



DRAINAGE IMPACT ASSESSMENT

Land off Whaley Road
Barugh Green
Barnsley

Reference

6709-JPG-XX-XX-RP-D-0622-S2-P02

Date

24 July 2026

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CONFIDENTIALITY STATEMENT

This report is addressed to and may be relied upon by the following:

Wordsworth Properties
Unit 1 Wordsworth Business Park
Whaley Road
Barugh Green
BARNSLEY
South Yorkshire
S75 1FJ

This report has been prepared for the sole use and reliance of the above-named party. This report shall not be relied upon or transferred to any other parties without the express written authorisation of JPG (Leeds) Limited. No responsibility will be accepted where this report is used, either in its entirety or in part, by any other party.

DOCUMENT HISTORY

Revision	Date	Revision Details	Status	Author(s)	Approved
P01	24.07.2026	First Revision	Information	BT	BT
P02	31.07.2026	Second Revision	Information	BT	BT



1.0 INTRODUCTION

JPG (Leeds) Limited (JPG) has been instructed by Wordsworth Properties to prepare a Flood Risk Assessment for the proposed construction of a new vehicle maintenance unit and associated works at Whaley Road, Barnsley.

This report will detail the drainage strategy associated with the proposed development and provide details of any mitigation required as part of the drainage assessment.

A separate Flood Risk Assessment Report will cover the flood risk associated with this site, document reference 6709-JPG-XX-XX-RP-0620.

Other documents we have reviewed and referred to in compiling this Drainage Impact assessment report are detailed below.

These include both technical, nontechnical, legislation, codes, and guidance document at both national and local level:

- National Planning Policy Framework 2024.
- Planning Practice Guidance Flood Risk and Coastal Change 2022.
- Flood and Water Management Act 2010.
- Water Industry Act 1991.
- Defra's Non-Statutory Technical Standards for SuDS.
- CIRIA C753 SUDS Manual and various other CIRIA guidance.
- Building Regulations: Approved Document H - Drainage and Waste Disposal (2015 edition).
- BS 8582:2013 Code of Practice for Surface Water Management for Development Sites.
- BS 8533:2017 Assessing and managing flood risk in development. Code of practice.
- BS EN 752:2017 Drain and sewer systems outside buildings - sewer system management.
- Barnsley Strategic Flood Risk Assessment Level 1 SRFA Report 2010.
- Barnsley Local Flood Risk Management Strategy 2017
- Yorkshire Water Foul and Surface Water Drainage Policies.
- Sewers for Adoption 6th and 7th Edition (now superseded).
- Design and Construction Guidance (DCG) version 2.3, November 2023.



2.0 THE SITE

2.1 Location

The site is located off Whaley Road in Barugh Green, approximately 3km to the northwest of Barnsley town centre. The approximate centre of the site is located at NGR 432136, 408281.

A site location plan is provided in Appendix A.

2.2 Site Description and Topography

A site walkover was carried out by a JPG Engineer on 5 May 2026.

The site is irregular in shape and covers an area of approximately 2.4 hectares.

The landowner (Wordsworth Properties) occupies the land in the north, east and south of the site. Two tenants occupy the land in the centre and west of the site.

Land use typically comprises storage, car parking and service yards with a number of temporary buildings and storage units.

The land occupied by the tenant in the western part of the site can be accessed from the southwest; the remainder of the site can be accessed from the south.

The site is traversed by several roads and tracks providing access across the site.

An electricity pylon is located in the south of the site in the centre of a car park used by Wordsworth Construction. The pylon has a gabion retaining wall at its base which will required to be maintained as part of any future development. Overhead electricity cables extend east to west, spanning the southern part of the site.

The land to the north, south and west comprises industrial land use. A railway track is located immediately to the northeast of the site with agricultural land beyond.

A topographic survey has been provided in Appendix B.

3.0 EXISTING DRAINAGE NETWORK

3.1 Watercourses and Land Drainage

There are no known or visible existing water courses or land drainage systems located within the site boundary or immediately outside the site adjacent to the boundary.

The River Dearne is located approximately 0.90km to the east.

There is no direct access to these watercourses from the site without passing through third party land and it is unlikely that a gravity connection would be possible.



3.2 Public Sewer Network

Public sewer records have been obtained from Yorkshire Water (YW) and indicate public sewer assets outside of the development boundary.

Based on the Yorkshire Water record drawing there are public surface, foul and combined water sewers located circa 250m south of site in Zenith Park, YW records do not confirm the size or material of these sewers.

The law regarding responsibility for drains and sewers changed on the 1 October 2011. From this date the Government transferred the majority of drainage pipes that are either outside a property's boundary or are shared with other buildings to the Sewage/Water companies. The sewer records may not show all of the transferred sewers.

An extract from Yorkshire Water sewer record plan is provided in Appendix C.

3.3 Private Drainage Systems/Network

There is an extensive existing private drainage system which serves the existing wider development, with foul water drainage that enters the development boundary.

As these sewers head east and south from site it is assumed this network has downstream connection to the existing adopted combined water sewer that crosses the Naylor Concrete site.

An existing drainage layout plan is located in Appendix C.

It is proposed to connect into the existing drainage system for the new development drainage at a restricted greenfield rate.

4.0 DEVELOPMENT PROPOSALS

A site layout plan for the proposed development has been provided. This is provided in Appendix D.

This shows the proposed Vehicle Maintenance Unit building in the west of the site, with extensive areas of hardstanding, comprising mostly vehicle parking across the remainder of the site.

Phase 2 of the development constitutes the formalisation of an existing hard standing area used as car parking.



5.0 PROPOSED SURFACE WATER DRAINAGE

5.1 Proposed Surface Water Drainage & Disposal Hierarchy

The proposed on-site plot drainage will consist of a separate surface and foul water drainage system and will remain in private ownership. Any off-site infrastructure drainage maybe put forward to the local Water Company (Yorkshire Water) for adoption via a Section 104 agreement should the developer what to go down this route and the design meets with the Water Company criteria.

SuDS features employed as part of the drainage infrastructure on the development will be maintained by either the Water Company, Local Authority or private management company.

The features could be either adopted or remain private and further discussion at detailed design will be required with the various stakeholders to agree and establish this.

The adoption/maintenance of SuDS features is outside the scope of this report.

The following assessment summarises the disposal of surface water from the site.

As detailed in Building regulation Document H the hierarchy for surface water drainage disposal is as follows:

- Discharge to ground (infiltration).
- Discharge to a surface water body (Land drainage Ditch, Water Body or Watercourse).
- Discharge to a surface water sewer.
- Discharge to a combined water sewer.
- Discharge to a foul water sewer.

All options for the disposal of the surface water have been considered in accordance with current legislation, recommendation, and good practice. Refer to Section 5.3 of this report for more details.

Operation and maintenance of the proposed drainage system is covered in a separate report reference 6091-JPG-XX-XX-RP-D-0623 Drainage Maintenance and Management Plan (DMMP). This report should be read in conjunction with the Flood Risk Assessment Report and Drainage Impact Assessment Report.

5.2 Sustainable Urban Drainage Systems (SUDS)

Sustainable Urban Drainage System (SuDS) may be used in conjunction with conventional drainage systems to improve water quality as well as manage surface water discharge. Incorporation of SuDs should be considered at an early design stage of the project.



Soakaway tests have been carried out on this site as part of a previous planning application, the results of this resting can be found in Appendix K. The results show that infiltration is not viable

Based on the requirements that SuDs drainage features should be considered and that infiltration drainage methods at the site would unsuitable the following audit has been undertaken relating to suitability of SuDS features/systems at the proposed development.

While the audit outlines drainage features that could be considered ultimately the proposed layout and levels of the development will dictate what can be reasonably incorporated.

Site specific SuDs Audit below:

Drainage Method	Description/Suitability	Proposal/Feasibility
1. Infiltration.	Site ground conditions unsuitable for infiltration	Not Applicable
2. Ponds and wetlands.	May be utilised – subject to detailed design.	Applicable (non-infiltration method)
3. Infiltration Basins.	Site ground conditions unsuitable for infiltration	Not Applicable
4. Detention Basins.	May be utilised – subject to detailed design.	Applicable (non-infiltration method)
5. Swale.	May be utilised – subject to detailed design.	Applicable (non-infiltration method)
6. French/Filter drain.	May be utilised to convey water.	Applicable (non-infiltration method)
7. Pervious/Permeable Pavement.	May be utilised - subject to detailed design.	Applicable (non-infiltration method)
8. Geocellular Systems/Tank systems.	May be utilised – subject to detailed design.	Applicable.
9. Oversized pipes.	May be used as surface water attenuation.	Applicable.
10. Box culverts.	May be used as surface water attenuation.	Applicable.
11. Proprietary tanks systems.	May be used as surface water attenuation.	Applicable.

5.3 Surface Water Drainage

Requirement H3 of the Building Regulations establishes a preferred hierarchy for the disposal of surface water. Consideration should firstly be given to soakaway, infiltration, watercourse, and sewer in that priority order.

Soakaway tests have been carried out on this site as part of a previous planning application, the results of this resting can be found in Appendix J. The results show that infiltration is not viable

Based on the above statement and drainage hierarchy connection to watercourse should be consider next.

There are no watercourses or land drainage systems in the vicinity of the site for direct connection.



Thus, the most feasible place for disposal of surface water from the development would be into the existing private network on site at a restricted rate.

Record drawings have been obtained and are located in Appendix C.

5.4 Run Off and Restricted Discharge

The proposed site of the VMU unit is currently used by Wordsworth Properties for the storage of plant, machine attachments, temporary site equipment and welfare units. It is also used for servicing, inspection, cleaning and maintenance of plant and equipment before redeployment.

There is a significant existing impermeable area within the existing development plot. Refer to the existing impermeable area plan in Appendix E.

As the development plot is a brownfield site typically a reduction on calculated brownfield run-off would be proposed. However, as the site will discharge into an existing private drainage network before eventual assume outfall to the Yorkshire Water system a 5 l/s discharge is proposed to ensure a significant betterment is proposed to existing off site networks.

Phase 2 of the development will be drained into the phase 1 drainage network at a restructured rate of 3 l/s, this has been accounted for in the phase 1 drainage design.

Phase 2 will have its own attenuation tank sized suitably for the 1 in 100 + 40% climate change event.

The proposed impermeable area plan 6709-JPG-ZZ-ZZ-R-D-1453 is located in Appendix F.

Refer to section 5.6 of this report which will provide further detail on the proposed restricted discharge rate.

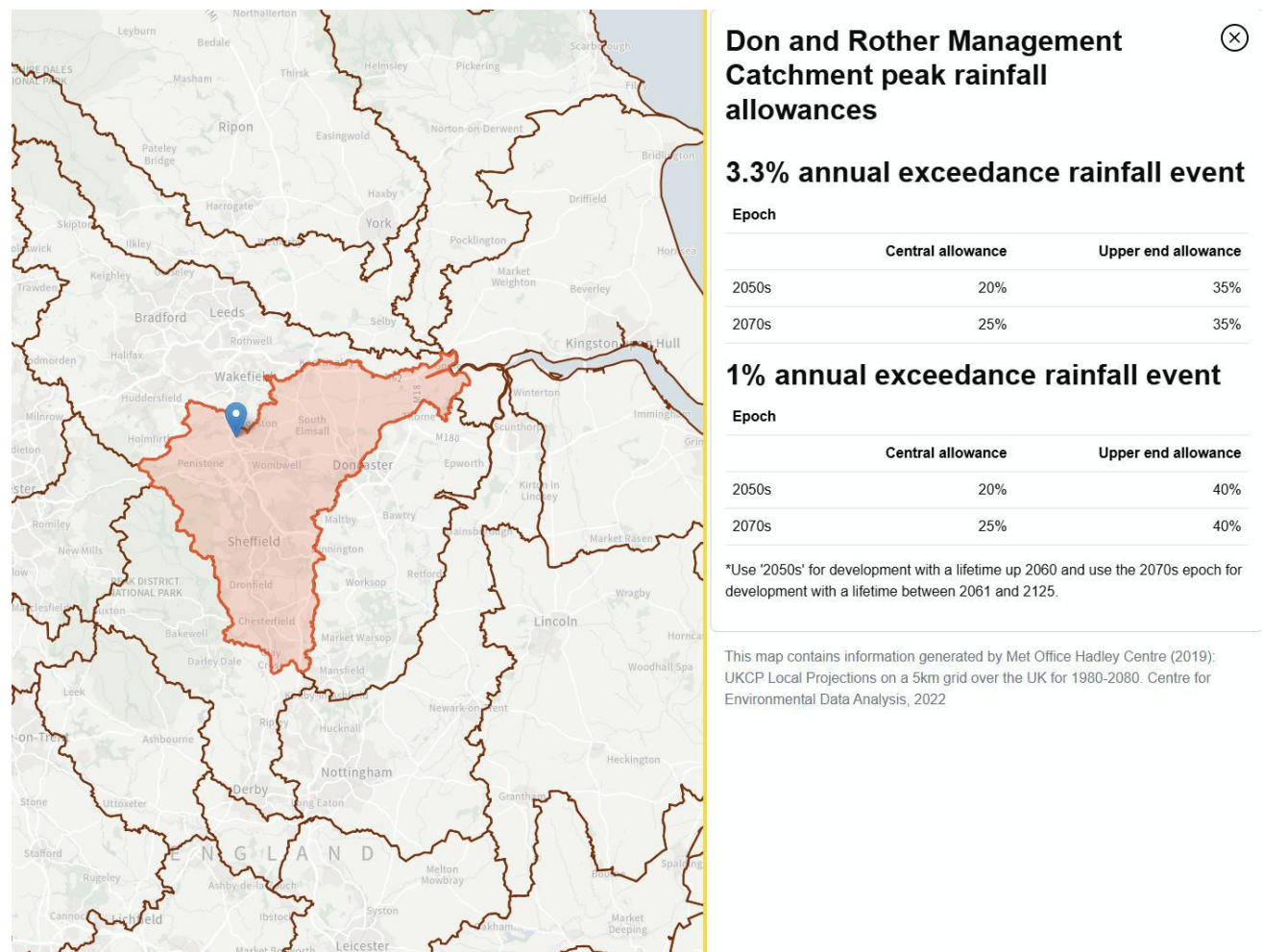


5.5 Climate Change Allowance

For the proposed drainage design an allowance for climate change must be applied to the 1 in 100-year storm event.

Up to date climate change allowance can be found on the Environment Agencies web site for the development catchment which is Don and Rother Management Catchment.

An extract from the EA climate change allowance data map for the proposed development site is shown below.



The mapping gives a range of uplift percentages for development base on the design life.

EA guidance states that both the central and upper allowances should be considered as part of the drainage design.

For design purposes the proposed climate change uplift to be applied for this development is 40%.



5.6 Surface Water Design

The proposed on-site drainage system shall be designed in accordance with the relevant requirements of Codes for Adoption, Sewers for Adoption, national non-statutory technical SuDS standards, British Standards and Building Regulations and industry best practice and shall demonstrate that:

- No surcharge of pipes occurs in the 1 in 2-year rainfall event.
- No surface flooding occurs in 1 in 30-year rainfall event.
- No flooding to buildings and adjacent properties occurs in 1 in 100-year rainfall event (including an allowance of for the effects of future climate change), as defined in NPPF Technical Guidance. The climate change allowance shall be 40%.

The drainage system will be a gravity system via pipes and manholes to the attenuation tank with a pumped outfall to gravity sewer.

Hydraulic modelling of the proposed drainage arrangement has been carried out and the results can be found in Appendix G. These calculations show the design aligns with the NPPF technical guidance.

Phase 2 of the development will be drained into the phase 1 drainage network at a restructured rate of 3 l/s, this has been accounted for in the phase 1 drainage design calculations.

Preliminary surface water attenuation storage will be provided in below ground geo-cellular tanks.

Restricted discharge will be achieved via a package pump chamber, limiting flow to the required discharge rate.

The proposed plot drainage is detailed on drawing 6091-JPG-ZZ-ZZ-DR-D-1401 and is located in Appendix I.

5.7 Water Quality and Pollution Control

It is a requirement to ensure that the quality of any receiving water body is not adversely affected by the development.

Both SuDs and proprietary treatment systems can be incorporated into the drainage design to assist with cleaning of the surface water runoff.

Clean roof water drainage will discharge directly into the sealed drainage network (i.e., not via gullies) and will then discharge into the off-site private drainage network. Treatment will be provided in the SuDs features located in the private drainage system.

Runoff from the access road, parking areas and service yards will be routed through appropriately sized oil interceptors and/or SuDs features to provide treatment of the runoff prior to discharge offsite.



The pollution hazard level of surface water runoff from the development is detailed in Chapter 26 of the SuDS Manual.

The proposed development site is classified as medium risk according to Table 26.2 of the CIRIA SuDS Manual.

Table 26.3 of the CIRIA SuDS Manual details SuDS mitigation indices for Total Suspended Solids (TSS), metals and hydrocarbons for a range of SuDS devices.

The pollution hazard indices for the development have been compared against the mitigation indices of the proposed SuDS devices. The proposed SuDS mitigation indices calculation can be found in the table below.

Pollution Hazard Indices and SuDS mitigation is as follows:

Commercial yard.

	TSS	Metals	Hydrocarbons
Hazard Indices Low	0.70	0.60	0.70
1st Mitigation Bioretention System	0.80	0.60	0.90
Total Mitigation	0.80	0.60	0.90

5.8 Volume Control

SuDS guidance advises that the run-off volume from the development site for the 1 in 100-year, six-hour rainfall event should not exceed the greenfield run-off volume for the same event.

The predevelopment greenfield run off volume for the 1 in 100-year, six-hour event has been calculated as 492.056m³.

Volume calculations for the predevelopment site are included in Appendix I.

The post development run off volume for 1 in 100-year, six-hour plus 40% climate change event has been calculated as follows:

- Proposed Development = 206.738m³.

5.9 Exceedance Event

For storm events above the design event of 1 in 100-year event plus climate change run off would be managed so that it would not affect the proposed building along with any existing buildings and third party property/development.

The excellence flood route would be applicable for storm events above the 1 in 100-year plus climate change event.



A Drainage Exceedance Plan drawing 6709-JPG-ZZ-ZZ-DR-D-1454 has been produced to demonstrate the flood routing.

A copy of the exceedance plan drawing is located in Appendix J.

5.10 Foul Water Drainage

Domestic foul water is proposed to discharge to the existing on site private network. The proposed wash down and refuelling facilities are also proposed to drain to the private foul water network.

6.0 CONCLUSIONS

The report has been prepared to assess the drainage impact for a proposed development for a new vehicle maintenance unit at Whaley Road, Barnsley.

This report shall be read in conjunction with the corresponding Flood Risk Assessment Report 6709-JPG-XX-XX-RP-D-0620 and shall also be read in conjunction with the corresponding drainage Maintenance and Management Plan 6709-JPG-XX-XX-RP-D-0623.

As confirmed by the accompanying Flood Risk Assessment Report the site falls within Flood Zone 1 (low flood risk) and is considered to be at a low and acceptable flood risk.

The onsite private surface water drainage system will be design and constructed in accordance with Building Regulations, all national and local standards and best practice.

Hierarchy for discharge of surface water has been considered as detailed in building regulations document H3. Consideration should firstly be given to soakaway, infiltration, watercourse, and sewer in that priority order.

Infiltration drainage techniques are not suitable on this site due to the underlying ground conditions.

There are no watercourses or land drainage systems in the vicinity of the site for direct connection.

Thus, the most feasible place for disposal of surface water from the development would be into the existing private drainage network located on site.

Proposed surface water from the development will be restricted to 5 l/s to ensure significant betterment on the existing brownfield run-off rate.

Attenuation storage will be provided on site in a below ground attenuation tank.

Proposed allowance for climate change for this development is 40%.

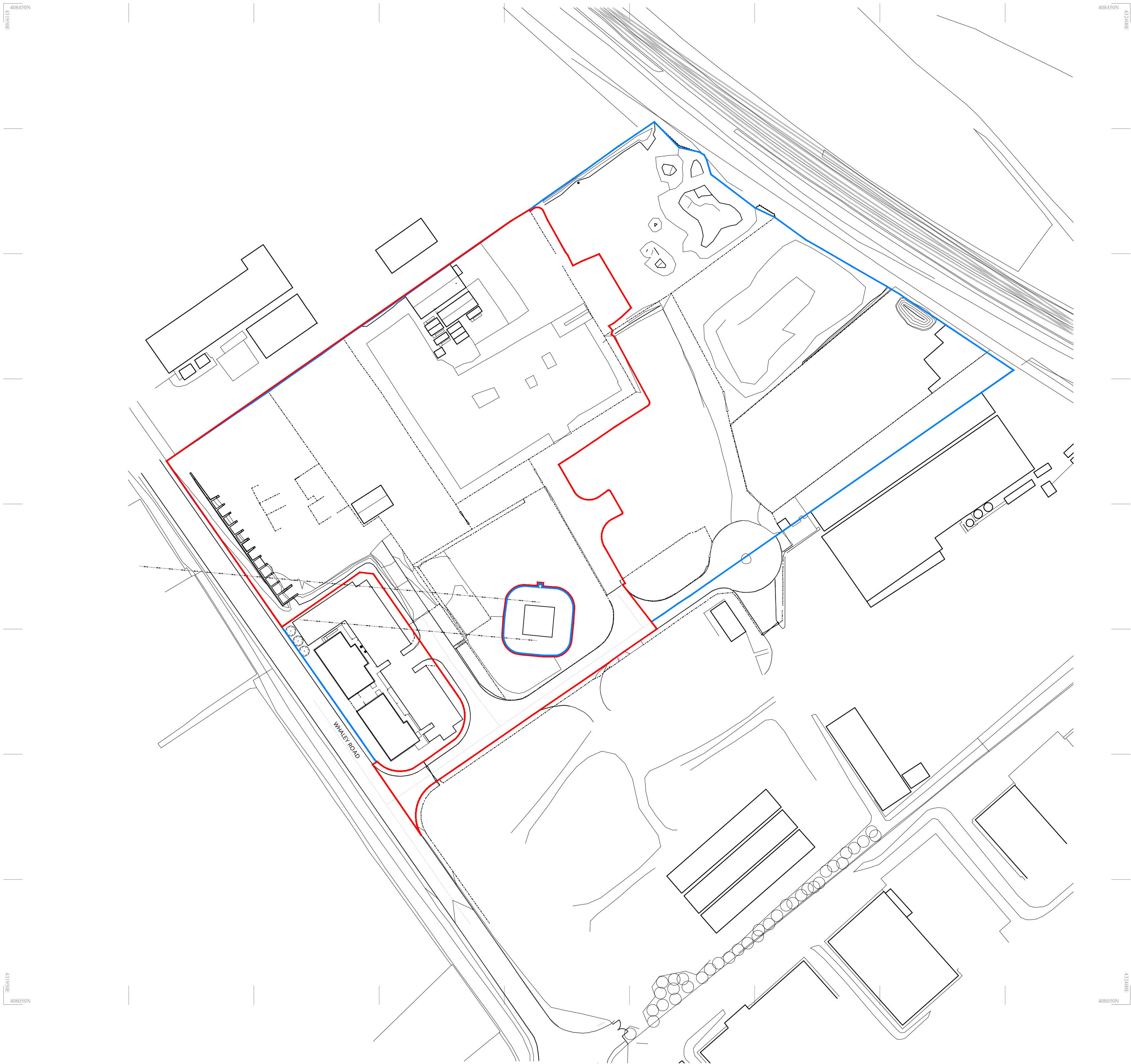


The reports supporting calculations and drawings provide a robust case for justifying the means of surface water drainage and that the site can be suitably, safely, and sustainably drained.

Overall, this report demonstrates that the surface water drainage systems reasonable and acceptable for the proposed development.



Appendix A Site Location Plan



notes

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0m25m50m75m

Scale 1:1000

- Planning Boundary
- Ownership Boundary

B	27.07.26	Blue line updated	Zi
A	30.06.26	Red line updated	Zi
no.	date	revision	by



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client

Wordsworth Property Ltd

project

Proposed VMU
& External Works
Whaley Road
Barnsley

drawing

Site Location Plan

scale	1:1000 @ A1	drawn	Zi
checked	spp	date	26-06-2026

no

7628-008 B



Appendix B Topographic Survey

KEY/ LEGEND

- Building
- Bottom of Batter
- Building Detail
- Edging
- Fence
- Kerb
- Kerb Top
- General Detail
- Road Camber
- Top of Batter
- Gully
- British Telecoms
- Manhole/ Cover Level
- Lamp Post
- Inspection Cover
- Top of Wall
- Gate
- Overhead Cable

ASPHALT

CONCRETE

EARTH

EARTH STOCKPILE

GRASS

GRAVEL

PAVING

UN-SURFACED

Survey coordinated to OSGB36 (15)

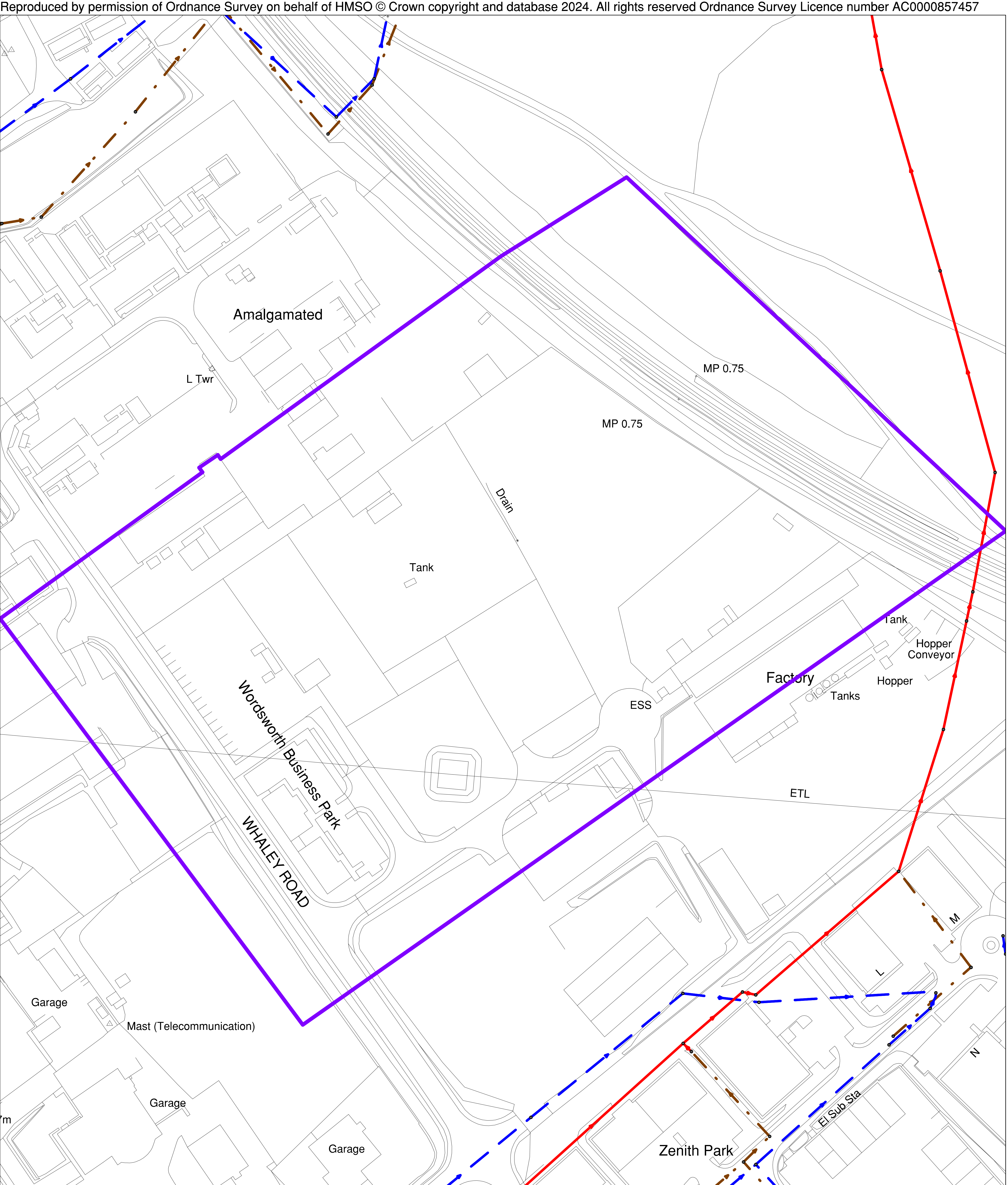
Scale Bar 1:1000

0m 10m 20m 30m 40m 50m 60m 70m 80m 90m

A	Topographical Survey	02/02/26
Rev	Revisions/Descriptions	Date
Client/Project Name: Wordsworth Excavations, Baugh Green, S75 1FJ		
Drawing Title: Topographical Survey		
Date: 02nd February 2026		Scale: 1:500 @ A1 (Do Not Scale)
Wordsworth Excavations Ltd Project/Drawing No.: WEL-Yard-001		Rev: A
Drawing Status: INFORMATION		Survey by: RJS
Wordsworth EXCAVATIONS www.wordswortheexcavations.co.uk		Wordsworth Excavations Ltd Unit 1 Wordsworth Business Park Whalley Road Baugh Green Barnsley, S75 1FJ. Tel. (01226) 244478



Appendix C Existing Drainage and Sewer Record Plans



Public Waste Water Network 19/02/2026 14:03:23 OS Grid Coordinates: 431951 : 408010 Map Name : SE3108SE svcGISSafeMovePD



1 Existing Drainage Layout
1 : 500

P1 Initial Issue		LW	MH	01.12.21
Rev	Revision Description	By	Chk	Date
SCALE @ A1 1 : 500		ISSUING OFFICE Leeds		MSJ PROJECT NUMBER 221062
STATUS S0		PURPOSE OF ISSUE WORK IN PROGRESS		
MSJ Melia Smith & Jones		Melia Smith & Jones Consulting Civil & Structural Engineers Vinery Court 58 Cardigan Lane Leeds LS1 2LD 0113 2366880 www.msj.co.uk		
PROJECT Wordsworth Properties Ltd. Vehicle Maintenance Building				
TITLE Existing Drainage Layout				
CLIENT Martin Walsh Architectural				
DRAWING NUMBER 221062-MSJ-XX-XX-DR-D-4002				REV P1



Appendix D Proposed Site Layout Plan



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N

0m

25m

50m

Scale 1:500

Schedule of Areas (GIA)		
VMU	13,100 sq.ft.	1,217 sq.m.
Single Storey Offices	2,030 sq.ft.	189 sq.m.
(Area includes blockwork perimeter)		
Total	15,130 sq.ft.	1,406 sq.m.
Car Parking (inc. 2No. EV Spaces)	20 spaces	
Ancilliary Parking (Indicative only)	114 spaces	
Vehicle Parking (16x4m spaces)		
Total	55 spaces	
Planning Boundary	5.48 acres	2.22 ha.

D	30.07.26	Minor update	Zi
C	30.07.26	Minor update	Zi
B	27.07.26	Landscaping updated	Zi
A	30.06.26	Red line updated	Zi
no.	date	revision	by



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client

Wordsworth Property Ltd

project

Proposed VMU
& External Works
Whaley Road
Barnsley

drawing

Proposed Site Plan

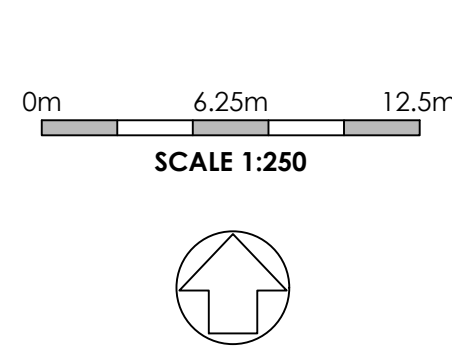
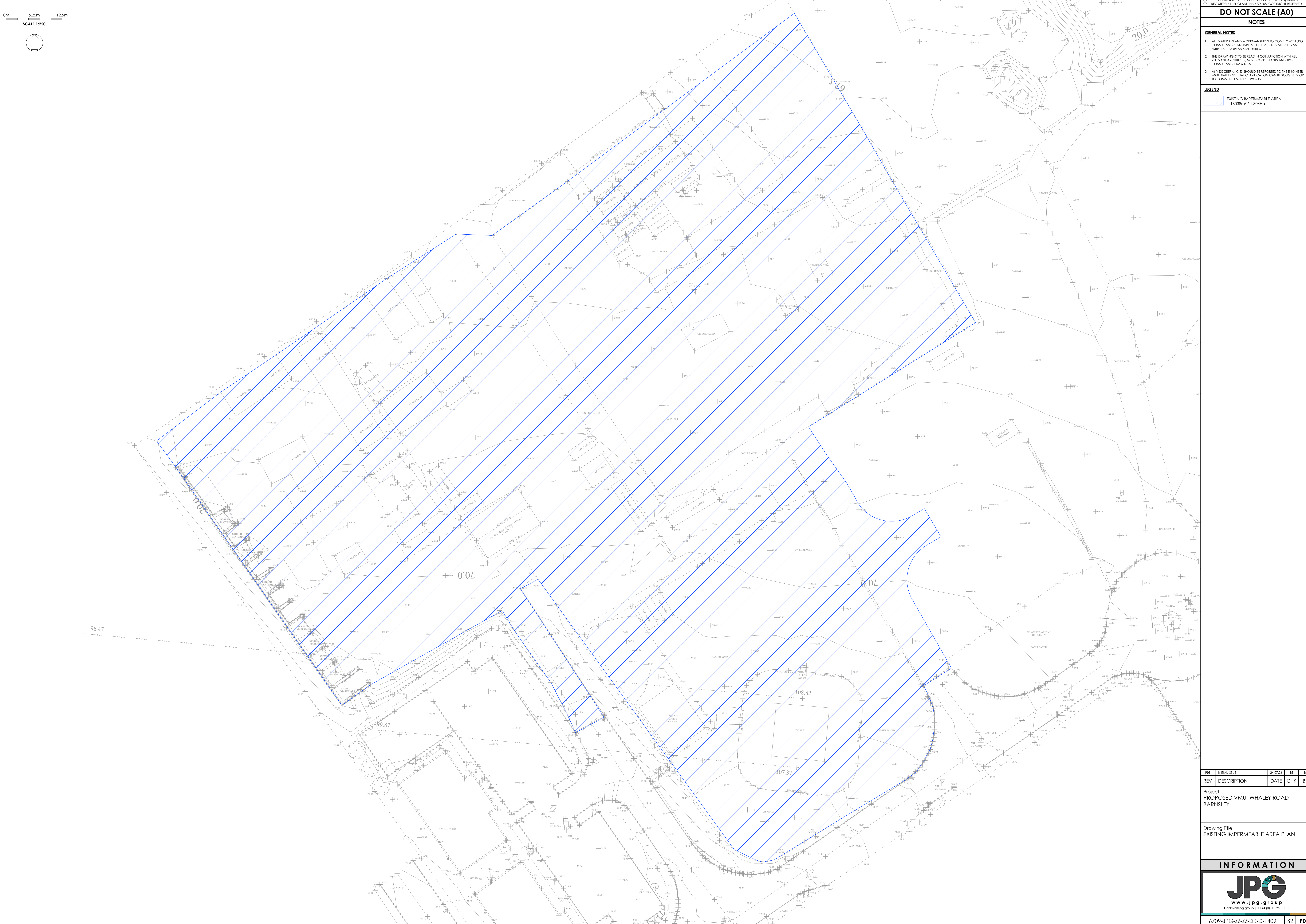
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checked	spp	date	26-06-2026

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7628-010 D



Appendix E Existing Impermeable Area Plan



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NOTES

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LEGEND

EXISTING IMPERMEABLE AREA
= 1803897 / 1.8041g

P01	INITIAL ISSUE	24.07.26	BT	BT
REV	DESCRIPTION	DATE	CHK	BY

Project
PROPOSED VMU, WHALEY ROAD
BARNSELEY

Drawing Title
EXISTING IMPERMEABLE AREA PLAN

INFORMATION

JPG

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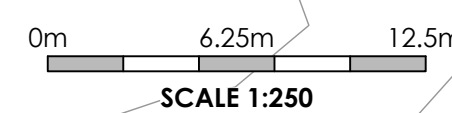
6709-JPG-IZ-ZZ-DR-D-1409

S2

P01



Appendix F Proposed Impermeable Area Plan



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P02	UPDATED TO SUIT RECENT SITE LAYOUT	31.07.26	BT	EY
P01	INITIAL ISSUE	24.07.26	BT	BT
REV	DESCRIPTION	DATE	CHK	BY

Project

PROPOSED VMU, WHALEY ROAD
BARNLEY

Drawing Title

DRAINAGE AREA PLAN

INFORMATION

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6709-JPG-ZZ-ZZ-DR-D-1410

S2

P02



Appendix G SW Drainage Hydraulic Calculations

Project: Proposed VMU Whaley Road	Date: 24/07/2026		
	Designed by: BT	Checked by: BT	Approved By:
Report Details: Type: Inflows Storm Phase: SW	Company Address:		





SW16-01

Type : Catchment Area

Area (m²)	778.762
-----------	---------

Dynamic Sizing

Runoff Method	Time of Concentration
Summer Volumetric Runoff	1.000
Winter Volumetric Runoff	1.000
Time of Concentration (hrs)	0.00
Percentage Impervious (%)	100



SW17-01

Type : Catchment Area

Area (m²)	122.913
-----------	---------

Dynamic Sizing

Runoff Method	Time of Concentration
Summer Volumetric Runoff	1.000
Winter Volumetric Runoff	1.000
Time of Concentration (hrs)	0.00
Percentage Impervious (%)	100



SW27-01

Type : Catchment Area

Area (m²)	119.579
-----------	---------

Dynamic Sizing

Runoff Method	Time of Concentration
Summer Volumetric Runoff	1.000
Winter Volumetric Runoff	1.000
Time of Concentration (hrs)	0.00
Percentage Impervious (%)	100



SW28-01

Type : Catchment Area

Area (m²)	408.996
-----------	---------

Dynamic Sizing

Runoff Method	Time of Concentration
Summer Volumetric Runoff	1.000
Winter Volumetric Runoff	1.000
Time of Concentration (hrs)	0.00
Percentage Impervious (%)	100

Project: Proposed VMU Whaley Road	Date: 24/07/2026		
	Designed by: BT	Checked by: BT	Approved By:
Report Details: Type: Inflows Storm Phase: SW	Company Address:		





SW29-01

Type : Catchment Area

Area (m²)	126.082
-----------	---------

Dynamic Sizing

Runoff Method	Time of Concentration
Summer Volumetric Runoff	1.000
Winter Volumetric Runoff	1.000
Time of Concentration (hrs)	0.00
Percentage Impervious (%)	100



SW24-01

Type : Catchment Area

Area (m²)	573.905
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Dynamic Sizing

Runoff Method	Time of Concentration
Summer Volumetric Runoff	1.000
Winter Volumetric Runoff	1.000
Time of Concentration (hrs)	0.00
Percentage Impervious (%)	100



SW25-01

Type : Catchment Area

Area (m²)	295.058
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Dynamic Sizing

Runoff Method	Time of Concentration
Summer Volumetric Runoff	1.000
Winter Volumetric Runoff	1.000
Time of Concentration (hrs)	0.00
Percentage Impervious (%)	100



SW25-02

Type : Catchment Area

Area (m²)	568.542
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Dynamic Sizing

Runoff Method	Time of Concentration
Summer Volumetric Runoff	1.000
Winter Volumetric Runoff	1.000
Time of Concentration (hrs)	0.00
Percentage Impervious (%)	100

Project: Proposed VMU Whaley Road	Date: 24/07/2026		
	Designed by: BT	Checked by: BT	Approved By:
Report Details: Type: Inflows Storm Phase: SW	Company Address:		





SW19-01

Type : Catchment Area

Area (m²)	1945.154
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Dynamic Sizing

Runoff Method	Time of Concentration
Summer Volumetric Runoff	1.000
Winter Volumetric Runoff	1.000
Time of Concentration (hrs)	0.00
Percentage Impervious (%)	100



SW19-02

Type : Catchment Area

Area (m²)	669.934
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Dynamic Sizing

Runoff Method	Time of Concentration
Summer Volumetric Runoff	1.000
Winter Volumetric Runoff	1.000
Time of Concentration (hrs)	0.00
Percentage Impervious (%)	100



SW18-01

Type : Catchment Area

Area (m²)	1513.067
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Dynamic Sizing

Runoff Method	Time of Concentration
Summer Volumetric Runoff	1.000
Winter Volumetric Runoff	1.000
Time of Concentration (hrs)	0.00
Percentage Impervious (%)	100



SW21-01

Type : Catchment Area

Area (m²)	1798.876
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Dynamic Sizing

Runoff Method	Time of Concentration
Summer Volumetric Runoff	1.000
Winter Volumetric Runoff	1.000
Time of Concentration (hrs)	0.00
Percentage Impervious (%)	100

Project: Proposed VMU Whaley Road	Date: 24/07/2026		
	Designed by: BT	Checked by: BT	Approved By:
Report Details: Type: Inflows Storm Phase: SW	Company Address:		





SW20-01

Type : Catchment Area

Area (m²)	513.686
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Dynamic Sizing

Runoff Method	Time of Concentration
Summer Volumetric Runoff	1.000
Winter Volumetric Runoff	1.000
Time of Concentration (hrs)	0.00
Percentage Impervious (%)	100



SW21-02

Type : Catchment Area

Area (m²)	2681.747
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Dynamic Sizing

Runoff Method	Time of Concentration
Summer Volumetric Runoff	1.000
Winter Volumetric Runoff	1.000
Time of Concentration (hrs)	0.00
Percentage Impervious (%)	100

Project: Proposed VMU Whaley Road	Date: 24/07/2026			
	Designed by: BT	Checked by: BT	Approved By:	
Report Details: Type: Inflows Storm Phase: SW	Company Address:			



Base Flow

Type : Base Flow

Flow (L/s)	3.0
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Project: Proposed VMU Whaley Road	Date: 24/07/2026		
	Designed by: BT	Checked by: BT	Approved By:
Report Details: Type: Junctions Storm Phase: SW	Company Address:		



Name	Junction Type	Easting (m)	Northing (m)	Cover Level (m)	Depth (m)	Invert Level (m)	Chamber Shape	Diameter (m)
025	Manhole	432056.847	408281.565	70.830	1.430	69.400	Circular	1.200
024	Manhole	432025.917	408260.478	70.811	0.961	69.850	Circular	1.200
016	Manhole	432087.811	408225.768	70.420	1.420	69.000	Circular	1.500
017	Manhole	432116.364	408245.267	70.296	1.494	68.802	Circular	1.500
027	Manhole	432184.211	408228.642	70.053	1.350	68.703	Circular	1.200
018	Manhole	432131.524	408279.167	69.850	2.744	67.106	Circular	1.500
019	Manhole	432122.806	408292.130	69.760	2.818	66.942	Circular	1.500
029	Manhole	432154.903	408276.286	69.606	2.290	67.316	Circular	1.200
028	Manhole	432168.835	408255.662	69.458	2.000	67.458	Circular	1.200
020	Manhole	432150.207	408323.866	68.929	2.299	66.630	Circular	1.500
021	Manhole	432147.909	408327.224	68.900	2.365	66.535	Circular	1.500
INT-01	Manhole	432139.946	408338.856	68.789	2.389	66.400	Circular	1.500
031	Manhole	432142.245	408344.654	68.641	2.670	65.971	Circular	1.800

Name	Lock	Part Family
025	All	Type B
024	All	Type B
016	All	Type B
017	All	Type B
027	All	Type B
018	All	Type B
019	All	Type B
029	All	Type B
028	All	Type B
020	All	Type B
021	All	Type B
INT-01	All	Type B
031	All	Type B

Inlets

Junction	Inlet Name	Incoming Item(s)	Bypass Destination	Capacity Type
025	Inlet	1.000 SW25-01 SW25-02	(None)	No Restriction
024	Inlet	SW24-01	(None)	No Restriction
016	Inlet	SW16-01	(None)	No Restriction
017	Inlet	2.000 SW17-01	(None)	No Restriction
027	Inlet	SW27-01	(None)	No Restriction
018	Inlet	2.001 SW18-01	(None)	No Restriction
	Inlet (1)	3.002	(None)	No Restriction
019	Inlet	2.002 SW19-01 SW19-02	(None)	No Restriction
029	Inlet	3.001 SW29-01	(None)	No Restriction
028	Inlet	3.000 SW28-01	(None)	No Restriction
	Inlet (1)	Base Flow	(None)	No Restriction
020	Inlet	2.003 SW20-01	(None)	No Restriction
021	Inlet	2.004 SW21-01 SW21-02	(None)	No Restriction
INT-01	Inlet	2.005	(None)	No Restriction
031	Inlet	1.002	(None)	No Restriction

Outlets

Project: Proposed VMU Whaley Road	Date: 24/07/2026		
	Designed by: BT	Checked by: BT	Approved By:
Report Details: Type: Junctions Storm Phase: SW	Company Address:		



Junction	Outlet Name	Outgoing Connection	Outlet Type
025	Outlet	1.001	Free Discharge
024	Outlet	1.000	Free Discharge
016	Outlet	2.000	Free Discharge
017	Outlet	2.001	Free Discharge
027	Outlet	3.000	Free Discharge
018	Outlet	2.002	Free Discharge
019	Outlet	2.003	Free Discharge
029	Outlet	3.002	Free Discharge
028	Outlet	3.001	Free Discharge
020	Outlet	2.004	Free Discharge
021	Outlet	2.005	Free Discharge
INT-01	Outlet	2.006	Free Discharge
031	Outlet	(None)	Pump
	Invert Level (m)	65.971	
	Depth (m)	Outflow (L/s)	
	0.100	5.0	
	0.200	5.0	
	0.300	5.0	
	0.400	5.0	
	0.500	5.0	
	0.600	5.0	
	0.700	5.0	
	0.800	5.0	
	0.900	5.0	
	1.000	5.0	
	1.100	5.0	
	1.200	5.0	
	1.300	5.0	
	1.400	5.0	
	1.500	5.0	
	1.600	5.0	
	1.700	5.0	
	1.800	5.0	
	1.900	5.0	
	2.000	5.0	
	2.100	5.0	
	2.200	5.0	
	2.300	5.0	
	2.400	5.0	
	2.500	5.0	
	2.600	5.0	
	2.700	5.0	
	2.800	5.0	
	2.900	5.0	
	3.000	5.0	
	3.100	5.0	
	3.200	5.0	
	3.300	5.0	
	3.400	5.0	
	3.500	5.0	
	3.600	5.0	
	3.700	5.0	
	3.800	5.0	
	3.900	5.0	
	4.000	5.0	
	4.100	5.0	
	4.200	5.0	
	4.300	5.0	
	4.400	5.0	
	4.500	5.0	
	4.600	5.0	
	4.700	5.0	
	4.800	5.0	
	4.900	5.0	
	5.000	5.0	
	5.100	5.0	
	5.200	5.0	
	5.300	5.0	

Project: Proposed VMU Whaley Road	Date: 24/07/2026			
	Designed by: BT	Checked by: BT	Approved By:	
Report Details: Type: Junctions Storm Phase: SW	Company Address:			

Junction	Outlet Name	Outgoing Connection	Outlet Type
	5.400	5.0	
	5.500	5.0	
	5.600	5.0	
	5.700	5.0	
	5.800	5.0	
	5.900	5.0	
	6.000	5.0	
	6.100	5.0	
	6.200	5.0	
	6.300	5.0	
	6.400	5.0	
	6.500	5.0	
	6.600	5.0	
	6.700	5.0	
	6.800	5.0	
	6.900	5.0	
	7.000	5.0	
	7.100	5.0	
	7.200	5.0	
	7.300	5.0	
	7.400	5.0	
	7.500	5.0	
	7.600	5.0	
	7.700	5.0	
	7.800	5.0	
	7.900	5.0	
	8.000	5.0	
	8.100	5.0	
	8.200	5.0	
	8.300	5.0	
	8.400	5.0	
	8.500	5.0	
	8.600	5.0	
	8.700	5.0	
	8.800	5.0	
	8.900	5.0	
	9.000	5.0	
	9.100	5.0	
	9.200	5.0	
	9.300	5.0	
	9.400	5.0	
	9.500	5.0	
	9.600	5.0	
	9.700	5.0	
	9.800	5.0	
	9.900	5.0	
	10.000	5.0	

Project: Proposed VMU Whaley Road	Date: 24/07/2026		
	Designed by: BT	Checked by: BT	Approved By:
Report Details: Type: Stormwater Controls Storm Phase: SW	Company Address:		





Tank

Type : Tank

Dimensions

Exceedance Level (m)	68.814
Depth (m)	2.814
Base Level (m)	66.000
Freeboard (mm)	0
Initial Depth (m)	0.000
Porosity (%)	95
Average Slope (1:X)	-7.966
Total Volume (m³)	1521.067

Depth (m)	Area (m²)	Volume (m³)
0.000	800.000	0.000
2.000	800.000	1520.000
2.001	0.001	1520.254

Inlets

Inlet

Inlet Type	Point Inflow
Incoming Item(s)	1.001
Bypass Destination	(None)
Capacity Type	No Restriction

Inlet (1)

Inlet Type	Point Inflow
Incoming Item(s)	2.006
Bypass Destination	(None)
Capacity Type	No Restriction

Outlets

Outlet

Outgoing Connection	1.002
Outlet Type	Free Discharge

Advanced

Perimeter	Circular
Length (m)	49.589

Project: Proposed VMU Whaley Road	Date: 24/07/2026		
	Designed by: BT	Checked by: BT	Approved By:
Report Details: Type: Connections Storm Phase: SW	Company Address:		



Name	From	To	Length (m)	Connection Type	Slope (1:X)	Manning's n	Colebrook-White Roughness (mm)	Diameter / Base Width (mm)
2.000	016	017	34.576	Pipe	175.000		0.6	225
2.001	017	018	37.135	Pipe	22.909		0.6	225
2.002	018	019	15.622	Pipe	175.000		0.6	300
2.003	019	020	41.929	Pipe	175.000		0.6	375
2.004	020	021	4.069	Pipe	200.000		0.6	450
2.005	021	INT-01	14.097	Pipe	402.763		0.6	525
2.006	INT-01	Tank	4.739	Pipe	253.976		0.6	525
1.000	024	025	37.434	Pipe	83.187		0.6	225
1.001	025	Tank	48.760	Pipe	30.006		0.6	225
3.000	027	028	31.089	Pipe	26.571		0.6	150
3.001	028	029	24.888	Pipe	175.000		0.6	225
3.002	029	018	23.556	Pipe	175.000		0.6	225
1.002	Tank	031	10.110	Pipe	344.679		0.6	525

Name	Upstream Cover Level (m)	Upstream Invert Level (m)	Downstream Cover Level (m)	Downstream Invert Level (m)	Part Family	Lock	Velocity (m/s)	Culvert Type
2.000	70.420	69.000	70.296	68.802	Clay Pipe SI	All		(None)
2.001	70.296	68.802	69.850	67.181	Clay Pipe SI	All		(None)
2.002	69.850	67.106	69.760	67.017	Concrete Pipe SI	All		(None)
2.003	69.760	66.942	68.929	66.702	Concrete Pipe SI	All		(None)
2.004	68.929	66.630	68.900	66.610	Concrete Pipe SI	All		(None)
2.005	68.900	66.535	68.789	66.500	Concrete Pipe SI	All		(None)
2.006	68.789	66.400	68.814	66.381	Concrete Pipe SI	All		(None)
1.000	70.811	69.850	70.830	69.400	Clay Pipe SI	All		(None)
1.001	70.830	69.400	68.814	67.775	Clay Pipe SI	All		(None)
3.000	70.053	68.703	69.458	67.533	Clay Pipe SI	All		(None)
3.001	69.458	67.458	69.606	67.316	Clay Pipe SI	All		(None)
3.002	69.606	67.316	69.850	67.181	Clay Pipe SI	All		(None)
1.002	68.814	66.000	68.641	65.971		None		(None)

Name	Culvert Entrance	Wall Thickness (mm)	Material	Trench Width (mm)	Bedding Material	Surrounding Material
2.000	(None)	0		0		
2.001	(None)	0		0		
2.002	(None)	0		0		
2.003	(None)	0		0		
2.004	(None)	0		0		
2.005	(None)	0		0		
2.006	(None)	0		0		
1.000	(None)	0		0		
1.001	(None)	0		0		
3.000	(None)	0		0		
3.001	(None)	0		0		
3.002	(None)	0		0		
1.002	(None)	0		0		

Project: Proposed VMU Whaley Road		Date: 24/07/2026			
		Designed by: BT	Checked by: BT		Approved By:
Report Details: Type: Inflow Summary Storm Phase: SW		Company Address:			

Inflow Label	Connected To	Flow (L/s)	Runoff Method	Area (m²)	Percentage Impervious (%)	Urban Creep (%)	Adjusted Percentage Impervious (%)	Area Analysed (m²)
Base Flow	028	3.0						
SW16-01	016		Time of Concentration	778.762	100	0	100	778.762
SW17-01	017		Time of Concentration	122.913	100	0	100	122.913
SW18-01	018		Time of Concentration	1513.067	100	0	100	1513.067
SW19-01	019		Time of Concentration	1945.154	100	0	100	1945.154
SW19-02	019		Time of Concentration	669.934	100	0	100	669.934
SW20-01	020		Time of Concentration	513.686	100	0	100	513.686
SW21-01	021		Time of Concentration	1798.876	100	0	100	1798.876
SW21-02	021		Time of Concentration	2681.747	100	0	100	2681.747
SW24-01	024		Time of Concentration	573.905	100	0	100	573.905
SW25-01	025		Time of Concentration	295.058	100	0	100	295.058
SW25-02	025		Time of Concentration	568.542	100	0	100	568.542
SW27-01	027		Time of Concentration	119.579	100	0	100	119.579
SW28-01	028		Time of Concentration	408.996	100	0	100	408.996
SW29-01	029		Time of Concentration	126.082	100	0	100	126.082
TOTAL		3.0		12116.302				12116.302

Project: Proposed VMU Whaley Road		Date: 24/07/2026			
Report Details: Type: Network Design Criteria Storm Phase: SW		Designed by: BT	Checked by: BT		Approved By:
		Company Address:			

Flow Options

Peak Flow Calculation	(UK) Modified Rational Method
Min. Time of Entry (hrs)	0.083
Max. Travel Time (hrs)	0.50

Pipe Options

Lock Slope Options	None
Design Options	Minimise Excavation
Design Level	Level Soffits
Min. Cover Depth (m)	1.200
Min. Slope (1:X)	500.00
Max. Slope (1:X)	40.00
Min. Velocity (m/s)	1.0
Max. Velocity (m/s)	3.0
Use Flow Restriction	☐
Reduce Channel Depths	☐

Pipe Size Library

Default

Add. Increment (mm)	75
Max. Diameter (mm)	0

Diameter (mm)	Min. Slope (1:X)	Max. Slope (1:X)
100	0.00	0.00
150	0.00	0.00

Project: Proposed VMU Whaley Road	Date: 24/07/2026		
	Designed by: BT	Checked by: BT	Approved By:
Report Details: Type: Network Design Criteria Storm Phase: SW	Company Address:		



Manhole Options

Apply Offset ☐

Manhole Size Library

Default

Diameter / Width

Connection (mm)	Diameter / Length (m)	Width (m)
0	1.200	0.000
375	1.350	0.000
500	1.500	0.000
750	1.800	0.000

Additional Sizing

Connection (mm)	900
Diameter / Length (m)	0.900
Width (m)	0.000

Depth

Depth (m)	Diameter / Length (m)	Width (m)
0.000	1.050	0.000
1.500	1.200	0.000

Access

Depth (m)	Ladder Protrusion (mm)
0.000	130
3.000	230

Benching Requirements

Landing Width (mm)	500
Benching Width (mm)	225

Project: Proposed VMU Whaley Road	Date: 24/07/2026			
	Designed by: BT	Checked by: BT	Approved By:	
Report Title: Rainfall Analysis Criteria	Company Address:			

Runoff Type	Dynamic
Output Interval (mins)	5
Time Step	Default
Urban Creep	Apply Global Value
Urban Creep Global Value (%)	0
Junction Flood Risk Margin (mm)	300
Perform No Discharge Analysis	☐

Rainfall

FEH		Type: FEH
Site Location	GB 432116 408253 SE 32116 08253	
Rainfall Version	2022	
Summer	☒	
Winter	☒	

Return Period

Return Period (years)	Increase Rainfall (%)
2.0	0.000
30.0	0.000
100.0	40.000

Storm Durations

Duration (hrs)	Run Time (hrs)
0.25	0.50
0.50	1.00
1.00	2.00
2.00	4.00
4.00	8.00
6.00	12.00
8.00	16.00
16.00	32.00
24.00	48.00

Project: Proposed VMU Whaley Road	Date: 24/07/2026		
	Designed by: BT	Checked by: BT	Approved By:
Report Details: Type: Junctions Summary Storm Phase: SW	Company Address:		





FEH: 2 years: Increase Rainfall (%): +0: Critical Storm Per Item: Rank By: Max. Depth

Junction	Storm Event	Cover Level (m)	Invert Level (m)	Max. Level (m)	Max. Depth (m)	Max. Inflow (L/s)	Max. Resident Volume (m³)	Max. Flooded Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Status
025	FEH: 2 years: +0 %: 0.25 hrs: Summer	70.83 0	69.40 0	69.482	0.082	27.7	0.093	0.000	25.7	12.226	OK
024	FEH: 2 years: +0 %: 0.25 hrs: Summer	70.81 1	69.85 0	69.916	0.066	11.3	0.075	0.000	10.8	4.889	OK
016	FEH: 2 years: +0 %: 0.25 hrs: Summer	70.42 0	69.00 0	69.101	0.101	15.3	0.178	0.000	14.4	6.628	OK
017	FEH: 2 years: +0 %: 0.25 hrs: Summer	70.29 6	68.80 2	68.860	0.058	16.8	0.103	0.000	16.0	7.666	OK
027	FEH: 2 years: +0 %: 0.25 hrs: Summer	70.05 3	68.70 3	68.729	0.026	2.3	0.029	0.000	2.2	1.014	OK
018	FEH: 2 years: +0 %: 0.25 hrs: Summer	69.85 0	67.10 6	67.303	0.197	60.3	0.348	0.000	55.1	31.016	OK
019	FEH: 2 years: +0 %: 0.25 hrs: Summer	69.76 0	66.94 2	67.187	0.245	106.4	0.432	0.000	100.1	53.020	OK
029	FEH: 2 years: +0 %: 0.25 hrs: Summer	69.60 6	67.31 6	67.413	0.098	15.2	0.110	0.000	14.6	10.639	OK
028	FEH: 2 years: +0 %: 0.25 hrs: Summer	69.45 8	67.45 8	67.550	0.092	13.2	0.105	0.000	12.8	9.809	OK
020	FEH: 2 years: +0 %: 0.25 hrs: Summer	68.92 9	66.63 0	66.925	0.295	110.2	0.521	0.000	104.9	57.282	OK
021	FEH: 2 years: +0 %: 0.25 hrs: Summer	68.90 0	66.53 5	66.887	0.352	192.8	0.622	0.000	187.6	95.213	OK
INT-01	FEH: 2 years: +0 %: 0.25 hrs: Summer	68.78 9	66.40 0	66.737	0.337	187.6	0.595	0.000	185.5	95.104	OK
031	FEH: 2 years: +0 %: 24.00 hrs: Winter	68.64 1	65.97 1	66.509	0.538	5.1	1.369	0.000	5.0	815.712	OK

Project: Proposed VMU Whaley Road	Date: 24/07/2026		
	Designed by: BT	Checked by: BT	Approved By:
Report Details: Type: Junctions Summary Storm Phase: SW	Company Address:		





FEH: 30 years: Increase Rainfall (%): +0: Critical Storm Per Item: Rank By: Max. Depth

Junction	Storm Event	Cover Level (m)	Invert Level (m)	Max. Level (m)	Max. Depth (m)	Max. Inflow (L/s)	Max. Resident Volume (m³)	Max. Flooded Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Status
025	FEH: 30 years: +0 %: 0.25 hrs: Summer	70.830	69.400	69.536	0.136	64.1	0.154	0.000	59.9	28.203	OK
024	FEH: 30 years: +0 %: 0.25 hrs: Summer	70.811	69.850	69.956	0.106	26.0	0.120	0.000	25.0	11.261	OK
016	FEH: 30 years: +0 %: 0.25 hrs: Summer	70.420	69.000	69.168	0.168	35.2	0.297	0.000	33.5	15.283	OK
017	FEH: 30 years: +0 %: 0.25 hrs: Summer	70.296	68.802	68.893	0.091	39.0	0.161	0.000	37.9	17.663	OK
027	FEH: 30 years: +0 %: 0.25 hrs: Summer	70.053	68.703	68.742	0.039	5.4	0.044	0.000	5.3	2.327	OK
018	FEH: 30 years: +0 %: 0.25 hrs: Summer	69.850	67.106	68.024	0.918	122.9	1.621	0.000	103.2	65.505	Surcharged
019	FEH: 30 years: +0 %: 0.25 hrs: Summer	69.760	66.942	67.827	0.885	221.5	1.564	0.000	203.6	116.751	Surcharged
029	FEH: 30 years: +0 %: 0.25 hrs: Summer	69.606	67.316	68.054	0.738	25.9	0.835	0.000	20.2	18.162	Surcharged
028	FEH: 30 years: +0 %: 0.25 hrs: Summer	69.458	67.458	68.123	0.665	26.8	0.752	0.000	20.2	15.798	Surcharged
020	FEH: 30 years: +0 %: 0.25 hrs: Summer	68.929	66.630	67.271	0.641	226.9	1.132	0.000	220.4	126.300	Surcharged
021	FEH: 30 years: +0 %: 0.25 hrs: Summer	68.900	66.535	67.204	0.669	423.1	1.182	0.000	417.5	213.962	Surcharged
INT-01	FEH: 30 years: +0 %: 24.00 hrs: Winter	68.789	66.400	67.007	0.607	26.6	1.073	0.000	26.6	1320.496	Surcharged
031	FEH: 30 years: +0 %: 24.00 hrs: Winter	68.641	65.971	67.007	1.036	5.1	2.637	0.000	5.0	829.067	OK

Project: Proposed VMU Whaley Road	Date: 24/07/2026		
	Designed by: BT	Checked by: BT	Approved By:
Report Details: Type: Junctions Summary Storm Phase: SW	Company Address:		





FEH: 100 years: Increase Rainfall (%): +40: Critical Storm Per Item: Rank By: Max. Depth

Junction	Storm Event	Cover Level (m)	Invert Level (m)	Max. Level (m)	Max. Depth (m)	Max. Inflow (L/s)	Max. Resident Volume (m³)	Max. Flooded Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Status
025	FEH: 100 years: +40 %: 0.25 hrs: Summer	70.830	69.400	69.690	0.290	114.0	0.328	0.000	93.7	50.619	Surcharged
024	FEH: 100 years: +40 %: 0.25 hrs: Summer	70.811	69.850	70.002	0.152	46.1	0.172	0.000	44.6	20.145	OK
016	FEH: 100 years: +40 %: 0.25 hrs: Summer	70.420	69.000	69.912	0.912	62.6	1.612	0.000	39.8	27.315	Surcharged
017	FEH: 100 years: +40 %: 0.25 hrs: Summer	70.296	68.802	69.688	0.886	49.7	1.566	0.000	57.9	31.765	Surcharged
027	FEH: 100 years: +40 %: 0.25 hrs: Summer	70.053	68.703	69.574	0.871	9.6	0.985	0.000	4.6	4.523	Surcharged
018	FEH: 100 years: +40 %: 0.25 hrs: Summer	69.850	67.106	69.578	2.472	164.7	4.367	0.000	180.3	115.587	Flood Risk
019	FEH: 100 years: +40 %: 0.25 hrs: Summer	69.760	66.942	69.285	2.343	349.6	4.140	0.000	330.0	205.853	Surcharged
029	FEH: 100 years: +40 %: 0.25 hrs: Summer	69.606	67.316	69.537	2.221	75.7	2.512	0.000	79.2	33.938	Flood Risk
028	FEH: 100 years: +40 %: 0.25 hrs: Summer	69.458	67.458	69.463	2.005	40.7	6.791	4.529	73.5	27.460	Flood
020	FEH: 100 years: +40 %: 16.00 hrs: Winter	68.929	66.630	68.894	2.264	2147.2	15.514	11.452	1406.9	2303.320	Flood Risk
021	FEH: 100 years: +40 %: 6.00 hrs: Summer	68.900	66.535	68.898	2.363	763.0	8.987	4.808	511.7	1647.073	Flood Risk
INT-01	FEH: 100 years: +40 %: 6.00 hrs: Winter	68.789	66.400	68.789	2.389	810.8	10.129	5.908	118.7	1435.278	Flood
031	FEH: 100 years: +40 %: 24.00 hrs: Summer	68.641	65.971	67.954	1.983	51.4	5.048	0.000	5.0	850.685	OK

Project: Proposed VMU Whaley Road		Date: 24/07/2026			
		Designed by: BT	Checked by: BT		Approved By:
Report Details: Type: Stormwater Controls Summary Storm Phase: SW		Company Address:			



FEH: 2 years: Increase Rainfall (%): +0: Critical Storm Per Item: Rank By: Max. Avg. Depth

Stormwater Control	Storm Event	Max. US Level (m)	Max. DS Level (m)	Max. US Depth (m)	Max. DS Depth (m)	Max. Inflow (L/s)	Max. Residant Volume (m³)	Max. Flooded Volume (m³)	Total Lost Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Percentage Available (%)	Status
Tank	FEH: 2 years: +0 %: 24.00 hrs: Winter	66.509	66.509	0.509	0.509	18.0	386.769	0.000	0.000	5.1	817.155	74.572	OK

Project: Proposed VMU Whaley Road		Date: 24/07/2026			
		Designed by: BT	Checked by: BT		Approved By:
Report Details: Type: Stormwater Controls Summary Storm Phase: SW		Company Address:			



FEH: 30 years: Increase Rainfall (%): +0: Critical Storm Per Item: Rank By: Max. Avg. Depth

Stormwater Control	Storm Event	Max. US Level (m)	Max. DS Level (m)	Max. US Depth (m)	Max. DS Depth (m)	Max. Inflow (L/s)	Max. Residual Volume (m³)	Max. Flooded Volume (m³)	Total Lost Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Percentage Available (%)	Status
Tank	FEH: 30 years: +0 %: 24.00 hrs: Winter	67.007	67.007	1.007	1.007	29.7	765.458	0.000	0.000	5.1	832.321	49.676	OK

Project: Proposed VMU Whaley Road		Date: 24/07/2026			
		Designed by: BT	Checked by: BT		Approved By:
Report Details: Type: Stormwater Controls Summary Storm Phase: SW		Company Address:			



FEH: 100 years: Increase Rainfall (%): +40: Critical Storm Per Item: Rank By: Max. Avg. Depth

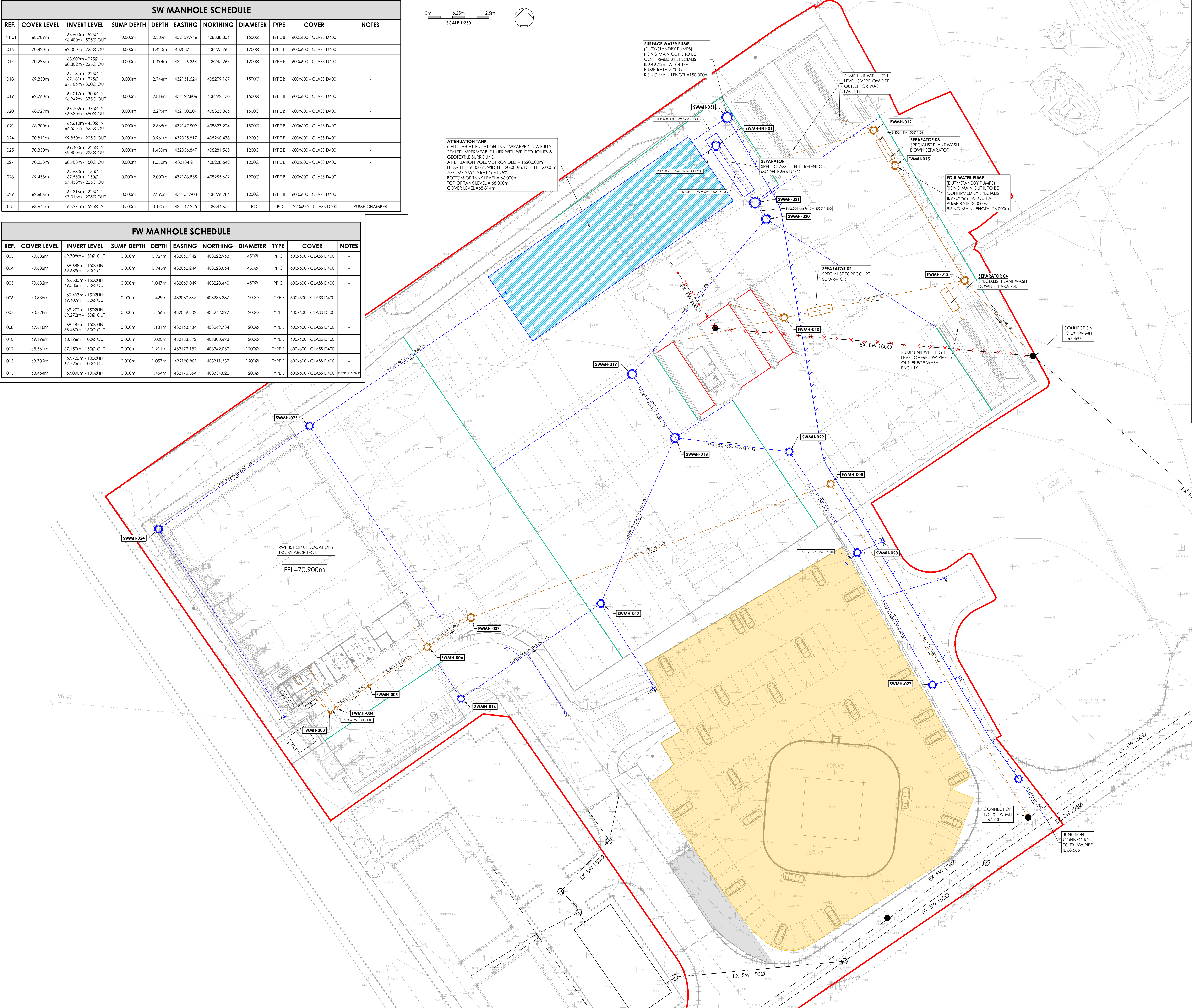
Stormwater Control	Storm Event	Max. US Level (m)	Max. DS Level (m)	Max. US Depth (m)	Max. DS Depth (m)	Max. Inflow (L/s)	Max. Residant Volume (m³)	Max. Flooded Volume (m³)	Total Lost Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Percentage Available (%)	Status
Tank	FEH: 100 years: +40 %: 24.00 hrs: Summer	67.949	67.949	1.949	1.949	1156.0	1481.383	0.000	0.000	51.4	2199.323	2.609	OK



Appendix H Proposed Drainage Layout Drawing

SW MANHOLE SCHEDULE										
REF.	COVER LEVEL	INVERT LEVEL	SUMP DEPTH	DEPTH	EASTING	NORTHING	DIAMETER	TYPE	COVER	NOTES
INT-01	68.789m	66.500m - 5250 IN 66.400m - 5250 OUT	0.000m	2.389m	432139.946	408338.856	1500Ø	TYPE B	600x600 - CLASS D400	-
016	70.420m	69.000m - 2250 OUT	0.000m	1.420m	432087.811	408225.768	1200Ø	TYPE E	600x600 - CLASS D400	-
017	70.296m	68.800m - 2250 IN 68.800m - 2250 OUT	0.000m	1.494m	432116.364	408245.267	1200Ø	TYPE E	600x600 - CLASS D400	-
018	69.850m	67.181m - 2250 IN 67.181m - 2250 IN 67.106m - 300Ø OUT	0.000m	2.744m	432131.524	408279.167	1500Ø	TYPE B	600x600 - CLASS D400	-
019	69.760m	67.017m - 300Ø IN 66.942m - 375Ø OUT	0.000m	2.818m	432122.806	408292.130	1500Ø	TYPE B	600x600 - CLASS D400	-
020	68.929m	66.700m - 2250 IN 66.630m - 450Ø OUT	0.000m	2.299m	432150.207	408323.866	1500Ø	TYPE B	600x600 - CLASS D400	-
021	68.900m	66.610m - 450Ø IN 66.535m - 5250 OUT	0.000m	2.365m	432147.909	408327.224	1800Ø	TYPE B	600x600 - CLASS D400	-
024	70.811m	69.850m - 2250 OUT	0.000m	0.961m	432025.917	408260.478	1200Ø	TYPE E	600x600 - CLASS D400	-
025	70.830m	69.400m - 2250 IN 69.400m - 2250 OUT	0.000m	1.430m	432056.847	408281.545	1200Ø	TYPE E	600x600 - CLASS D400	-
027	70.053m	68.703m - 150Ø OUT	0.000m	1.350m	432184.211	408228.442	1200Ø	TYPE E	600x600 - CLASS D400	-
028	69.458m	67.533m - 150Ø IN 67.533m - 150Ø IN 67.458m - 2250 OUT	0.000m	2.000m	432148.835	408255.662	1200Ø	TYPE B	600x600 - CLASS D400	-
029	69.606m	67.316m - 2250 IN 67.316m - 2250 OUT	0.000m	2.290m	432154.903	408276.286	1200Ø	TYPE B	600x600 - CLASS D400	-
031	68.641m	65.971m - 5250 IN	0.500m	3.170m	432142.245	408344.654	TBC	TBC	1220x675 - CLASS D400	PUMP CHAMBER

FW MANHOLE SCHEDULE										
REF.	COVER LEVEL	INVERT LEVEL	SUMP DEPTH	DEPTH	EASTING	NORTHING	DIAMETER	TYPE	COVER	NOTES
003	70.632m	69.708m - 150Ø OUT	0.000m	0.924m	432060.942	408222.963	450Ø	PPIC	600x600 - CLASS D400	-
004	70.632m	69.688m - 150Ø IN 69.688m - 150Ø OUT	0.000m	0.945m	432062.244	408223.864	450Ø	PPIC	600x600 - CLASS D400	-
005	70.632m	69.585m - 150Ø IN 69.585m - 150Ø OUT	0.000m	1.047m	432069.049	408228.440	450Ø	PPIC	600x600 - CLASS D400	-
006	70.835m	69.407m - 150Ø IN 69.407m - 150Ø OUT	0.000m	1.429m	432080.865	408236.387	1200Ø	TYPE E	600x600 - CLASS D400	-
007	70.728m	69.272m - 150Ø IN 69.272m - 150Ø OUT	0.000m	1.456m	432089.802	408242.397	1200Ø	TYPE E	600x600 - CLASS D400	-
008	69.618m	68.487m - 150Ø IN 68.487m - 150Ø OUT	0.000m	1.131m	432163.434	408269.734	1200Ø	TYPE E	600x600 - CLASS D400	-
010	69.196m	68.196m - 100Ø OUT	0.000m	1.000m	432153.872	408303.693	1200Ø	TYPE E	600x600 - CLASS D400	-
012	68.361m	67.150m - 150Ø OUT	0.000m	1.211m	432172.182	408342.030	1200Ø	TYPE E	600x600 - CLASS D400	-
013	68.782m	67.725m - 100Ø IN 67.725m - 100Ø OUT	0.000m	1.057m	432190.801	408311.337	1200Ø	TYPE E	600x600 - CLASS D400	-
015	68.464m	67.000m - 100Ø IN	0.000m	1.464m	432176.554	408334.822	1200Ø	TYPE E	600x600 - CLASS D400	PUMP CHAMBER



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NOTES

GENERAL NOTES

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2. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL RELEVANT ARCHITECTURAL & CONSULTANT AND JPG CONSULTANTS DRAWINGS.

3. ANY DISCREPANCIES SHOULD BE REPORTED TO THE ENGINEER IMMEDIATELY SO THAT CLARIFICATION CAN BE SOUGHT PRIOR TO COMMENCEMENT OF WORKS.

LEGEND

PROPOSED SURFACE WATER PIPE

PROPOSED SURFACE WATER MANHOLE

PROPOSED FOUL WATER PIPE

PROPOSED FOUL WATER MANHOLE

EXISTING SURFACE WATER PIPE

EXISTING SURFACE WATER MANHOLE

EXISTING FOUL WATER PIPE

EXISTING FOUL WATER MANHOLE

PROPOSED DRAINAGE CHANNEL

PROPOSED KERB DRAIN

PROPOSED FOUL WATER CHANNEL

PROPOSED ROAD GULLY

PROPOSED RAINWATER PIPE

PROPOSED SYNPHONIC RAINWATER PIPE

PROPOSED WASTE POINT CONNECTION

PROPOSED PHASE 2 AREA, 30% ALLOWANCE TO BE MADE IN PHASE 1 DRAINAGE LAYOUT

RG

RWP

SWP

WPC

1. ALL BUILDING DRAINAGE WORKS SHALL BE CARRIED OUT IN ACCORDANCE WITH BS EN 752 DRAINAGE AND SEWER SYSTEMS OUTSIDE BUILDINGS, THE CURRENT BUILDING REGULATIONS, CODES FOR ADOPTION AND THE LOCAL AUTHORITY BUILDING CONTROL SPECIFICATIONS AND REQUIREMENTS.

2. ANY DRAINAGE TO BE PUT FORWARD FOR ADOPTION EITHER WITHIN THE SITE OR OUTSIDE SHALL BE CONSTRUCTED TO THE DESIGN AND SEWER GUIDANCE "CODES" FOR ADOPTION LATEST EDITION AND ANY SPECIFIC REQUIREMENTS OF THE ADOPTING SEWERAGE WATER AUTHORITY.

3. THE LOCATION, SIZE AND DEPTH OF ALL EXISTING DRAINAGE WORKS SHALL BE ESTABLISHED BY THE CONTRACTOR PRIOR TO THE COMMENCEMENT OF WORKS ON SITE. ANY DISCREPANCIES FROM THE INFORMATION INDICATED ON THESE DRAWINGS SHALL IMMEDIATELY BE BROUGHT TO THE ATTENTION OF THE ENGINEER.

4. THE CONTRACTOR SHALL IMMEDIATELY NOTIFY THE ENGINEER SHOULD ANY EXISTING LIVE DRAINAGE BE FOUND WITHIN THE SITE BOUNDARY SERVING ADJACENT PROPERTIES.

5. ALL EXISTING DRAINAGE WITHIN THE SITE NOT REQUIRED FOR THE NEW DEVELOPMENT SHALL BE ABANDONED. DRAINS AND SEWERS LESS THAN 1.500m DEEP WHICH ARE IN OPEN GROUND SHOULD AS FAR AS IS PRACTICABLE BE FULLY REMOVED. ALL OTHER PIPES SHOULD BE SEALED AT BOTH ENDS AND AT ANY POINT OF CONNECTION, AND BE GROUT FULLED TO ENSURE THAT RATS CANNOT GAIN ACCESS. LARGER PIPES 2250 OR ABOVE SHOULD BE GROUT FULLED TO PREVENT SUBSIDENCE OR DAMAGE TO BUILDINGS OR SERVICES IN THE EVENT OF COLLAPSE.

6. THE CONTRACTOR SHALL ALLOW FOR THE PROTECTION, TEMPORARY AND PERMANENT SUPPORT AND OVERSEEN WORKS AS NECESSARY TO ALL EXISTING SERVICES TO THE SATISFACTION OF THE ENGINEER.

7. THE CONTRACTOR SHALL ALLOW FOR DEALING WITH SURFACE WATER RUN OFF INTO EXCAVATIONS AND FROM COINCIDENTAL RAINFALL. PUMPING AND DE WATERING AS APPROPRIATE IN ORDER TO KEEP THE EXCAVATION AS REASONABLY DRY AS POSSIBLE DURING THE CONSTRUCTION OF THE WORKS.

8. THE CONTRACTOR SHALL TAKE ALL NECESSARY SAFETY PRECAUTIONS IN THE CURRENT LOCATION WHEN WORKING IN NEAR CONFINED SPACES, DEEP EXCAVATIONS AND MACHINERY.

9. THE CONTRACTOR SHALL ALLOW FOR OBTAINING ALL APPROVALS FROM THE RELEVANT AUTHORITIES WHEN WORKING IN THE PUBLIC HIGHWAY AND ON THE SEWERAGE SYSTEM.

10. THE CONTRACTOR SHALL SUITABLY PROTECT PEDESTRIANS AND VEHICLES FROM WORKING AREAS.

11. ALL MANHOLE/CHAMBER COVER LEVELS ARE APPROXIMATE AND SHALL BE ADJUSTED ON SITE TO SUIT THE PROPOSED FINISHED LEVELS.

12. ALL PIPES SHALL BE LAD WITH LEVEL SLOTTES AND ALL MANHOLE/INSPECTION CHAMBER INVERT LEVELS SHOWN ARE FOR THE OUT GOING PIPE UNDO. ON THE DRAWING NOTE THAT ALL PIPE GRADIENTS INDICATED ON THE DRAWINGS ARE APPROXIMATE ONLY.

13. ALL PIPE CONNECTION FROM DRAINAGE CHANNELS AND GULLIES SHALL BE 1500 PIPS AT A MINIMUM GRADIENT OF 1:100 WITH CLASS 2 BEDDING UNDO. ON THE DRAWING.

14. ALL PIPE CONNECTIONS FROM RWPS TO BE 1000 AT 1:60 MIN. AND ALL PIPE CONNECTIONS FROM RWPS TO FIRST CHAMBER SHALL BE 1000 AT 1:60 MIN. WITH CLASS 3 BEDDING BENEATH THE BUILDING AND CLASS 2 UNDER EXTERIORS WHERE COVER IS LESS THAN 1.200m UNDO. ON THE DRAWING. LOCATION OF RWPS AND WPCS TO BE CONFIRMED BY THE ARCHITECT AND ARE SHOWN INDICATIVELY ONLY.

15. ALL SYNPHONIC RWP SYSTEMS TO BE DESIGNED BY OTHERS. PIPING FROM DOWN PIPE TO FIRST MANHOLE TO BE SIZED DESIGNED BY SYNPHONIC SYSTEM DESIGNER. THE FIRST MANHOLE TO HAVE AN OPEN GRATE COVER SAINT GORAN WATERWAY 2000 - 10400 OR SIMILAR APPROVED.

16. SUITABLY SIZED PETROL INTERCEPTORS MUST COMPLY WITH THE REQUIREMENTS OUTLINE IN PP03 THESE INCLUDE 3x1 STORAGE CAPACITY AND HIGH LEVEL HYDROCARBON ALARM, WIRED BACK TO A MANNED OFFICE.

17. UPON COMPLETION OF THE DRAINAGE WORKS THE CONTRACTOR SHALL CLEAN ALL DRAIN PIPES BY JETTING AND REMOVE ALL DEBRIS FROM SITE. NO DEBRIS SHALL BE PERMITTED TO ENTER THE PUBLIC SEWER AND/OR WATERCOURSE SYSTEM. ONCE THE DRAINAGE SYSTEM HAS BEEN FULLY CLEANED OUT A CCTV CAMERA CONDITION SURVEY SHALL BE UNDERTAKEN TO ALL CONSTRUCTED DRAINAGE AND SEWER PIPES WITH THE FOOTAGE ISSUED TO THE ENGINEER FOR VIEW. THE AS BUILT INVERT AND COVER LEVELS SHALL BE RECORDED BY THE CONTRACTOR AND PASSED ON TO THE ENGINEER FOR REVIEW.

P02	REVISED FOR LATEST SITE PLAN	31.07.26	01	01
P01	INITIAL ISSUE	24.07.26	01	01
REV	DESCRIPTION	DATE	CHK	BY

Project
PROPOSED VMU, WHALEY ROAD
BARNSELY

Drawing Title
DRAINAGE LAYOUT

INFORMATION

6709-JPG-IZ-ZZ-DR-D-1400 S2 P02



Appendix I Greenfield Run-Off Volume Calculations



UK and Ireland Rural Runoff Calculator

ICP SUDS / IH 124	ADAS 345	FEH	ReFH2	Greenfield Volume
-------------------	----------	-----	-------	-------------------

Calculation Method: FSR

Region: England And Wales

M5-60 (mm): 19.0

Ratio R: 0.372

Area (m²): 18038.00

SAAR (mm): 666.0

CWI: 98.880

Urban: 1990

Areal Reduction Factor: 1.00

SPR: 47.000

Storm Details

Storm Duration (hrs): 6.00

Return Period (years): 100

Calculate

Results

PR%: 44.33

Greenfield Runoff Volume (m³): 492.056

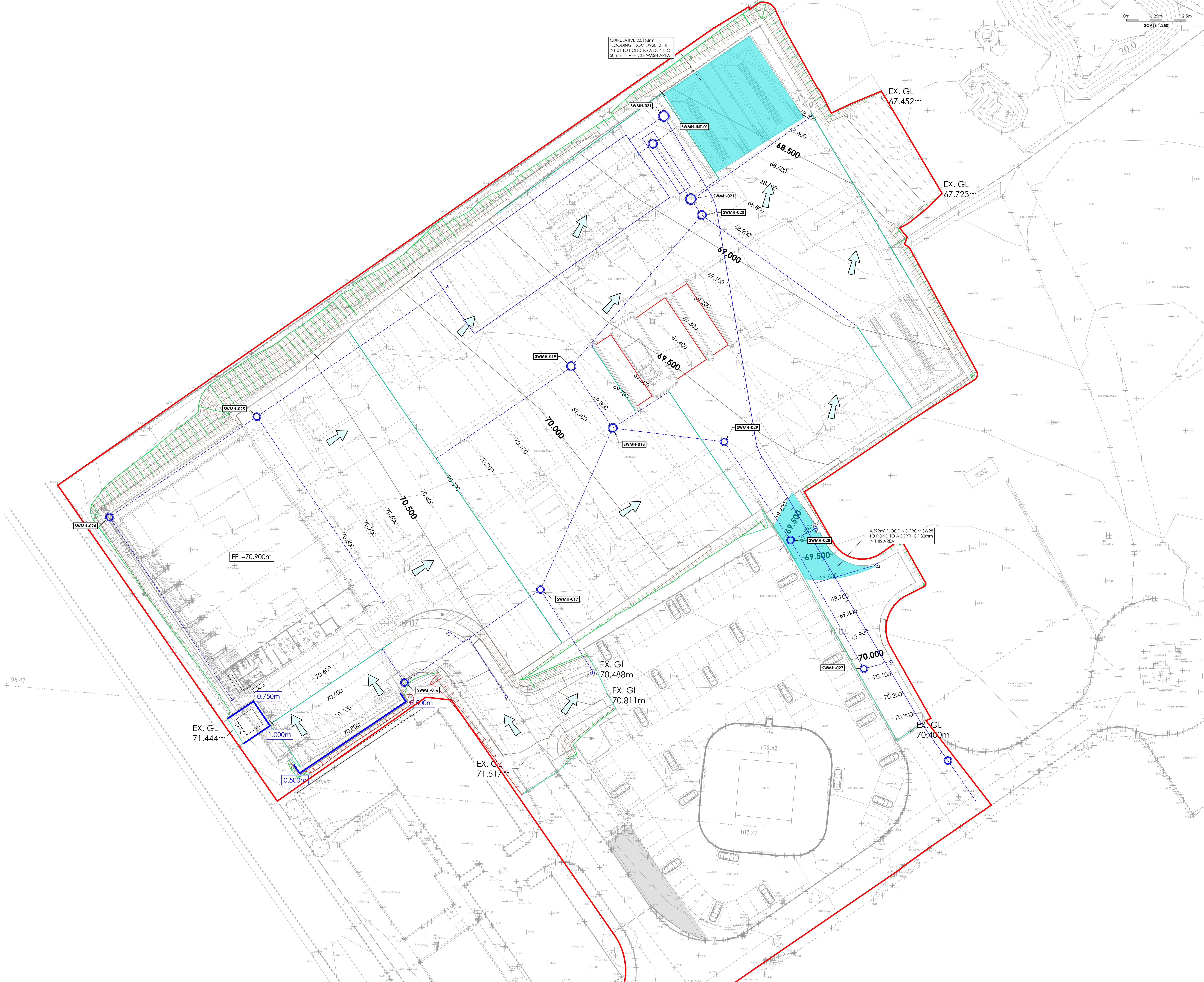
OK Cancel

0.000 <= CWI <= 99999999.999

Help



Appendix J Drainage Exceedance Plan



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NOTES

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- ANY DISCREPANCIES SHOULD BE REPORTED TO THE ENGINEER IMMEDIATELY SO THAT CLARIFICATION CAN BE SOUGHT PRIOR TO COMMENCEMENT OF WORKS.

LEGEND

- 0.500 DENOTES PROPOSED MAJOR CONTOURS
- 0.100 DENOTES PROPOSED MINOR CONTOURS
- X 0.000m DENOTES PROPOSED LEVELS
- EX. GL 0.000m DENOTES EXISTING LEVELS
- 1:40 DENOTES PROPOSED GRADIENTS
- EXCEEDANCE FLOW PATHS
- PROPOSED AREA OF PONDING

P02	REVISED TO SUIT RECENT SITE LAYOUT	31.07.26	BT	EY
P01	INITIAL ISSUE	24.07.26	BT	BT
REV	DESCRIPTION	DATE	CHK	BY

Project
PROPOSED VMU, WHALEY ROAD
BARNSELEY

Drawing Title
DRAINAGE EXCEEDANCE PLAN

INFORMATION

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Appendix K Infiltration Testing

10.7 Drainage

Further settlements in the made ground deposits are possible and therefore measures should be incorporated into the design of the drainage to deal with this possibility.

All pipes should be flexible with flexible and watertight joints. In order to make allowance for future settlement, the design gradients should be steeper than the minimum allowed for the flow rate and pipe size.

In addition to the above, it is recommended that trenches are over-excavated to a depth of 600mm and backfilled with compacted granular material prior to pipe laying."

10.8 Soakaways

Soakaways were undertaken on this site in accordance with BRE365; however, the 2 No. tests failed on the initial run of three. It is not considered appropriate for soakaways to be adopted for the discharge to ground of surface water.

It should be noted that no slope stability assessment has been carried out on the cutting which forms the north-eastern boundary of the site. The cutting is circa 5m to 8m in height, with a railway at the base. It is considered prudent to divert where possible surface water from entering the slope. Gradients for hardstanding should shed surface water away from the slope where possible.

10.9 Road Design

Based on the types of near surface material encountered, it is recommended for preliminary design purposes a CBR value = 2% is adopted. Based on the types of near surface material encountered during the investigation, the likely subgrade material will comprise made ground. A CBR value of 1-2% is therefore recommended for preliminary design purposes.

Consideration should also be given to the use of geotextiles to allow reduction of capping thickness. The advice of a suitable contractor should be sought as to the most appropriate type of geotextile to use in the ground conditions encountered at this site.

It should be noted that the type of construction will depend on proposed finished pavement levels across the site and it is recommended the pavement design is reviewed once these levels are known. In this context, it is essential that further in situ CBR testing is carried out once formation levels are known to confirm design CBR values and reference should be made to the 'Design Guidance for Road Pavement Foundations', Interim Advice Note 73/06, Revision 1 (2009), when considering the CBR value appropriate for use.

Carried out by:	Date:	Method:			Trial pit dimensions:	Before:	After:	Location:	Grid: OSGB
HW	09/11/21	BRE Digest DG 365: 2016 & BS6297:2007+A1:2008			Length (m):	1.30	1.30	mE:	432157.00
Chkd by:	Test no:	Granular infill:	Datum height (m agl):	Depth to water: Start: End:		Width (m):	0.60	0.60	mN:
JT	1	No	0.00	1.19	1.70	Depth (m):	2.50	2.50	m OD:
									-

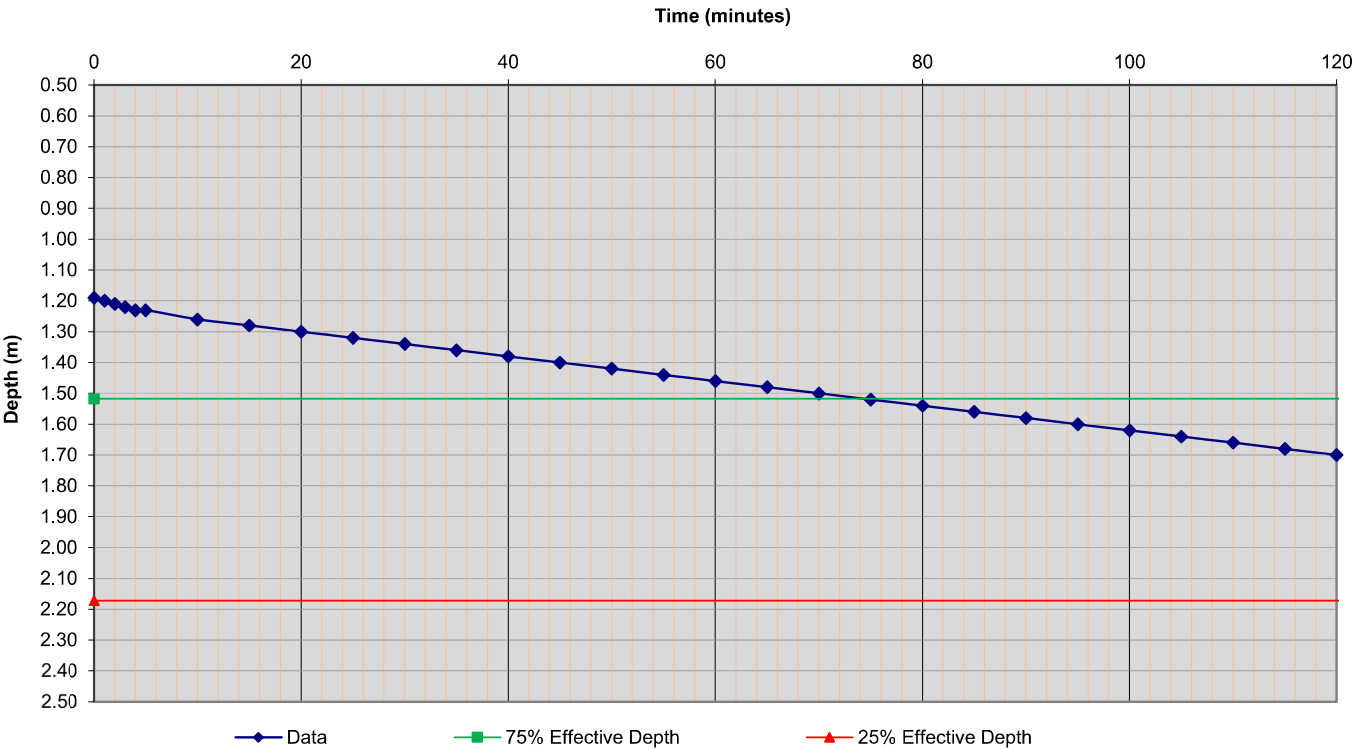
Elapsed time (mins):	Water depth (m below datum):	Elapsed time (mins):	Water depth (m below datum):
0	1.19	95	1.60
1	1.20	100	1.62
2	1.21	105	1.64
3	1.22	110	1.66
4	1.23	115	1.68
5	1.23	120	1.70
10	1.26		
15	1.28		
20	1.30		
25	1.32		
30	1.34		
35	1.36		
40	1.38		
45	1.40		
50	1.42		
55	1.44		
60	1.46		
65	1.48		
70	1.50		
75	1.52		
80	1.54		
85	1.56		
90	1.58		

Effective depth (m):		Elapsed time (mins) (from graph):	
75%	1.52	75%	35.00
50%	1.85	50%	100.00
25%	2.17	25%	190.00

Base area of pit	0.78	m ²
Mean surface area through which outflow occurs	3.27	m ²
Volume outflow between 75 and 25% effective depth	0.51	m ³

Soil infiltration rate, f	1.68E-05	m ³ /m ² /s
Soil infiltration rate, f	6.05E-02	m/hr
Percolation Value, vp	1.42E+01	s/mm

Notes: Coordinates are approximate
Located at TP04



BYRNE LOOBY

Elapsed time (mins):	Water depth (m below datum):	Elapsed time (mins):	Water depth (m below datum):
0	1.46	95	1.47
1	1.47	100	1.47
2	1.47	105	1.47
3	1.47	110	1.47
4	1.47	115	1.47
5	1.47	120	1.47
10	1.47		
15	1.47		
20	1.47		
25	1.47		
30	1.47		
35	1.47		
40	1.47		
45	1.47		
50	1.47		
55	1.47		
60	1.47		
65	1.47		
70	1.47		
75	1.47		
80	1.47		
85	1.47		
90	1.47		

Soil infiltration rate, f	4.01E-05	m ³ /m ² /s
Soil infiltration rate, f	1.45E-01	m/hr
Percolation Value, vp	7.27E+00	s/mm

Coordinates are approximate
Located at TP05



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