



Drainage Strategy

Sound Design Creation Centre, Barnsley

Client:	Pitstop Productions
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Version History

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The report is written in the context of the development proposals submitted to Apex Consulting Engineers by the Client as part of the appointment. Any changes to the development proposals may necessitate significant revisions to this report.

Revision	Date	Notes	Prepared by	Checked by	Approved by
001	19/04/2024	First Issue	G. Boden	C. Hague	J. Shepherd

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1.0 Introduction

This report is prepared in accordance with instructions from Pitstop Productions to support discharge of planning conditions 11 and 28 from an existing planning permission (Ref 2021/0747) with Barnsley Metropolitan Borough Council (BMBC). The development comprises a development of a commercial sound design creation centre at land adjacent Windhill Lane, Staincross, Barnsley, S75 5BH.

2.0 Scope and Objectives

The purpose of the report is to determine the means of collection and discharge of the foul and surface water from the proposed development and to ensure the volume of surface water runoff from the development is reduced, therefore, reducing flood risk elsewhere. The report will also consider the use and efficiency of Sustainable Drainage Systems (SuDS) and how they can be potentially implemented on the site.

3.0 Planning Policy and Guidance

National Planning Policy Framework (NPPF) and Planning Practice Guidance (PPG)

The National Planning Policy Framework (NPPF) and its associated technical guidance (replacing PPS25 in 2012) sets out the Government's planning policies for England and how these are expected to be applied. The purpose of the policy is to contribute to the achievement of sustainable development and states that priority should be given to sustainable drainage and discusses the impact of new development on flood risk. The NPPF maintains strong policy on avoiding and managing flood risk, based on local planning authorities preparing local plans and deciding planning applications and granting planning permissions.

South Yorkshire Interim Local Guidance for Sustainable Drainage Systems

This document provides guidance for the local standards for the South Yorkshire Lead Local Flood Authorities (LLFAs) and together with the Non-Statutory Technical Standards (NSTS) strongly promotes the use of Sustainable Drainage Systems (SuDS). The NSTS allow for the setting of Local Standards by the LLFA and Planning Authority (LPA), which relates to the framework set by the National Planning Policy Framework this allows specific to all local conditions, requirements, risks, and surface water management, and delivers important local benefits to be introduced.

Barnsley Local Plan

The Barnsley Local Plan is the overall strategic plan for Barnsley, adopted in 2019, setting out an integrated economic, environmental, transport and social framework for the development of Barnsley over the next 14 years. Policies CC1 CC3, CC4 are aimed at ensuring that sustainable drainage techniques are utilised wherever practical for new developments.

4.0 Site Description

4.1 Location

The site area is approximately 0.94ha and comprises an irregular shaped parcel of land located to the north of Barnsley Town centre. The site is in the sub-regional town of Staincross, north of the sub-regional town of Darton which is an allocated local centre within Urban Barnsley that serve the needs of the local area as specified in the Barnsley Local Plan.

The site is bound to the east by Warren Lane, to the south by Windhill Lane and to the north and east by farmland.

The site is currently occupied by a single agricultural farm building with associated footpaths and paving but the majority of the site can be classed as greenfield. Beyond the site boundary lies a large area of residential development to the south of Windhill Lane, and a small area of residential development just off Warren Lane.

The National grid reference (NGR) for the approximate centre of the site is 432391E, 411166N (SE323111). A location plan is included within Appendix A.

4.2 Topography

The footprint of the buildings and associated hardstanding areas is approximately 0.027ha, therefore total impermeable area is approximately 3% of the total site area, with the remaining 97% consisting of undeveloped soft landscaping. A detailed topographical survey has been undertaken on the proposed development area. Generally, ground levels fall from north to south from a maximum level of +153.00m AOD to a minimum level of +142.12m AOD. A topographical survey is included within Appendix C.

4.3 Watercourses

The nearest watercourse is an unnamed ditched located to the east of the site just off Warren Lane and is approximately 110m from the eastern site boundary. The nearest receiving watercourse is the River Dearne located approximately 1.5km away at its nearest point.

4.4 Existing Sewerage

The existing local public sewer networks currently serving the site and wider Barnsley area are owned and maintained by Yorkshire Water. According to the Yorkshire Water sewer records, there are no public sewers within the vicinity of the site boundary, however, there are several public sewers within the immediate vicinity of the site.

A 150mm diameter public surface water sewer located just south of Windhill Lane which runs in an easterly direction.

A 150mm diameter public foul sewer crosses Keswick Road and runs through the gardens of several properties within the residential area located to the south of Windhill Lane.

A 100mm diameter public foul sewer runs through the gardens of several properties within the residential area located to the south of Windhill Lane.

A review of the topographical survey indicates that the site does not positively drain to the public sewers and any surface water runoff is directed onto the soft landscaping where it would either eventually evaporate or percolate into the natural ground. Therefore it is anticipated there are no existing private sewers within the site boundary.

A copy of sewer records has been included within Appendix E.

4.5 Geology/Hydrogeology

A separate Ground Appraisal Report has been undertaken by Apex Consulting Engineers (Ref. 1226-ACE-GEO-GA-002) which provides an assessment of ground conditions from intrusive investigations. The geology description from the report is summarised as follows:

- *Made ground Topsoil:* Very soft brown lightly sandy clay topsoil at surface level to a maximum depth between 0.10m to 0.50m.
- *Made ground spoil heap:* Reddish brown very sandy angular coal mudstone and burnt shale gravel over varying strength grey gravelly clays, below made ground topsoil to a maximum depth between 0.40m to 3.10m.
- *Made ground reworked:* Firm grey mottled green, black, and red sandy gravelly clays where gravel is predominantly burnt shale or a reddish clayey burnt shale gravel, below made ground spoil heap to a maximum depth of 1.10m to 2.95m
- *Topsoil:* Encountered in all locations except from BH's 9 & 11, and TP's 8 – 10, 12 & 13, from surface level to a maximum depth of between 0.20m and 0.50m. Typically comprises dark brown sandy clay where sand is fine.
- *Granular Residual Soils:* Encountered below topsoil to a maximum depth of between 0.40m and 1.97m. Typically comprises yellowish brown clayey slightly gravelly fine to coarse sand where gravels are sandstone and mudstone.
- *Cohesive residual soils:* Encountered below either made ground – spoil heap, made ground – reworked, granular residual or the meltonfield coal seam to a maximum depth of between 0.80m and 3.50m (base not proven). Typically comprises firm light yellowish brown sandy gravelly clay with common mudstone lithorelics. Sand is fine to medium, and gravels are angular fine to medium mudstone. Ratio of lithorelics to gravels increases

with depth.

- *Weathered Mudstone*: Encountered below cohesive residual soils to a maximum depth of 2.70m. Comprising extremely weak light yellowish grey weathered mudstone recovered as silty very sandy angular tabular mudstone GRAVEL where sand is fine to coarse.

The Environment Agency's (EA) online indicative aquifer mapping identifies Redcliffe Sandstone as a Secondary A aquifer. Secondary A aquifers comprise permeable layers that can support local water supplies and may form an important source of base flow to rivers.

4.6 Proposed Development

The latest development proposals comprise demolition of an existing agricultural building shed; erection of a low-rise commercial unit, several single room work "pods", with associated parking and a private access road.

The low-rise commercial unit provides a large recording hall, and several recording rooms, mix use rooms and meeting rooms. There are a number of sound booths located to the north of the development, enclosed by a 3-metre-high wall.

5.0 Surface Water Proposals

5.1 Design Guidance

The surface water drainage system will be designed in accordance with the following documents:

- BS EN 752:2008 Drain and sewer systems outside buildings
- BS EN 10256-2:2000 Gravity drainage systems inside buildings
- Building Regulations Part H: Drainage and waste disposal
- CIRIA C522 document 'Sustainable Drainage Systems – Design Manual for England and Wales'
- CIRIA C753 document 'The SuDS Manual'

In the event that sewers are to be adopted, the design will conform to guidance provided in the latest Water UK Design and Construction Guidance (DCG) Code for Adoption.

5.2 Discharge Hierarchy

There are four possible options to discharge the surface water runoff in accordance with the hierarchy defined within the Planning Practice Guidance:

- Into the ground (Infiltration)
- To a surface water body;
- To a surface water sewer, highway drain or another drainage system;
- To a combined sewer

Infiltration

The preferred method for the disposal of surface water in the hierarchy is infiltration to ground. Trial pits excavated to depths ranging from 3.20m to 3.50m for the purpose of soakaway testing have been undertaken by Apex Consulting Engineers and test results have been included within Appendix D. All three tests show that the depth to water increased over time; however, the maximum change from all three tests was found in TP20 which changed 7mm over 189 minutes. The infiltration rates for all three tests were incalculable and the ground was therefore deemed unsuitable for infiltration.

Surface Water Body

The nearest watercourse is believed to be a ditched under riparian ownership to the east of the site just off Warren Lane and is approximately 110m from the eastern site boundary. Surface water discharge to this location requires third party consent and the disruption associated with installing the new infrastructure required to outfall direct to the ditch is considered impracticable and uneconomical given the existing infrastructure in place. Therefore, it has not been considered a feasible option for the development.

Surface water sewer, highway drain or another drainage system

The Yorkshire Water sewer records indicate that there is a 150mm diameter public surface water sewer located south of Windhill Lane which runs in an easterly direction. This is the preferred method for disposal of surface water.

Combined Sewer

There are no public combined sewers within the surrounding highways that currently serve the existing site.

5.2 Climate Change

The National Planning Policy Framework (NPPF) sets out guidelines on how the potential for changes in rainfall, sea levels and river flows due to climate change should be incorporated into the planning system. This includes demonstrating how flood risk will be managed now and over the development's lifetime – taking climate change into account.

While there have been significant natural fluctuations in the climate over time historically, there is good scientific evidence to show that the climate is changing more rapidly due to human activity (particularly greenhouse gas emissions) with higher global average surface temperatures and sea level rise.

There is now a requirement to assess both central and upper end allowances to understand the range of potential impact. The site lies within the Don and Rother Management Catchment, where the upper end allowance for the 1% annual exceedance rainfall event is 40%.

5.3 Peak Runoff Control

The introduction of impermeable surfaces inherently alters the rainfall-runoff relationship of a site, increasing the rate and volume of surface water runoff from a development and increasing the flood risk. There is an increase of impermeable area of approximately 2131m², from 309m² to 2439m². The proposed development will be approximately 26% impermeable, a significant increase from the previous 3%.

The South Yorkshire Interim Local Guidance for Sustainable Drainage Systems states *“The SuDS NTS: S4 & S5 states that for greenfield developments, the peak runoff rate from the development to any highway drain, sewer or surface water body for the 1 in 1 year rainfall event and the 1 in 100 year rainfall event must not exceed the peak greenfield runoff rate for the same event, unless there are exceptional circumstances where further restrictions may be required in order to control flows for both the 1 and 100 year return period events, two or more flow control components or a multi-level system should be included in the design. Achieving multiple level flow control is challenging and therefore reasonable tolerances to achieving the criteria are required”*.

The greenfield run-off rate (Q_{BAR}) calculated for the 0.94ha site is 1.7l/s. It is not always possible to reduce the rates as low as the greenfield runoff rate. The

Design and Construction Guidance allows adoption down to a 50mm orifice, so it is now generally felt that around 2l/s (which can be achieved with a vortex control regulator), is now an appropriate target for the minimum flow rate. The peak runoff rate for the development shall not exceed 1.7l/s for all design storm events up to and including the 1 in 100 year + 40% climate change allowance. The greenfield runoff rates are shown within Appendix G.

5.4 Peak Volume Control

The site will be restricted to the existing greenfield runoff rate and therefore the development will require attenuation. The storage volume required to serve the catchment area has been calculated using Causeway Flow software. The total volumes have been summarised in the table below and detailed calculations are included within Appendix G.

Return Period	Max. Discharge Rate (l/s)	Impermeable Area (Ha)	Attenuation Volume (m ³)
2 year	1.4	0.244	46
30 year	1.4	0.244	110
100 year	1.4	0.244	148
100 year + 40% CC	1.7	0.244	223

5.5 Sustainable Drainage Systems (SuDS)

Surface water runoff should be controlled as near to its source as possible through a sustainable drainage approach to surface water management. SuDS are an approach to managing surface water runoff which seeks to mimic natural drainage systems and retain water on or near the site. SuDS offer significant advantages over conventional piped drainage systems in reducing flood risk by attenuating the rate and quantity of surface water run-off from a site, promoting groundwater recharge, and improving water quality and, amenity and ecological value.

It is necessary to identify the most appropriate method of controlling and discharging surface water. The SuDS techniques in Table 5.5.1 below assesses suitability for the proposed development using the selection process defined in CIRIA C753 The SuDS Manual.

SuDS Category	SuDS Technique	Viability	Explanation
Infiltration/Filtration	Infiltration Trenches	✗	Soakaway testing was undertaken by Apex consulting, see Appendix D. Infiltration rates were incalculable and deemed unsuitable for infiltration.
	Infiltration Basins	✗	Soakaway testing was undertaken by Apex consulting, see Appendix D. Infiltration rates were incalculable and deemed unsuitable for infiltration.
	Soakaways	✗	Soakaway testing was undertaken by Apex consulting, see Appendix D. Infiltration rates were incalculable and deemed unsuitable for infiltration.
	Bioretention/Filter Strips	✗	Soakaway testing was undertaken by Apex consulting, see Appendix D. Infiltration rates were incalculable and deemed unsuitable for infiltration.
Source Control	Green Roof/Living wall	✗	The roof is pitched and therefore a green is not considered appropriate. A living/green wall has not been proposed for the planning application.
	Permeable Paving	✓	Permeable paving is proposed within the parking bays. A 'Type C' non-infiltration system can be used for storage and treatment.
	Rainwater Harvesting	✓	Water butts could be considered as for rainwater re-use.
Conveyance	Swales	✓	A dry swale is proposed for the site to collect and convey surface water run-off from the access road.
	Filter Drains	✓	Applicable to the site, however, swales are being proposed.
	Rain Gardens/Tree Pits/Rills	✗	Rain gardens are not considered due to the sloping nature of the site.
Retention/Detention	Detention Basin/Retention Pond	✗	Not considered appropriate due to the volume requirements and the sloping nature of the development.
	Geo-cellular Storage	✓	Geo-cellular storage is proposed for the site to accommodate the attenuation volume required.

Table 5.5.1: Summary of the SuDS options appraisal

5.7 Water Quality

Although the drainage principles proposed will conform to the basic level of treatment control as a minimum by using more traditional techniques such as silt traps, additional SuDS features can provide another treatment stage.

Permeable Paving

Pollutants can be retained on the surface of permeable pavements (especially where there is little or no fall), before being carried through to the laying course and sub-base layers during a rainfall event, where they can be trapped and degraded over time. CIRIA, the leading body in the research for SuDS, states that 60-95% of suspended solids and 70-90% of hydrocarbons can be removed by permeable pavements in this way. The development proposals could have capacity to accommodate permeable paving within the car parking bays. This option will be explored at the detailed design stage.

As per the CIRIA SuDS Manual Table 4.3 the pollution hazard level for residential roofs is considered 'Very low' and the pollution hazard level for the rest of the site is considered 'Low'. The treatment provided can be considered adequate on this site and exceeds the pollution hazard indices for suspended solids, metals and hydrocarbons.

Dry Swale

Swales are shallow channels designed to store and/or convey runoff and remove pollutants. They may be used as conveyance structures to pass the runoff to the next stage of the treatment train and can be designed to promote infiltration where soil and groundwater conditions allow.

The dry swale is a vegetated conveyance channel, designed to include a filter bed of prepared soil that overlays an under-drain system. This provides additional treatment and conveyance capacity beneath the base of the swale. As they remain dry most of the time, they do not become boggy during wet weather. In some locations, such as pollution hotspots, dry swales may require lining to prevent infiltration. The development proposals could have capacity to accommodate a dry swale adjacent the proposed access road. This option will be explored at the detailed design stage.

6.0 Foul Drainage Proposals

6.1 Design Guidance

The foul drainage system will be designed in accordance with the following documents:

- BS EN 752:2008 Drain and sewer systems outside buildings
- BS EN 10256-2:2000 Gravity drainage systems inside buildings
- Building Regulations Part H: Drainage and waste disposal

In the event that sewers are to be adopted, the design will conform to guidance provided in the latest Water UK Design and Construction Guidance (DCG) Code for Adoption.

6.2 Foul Strategy

The foul sewerage for the proposed development will comprise a newly dedicated below ground foul drainage network that will service the proposed development.

Due to the building layout, the preferred method for the disposal of foul drainage will outfall to the 150mm dia. public foul sewer located within the residential area to the south of Windhill Lane. An upstream and downstream manhole depth or survey is required to confirm the connection levels from the proposed development.

6.3 Proposed Foul Flows

The foul drainage system has been sized based on the Discharge Unit method of design based on the maximum peak flows from appliances. For the purpose of the flow estimations the calculations are in accordance with BS EN752, which provides a table of frequency factors (k_{DU}) depending on the type of development, and a table of discharge units (DU) depending of the type of appliance used.

The discharge frequency and units that have been used:

- | | |
|---|----------------|
| • Hospital/School/Restaurant/Hotel (Frequent use) | $k_{DU} = 0.7$ |
| • WC x 6 | DU = 1.2 |
| • Washbasin x 4 | DU = 0.3 |
| • Kitchen Sink | DU = 0.8 |

Design flow rate (Q) = $K_{DU} \times \sqrt{\Sigma DU}$

$$Q = 0.7 \times \sqrt{[(6 \times 1.2) + (4 \times 0.3) + 0.8]} = 2.12 \text{ l/s}$$

Based upon the above analysis the proposed developments daily average foul discharge rates are unlikely to exceed 1l/s. Taken as a peak, this could be 2.12 l/s when diurnal flows are accounted for. Nevertheless, the proposed discharge rate would easily be accommodated within the sites foul network and the receiving public sewerage system.

7.0 Approvals

At the detailed design stage, a Section 104 application will be made to Yorkshire under the Water Industry Act 1991 for consent to discharge foul and surface drainage from the proposed development to the public sewerage system.

All relevant authorities will be kept informed regarding the design of the proposed drainage system. It is standard practice for detailed drainage design for foul systems to be subject to the approval of the local planning authority subsequent to the grant of planning permission and this will be sought from Barnsley Metropolitan Borough Council at the appropriate time.

8.0 Managing Exceedance

8.1 Managing Exceedance

Below ground conveyance such as pipes cannot be built large enough for all types of extreme storm events. As a result, there will be times when surface water runoff will exceed the capacity of sewer networks. This can occur when the receiving drainage system becomes overloaded or when the outfall is restricted due to flood levels in the receiving water.

The drainage system will be designed to cater for the following storm events:

- No surcharging in the 1 in 1 or 1 in 2 year rainfall event
- No flooding in the 1 in 30 year rainfall event
- No flooding (or minimal and contained on site) in the 1 in 100 year rainfall event plus a climate change allowance of 40%.

8.2 Pathways and Conveyance

The drainage system will ensure that so far as is reasonably practicable, flows resulting from rainfall in excess of a 1 in 100 year rainfall event are managed in conveyance routes that minimise the risks to people and property.

The topography of the proposed site slopes from north to south where any flooding from public sewers will be contained within the highway. The proposed drainage system will ensure the building and neighbouring sites are not at risk from an exceedance event, with surface pathways linked together in the same way a conventional drainage system works to effectively convey these flows. The proposed pathways will have sufficient draining gradients towards landscaping and car parking/highway areas.

9.0 Conclusions

Surface water from the site will discharge to the surface water sewer within adjacent Windhill Lane at a maximum discharge rate of 1.7 l/s (Q_{BAR}), complying with Policy S4 and S5 of the South Yorkshire Interim Local Guidance for Sustainable Drainage Systems.

Hydraulic calculations have been undertaken for all storms up to and including the 1 in 100 year return with an allowance of 40% climate change. Storage volumes can be readily accommodated within the site boundary.

The surface water drainage system will use SuDS attenuation techniques where possible such as permeable paving and swales.

Foul drainage will discharge unrestricted to the foul sewer within the residential area located to the south of Windhill Lane, crossing Keswick Road.

A sewer survey is required to determine the depth of the proposed connection points and location of existing drainage within the site boundary.

Overland flooding for storm events exceeding the worst case 1 in 100 year event + 40% climate change will be retained on site where possible.

With regard to drainage and consequential flood risk, the site is suitable for the proposed use. Subject to the implementation of this Drainage Strategy, the development may be occupied safely and adequately drained while reducing flood risk overall.



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Appendix A – Location Plan



Location Plan
1 : 1250



Existing Site Plan
1 : 500

P1	Minor amendments	04/01/23	CS
Rev	Description	Date	By
peakarchitects			
Project			
587-2022			
Sound Design Creation Studio			
Client			
Pittstop Productions			
Drawing			
587-PKA-XX-XX-DR-A-PL - 01			
Existing Location and Site Plan			
Revision	P1	Date Created	AUG 2023
Suitability	Scale	As indicated	@ A1
Drawn By	OG	Checked By	OG



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Appendix B – Proposed Site Plans



All drawings should be read in conjunction with the entire **PL Series** drawings. Full details and specifications will be provided following approval of the planning application and through a formal Building Control submission prior to commencement of site works & construction.

- Key**
- Site application boundary
 - Proposed Building
 - Soft Landscaping to LA design and details
 - Access Road
 - Walkway
 - Access/Exit Point
 - Parking Bay
 - 20m exclusion zone



Proposed Site Plan
1 : 500

Rev	Minor Amendments Description	Date	CS By
P1	Minor Amendments	04/01/24	CS

Project 587 Sound Design Creation Centre			
Client Pittstop Productions			
Drawing 587-PKA-ZZ-ZZ-DR-A-PL02 Proposed Site Plan			
Revision	P1	Date Created	AUG 23
Suitability	S3	Scale	1 : 500 @ A1
Drawn By	OG	Checked By	OG

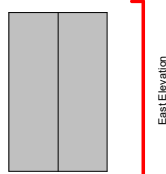
PLANNING



All drawings should be read in conjunction with the entire **PL Series** drawings. Full details and specifications will be provided following approval of the planning application and through a formal Building Control submission prior to commencement of site works & construction.

Materials Key

- 01 Vertical Standing Seam Cladding Dark Grey
- 02 PPC Aluminium Windows Dark Grey
- 03 Timber effect vertical laid brise soleil
- 04 Obscure glazing
- 05 Glazed Rooflights
- 06 Solid timber effect doorways
- 07 Building Signage
- 08 Timber effect vertical cladding
- 09 Brickwork Plinth



South Elevation

East Elevation



South Elevation.
1 : 50



East Elevation.
1 : 50

P3	Minor amendments	04/01/23	CS
P2	Level of glazing reduced	06/12/23	OG
P1	drawing updated following comments received	11/09/23	OG
Rev	Description	Date	By

peakarchitects
Registered: 9-10 Brunel Road, Sheffield, S10 2DN
www.peakarchitects.co.uk

Project 587-2022 Sound Design Creation Studio			
Client Pitstop Productions			
Drawing 587-PKA-XX-XX-DR-A-PL - 04 Proposed Elevations - Sheet 01			
Revision	P3	Date Created	AUG 23
Suitability	S3	Scale	As indicated @ A1
Drawn By	OG	Checked By	OG

PLANNING

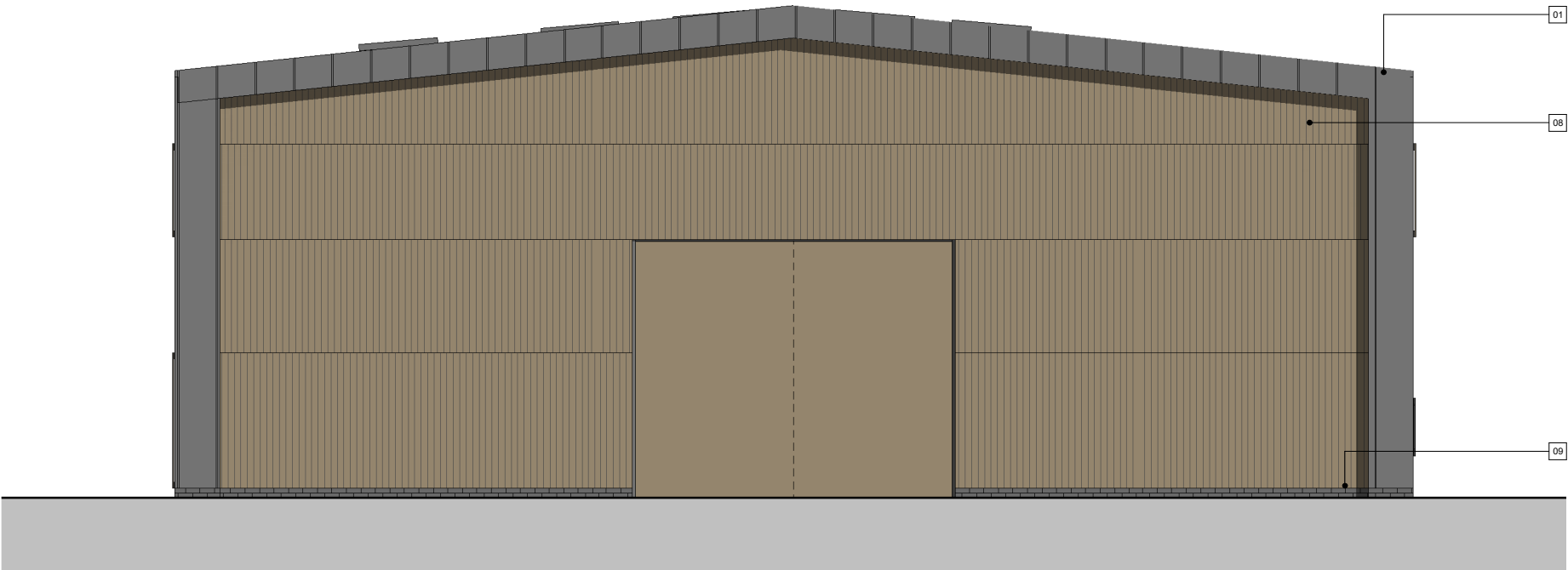
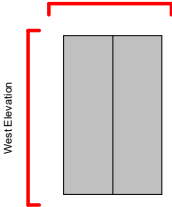


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Materials Key

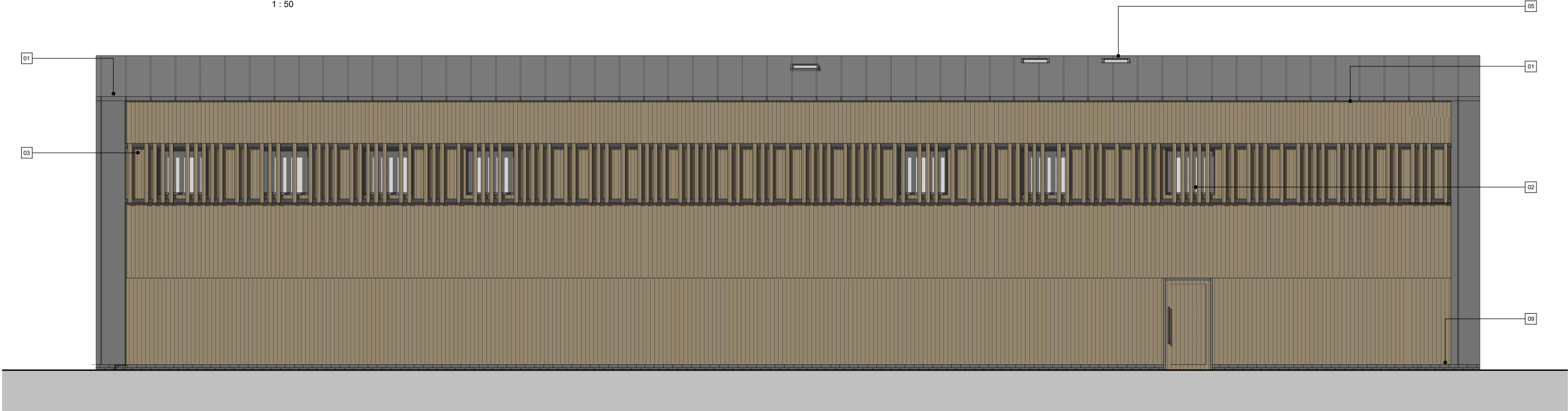
- 01 Vertical Standing Seam Cladding Dark Grey
- 02 PPC Aluminium Windows Dark Grey
- 03 Timber effect vertical laid brise soleil
- 04 Obscure glazing
- 05 Glazed Rooflights
- 06 Solid timber effect doorways
- 07 Building Signage
- 08 Timber effect vertical cladding
- 09 Brickwork Plinth

North Elevation



North Elevation.

1 : 50



West Elevation.

1 : 50

P1	Minor amendments	04/01/23	CS
Rev	Description	Date	By

peakarchitects

Recorded, 9-10 Brunel Road, Sheffield, S10 2DN

www.peakarchitects.co.uk

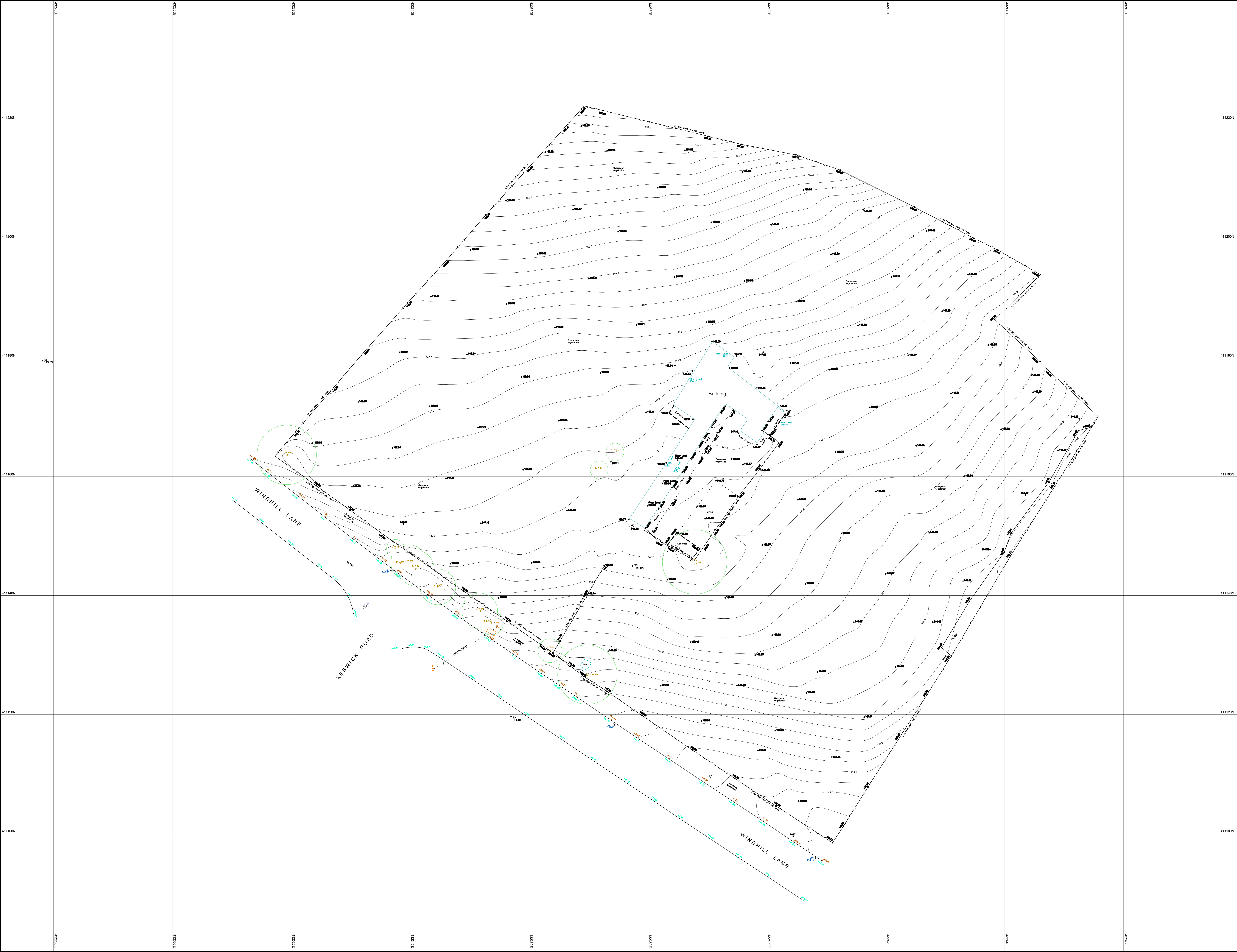
Project 587-2022 Sound Design Creation Studio			
Client Pitstop Productions			
Drawing 587-PKA-XX-XX-DR-A-PL - 05 Proposed Elevations - Sheet 02			
Revision	P1	Date Created	SEPT 2023
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Drawn By	OG	Checked By	OG

PLANNING



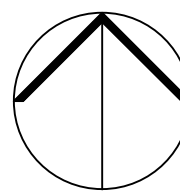
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Appendix C – Topographical Survey



Grid : OS National Grid.

Datum - OS Level Datum.
Using the OS GPS Network and applying
OSGM02 National Geoid Model to obtain
local area corrections.


Direction
of North

Drawing Layout Key:

Key:

BN
BOLLARD
BUS STOP
CABLE TV COVER
CABLE TV SUPPLY
COLUMN
EARTHING POINT
ELECTRICITY COVER
ELECTRICITY POLE
FIRE HYDRANT
GAS VALVE
GATE
INSPECTION COVER (CIRCULAR)
INSPECTION COVER
HERB OUTLET
LAMP POST
MANHOLE (CIRCULAR)
Building Line
Wall
Concrete
Paving
Kerb
Footpath

BN
BOLLARD
BUS STOP
CABLE TV COVER
CABLE TV SUPPLY
COLUMN
EARTHING POINT
ELECTRICITY COVER
ELECTRICITY POLE
FIRE HYDRANT
GAS VALVE
GATE
INSPECTION COVER (CIRCULAR)
INSPECTION COVER
HERB OUTLET
LAMP POST
MANHOLE (CIRCULAR)
Building Line
Wall
Concrete
Paving
Kerb
Footpath

MANHOLE (RECTANGULAR)
MANHOLE (TRIANGULAR)
MARKER POST
GULLY
RODDING EYE
SIGN POST
TELECOM COVER
TELEGRAPH POLE
THRESHOLD LEVEL
TRAFFIC LIGHT
TRIAL PIT
WASH OUT
WATER METER
WATER STOP COOK
WATER STOP VALVE
TELECOMS COVER
TOP OF FENCE LEVEL
THRESHOLD LEVEL
PARAPET LEVEL
EAVES LEAVES LEVEL
RIDGE LEVEL
Top of Bank
Bottom of Bank

MH
MS
MP
MPS
R/GULLY
FE
TL
TP
THL
TL
PIT
WO
WM
WSC
WSV
TC
TOFL
THL
PAR
EAL
RDL
TOB
BOL

Station Listing

Station	Easting	Northing	Level
SA	432356.993	411119.673	144.109
SB	432278.177	411179.467	149.396
SC	432377.408	411144.890	146.307

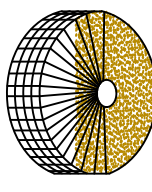
Rev	Description	Date	By

Peak Architects

Land Off Windmill Lane,
Staincross, Barnsley

2D Topographical Survey

Silkstone
Surveys



Land & Measured Building Surveyors
7, Hall Annex, Thorncliffe Park, Chapeltown, Sheffield, S35 2PH
mail@silkstoneenvironmental.co.uk
Tel: 0114 2573457 www.silkstoneenvironmental.co.uk

Project No.	22107	Dwg No.	22107_2DT	0				
Date:	06/22	Drawn:	MS	Check:	SA	Scale:	1:200	A0

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Appendix D – Soakaway Tests

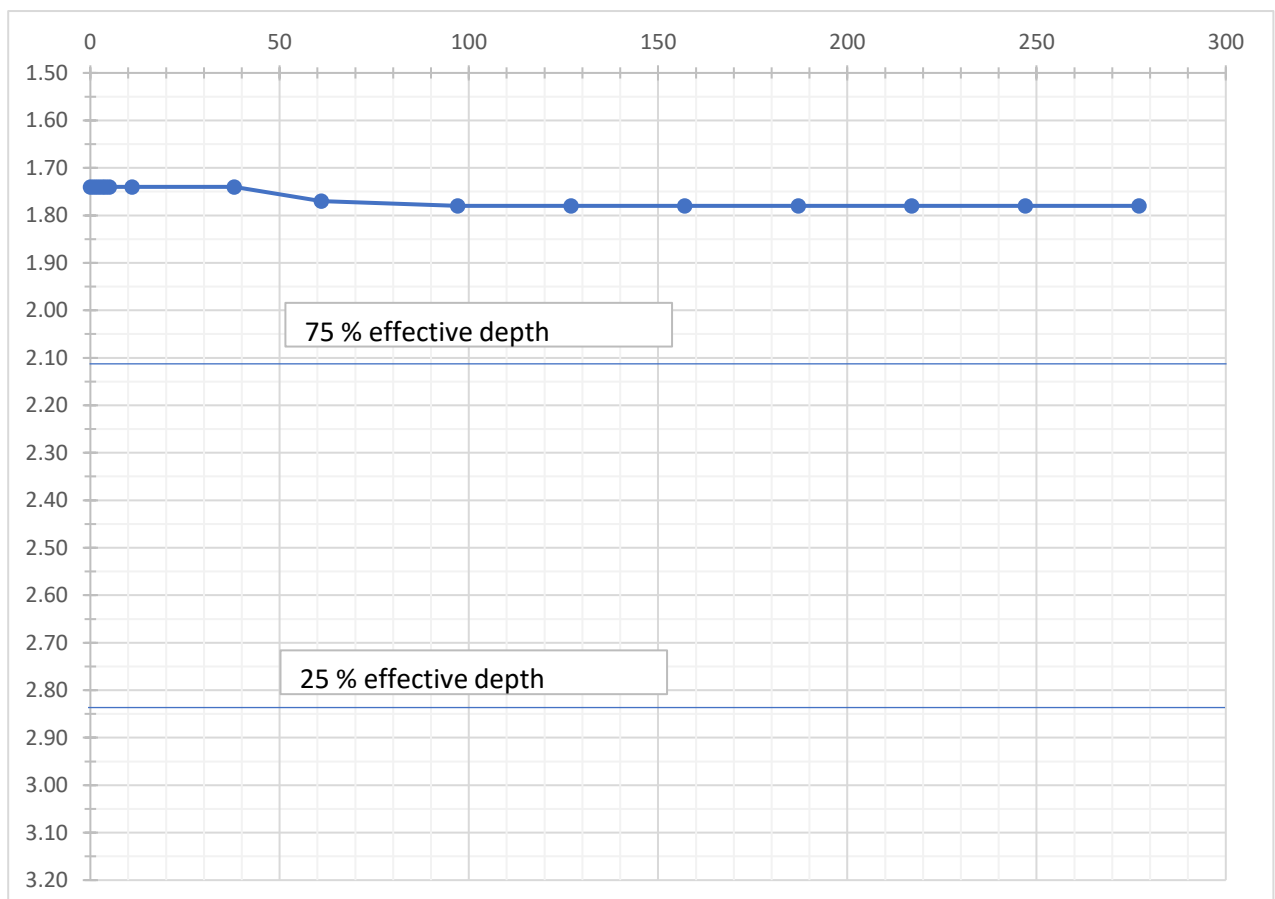
Trial Pit	TP8
Test no.	1

Elapsed Time (min)	Depth to water (m)
0	1.74
1	1.74
2	1.74
3	1.74
4	1.74
5	1.74
11	1.74
38	1.74
61	1.77
97	1.78
127	1.78
157	1.78
187	1.78
217	1.78
247	1.78
277	1.78

Length (m)	2.00
Width (m)	0.35
Depth (m)	3.20
Water column (m)	1.46
75%-25% Water volume (m ³)	0.51
Water surface area (m ²)	4.13
75% effective depth	2.11
50% effective depth	0.73
25% effective depth	2.84

Mins at 75 % effective depth	N/A
Mins at 25 % effective depth	N/A

Infiltration rate
Unable to calculate



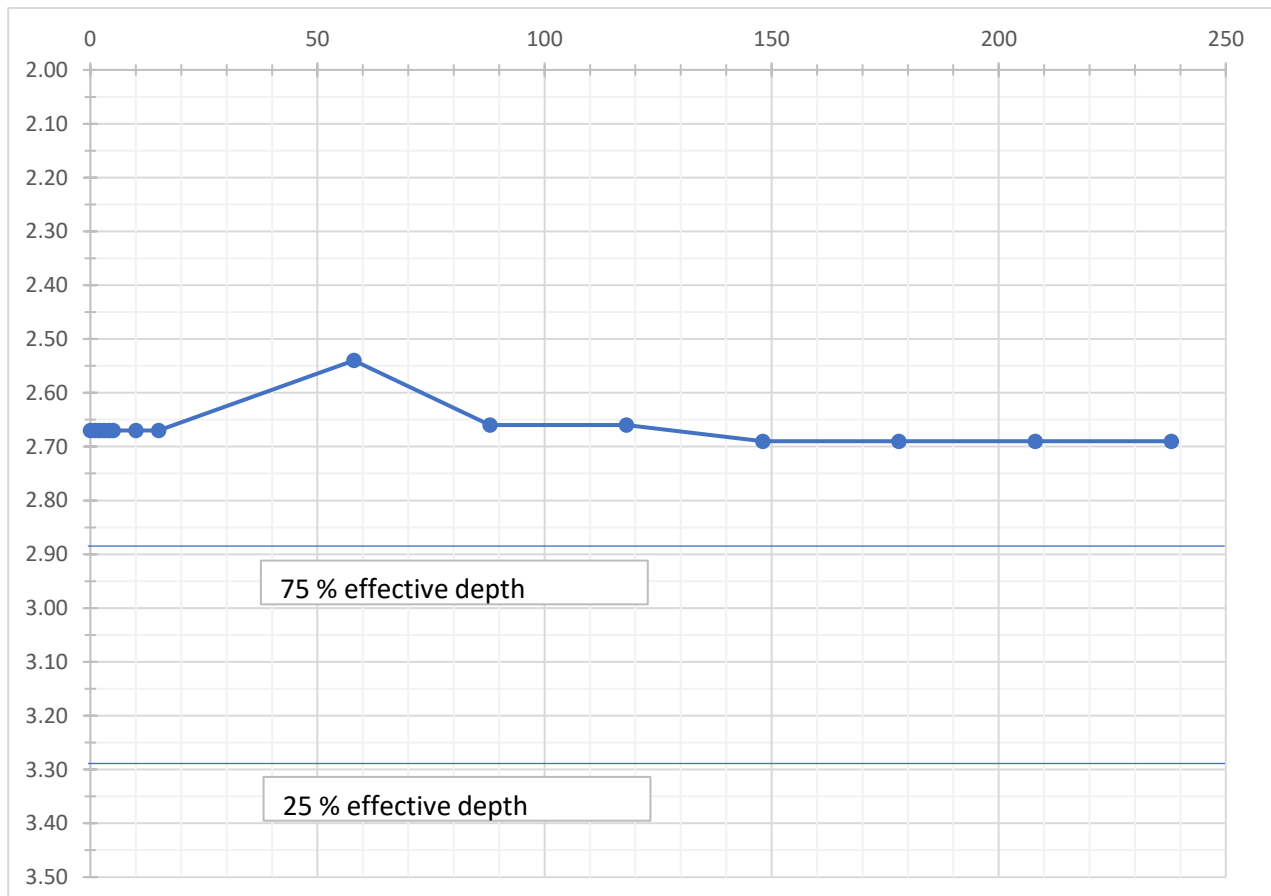
Trial Pit	TP12
Test no.	1

Elapsed Time (min)	Depth to water (m)
0	2.67
1	2.67
2	2.67
3	2.67
4	2.67
5	2.67
10	2.67
15	2.67
58	2.54
88	2.66
118	2.66
148	2.69
178	2.69
208	2.69
238	2.69

Length (m)	2.00
Width (m)	0.40
Depth (m)	3.50
Water column (m)	0.83
75%-25% Water volume (m ³)	0.33
Water surface area (m ²)	2.79
75% effective depth	2.88
50% effective depth	0.42
25% effective depth	3.29

Mins at 75 % effective depth	N/A
Mins at 25 % effective depth	N/A

Infiltration rate
Unable to calculate



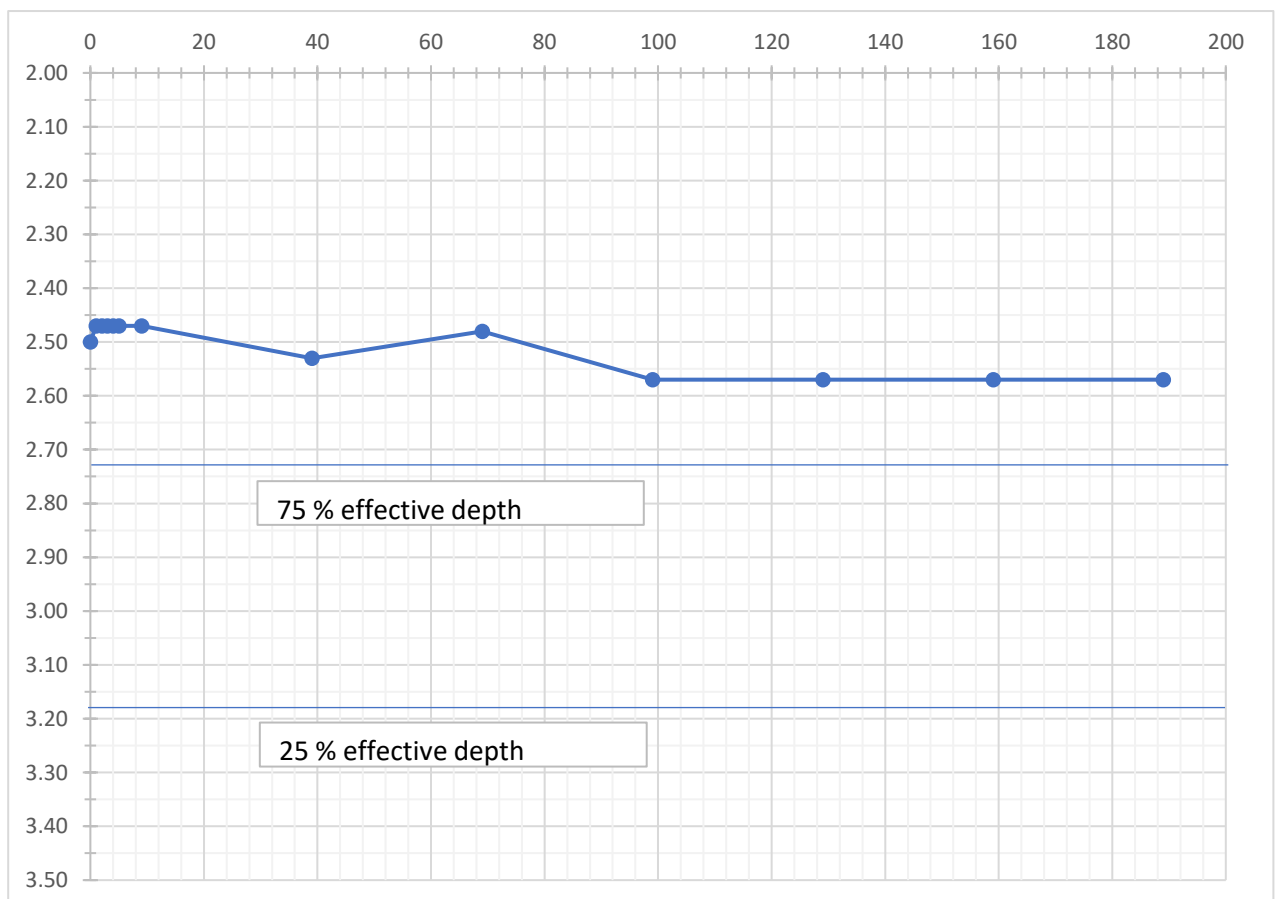
Trial Pit	TP10
Test no.	1

Elapsed Time (min)	Depth to water (m)
0	2.50
1	2.47
2	2.47
3	2.47
4	2.47
5	2.47
9	2.47
39	2.53
69	2.48
99	2.57
129	2.57
159	2.57
189	2.57

Length (m)	2.00
Width (m)	0.40
Depth (m)	3.40
Water column (m)	0.90
75%-25% Water volume (m ³)	0.36
Water surface area (m ²)	2.96
75% effective depth	2.73
50% effective depth	0.45
25% effective depth	3.18

Mins at 75 % effective depth	N/A
Mins at 25 % effective depth	N/A

Infiltration rate
Unable to calculate





Document Title: Drainage Strategy Report
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Appendix E – Existing Sewer Records

YORKSHIRE WATER PROTECTION OF MAINS AND SERVICES

1. The position of Yorkshire Water Services Ltd (YWS) apparatus shown on the existing mains record drawing(s) indicates the **general** position and nature of our apparatus and the accuracy of this information cannot be guaranteed. Any damage to YWS apparatus as a result of your works may have serious consequences and you will be held responsible for all costs incurred. Prior to commencing major works, the exact location of apparatus must be determined on site, if necessary by excavating trial holes. The actual position of such apparatus and that of service pipes which have not been indicated must be established on site by contacting the Customer Helpline on 0845 124 24 24 for both water and sewerage.
2. The public sewer and water network is lawfully retained in its existing position and the sewerage and water undertaker is entitled to have it remain so without any disturbance. The provisions of section 159 of the Water Industry Act 1991 provides that the undertaker may "inspect, maintain, adjust, repair or alter" the network. Those rights are given to enable the undertaker to perform its statutory duties. Any development of the land or any other action that unacceptably hindered the exercise of those rights would be unlawful. The provisions contained in Section 185 of the Water Industry Act 1991 state that where it is reasonable to do so, a person may require the water supply undertaker to alter or remove a pipe where it is necessary to enable that person to carry out a proposed change of use of the land. The provisions contained in Section 185 also require the person making the request to pay the full cost of carrying out the necessary works.
3. Ground levels over existing YWS apparatus are to be maintained. Sewers in highways will **generally** be laid to give 1200mm of cover from finished ground level working to kerb races, other permanent identification of the limits of the road or to an agreed line and level. Substantial increases or decreases to this 1200mm depth of cover will result in the sewer being re-laid at your expense. Water mains and services will **generally** be laid with a minimum of 750mm depth of cover however some mains and services usually those installed over 50 years ago may have less ground cover.
4. If surface levels are to be decreased / increased significantly the effects on existing water supply apparatus will be carefully considered and if any alterations are necessary, the costs of the alterations will be recharged to you in full. Outlets on fire hydrants must be no more than 300mm below the new levels and all surface boxes must be adjusted as part of the scheme.
5. To enable future repair works to be carried out without hindrance; any pipe, cable, duct, etc. installed parallel to a water main or service pipe should not be installed directly over or within 300mm of a water main or service pipe or 1000mm of a waste water asset. Where a pipe, cable, duct, etc. crosses a main or service it should preferably cross perpendicular or at an angle of no less than 45° and with a minimum clearance of 150mm. These requirements apply to activities within an existing highway and are relevant to the installation of pipes, cables, ducts, etc. up to and including 250mm in diameter (*see illustration below*). Necessary protection measures for installations greater than 250mm in diameter and/or in private land will need to be agreed on an individual basis. Installations within a new development site must comply with the National Joint Utilities Group publication Volume 2: NJUG Guidelines On The Positioning Of Underground Utilities Apparatus For New Development Sites.
6. All excavation works near to YW apparatus should be by hand digging only.
7. Backfilling with a suitable material to a minimum 300mm above YW apparatus is required.
8. Adequate support must be provided where any works pass under YW apparatus.
9. Jointing chambers, lighting columns and other structures must be installed in such a way that future repair or maintenance works to YW apparatus will not be hindered.
10. Apparatus such as; railings, sign posts, etc. must not be placed in such a way that they prevent access to or full operation of controlling valves, hydrants or similar apparatus. YWS surface boxes must not be covered or buried. Any adjustment, alteration or replacement of manhole covers must be agreed on site prior to the commencement of the works with a YWS Inspector who may be contacted via our Call Centre on 0845 124 24 24.
11. Explosives shall not be used within 100 metres of any Yorkshire Water Services apparatus or installations.
12. Vibrating plant should not be used directly over any apparatus. Movement or operation by vehicles or heavy plant is not to be permitted in the immediate vicinity of YWS plant or apparatus unless there has been prior consultation and, if necessary, adequate protection provided without cost to YWS.
13. **Under no circumstances** should thrust boring or similar trenchless techniques commence until the actual position of the Company's mains/services along the proposed route have been confirmed by trial holes.
14. Any alterations to the highway should be notified following the procedures outlined in the New Road and Street Works Act 1991 Code of Practice; Measures Necessary Where Apparatus Is Affected By Major Works (Diversiary Works).
15. You will be held responsible for any damage or loss to YWS apparatus during and after completion of work, caused by yourselves, your servant or agent. Any damage caused or observed to YWS plant or apparatus should be immediately reported to YWS. Should YW incur any costs as a result of non-compliance with the above, all costs will be rechargeable in full.
16. You should ensure that nothing is done on the site to prejudice the safety or operation of YWS employees, plant or apparatus.
17. In accordance with the New Roads and Street Works Act 1991, Chapter 22, Part 3, Section 80. The location of any identified YW asset "which is not marked, or is wrongly marked, on the records made available" should be communicated back to Yorkshire Water. The location of the apparatus should be identified on copies of the supplied plans which should be returned to Yorkshire Water (Asset Records Team) with photographic supporting evidence where possible.
18. The Government has decided that responsibility for private sewers serving two or more properties and lateral drains (the section of pipe beyond the boundary of a single property, connecting it to the public sewer) will be transferred to the water companies on Oct 1 2011.

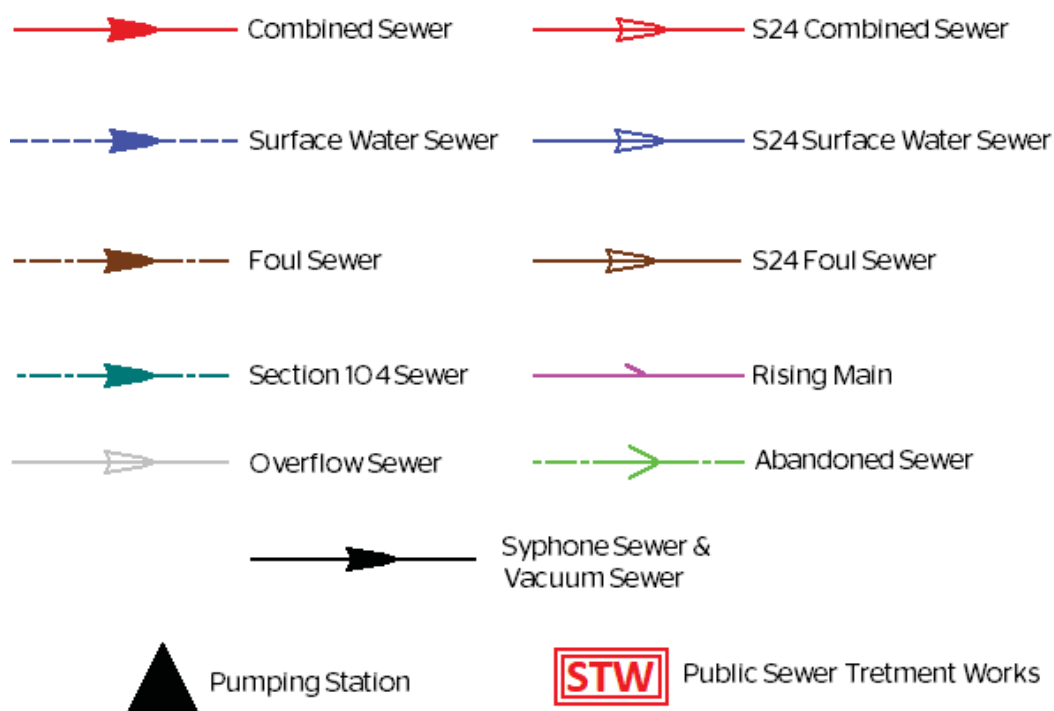
Private pumping stations will also transfer during the period 1 October 2011 – 1 Oct 2016. Records of these assets may not yet be shown on the existing mains record drawing(s). If you encounter any of these assets you must inform Yorkshire Water Services Ltd (YWS).

19. Please note that the information supplied on the enclosed plans is reproduced from Ordnance Survey material with the permission of the Ordnance Survey on behalf of the Controller of Her Majesty's Stationery Office, © Crown Copyright. Unauthorised reproduction infringes Crown Copyright and may lead to prosecution or civil proceedings. Licence Number 1000019559.
20. This information is for guidance only and the position and depth of any YW apparatus is approximate only. Likewise, the nature and condition of any YW apparatus cannot be guaranteed. YW has no responsibility for recording the locations of privately owned apparatus. As of 1 October 2011, there may be some lateral drains and/or public sewers which are not documented on YW records but may still be present. For the avoidance of doubt, this information is not a substitute for appropriate professional and/or legal advice. YW accepts no responsibility for any inaccuracy or omissions in this information. The actual position of YW apparatus must be determined on site by excavating trial holes by hand. YW requires a minimum of two working days' written notice of the intention to excavate any trial holes before any excavation can be undertaken. If there are any queries in this respect please contact Yorkshire Water on 0845 124 24 24.

Property Identifier

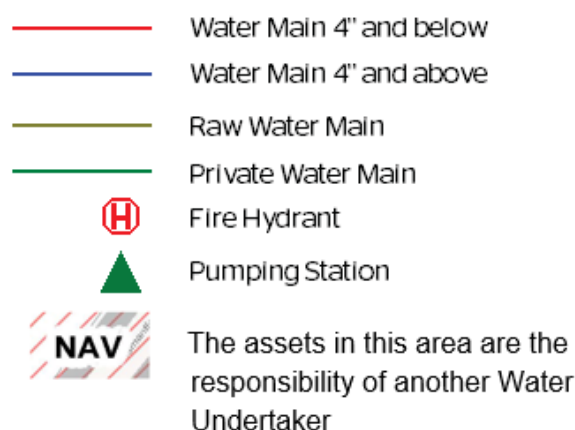


Sewer Legend

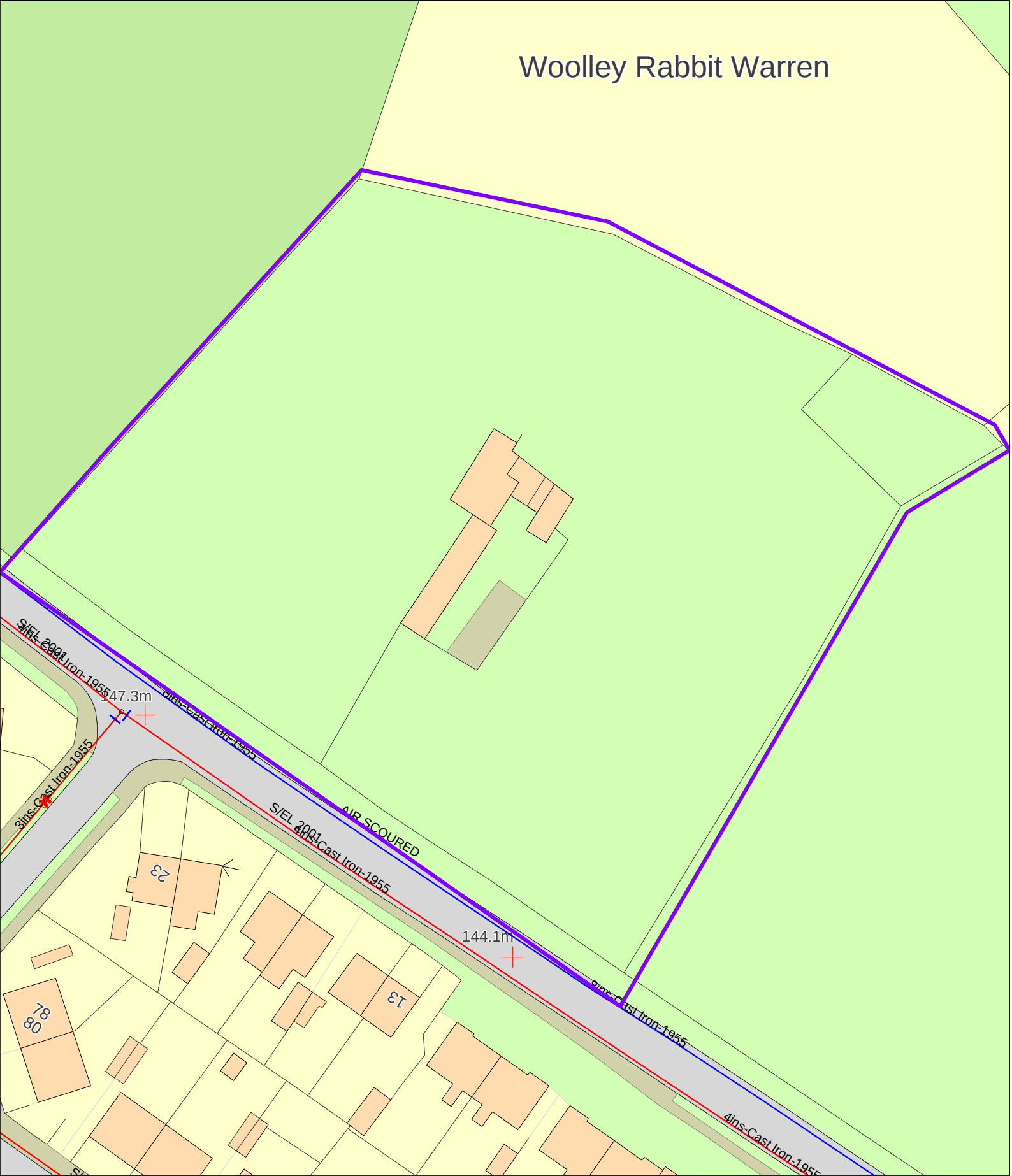


Please note that the direction of flow arrows may not always appear depending on the scale of the map.

Water Legend

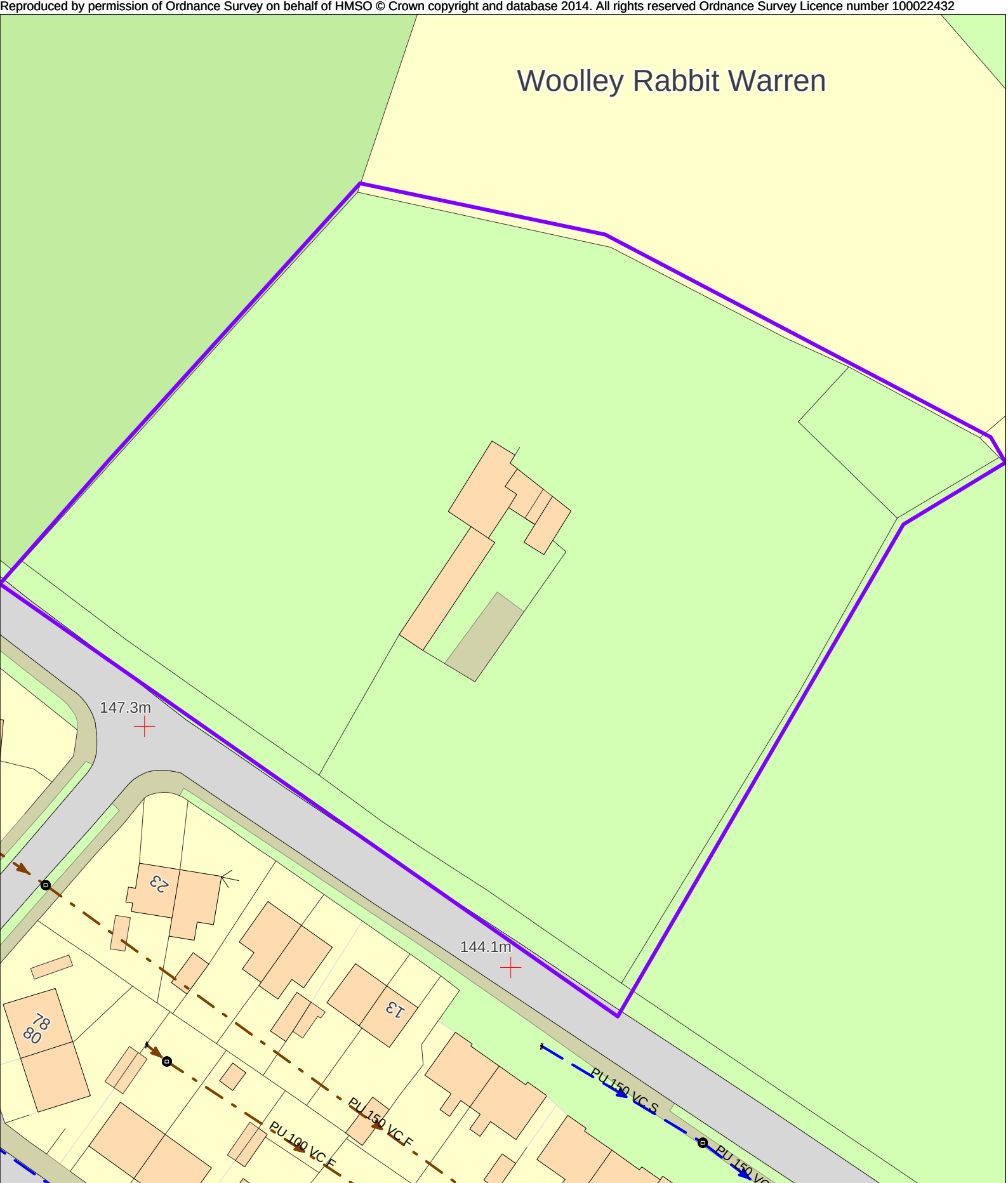


Woolley Rabbit Warren



Public Clean Water Network 19/03/2024 10:43:42 OS Grid Coordinates: 432314 : 411067 Map Name : SE3211SW svcGISSafeMovePD

Woolley Rabbit Warren

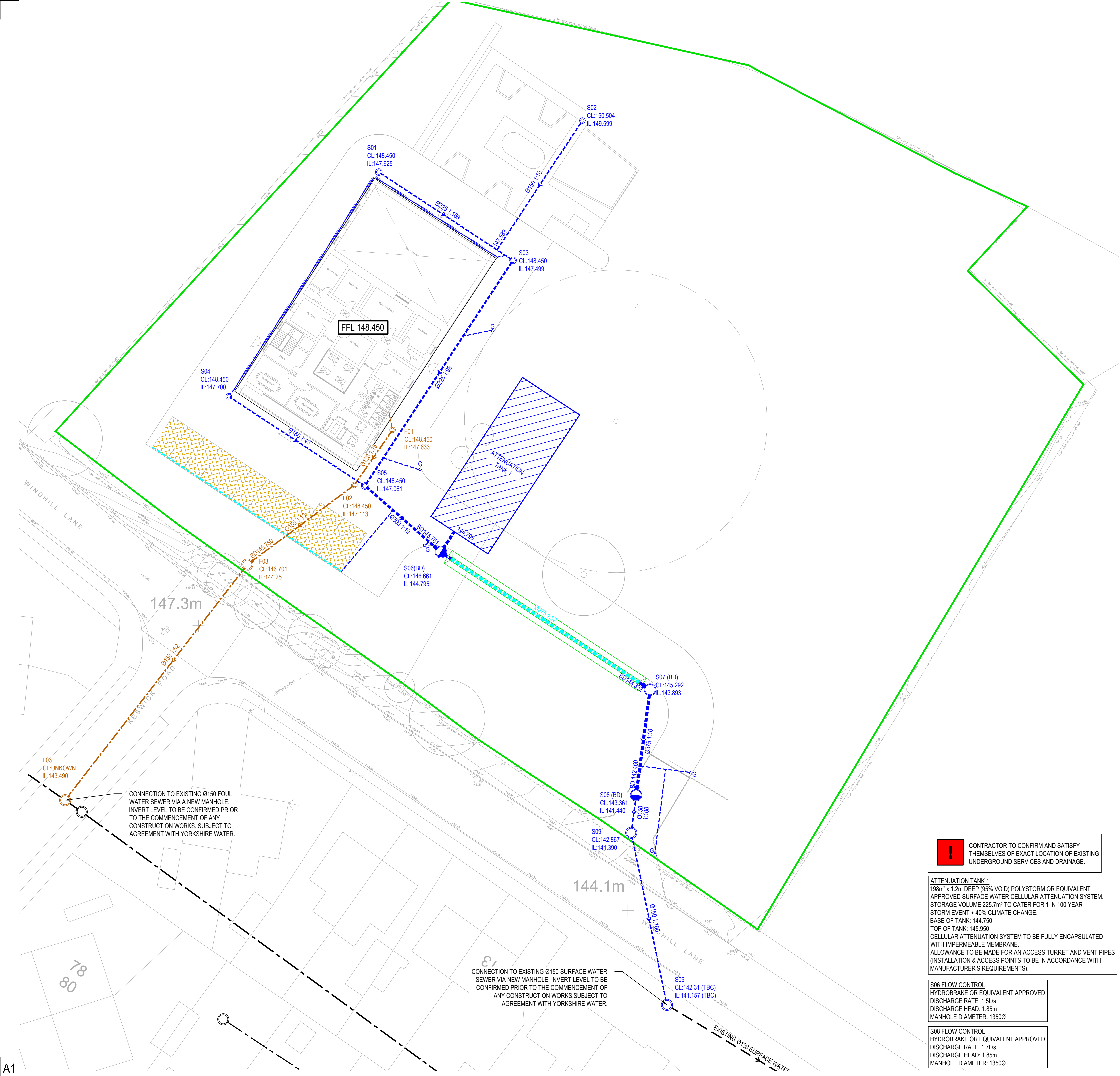


Public Waste Water Network 19/03/2024 10:43:43 OS Grid Coordinates: 432314 : 411067 Map Name : SE3211SW svcGISSafeMovePD



Document Title: Drainage Strategy Report
Document No.: 1226-ACE-ZZ-XX-RP-C-1001
Revision: 001
Date: April 2024

Appendix F – Drainage Drawings



KEY

- SITE BOUNDARY
- SURFACE WATER DRAINAGE PIPE
- SURFACE WATER INSPECTION CHAMBER
- SURFACE WATER MANHOLE
- SURFACE WATER FLOW CONTROL
- SURFACE WATER BACK DROP
- SURFACE WATER CHANNEL DRAIN
- SURFACE WATER PERFORATED PIPE
- SURFACE WATER SWALE WITH UNDER DRAIN
- FOUL WATER DRAINAGE PIPE
- FOUL WATER INSPECTION CHAMBER
- FOUL WATER MANHOLE
- EXISTING FOUL SEWER
- EXISTING SURFACE WATER SEWER
- SURFACE WATER ATTENUATION
- SURFACE WATER PERMEABLE PAVING (TYPE C)

DRAINAGE NOTES:

- ALL WORKS TO BE CONDUCTED IN STRICT ACCORDANCE WITH SPECIFICATION OF THE LOCAL AUTHORITY & BS EN 752:2017.
- ALL PIPE RUNS NEAR BUILDINGS TO COMPLY WITH THE LATEST BUILDING REGULATIONS PART H1. WHERE A PIPE IS WITHIN 1m OF A FOUNDATION THE TRENCH SHALL BE FILLED WITH CLASS GEN3 CONCRETE UP TO THE LOWEST LEVEL OF THE FOUNDATION. WHERE THE TRENCH IS FURTHER THAN 1m FROM THE FOUNDATION, THE TRENCH SHALL BE FILLED WITH CLASS GEN3 CONCRETE TO A LEVEL BELOW THE LOWEST LEVEL FOR THE FOUNDATION EQUAL TO THE DISTANCE FROM THE FOUNDATION LESS 150mm. IN BOTH CASES THE PIPE SHALL BE BEDDED AND SURROUNDED IN 150mm THICK CLASS GEN3 CONCRETE.
- WHERE PIPES, EXTERNAL TO THE STRUCTURES, HAVE A DEPTH TO SOFFIT FROM GROUND LEVEL OF LESS THAN 600mm THEY SHALL HAVE A CLASS GEN3 CONCRETE ENCASEMENT (150mm THICK).
- WHERE A PIPE, UNDER A CARRIAGEWAY, HAS A DEPTH OF COVER OF LESS THAN 1.2m THE PIPE SHALL BE LAID IN A CLASS Z BEDDING.
- WHERE PIPES ARE BEDDED AND SURROUNDED IN CONCRETE, FLEXIBLE JOINTS SHOULD BE PROVIDED. COMPRESSIBLE BOARDS (FIBREBOARD OR POLYSTYRENE) SHALL BE PROVIDED AT A MAXIMUM OF 8m CENTRES (COINCIDING WITH PIPE JOINTS). THE BOARDS SHALL BE PRE-CUT TO PIPE DIAMETER AND TO A HEIGHT AND WIDTH EQUAL TO THE CONCRETE CROSS SECTION. A BOARD THICKNESS OF 18mm FOR PIPES UP TO 450mm NOMINAL DIAMETER AND 36mm FOR PIPES OVER 450mm NOMINAL DIAMETER.
- ALL PRIVATE BUILDING DRAINAGE SHALL BE CONSTRUCTED IN STRICT ACCORDANCE WITH BS EN 752:2017.
- UNLESS OTHERWISE SPECIFIED, BUILDING DRAINAGE TO BE 150mm INTERNAL DIAMETER.
- MINIMUM GRADIENT FOR Ø100mm SURFACE DRAINAGE PIPES IS 1:60, AND Ø150mm IS 1:100 U.N.O.
- MINIMUM GRADIENTS FOR FOUL DRAINAGE PIPES: Ø100mm: 1:40 WHERE FLOW IS LESS THAN 1L/S, OR WHERE NO WCS ARE CONNECTED. Ø100mm: 1:80 WHERE FLOW IS 1L/S OR GREATER, OR WHERE AT LEAST 1NO. WC IS CONNECTED. Ø150mm: 1:135 WHERE FLOW IS LESS THAN 5L/S, OR WHERE UP TO 5NO. WCS ARE CONNECTED. Ø150mm: 1:150 WHERE FLOW IS 5L/S OR GREATER, OR WHERE 5NO. OR MORE WCS ARE CONNECTED.
- Ø450mm PPIC'S TO HAVE A Ø150mm TO Ø225mm REDUCER FOR ALL OUTFALL CONNECTIONS TO A Ø225mm PIPE. NO Ø225mm PIPES TO CONNECT AS INLETS TO Ø450 PPIC'S, Ø600 PPIC'S TO BE USED IN THIS OCCURRENCE.
- ALL GULLIES NOT CONNECTED TO INSPECTION CHAMBERS ARE TO BE RODDABLE.
- ALL GULLY CONNECTIONS OTHER THAN THOSE AT MANHOLES TO BE MADE VIA "Y" JUNCTIONS.
- GULLIES COINCIDENT WITH PEDESTRIAN/ DRIVE CROSSINGS TO HAVE PEDESTRIAN TYPE GULLY COVERS.
- ALL ROAD GULLY CONNECTIONS TO BE 150mm DIAMETER AND ANY GULLY CONNECTIONS SUBJECT TO TRAFFIC LOADING TO HAVE CLASS Z BEDDING & SURROUND.
- ALL STUB STACKS TO BE FITTED WITH AIR ADMITTANCE VALVES WHERE BRANCH DRAIN EXCEEDS 12m DEPT AT THE HEAD OF THE RUN. SOIL VENT PIPES LOCATED AT THE HEAD OF A RUN TO BE INSTALLED WITH ROOF TILE VENT.
- ALL CONNECTIONS TO BE MADE FROM SOFFIT TO SOFFIT UNLESS WERE NOTED OTHERWISE.
- ALL MANHOLES SHALL BE WATERTIGHT.
- TRENCH TEMPORARY FORMWORK IS REQUIRED TO ALL EXCAVATIONS EXCEEDING 1.2m DEPTH TO PROVIDE ADEQUATE SUPPORT AND STABILITY AT ALL TIMES.
- SEWERS ARE TO BE CONSTRUCTED IN SINGLE SECTIONS BETWEEN MANHOLES ONLY. TRENCHES TO BE BACKFILLED PRIOR TO EXCAVATING THE SUCCEEDING SEWER RUN.
- ALL CONCRETE AND CONCRETE PRODUCTS TO BE IN ACCORDANCE WITH BRE SPECIAL DIGEST 1 FOR SULPHATES.
- WHERE SEWER OR DRAINS ARE TO BE ABANDONED THEY SHALL BE REMOVED OR INFILLED BY GROUTING IN ACCORDANCE WITH THE CIVIL ENGINEER SPECIFICATION FOR THE WATER INDUSTRY 7TH EDITION, CLAUSE S.23.
- EXTERNAL RAIN WATER PIPES TO HAVE ACCESS POINTS 1m ABOVE GROUND LEVEL. (REFER TO DETAIL WITHIN CONSTRUCTION DETAILS).
- ALL RWP, SVP AND SS LOCATIONS TO HAVE ABOVE GROUND RODDABLE ACCESS POINTS BY M&E.
- ALL DRAINAGE TO BE CCTV SURVEYED FOLLOWING CONSTRUCTION.
- REFER TO SPECIFICATION FOR DETAILS OF PIPE BEDDING BENEATH / ADJACENT TO FLOOR SLAB & FOUNDATIONS.
- THE CONTRACTOR SHALL CHECK ALL EXISTING MANHOLE INVERT LEVELS PRIOR TO THE COMMENCEMENT OF ANY DRAINAGE WORKS AND REPORT HIS FINDINGS BACK TO THE ENGINEER IN WRITING.
- WHERE PROPOSED DRAINAGE PIPE WORK RUNS ARE IN CLOSE PROXIMITY TO THE NEW FOUNDATIONS, THE CONTRACTOR SHALL ALLOW FOR EXTENDING THE DEPTH OF NEW FOUNDATIONS IN LEAN MIX CONCRETE DOWN TO THE PROPOSED PIPE BEDDING LEVEL, EXCLUDING WHERE SITE HAS PILED FOUNDATIONS.

Notes

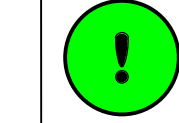
- THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL OTHER RELEVANT ARCHITECTS, ENGINEERS AND SPECIALISTS DRAWINGS TOGETHER WITH THE APPROPRIATE SPECIFICATIONS.
- IT IS THE CONTRACTORS RESPONSIBILITY TO CHECK ALL DIMENSIONS ON SITE. DIMENSIONS MUST NOT BE SCALED FROM THIS DRAWING. ANY DISCREPANCIES TO BE BROUGHT TO THE IMMEDIATE ATTENTION OF THE ARCHITECT IN WRITING.
- ALL DIMENSIONS ARE IN MILLIMETRES UNLESS NOTED OTHERWISE.
- ALL LEVELS ARE IN METRES, UNLESS NOTED OTHERWISE.

GENERAL NOTES:

- THE WORKS SHALL BE IN ACCORDANCE WITH THE FOLLOWING SPECIFICATIONS, NATIONAL BUILDING SPECIFICATION (NBS) BUILDING REGULATIONS PART H & VOLUME 1 OF THE MANUAL OF CONTRACT DOCUMENTS FOR HIGHWAY WORKS.
- THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL RELEVANT ENGINEERS DRAWINGS, ARCHITECTS DRAWINGS, MECHANICAL AND ELECTRICAL DRAWINGS AND SPECIFICATIONS.
- THE LOCATION, LINE & LEVEL OF ALL KNOWN EXISTING BURIED SERVICE MAINS AND DRAINAGE PIPEWORK INDICATED ON THE DRAWINGS ARE APPROXIMATE AND FOR GUIDANCE PURPOSES ONLY. IT IS THE CONTRACTORS RESPONSIBILITY TO DETERMINE THEIR EXACT LINE & LEVEL, BY WAY OF HAND EXCAVATED TRIAL PITS, PRIOR TO THE COMMENCEMENT OF ANY EXCAVATION WORKS ON SITE. THE CONTRACTOR SHALL TAKE ALL NECESSARY PRECAUTIONS TO MAINTAIN THE STRUCTURAL INTEGRITY OF ALL ABOVE AND BELOW GROUND SERVICE MAINS / DRAINAGE INSTALLATIONS.
- THE CONTRACTOR MUST COMPLY WITH ALL CURRENT LEGISLATION RELATING TO HEALTH & SAFETY.
- THE MAIN CONTRACTOR IS RESPONSIBLE FOR THE DESIGN OF ALL TEMPORARY WORKS, AND IS ALSO RESPONSIBLE FOR THE SAFE MAINTENANCE AND STABILITY OF EXISTING BUILDINGS AT ALL TIMES.
- THE MAIN CONTRACTOR IS RESPONSIBLE FOR THE MITIGATION OF ALL OCCURRENCES OF GROUND WATER DURING THE CONSTRUCTION PERIOD.
- THE CONTRACTOR SHALL MAKE ALLOWANCE FOR RAISING / LOWERING ALL EXISTING ACCESS COVERS & FRAMES TO SUIT NEW FINISHED LEVELS.
- CONTRACTOR TO CONFIRM THE CONDITION OF THE EXISTING PIPES BEFORE REUSE. ANY PIPES THAT ARE BROKEN SHOULD BE LINED, REPAIRED OR REPLACED. ANY PIPES THAT ARE BLOCKED SHOULD BE CLEARED.
- ALL SOFT / HARD PAVED AREAS AFFECTED BY THE WORKS SHALL BE FULLY REINSTATED UPON COMPLETION OF THE WORKS. ALL SURFACE MARKINGS DAMAGED BY THE WORKS SHALL BE FULLY REINSTATED.
- ALL SURPLUS EXCAVATED MATERIAL SHALL BE DISPOSED OF OFF SITE.
- ALL LEVELS ARE TO ORDNANCE DATUM.
- REFER TO PHG CONSULTING ENGINEERS:
2359-PHG-ZZ-00-DR-C-200_C7_B1 - PROPOSED DRAINAGE LAYOUT FOR PROPOSED DRAINAGE FOR SOUTHERN DEVELOPMENT (CALLAGHAN SQUARE).

DESIGN NOTES

- COVER LEVELS, INVERT LEVELS, AND POSITIONS OF INSPECTION CHAMBERS AND DRAINS ARE INDICATIVE ONLY, TO BE CONFIRMED UPON RECEIPT OF M&E INTERNAL DRAINAGE DESIGN.
- MAXIMUM LOAD IMPOSED AND MINIMUM COVER OVER ATTENUATION TO BE CONFIRMED WITH MANUFACTURER PRIOR TO INSTALLATION.
- OFFSITE DRAINAGE INCLUDING SERVICE CLASHES TO BE REVIEWED AND DESIGNED BY OTHERS. OFFSITE DRAINAGE SHOWN INDICATIVELY UNTIL OFFSITE DESIGN APPROVED
- ALLOWANCE TO BE MADE FOR ADDITIONAL GULLIES AND DRAINAGE CHANNELS. REQUIREMENTS TBC UPON RECEIPT OF APPROVED LANDSCAPING LAYOUTS.



P01	30.04.24	CH	FIRST ISSUE	GB
Rev	Date	By	Description	Appd

PRELIMINARY



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Client

PITSTOP PRODUCTIONS

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PEAK ARCHITECTS

Project

SOUND DESIGN CREATION CENTRE

Title

DRAINAGE GENERAL ARRANGEMENT

Scale	Drawn	Revision
1:250@A1	CH	P01
Date	Checked	
APRIL 2024	GB	

1226

8000

A1



Document Title: Drainage Strategy Report
Document No.: 1226-ACE-ZZ-XX-RP-C-1001
Revision: 001
Date: April 2024

Appendix G – Drainage Calculations

Design Settings

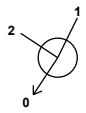
Rainfall Methodology	FEH-22	Minimum Velocity (m/s)	1.00
Return Period (years)	100	Connection Type	Level Soffits
Additional Flow (%)	40	Minimum Backdrop Height (m)	0.200
CV	1.000	Preferred Cover Depth (m)	0.600
Time of Entry (mins)	5.00	Include Intermediate Ground	✓
Maximum Time of Concentration (mins)	30.00	Enforce best practice design rules	x
Maximum Rainfall (mm/hr)	200.0		

Pipeline Schedule

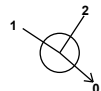
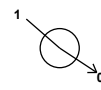
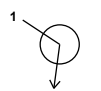
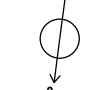
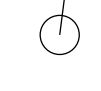
Link	Length (m)	Slope (1:X)	Dia (mm)	Link Type	US CL (m)	US IL (m)	US Depth (m)	DS CL (m)	DS IL (m)	DS Depth (m)
1.000	21.264	168.8	225	Circular	148.450	147.625	0.600	148.450	147.499	0.726
2.000	20.099	10.4	150	Circular	150.504	149.499	0.855	148.450	147.574	0.726
1.001	35.663	98.2	225	Circular	148.450	147.499	0.726	148.450	147.136	1.089
3.000	21.240	43.4	150	Circular	148.450	147.700	0.600	148.450	147.211	1.089
1.002	13.345	10.3	300	Circular	148.450	147.061	1.089	146.661	145.761	0.600
1.003	33.088	82.1	375	Circular	146.661	144.795	1.491	145.292	144.392	0.525
5.000	14.052	9.8	375	Circular	145.292	143.893	1.024	143.360	142.460	0.525
5.001	5.009	100.2	150	Circular	143.360	141.440	1.770	142.867	141.390	1.327

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
1.000	S01	600	Manhole	Adoptable	S03	600	Manhole	Adoptable
2.000	S02	450	Manhole	Adoptable	S03	600	Manhole	Adoptable
1.001	S03	600	Manhole	Adoptable	S05	600	Manhole	Adoptable
3.000	S04	450	Manhole	Adoptable	S05	600	Manhole	Adoptable
1.002	S05	600	Manhole	Adoptable	S06	1350	Manhole	Adoptable
1.003	S06	1350	Manhole	Adoptable	S07	1350	Manhole	Adoptable
5.000	S07	1350	Manhole	Adoptable	S08	1350	Manhole	Adoptable
5.001	S08	1350	Manhole	Adoptable	S09	1200	Manhole	Adoptable

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
S01	432360.773	411198.853	148.450	0.825	600				
						0	1.000	147.625	225
S02	432387.658	411205.654	150.504	1.005	450				
						0	2.000	149.499	150
S03	432378.537	411187.166	148.450	0.951	600		1	2.000	147.574
						2	1.000	147.499	225
						0	1.001	147.499	225
S04	432341.179	411169.073	148.450	0.750	450				
						0	3.000	147.700	150

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)	
S05	432358.915	411157.386	148.450	1.389	600		1	3.000	147.211	150
							2	1.001	147.136	225
							0	1.002	147.061	300
S06	432368.983	411148.626	146.661	1.866	1350		1	1.002	145.761	300
							0	1.003	144.795	375
S07	432396.617	411130.427	145.292	1.399	1350		1	1.003	144.392	375
S08	432394.763	411116.498	143.360	1.920	1350		0	5.000	143.893	375
							1	5.000	142.460	375
S09	432394.128	411111.529	142.867	1.477	1200			0	5.001	141.440
						1		5.001	141.390	150

Simulation Settings

Rainfall Methodology	FEH-22	Skip Steady State	x	1 year (l/s)	1.5
Summer CV	1.000	Drain Down Time (mins)	240	30 year (l/s)	3.0
Winter CV	1.000	Additional Storage (m³/ha)	0.0	100 year (l/s)	3.6
Analysis Speed	Detailed	Check Discharge Rate(s)	✓	Check Discharge Volume	x

Storm Durations

15	60	180	360	600	960	2160	4320	7200	10080
30	120	240	480	720	1440	2880	5760	8640	

Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
2	0	0	0
30	0	0	0
100	0	0	0
100	40	0	0

Pre-development Discharge Rate

Site Makeup	Greenfield	Growth Factor 30 year	1.75
Greenfield Method	FEH	Growth Factor 100 year	2.08
Positively Drained Area (ha)	0.940	Betterment (%)	0
SAAR (mm)	677	QMed	1.6
Host	6	QBar	1.7
BFIHost	0.625	Q 1 year (l/s)	1.5
Region	3	Q 30 year (l/s)	3.0
QBar/QMed conversion factor	1.064	Q 100 year (l/s)	3.6
Growth Factor 1 year	0.86		

Node S06 Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	✓	Sump Available	✓
Invert Level (m)	144.795	Product Number	CTL-SHE-0050-1500-1850-1500
Design Depth (m)	1.850	Min Outlet Diameter (m)	0.075
Design Flow (l/s)	1.5	Min Node Diameter (mm)	1200

Node S08 Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	✓	Sump Available	✓
Invert Level (m)	141.440	Product Number	CTL-SHE-0053-1700-1850-1700
Design Depth (m)	1.850	Min Outlet Diameter (m)	0.075
Design Flow (l/s)	1.7	Min Node Diameter (mm)	1200

Node S06 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	144.795
Side Inf Coefficient (m/hr)	0.00000	Porosity	0.95	Time to half empty (mins)	

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	198.0	0.0	1.200	198.0	0.0	1.201	0.0	0.0

Node S05 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	147.510
Side Inf Coefficient (m/hr)	0.00000	Porosity	0.30	Time to half empty (mins)	0

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	158.4	0.0	0.500	158.4	0.0	0.501	0.0	0.0

Rainfall

Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)
2 year 15 minute summer	104.359	29.530
2 year 15 minute winter	73.234	29.530
2 year 30 minute summer	67.729	19.165
2 year 30 minute winter	47.529	19.165
2 year 60 minute summer	45.342	11.982
2 year 60 minute winter	30.124	11.982
2 year 120 minute summer	31.268	8.263
2 year 120 minute winter	20.774	8.263
2 year 180 minute summer	25.281	6.506
2 year 180 minute winter	16.433	6.506
2 year 240 minute summer	20.606	5.446
2 year 240 minute winter	13.690	5.446
2 year 360 minute summer	16.288	4.192
2 year 360 minute winter	10.588	4.192
2 year 480 minute summer	13.091	3.459
2 year 480 minute winter	8.697	3.459
2 year 600 minute summer	10.859	2.970
2 year 600 minute winter	7.420	2.970

Rainfall

Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)
2 year 720 minute summer	9.763	2.617
2 year 720 minute winter	6.562	2.617
2 year 960 minute summer	8.100	2.133
2 year 960 minute winter	5.365	2.133
2 year 1440 minute summer	5.939	1.592
2 year 1440 minute winter	3.991	1.592
2 year 2160 minute summer	4.273	1.181
2 year 2160 minute winter	2.944	1.181
2 year 2880 minute summer	3.571	0.957
2 year 2880 minute winter	2.400	0.957
2 year 4320 minute summer	2.745	0.718
2 year 4320 minute winter	1.808	0.718
2 year 5760 minute summer	2.306	0.590
2 year 5760 minute winter	1.493	0.590
2 year 7200 minute summer	2.009	0.512
2 year 7200 minute winter	1.297	0.512
2 year 8640 minute summer	1.801	0.459
2 year 8640 minute winter	1.162	0.459
2 year 10080 minute summer	1.649	0.421
2 year 10080 minute winter	1.064	0.421
30 year 15 minute summer	277.572	78.543
30 year 15 minute winter	194.787	78.543
30 year 30 minute summer	183.005	51.784
30 year 30 minute winter	128.425	51.784
30 year 60 minute summer	123.507	32.639
30 year 60 minute winter	82.055	32.639
30 year 120 minute summer	73.768	19.495
30 year 120 minute winter	49.010	19.495
30 year 180 minute summer	55.990	14.408
30 year 180 minute winter	36.395	14.408
30 year 240 minute summer	43.970	11.620
30 year 240 minute winter	29.212	11.620
30 year 360 minute summer	33.305	8.571
30 year 360 minute winter	21.649	8.571
30 year 480 minute summer	26.184	6.920
30 year 480 minute winter	17.396	6.920
30 year 600 minute summer	21.440	5.864
30 year 600 minute winter	14.649	5.864
30 year 720 minute summer	19.117	5.124
30 year 720 minute winter	12.848	5.124
30 year 960 minute summer	15.715	4.138
30 year 960 minute winter	10.410	4.138
30 year 1440 minute summer	11.413	3.059
30 year 1440 minute winter	7.670	3.059
30 year 2160 minute summer	8.143	2.251
30 year 2160 minute winter	5.611	2.251
30 year 2880 minute summer	6.746	1.808
30 year 2880 minute winter	4.534	1.808
30 year 4320 minute summer	5.069	1.325
30 year 4320 minute winter	3.338	1.325
30 year 5760 minute summer	4.174	1.068
30 year 5760 minute winter	2.701	1.068

Rainfall

Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)
30 year 7200 minute summer	3.572	0.911
30 year 7200 minute winter	2.306	0.911
30 year 8640 minute summer	3.154	0.805
30 year 8640 minute winter	2.036	0.805
30 year 10080 minute summer	2.851	0.727
30 year 10080 minute winter	1.840	0.727
100 year 15 minute summer	355.061	100.470
100 year 15 minute winter	249.166	100.470
100 year 30 minute summer	236.778	67.000
100 year 30 minute winter	166.160	67.000
100 year 60 minute summer	161.198	42.600
100 year 60 minute winter	107.096	42.600
100 year 120 minute summer	94.541	24.984
100 year 120 minute winter	62.811	24.984
100 year 180 minute summer	71.230	18.330
100 year 180 minute winter	46.301	18.330
100 year 240 minute summer	55.776	14.740
100 year 240 minute winter	37.056	14.740
100 year 360 minute summer	42.283	10.881
100 year 360 minute winter	27.485	10.881
100 year 480 minute summer	33.308	8.802
100 year 480 minute winter	22.129	8.802
100 year 600 minute summer	27.335	7.477
100 year 600 minute winter	18.677	7.477
100 year 720 minute summer	24.429	6.547
100 year 720 minute winter	16.418	6.547
100 year 960 minute summer	20.168	5.311
100 year 960 minute winter	13.360	5.311
100 year 1440 minute summer	14.708	3.942
100 year 1440 minute winter	9.885	3.942
100 year 2160 minute summer	10.471	2.894
100 year 2160 minute winter	7.215	2.894
100 year 2880 minute summer	8.620	2.310
100 year 2880 minute winter	5.793	2.310
100 year 4320 minute summer	6.365	1.664
100 year 4320 minute winter	4.192	1.664
100 year 5760 minute summer	5.160	1.321
100 year 5760 minute winter	3.340	1.321
100 year 7200 minute summer	4.357	1.111
100 year 7200 minute winter	2.812	1.111
100 year 8640 minute summer	3.801	0.970
100 year 8640 minute winter	2.453	0.970
100 year 10080 minute summer	3.401	0.868
100 year 10080 minute winter	2.195	0.868
100 year +40% CC 15 minute summer	497.086	140.658
100 year +40% CC 15 minute winter	348.832	140.658
100 year +40% CC 30 minute summer	331.489	93.800
100 year +40% CC 30 minute winter	232.624	93.800
100 year +40% CC 60 minute summer	225.678	59.640
100 year +40% CC 60 minute winter	149.935	59.640
100 year +40% CC 120 minute summer	132.357	34.978
100 year +40% CC 120 minute winter	87.935	34.978

Rainfall

Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)
100 year +40% CC 180 minute summer	99.722	25.662
100 year +40% CC 180 minute winter	64.822	25.662
100 year +40% CC 240 minute summer	78.087	20.636
100 year +40% CC 240 minute winter	51.879	20.636
100 year +40% CC 360 minute summer	59.196	15.233
100 year +40% CC 360 minute winter	38.479	15.233
100 year +40% CC 480 minute summer	46.631	12.323
100 year +40% CC 480 minute winter	30.981	12.323
100 year +40% CC 600 minute summer	38.269	10.467
100 year +40% CC 600 minute winter	26.148	10.467
100 year +40% CC 720 minute summer	34.200	9.166
100 year +40% CC 720 minute winter	22.985	9.166
100 year +40% CC 960 minute summer	28.236	7.435
100 year +40% CC 960 minute winter	18.704	7.435
100 year +40% CC 1440 minute summer	20.591	5.519
100 year +40% CC 1440 minute winter	13.839	5.519
100 year +40% CC 2160 minute summer	14.660	4.051
100 year +40% CC 2160 minute winter	10.101	4.051
100 year +40% CC 2880 minute summer	12.068	3.234
100 year +40% CC 2880 minute winter	8.111	3.234
100 year +40% CC 4320 minute summer	8.911	2.330
100 year +40% CC 4320 minute winter	5.868	2.330
100 year +40% CC 5760 minute summer	7.224	1.849
100 year +40% CC 5760 minute winter	4.676	1.849
100 year +40% CC 7200 minute summer	6.100	1.556
100 year +40% CC 7200 minute winter	3.937	1.556
100 year +40% CC 8640 minute summer	5.322	1.358
100 year +40% CC 8640 minute winter	3.435	1.358
100 year +40% CC 10080 minute summer	4.762	1.215
100 year +40% CC 10080 minute winter	3.073	1.215

Results for 2 year Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	S01	10	147.678	0.053	4.9	0.0149	0.0000	OK
15 minute summer	S02	10	149.534	0.035	6.5	0.0056	0.0000	OK
15 minute summer	S03	11	147.588	0.089	17.1	0.0253	0.0000	OK
15 minute summer	S04	10	147.750	0.050	6.3	0.0080	0.0000	OK
15 minute summer	S05	10	147.128	0.067	34.5	0.0190	0.0000	OK
960 minute summer	S06	675	145.038	0.243	5.2	45.9948	0.0000	OK
15 minute summer	S07	11	143.913	0.020	3.3	0.0283	0.0000	OK
240 minute summer	S08	152	142.421	0.981	1.9	1.4032	0.0000	SURCHARGED
15 minute summer	S09	1	141.390	0.000	1.1	0.0000	0.0000	OK

Link Event (Outflow)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	S01	1.000	S03	4.8	0.458	0.121	0.2298	
15 minute summer	S02	2.000	S03	6.5	2.074	0.116	0.0625	
15 minute summer	S03	1.001	S05	16.8	1.166	0.320	0.5135	
15 minute summer	S04	3.000	S05	6.2	1.226	0.230	0.1077	
15 minute summer	S05	1.002	S06	34.4	3.061	0.099	0.1500	
240 minute summer	S06	Hydro-Brake®	S07	1.0				
15 minute summer	S07	5.000	S08	3.3	1.535	0.005	0.0306	
240 minute summer	S08	Hydro-Brake®	S09	1.3				25.5

Results for 30 year Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	S01	10	147.713	0.087	13.1	0.0248	0.0000	OK
15 minute summer	S02	10	149.556	0.057	17.2	0.0091	0.0000	OK
15 minute summer	S03	11	147.666	0.167	45.5	0.0473	0.0000	OK
15 minute summer	S04	10	147.789	0.089	16.8	0.0142	0.0000	OK
15 minute summer	S05	10	147.177	0.116	92.2	0.0328	0.0000	OK
960 minute winter	S06	915	145.376	0.581	6.5	110.1851	0.0000	SURCHARGED
15 minute summer	S07	10	143.924	0.031	8.6	0.0442	0.0000	OK
60 minute winter	S08	51	143.171	1.731	4.8	2.4766	0.0000	FLOOD RISK
15 minute summer	S09	1	141.390	0.000	1.5	0.0000	0.0000	OK

Link Event (Outflow)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	S01	1.000	S03	13.0	0.572	0.325	0.4867	
15 minute summer	S02	2.000	S03	17.1	2.495	0.309	0.1753	
15 minute summer	S03	1.001	S05	44.6	1.455	0.851	1.0938	
15 minute summer	S04	3.000	S05	16.6	1.567	0.614	0.2251	
15 minute summer	S05	1.002	S06	91.9	3.924	0.263	0.3126	
15 minute summer	S06	Hydro-Brake®	S07	1.0				
15 minute summer	S07	5.000	S08	8.5	2.034	0.013	0.7840	
60 minute winter	S08	Hydro-Brake®	S09	1.7				20.6

Results for 100 year Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	S01	11	147.756	0.131	16.8	0.0371	0.0000	OK
15 minute summer	S02	10	149.565	0.066	22.0	0.0104	0.0000	OK
15 minute summer	S03	11	147.739	0.240	57.7	0.0679	0.0000	SURCHARGED
15 minute summer	S04	10	147.807	0.107	21.5	0.0170	0.0000	OK
15 minute summer	S05	10	147.194	0.133	115.8	0.0377	0.0000	OK
960 minute winter	S06	930	145.575	0.780	8.5	147.7488	0.0000	SURCHARGED
15 minute summer	S07	10	143.927	0.034	10.8	0.0482	0.0000	OK
60 minute winter	S08	39	143.360	1.920	5.9	2.7475	0.8657	FLOOD
15 minute summer	S09	1	141.390	0.000	1.7	0.0000	0.0000	OK

Link Event (Outflow)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	S01	1.000	S03	16.0	0.595	0.402	0.6783	
15 minute summer	S02	2.000	S03	21.9	2.383	0.396	0.2491	
15 minute summer	S03	1.001	S05	54.2	1.484	1.034	1.3542	
15 minute summer	S04	3.000	S05	21.2	1.642	0.785	0.2747	
15 minute summer	S05	1.002	S06	115.6	4.138	0.331	0.3729	
960 minute winter	S06	Hydro-Brake®	S07	1.0				
15 minute summer	S07	5.000	S08	10.8	2.139	0.017	0.8046	
30 minute summer	S08	Hydro-Brake®	S09	1.7				19.0

Results for 100 year +40% CC Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	S01	11	148.282	0.657	23.5	0.1860	0.0000	FLOOD RISK
15 minute summer	S02	10	149.579	0.080	30.8	0.0127	0.0000	OK
15 minute summer	S03	11	148.233	0.734	78.1	0.2077	0.0000	FLOOD RISK
15 minute summer	S04	11	148.001	0.301	30.0	0.0479	0.0000	SURCHARGED
15 minute summer	S05	11	147.226	0.165	160.5	0.0466	0.0000	OK
1440 minute winter	S06	1380	145.970	1.175	8.7	222.7545	0.0000	SURCHARGED
15 minute summer	S07	10	143.932	0.039	14.8	0.0558	0.0000	OK
60 minute winter	S08	33	143.360	1.920	7.8	2.7475	3.6864	FLOOD
15 minute summer	S09	1	141.390	0.000	1.7	0.0000	0.0000	OK

Link Event (Outflow)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	S01	1.000	S03	22.1	0.624	0.555	0.8457	
15 minute summer	S02	2.000	S03	30.7	2.477	0.554	0.2726	
15 minute summer	S03	1.001	S05	77.3	1.945	1.475	1.4036	
15 minute summer	S04	3.000	S05	28.9	1.644	1.070	0.3720	
15 minute summer	S05	1.002	S06	160.6	4.442	0.460	0.4824	
1440 minute winter	S06	Hydro-Brake®	S07	1.2				
15 minute summer	S07	5.000	S08	14.7	2.198	0.023	0.8163	
15 minute summer	S08	Hydro-Brake®	S09	1.7				18.2

Appendix H – SuDS Maintenance and Management



Document Title: Operations and Maintenance Plan
Document No.: 1226-ACE-ZZ-XX-RP-C-1002
Revision: 001
Date: 2024/04/30

SOUND DESIGN CREATION CENTRE – Operations and Maintenance Plan

1.0 General Information			
Site ID	Sound Design Creation Centre		
Site location and co-ordinates (GIS if appropriate)	X:432391, Y:411166		
Elements forming the SuDS scheme	Vortex Flow Control Device, Catchpits/Inspection Chambers, Permeable Paving, Swale		
Inspection frequency	Minimum 12 months		
Authorities	Barnsley Metropolitan Borough Council Yorkshire Water		
Type of development	Residential	Drawing Reference(s):	1226-ACE-ZZ-XX-DR-C-8000_DRAINAGE GENERAL ARRANGEMENT
Responsible party for maintenance of SuDS features	To be confirmed by client.		

2.0 Inspection Checklist				Inspection Date		Inspection Date		
				Details	Y/N	Action Required	Date Completed	
General Inspection								
Is there any evidence of erosion, channelling, ponding (where not desirable) or other poor hydraulic performance?								
Is there any evidence of accidental spillages, oils, poor water quality, odours, nuisance insects?								
Have any health and safety risks been identified to either the public or maintenance operatives?								
Is there any deterioration in the surface of permeable or porous surfaces (e.g. rutting, spreading of blocks or signs of ponding water)?								

Inspection Checklist	Inspection Date				Inspection Date			
	Details	Y/N	Action Required	Date Completed	Details	Y/N	Action Required	Date Completed
Silt/Sediment Accumulation								
Is there any sediment accumulation at inlets (or other defined accumulation zones such as the surface of filter drains or infiltration basins and within proprietary devices)?								
If yes, state depth (mm) and extent Is removal required?								
If yes, state waste disposal requirements and confirm all waste management requirements have been complied with (consult Environment Agency or SEPA).								
Is surface clogging visible (potentially problematic where water has to soak into the underlying construction or ground)?								
System Blockages/Litter Build Up								
Is there evidence of litter accumulation in the system?								
If yes, is this a blockage risk?								
Is there any evidence of any other clogging/blockage of outlets or drainage paths?								



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 Date: 2024/04/30

Inspection Checklist	Inspection Date				Inspection Date			
	Details	Y/N	Action Required	Date Completed	Details	Y/N	Action Required	Date Completed
Infrastructure								
Are any check dams or weirs in good condition?								
Is there evidence of any accidental damage to the system (e.g. wheel ruts?)								
Is there any evidence of cross connections or other unauthorised inflows?								
Is there any evidence of tampering with the flow control?								
Is there any evidence of tampering with the Attenuation Systems?								
Are gullies/channels/kerb drainage clear of debris/detritus?								
Are there any other matters that could affect the performance of the system in relation to the design objectives for hydraulic, water quality, biodiversity, and visual aspects? (Specify)								
Other Observations								
Information appended (e.g. photos)								



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Inspection Checklist	Inspection Date				Inspection Date			
	Details	Y/N	Action Required	Date Completed	Details	Y/N	Action Required	Date Completed
Suitability of Current Maintenance Regime								
1. Continue as current 2. Increase maintenance 3. Decrease maintenance								
Next Inspection								
Proposed date for next inspection								

3.0 Maintenance Specification		Frequency
	Regular Maintenance	
1	Litter management	
1.1	Pick up all litter in SuDS and Landscape areas and remove from site	12 visits monthly
2	Grass Maintenance	
2.1	Mow all grass verges, paths and amenity at 35-50mm with 75mm max. Leaving grass in situ	As required or monthly
3	Hard Surfaces	
3.1	Sweep all paving regularly. Sweep and suction brush paving in autumn after leaf fall.	1 visit
	Occasional Tasks	
4	Inspection and Control Chambers	
4.1	Annual inspection, remove silt and check free flow	1 visit
	Remedial Work	
5	Inspect SuDS system regularly to check for damage or failure. Undertake remedial work as required.	As required

4.0 Sustainable Drainage Maintenance Specification		
1.0	General Requirements	Frequency
	Maintenance activities comprise: • Regular maintenance • Occasional tasks • Remedial work	
	Generally: • Litter – collect all litter or other debris and remove from site at each site visit. • Avoid – use of weedkillers and pesticides to prevent chemical pollution. De-icing agents wherever possible to allow bio-remediation of pollutants in permeable surfaces. • Protect – all permeable, porous and infiltration surfaces from silt, sand, mulch and other fine particles. • Exclusions – maintenance of pumps, etc.	Monthly

Drainage/SuDs Component	Maintenance Tasks	Frequency	Actions or Remedial Work
2.0 FLOW CONTROLS, PUMPS AND INSPECTION CHAMBERS <u>NOTES</u> Inlets and outlets structures must be free from obstruction at all times. Flow control structures to be accessible and easy to maintain.	• Inspect and identify any areas that are not operating correctly. If required, take remedial action. • Debris removal from catchment surface (where it may cause risks to performance).	Monthly for 3 months, then annually Monthly Annually	Repair any physical damage if necessary and allow for jetting if blockages/silt build-up found.

Drainage/SuDs Component	Maintenance Tasks	Frequency	Actions or Remedial Work
Refer to manufacturers maintenance guide for any specific guidance relating to the drainage systems i.e. attenuation and pump systems.	- Inspect all inlets, outlets, vents and overflows to ensure that they are in good condition and operating as designed - Remove sediment from pre-treatment structures (e.g. upstream silt-traps or vortex flow control upstream) and geo-cellular system where required. - Inspect and document the presence of wildlife. - Survey inside of tank for sediment build-up and remove if necessary - All drainage to be CCTV surveyed following construction	Annually and after leaf fall in Autumn/heavy storm events Annually Every 5 years or as required Following construction	

Drainage/SuDs Component	Maintenance Tasks	Frequency	Actions or Remedial Work
3.0 Planting and existing vegetation Ornamental Trees - All ornamental planting to be kept weed free and pruned using secateurs to keep the shrubs to an agreed and reasonable size. Native Trees and Shrubs – All native planting to be allowed to grow freely removing overhanging branches as required.	Amenity Grass Mow all grass verges, paths and amenity grass at 3550mm with 75mm max. All cuttings to remain in situ. Rough grass Mow at 75-100mm but not to exceed 150mm. All cuttings to wildlife piles. Ornamental tree & shrub planting. Weed all shrub beds as detailed spec as necessary. Cut back planting from lights, paths and visibility sight lines in late autumn and as necessary. Cut hedges slightly tapered back from base with flat top at specified height. Do not mulch planting adjacent to permeable/porous paving surfaces. Remove stakes and ties from trees when no longer needed for support and within 3 years of planting. Protect from trimmer damage and remove	When Required	Replace trees and shrubs which fail in the first five years after planting. Carry out tree surgery as necessary.

Drainage/SuDs Component	Maintenance Tasks	Frequency	Actions or Remedial Work
	competitive growth until well established. Native trees & shrub planting. Prune to shape in year 1. Protect trees from strimmer damage and remove competitive growth until well established. Remove stakes and ties from trees when no longer needed for support and within 3 years from planting. Existing trees. Check existing trees for safety.		

Drainage/SuDs Component	Maintenance Tasks	Frequency	Actions or Remedial Work
4.0 Permeable Paving	Inspect silt accumulation rates and establish appropriate brushing frequencies.	Annually	Remedial works to any depressions, rutting and cracked or broken blocks considered detrimental to the structural performance or a hazard to user, and replace lost jointing material.
	Inspect for evidence of poor operation and/or weed growth – if required, take remedial action.	Three-monthly, 48 hours after large storms in first six months.	Rehabilitation of surface and upper substructure by remedial sweeping.
	Brushing and vacuuming (standard cosmetic sweep over whole surface)	Once a year, after autumn leaf fall, or reduced frequency as required.	Remediate any landscaping which, through vegetation maintenance or soil slip, has been raised within 50mm of the level of the paving.
	Stabilise and any contributing and adjacent areas.	As required.	
	Removal of weeds or management using glyphosate applied directly into the weeds by an applicator rather than spraying.	As required.	

Drainage/SuDs Component	Maintenance Tasks	Frequency	Actions or Remedial Work
5.0 SWALE	Remove litter and debris. Cut grass – to retain grass height within specified design range. Manage other vegetation and remove nuisance plants. Inspect inlets, outlets, overflows for blockages, and clear if required. Inspect infiltration surfaces for ponding, compaction, silt accumulation, record areas where water is ponding for > 48 hours. Inspect vegetation coverage. Inspect inlets and facility surface for silt accumulation, establish appropriate silt removal frequencies. Reseed areas of poor vegetation growth, alter plant	Monthly, or as required. Monthly (during growing season), or as required. Monthly at start, then as required. Monthly. Monthly, or when required. Monthly for 6 months, quarterly for 2 years, then half yearly. Half yearly. As required of if bare soil is exposed over 10% or more of the swale treatment area.	Repair erosion or other damage by re-turfing or reseeding. Relevel uneven surface and reinstate design levels. Scarify and spike topsoil layer to improve infiltration performance, break up silt deposits and prevent compaction of the soil surface. Remove build-up of sediment on upstream gravel trench, flow spreader or at top of filter strip. Remove and dispose of oils or petrol residues using safe standard practices.

Drainage/SuDs Component	Maintenance Tasks	Frequency	Actions or Remedial Work
	types to better suit conditions, if required.		

5.0 Spillage – Emergency Action

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

In the event of a serious spillage, either by volume or of unknown or toxic compounds, then isolate the spillage with soil, turf or fabric and block outlet pipes from chamber(s) downstream of the spillage with a bung(s). (A bung for blocking pipes may be made by wrapping soil or turf in a plastic sheet or close woven fabric.). Contact the Environment Agency immediately.



Apex Consulting Engineers

Unit 3 Acres Hill Business Park
Acres Hill Lane
Sheffield
S9 4LR
0114 241 9360