buildings used for agriculture and forestry. • Waste treatment (except landfill and hazardous waste facilities). • Minerals working and processing (except for sand and gravel working). • Water treatment plants. • Sewage treatment plants (if adequate pollution control measures are in place).
Water-compatible development	• Flood control infrastructure • Water transmission infrastructure and pumping stations. • Sewage transmission infrastructure and pumping stations. • Sand and gravel workings. • Docks, marinas and wharves. • Navigation facilities. • MOD defence installations. • Ship building, repairing and dismantling, dockside fish processing and refrigeration and compatible activities requiring a waterside location. • Water-based recreation (excluding sleeping accommodation). • Lifeguard and coastguard stations. • Amenity open space, nature conservation and biodiversity, outdoor sports and recreation and essential facilities such as changing rooms. • Essential ancillary sleeping or residential accommodation for staff required by uses in this category, subject to a specific warning and evacuation plan.

Table 3 Flood Risk Compatibility

Flood Zone	Essential Infrastructure	Water Compatible	Highly Vulnerable	More Vulnerable	Less Vulnerable
Zone 1	Appropriate	Appropriate	Compatible	Appropriate	Appropriate
Zone 2	Appropriate	Appropriate	Exception Test required	Appropriate	Appropriate
Zone 3a	Exception Test required	Appropriate	Not Permitted	Exception Test required	Appropriate
Zone 3b	Exception Test required	Appropriate	Not Permitted	Not Permitted	Not Permitted

7. Management of Surface Water

Existing Drainage Regime

7.1 The topography of the site would suggest that any overland flow will follow the existing contours of the site via gravity.

7.2 The equivalent greenfield run off rates from the existing site have been calculated using HR Wallingford Greenfield Runoff Estimation. Calculations can be found in Appendix 5.

7.3 The overall developable boundary for the site is 13 hectares (ha). The existing rates are shown below based on 12.2 ha of Greenfield area.

Return Period	12.2ha Developable Boundary Existing Peak Discharge Rate (l/sec)	Proposed Discharge Rate (l/sec)	Percentage Reduction (%)
1 year	95.7		
QBar	**110.0**	**110.0**	-
30 year	187.0	**110.0**	41.17
100 year	228.8	**110.0**	51.92

7.4 The existing peak discharge rate for the developable boundary equates to QBar 110.0 l/sec.

7.5 It is proposed to restrict the discharge rate to QBar 110.0 l/sec for all storm events which equates to a 41.17% reduction over the 30-year event and a 51.92% reduction over the 100-year event.

Possible Drainage Solutions

7.6 An assessment of possible drainage options has been undertaken in accordance with Building Regulations H3 Section 3 and NPPF. The disposal of surface water has been considered in the following order of priority.

-An adequate soakaway or some other infiltration system; or, where not reasonably practicable,

-A watercourse, or where not reasonably practicable,

-A sewer

Infiltration

7.7 Infiltration drainage has been considered in accordance with the drainage hierarchy; however, based on the available ground information infiltration drainage is unlikely to be feasible across the site.

Discharge to a Watercourse

7.8 There are watercourses located in the sites immediate vicinity which provide a viable discharge option for surface water flows.

Discharge to Public Sewers

7.9 Existing public sewers are located within the immediate vicinity of the site and are considered to provide a viable discharge option for foul flows.

8. Preferred Drainage Solution

Storm Drainage

8.1 The proposed surface water drainage strategy has been developed in accordance with current best practice and the SuDS hierarchy, with the aim of restricting runoff to greenfield rates and managing flows on site through attenuation.

8.2 Given the site characteristics, infiltration has been disregarded and attenuation-based Sustainable Drainage Systems (SuDS) are proposed. Surface water runoff will therefore be managed via a series of on-site attenuation basins, which will provide storage during storm events and discharge at controlled rates via flow control devices.

8.3 The site will be divided into three discrete surface water drainage catchments. One catchment will drain to a pair of attenuation basins arranged in series, providing staged attenuation and enhanced control of runoff. The remaining catchments will each drain to a single attenuation basin. This arrangement has been developed in response to site topography and drainage connectivity, while still ensuring effective management of runoff across the site.

8.4 Surface water runoff from impermeable areas will be collected via a gravity piped network and conveyed to a series of swales and attenuation basins. The swales will provide above-ground conveyance, interception of overland flows, and an element of water quality treatment prior to discharge to the attenuation features. Attenuated flows will then discharge to the watercourse Midgey Gill.

8.5 The proposed drainage layout is illustrated on the engineering drawings included within Appendix 3.

8.6 Attenuation storage requirements have been calculated for the critical 1 in 100 year rainfall event, including allowances for +50% climate change and a 10% increase in impermeable area to account for urban creep. The total attenuation volume required for the site is estimated to be approximately 2,920 m^3. This volume will be distributed across the four proposed attenuation basins to ensure sufficient storage capacity is provided and that runoff is effectively managed across the development.

8.7 All new adoptable standard surface water drainage is to be designed in accordance with 'Sewerage Sector Guidance'. An increase in impermeable area should be applied for urban creep (10%) in addition to consideration for a 50% increase in rainfall due to climate change resulting in future proofing against flood risk for the life of the development.

Foul Drainage

8.8 A review of available utility records indicates that a 225 mm diameter foul water sewer is present within the site boundary. In addition, two further foul sewers are located to the north of the site, providing potential connection points for the proposed development.

8.9 It is proposed that foul flows generated by the development will be managed via three separate drainage networks, with each network discharging to one of the identified foul sewers.

8.10 A pre-planning enquiry will be submitted to United Utilities to confirm key details of the existing sewer network, including the precise location, invert levels, pipe diameters, and available capacity. Any proposed connections will be subject to formal approval under Section 106 of the Water Industry Act 1991, and agreement to discharge will be required from the statutory undertaker prior to implementation.

8.11 All new adoptable foul sewerage is to be designed in accordance with 'Sewerage Sector Guidance'.

9. Conclusion

Flood Risk

9.1 The flood risk assessment and drainage strategy has been prepared in accordance with the NPPF, Flood Risk and Coastal Change Planning Practice Guidance. The management of the surface water flows have also been considered in accordance with Building Regulations H3 Section 3.

9.2 There is low risk of flooding from fluvial sources with a probability of 1 in 1000 in any one year (<0.1%). The proposed development is classified as 'more vulnerable' and is located within FLOOD ZONE 1, therefore, the development is suitable within this flood zone in accordance with NPPF. Employment of the mitigation measures stated in this report will ensure that the development will be safe and is suitable in this location.

9.3 Flood risk from all sources have been considered and with mitigation where necessary it has been established that these sources do not pose a residual risk to the development.

Surface Water Management

9.4 The proposed surface water drainage strategy will attenuate runoff to greenfield rates prior to discharge to watercourses located within the immediate vicinity of the site.

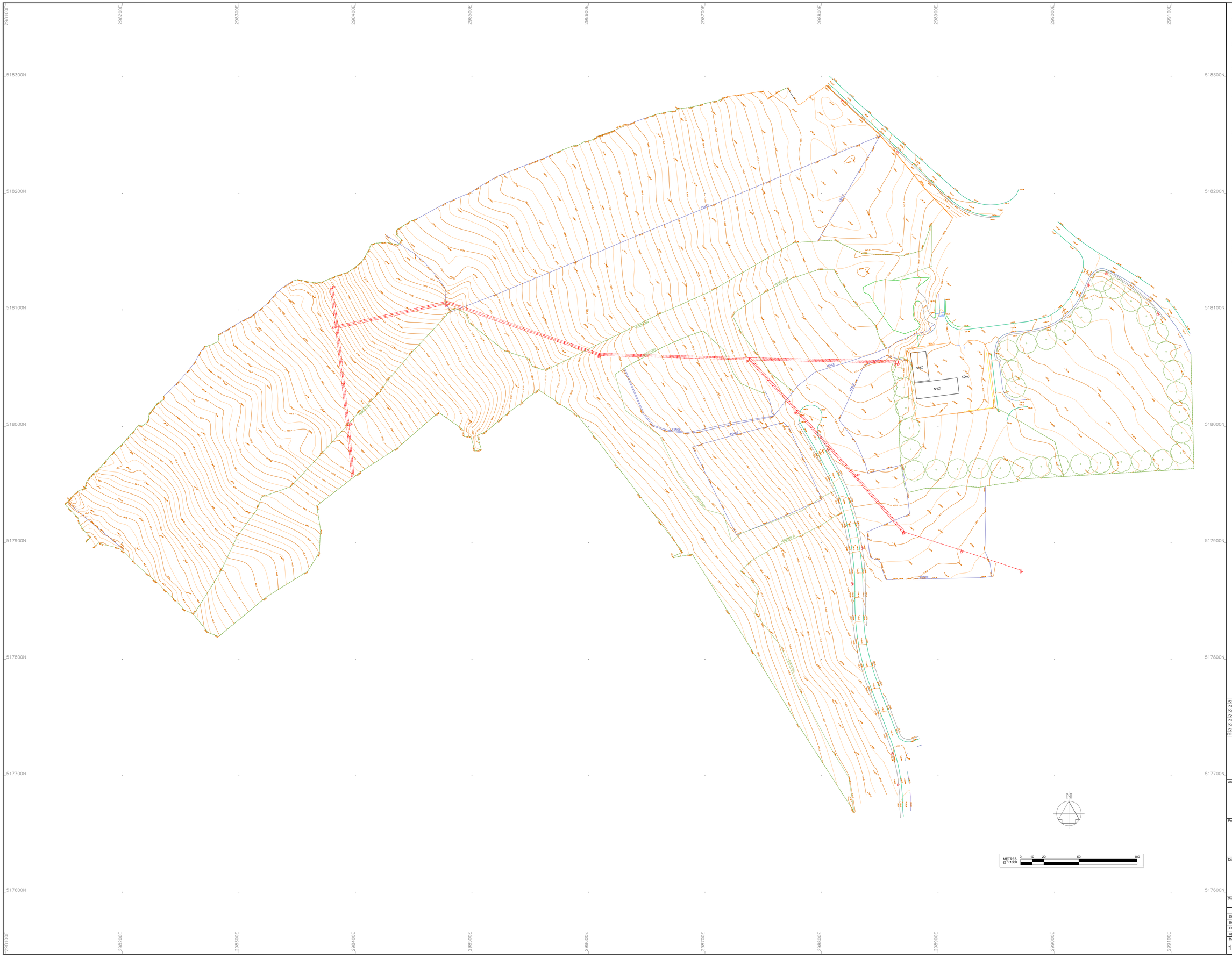
9.5 All new adoptable standard surface water drainage is to be designed in accordance with 'Sewerage Sector Guidance'. A 50% increase in rainfall due to climate change has been considered, in addition to an increase in impermeable area for urban creep (10%), to future proof for the lifetime of the development.

Foul Drainage

9.6 Foul flows from the proposed development will be discharged to the foul United Utilities sewers located on site and in the immediate vicinity.

9.7 All new adoptable foul sewerage is to be designed in accordance with 'Sewerage Sector Guidance'.

Appendix 1 – Topographical Survey



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The Survey information contained herein has been derived from an airborne LiDAR survey.

The point cloud classification removed noise to allow for the true ground profile to be extracted to a relative accuracy of +/-40mm in plan and height

REV	DESCRIPTION	DRN	CHK	APP	DATE
P07	-	JB	JB	JB	00.00.00
P06	-	JB	JB	JB	00.00.00
P05	-	JB	JB	JB	00.00.00
P04	-	JB	JB	JB	00.00.00
P03	-	JB	JB	JB	00.00.00
P02	-	JB	JB	JB	00.00.00
P01	-	JB	JB	JB	00.00.00

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Architect/Client/Contractor

Project
HARRAS MOOR

Drawing Title
TOPOGRAPHIC SURVEY

Drawing Status
INFORMATION

	Name	Date	Status Code
Drawn	A.MCVICAR	30.09.24	S3
Designed			Scale
Eng Chk	A.MCKEVITT	01.10.24	1:1000
Approved	A.MUIR	01.10.24	Revision C01

Drawing No.
109633 - PEF - XX - XXX - MM3 - Y - 00001

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Appendix 2 – United Utilities Correspondence

CON29DW Commercial Search

Responses to a drainage and water enquiry for commercial premises or development sites.

Client:

Searchflow

42
Kings Hill Avenue,
West Malling, Kent
ME19 4AJ

FAO:

Client ref: SF33400125000

Order number: UUPS-ORD-628977
Received date: 29/01/2025
Response date: 03/02/2025

The following records were searched in compiling this report:

The map of public sewers
The map of waterworks
Water and sewerage billing records
Adoption of public sewers records
Building over public sewer records
Adoption of public water mains records
Water supply clarification

Property address: Land and buildings at Harras Moor North, Whitehaven, CA28 6TA

Please Note - We must make you aware that due to the introduction of the open market with effect from 1st April 2017 for commercial customers, Property Searches will no longer be able to resolve issues regarding some discrepancies within the report. Due to the change in the structure of the market the retailer is now responsible for taking ownership of certain issues, particularly relating to billing/tariff charges as well as, but not limited to change of usage of a property.

Enquiries and Responses
The records were searched by Katy Lowry for United Utilities who does not have, nor is likely to have, any personal or business relationship with any person involved in the sale of the property.

This search report was prepared by Katy Lowry for United Utilities who does not have, nor is likely to have, any personal or business relationship with any person involved in the sale of the property.

How to contact us:

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

What is included:

1. Summary of findings and key
2. Detailed findings of the CON29DW
3. Guidance for interpretation
4. Terms and conditions
5. Complaints policy

United Utilities
Water for the North West

CON29DW COMMERCIAL DRAINAGE & WATER SEARCH

To help understand the implications of the drainage and water enquiries report a summary guide to the content of the full report is provided below.

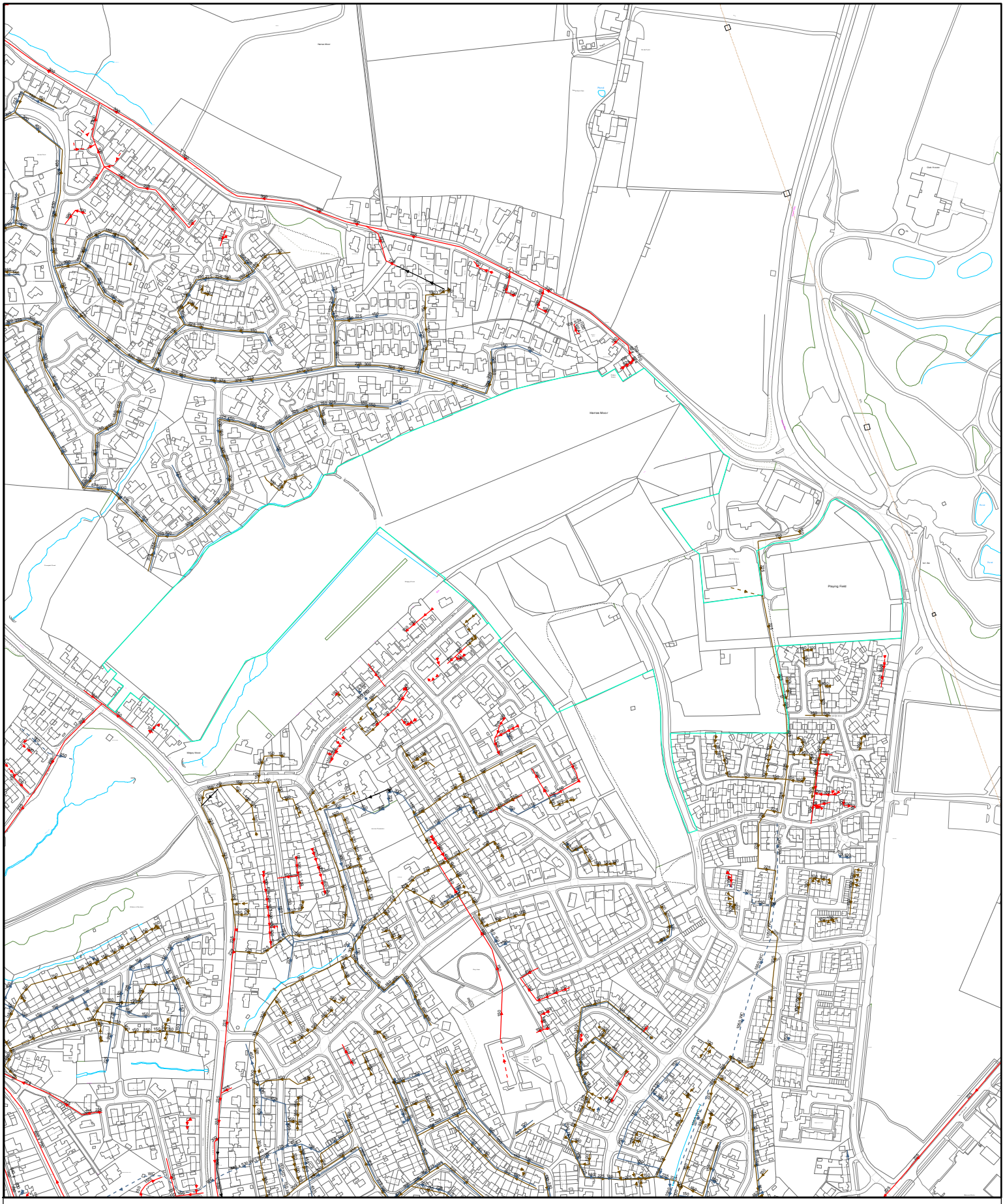
✓ *This response represents the typical situation for a property.*

✗ *This response represents an uncommon situation for a property and the purchaser should carefully consider its implications.*

⚑ *The attention of the purchaser is drawn to this response. The purchaser may wish to make further investigations into this situation.*

Question	Report Schedule	Answer	
1.1	Where relevant, please include a copy of an extract from the public sewer map.	Yes & in vicinity	✓
1.2	Where relevant, please include a copy of an extract from the map of waterworks.	Yes & in vicinity	✓
2.1	Does foul water from the property drain to a public sewer?	Plot of land	⚑
2.2	Does surface water from the property drain to a public sewer?	Plot of land	⚑
2.3	Is a surface water drainage charge payable?	No	✗
2.4	Does the public sewer map indicate any public sewer, disposal main or lateral drain within the boundaries of the property?	Public	✗
2.4.1	Does the public sewer map indicate any public pumping station or ancillary apparatus within the boundaries of the property?	None	✓
2.5	Does the public sewer map indicate any public sewer within 30.48 metres (100 feet) of any buildings within the property?	None	⚑
2.5.1	Does the public sewer map indicate any public pumping station or any other ancillary apparatus within 50 metres (164.04 feet) of any buildings within the property?	None	✓
2.6	Are any sewers or lateral drains serving or which are proposed to serve the property the subject of an existing adoption agreement or an application for such an agreement?	F - No SW - No	✓ ✓
2.7	Has a sewerage undertaker approved or been consulted about any plans to erect a building or extension on the property over or in the vicinity of a public sewer, disposal main or drain?	None	✓
2.8	Is any building which is or forms part of the property at risk of internal flooding due to overloaded public sewers?	No	✓
2.9	Please state the distance from the property to the nearest boundary of the nearest sewage treatment works.	Yes	✓
3.1	Is the property connected to mains water supply?	Plot of Land	⚑
3.2	Are there any water mains, resource mains or discharge pipes within the boundaries of the property?	Yes	✗
3.3	Is any water main or service pipe serving or which is proposed to serve the property the subject of an existing adoption agreement or an application for such an agreement?	No	✓

Question	Report Schedule	Answer	
3.4	Is this property at risk of receiving low water pressure or flow?	No	✓
3.5	What is the clarification of the water supply for the property?	Very Soft	✓
3.6	Is there a meter installed at the property?	No	✓
3.7	Please include details of the location of any water meter serving the property.	No meter	✓
4.1.1	Who is responsible for providing the sewerage services for the property?	United Utilities	✓
4.1.2	Who is responsible for providing the water services for the property?	United Utilities	✓
4.2	Who bills the property for sewerage services?	Retailer sewer	✓
4.3	Who bills the property for water services?	Retailer water	✓
5.1	Is there Consent to discharge Trade Effluent under S118 of the Water Industry Act (1991) into the public sewerage system?	No	✓
6.1	Is there a wayleave/easement agreement giving the Water and/or Sewerage Undertaker the right to lay or maintain assets or right of access to pass through private land in order to reach the Company's assets?	No	✓
6.2	On the copy extract from the public sewer map, please show manhole cover, depth and invert levels where the information is available.	Not included	✓



Date: 03/02/2025

Extract from Map of Public Sewers

Printed By:
Property Searches

Land and buildings at Harras Moor North, Whitehaven, CA28 6T

United Utilities
Water for the North West

The position of underground apparatus shown on this plan is approximate only and is given in accordance with the best information currently available. The actual positions may be different from those shown on the plan and private pipes, sewers or drains may not be recorded. United Utilities Water PLC will not accept any liability for any damage caused by the actual positions being different from those shown.

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Wastewater Symbology

Abandoned	Foul	Surface Water	Combined	
				Public Sewer
				Private Sewer
				Section 104
				Rising Main
				Sludge Main
				Overflow
				Water Course
				Highway Drain

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

- Manhole
- HS Head of System
- ES Extent of Survey
- RE Rodding Eye
- IN Inlet
- DP Discharge Point
- HY Vortex
- PE Penstock
- WO Washout Chamber
- VA Valve
- AV Air Valve
- NRV Non Return Valve
- SO Soakaway
- GU Gully
- CA Cascade
- FM Flow Meter
- HA Hatch Box
- OI Oil Interceptor
- SM Summit
- DS Drop Shaft
- OP Orifice Plate
- Side Entry Manhole
- Outfall
- Screen Chamber
- IC Inspection Chamber
- Bifurcation Chamber
- LH Lamp Hole
- T Junction / Saddle
- Catchpit
- Valve Chamber
- Vent Column
- Vortex Chamber
- Penstock Chamber
- T Network Storage Tank
- V Sewer Overflow
- WwTW Ww Treatment Works
- Ww Pumping Station
- Septic Tank
- Control Kiosk
- DNM Network Monitoring Point
- Change of Characteristic

Clean Water Symbology

Proposed	Abandoned	Live	
			Distribution Main
			Trunk Main
			Comms Pipe
			Private Pipe
			Concessionary Service
			Raw Water
			LDTM Raw Water
			LDTM Treated Water

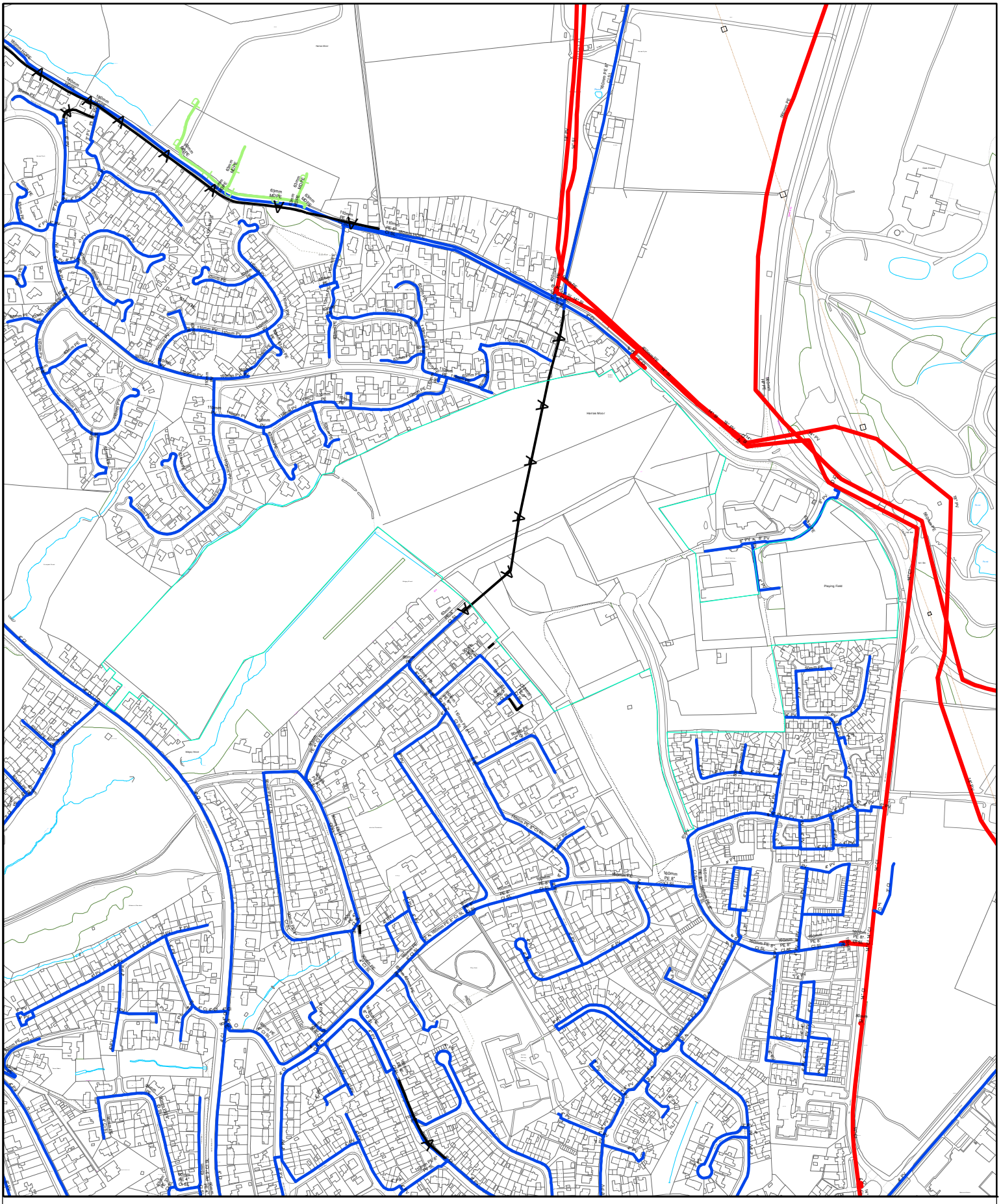
- Air Valve
- AC Valve, open
- AC Valve, closed
- CC Valve, open
- CC Valve, closed
- Non Return Valve
- Pressure Management Valve
- OMS Valve
- Stop Tap
- Flow Meter
- Domestic Meter
- Commercial Meter
- Pump
- Hydrant
- Fire Hydrant
- Anode
- Chlorination Point
- De-chlorination Point
- Strainer Point
- Access Point
- Hatch Box
- IP Point
- Sampling Station
- Logger Box

- Bore Hole
- Inlet Point
- Bulk Supply Point
- End Cap
- Site Termination
- Change of Characteristic
- Condition Report

Property Types

- Water Tower
- Valve House
- Booster Pumping Station
- Intake Pumping Station
- Water Treatment Works
- Supply Reservoir
- Service Reservoir
- Impounding Reservoir
- Pipe Bridge

Symbology for proposed assets is the same as above, but shown in green
Symbology for abandoned assets is the same as above, but shown in black



Date: 03/02/2025

Extract from Map Of Water Mains

Printed By:
Property Searches

Land and buildings at Harras Moor North, Whitehaven, CA28 6

United Utilities
Water for the North West

The position of underground apparatus shown on this plan is approximate only and is given in accordance with the best information currently available. The actual positions may be different from those shown on the plan and private pipes, sewers or drains may not be recorded. United Utilities Water PLC will not accept any liability for any damage caused by the actual positions being different from those shown.

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Question 1.1 **Where relevant, please include a copy of an extract from the public sewer map.**

Answer **A copy of an extract of the public sewer map within the vicinity of the property is included.**

Guidance

1. The Water Industry Act 1991 defines Public Sewers as those which (United Utilities) have responsibility for. Other assets and rivers, water courses, ponds, culverts or highway drains may be shown for information purposes only.

2. Any private sewers or lateral drains which are indicated on the extract of the public sewer map as being subject to an agreement under Section 104 of the Water Industry Act 1991 are not an 'as constructed' record. It is recommended these details be checked with the developer.

3. The Sewerage Undertaker has a statutory right of access to carry out work on its assets, subject to notice. This may result in employees of the Sewerage Undertaker or its contractors needing to enter the property to carry out work.

Question 1.2 **Where relevant, please include a copy of an extract from the map of waterworks.**

Answer **A copy of an extract of the map of waterworks is included, showing water mains, resource mains or discharge pipes in the vicinity of the property.**

Guidance

The "water mains" in this context are those which are vested in and maintainable by the Water Undertaker under statute.

Assets other than public water mains may be shown on the plan, for information only. Water Undertakers are not responsible for private supply pipes connecting the property to the public water main and do not hold details of these. These may pass through land outside of the control of the seller, or may be shared with adjacent properties. The buyer may wish to investigate whether separate rights or easements are needed for their inspection, repair or renewal.

If an extract of the public water main record is enclosed, it will show known public water mains in the vicinity of the property. It should be possible to estimate the likely length and route of any private water supply pipe connecting the property to the public water network.

The presence of a public water main running within the boundary of the property may restrict further development within it. Water Undertakers have a statutory right of access to carry out work on their assets, subject to notice. This may result in employees of the Water Undertaker or its contractors needing to enter the property to carry out work.

Question 2.1 **Does foul water from the property drain to a public sewer?**

Answer **This enquiry appears to relate to a plot of land or a recently built property. It is recommended that drainage proposals are checked with the developer.**

Guidance

Sewerage Undertakers are not responsible for any private drains or sewers that connect the property to the public sewerage system, and do not hold details of these.

The property owner will normally have sole responsibility for private drains serving the property and may have shared responsibility, with other users, if the property is served by a private sewer which also serves other properties. These may pass through land outside of the control of the seller and the buyer may wish to investigate whether separate rights or easements are needed for their inspection, repair or renewal.

If foul water does not drain to the public sewerage system the property may have private facilities in the form of a cesspit, septic tank or other type of treatment plant.

If an extract from the public sewer map is enclosed, this will show known public sewers in the vicinity of the property and it should be possible to estimate the likely length and route of any private drains and/or sewers connecting the property to the public sewerage system.

Question 2.2 **Does surface water from the property drain to a public sewer?**

Answer **This enquiry appears to relate to a plot of land or a recently built property. It is recommended that drainage proposals are checked with the developer. If the property was constructed after the 6th April 2015 the surface water drainage may be served by a sustainable drainage system.**

Guidance

Sewerage Undertakers are not responsible for any private drains or sewers that connect the property to the public sewerage system and do not hold details of these.

The property owner will normally have sole responsibility for private drains serving the property and may have shared responsibility with other users, if the property is served by a private sewer which also serves other properties. These may pass through land outside of the control of the seller and the buyer may wish to investigate whether separate rights or easements are needed for their inspection, repair or renewal.

In some cases, Sewerage Undertakers' records do not distinguish between foul and surface water connections to the public sewerage system. If on inspection the buyer finds that the property is not connected for surface water drainage, the property may be eligible for a rebate of the surface water drainage charge. Details can be obtained from the Sewerage Undertaker.

If surface water does not drain to the public sewerage system the property may have private facilities in the form of a soakaway or private connection to a watercourse. If an extract from the public sewer map is enclosed, this will show known public sewers in the vicinity of the property and it should be possible to estimate the likely length and route of any private drains and/or sewers connecting the property to the public sewerage system.

Question 2.3 **Is a surface water drainage charge payable?**

Answer **Records indicate that a surface water drainage charge is not applicable for the property.**

Guidance

Since 1st April 2017 commercial customers can choose their retailer for clean, waste or both services. For more information on any applicable surface water charges you will need to contact the current owner of the property to find out who the current retailer is. Details of the retailer for a property can be found on the current occupiers bill. For a list of all potential retailers of water and waste water services for the property please visit www.open-water.org.uk.

Please note if the property was constructed after 6th April 2015 the Surface Water drainage may be served by a Sustainable Drainage System. Further information may be available from the Developer.

Question 2.4 **Does the public sewer map indicate any public sewer, disposal main or lateral drain within the boundaries of the property?**

Answer **The public sewer map included indicates that there are public sewers, disposal mains or lateral drains within the boundary of the property. However from the 1st October 2011 there may be additional public sewers, disposal mains or lateral drains which are not recorded on the public sewer map which may further prevent or restrict development of the property. If you are considering any future development at this property which may require build over consent, please complete the enquiry form by accessing the following link http://www.unitedutilities.com/planning-wastewater-guidance.aspx.**

Guidance

The approximate boundary of the property has been determined by reference to the Ordnance Survey record. A property of this type will normally be served by a shared sewer passing through the boundaries of several properties. It is therefore likely that a public sewer or lateral drain is present within the property boundary.

Please note that from 1st October 2011 the majority of private sewers and lateral drains connected to the public network as of 1st July 2011 transferred into public ownership and therefore it is possible there may be additional public assets which may not be shown on the public sewer plan.

The presence of public assets running within the boundary of the property may restrict further development. If there are any plans to develop the property further enquiries should be made to United Utilities Build Over department.

United Utilities Water has a legal right of access to carry out work on its assets, subject to notice. This may result in employees of the Company or its contractors needing to enter the property to carry out work.

Question 2.4.1 **Does the public sewer map indicate any public pumping station or ancillary apparatus within the boundaries of the property?**

Answer **The public sewer map included indicates that there is no public pumping station or other ancillary apparatus within the boundaries of the property. However, from the 1st October 2016 private pumping stations which serve more than one property will be transferred into public ownership but may not be recorded on the public sewer map until that time**

Guidance

From 1 October 2016 United Utilities will be responsible for private pumping stations (though we may take ownership of some stations before this date) that either:

* serve a single property, and are outside the property boundary or

* serves two or more properties

Only private pumping stations installed before 1st July 2011 will be transferred into our ownership. United Utilities will be responsible for all associated costs, maintenance, repairs and any necessary upgrade work.

Where the property is part of a very recent or ongoing development and the sewers/pumping station are not the subject of an adoption application, buyers should consult with the developer to ascertain the extent of private drains, sewers and pumping stations for which they will hold maintenance and renewal liabilities.

Other ancillary apparatus may include in-sewer monitors. These devices help Untied Utilities proactively monitor performance of the sewerage network. United Utilities will be responsible for maintaining these devices. If an in-sewer monitor is installed in the sewerage network within the boundary of the property then please be aware that maintenance work may be needed on the device.

Question 2.5 **Does the public sewer map indicate any public sewer within 30.48 metres (100 feet) of any buildings within the property?**

Answer **The public sewer map included indicates that there are no public sewers within 30.48 metres (100 feet) of a building within the boundary of the property. However from the 1st October 2011 private sewers will be transferred into public ownership and may not be recorded on the public sewer map and it is our professional opinion that there will be a public sewer within 30.48 (100 feet) of a building within the boundary of the property.**

Guidance

From 1st October 2011 there may be additional lateral drains and/or public sewers which are not recorded on the public sewer map but are also within 30.48 metres (100 feet) of a building within the property.

The presence of a public sewer within 30.48 metres (100 feet) of the building(s) within the property can result in the Local Authority requiring a property to be connected to the public sewer.

The measure is estimated from the Ordnance Survey record, between the building(s) within the boundary of the property and the nearest public sewer.

Sewers indicated on the extract of the public sewer map as being subject to an agreement under Section 104 of the Water Industry Act 1991 are not an 'as constructed' record. It is recommended that these details are checked with the developer, if any.

Assets other than public sewers may be shown on the copy extract for information only.

Question 2.5.1 **Does the public sewer map indicate any public pumping station or any other ancillary apparatus within 50 metres (164.04 feet) of any buildings within the property?**

Answer

The public sewer map included indicates that there is no public pumping station or other ancillary apparatus within 50 metres of any buildings within the property. However, from 1st October 2016 private pumping stations which serve more than one property will be transferred into public ownership but may not be recorded on the public sewer map until that time.

Guidance

From 1 October 2016 United Utilities will be responsible for private pumping stations (though we may take ownership of some stations before this date) that either:

* serve a single property, and are outside the property boundary or

* serves two or more properties.

Only private pumping stations installed before 1st July 2011 will be transferred into our ownership. United Utilities will be responsible for all associated costs, maintenance, repairs and any necessary upgrade work.

If you think there might be a private pumping station on your land or near your business property, please let us know by completing this questionnaire with as much information as possible, please visit our website http://www.unitedutilities.com/ppstransfer.aspx.

Where the property is part of a very recent or ongoing development and the sewers/pumping station are not the subject of an adoption application, buyers should consult with the developer to ascertain the extent of private drains, sewers and pumping stations for which they will hold maintenance and renewal liabilities.

Question 2.6

Are any sewers or lateral drains serving or which are proposed to serve the property the subject of an existing adoption agreement or an application for such an agreement?

Answer

Foul - Records confirm that foul sewers and/or lateral drains serving the development, of which the property forms part are not the subject of an existing adoption agreement or an application for such an agreement.

Surface Water - Records confirm that the surface water sewer(s) and/or surface water lateral drain(s) are not the subject of an adoption agreement and it is recommended that responsibility for maintenance of these is checked with the developer as this may be due to a Sustainable Drainage Scheme (SUDS)

Guidance

This enquiry is of interest to purchasers of new property who will want to know whether or not the property will be linked to a public sewer.

Where the property is part of a very recent or ongoing development and the sewers are not the subject of an adoption application, buyers should consult with the developer to ascertain the extent of private drains and sewers for which they will hold maintenance and renewal liabilities.

Final adoption is subject to the developer complying with the terms of the adoption agreement under Section 104 of the Water Industry Act 1991.

Question 2.7

Has a sewerage undertaker approved or been consulted about any plans to erect a building or extension on the property over or in the vicinity of a public sewer, disposal main or drain?

Answer

There are no records in relation to any approval or consultation about plans to erect a building or extension on the property over or in the vicinity of a public sewer, disposal main or drain. However, the sewerage undertaker might not be aware of a building or extension on the property over or in the vicinity of a public sewer, disposal main or drain.

Guidance

From the 1st October 2011 private sewers, disposal mains and lateral drains were transferred into public ownership and the sewerage undertaker may not have granted approval or been consulted about any plans to erect a building or extension on the property over or in the vicinity of these assets.

Prior to 2003 United Utilities Water Limited had sewerage agency agreements with the local authorities therefore details of any agreements/consents or rejections may not have been forwarded on to our offices before this date.

Buildings or extensions erected over a sewer in contravention of building controls may have to be removed or altered.

Question 2.8 **Is any building which is or forms part of the property at risk of internal flooding due to overloaded public sewers?**

Answer **The building is not recorded as being at risk of internal flooding due to overloaded public sewers. From the 1st October 2011 private sewers, disposal mains and lateral drains were transfered into public ownership it is therefore possible that a property may be at risk of internal flooding due to an overloaded public sewer which the sewerage undertaker is not aware of. For further information it is recommended that enquiries are made of the vendor.**

Guidance

1. A sewer is "overloaded" when the flow from a storm is unable to pass through it due to a permanent problem (e.g. flat gradient, small diameter). Flooding as a result of temporary problems such as blockages, siltation, collapses and equipment or operational failures are excluded.

2. "Internal flooding" from public sewers is defined as flooding, which enters a building or passes below a suspended floor. For reporting purposes, buildings are restricted to those normally occupied and used for residential, public, commercial, business or industrial purposes.

3.These are defined as properties that have suffered or are likely to suffer internal flooding from public foul, combined or surface water sewers due to overloading of the sewerage system more frequently than the relevant reference period (either once or twice in ten years) as determined by the Sewerage Undertaker's reporting procedure.

4. Flooding as a result of storm events proven to be exceptional and beyond the reference period of one in ten years are not included.

5. Properties may be at risk of flooding but not included where flooding incidents have not been reported to the Sewerage Undertaker.

6. Public sewers are defined as those for which the Sewerage Undertaker holds statutory responsibility under the Water Industry Act 1991.

7. It should be noted that flooding can occur from private sewers and drains which are not the responsibility of the Sewerage Undertaker.

8. This report excludes flooding from private sewers and drains and the Sewerage Undertaker makes no comment upon this matter. For reporting purposes buildings are restricted to those normally occupied and used for residential, public, commercial, business or industrial purposes.

Question 2.9 **Please state the distance from the property to the nearest boundary of the nearest sewage treatment works.**

Answer **The nearest Sewage Treatment Works is 1.83 miles (2.94 km), North West of the property. The name of the Sewage treatment works is Whitehaven WwTW. The owner is United Utilities**

Guidance

The nearest sewage treatment works will not always be the sewage treatment works serving the catchment within which the property is situated i.e. the property may not necessarily drain to this works.

The Sewerage Undertaker's records were inspected to determine the nearest sewage treatment works.

It should be noted therefore that there may be a private sewage treatment works closer than the one detailed above that has not been identified. As a responsible utility operator, United Utilities Water Limited seeks to manage the impact of odour from operational sewage works on the surrounding area.

This is done in accordance with the "Code of Practice on Odour Nuisance from Sewage Treatment Works" issued via the Department of Environment, Food and Rural Affairs (DEFRA).

This Code recognises that odour from sewage treatment works can have a detrimental impact on the quality of the local environment for those living close to works.

However DEFRA also recognises that sewage treatment works provide important services to communities and are essential for maintaining standards in water quality and protecting aquatic based environments. For more information visit www.unitedutilities.com.

Question 3.1 **Is the property connected to mains water supply?**

Answer **This enquiry relates to a plot of land or a recently built property. It is recommended that the water supply proposals are checked with the developer.**

Guidance If the property is suplied by private water mains please note that details of private supplies are not kept by the Water Undertaker. The situation should be checked with the current owner of the property.

Question 3.2 **Are there any water mains, resource mains or discharge pipes within the boundaries of the property?**

Answer **The map of waterworks indicates that there are water mains, resource mains or discharge pipes within the boundaries of the property.**

Guidance The boundary of the property has been determined by reference to the Ordnance Survey record.

The presence of a public water main within the boundary of the property may restrict further development within it. Water Undertakers have a statutory right of access to carry out work on their assets, subject to notice.

This may result in employees of the Water Undertaker or its contractors needing to enter the property to carry out work.

Question 3.3 **Is any water main or service pipe serving or which is proposed to serve the property the subject of an existing adoption agreement or an application for such an agreement?**

Answer **Records confirm that water mains or service pipes serving the property are not the subject of an existing adoption agreement or an application for such an agreement.**

Guidance This enquiry is of interest to purchasers of new premises who will want to know whether or not the property will be linked to the mains water supply.

Question 3.4 **Is this property at risk of receiving low water pressure or flow?**

Answer **Records confirm that the building is not recorded by the water undertaker as being at risk of receiving low water pressure or flow.**

Guidance The boundary of the property has been determined by reference to the Ordnance Survey record. "Low water pressure" means water pressure below the regulatory reference level which is the minimum pressure when demand on the system is not abnormal. Water undertakers report properties receiving pressure below the reference level, provided that allowable exclusions do not apply (i.e. events which can cause pressure to temporarily fall below the reference level). Reference level: The reference level of service is a flow of 9l/min at a pressure of 10m head on the customer’s side of the main stop tap (mst). The reference level applies to a single property. The reference level of service must be applied on the customer's side of a meter or any other company fittings that are on the customer's side of the main stop tap. Where a common service pipe serves more than one property, the flow assumed in the reference level must be appropriately increased to take account of the total number of properties served. Surrogate for the reference level: Because of the difficulty in measuring pressure and flow at the mst, companies may measure against a surrogate reference level. Companies should use a surrogate of 15m head in the adjacent distribution main unless a different level can be shown to be suitable. In some circumstances companies may need to use a surrogate pressure greater than 15m to ensure that the reference level is supplied at the customer's side of the mst (for example in areas with small diameter or shared communication pipes).

There are a number of circumstances under which properties identified as receiving low pressure should be excluded from the reported figure. The aim of these exclusions is to exclude properties which receive a low pressure as a result of a one-off event and which, under normal circumstances (including normal peaks in demand), will not receive pressure or flow below the reference level. Companies must maintain verifiable, auditable records of all the exclusions that they apply in order to confirm the accuracy and validity of their information. Allowable exclusions includes Abnormal demand, Planned maintenance, One off incidents, Low pressure incidents of short duration and common supply.

Abnormal demand:

This exclusion is intended to cover abnormal peaks in demand and not the daily, weekly or monthly peaks in demand, which are normally expected. Water undertakers exclude figures from properties which are affected by low pressure only on those days with the highest peak demands. During the yearly report water undertakers may exclude, for each property, up to five days of low pressure caused by peak demand.

Planned maintenance:

Water undertakers will not report low pressures caused by planned maintenance. It is not intended that water undertakers identify the number of properties affected in each instance. However, water undertakers must maintain sufficiently accurate records to verify that low-pressure incidents that are excluded because of planned maintenance, are actually caused by maintenance.

One-off incidents:

This exclusion covers a number of causes of low pressure; mains bursts; failures of company equipment (such as pressure reducing valves or booster pumps); fire fighting and action by a third party. However, if problems of this type affect a property frequently, they cannot be classed as one-off events and further investigation will be required before they can be excluded.

Low pressure incidents of short duration:

Properties affected by low pressures that only occur for a short period, and for which there is evidence that incidents of a longer duration would not occur during the course of the year, may be excluded.

A company must maintain a minimum pressure in the communication pipe of seven metres static head (0.7 bar). If pressure falls below this on two occasions, each occasion lasting more than one hour, within a 28-day period, the company must automatically make a GSS payment to the customer. There are exceptions to the requirement to make a GSS payment if the pressure standard is not met. These are: a payment has already been made to the same customer in respect of the same financial year; it is impractical for the company to have identified the particular customer as being affected, and the customer has not made a claim within three months of the date of the latter occasion; industrial action by the company's employees makes it not feasible to maintain the pressure standard; the act or default of a person other than the company’s representative make it not feasible to maintain the pressure standard; or the pressure falls below the minimum standard due to necessary works taking place or due to a drought.

It should be noted that low water pressure can occur from private water mains, private supply pipes (the pipework from the external stop cock to the property) or internal plumbing which are not the responsibility of the Water Undertaker. This report excludes low water pressure from private water mains, supply pipes and internal plumbing and the Water Undertaker makes no comment upon this matter. For reporting purposes buildings are restricted to those normally occupied and used for residential, public, commercial, business or industrial purposes.

Question 3.5 **What is the clarification of the water supply for the property?**

Answer **The water supplied to the property has an average water hardness of 48mg/l calcium carbonate, which is defined as very soft by United Utilities**

Guidance The hardness of water is due to the presence of calcium and magnesium minerals that are naturally present in the water. The usual signs of a hard water supply are scaling inside kettles, poor lathering of soaps and scum.

What is water hardness?

Hard water is formed when water passes through or over limestone or chalk areas and calcium and magnesium ions dissolve into the water. The hardness is made up of two parts: temporary (carbonate) and permanent (non-carbonate) hardness. When water is boiled, calcium carbonate scale can form, which can deposit on things like kettle elements. The scale will not stick to kettles that have a plastic polypropylene lining but will float on the surface. The permanent hardness that comprises calcium and magnesium sulphate does not go on to form scale when heated or boiled.

How is water hardness measured?

Hardness is usually expressed in terms of the equivalent quantity of calcium carbonate ($CaCO_3$) in milligrams per litre or parts per million. You may also see hardness expressed as degrees of hardness in Clark (English) degrees, French or German degrees. Interconversion between the different measurements can be made by using the appropriate conversion factors below. There are no standard levels as to what constitutes a hard or a soft water. Table 1 gives an indication of the equivalents of calcium and calcium carbonate and the relative degree of hardness.

Water quality standards

There are no regulatory standards for water hardness in drinking water.

Water hardness in the North West

The majority of raw water in the United Utilities region comes from upland surface water reservoirs. The water in the reservoirs has little chance of passing through rocks and to dissolve the minerals that make water hard. Therefore, the majority of water in this region is soft or very soft. We supply water from a number of boreholes in the south of the region that are reasonably hard, but these tend to be blended with softer sources to meet demand. No water supply in the North West is artificially softened.

Can hard water be softened?

Yes, water can be softened artificially by the installation of a water softener or the use of 'jug type' filters. Medical experts recommend that a non-softened supply is maintained for drinking purposes because softened water may contain high levels of sodium. Softeners should be fitted after the drinking water tap and comply with the requirements of the Water Supply (Water Fittings) Regulations 1999. They should be maintained in accordance with manufacturers' instructions.

If you're interested in finding out more about the quality of your drinking water, please visit www.unitedutilities.com/waterquality and enter your postcode.

The Drinking Water Inspectorate is responsible for ensuring the quality of public water supplies. Visit their website at: www.dwi.defra.gov.uk.

Question 3.6 **Is there a meter installed at the property?**

Answer **Records indicate that the property is not served by a water meter**

Guidance Not applicable

Question 3.7 **Please include details of the location of any water meter serving the property.**

Answer **Records indicate that the property is not served by a water meter.**

Guidance Where the property is not served by a meter the current occupier can contact the retailer directly to advise on the current charging method, details of the retailer can also be found on the current occupiers bill.

Question 4.1.1 **Who is responsible for providing the sewerage services for the property?**

Answer **United Utilities Water Limited, Haweswater House, Lingley Mere Business Park, Lingley Green Avenue, Great Sankey, Warrington, WA5 3LP**

Guidance	United Utilities is the sewerage undertaker and will be responsible for providing the sewerage services for the property. If the property is not connected then United Utilities is still the sewerage undertaker responsible for providing sewerage services in this area.
Question 4.1.2	**Who is responsible for providing the water services for the property?**
Answer	**United Utilities Water Limited, Haweswater House, Lingley Mere Business Park, Lingley Green Avenue, Great Sankey, Warrington, WA5 3LP. United Utilities is the water undertaker and will be responsible for providing the water services for the property. If the property is not connected then United Utilities is still the water undertaker responsible for providing water services in this area.**
Guidance	Not Applicable
Question 4.2	**Who bills the property for sewerage services?**
Answer	**Since 1st April 2017 commercial customers can choose their retailer. If you wish to know who currently bills the property for sewerage services you will need to contact the owner of the property to find out who the retailer is.**
Guidance	For a list of all potential retailers of wastewater services for the property please visit www.open-water.org.uk
Question 4.3	**Who bills the property for water services?**
Answer	**Since 1st April 2017 commercial customers can choose their retailer. If you wish to know who currently bills the property for water services you will need to contact the owner of the property to find out who the retailer is.**
Guidance	For a list of all potential retailers of water services for the property please visit www.open-water.org.uk
Question 5.1	**Is there Consent to discharge Trade Effluent under S118 of the Water Industry Act (1991) into the public sewerage system?**
Answer	**There is no record of a Trade Effluent consent at this property. Applications for Trade Effluent consents should be submitted via your retailer for info please visit https://www.unitedutilities.com/Business-services/trade-effluent/**
Guidance	The owner/occupiers of Trade Premises do not have the right to discharge Trade Effluent to the public wastewater network. Any Trade Effluent Discharge Consent will be issued under Section 118 of the Water Industry Act 1991 and will be subject to conditions set by the Sewerage Undertaker. Generally these conditions are to ensure: a) The Health and Safety of staff working within the wastewater network and at wastewater treatment plants. b) The apparatus of the wastewater network is not damaged. c) The flow of the contents of the wastewater network is not restricted. d) Equipment, plant, and processes at treatment works are not disrupted or damaged. e) Treatment of sewage sludge is not impeded and sludges are disposed of in an environmentally friendly manner. f) Final effluent discharge from wastewater treatment plants has no impact on the environment or prevents the receiving waters from complying with EU Directives.

g) Potential damage to the environment via storm water overflows is minimised.

Disputes between an occupier of a Trade Premise and the Sewerage Undertaker can be referred to the Director General of Water Services (OFWAT).

Protecting Public Sewers - Discharges Section 111 of the Water Industry Act 1991, places prohibition on the discharge of the following into a public sewer, drain or a sewer that communicates with a public sewer.

i) Any matter likely to injure the sewer or drain, to interfere with the free flow of its contents or to affect prejudicially the treatment or disposal of its contents.

ii) Any chemical refuse or waste steam or any liquid of temperature higher than 43.3 degrees Celsius (110 degrees Fahrenheit).

iii) Any petroleum spirit or carbide of calcium. On summary conviction offences under this Section carry a fine not exceeding the statutory maximum or a term of imprisonment not exceeding two years, or both.

Please note any existing consent is dependant on the business being carried out at the property and will not transfer automatically upon change of ownership.

Question 6.1 **Is there a wayleave/easement agreement giving the Water and/or Sewerage Undertaker the right to lay or maintain assets or right of access to pass through private land in order to reach the Company's assets?**

Answer **There is no record of a formal easement affecting this property.**

Guidance Not Applicable

Question 6.2 **On the copy extract from the public sewer map, please show manhole cover, depth and invert levels where the information is available.**

Answer **This information is not available in this product but is available in the commercial A1 sewer, A3 water product for those that require this information as part of their due diligence.**

Guidance Not applicable

Appendix 1- General interpretation

1. (1) In this Schedule-

"the 1991 Act" means the Water Industry Act 1991(a);

"the 2000 Regulations" means the Water Supply (Water Quality) Regulations 2000(b);

"the 2001 Regulations" means the Water Supply (Water Quality) Regulations 2001(c);

"adoption agreement" means an agreement made or to be made under Section 51A(1) or 104(1) of the 1991 Act (d);

"bond" means a surety granted by a developer who is a party to an adoption agreement;

"bond waiver" means an agreement with a developer for the provision of a form of financial security as a substitute for a bond;

"calendar year" means the twelve months ending with 31st December;

"discharge pipe" means a pipe from which discharges are made or are to be made under Section 165(1) of the 1991 Act;

"disposal main" means (subject to Section 219(2) of the 1991 Act) any outfall pipe or other pipe which-
a) is a pipe for the conveyance of effluent to or from any sewage disposal works, whether of a sewerage undertaker or of any other person; and
(b) is not a public sewer;

"drain" means (subject to Section 219(2) of the 1991 Act) a drain used for the drainage of one building or any buildings or yards appurtenant to buildings within the same curtilage;

"effluent" means any liquid, including particles of matter and other substances in suspension in the liquid; "financial year" means the twelve months ending with 31st March;

"lateral drain" means-
(a) that part of a drain which runs from the curtilage of a building (or buildings or yards within the same curtilage) to the sewer with which the drain communicates or is to communicate; or
b) (if different and the context so requires) the part of a drain identified in a declaration of vesting made under Section 102 of the 1991 Act or in an agreement made under Section 104 of that Act (e);

"licensed water supplier" means a company which is the holder for the time being of a water supply licence under Section 17A(1) of the 1991 Act(f);

"maintenance period" means the period so specified in an adoption agreement as a period of time-
(a) from the date of issue of a certificate by a Sewerage Undertaker to the effect that a developer has built (or substantially built) a private sewer or lateral drain to that undertaker's satisfaction; and
(b) until the date that private sewer or lateral drain is vested in the Sewerage Undertaker;

"map of waterworks" means the map made available under Section 198(3) of the 1991 Act (g) in relation to the information specified in subsection (1A);

"private sewer" means a pipe or pipes which drain foul or surface water, or both, from premises, and are not vested in a Sewerage Undertaker;

"public sewer" means, subject to Section 106(1A) of the 1991 Act(h), a sewer for the time being vested in a Sewerage Undertaker in its capacity as such, whether vested in that undertaker-
(a) by virtue of a scheme under Schedule 2 to the Water Act 1989(i);
(b) by virtue of a scheme under Schedule 2 to the 1991 Act (j);

(c) under Section 179 of the 1991 Act (k); or
(d) otherwise;

"public sewer map" means the map made available under Section 199(5) of the 1991 Act (l);

"resource main" means (subject to Section 219(2) of the 1991 Act) any pipe, not being a trunk main, which is or is to be used for the purpose of-
(a) conveying water from one source of supply to another, from a source of supply to a regulating reservoir or from a regulating reservoir to a source of supply; or
(b) giving or taking a supply of water in bulk;

"sewerage services" includes the collection and disposal of foul and surface water and any other services which are required to be provided by a Sewerage Undertaker for the purpose of carrying out its functions;

"Sewerage Undertaker" means the company appointed to be the Sewerage Undertaker under Section 6(1) of the 1991 Act for the area in which the property is or will be situated;

"surface water" includes water from roofs and other impermeable surfaces within the curtilage of the property;

"water main" means (subject to Section 219(2) of the 1991 Act) any pipe, not being a pipe for the time being vested in a person other than the water Undertaker, which is used or to be used by a Water Undertaker or licensed water supplier for the purpose of making a general supply of water available to customers or potential customers of the undertaker or supplier, as distinct from for the purpose of providing a supply to particular customers;

"water meter" means any apparatus for measuring or showing the volume of water supplied to, or of effluent discharged from any premises; "water supplier" means the company supplying water in the water supply zone, whether a water undertaker or licensed water supplier;

"water supply zone" means the names and areas designated by a Water Undertaker within its area of supply that are to be its water supply zones for that year; and

"Water Undertaker" means the company appointed to be the Water Undertaker under Section 6(1) of the 1991 Act for the area in which the property is or will be situated.

(2) In this Schedule, references to a pipe, including references to a main, a drain or a sewer, shall include references to a tunnel or conduit which serves or is to serve as the pipe in question and to any accessories for the pipe.

(a) 1991 c. 56
(b) S.I. 2000/3184. These Regulations apply in relation to England.
(c) S.I. 2001/3911. These Regulations apply in relation to Wales.
(d) Section 51A was inserted by Section 92(2) of the Water Act 2003 (c. 37). Section 104(1) was amended by Section 96(4) of that Act.
(e) Various amendments have been made to Sections 102 and 104 by Section 96 of the Water Act 2003.
(f) Inserted by Section 56 of and Schedule 4 to the Water Act 2003.
(g) Subsection (1A) was inserted by Section 92(5) of the Water Act 2003.
(h) Section 106(1A) was inserted by Section 99 of the Water Act 2003.
(i) 1989 c. 15.
(j) To which there are various amendments made by Section 101(1) of and Schedule 8 to the Water Act 2003.
(k) To which there are various amendments made by Section 101(1) of and Schedule 8 to the Water Act 2003.
(l) Section 199 was amended by Section 97(1) and (8) of the Water Act 2003.

Appendix 2 - DRAINAGE AND WATER ENQUIRY (COMMERCIAL) AGREEMENT

The Customer and the Client are asked to note the provisions of this Agreement, which govern the basis on which this drainage and water report is supplied.

Definitions

'Client' means the person, company or body who is the intended recipient of the Report with an actual or potential interest in the Property (including, where relevant, their mortgage lender).

'Company' means United Utilities Water Limited who produce the Report; its registered office being at Haweswater House, Lingley Mere Business Park, Lingley Green Avenue, Great Sankey, Warrington WA5 3LP, company number 2366678.

'Customer' means the person, company, firm or other legal body placing the Order, either on their own behalf as Client, or, as an agent for a Client. 'Order' means any request completed by the Customer requesting the Report.

'Property' means the address or location supplied by the Customer in the Order.

'Report' means the drainage and water report prepared by the Company in respect of the Property.

Agreement

1.1 The Company agrees to supply the Report to the Customer and the Client subject to this Agreement. The scope and limitations of the Report are described in clauses 2 and 3 of this Agreement. Where the Customer is acting as an agent for the Client, the Customer shall be responsible for bringing this Agreement (including, without limitation, any limitations and exclusions contained in it) to the attention of the Client and ensuring their acceptance of it pursuant to clause 1.2.

1.2 The Customer and the Client agree that the placing of an Order for a Report and the subsequent provision of a copy of the Report to the Customer and/or the Client indicates their acceptance of this Agreement and the Company shall be entitled to rely on this notwithstanding the Customer's failure to comply with clause 1.1.

1.3 The Company's cancellation policy in relation to an Order shall form part of this Agreement and is detailed at https://propertysearches.unitedutilities.com/cancellation/

Report

2.1 Whilst the Company will use reasonable care and skill in producing the Report, it is provided to the Customer and the Client on the basis that they acknowledge and agree to the following:-

2.2 The information contained in the Report can change on a regular basis so the Company cannot be responsible to the Customer and/or the Client for any change in the information contained in the Report after the date on which the Report was produced.

2.3 The Report does not give details about the actual state or condition of the Property nor should it be used or taken to indicate or exclude actual suitability or unsuitability of the Property for any particular purpose, or relied upon for determining saleability or value, or used as a substitute for any physical investigation or inspection. Further advice and information from appropriate experts and professionals should always be obtained.

2.4 The information contained in the Report is based upon the accuracy, completeness and legibility of the address, drawn boundaries and/or plans supplied by the Customer in the Order.

2.5 The Report provides information as to the indicative location and connection status of existing services and other information in relation to drainage and water enquiries and should not be used or relied on for any other purpose. The Report may contain opinions or general advice to the Customer and the Client. The Company, subject to clauses 3.4 and 3.7 and without prejudice to the other provisions of this Agreement, accepts no liability in relation to any such opinion or general advice or any other information contained in the Report (including, without limitation, any inaccuracies, errors or omissions) unless and only to the extent that such liability arises as a direct result of the Company's negligence (if relevant).

2.6 The position and depth of apparatus shown on any maps attached to the Report are approximate, and are furnished as a general guide only, and no warranty as to its correctness is given or implied. The exact positions and depths should be obtained by excavation trial holes and the maps must not be relied on in the event of excavation or other works made at the Property and/or in the vicinity of the Company's apparatus and, subject to clause 3.7, the Company accepts no liability in relation to any such reliance.

2.7 In providing the Report the Company will comply with the Drainage & Water Searches Network (DWSN) Standards, https://www.con29dw.co.uk/about-dwsn/#standards

Liability

3.1 The Company shall not be liable to the Customer and/or the Client for any failure defect or non-performance of its obligations arising from any failure to provide or delay in providing the Report to the extent that such failure or delay is due to an event or circumstance beyond the reasonable control of the Company including but not limited to any delay, failure of or defect in any machine, processing system or transmission link or any failure or default of a supplier or sub-contractor of the Company or any provider of any third party information except to the extent that such failure or delay is directly caused by the negligence of the Company.

3.2 Where a Report is requested for an address falling within a geographical area where two different entities separately provide Water and Sewerage Services, then any liability imposed on the Company pursuant to this Agreement for information contained in the Report which has been provided by the other entity shall be subject to the provisions of this Agreement and shall, without prejudice to the other provisions of this Agreement (including without limitation clauses 3.3 to 3.7), not exceed the liability that would have been imposed on the other entity had it supplied that information directly to the Customer.

3.3 The Report is produced only for use in relation to individual commercial property transactions (i.e. single commercial units, mixed sales of a building or area of land used for non-residential purposes, dual use of a dwelling house, farms sold with agricultural land and/or buildings, a group of holiday homes or an entire new development or a plot of land/additional area with a single or no building) and which requires the provision of drainage and water information and cannot be used for residential properties (i.e. a single dwelling house together with any associated land). Subject to clauses 3.4 to 3.7, the Company's entire liability to the Client howsoever arising under or in connection with the Report and/or this Agreement and whether in contract, negligence or any other tort or for breach of statutory duty or otherwise shall not exceed £10,000,000 (ten million pounds). The Company shall not in any circumstances (whether for breach of contract, negligence or any other tort, under statute or statutory duty, restitution or otherwise at all) be liable to the Client for any indirect or consequential loss or damage whatsoever caused and howsoever arising under or in connection with the Report and/or this Agreement

3.4. The plans attached to the Report are provided pursuant to the Company's statutory duty to make such plans available for inspection (notwithstanding the provisions of this clause) and your attention is drawn to the notice on the plan(s) attached to the Report which applies to the plan(s) and its/their contents. For the avoidance of doubt, nothing in this Agreement shall be interpreted as, or deemed to be, in any way an acknowledgement or acceptance by the Company that a common law duty of care exists between the Company, the Customer and/or the Client in relation to those plans (including, without limitation, the provision of such plans and the information contained within them) and/or any other information contained in the Report.

3.5 Subject to clause 3.7, the Company's entire liability to the Customer howsoever arising under or in connection with this Agreement and whether in contract, negligence or any other tort or for breach of statutory duty or otherwise shall not exceed £5,000 (five thousand pounds) and the Company shall not in any circumstances (whether for breach of contract, negligence or any other tort, under statute or statutory duty, restitution or otherwise at all) be liable to the Customer for any indirect or consequential loss or damage whatsoever caused and howsoever arising under or in connection with this Agreement .

3.6 The Customer and the Client shall ensure that the Report is not accessed by, made available to, used by and/or relied on (in whole or in part) in any way by any other third party, and, subject to clause 3.7, the Company shall not in any circumstances (whether for breach of contract, negligence or any other tort, under statute or statutory duty, restitution or otherwise at all) be liable to any third party for any loss (whether direct, indirect or consequential loss (all three of which terms include without limitation, pure economic loss, loss of profit, loss of business depletion of goodwill and like loss)) or damage whatsoever caused and howsoever arising under or in connection with this Agreement and/or the Report and/or any use of or reliance placed upon the Report. The Customer and the Client agree to indemnify the Company against any losses, costs, claims and damage suffered by the Company as a result of any breach by either of them of the provisions of this clause 3.6.

3.7 Nothing in this Agreement shall exclude the Company's liability for death or personal injury arising from its negligence or for fraud or any other matter to the extent that such liability cannot be excluded or limited by law.

Copyright and Confidentiality

4.1 The Customer and the Client acknowledge that the Report is confidential and is intended for the personal use of the Client only and shall not be used (in whole or in part) for any commercial gain in any circumstances. The Customer and the Client shall ensure that the Report is not accessed by, made available to, used by and/or relied on (in whole or in part) in any way by any other third party. The copyright and any other intellectual property rights in the Report shall remain the property of the Company and its licensors. No intellectual or other property rights are transferred or licensed to the Customer or the Client except to the extent expressly provided herein.

4.2 The Customer or the Client is entitled to make copies of the Report but may only copy Ordnance Survey mapping or data contained in or attached to the Report, if they have an appropriate licence from the originating source of that mapping or data

4.3 The Customer and, the Client agree (in respect of both the original and any copies made) to respect and not to alter any part of the Report including but not limited to altering, removing or obscuring the trademark, logo, copyright notice or other property marking which appears on the Report.

4.4 The maps contained in the Report are protected by Crown Copyright and must not be used for any purpose outside the context of the Report.

4.5 The enquiries contained in the Report are protected by copyright by the Law Society of 113 Chancery Lane, London, WC2A 1PL and must not be used for any purpose outside the context of the Report

4.6 The Customer and the Client agree to indemnify the Company against any losses, costs, claims and damage suffered by the Company as a result of any breach by either of them of the provisions of clauses 4.1 to 4.5 inclusive.

Payment

5.1 Unless otherwise stated all prices are inclusive of VAT. The Customer shall pay the price of the Report specified by the Company, without any set off, deduction or counterclaim.

5.2 Payment must be received in advance unless an account has been set up with the Company. In these cases, payment terms will be as agreed with the Company, but in any event any invoice must be paid within 30 days of the date of its issue.

5.3 The Company reserves the right to increase fees on reasonable prior written notice at any time.

Data Protection

6.1 We will process any personal data you provide to us in accordance with applicable data protection laws and our Data Protection and Privacy Notice (https://www.unitedutilities.com/privacy/). In addition we will use your personal data to manage and administer the provision of the Report under this Agreement and to develop and improve the business and services we provide to our customers. We may also disclose it to other companies in the United Utilities group (being United Utilities Water Limited, its holding companies (and their subsidiary companies) and its subsidiary companies) and their sub-contractors in connection with those purposes, but it will not be processed for other purposes or disclosed to other third parties without your express permission or without lawful purpose under data protection law.

General

7.1 If any provision of this Agreement is or becomes invalid or unenforceable, it will be taken to be removed from the rest of this Agreement to the extent that it is invalid or unenforceable. No other provision of this Agreement shall be affected.

7.2 This Agreement shall be governed by English law and all parties submit to the exclusive jurisdiction of the English courts.

7.3 Nothing in this Agreement and conditions shall in any way restrict the Company’s or the Customer's or the Client's statutory or any other rights in relation to the provision of and/or access to the information contained in the Report.

7.4 This Agreement and conditions may be enforced by the Customer and the Client but not by any other third party.

7.5 Before you agree to this Agreement, please note that where you are the Customer it is your responsibility to ensure your client/customer is aware of them and that any objections are raised accordingly.

Property Searches complaints procedure

In the event of any queries relating to this Report please e-mail, write or phone our customer team quoting the United Utilities reference detailed on the Report, We will endeavor to resolve any telephone contact or complaint at the time of the call.

Whilst we always try to resolve all complaints straight away, if this is not possible and you are not happy with the course of action taken by us you can ask us to escalate the issues internally via the complaints process detailed below.

We will listen to your complaint and do our best to deal with it immediately.

If we fail to give you a written substantive response within 5 working days the Company will compensate the Customer or the Client (as applicable) the amount of the original fee paid to the Company for the Report, regardless of the outcome of your complaint.

If it is a complex issue requiring more time, we will still get back to you within 5 working days and notify you of progress and update you with the new timescales.

If we consider your complaint to be justified or we have made any errors that substantially change the outcome of the search we will:

- Refund your Report fee

- Provide you with a revised Report (if requested)

- Take the necessary action within our power to put things right which may (where appropriate) include, at our complete discretion, financial compensation or the relocation/removal/installation of our affected water or sewerage assets.

- Keep you informed of any action required

If your complaint has gone through our full internal complaints procedure and you are not satisfied with the response or you believe that we have failed to comply with our internal complaints procedure you may be able to refer your complaint for consideration under The Property Ombudsman Scheme (TPOs). The maximum award available to TPO through their redress scheme is £25k. In addition to TPO's redress scheme covering consumers, TPO will also provide redress for small businesses (including charities and trusts) that meet the following criteria:

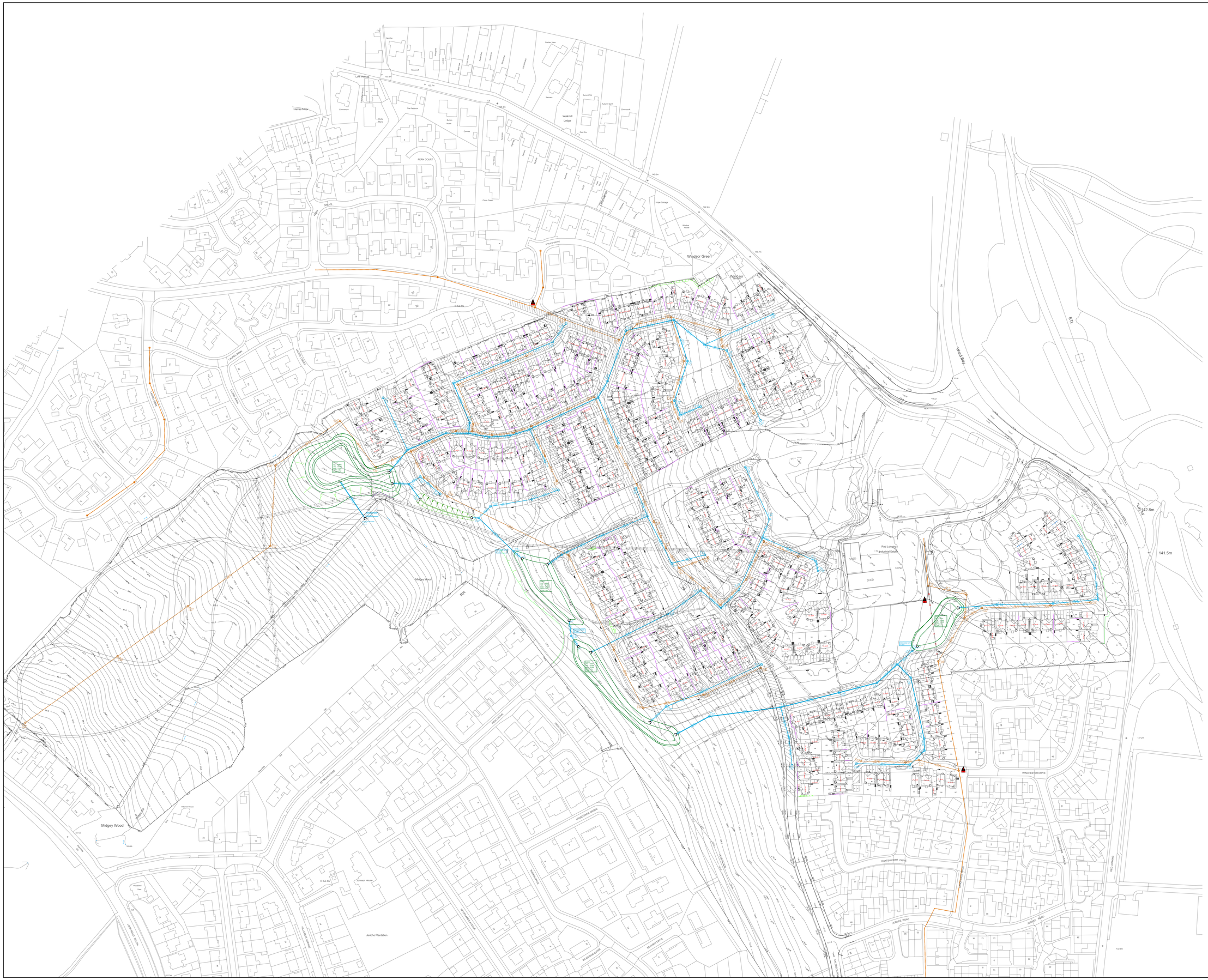
- a small business (or group of companies) with an annual turnover of less than £3 million;

- a charity with an annual income of less than £3 million; or

- a trust with a net asset value of less than £3 million.

You can obtain further information by visiting www.tpos.co.uk or email admin@tpos.co.uk

Appendix 3 – Drainage Strategy



Only PDF/ DWF Issues of this drawing are controlled. All other formats (eg. DWG AutoCAD FILES) are UN-controlled and are used at your own risk.

General Notes:

1. DO NOT USE THIS DRAWING IN ISOLATION. This drawing has been prepared as part of a set, and must therefore be read in conjunction with all other drawings. Any discrepancies or design queries must be reported to the engineer prior to completion of tender and commencement of works. Following completion of tender it is assumed that developer and contractor are in full agreement with the design drawings (with the exception of any discrepancies noted).
2. Third party information is used to prepare the engineering design (including, architecture layout, ground investigation, existing utilities records, and specialist design items). The engineering design must therefore be read in conjunction with all third party information prior to commencing work. Queensberry Design Ltd are not responsible for any third party information or details.
3. House type working drawings are to be used in conjunction with the plot setting out drawing.
4. Drawing status will remain preliminary until full technical approval is received from local authority and sewerage undertaker. Works commenced prior to technical approval are done so at risk and may be subject to change.
5. The contractor is expected to prepare appropriate construction method statements for all aspects of apportioned work. This should include any temporary protection works.
6. Land drainage is not permitted to discharge into the public sewer network. Any need for land drainage should be assessed by the ground worker and landscaper during construction and appropriate measures put in place to deal with this. If land drainage designs are required, they should be apposited prior to plot completion.
7. The contractor is expected to cross check all drainage inverts prior to commencing work, this may involve completion of trial holes if invert levels have been interpolated.
8. The contractor must monitor the "as build" progress of each construction stage (roads/sewers/plot works) etc), to enable the next stages of construction to be checked before installation. For this reason the design of, floor levels, external works, retaining walls, and plot drainage are to be read as guidance only.

Highways

1. All highway works to be carried out in accordance with the current local authority design guide and specification
2. All excavations below proposed and existing highways to be back filled with granular Type 1 sub base and well compacted in layers not exceeding 150mm, unless otherwise agreed.
3. Highway authority to be notified by the contractor prior to the commencement of works.

Adoptable Drainage

1. All adoptable drainage works to be in accordance with the water authorities publication - "Sewerage Sector Guidance" asw/ as the approved drawings.
2. Precast concrete manhole rings to comply with the relevant provisions of BS5911: Part 200.
3. All brickwork to be Class B engineering complying with the relevant provisions of BS 3921. Concrete bricks maybe used if their specification is the same as Class B engineering bricks. Please seek approval from relevant water authority before using.
4. Manhole covers and frames shall comply with the relevant provisions of BS EN 124 and be of a non-rocking, non-ventilating design.
5. Ladders that are required in Type A manholes are to comply with "Sewerage Sector Guidance".
6. Concrete must be either C20 sulphate resistant portland cement with high strength concrete topping to the benching or C35 ordinary portland cement
7. 150mm Concrete surround is required around pipes where the depth from finished surface to soffit of pipe is less than 1200mm. This may be reduced to 900mm within open space.
8. The location of existing drainage that is within close proximity to the proposed site works, which is not to be diverted, should be confirmed by the contractor and reported to the developer to ensure it corresponds to that shown on the engineering layout and that no proposed works are affected.
9. The position, line and diameter of all existing drainage apparatus should be confirmed on site prior to the commencement of the works. Any discrepancies must be reported to the engineer immediately.
10. The connection of foul and surface water drainage to the existing public sewer system shall be subject to the approval of the local sewerage undertaker. The contractor is expected to apply for relevant permits prior to commencing the work.
11. Roads and sewers contractor must inform water authority prior to works commencing

Existing Services

Any existing services which may be affected by the proposed works should be located by means of a hand dig in close liaison with the statutory service authorities. The contractor shall inform the developer of any services that may affect the proposed design.
Contractor to notify statutory service authorities prior to commencement of work.

As Constructed Information

Refer to note H above. It is the contractors responsibility to provide the following as constructed drawings to the developer upon the completion of the works covered by the contract:

1. Position/co-ordinates of all adoptable manholes.
2. Invert and cover levels of all adoptable manholes.
3. New gully positions and connections.
4. Position and depth of service ducts for water, gas, electric, BT, cable and street lighting, stating size and number of ducts.

ENGINEERING LEGEND

ADOPTABLE DRAINAGE

PROPOSED ADOPTABLE FOUL MANHOLE
PROPOSED ADOPTABLE STORM MANHOLE
EXISTING ADOPTED FOUL MANHOLE
EXISTING ADOPTED STORM MANHOLE
EXISTING ADOPTED COMBINED MANHOLE

ADOPTABLE HIGHWAYS

PROPOSED HIGHWAY TO BE CAMBERED
PROPOSED HIGHWAY TO HAVE CROSSFALL
PROPOSED HIGHWAY GULLY
PROPOSED TACTILE PEDESTRAN CROSSING — T.C.

PRIVATE DRAINAGE

PRIVATE DRAINAGE CHANNEL
PRIVATE STORM RODDING EYE
300MM DIA. PRIVATE INSPECTION CHAMBER. TO BE USED WHERE DEPTH TO INVERT IS 600MM OR LESS
450MM DIA. PRIVATE INSPECTION CHAMBER. TO BE USED WHERE DEPTH TO INVERT IS 3000MM OR LESS. REDUCED ACCESS FITTING REQUIRED AT DEPTHS GREATER THAN 1200MM

- ALL PRIVATE DRAINAGE TO BE 100MM RIGID PIPE OR 110MM FLEXIBLE PIPE UNLESS OTHERWISE SHOWN.
- WHERE 5 OR MORE PROPERTIES CONNECT TO THE SAME PRIVATE STORM RUN THE PIPE(S) SHOULD BE UPSIZED TO 150MM DIA. AFTER THE FIFTH PROPERTY.
- PLEASE REFER TO LAYOUT TO SEE PIPES THAT MAYBE AFFECTED.
- WHERE 5 OR MORE PROPERTIES CONNECT TO THE SAME PRIVATE FOUL RUN THE PIPE(S) SHOULD BE UPSIZED TO 150MM DIA. AFTER THE TENTH PROPERTY. PLEASE REFER TO LAYOUT TO SEE PIPES THAT MAYBE AFFECTED.
- ALL PRIVATE DRAINAGE TO HAVE A MINIMUM FALL OF 1:75 UNLESS OTHERWISE SHOWN.
- BEDDING TO BE GRANULAR MATERIAL TO BS 882: PART 2 OF 10MM NOMINAL SINGLE SIZED AGGREGATE. RIGID PIPES OF NOMINAL SIZE 150MM & 160MM FLEXIBLE PIPES SHOULD HAVE GRANULAR MATERIAL BEDDING TO BS 882: PART 2 OF 10MM OR 14MM NOMINAL SIZED AGGREGATE OR 14MM TO 5MM GRADED AGGREGATE.

RETAINING WALLS AND STEPS

RETAINING WALL (RETAINED HEIGHT SHOWN) (ALLOW EDGE PROTECTION OVER 600MM HT) — RW
FLAG ON EDGE — FOE
BROKKWORK TO BE SHOWN BELOW DPC
PAVING FLAG STEPS - 300MM GOING 150MM RISE — 35ea
BATTER - THESE SHOULD NOT EXCEED 1:3 ADJACENT TO ADOPTABLE HIGHWAYS
PROPOSED FINISHED GROUND LEVEL — 53.575
EXISTING GROUND LEVEL (WITH BRACKETS) — (53.575)

DPC LEVELS MUST NOT BE ALTERED WITHOUT INFORMING DESIGNER.
REFER TO ARCHITECTS LAYOUT FOR DETAILS OF FENCING AND WALLS

Warning Triangles

1	INVERT LEVEL AND CAPACITY OF EXISTING SEWER TO BE CONFIRMED PRIOR TO FORMING THE CONNECTION INTO EXISTING FOUL
2	EXISTING FOUL SEWER DIVERSION TO AVOID PROPOSED SUDS BASIN.

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Rev.	Date	Revision Details	Drawn	Checked
A	29.05.26	ENGINEERING UPDATED TO REVISED LAYOUT	JP	AL

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Client
GLEESON HOMES

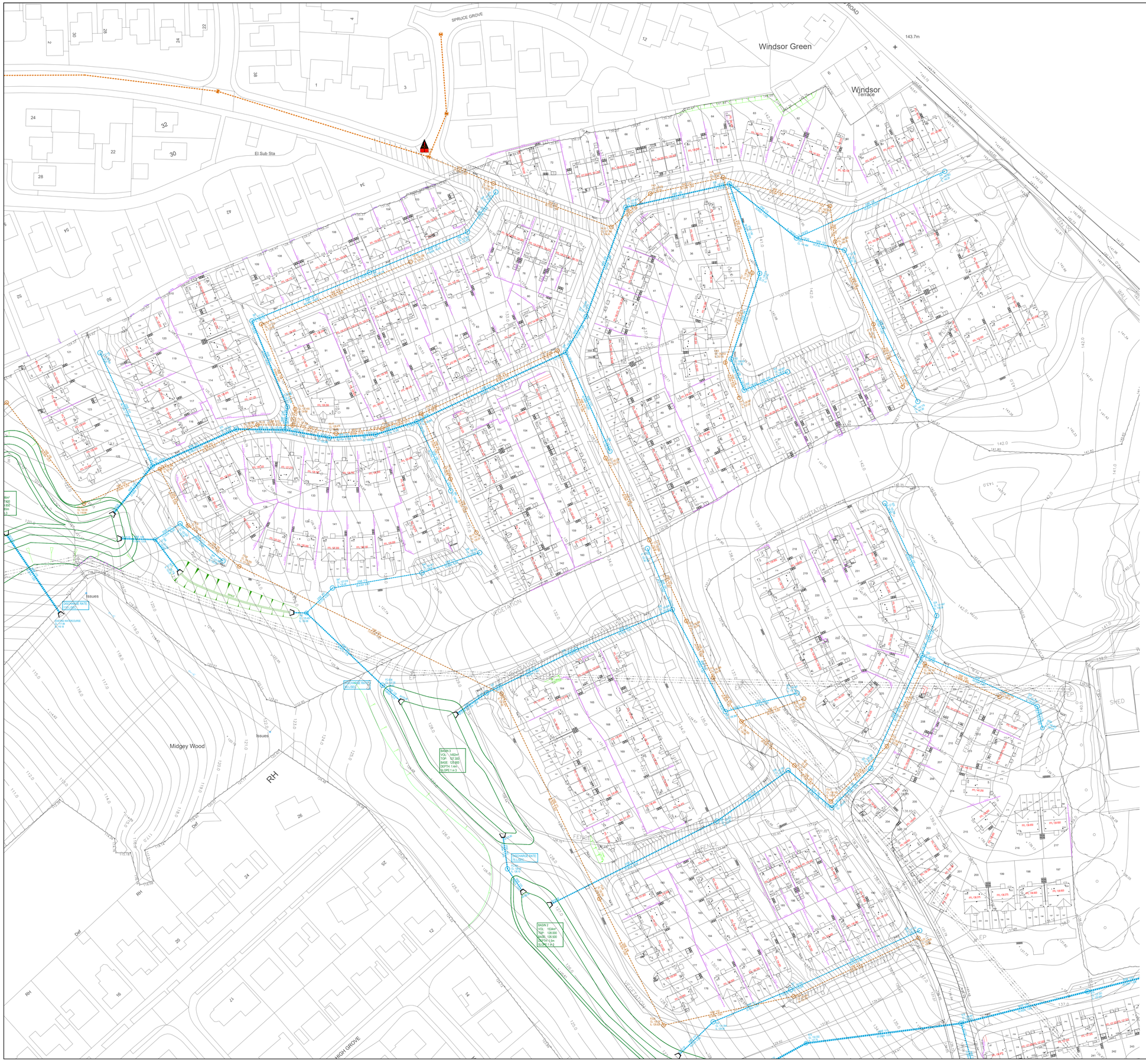
Project
HARRAS MOOR

Title
ENGINEERING LAYOUT STRATEGY OVERALL

Drawn:	Checked:	Date:
JP	AL	APRIL 2026

Drawing Number: QD2478-00-00

Drawing Status:	Scale:	Rev:
STRATEGY	1:1000 - A0	A



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3. House type working drawings are to be used in conjunction with the plot setting out drawing.
4. Drawing status will remain preliminary until full technical approval is received from local authority and sewerage undertaker. Works commenced prior to technical approval are done so at risk and may be subject to change.
5. The contractor is expected to prepare appropriate construction method statements for all aspects of aspointed work. This should include any temporary protection works.
6. Land drainage is not permitted to discharge into the public sewer network. Any need for land drainage should be assessed by the ground worker and landscaper during construction and implemented accordingly. Where ground drains, land and drainage designs are required, they should be appointed prior to plot completion.
7. The contractor is expected to cross check all drainage inverts prior to commencing work, this may involve completion of trial holes if invert levels have been interpolated.
8. The contractor must monitor the "as build" progress of each construction stage (roads/sewers/plot works) etc, to enable the next stages of construction to be checked before installation. For this reason the design of, floor levels, external works, retaining walls, and plot drainage are to be read as guidance only.

Highways

1. All highway works to be carried out in accordance with the current local authority design guide and specification
2. All excavations below proposed and existing highways to be back filled with granular Type 1 sub base and well compacted in layers not exceeding 150mm, unless otherwise agreed.
3. Highway authority to be notified by the contractor prior to the commencement of works.

Adoptable Drainage

1. All adoptable drainage works to be in accordance with the water authorities publication - "Sewerage Sector Guidance" aswell as the approved drawings.
2. Precast concrete manhole rings to comply with the relevant provisions of BS5911: Part 200.
3. All brickwork to be Class B engineering complying with the relevant provisions of BS 3921: Concrete bricks maybe used if their specification is the same as Class B engineering bricks. Please seek approval from relevant water authority before using.
4. Manhole covers and frames shall comply with the relevant provisions of BS EN 124 and be of a non-rocking, non-ventilating design.
5. Ladders that are required in Type A manholes are to comply with "Sewerage Sector Guidance".
6. Concrete must be either C20 sulphate resistant portland cement with high strength concrete topping to the benching or C35 ordinary portland cement
7. 150mm Concrete surround is required around pipes where the depth from finished surface to soffit of pipe is less than 1200mm. This may be reduced to 900mm within open space.
8. The location of existing drainage that is within close proximity to the proposed site works, which is not to be diverted, should be confirmed by the contractor and reported to the developer to ensure it corresponds to that shown on the engineering layout and that no proposed works are affected.
9. The position, line and diameter of all existing drainage apparatus should be confirmed on site prior to the commencement of the works. Any discrepancies must be reported to the engineer immediately.
10. The connection of foul and surface water drainage to the existing public sewer system shall be subject to the approval of the local sewerage undertaker. The contractor is expected to apply for relevant permits prior to commencing the work.
11. Roads and sewers contractor must inform water authority prior to works commencing

Existing Services

Any existing services which may be affected by the proposed works should be located by means of a hand dig in close liaison with the statutory service authorities. The contractor shall inform the developer of any services that may affect the proposed design.
Contractor to notify statutory service authorities prior to commencement of work.

As Constructed Information

Refer to note 11 above. It is the contractors responsibility to provide the following as constructed drawings to the developer upon the completion of the works covered by the contract:

1. Position/co-ordinates of all adoptable manholes.
2. Invert and cover levels of all adoptable manholes.
3. New gully positions and connections.
4. Position and depth of service ducts for water, gas, electric, BT, cable and street lighting, stating size and number of ducts.

ENGINEERING LEGEND

ADOPTABLE DRAINAGE

PROPOSED ADOPTABLE FOUL MANHOLE
PROPOSED ADOPTABLE STORM MANHOLE
EXISTING ADOPTED FOUL MANHOLE
EXISTING ADOPTED STORM MANHOLE
EXISTING ADOPTED COMBINED MANHOLE

ADOPTABLE HIGHWAYS

PROPOSED HIGHWAY TO BE CAMBERED
PROPOSED HIGHWAY TO HAVE CROSSFALL
PROPOSED HIGHWAY GULLY
PROPOSED TACTILE PEDESTRIAN CROSSING — T.C.

PRIVATE DRAINAGE

PRIVATE DRAINAGE CHANNEL
PRIVATE STORM RODDING EYE
300MM DIA. PRIVATE INSPECTION CHAMBER. TO BE USED WHERE DEPTH TO INVERT IS 600MM OR LESS
450MM DIA. PRIVATE INSPECTION CHAMBER. TO BE USED WHERE DEPTH TO INVERT IS 3000MM OR LESS. REDUCED ACCESS FITTING REQUIRED AT DEPTHS GREATER THAN 1200MM

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- WHERE 10 OR MORE PROPERTIES CONNECT TO THE SAME PRIVATE FOUL RUN THE PIPE(S) SHOULD BE UPSIZED TO 150MM DIA. AFTER THE TENTH PROPERTY. PLEASE REFER TO LAYOUT TO SEE PIPES THAT MAYBE AFFECTED.
- ALL PRIVATE DRAINAGE TO HAVE A MINIMUM FALL OF 1:70 UNLESS OTHERWISE SHOWN.
- BEDDING TO BE GRANULAR MATERIAL TO BS 882: PART 2 OF 10MM NOMINAL SINGLE SIZED AGGREGATE. RIGID PIPES OF NOMINAL SIZE 150MM & 160MM FLEXIBLE PIPES SHOULD HAVE GRANULAR MATERIAL BEDDING TO BS 882: PART 2 OF 10MM OR 14MM NOMINAL SIZED AGGREGATE OR 14MM TO 5MM GRADED AGGREGATE.

RETAINING WALLS AND STEPS

RETAINING WALL (RETAINED HEIGHT SHOWN) (ALLOW EDGE PROTECTION OVER 600MM HT) — RWL
FLAG ON EDGE — FOE
BRICKWORK TO BE SHOWN BELOW DPC
PAVING FLAG STEPS - 300MM GOING 150MM RISE — 150rise
BATTER - THESE SHOULD NOT EXCEED 1:3 ADJACENT TO ADOPTABLE HIGHWAYS
PROPOSED FINISHED GROUND LEVEL — 53.570
EXISTING GROUND LEVEL (WITH BRACKETS) — (53.570)

DPC LEVELS MUST NOT BE ALTERED WITHOUT INFORMING DESIGNER
REFER TO ARCHITECTS LAYOUT FOR DETAILS OF FENCING AND WALLS

Warning Triangles

1	INVERT LEVEL AND GRADIENT OF EXISTING SEWER TO BE CONFIRMED PRIOR TO FORMING THE CONNECTION INTO EXISTING FOUL.
2	EXISTING FOUL SEWER DIVERSION TO AVOID PROPOSED SUDS BASIN.

N W E S

Rev.	Date	Revision Details	Drawn	Checked
A	28.05.26	ENGINEERING UPDATED TO REVISED LAYOUT	JP	AL

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www.queensberrydesign.co.uk

Client: GLEESON HOMES

Project: HARRAS MOOR

Title: ENGINEERING LAYOUT STRATEGY SHEET 1

Drawn	Checked	Date
JP	AL	APRIL 2026

Drawing Number: QD2478-00-01

Drawing Status	Scale	Rev.
STRATEGY	1:500 - A0	A

ENGINEERING LEGEND

ADOPTABLE DRAINAGE

PROPOSED ADOPTABLE FOUL MANHOLE
PROPOSED ADOPTABLE STORM MANHOLE
EXISTING ADOPTED FOUL MANHOLE
EXISTING ADOPTED STORM MANHOLE
EXISTING ADOPTED COMBINED MANHOLE

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RETAINING WALL (RETAINED HEIGHT SHOWN) (ALLOW EDGE PROTECTION OVER 600MM HT) — RW
FLAG ON EDGE — FOE
BRICKWORK TO BE SHOWN BELOW DPC
PAVING FLAG STEPS - 300MM GOING 150MM RISE — Steps
BATTER - THESE SHOULD NOT EXCEED 1:3 ADJACENT TO ADOPTABLE HIGHWAYS
PROPOSED FINISHED GROUND LEVEL — 93.579
EXISTING GROUND LEVEL (WITH BRACKETS) — (93.579)

DPC LEVELS MUST NOT BE ALTERED WITHOUT INFORMING DESIGNER

REFER TO ARCHITECTS LAYOUT FOR DETAILS OF FENCING AND WALLS

N W E S

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Warning Triangles

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Rev.	Date	Revision Details	Drawn	Checked
A	28.05.26	ENGINEERING UPDATED TO REVISED LAYOUT	JP	AL

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Client: GLEESON HOMES

Project: HARRAS MOOR

Title: ENGINEERING LAYOUT STRATEGY SHHET 2

Drawn	Checked	Date
JP	AL	APRIL 2026

Drawing Number: QD2478-00-02

Drawing Status	Scale	Rev.
STRATEGY	1:500 - A1	A

Appendix 4 – Microdrainage Calculations

STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for Surface Network 1

Pipe Sizes STANDARD Manhole Sizes STANDARD

FEH Rainfall Model

Return Period (years)	2
FEH Rainfall Version	2013
Site Location	GB 298562 518054 NX 98562 18054
Data Type	Point
Maximum Rainfall (mm/hr)	50
Maximum Time of Concentration (mins)	30
Foul Sewage (l/s/ha)	0.000
Volumetric Runoff Coeff.	1.000
PIMP (%)	100
Add Flow / Climate Change (%)	0
Minimum Backdrop Height (m)	0.000
Maximum Backdrop Height (m)	1.500
Min Design Depth for Optimisation (m)	1.200
Min Vel for Auto Design only (m/s)	1.00
Min Slope for Optimisation (1:X)	500

Designed with Level Soffits

Network Design Table for Surface Network 1

- Indicates pipe length does not match coordinates
« - Indicates pipe capacity < flow

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	n	HYD SECT	DIA (mm)	Section Type	Auto Design
1.000	30.730	0.300	102.4	0.081	5.00	0.0	0.600		o	225	Pipe/Conduit	
1.001	26.718	0.500	53.4	0.078	0.00	0.0	0.600		o	225	Pipe/Conduit	
1.002	38.117	1.275	29.9	0.032	0.00	0.0	0.600		o	300	Pipe/Conduit	
1.003	47.607	1.200	39.7	0.151	0.00	0.0	0.600		o	300	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
1.000	48.40	5.40	139.000	0.081	0.0	0.0	0.0	1.29	51.4	14.1
1.001	47.66	5.64	138.700	0.159	0.0	0.0	0.0	1.79	71.3	27.3
1.002	47.01	5.86	138.125	0.191	0.0	0.0	0.0	2.89	204.0	32.3
1.003	46.10	6.18	136.850	0.342	0.0	0.0	0.0	2.50	177.0	56.9

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Network Design Table for Surface Network 1

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	n	HYD SECT	DIA (mm)	Section Type	Auto Design
1.004	31.850#	1.075	29.6	0.186	0.00	0.0	0.600		o	375	Pipe/Conduit	
1.005	5.000#	0.500	10.0	0.051	0.00	0.0	0.600		o	300	Pipe/Conduit	
1.006	17.117	0.950	18.0	0.000	0.00	0.0	0.600		o	225	Pipe/Conduit	
2.000	45.262	0.575	78.7	0.126	5.00	0.0	0.600		o	300	Pipe/Conduit	
2.001	17.107	0.075	228.1	0.069	0.00	0.0	0.600		o	300	Pipe/Conduit	
2.002	10.291	0.050	205.8	0.077	0.00	0.0	0.600		o	450	Pipe/Conduit	
2.003	52.700	0.125	421.6	0.138	0.00	0.0	0.600		o	450	Pipe/Conduit	
2.004	16.022	0.050	320.4	0.047	0.00	0.0	0.600		o	450	Pipe/Conduit	
1.007	23.276	0.058	401.3	0.037	0.00	0.0	0.600		o	600	Pipe/Conduit	
1.008	33.339	0.074	450.5	0.060	0.00	0.0	0.600		o	600	Pipe/Conduit	
1.009	50.952	0.113	450.9	0.085	0.00	0.0	0.600		o	600	Pipe/Conduit	
3.000	22.882	0.150	152.5	0.093	5.00	0.0	0.600		o	225	Pipe/Conduit	
3.001	27.286	0.150	181.9	0.058	0.00	0.0	0.600		o	300	Pipe/Conduit	
1.010	61.036	4.675	13.1	0.068	0.00	0.0	0.600		o	600	Pipe/Conduit	
1.011	31.082#	1.150	27.0	0.000	0.00	0.0	0.600		o	600	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
1.004	45.66	6.34	135.575	0.528	0.0	0.0	0.0	3.34	368.8	87.0
1.005	45.61	6.36	134.500	0.578	0.0	0.0	0.0	5.00	353.4	95.3
1.006	45.36	6.45	134.000	0.578	0.0	0.0	0.0	3.10	123.2	95.3
2.000	48.31	5.43	133.850	0.126	0.0	0.0	0.0	1.77	125.4	21.9
2.001	47.49	5.70	133.275	0.195	0.0	0.0	0.0	1.04	73.3	33.5
2.002	47.14	5.82	133.050	0.272	0.0	0.0	0.0	1.41	224.8	46.2
2.003	44.64	6.71	133.000	0.409	0.0	0.0	0.0	0.98	156.5	66.0
2.004	44.02	6.95	132.875	0.456	0.0	0.0	0.0	1.13	179.8	72.6
1.007	43.21	7.27	132.675	1.072	0.0	0.0	0.0	1.21	341.9	167.3
1.008	42.04	7.76	132.617	1.132	0.0	0.0	0.0	1.14	322.5	171.8
1.009	40.38	8.50	132.543	1.217	0.0	0.0	0.0	1.14	322.4	177.4
3.000	48.51	5.36	133.100	0.093	0.0	0.0	0.0	1.06	42.0	16.3
3.001	47.34	5.75	132.875	0.151	0.0	0.0	0.0	1.16	82.2	25.8
1.010	40.06	8.65	132.425	1.436	0.0	0.0	0.0	6.76	1912.2	207.8
1.011	39.83	8.76	127.750	1.436	0.0	0.0	0.0	4.70	1327.9	207.8

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Network Design Table for Surface Network 1

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	n	HYD SECT	DIA (mm)	Section Type	Auto Design
4.000	55.471	4.000	13.9	0.243	5.00	0.0	0.600		o	225	Pipe/Conduit	
4.001	32.780	3.100	10.6	0.114	0.00	0.0	0.600		o	300	Pipe/Conduit	
4.002	18.070#	1.800	10.0	0.126	0.00	0.0	0.600		o	300	Pipe/Conduit	
1.012	78.902	0.200	394.5	0.000	0.00	0.0		0.045	3 \=/	500	1:3 Swale	
5.000	48.442	1.500	32.3	0.095	5.00	0.0	0.600		o	225	Pipe/Conduit	
5.001	16.516	0.600	27.5	0.038	0.00	0.0	0.600		o	225	Pipe/Conduit	
6.000	8.717	0.050	174.3	0.030	5.00	0.0	0.600		o	225	Pipe/Conduit	
6.001	49.224	0.225	218.8	0.070	0.00	0.0	0.600		o	225	Pipe/Conduit	
5.002	48.531	1.550	31.3	0.056	0.00	0.0	0.600		o	300	Pipe/Conduit	
5.003	21.636	0.700	30.9	0.108	0.00	0.0	0.600		o	300	Pipe/Conduit	
5.004	22.475	0.500	44.9	0.082	0.00	0.0	0.600		o	375	Pipe/Conduit	
5.005	34.240	2.500	13.7	0.024	0.00	0.0	0.600		o	375	Pipe/Conduit	
5.006	72.003#	6.800	10.6	0.193	0.00	0.0	0.600		o	375	Pipe/Conduit	
1.013	9.781#	0.400	24.5	0.003	0.00	0.0	0.600		o	300	Pipe/Conduit	
1.014	12.329#	0.200	61.6	0.000	0.00	0.0	0.600		o	375	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
4.000	48.81	5.26	136.300	0.243	0.0	0.0	0.0	3.53	140.5	42.8
4.001	48.47	5.37	132.225	0.357	0.0	0.0	0.0	4.86	343.7	62.5
4.002	48.29	5.43	129.050	0.483	0.0	0.0	0.0	4.99	352.7	84.2
1.012	31.36	14.28	126.600	1.919	0.0	0.0	0.0	0.24	34.0«	217.3
5.000	48.54	5.35	140.800	0.095	0.0	0.0	0.0	2.31	91.9	16.6
5.001	48.21	5.46	139.300	0.133	0.0	0.0	0.0	2.50	99.5	23.2
6.000	49.16	5.15	138.975	0.030	0.0	0.0	0.0	0.99	39.3	5.3
6.001	46.39	6.08	138.925	0.100	0.0	0.0	0.0	0.88	35.0	16.8
5.002	45.59	6.37	138.625	0.289	0.0	0.0	0.0	2.82	199.3	47.6
5.003	45.24	6.49	137.075	0.398	0.0	0.0	0.0	2.84	200.6	65.0
5.004	44.86	6.63	136.300	0.480	0.0	0.0	0.0	2.71	299.2	77.8
5.005	44.55	6.75	135.800	0.504	0.0	0.0	0.0	4.92	543.2	81.1
5.006	43.99	6.96	133.300	0.697	0.0	0.0	0.0	5.60	618.0	110.7
1.013	31.31	14.33	126.500	2.618	0.0	0.0	0.0	3.19	225.7«	296.0
1.014	31.20	14.42	126.100	2.618	0.0	0.0	0.0	2.31	255.3«	296.0

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Network Design Table for Surface Network 1

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	n	HYD SECT	DIA (mm)	Section Type	Auto Design
7.000	28.973	2.425	11.9	0.127	5.00	0.0	0.600		o	225	Pipe/Conduit	
7.001	44.940	1.300	34.6	0.056	0.00	0.0	0.600		o	300	Pipe/Conduit	
8.000	25.771	0.425	60.6	0.048	5.00	0.0	0.600		o	225	Pipe/Conduit	
7.002	40.722	2.575	15.8	0.058	0.00	0.0	0.600		o	300	Pipe/Conduit	
7.003	38.830	3.700	10.5	0.179	0.00	0.0	0.600		o	375	Pipe/Conduit	
7.004	13.773#	0.975	14.1	0.112	0.00	0.0	0.600		o	450	Pipe/Conduit	
1.015	8.683#	0.400	21.7	0.000	0.00	0.0	0.600		o	300	Pipe/Conduit	
1.016	40.957	0.500	81.9	0.000	0.00	0.0	0.600		o	375	Pipe/Conduit	
9.000	23.930	1.500	16.0	0.092	5.00	0.0	0.600		o	225	Pipe/Conduit	
9.001	37.967	2.600	14.6	0.000	0.00	0.0	0.600		o	225	Pipe/Conduit	
9.002	14.003	0.300	46.7	0.059	0.00	0.0	0.600		o	225	Pipe/Conduit	
1.017	43.500	2.700	16.1	0.000	0.00	0.0		0.045	3 \=/	500	1:3 Swale	
1.018	23.683	1.100	21.5	0.000	0.00	0.0		0.045	3 \=/	500	1:3 Swale	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
7.000	49.22	5.13	137.300	0.127	0.0	0.0	0.0	3.81	151.4	22.6
7.001	48.37	5.41	134.800	0.183	0.0	0.0	0.0	2.68	189.7	32.0
8.000	48.83	5.26	133.800	0.048	0.0	0.0	0.0	1.68	66.9	8.5
7.002	47.86	5.58	133.300	0.290	0.0	0.0	0.0	3.97	280.8	50.0
7.003	47.52	5.69	130.650	0.468	0.0	0.0	0.0	5.62	620.7	80.3
7.004	47.39	5.73	126.875	0.580	0.0	0.0	0.0	5.43	863.8	99.3
1.015	31.16	14.46	125.900	3.198	0.0	0.0	0.0	3.39	239.6«	359.8
1.016	30.78	14.80	125.500	3.198	0.0	0.0	0.0	2.00	221.3«	359.8
9.000	49.23	5.12	129.500	0.092	0.0	0.0	0.0	3.29	130.9	16.4
9.001	48.68	5.30	128.000	0.092	0.0	0.0	0.0	3.44	136.9	16.4
9.002	48.31	5.43	125.400	0.152	0.0	0.0	0.0	1.92	76.3	26.4
1.017	30.13	15.42	124.900	3.350	0.0	0.0	0.0	1.18	168.1«	364.4
1.018	29.73	15.80	122.200	3.350	0.0	0.0	0.0	1.02	145.4«	364.4

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Network Design Table for Surface Network 1

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	n	HYD SECT	DIA (mm)	Section Type	Auto Design
10.000	22.233	0.200	111.2	0.097	5.00	0.0	0.600		o	225	Pipe/Conduit	
10.001	11.531	1.000	11.5	0.000	0.00	0.0	0.600		o	225	Pipe/Conduit	
1.019	13.155#	0.275	47.8	0.000	0.00	0.0	0.600		o	450	Pipe/Conduit	
11.000	65.732	0.975	67.4	0.158	5.00	0.0	0.600		o	225	Pipe/Conduit	
11.001	19.373	0.950	20.4	0.104	0.00	0.0	0.600		o	300	Pipe/Conduit	
12.000	63.526	2.450	25.9	0.180	5.00	0.0	0.600		o	225	Pipe/Conduit	
11.002	33.666	2.525	13.3	0.050	0.00	0.0	0.600		o	375	Pipe/Conduit	
13.000	18.419	0.400	46.0	0.054	5.00	0.0	0.600		o	300	Pipe/Conduit	
13.001	13.238	0.225	58.8	0.194	0.00	0.0	0.600		o	375	Pipe/Conduit	
13.002	35.255	0.400	88.1	0.000	0.00	0.0	0.600		o	375	Pipe/Conduit	
13.003	36.921	0.400	92.3	0.000	0.00	0.0	0.600		o	375	Pipe/Conduit	
11.003	41.476	1.475	28.1	0.188	0.00	0.0	0.600		o	450	Pipe/Conduit	
11.004	45.450	1.650	27.5	0.086	0.00	0.0	0.600		o	450	Pipe/Conduit	
11.005	16.103	0.600	26.8	0.116	0.00	0.0	0.600		o	450	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
10.000	48.70	5.30	122.200	0.097	0.0	0.0	0.0	1.24	49.3	17.1
10.001	48.55	5.35	122.000	0.097	0.0	0.0	0.0	3.88	154.1	17.1
1.019	29.66	15.88	120.625	3.447	0.0	0.0	0.0	2.95	468.4	369.2
11.000	47.53	5.69	141.600	0.158	0.0	0.0	0.0	1.60	63.4	27.2
11.001	47.26	5.78	140.550	0.263	0.0	0.0	0.0	3.50	247.2	44.8
12.000	48.36	5.41	142.200	0.180	0.0	0.0	0.0	2.58	102.6	31.5
11.002	46.93	5.89	139.525	0.493	0.0	0.0	0.0	4.98	550.5	83.6
13.000	49.20	5.13	138.500	0.054	0.0	0.0	0.0	2.32	164.2	9.5
13.001	48.92	5.23	138.025	0.248	0.0	0.0	0.0	2.37	261.3	43.8
13.002	48.00	5.53	137.800	0.248	0.0	0.0	0.0	1.93	213.3	43.8
13.003	47.04	5.86	137.400	0.248	0.0	0.0	0.0	1.89	208.4	43.8
11.003	46.41	6.07	136.925	0.929	0.0	0.0	0.0	3.85	611.6	155.7
11.004	45.86	6.27	135.450	1.015	0.0	0.0	0.0	3.89	618.0	168.2
11.005	45.67	6.33	133.800	1.131	0.0	0.0	0.0	3.94	626.1	186.5

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Network Design Table for Surface Network 1

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	n	HYD SECT	DIA (mm)	Section Type	Auto Design
14.000	42.348	0.350	121.0	0.191	5.00	0.0	0.600		o	300	Pipe/Conduit	
11.006	64.080	4.250	15.1	0.132	0.00	0.0	0.600		o	450	Pipe/Conduit	
15.000	30.176	0.375	80.5	0.090	5.00	0.0	0.600		o	225	Pipe/Conduit	
11.007	17.001	1.150	14.8	0.102	0.00	0.0	0.600		o	600	Pipe/Conduit	
11.008	18.011	1.225	14.7	0.065	0.00	0.0	0.600		o	600	Pipe/Conduit	
11.009	17.667	1.200	14.7	0.065	0.00	0.0	0.600		o	600	Pipe/Conduit	
16.000	19.179	1.300	14.8	0.089	5.00	0.0	0.600		o	225	Pipe/Conduit	
16.001	41.426	2.800	14.8	0.084	0.00	0.0	0.600		o	300	Pipe/Conduit	
16.002	49.640	2.400	20.7	0.126	0.00	0.0	0.600		o	300	Pipe/Conduit	
16.003	36.333	0.600	60.6	0.123	0.00	0.0	0.600		o	450	Pipe/Conduit	
16.004	9.032	0.050	180.6	0.066	0.00	0.0	0.600		o	450	Pipe/Conduit	
11.010	18.996	1.400	13.6	0.011	0.00	0.0	0.600		o	600	Pipe/Conduit	
11.011	35.801	2.325	15.4	0.088	0.00	0.0	0.600		o	600	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
14.000	48.11	5.49	133.700	0.191	0.0	0.0	0.0	1.43	101.0	33.2
11.006	45.12	6.54	133.200	1.454	0.0	0.0	0.0	5.26	836.0	236.9
15.000	48.56	5.34	129.550	0.090	0.0	0.0	0.0	1.46	58.0	15.8
11.007	45.00	6.58	128.800	1.647	0.0	0.0	0.0	6.35	1796.8	267.5
11.008	44.87	6.63	127.650	1.711	0.0	0.0	0.0	6.37	1801.7	277.3
11.009	44.75	6.68	126.425	1.776	0.0	0.0	0.0	6.37	1800.5	287.0
16.000	49.32	5.09	132.750	0.089	0.0	0.0	0.0	3.42	136.2	15.9
16.001	48.81	5.26	131.375	0.173	0.0	0.0	0.0	4.11	290.4	30.6
16.002	48.09	5.50	128.575	0.299	0.0	0.0	0.0	3.47	245.5	52.0
16.003	47.40	5.73	126.025	0.423	0.0	0.0	0.0	2.62	416.1	72.3
16.004	47.11	5.83	125.425	0.488	0.0	0.0	0.0	1.51	240.1	83.0
11.010	44.62	6.72	125.225	2.275	0.0	0.0	0.0	6.63	1875.7	366.5
11.011	44.37	6.82	123.825	2.363	0.0	0.0	0.0	6.23	1760.5	378.6

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Network Design Table for Surface Network 1

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	n	HYD SECT	DIA (mm)	Section Type	Auto Design
17.000	48.775	1.325	36.8	0.066	5.00	0.0	0.600		o	225	Pipe/Conduit	
11.012	23.450#	1.150	20.4	0.149	0.00	0.0	0.600		o	600	Pipe/Conduit	
1.020	36.251#	3.670	9.9	0.000	0.00	0.0	0.600		o	600	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
17.000	48.46	5.38	123.200	0.066	0.0	0.0	0.0	2.16	86.0	11.6
11.012	44.18	6.89	121.500	2.579	0.0	0.0	0.0	5.41	1529.4	411.4
1.020	29.58	15.96	119.850	6.026	0.0	0.0	0.0	7.78	2199.0	643.8

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PIPELINE SCHEDULES for Surface Network 1

Upstream Manhole

- Indicates pipe length does not match coordinates

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
1.000	o	225	S1	140.450	139.000	1.225	Open Manhole	1500
1.001	o	225	S2	140.175	138.700	1.250	Open Manhole	1500
1.002	o	300	S3	139.633	138.125	1.208	Open Manhole	1500
1.003	o	300	S4	138.362	136.850	1.212	Open Manhole	1500
1.004	o	375	S5	137.195	135.575	1.245	Open Manhole	1500
1.005	o	300	BASIN1	135.828	134.500	1.028	Open Manhole	1500
1.006	o	225	FC-S6	135.850	134.000	1.625	Open Manhole	1200
2.000	o	300	S7	135.394	133.850	1.244	Open Manhole	1500
2.001	o	300	S8	134.806	133.275	1.231	Open Manhole	1500
2.002	o	450	S9	134.768	133.050	1.268	Open Manhole	1500
2.003	o	450	S10	134.886	133.000	1.436	Open Manhole	1500
2.004	o	450	S11	135.935	132.875	2.610	Open Manhole	1500
1.007	o	600	S12	136.258	132.675	2.983	Open Manhole	1500
1.008	o	600	S14	136.776	132.617	3.559	Open Manhole	1500
1.009	o	600	S15	137.351	132.543	4.208	Open Manhole	1500

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
1.000	30.730	102.4	S2	140.175	138.700	1.250	Open Manhole	1500
1.001	26.718	53.4	S3	139.633	138.200	1.208	Open Manhole	1500
1.002	38.117	29.9	S4	138.362	136.850	1.212	Open Manhole	1500
1.003	47.607	39.7	S5	137.195	135.650	1.245	Open Manhole	1500
1.004	31.850#	29.6	BASIN1	135.828	134.500	0.953	Open Manhole	1500
1.005	5.000#	10.0	FC-S6	135.850	134.000	1.550	Open Manhole	1200
1.006	17.117	18.0	S12	136.258	133.050	2.983	Open Manhole	1500
2.000	45.262	78.7	S8	134.806	133.275	1.231	Open Manhole	1500
2.001	17.107	228.1	S9	134.768	133.200	1.268	Open Manhole	1500
2.002	10.291	205.8	S10	134.886	133.000	1.436	Open Manhole	1500
2.003	52.700	421.6	S11	135.935	132.875	2.610	Open Manhole	1500
2.004	16.022	320.4	S12	136.258	132.825	2.983	Open Manhole	1500
1.007	23.276	401.3	S14	136.776	132.617	3.559	Open Manhole	1500
1.008	33.339	450.5	S15	137.351	132.543	4.208	Open Manhole	1500
1.009	50.952	450.9	S18	136.491	132.430	3.461	Open Manhole	1500

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PIPELINE SCHEDULES for Surface Network 1

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
3.000	o	225	S16	134.582	133.100	1.257	Open Manhole	1500
3.001	o	300	S17	135.323	132.875	2.148	Open Manhole	1200
1.010	o	600	S18	136.491	132.425	3.466	Open Manhole	1500
1.011	o	600	S19	132.332	127.750	3.982	Open Manhole	1200
4.000	o	225	S20	137.723	136.300	1.198	Open Manhole	1500
4.001	o	300	S21	133.639	132.225	1.114	Open Manhole	1500
4.002	o	300	S22	131.394	129.050	2.044	Open Manhole	1500
1.012	3 \=/	500	Swale	128.000	126.600	1.250	Open Manhole	1200
5.000	o	225	S23	142.228	140.800	1.203	Open Manhole	1500
5.001	o	225	S24	141.697	139.300	2.172	Open Manhole	1500
6.000	o	225	S25A	140.400	138.975	1.200	Open Manhole	1050
6.001	o	225	S25	140.734	138.925	1.584	Open Manhole	1500

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
3.000	22.882	152.5	S17	135.323	132.950	2.148	Open Manhole	1200
3.001	27.286	181.9	S18	136.491	132.725	3.466	Open Manhole	1500
1.010	61.036	13.1	S19	132.332	127.750	3.982	Open Manhole	1200
1.011	31.082#	27.0	Swale	128.000	126.600	0.800	Open Manhole	1200
4.000	55.471	13.9	S21	133.639	132.300	1.114	Open Manhole	1500
4.001	32.780	10.6	S22	131.394	129.125	1.969	Open Manhole	1500
4.002	18.070#	10.0	Swale	128.000	127.250	0.450	Open Manhole	1200
1.012	78.902	394.5	BASIN2	128.000	126.400	1.450	Open Manhole	1200
5.000	48.442	32.3	S24	141.697	139.300	2.172	Open Manhole	1500
5.001	16.516	27.5	S26	141.268	138.700	2.343	Open Manhole	1500
6.000	8.717	174.3	S25	140.734	138.925	1.584	Open Manhole	1500
6.001	49.224	218.8	S26	141.268	138.700	2.343	Open Manhole	1500

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PIPELINE SCHEDULES for Surface Network 1

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
5.002	o	300	S26	141.268	138.625	2.343	Open Manhole	1500
5.003	o	300	S27	138.938	137.075	1.563	Open Manhole	1500
5.004	o	375	S28	138.074	136.300	1.399	Open Manhole	1500
5.005	o	375	S29	137.381	135.800	1.206	Open Manhole	1500
5.006	o	375	S30	134.873	133.300	1.198	Open Manhole	1500
1.013	o	300	BASIN2	128.000	126.500	1.200	Open Manhole	1200
1.014	o	375	FC-S31	128.000	126.100	1.525	Open Manhole	1500
7.000	o	225	S32	139.497	137.300	1.972	Open Manhole	1500
7.001	o	300	S33	136.364	134.800	1.264	Open Manhole	1500
8.000	o	225	S34	135.690	133.800	1.665	Open Manhole	1500
7.002	o	300	S35	135.898	133.300	2.298	Open Manhole	1500
7.003	o	375	S36	132.943	130.650	1.918	Open Manhole	1500
7.004	o	450	S37	129.971	126.875	2.646	Open Manhole	1500

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
5.002	48.531	31.3	S27	138.938	137.075	1.563	Open Manhole	1500
5.003	21.636	30.9	S28	138.074	136.375	1.399	Open Manhole	1500
5.004	22.475	44.9	S29	137.381	135.800	1.206	Open Manhole	1500
5.005	34.240	13.7	S30	134.873	133.300	1.198	Open Manhole	1500
5.006	72.003#	10.6	BASIN2	128.000	126.500	1.125	Open Manhole	1200
1.013	9.781#	24.5	FC-S31	128.000	126.100	1.600	Open Manhole	1500
1.014	12.329#	61.6	BASIN3	127.300	125.900	1.025	Open Manhole	1500
7.000	28.973	11.9	S33	136.364	134.875	1.264	Open Manhole	1500
7.001	44.940	34.6	S35	135.898	133.500	2.098	Open Manhole	1500
8.000	25.771	60.6	S35	135.898	133.375	2.298	Open Manhole	1500
7.002	40.722	15.8	S36	132.943	130.725	1.918	Open Manhole	1500
7.003	38.830	10.5	S37	129.971	126.950	2.646	Open Manhole	1500
7.004	13.773#	14.1	BASIN3	127.300	125.900	0.950	Open Manhole	1500

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PIPELINE SCHEDULES for Surface Network 1

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
1.015	o	300	BASIN3	127.300	125.900	1.100	Open Manhole	1500
1.016	o	375	FC-S38	127.300	125.500	1.425	Open Manhole	1500
9.000	o	225	S39	130.979	129.500	1.254	Open Manhole	1500
9.001	o	225	S40	129.451	128.000	1.226	Open Manhole	1500
9.002	o	225	S41	126.809	125.400	1.184	Open Manhole	1500
1.017	3 \=/	500	S42	125.457	124.900	0.407	Open Manhole	1200
1.018	3 \=/	500	S43	122.779	122.200	0.429	Junction	
10.000	o	225	S44	123.766	122.200	1.341	Open Manhole	1500
10.001	o	225	S45	123.526	122.000	1.301	Open Manhole	1500
1.019	o	450	S46	121.704	120.625	0.629	Open Manhole	1200
11.000	o	225	S47	143.178	141.600	1.353	Open Manhole	1500
11.001	o	300	S48	142.706	140.550	1.856	Open Manhole	1200

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
1.015	8.683#	21.7	FC-S38	127.300	125.500	1.500	Open Manhole	1500
1.016	40.957	81.9	S42	125.457	125.000	0.082	Open Manhole	1200
9.000	23.930	16.0	S40	129.451	128.000	1.226	Open Manhole	1500
9.001	37.967	14.6	S41	126.809	125.400	1.184	Open Manhole	1500
9.002	14.003	46.7	S42	125.457	125.100	0.132	Open Manhole	1200
1.017	43.500	16.1	S43	122.779	122.200	0.429	Junction	
1.018	23.683	21.5	S46	121.704	121.100	0.454	Open Manhole	1200
10.000	22.233	111.2	S45	123.526	122.000	1.301	Open Manhole	1500
10.001	11.531	11.5	S46	121.704	121.000	0.479	Open Manhole	1200
1.019	13.155#	47.8	BASIN4	121.500	120.350	0.700	Open Manhole	1500
11.000	65.732	67.4	S48	142.706	140.625	1.856	Open Manhole	1200
11.001	19.373	20.4	S50	141.464	139.600	1.564	Open Manhole	1500

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PIPELINE SCHEDULES for Surface Network 1

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
12.000	o	225	S49	143.662	142.200	1.237	Open Manhole	1500
11.002	o	375	S50	141.464	139.525	1.564	Open Manhole	1500
13.000	o	300	S51	140.851	138.500	2.051	Open Manhole	1350
13.001	o	375	S52	139.624	138.025	1.224	Open Manhole	1500
13.002	o	375	S53	139.501	137.800	1.326	Open Manhole	1500
13.003	o	375	S54	139.674	137.400	1.899	Open Manhole	1200
11.003	o	450	S55	140.002	136.925	2.627	Open Manhole	1500
11.004	o	450	S56	137.871	135.450	1.971	Open Manhole	1500
11.005	o	450	S57	135.664	133.800	1.414	Open Manhole	1500
14.000	o	300	S58	135.270	133.700	1.270	Open Manhole	1500
11.006	o	450	S59	135.094	133.200	1.444	Open Manhole	1500

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
12.000	63.526	25.9	S50	141.464	139.750	1.489	Open Manhole	1500
11.002	33.666	13.3	S55	140.002	137.000	2.627	Open Manhole	1500
13.000	18.419	46.0	S52	139.624	138.100	1.224	Open Manhole	1500
13.001	13.238	58.8	S53	139.501	137.800	1.326	Open Manhole	1500
13.002	35.255	88.1	S54	139.674	137.400	1.899	Open Manhole	1200
13.003	36.921	92.3	S55	140.002	137.000	2.627	Open Manhole	1500
11.003	41.476	28.1	S56	137.871	135.450	1.971	Open Manhole	1500
11.004	45.450	27.5	S57	135.664	133.800	1.414	Open Manhole	1500
11.005	16.103	26.8	S59	135.094	133.200	1.444	Open Manhole	1500
14.000	42.348	121.0	S59	135.094	133.350	1.444	Open Manhole	1500
11.006	64.080	15.1	S61	130.665	128.950	1.265	Open Manhole	1500

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PIPELINE SCHEDULES for Surface Network 1

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
15.000	o	225	S60	130.995	129.550	1.220	Open Manhole	1500
11.007	o	600	S61	130.665	128.800	1.265	Open Manhole	1500
11.008	o	600	S62	129.514	127.650	1.264	Open Manhole	1500
11.009	o	600	S63	128.288	126.425	1.263	Open Manhole	1500
16.000	o	225	S64	134.213	132.750	1.238	Open Manhole	1500
16.001	o	300	S65	132.923	131.375	1.248	Open Manhole	1500
16.002	o	300	S66	130.126	128.575	1.251	Open Manhole	1500
16.003	o	450	S67	127.727	126.025	1.252	Open Manhole	1500
16.004	o	450	S68	127.378	125.425	1.503	Open Manhole	1500
11.010	o	600	S69	127.085	125.225	1.260	Open Manhole	1500
11.011	o	600	S70	125.824	123.825	1.399	Open Manhole	1500
17.000	o	225	S71	124.693	123.200	1.268	Open Manhole	1500
11.012	o	600	S72	123.544	121.500	1.444	Open Manhole	1500

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
15.000	30.176	80.5	S61	130.665	129.175	1.265	Open Manhole	1500
11.007	17.001	14.8	S62	129.514	127.650	1.264	Open Manhole	1500
11.008	18.011	14.7	S63	128.288	126.425	1.263	Open Manhole	1500
11.009	17.667	14.7	S69	127.085	125.225	1.260	Open Manhole	1500
16.000	19.179	14.8	S65	132.923	131.450	1.248	Open Manhole	1500
16.001	41.426	14.8	S66	130.126	128.575	1.251	Open Manhole	1500
16.002	49.640	20.7	S67	127.727	126.175	1.252	Open Manhole	1500
16.003	36.333	60.6	S68	127.378	125.425	1.503	Open Manhole	1500
16.004	9.032	180.6	S69	127.085	125.375	1.260	Open Manhole	1500
11.010	18.996	13.6	S70	125.824	123.825	1.399	Open Manhole	1500
11.011	35.801	15.4	S72	123.544	121.500	1.444	Open Manhole	1500
17.000	48.775	36.8	S72	123.544	121.875	1.444	Open Manhole	1500
11.012	23.450#	20.4	BASIN4	121.500	120.350	0.550	Open Manhole	1500

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PIPELINE SCHEDULES for Surface Network 1

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
1.020	o	600	BASIN4	121.500	119.850	1.050	Open Manhole	1500

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
1.020	36.251#	9.9	EXISTING WATERCOURSE	117.990	116.180	1.210	Junction	

Free Flowing Outfall Details for Surface Network 1

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
1.020	EXISTING WATERCOURSE	117.990	116.180	0.000	0	0

Simulation Criteria for Surface Network 1

Volumetric Runoff Coeff	1.000	Additional Flow - % of Total Flow	0.000
Areal Reduction Factor	1.000	MADD Factor * 10m³/ha Storage	2.000
Hot Start (mins)	0	Inlet Coeffiecient	0.800
Hot Start Level (mm)	0	Flow per Person per Day (l/per/day)	0.000
Manhole Headloss Coeff (Global)	0.500	Run Time (mins)	60
Foul Sewage per hectare (l/s)	0.000	Output Interval (mins)	1

Number of Input Hydrographs	0	Number of Offline Controls	0	Number of Time/Area Diagrams	0
Number of Online Controls	4	Number of Storage Structures	4	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FEH
Return Period (years)	2
FEH Rainfall Version	2013
Site Location	GB 298562 518054 NX 98562 18054
Data Type	Point
Summer Storms	Yes
Winter Storms	Yes
Cv (Summer)	1.000

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Synthetic Rainfall Details

Cv (Winter)	0.840
Storm Duration (mins)	30

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Online Controls for Surface Network 1

Hydro-Brake® Optimum Manhole: FC-S6, DS/PN: 1.006, Volume (m³): 2.4

Unit Reference	MD-SHE-0093-5000-1850-5000
Design Head (m)	1.850
Design Flow (l/s)	5.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	93
Invert Level (m)	134.000
Minimum Outlet Pipe Diameter (mm)	150
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.850	5.0	Kick-Flo®	0.834	3.5
Flush-Flo™	0.412	4.3	Mean Flow over Head Range	-	4.0

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	3.0	1.200	4.1	3.000	6.3	7.000	9.4
0.200	4.0	1.400	4.4	3.500	6.7	7.500	9.7
0.300	4.2	1.600	4.7	4.000	7.2	8.000	10.0
0.400	4.3	1.800	4.9	4.500	7.6	8.500	10.3
0.500	4.3	2.000	5.2	5.000	8.0	9.000	10.5
0.600	4.2	2.200	5.4	5.500	8.3	9.500	10.8
0.800	3.6	2.400	5.6	6.000	8.7		
1.000	3.8	2.600	5.9	6.500	9.0		

Hydro-Brake® Optimum Manhole: FC-S31, DS/PN: 1.014, Volume (m³): 4.0

Unit Reference	MD-SHE-0339-7500-1900-7500
Design Head (m)	1.900
Design Flow (l/s)	75.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	339
Invert Level (m)	126.100
Minimum Outlet Pipe Diameter (mm)	375

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Hydro-Brake® Optimum Manhole: FC-S31, DS/PN: 1.014, Volume (m³): 4.0

Suggested Manhole Diameter (mm) Site Specific Design (Contact Hydro International)

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.900	75.0	Kick-Flo®	1.325	63.0
Flush-Flo™	0.616	74.9	Mean Flow over Head Range	-	63.7

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	9.9	1.200	68.3	3.000	93.6	7.000	141.4
0.200	34.4	1.400	64.7	3.500	100.9	7.500	146.3
0.300	62.2	1.600	69.0	4.000	107.6	8.000	150.9
0.400	72.6	1.800	73.0	4.500	114.0	8.500	155.5
0.500	74.4	2.000	76.9	5.000	120.0	9.000	159.9
0.600	74.9	2.200	80.5	5.500	125.7	9.500	164.2
0.800	74.1	2.400	84.0	6.000	131.1		
1.000	72.2	2.600	87.3	6.500	136.4		

Hydro-Brake® Optimum Manhole: FC-S38, DS/PN: 1.016, Volume (m³): 3.7

Unit Reference	MD-SHE-0308-6000-1800-6000
Design Head (m)	1.800
Design Flow (l/s)	60.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	308
Invert Level (m)	125.500
Minimum Outlet Pipe Diameter (mm)	375
Suggested Manhole Diameter (mm)	2100

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.800	59.9	Kick-Flo®	1.247	50.2
Flush-Flo™	0.577	59.7	Mean Flow over Head Range	-	51.0

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	9.3	0.200	31.6	0.300	54.4	0.400	58.4

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Hydro-Brake® Optimum Manhole: FC-S38, DS/PN: 1.016, Volume (m³): 3.7

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.500	59.5	1.800	59.9	4.000	88.2	7.500	119.7
0.600	59.7	2.000	63.0	4.500	93.4	8.000	123.6
0.800	58.8	2.200	66.0	5.000	98.3	8.500	127.3
1.000	56.9	2.400	68.8	5.500	102.9	9.000	130.9
1.200	52.2	2.600	71.5	6.000	107.4	9.500	134.4
1.400	53.0	3.000	76.7	6.500	111.7		
1.600	56.6	3.500	82.6	7.000	115.8		

Hydro-Brake® Optimum Manhole: BASIN4, DS/PN: 1.020, Volume (m³): 11.0

Unit Reference	MD-SHE-0400-1100-1850-1100
Design Head (m)	1.850
Design Flow (l/s)	110.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	400
Invert Level (m)	119.850
Minimum Outlet Pipe Diameter (mm)	450
Suggested Manhole Diameter (mm)	Site Specific Design (Contact Hydro International)

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.850	110.0	Kick-Flo®	1.349	94.4
Flush-Flo™	0.667	110.0	Mean Flow over Head Range	-	92.0

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	11.0	1.200	102.1	3.000	139.2	7.000	210.6
0.200	39.4	1.400	96.1	3.500	150.0	7.500	217.8
0.300	76.1	1.600	102.5	4.000	160.2	8.000	224.8
0.400	105.1	1.800	108.5	4.500	169.6	8.500	231.6
0.500	108.4	2.000	114.2	5.000	178.6	9.000	238.2
0.600	109.8	2.200	119.7	5.500	187.1	9.500	244.6
0.800	109.4	2.400	124.8	6.000	195.3		
1.000	106.9	2.600	129.8	6.500	203.1		

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Storage Structures for Surface Network 1

Tank or Pond Manhole: BASIN1, DS/PN: 1.005

Invert Level (m) 134.500

Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	441.1	0.400	580.3	0.800	730.8	1.200	892.0
0.100	474.4	0.500	616.9	0.900	770.1	1.300	934.0
0.200	509.0	0.600	654.2	1.000	810.0		
0.300	544.3	0.700	692.2	1.100	850.7		

Tank or Pond Manhole: BASIN2, DS/PN: 1.013

Invert Level (m) 126.500

Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	1.8	0.500	893.6	1.000	1228.1	1.500	1575.7
0.100	393.0	0.600	959.4	1.100	1296.5	1.501	1576.5
0.200	656.1	0.700	1025.8	1.200	1365.5		
0.300	763.5	0.800	1092.7	1.300	1435.1		
0.400	828.3	0.900	1160.1	1.400	1505.1		

Tank or Pond Manhole: BASIN3, DS/PN: 1.015

Invert Level (m) 125.900

Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	738.0	0.400	916.8	0.800	1108.2	1.200	1311.3
0.100	781.0	0.500	963.6	0.900	1157.9	1.300	1363.9
0.200	825.5	0.600	1011.1	1.000	1208.3	1.400	1417.2
0.300	870.8	0.700	1059.3	1.100	1259.4		

Tank or Pond Manhole: BASIN4, DS/PN: 1.020

Invert Level (m) 119.850

Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	810.2	0.500	1000.3	1.000	1366.9	1.500	1652.6
0.100	846.4	0.600	1148.5	1.100	1422.9	1.600	2053.7
0.200	883.9	0.700	1202.2	1.200	1479.5	1.650	2264.5
0.300	922.1	0.800	1256.6	1.300	1536.6		
0.400	960.9	0.900	1311.4	1.400	1594.3		

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2 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Surface Network 1

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	2.000
Hot Start Level (mm)	0	Inlet Coeffiecient	0.800
Manhole Headloss Coeff (Global)	0.500	Flow per Person per Day (l/per/day)	0.000
Foul Sewage per hectare (l/s)	0.000		

Number of Input Hydrographs	0	Number of Offline Controls	0	Number of Time/Area Diagrams	0
Number of Online Controls	4	Number of Storage Structures	4	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FEH
FEH Rainfall Version	2013
Site Location	GB 298562 518054 NX 98562 18054
Data Type	Point
Cv (Summer)	1.000
Cv (Winter)	1.000

Margin for Flood Risk Warning (mm)	300.0
Analysis Timestep	2.5 Second Increment (Extended)
DTS Status	OFF
DVD Status	ON
Inertia Status	ON

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 240, 360, 480, 960, 1440
Return Period(s) (years)	2, 30, 100
Climate Change (%)	0, 0, 50

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
1.000	S1	15 Summer	2	+0%	100/15 Summer				139.083
1.001	S2	15 Summer	2	+0%	100/15 Summer				138.797
1.002	S3	15 Summer	2	+0%					138.205
1.003	S4	15 Summer	2	+0%	100/15 Summer				136.965
1.004	S5	15 Summer	2	+0%	100/15 Summer				135.700
1.005	BASIN1	480 Summer	2	+0%	30/60 Summer				134.713
1.006	FC-S6	480 Summer	2	+0%	2/15 Summer				134.736
2.000	S7	15 Summer	2	+0%	100/15 Summer				133.938
2.001	S8	15 Summer	2	+0%	30/15 Summer				133.427
2.002	S9	15 Summer	2	+0%	100/15 Summer				133.229
2.003	S10	15 Summer	2	+0%	100/15 Summer				133.207
2.004	S11	15 Summer	2	+0%	100/15 Summer				133.089

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2 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Surface Network 1

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	S1	-0.142	0.000	0.29			13.9	OK	
1.001	S2	-0.128	0.000	0.38			25.2	OK	
1.002	S3	-0.220	0.000	0.16			29.9	OK	
1.003	S4	-0.185	0.000	0.31			51.6	OK	
1.004	S5	-0.250	0.000	0.24			78.1	OK	
1.005	BASIN1	-0.087	0.000	0.03			5.8	OK	
1.006	FC-S6	0.511	0.000	0.04			4.3	SURCHARGED	
2.000	S7	-0.212	0.000	0.18			21.6	OK	
2.001	S8	-0.148	0.000	0.51			31.8	OK	
2.002	S9	-0.271	0.000	0.27			42.6	OK	
2.003	S10	-0.243	0.000	0.42			59.5	OK	
2.004	S11	-0.236	0.000	0.46			63.7	OK	

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2 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Surface Network 1

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
1.007	S12	30 Summer	2	+0%	100/15 Summer				132.908
1.008	S14	30 Summer	2	+0%	100/15 Summer				132.854
1.009	S15	30 Summer	2	+0%	100/15 Summer				132.769
3.000	S16	15 Summer	2	+0%	100/15 Summer				133.202
3.001	S17	15 Summer	2	+0%	100/15 Summer				132.995
1.010	S18	30 Summer	2	+0%					132.522
1.011	S19	30 Summer	2	+0%					127.876
4.000	S20	15 Summer	2	+0%	100/15 Summer				136.387
4.001	S21	15 Summer	2	+0%					132.313
4.002	S22	15 Summer	2	+0%	100/15 Summer				129.154
1.012	Swale	30 Summer	2	+0%					126.913
5.000	S23	15 Summer	2	+0%					140.866
5.001	S24	15 Summer	2	+0%	100/15 Summer				139.377
6.000	S25A	15 Summer	2	+0%	30/15 Summer				139.048
6.001	S25	15 Summer	2	+0%	30/15 Summer				139.033
5.002	S26	15 Summer	2	+0%	100/15 Summer				138.725
5.003	S27	15 Summer	2	+0%	100/15 Summer				137.197
5.004	S28	15 Summer	2	+0%	100/15 Summer				136.437
5.005	S29	15 Summer	2	+0%					135.898
5.006	S30	15 Summer	2	+0%					133.406
1.013	BASIN2	120 Summer	2	+0%	30/15 Summer				126.765
1.014	FC-S31	120 Summer	2	+0%	2/15 Summer				126.671
7.000	S32	15 Summer	2	+0%					137.360
7.001	S33	15 Summer	2	+0%					134.883
8.000	S34	15 Summer	2	+0%					133.855
7.002	S35	15 Summer	2	+0%					133.387
7.003	S36	15 Summer	2	+0%					130.740
7.004	S37	15 Summer	2	+0%					126.996
1.015	BASIN3	360 Summer	2	+0%	30/60 Summer				126.191
1.016	FC-S38	360 Summer	2	+0%	2/15 Summer				126.089
9.000	S39	15 Summer	2	+0%					129.555
9.001	S40	15 Summer	2	+0%					128.053
9.002	S41	15 Summer	2	+0%	100/15 Summer				125.496
1.017	S42	120 Summer	2	+0%					124.997
1.018	S43	120 Summer	2	+0%					122.305
10.000	S44	15 Summer	2	+0%	100/15 Summer				122.296
10.001	S45	15 Summer	2	+0%					122.054
1.019	S46	120 Summer	2	+0%	100/30 Summer				120.786
11.000	S47	15 Summer	2	+0%	100/15 Summer				141.706
11.001	S48	15 Summer	2	+0%					140.641
12.000	S49	15 Summer	2	+0%	100/15 Summer				142.287
11.002	S50	15 Summer	2	+0%					139.627
13.000	S51	15 Summer	2	+0%	100/15 Summer				138.550

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2 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Surface Network 1

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
1.007	S12	-0.367	0.000	0.27			71.8	OK	
1.008	S14	-0.363	0.000	0.29			76.9	OK	
1.009	S15	-0.374	0.000	0.30			84.1	OK	
3.000	S16	-0.123	0.000	0.42			16.0	OK	
3.001	S17	-0.180	0.000	0.33			24.6	OK	
1.010	S18	-0.503	0.000	0.06			106.0	OK	
1.011	S19	-0.474	0.000	0.10			105.9	OK	
4.000	S20	-0.138	0.000	0.31			42.1	OK	
4.001	S21	-0.212	0.000	0.19			58.6	OK	
4.002	S22	-0.196	0.000	0.25			76.8	OK	
1.012	Swale	-1.087	0.000	0.03			159.1	OK	
5.000	S23	-0.159	0.000	0.19			16.3	OK	
5.001	S24	-0.148	0.000	0.25			21.9	OK	
6.000	S25A	-0.152	0.000	0.16			5.2	OK	
6.001	S25	-0.117	0.000	0.45			15.2	OK	
5.002	S26	-0.200	0.000	0.24			45.2	OK	
5.003	S27	-0.178	0.000	0.34			60.7	OK	
5.004	S28	-0.238	0.000	0.28			72.3	OK	
5.005	S29	-0.277	0.000	0.16			75.6	OK	
5.006	S30	-0.269	0.000	0.18			102.6	OK	
1.013	BASIN2	-0.035	0.000	0.49			78.1	OK	
1.014	FC-S31	0.196	0.000	0.43			74.6	SURCHARGED	
7.000	S32	-0.165	0.000	0.16			22.2	OK	
7.001	S33	-0.217	0.000	0.17			30.1	OK	
8.000	S34	-0.170	0.000	0.14			8.4	OK	
7.002	S35	-0.213	0.000	0.18			46.9	OK	
7.003	S36	-0.285	0.000	0.13			72.8	OK	
7.004	S37	-0.329	0.000	0.16			89.0	OK	
1.015	BASIN3	-0.009	0.000	0.39			62.3	OK	
1.016	FC-S38	0.214	0.000	0.30			59.5	SURCHARGED	
9.000	S39	-0.170	0.000	0.13			16.1	OK	
9.001	S40	-0.172	0.000	0.12			16.0	OK	
9.002	S41	-0.129	0.000	0.37			24.6	OK	
1.017	S42	-0.460	0.000	0.03			73.4	OK	
1.018	S43	-0.474	0.000	0.03			73.4	OK	
10.000	S44	-0.129	0.000	0.37			16.8	OK	
10.001	S45	-0.171	0.000	0.13			16.9	OK	
1.019	S46	-0.289	0.000	0.28			82.5	OK	
11.000	S47	-0.119	0.000	0.45			27.7	OK	
11.001	S48	-0.209	0.000	0.20			42.6	OK	
12.000	S49	-0.138	0.000	0.31			31.1	OK	
11.002	S50	-0.273	0.000	0.16			81.1	OK	

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2 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Surface Network 1

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
13.000	S51	-0.250	0.000	0.07			9.4	OK	

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2 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Surface Network 1

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
13.001	S52	15 Summer	2	+0%	100/15 Summer				138.140
13.002	S53	15 Summer	2	+0%	100/15 Summer				137.914
13.003	S54	15 Summer	2	+0%	100/15 Summer				137.514
11.003	S55	15 Summer	2	+0%	100/15 Summer				137.083
11.004	S56	15 Summer	2	+0%	100/15 Summer				135.614
11.005	S57	15 Summer	2	+0%	100/15 Summer				133.998
14.000	S58	15 Summer	2	+0%	100/15 Summer				133.824
11.006	S59	15 Summer	2	+0%	100/15 Summer				133.366
15.000	S60	15 Summer	2	+0%	100/15 Summer				129.633
11.007	S61	15 Summer	2	+0%					128.997
11.008	S62	15 Summer	2	+0%	100/15 Summer				127.848
11.009	S63	15 Summer	2	+0%	100/15 Summer				126.628
16.000	S64	15 Summer	2	+0%					132.803
16.001	S65	15 Summer	2	+0%					131.440
16.002	S66	15 Summer	2	+0%	100/15 Summer				128.667
16.003	S67	15 Summer	2	+0%	100/15 Summer				126.153
16.004	S68	15 Summer	2	+0%	30/15 Summer				125.639
11.010	S69	15 Summer	2	+0%	100/15 Summer				125.446
11.011	S70	15 Summer	2	+0%	100/15 Summer				124.025
17.000	S71	15 Summer	2	+0%					123.256
11.012	S72	15 Summer	2	+0%	100/15 Summer				121.750
1.020	BASIN4	360 Summer	2	+0%	30/30 Summer				120.366

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
13.001	S52	-0.260	0.000	0.20			38.0	OK	
13.002	S53	-0.261	0.000	0.20			37.7	OK	
13.003	S54	-0.261	0.000	0.20			37.8	OK	
11.003	S55	-0.292	0.000	0.27			145.7	OK	
11.004	S56	-0.286	0.000	0.28			158.0	OK	
11.005	S57	-0.252	0.000	0.40			174.2	OK	
14.000	S58	-0.176	0.000	0.35			33.2	OK	
11.006	S59	-0.284	0.000	0.29			225.8	OK	
15.000	S60	-0.142	0.000	0.29			15.5	OK	
11.007	S61	-0.403	0.000	0.24			255.1	OK	
11.008	S62	-0.402	0.000	0.24			262.9	OK	
11.009	S63	-0.397	0.000	0.25			270.1	OK	
16.000	S64	-0.172	0.000	0.13			15.5	OK	
16.001	S65	-0.235	0.000	0.10			27.9	OK	
16.002	S66	-0.208	0.000	0.20			46.4	OK	

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2 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Surface Network 1

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
16.003	S67	-0.322	0.000	0.18			64.1	OK	
16.004	S68	-0.236	0.000	0.45			73.9	OK	
11.010	S69	-0.379	0.000	0.29			342.9	OK	
11.011	S70	-0.400	0.000	0.24			355.0	OK	
17.000	S71	-0.169	0.000	0.14			11.5	OK	
11.012	S72	-0.350	0.000	0.36			385.9	OK	
1.020	BASIN4	-0.084	0.000	0.06			108.7	OK	

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30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Surface Network 1

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	2.000
Hot Start Level (mm)	0	Inlet Coeffiecient	0.800
Manhole Headloss Coeff (Global)	0.500	Flow per Person per Day (l/per/day)	0.000
Foul Sewage per hectare (l/s)	0.000		

Number of Input Hydrographs	0	Number of Offline Controls	0	Number of Time/Area Diagrams	0
Number of Online Controls	4	Number of Storage Structures	4	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FEH
FEH Rainfall Version	2013
Site Location	GB 298562 518054 NX 98562 18054
Data Type	Point
Cv (Summer)	1.000
Cv (Winter)	1.000

Margin for Flood Risk Warning (mm)	300.0
Analysis Timestep	2.5 Second Increment (Extended)
DTS Status	OFF
DVD Status	ON
Inertia Status	ON

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 240, 360, 480, 960, 1440
Return Period(s) (years)	2, 30, 100
Climate Change (%)	0, 0, 50

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
1.000	S1	15 Summer	30	+0%	100/15 Summer				139.127
1.001	S2	15 Summer	30	+0%	100/15 Summer				138.868
1.002	S3	15 Summer	30	+0%					138.254
1.003	S4	15 Summer	30	+0%	100/15 Summer				137.054
1.004	S5	15 Summer	30	+0%	100/15 Summer				135.792
1.005	BASIN1	480 Winter	30	+0%	30/60 Summer				134.932
1.006	FC-S6	480 Winter	30	+0%	2/15 Summer				134.966
2.000	S7	15 Summer	30	+0%	100/15 Summer				133.979
2.001	S8	15 Summer	30	+0%	30/15 Summer				133.587
2.002	S9	15 Summer	30	+0%	100/15 Summer				133.408
2.003	S10	15 Summer	30	+0%	100/15 Summer				133.382
2.004	S11	15 Summer	30	+0%	100/15 Summer				133.268

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30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Surface Network 1

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	S1	-0.098	0.000	0.60			28.6	OK	
1.001	S2	-0.057	0.000	0.89			58.6	OK	
1.002	S3	-0.171	0.000	0.37			70.7	OK	
1.003	S4	-0.096	0.000	0.77			128.6	OK	
1.004	S5	-0.158	0.000	0.61			201.4	OK	
1.005	BASIN1	0.132	0.000	0.03			5.3	SURCHARGED	
1.006	FC-S6	0.741	0.000	0.04			4.3	SURCHARGED	
2.000	S7	-0.171	0.000	0.38			44.5	OK	
2.001	S8	0.012	0.000	1.12			69.9	SURCHARGED	
2.002	S9	-0.092	0.000	0.61			95.9	OK	
2.003	S10	-0.068	0.000	0.96			136.4	OK	
2.004	S11	-0.057	0.000	1.00			139.4	OK	

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30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Surface Network 1

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
1.007	S12	30 Summer	30	+0%	100/15 Summer				133.040
1.008	S14	30 Summer	30	+0%	100/15 Summer				132.984
1.009	S15	30 Summer	30	+0%	100/15 Summer				132.894
3.000	S16	15 Summer	30	+0%	100/15 Summer				133.264
3.001	S17	15 Summer	30	+0%	100/15 Summer				133.073
1.010	S18	30 Summer	30	+0%					132.572
1.011	S19	30 Summer	30	+0%					127.939
4.000	S20	15 Summer	30	+0%	100/15 Summer				136.433
4.001	S21	15 Summer	30	+0%					132.362
4.002	S22	15 Summer	30	+0%	100/15 Summer				129.220
1.012	Swale	30 Summer	30	+0%					127.057
5.000	S23	15 Summer	30	+0%					140.898
5.001	S24	15 Summer	30	+0%	100/15 Summer				139.421
6.000	S25A	15 Summer	30	+0%	30/15 Summer				139.203
6.001	S25	15 Summer	30	+0%	30/15 Summer				139.191
5.002	S26	15 Summer	30	+0%	100/15 Summer				138.787
5.003	S27	15 Summer	30	+0%	100/15 Summer				137.286
5.004	S28	15 Summer	30	+0%	100/15 Summer				136.533
5.005	S29	15 Summer	30	+0%					135.962
5.006	S30	15 Summer	30	+0%					133.477
1.013	BASIN2	60 Winter	30	+0%	30/15 Summer				127.019
1.014	FC-S31	60 Summer	30	+0%	2/15 Summer				126.918
7.000	S32	15 Summer	30	+0%					137.388
7.001	S33	15 Summer	30	+0%					134.929
8.000	S34	15 Summer	30	+0%					133.882
7.002	S35	15 Summer	30	+0%					133.436
7.003	S36	15 Summer	30	+0%					130.796
7.004	S37	15 Summer	30	+0%					127.074
1.015	BASIN3	240 Winter	30	+0%	30/60 Summer				126.390
1.016	FC-S38	360 Winter	30	+0%	2/15 Summer				126.218
9.000	S39	15 Summer	30	+0%					129.581
9.001	S40	15 Summer	30	+0%					128.077
9.002	S41	15 Summer	30	+0%	100/15 Summer				125.562
1.017	S42	30 Summer	30	+0%					125.018
1.018	S43	30 Summer	30	+0%					122.326
10.000	S44	15 Summer	30	+0%	100/15 Summer				122.351
10.001	S45	15 Summer	30	+0%					122.079
1.019	S46	30 Summer	30	+0%	100/30 Summer				120.839
11.000	S47	15 Summer	30	+0%	100/15 Summer				141.771
11.001	S48	15 Summer	30	+0%					140.692
12.000	S49	15 Summer	30	+0%	100/15 Summer				142.334
11.002	S50	15 Summer	30	+0%					139.683
13.000	S51	15 Summer	30	+0%	100/15 Summer				138.574

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30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Surface Network 1

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
1.007	S12	-0.235	0.000	0.57			152.0	OK	
1.008	S14	-0.233	0.000	0.61			164.2	OK	
1.009	S15	-0.249	0.000	0.63			178.8	OK	
3.000	S16	-0.061	0.000	0.86			33.0	OK	
3.001	S17	-0.102	0.000	0.74			55.0	OK	
1.010	S18	-0.453	0.000	0.14			233.4	OK	
1.011	S19	-0.411	0.000	0.22			233.2	OK	
4.000	S20	-0.092	0.000	0.64			86.6	OK	
4.001	S21	-0.163	0.000	0.42			131.9	OK	
4.002	S22	-0.130	0.000	0.60			181.8	OK	
1.012	Swale	-0.943	0.000	0.06			358.3	OK	
5.000	S23	-0.127	0.000	0.38			33.7	OK	
5.001	S24	-0.104	0.000	0.55			48.7	OK	
6.000	S25A	0.003	0.000	0.35			11.0	SURCHARGED	
6.001	S25	0.041	0.000	1.04			35.0	SURCHARGED	
5.002	S26	-0.138	0.000	0.55			102.7	OK	
5.003	S27	-0.089	0.000	0.81			142.5	OK	
5.004	S28	-0.142	0.000	0.68			173.3	OK	
5.005	S29	-0.213	0.000	0.37			182.0	OK	
5.006	S30	-0.198	0.000	0.44			254.8	OK	
1.013	BASIN2	0.219	0.000	0.49			78.4	SURCHARGED	
1.014	FC-S31	0.443	0.000	0.43			74.9	SURCHARGED	
7.000	S32	-0.137	0.000	0.33			45.8	OK	
7.001	S33	-0.171	0.000	0.38			67.6	OK	
8.000	S34	-0.143	0.000	0.28			17.3	OK	
7.002	S35	-0.164	0.000	0.41			107.9	OK	
7.003	S36	-0.229	0.000	0.32			179.3	OK	
7.004	S37	-0.251	0.000	0.40			223.4	OK	
1.015	BASIN3	0.190	0.000	0.39			62.5	SURCHARGED	
1.016	FC-S38	0.343	0.000	0.30			59.5	SURCHARGED	
9.000	S39	-0.144	0.000	0.28			33.2	OK	
9.001	S40	-0.148	0.000	0.25			33.0	OK	
9.002	S41	-0.063	0.000	0.85			56.5	OK	
1.017	S42	-0.439	0.000	0.04			104.0	OK	
1.018	S43	-0.453	0.000	0.04			103.6	OK	
10.000	S44	-0.074	0.000	0.77			34.5	OK	
10.001	S45	-0.146	0.000	0.27			34.8	OK	
1.019	S46	-0.236	0.000	0.46			135.0	OK	
11.000	S47	-0.054	0.000	0.91			55.8	OK	
11.001	S48	-0.158	0.000	0.44			94.9	OK	
12.000	S49	-0.091	0.000	0.64			64.0	OK	
11.002	S50	-0.217	0.000	0.36			177.6	OK	

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30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Surface Network 1

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
13.000	S51	-0.226	0.000	0.14			19.3	OK	

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30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Surface Network 1

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
13.001	S52	15 Summer	30	+0%	100/15 Summer				138.219
13.002	S53	15 Summer	30	+0%	100/15 Summer				137.990
13.003	S54	15 Summer	30	+0%	100/15 Summer				137.592
11.003	S55	15 Summer	30	+0%	100/15 Summer				137.190
11.004	S56	15 Summer	30	+0%	100/15 Summer				135.728
11.005	S57	15 Summer	30	+0%	100/15 Summer				134.157
14.000	S58	15 Summer	30	+0%	100/15 Summer				133.892
11.006	S59	15 Summer	30	+0%	100/15 Summer				133.481
15.000	S60	15 Summer	30	+0%	100/15 Summer				129.676
11.007	S61	15 Summer	30	+0%					129.128
11.008	S62	15 Summer	30	+0%	100/15 Summer				127.978
11.009	S63	15 Summer	30	+0%	100/15 Summer				126.760
16.000	S64	15 Summer	30	+0%					132.828
16.001	S65	15 Summer	30	+0%					131.475
16.002	S66	15 Summer	30	+0%	100/15 Summer				128.727
16.003	S67	15 Summer	30	+0%	100/15 Summer				126.238
16.004	S68	15 Summer	30	+0%	30/15 Summer				125.926
11.010	S69	15 Summer	30	+0%	100/15 Summer				125.602
11.011	S70	15 Summer	30	+0%	100/15 Summer				124.157
17.000	S71	15 Summer	30	+0%					123.283
11.012	S72	15 Summer	30	+0%	100/15 Summer				121.936
1.020	BASIN4	360 Summer	30	+0%	30/30 Summer				120.715

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
13.001	S52	-0.181	0.000	0.53			97.6	OK	
13.002	S53	-0.185	0.000	0.51			96.7	OK	
13.003	S54	-0.183	0.000	0.51			95.8	OK	
11.003	S55	-0.185	0.000	0.63			341.9	OK	
11.004	S56	-0.172	0.000	0.67			373.7	OK	
11.005	S57	-0.093	0.000	0.96			418.4	OK	
14.000	S58	-0.108	0.000	0.72			67.6	OK	
11.006	S59	-0.169	0.000	0.69			535.7	OK	
15.000	S60	-0.099	0.000	0.59			31.9	OK	
11.007	S61	-0.272	0.000	0.56			605.9	OK	
11.008	S62	-0.272	0.000	0.57			630.1	OK	
11.009	S63	-0.265	0.000	0.59			652.4	OK	
16.000	S64	-0.147	0.000	0.26			32.0	OK	
16.001	S65	-0.200	0.000	0.24			65.9	OK	
16.002	S66	-0.148	0.000	0.50			116.5	OK	

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30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Surface Network 1

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
16.003	S67	-0.237	0.000	0.45			166.0	OK	
16.004	S68	0.051	0.000	1.14			185.5	SURCHARGED	
11.010	S69	-0.223	0.000	0.71			843.2	OK	
11.011	S70	-0.268	0.000	0.59			870.1	OK	
17.000	S71	-0.142	0.000	0.29			23.6	OK	
11.012	S72	-0.164	0.000	0.87			937.2	OK	
1.020	BASIN4	0.265	0.000	0.06			110.0	SURCHARGED	

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100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Surface Network 1

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	2.000
Hot Start Level (mm)	0	Inlet Coeffiecient	0.800
Manhole Headloss Coeff (Global)	0.500	Flow per Person per Day (l/per/day)	0.000
Foul Sewage per hectare (l/s)	0.000		

Number of Input Hydrographs	0	Number of Offline Controls	0	Number of Time/Area Diagrams	0
Number of Online Controls	4	Number of Storage Structures	4	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FEH
FEH Rainfall Version	2013
Site Location	GB 298562 518054 NX 98562 18054
Data Type	Point
Cv (Summer)	1.000
Cv (Winter)	1.000

Margin for Flood Risk Warning (mm)	300.0
Analysis Timestep	2.5 Second Increment (Extended)
DTS Status	OFF
DVD Status	ON
Inertia Status	ON

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 240, 360, 480, 960, 1440
Return Period(s) (years)	2, 30, 100
Climate Change (%)	0, 0, 50

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
1.000	S1	15 Summer	100	+50%	100/15 Summer				139.880
1.001	S2	15 Summer	100	+50%	100/15 Summer				139.530
1.002	S3	15 Summer	100	+50%					138.379
1.003	S4	15 Summer	100	+50%	100/15 Summer				137.899
1.004	S5	15 Summer	100	+50%	100/15 Summer				135.996
1.005	BASIN1	960 Winter	100	+50%	30/60 Summer				135.362
1.006	FC-S6	960 Winter	100	+50%	2/15 Summer				135.396
2.000	S7	15 Summer	100	+50%	100/15 Summer				134.608
2.001	S8	15 Summer	100	+50%	30/15 Summer				134.336
2.002	S9	15 Summer	100	+50%	100/15 Summer				134.052
2.003	S10	15 Summer	100	+50%	100/15 Summer				133.957
2.004	S11	30 Summer	100	+50%	100/15 Summer				133.596

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100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Surface Network 1

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	S1	0.655	0.000	1.10			53.0	SURCHARGED	
1.001	S2	0.605	0.000	1.47			97.0	SURCHARGED	
1.002	S3	-0.046	0.000	0.61			115.1	OK	
1.003	S4	0.749	0.000	1.25			207.8	SURCHARGED	
1.004	S5	0.046	0.000	1.02			333.9	SURCHARGED	
1.005	BASIN1	0.562	0.000	0.03			5.1	SURCHARGED	
1.006	FC-S6	1.171	0.000	0.04			4.3	SURCHARGED	
2.000	S7	0.458	0.000	0.70			82.6	SURCHARGED	
2.001	S8	0.761	0.000	1.93			121.0	SURCHARGED	
2.002	S9	0.552	0.000	1.07			168.4	SURCHARGED	
2.003	S10	0.507	0.000	1.72			245.4	SURCHARGED	
2.004	S11	0.271	0.000	1.94			270.8	SURCHARGED	

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100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Surface Network 1

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
1.007	S12	30 Summer	100	+50%	100/15 Summer				133.366
1.008	S14	30 Summer	100	+50%	100/15 Summer				133.295
1.009	S15	30 Summer	100	+50%	100/15 Summer				133.185
3.000	S16	15 Summer	100	+50%	100/15 Summer				133.712
3.001	S17	15 Summer	100	+50%	100/15 Summer				133.317
1.010	S18	30 Summer	100	+50%					132.636
1.011	S19	30 Summer	100	+50%					128.024
4.000	S20	15 Summer	100	+50%	100/15 Summer				137.272
4.001	S21	15 Summer	100	+50%					132.418
4.002	S22	15 Summer	100	+50%	100/15 Summer				129.650
1.012	Swale	120 Winter	100	+50%					127.492
5.000	S23	15 Summer	100	+50%					140.949
5.001	S24	15 Summer	100	+50%	100/15 Summer				139.874
6.000	S25A	15 Summer	100	+50%	30/15 Summer				140.044
6.001	S25	15 Summer	100	+50%	30/15 Summer				140.025
5.002	S26	15 Summer	100	+50%	100/15 Summer				139.353
5.003	S27	15 Summer	100	+50%	100/15 Summer				138.058
5.004	S28	15 Summer	100	+50%	100/15 Summer				136.826
5.005	S29	15 Summer	100	+50%					136.018
5.006	S30	15 Summer	100	+50%					133.552
1.013	BASIN2	120 Winter	100	+50%	30/15 Summer				127.462
1.014	FC-S31	120 Winter	100	+50%	2/15 Summer				127.351
7.000	S32	15 Summer	100	+50%					137.432
7.001	S33	15 Summer	100	+50%					134.997
8.000	S34	15 Summer	100	+50%					133.920
7.002	S35	15 Summer	100	+50%					133.509
7.003	S36	15 Summer	100	+50%					130.868
7.004	S37	15 Summer	100	+50%					127.181
1.015	BASIN3	480 Winter	100	+50%	30/60 Summer				126.811
1.016	FC-S38	360 Winter	100	+50%	2/15 Summer				126.630
9.000	S39	15 Summer	100	+50%					129.619
9.001	S40	15 Summer	100	+50%					128.114
9.002	S41	15 Summer	100	+50%	100/15 Summer				126.146
1.017	S42	15 Summer	100	+50%					125.047
1.018	S43	15 Summer	100	+50%					122.358
10.000	S44	15 Summer	100	+50%	100/15 Summer				122.673
10.001	S45	15 Summer	100	+50%					122.114
1.019	S46	360 Winter	100	+50%	100/30 Summer				121.642
11.000	S47	30 Summer	100	+50%	100/15 Summer				143.159
11.001	S48	15 Summer	100	+50%					140.750
12.000	S49	15 Summer	100	+50%	100/15 Summer				143.080
11.002	S50	15 Summer	100	+50%					139.742
13.000	S51	15 Summer	100	+50%	100/15 Summer				138.899

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100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Surface Network 1

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
1.007	S12	0.091	0.000	1.09			289.6	SURCHARGED	
1.008	S14	0.078	0.000	1.19			317.3	SURCHARGED	
1.009	S15	0.042	0.000	1.21			343.2	SURCHARGED	
3.000	S16	0.387	0.000	1.64			63.0	SURCHARGED	
3.001	S17	0.142	0.000	1.39			103.0	SURCHARGED	
1.010	S18	-0.389	0.000	0.27			455.8	OK	
1.011	S19	-0.326	0.000	0.42			453.8	OK	
4.000	S20	0.747	0.000	1.09			146.8	SURCHARGED	
4.001	S21	-0.107	0.000	0.73			230.2	OK	
4.002	S22	0.300	0.000	1.06			322.2	SURCHARGED	
1.012	Swale	-0.508	0.000	0.06			332.6	OK	
5.000	S23	-0.076	0.000	0.75			66.2	OK	
5.001	S24	0.349	0.000	1.00			88.0	SURCHARGED	
6.000	S25A	0.844	0.000	0.64			20.0	SURCHARGED	
6.001	S25	0.875	0.000	1.73			58.0	SURCHARGED	
5.002	S26	0.428	0.000	0.93			173.8	SURCHARGED	
5.003	S27	0.683	0.000	1.33			234.6	SURCHARGED	
5.004	S28	0.151	0.000	1.14			289.9	SURCHARGED	
5.005	S29	-0.157	0.000	0.63			306.3	OK	
5.006	S30	-0.123	0.000	0.75			438.2	OK	
1.013	BASIN2	0.662	0.000	0.48			76.4	SURCHARGED	
1.014	FC-S31	0.876	0.000	0.43			74.9	SURCHARGED	
7.000	S32	-0.093	0.000	0.64			90.1	OK	
7.001	S33	-0.103	0.000	0.75			132.9	OK	
8.000	S34	-0.105	0.000	0.55			34.0	OK	
7.002	S35	-0.091	0.000	0.81			212.0	OK	
7.003	S36	-0.157	0.000	0.63			352.5	OK	
7.004	S37	-0.144	0.000	0.79			439.3	OK	
1.015	BASIN3	0.611	0.000	0.38			60.9	SURCHARGED	
1.016	FC-S38	0.755	0.000	0.30			59.5	SURCHARGED	
9.000	S39	-0.106	0.000	0.54			65.4	OK	
9.001	S40	-0.111	0.000	0.50			64.8	OK	
9.002	S41	0.521	0.000	1.63			108.7	SURCHARGED	
1.017	S42	-0.410	0.000	0.06			162.0	OK	
1.018	S43	-0.421	0.000	0.06			163.5	OK	
10.000	S44	0.248	0.000	1.50			67.5	SURCHARGED	
10.001	S45	-0.111	0.000	0.51			67.4	OK	
1.019	S46	0.567	0.000	0.28			83.7	FLOOD RISK	
11.000	S47	1.334	0.000	1.52			93.1	FLOOD RISK	
11.001	S48	-0.100	0.000	0.74			159.6	OK	
12.000	S49	0.655	0.000	1.12			111.3	SURCHARGED	
11.002	S50	-0.158	0.000	0.61			301.4	OK	

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100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Surface Network 1

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
13.000	S51	0.099	0.000	0.27			37.9	SURCHARGED	

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Appendix 5 – Greenfield Runoff Calculations

Greenfield runoff rate estimation tool

www.uksuds.com | Greenfield runoff rate estimation tool (https://www.uksuds.com/)

This is an estimation of the greenfield runoff rates that are used 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). This information on greenfield runoff rates may be the basis for setting consents for the drainage of surface water runoff from sites.

Project details

Date	02/04/2026
Calculated by	Farzana
Reference	QD2478
Model version	2.2.3

Location

Site name	Harras Moor
Site location	

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Site easting (British National Grid)	298700
Site northing (British National Grid)	518169

Site details

Total site area (ha)	13 ha

Greenfield runoff

Method

Method	IH124

IH124

	My value		Map value	
SAAR (mm)	1131	mm		1131
How should SPR be derived?	WRAP soil type			
WRAP soil type	4			4
SPR	0.47			
QBar (IH124) (l/s)	110	l/s		

Growth curve factors

	My value	Map value	
Hydrological region	10		10
1 year growth factor	0.87		
2 year growth factor	0.93		
10 year growth factor	1.38		
30 year growth factor	1.7		
100 year growth factor	2.08		
200 year growth factor	2.37		

Results

Method	IH124	
Flow rate 1 year (l/s)	95.7	l/s
Flow rate 2 year (l/s)	102.3	l/s
Flow rate 10 years (l/s)	151.8	l/s
Flow rate 30 years (l/s)	187.0	l/s
Flow rate 100 years (l/s)	228.8	l/s
Flow rate 200 years (l/s)	260.8	l/s

Please note runoff estimation is subject to significant uncertainty. Results are therefore normally reported to only 1 decimal place. Where 2 decimal places are provided, this does not indicate accuracy to this level, it has been adopted to prevent 'zero' figures from being reported. Outputs less than 0.01 l/s are reported as 0.01 l/s.

Disclaimer

This report was produced using the Greenfield runoff rate estimation tool (2.2.3) developed by HR Wallingford and available at 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). The outputs from this tool have been used to estimate Greenfield runoff rates. 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.