Flood Consequence Assessment & Drainage Strategy Report – Rev.B

August 2025

1 INTRODUCTION

1.1 This document has been prepared on behalf of Bluefield Land in support of a planning application for a proposed residential development at the site of the former Swelco Factory off Heol y Gors, Cwmgors, Neath Port Talbot SA18 1RR.

1.2 This document provides a flood consequence assessment and summary of the proposed drainage strategy associated with the proposed development.

2 EXISTING SITE

2.1 The location of the site and surrounding area is shown in Figure 2.1 below.

2.2 The application site is currently Brownfield, being the site of the former Swelco Factory, and has an approximate area of 1.78 hectares (ha). The site currently comprises circa 0.69 hectares of impermeable surfaces, including roofs, access road and hardstanding areas.

2.3 The site is located to the western edge of Cwmgors, approximately 6km northwest of Pontardawe at a National Grid Reference of 270329,210613.

The site is irregular in shape. The boundaries of the site are defined by the dismantled railway line and undeveloped land to the west, the continuation of the dismantled railway and residential development to the north, residential development – Heol-y-Gors and undeveloped land to the east and undeveloped land to the south.

The site is situated on a relatively level development plateau created as part of the factory construction at levels between 161m AOD and 165m AOD. An embankment forms the eastern boundary of the site with levels raising up to approximately 168m AOD.

Access to the site is from Heol-y-Gors via the northeast corner of the site. The access road crosses the site towards the main former works building which is located approximately within the centre of the site. There are areas of hardstanding around the building and the remaining floor slab of a former building which has been demolished top the south of the main building.

The area of the site to the north and south of the existing factory building and hardstandings is heavily vegetated and the who site densely wooded and/or vegetated around the boundaries.

A culvert is located crossing the site to the north of the existing factory building.

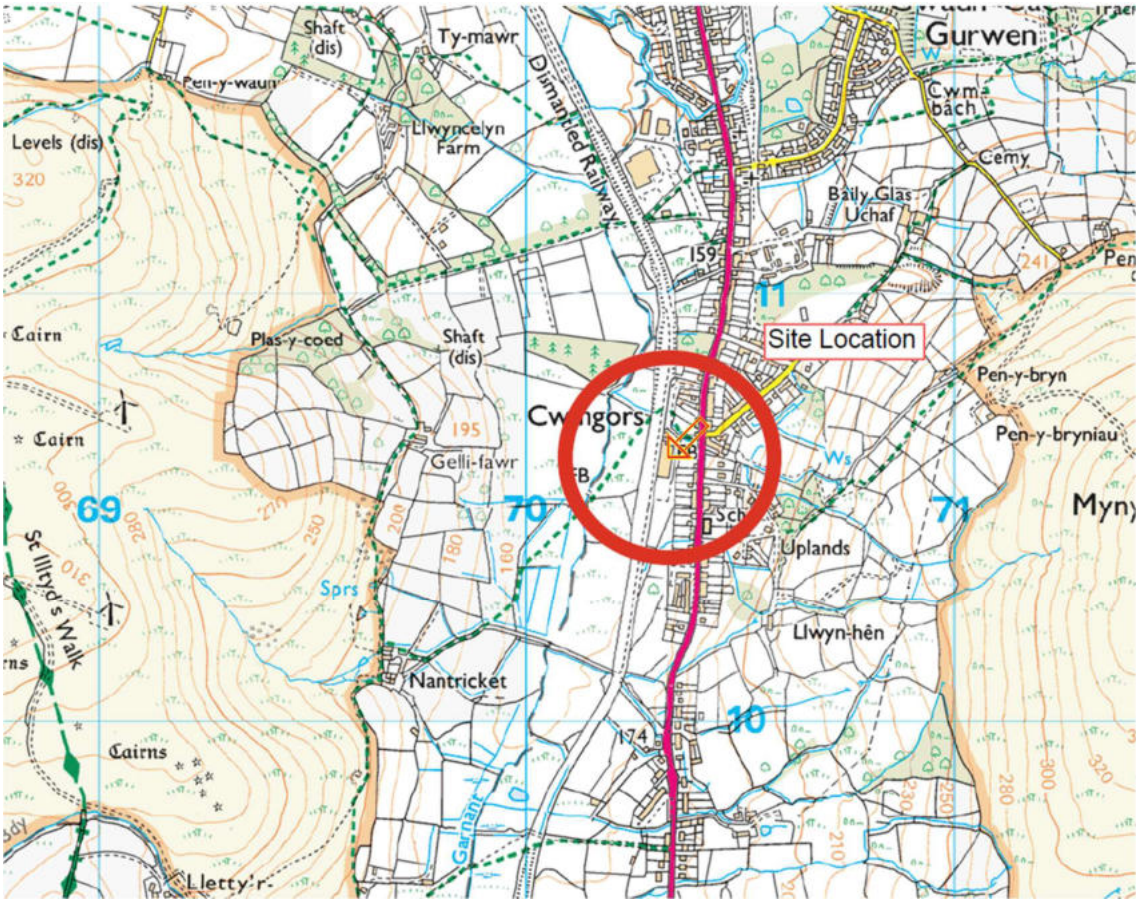


Figure 2.1 – Site Location

Existing Surface Water Drainage

2.4 The site is crossed by a minor watercourse which is culverted across its whole length where it traverses the application site to the north of the existing factory building. There is another minor watercourse located approximately 5m outside the southern site boundary and an existing 225 dia outfall pipe discharges surface water onto the existing embankment just within the eastern site boundary, south of the existing factory building.

2.5 The existing factory building and associated hardstanding areas are served by an existing surface water drainage system which outfalls to an existing headwall approximately 16m outside the western site boundary. This headwall is also the outfall for the culverted watercourse noted in 2.4 above. The route of the existing surface water system is indicated at **Appendix A** – Existing & Proposed Impermeable Area Plan. A CCTV survey of the existing 225 dia outfall pipe was undertaken by Draintech Surveys Ltd in January 2024. A copy of the survey report and plan can be found at **Appendix B**.

The existing site access road does not appear to be positively drained but, rather, drains to adjacent soft/vegetated areas.

Existing Ground Conditions

2.6 Soil infiltration testing was undertaken by Integral Geotechnique in September 2024. The tests were undertaken within 5no. trial pits across the site. The results of the soil infiltration tests are provided at **Appendix C**.

The soil infiltration tests undertaken within all trial pits were terminated due to negligible infiltration rates.

Note that the results are specific to the locations and depths of the tests undertaken. However, due to the cohesive and impermeable nature of the superficial soils, the use of sustainable drainage systems may not be deemed suitable at this site.

Brownfield & Greenfield Runoff

2.7 As noted in Section 2.5 above, it has been evidenced that the existing factory building, and associated hardstand areas are currently served by a surface water drainage system that discharges to an existing headwall to the west of the application site. The existing surface water network has been modelled using Causeway Flow hydraulic modelling software, and the results for the existing brownfield runoff rates for various storm events are summarised below. Note that these brownfield discharge rates do not allow for additional greenfield runoff from the remaining vegetated site.

Table 2.1 – Pre-development Brownfield Runoff Rates

Return Period	Runoff Rate (l/s/ha)	Volume (m^3 / ha)
Qbar	54.1	
Q1 Years	47.6	
Q30 Years	67.2	
Q100 Years	69.5	301

2.8 However, in response to the SAB pre-application made to Neath Port Talbot SAB, the SAB suggested that '*given the majority of the site (at least 66%) appears to be undeveloped land, the use of the greenfield rate is more appropriate for this development*'.

Accordingly, greenfield run off rates (per hectare) have been calculated using HR Wallingford's 'Greenfield Runoff Rate Estimation Tool' – see **Appendix D**. The resulting rates are summarised in Table 2.2 below.

Note that a WRAP soil type value of 5 has been used to calculate the greenfield runoff rate. This is based on the results of on-site infiltration testing, and the fact that a conservative and robust strategy is being employed by using the greenfield rate in lieu of the actual brownfield discharge rates.

Table 2.2 – Greenfield Runoff Rates

Return Period	Runoff Rate (l/s/ha)
Qbar	17.9
Q1 Year	15.7
Q30 Years	31.8
Q100 Years	39.0

3 FLOOD RISK

3.1 Natural Resources Wales' Flood Map for Planning in **Appendix E** identifies that the application site has no risk of flooding from rivers and sea – Tan 15 Flood Zones for the River Garnant being outside the application site area.

However, the Flood Map does identify areas of the application site as being at medium and high risk from Surface Water and Small Watercourses flooding i.e. Surface Water and Small Watercourses: Flood Zones 2 & 3.

3.2 An exercise has therefore been undertaken, overlaying the NRW Flood Map information over the existing site topographical survey to assess likely causes of the existing surface water flooding - see drawing 2625-750 Rev.A at **Appendix E**. The overlay identifies that the areas of flooding are generally contained within low-lying areas of the plateaued site, with higher risks of flooding largely occurring in the hardstanding areas surrounding the existing factory building. Detailed analysis of the site topographical survey has been used to identify the low-lying areas within the existing development, with areas, volumes and depths of flooding identified and noted on the drawing as Flood Nodes 1 to 12.

3.3 Whilst it should be noted that the proposed residential development is located within the highly vulnerable development category (Surface Water & Small Watercourses: Flood Zones 2 & 3), analysis of the potential flood areas identified as Flood Nodes 1 to 11 on drawing 2625-750 Rev.A evidences that potential flood depths and volumes are generally very low: A maximum flood depth of 210mm is identified at Flood Node 11, with a <u>total</u> potential flood volume of just 57.2m3 identified for Flood Nodes 1 to 11 inclusive. Furthermore, Flood Nodes 9, 10 & 11 are in areas of hardstanding where positive drainage exists to convey surface water runoff to the downstream watercourse. Whilst potential for more significant flooding is identified at Flood Node 12, it should be noted that this Flood Node is outside the proposed residential development footprint. See clause 3.5 for further information on Flood Node 12.

3.4 The development proposals aim to provide a general fall across the proposed ground surface from east to west across the development, thereby providing an unhindered route for overland flow from the east to the undeveloped land and River Garnant to the west and removing the risk of surface water flooding within the proposed development. Land drainage

will also be employed at the base of the existing embankment along the eastern site boundary to convey any overland flows to existing watercourses, and away from proposed properties.

3.5 There is an area of existing high surface water flood risk (Surface Water and Small Watercourses: Flood Zone 3) adjacent the site access road, and within the rear gardens of nos. 149 to 153 Heol-y-Gors (Flood Node 12). It is considered that this area of potential flooding exists due to the area in question being a low-lying area bounded to the north and west by the existing access road which is elevated above the gardens. Run off from the existing access road currently contributes to the surface water flooding at this location. The construction of the new, adoptable access road would alleviate some of this flooding, as runoff from the new highway would be conveyed downstream via a new adoptable highway drainage system. It is therefore deemed that proposed development would not exacerbate flooding at this location.

3.6 The Flood Map for Planning (see **Appendix E**) shows no recorded flood events within the vicinity of the proposed development.

3.7 Flood exceedance overland flow routes for the proposed development have been assessed and are provided on drawings 2625-748-1 and 2625-748-2 at **Appendix E**.

3.8 Flood emergency plans have been assessed and, whilst significant flooding depths within the proposed development is unlikely due to proposed levels being designed to convey any overland flows towards the lower lying land and River Garnant to the west, a safe evacuation/escape route to higher ground at Heol y Gors can be achieved along the proposed highway/footway – as evidenced by the evacuation routes shown on drawings 2625-748-1 and 748-2 at **Appendix E**.

3.9 Proposed surface water flows will be managed on site with discharge rates restricted to the pre-development Qbar greenfield runoff rate. Therefore, the development should pose no risk of flooding to adjacent land and properties.

3.10 It should be noted that whilst the Surface Water Design Report for the proposed development included in Appendix G highlights some flooding at nodes ic11, ic 12, ic13 and ic14 during the 100 year +40% CC critical storm, site levels have been designed such that any flooding from the proposed network would be conveyed via overland flows to the linear drainage basin, where sufficient capacity exists. Furthermore, it should be noted that no allowance for storage within the permeable paved driveway sub-base has been allowed for in the calculations. The additional storage volume within the permeable paving sub-base is more than 100m^3. Therefore, the design should be viewed as being conservative and robust.

4 DEVELOPMENT PROPOSALS

4.1 The planning application is for the re-development of the former Swelco factory site to provide a new residential development of circa 45 no. affordable housing units and associated access roads, parking, green spaces and Sustainable Urban Drainage (SuDS) areas. Site access will be maintained via the existing site access point off Heol-y-Gors.

4.2 The proposed Site layout and Drainage Strategy is shown on the proposed Engineering layout drawing included at **Appendix F**.

4.3 Based on the proposed site layout, the post-development impermeable area for the development, including proposed roof, yard and highway areas would be approximately 0.781ha. See **Appendix A** – *Existing & Proposed Impermeable Area Plan*.

5 SURFACE WATER DRAINAGE

5.1 The proposed drainage strategy is included on the proposed Engineering layout drawings at **Appendix F**.

5.2 As set out in Section 2.6, soil infiltration testing has been undertaken at various location on site with negligible infiltration recorded with all trial pits. Therefore, the use of infiltrating sustainable drainage systems may not be deemed suitable at this site due to the cohesive and impermeable nature of the superficial soils.

5.3 In accordance with the drainage hierarchy, it is therefore proposed to discharge surface water runoff from the site to the existing storm water outfall headworks, located to the west of the application site, via a new chamber to be located on the existing culverted length of watercourse. Note that a CCTV survey of the existing culvert length was undertaken by Draintech on 16th May 2025 which shows the existing culvert to be in sound condition, albeit with a requirement for debris to be removed. A copy of the culvert CCTV report and plan reference 20373 can be found at **Appendix B**.

5.4 In accordance with relevant guidance and SAB requirements, it is proposed to discharge surface water runoff from the site at a similar rate to a pre-development Greenfield scenario.

5.5 The post-development rates and volume from the proposed development are summarised in Table 5.1 below, whilst further details are set out on the calculations included at **Appendix G**.

Table 5.1 – Post Development Discharge Rates & Volume

Return Period	Discharge Rate (l/s)	Volume (m^3)
Q1 Years	24.9	
Q30 Years	24.9	
Q100 Years	25.0	498.7
Q100 +40% Years	25.0	

5.6 Table 5.2 below demonstrates that the proposed surface water strategy will generally provide significant betterment in comparison to the Greenfield scenario in terms of discharge rates from the site.

Table 5.2 – Comparison of Pre and Post Development Discharge Rates & Volume

Return Period	Greenfield Rate (1.3966ha catchment)	Post-Development Discharge Rate	Pre & Post development comparison
Q1 Years	21.9 l/s	24.9 l/s	**+3.0 l/s**
Q30 Years	44.4 l/s	24.9 l/s	**-19.5 l/s**
Q100 Years	54.5 l/s	25.0 l/s	**-29.5 l/s**
Q**bar**	**25.0 l/s**		

5.7 All surface water runoff is to be attenuated within a SuDS detention basin, linear SuDS basins and open graded sub-base located beneath permeable parking areas. Note that the detention basins storage volumes have been designed based upon the assumption that infiltration to ground is not feasible. However, the basins *could* remain un-lined to provide a 'leaky' system, thereby taking advantage of any infiltration that may occur. The attenuation detention basin locations and volumes are indicated on the Engineering Layout plans in **Appendix F**.

Water Quality

5.8 As part of the surface water strategy for the development, it is proposed to utilise various SuDS methods including permeable paving, rain gardens/SuDS pods, linear basins and a detention basin to provide sufficient water treatment.

5.9 As shown in Table 5.3 below, guidance set out in SuDS Manual Chapter 26: *Water Quality*, indicates the pollution hazard level for the proposed development is considered to be 'low' to 'Very Low'.

Table 5.3 – Pollution hazard indices for Residential land use

Land Use	Pollution Hazard Level	Total Suspended Solids (TSS)	Metals	Hydrocarbons
Residential roofs	Very Low	0.2	0.2	0.05
Driveways, low traffic roads	Low	0.5	0.4	0.4

5.10 As shown in Table 5.4 below, the SuDS mitigation indicates suggest the proposed use of an online detention basin will ensure the surface water runoff is sufficient treated prior to being discharged to the relevant outfalls.

Table 5.4 – SuDS mitigation indices for discharge to surface waters

	Mitigation Indices		
Type of SuDS component	**TSS**	**Metals**	**Hydrocarbons**
Porous Pavement	0.7	0.6	0.7
Swale	0.5	0.6	0.6
Detention Basin	0.5	0.5	0.6

5.11 It is therefore considered the proposed development will not have an adverse impact on the receiving watercourse.

Maintenance

5.12 A suggested maintenance regime will be provided at detailed design stage. However, it is assumed that the detention basin and linear basins would be conveyed to the SAB, whilst responsibility for maintenance of the remaining '*domestic*' SuDS features would remain with the Housing Authority in perpetuity.

5.13 Full details of the proposed surface water proposals for the development will be submitted to Neath Port Talbot SAB for formal SAB approval.

6 FOUL DRAINAGE

6.1 The proposed foul drainage strategy is shown on the Engineering Layout drawings included at **Appendix F**.

6.2 DCWW's Public Sewer Map provided in **Appendix H** . The sewer maps indicate a 225 dia foul water sewer to the rear of the properties an Heol y Gors, which crosses the proposed development site at the site access. Another 225 dia foul water sewer is located in Heol y Gors itself. DCWW have been consulted regarding the proposed development, and have confirmed that capacity exists within the existing sewer network to accept foul water flows from the new development. A copy of the correspondence is also included in **Appendix H**.

6.3 Due to the topography of the site, a foul pumping station and rising main sewer are required to discharge foul flows from the site.

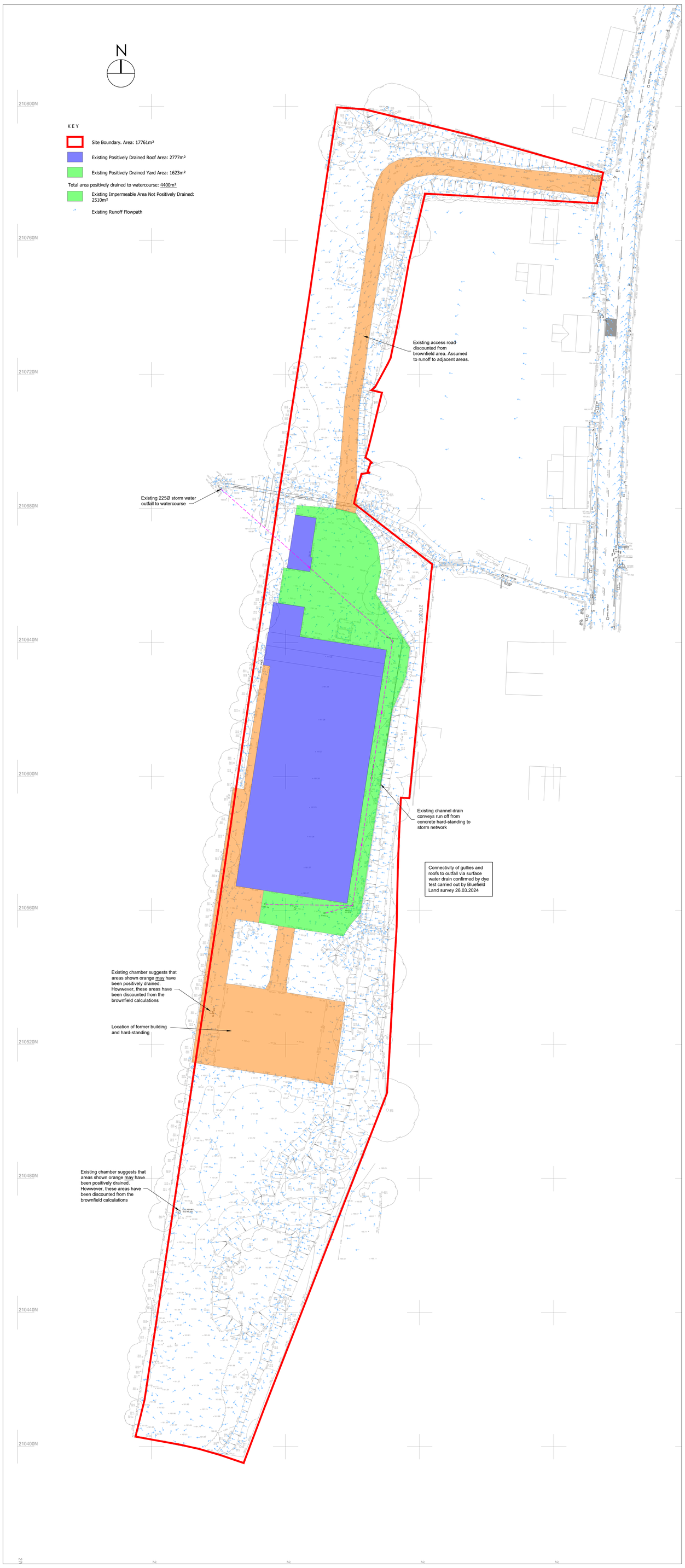
6.4 The new foul water sewer network, including pumping station and rising main will be adopted by DCWW under a Section 104 Agreement.

7 CONCLUSION

7.1 It is concluded that a suitable surface water and foul drainage strategy can be achieved with no adverse impact on the receiving watercourse or Combined sewer network.

Appendix A

Existing & Proposed Impermeable Areas



Existing Impermeable Area Plan
Scale 1:500

EXISTING BROWNFIELD SURFACE WATER DISCHARGE RATES

Pre-development Brownfield Catchment Area* = 0.44ha
*based on existing impermeable area positively drained to outfall only
i.e. remaining greenfield areas not included.

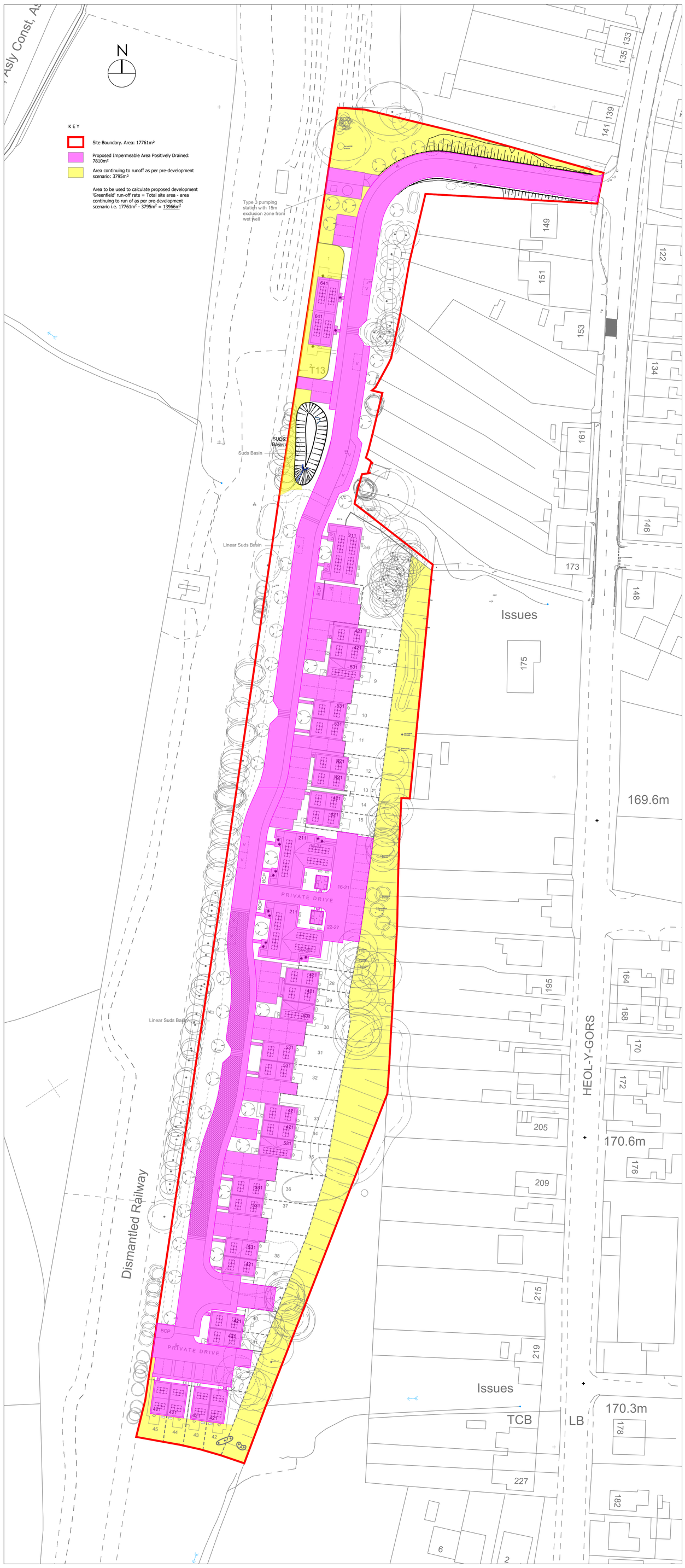
Pre-development Brownfield Runoff Rates (0.44ha)

Qbar	= 54.1 l/s (1.14 x Q1)
1 in 1yr	= 47.6 l/s
1 in 30yr	= 67.2 l/s
1 in 100yr	= 69.5 l/s

Note that modelling of the existing 225Ø pipe shows restricted flows due to pipe capacity. This is reflected in the above discharge rates.
See Causeway Flow Design Report '2024-08-12 - Brownfield Runoff - Dummy Network'

Pre-Development volume discharge (100yr 360mins) (0.44ha)

*1 in 100yr (360mins) = 301m³



Proposed Impermeable Area Plan
Scale 1:500

EXISTING & PROPOSED SURFACE WATER DISCHARGE RATES

Note: NPT SAB have requested that proposed development discharge rates be restricted to the pre-development greenfield rate and not the pre-development brownfield rate.
Therefore, the proposed discharge rate will be restricted to the pre-development Qbar greenfield rate for all storms up-to-and-including the 100 year +40% storm event. :-

Pre-development Greenfield Catchment Area* = 1.3966ha
*based on total; site area minus proposed site areas continuing to runoff as per pre-development scenario (see above)

Allowable Greenfield Runoff Rates (1.3966ha)

Qbar	= 25.0 l/s
1 in 1yr	= 21.9 l/s
1 in 30yr	= 44.4 l/s
1 in 100yr	= 54.5 l/s

Rates calculated using HR Wallingford 'Greenfield runoff rate estimation'

Post-Development
Approx Impermeable Area = 0.781ha

Post-Development peak flow rate

1 in 1yr	= 24.9 l/s (+3.0 l/s)
1 in 30yr	= 24.9 l/s (-19.5 l/s)
1 in 100yr	= 25.0 l/s (-29.5 l/s)
1 in 100yr +40%	= 25.0 l/s

Discharge Volume (100yr 360mins)

*Post-Dev - 1 in 100yr (360mins) = 498.7m³

Total Volume +/- = +197.7m³ *Note: All flows restricted to pre-development Brownfield Qbar rate. Therefore, discharge volumes are provided for information only.

SuDS Measures

The above post-development flow rates are based on a traditional piped system with a 5 minute concentration time.

However, all runoff is to be conveyed to pass through a SuDS feature which will further reduce the above discharge rates and volume.

The SuDS components will effectively increase concentration time, reduce flow velocities and rates, and providing significant volume losses through evaporation and evapotranspiration.

Losses are difficult to quantify and will vary depending on plant species, level of saturation and varied ground conditions across the site.

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rev	date	description	by
A	April 2025	Proposed site layout updated. Proposed discharge rate limited to pre-development greenfield Qbar rate.	RMJ
B	May 2025	Minor update to site layout: Plots 1 & 2 relocated, general plot handings.	RMJ
C	July 2025	Proposed discharge rates updated	RMJ
D	Aug 2025	Minor changes to site layout	RMJ

Status:

APPROVAL

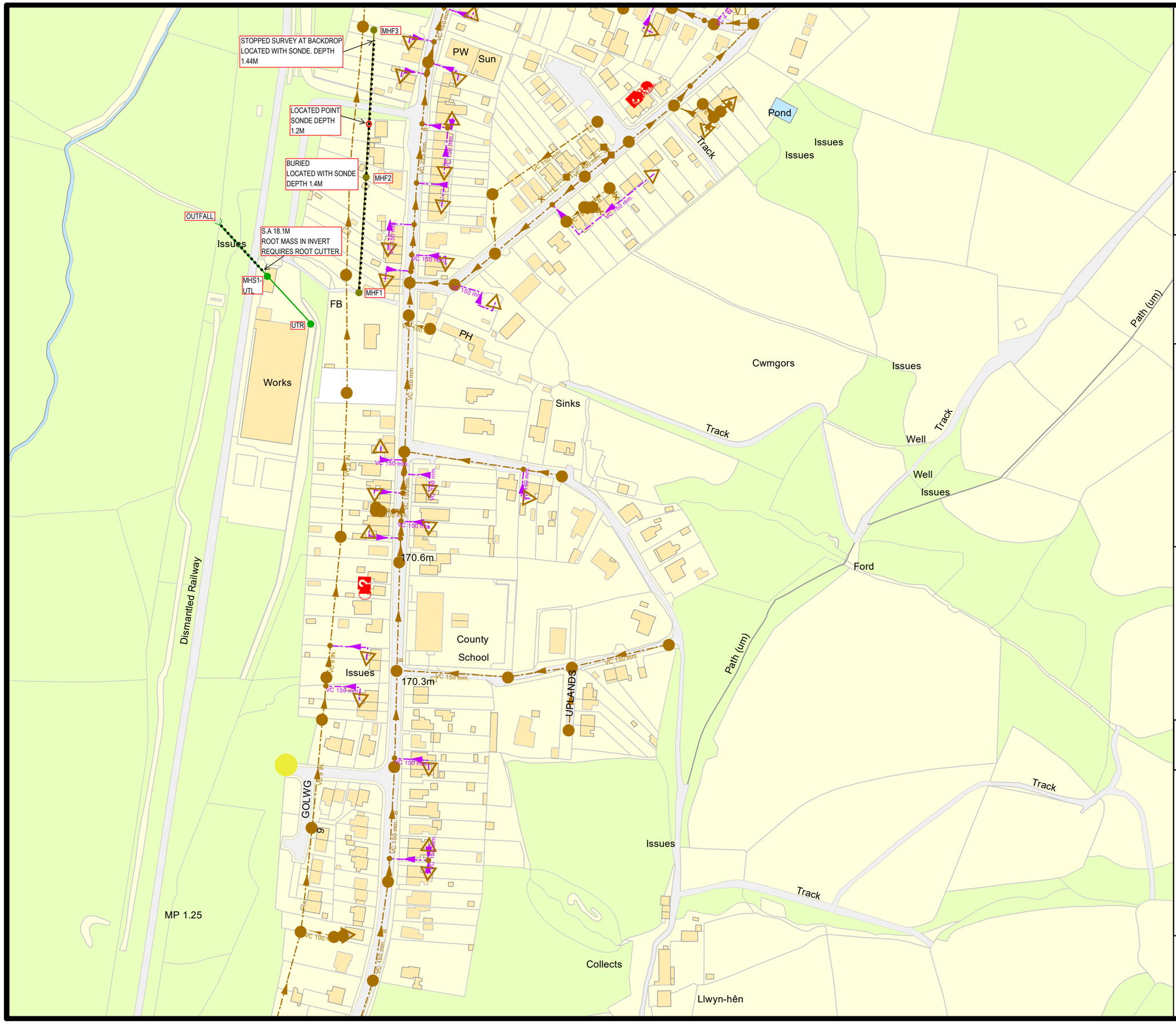
Drawn: RMJ
Checked: RMJ
Date: Aug 2024
Scale: 1:500

Client: Bluefield Land
Project: Heol y Gors, Cwmgors
Title: Existing & Prop. Impermeable Area Plan
Ref: 2625-501
Rev: D

spring design
Unit 2 Chapel Barns | Merthyr Mawr
Bridgend | CF32 0LS | 01656 656267
mail@spring-consultancy.co.uk

Appendix B

Draintech CCTV Survey Reports



Dŵr Cymru
Welsh Water

PPA0008322

N
W E
S

LEGEND(Representative of most common features)

Waste network:

- Foul chamber
- Surface water chamber
- Combined chamber
- Combined sewer overflow
- Special purpose chamber
- Treatment works
- Pumping station
- Outfall
- Lamphole
- Storm Overflow
- Rising main
- Gravity sewer
- Private sewer
- Private sewer subject to Sect. 104 adoption agreement
- Private Sewer Transfer
- Lateral Drain
- Inspection Chamber

NB: Sewer symbol colour indicates the type.
RED - Combined
GREEN - Surface Water
BROWN - Foul
Purple - Former S24 sewers (for indicative purposes only)

DRAINTECH
helping to improve the drainage network

Job/Plan ref: 18075 - 01 - 001

Key:
SA - Survey Abandoned
UTR - Unable to Raise
UTL - Unable to Locate

Whilst every reasonable effort has been taken to correctly record the pipe material of DCWW assets, there is a possibility that in some cases pipe material (other than Asbestos Cement or Pitch Fibre) may be found to be asbestos cement (AC) or Pitch Fibre (PF) . It is therefore advisable that the possible presence of AC or PF pipes be anticipated and considered as part of any risk assessment prior to excavation

Dŵr Cymru Cyfyngedig ('the Company') gives this information as to the position of its underground apparatus by way of general guidance only and on the strict understanding that it is based on the best information available and no warranty as to its correctness is relied upon in the event of excavations or other works made in the vicinity of the company's apparatus. The onus of locating apparatus before carrying out any excavations rests entirely on you. The information which is supplied by the Company, is done so in accordance with statutory requirements of sections 198 and 199 of the Water Industry Act 1991 which is based upon the best Information available and, in particular, but without prejudice to the generality of the foregoing, it should be noted that the records that are available to the Company may not disclose the existence of a water main, service pipe, sewer, lateral drain or disposal main and any associated apparatus laid before 1 September 1989, or, if they do, the particulars thereof including their position underground may not be accurate. It must be understood that the furnishing of this information is entirely without prejudice to the provision of the New Roads and Street Works Act 1991 and the Company's right to be compensated for any damage to its apparatus.

Service pipes are not generally shown but their presence should be anticipated.

EXACT LOCATIONS OF ALL APPARATUS TO BE DETERMINED ON SITE.

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Map Ref:	270532,210520
Map scale:	1:2250
Printed by:	Stacey Harris
Printed on:	25 Oct 2023

DRAINTECH

helping to improve the drainage network

Drainage Survey Report

Job Number : 18075

Project Number: 1

Project Name: Former Swelco Factory, Cwmgors

Company: Bluefield Land

Site Date: 22-01-2024

Draintech Surveys Ltd

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Project Name	Project Number	Project Date
18075 FORMER SWELCO FACTORY		25/01/2024

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Section Item 3: MHS1 > OUTFALL (MHS1X) 15

Project Information

Project Name	Project Number	Project Date
18075 FORMER SWELCO FACTORY		25/01/2024

Client

Company: Bluefield Land
Contact: Paul Markey

Site

Company: Draintech Surveys Ltd
Contact: Jason Shillito

Contractor

Company: Draintech Surveys Ltd

Draintech Surveys Ltd

Section Inspection - 25/01/2024 - MHF1X

Item No.	Insp. No.	Date	Time	Client`s Job Ref	Weather	Pre Cleaned	PLR
1	1	25/01/24	11:02	Not Specified	Rain	No	MHF1X

Operator	Vehicle	Camera	Preset Length	Legal Status	Alternative ID
DRAINTECH JS	Not Specified	Not Specified	Not Specified	Not Specified	Not Specified

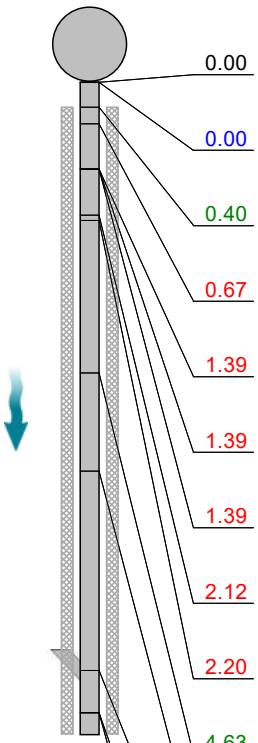
Town or Village:	Cwmgors	**Inspection Direction:**	Downstream	**Upstream Node:**	MHF1
Road:	Former Swelco Factory	**Inspected Length:**	71.90 m	**Upstream Pipe Depth:**	1.150 m
Location:		**Total Length:**	71.90 m	**Downstream Node:**	MHF2
Surface Type:		**Joint Length:**		**Downstream Pipe Depth:**	1.440 m

Use:	Foul	**Pipe Shape:**	Circular
Type of Pipe:		**Dia/Height:**	225 mm
Flow Control:	No flow control	**Pipe Material:**	Vitrified clay
Year Constructed:	Not Specified	**Lining Type:**	No Lining
Inspection Purpose:	Sample condition survey	**Lining Material:**	No Lining

Comments:
Recommendations:

Scale: 1:120

Depth: 1.15 m
MHF1



Position [m]		Code	Observation	MPEG	Photo	Grade
0.00		MH	Start node, manhole, reference: MHF1	00:00:00		
0.00		WL	Water level, 10% of the vertical dimension	00:00:09		
0.40	S01	DEG	Attached deposits, grease from 7 o'clock to 5 o'clock, 5% cross-sectional area loss, start: PATCHY	00:00:13		
0.67		CSJ	Cracks, spiral at joint from 9 o'clock to 10 o'clock	00:00:25		3 / 2
1.39		FLJ	Fracture, longitudinal at joint at 4 o'clock	00:00:46	1	3 / 2
1.39		FLJ	Fracture, longitudinal at joint at 2 o'clock	00:00:52	2	3 / 2
1.39		CCJ	Crack, circumferential at joint from 2 o'clock to 4 o'clock	00:00:54		2 / 2
2.12		FCJ	Fracture, circumferential at joint from 2 o'clock to 4 o'clock	00:01:10	3	3 / 2
2.20		CLJ	Crack, longitudinal at joint at 10 o'clock	00:01:22		2 / 2
4.63		RFJ	Roots, fine at joint	00:02:04		2
6.18		FSJ	Fracture, spiral at joint from 8 o'clock to 10 o'clock	00:02:32	4	4 / 2
9.35		JN	Junction at 2 o'clock, 100mm dia	00:03:17		
10.02		FLJ	Fracture, longitudinal at joint at 10 o'clock	00:03:33	5	3 / 2
10.02		FSJ	Fracture, spiral at joint from 1 o'clock to 3 o'clock	00:03:50	6	4 / 2

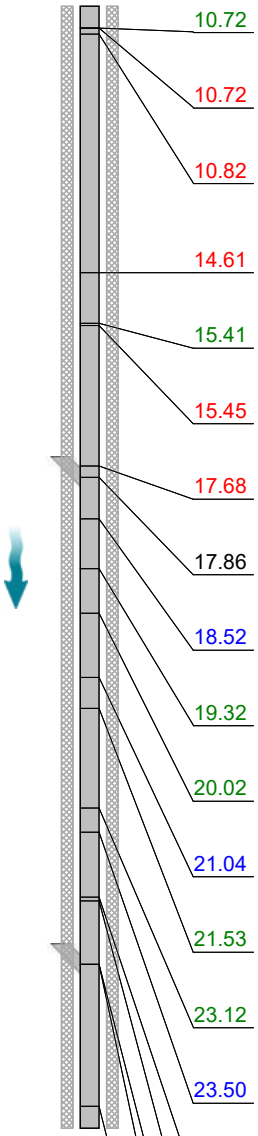
Draintech Surveys Ltd

Section Inspection - 25/01/2024 - MHF1X

Item No.	Insp. No.	Date	Time	Client`s Job Ref	Weather	Pre Cleaned	PLR
1	1	25/01/24	11:02	Not Specified	Rain	No	MHF1X

Operator	Vehicle	Camera	Preset Length	Legal Status	Alternative ID
DRAINTECH JS	Not Specified	Not Specified	Not Specified	Not Specified	Not Specified

Scale: 1:120



Position [m]	Code	Observation	MPEG	Photo	Grade
10.72	DEEJ	Attached deposits, encrustation at joint from 3 o'clock to 5 o'clock, 5% cross-sectional area loss	00:04:09		3
10.72	FCJ	Fracture, circumferential at joint from 9 o'clock to 2 o'clock	00:04:14	7	3 / 2
10.82	FLJ	Fracture, longitudinal at joint at 9 o'clock	00:04:26	8	3 / 2
14.61	CCJ	Crack, circumferential at joint from 11 o'clock to 1 o'clock	00:05:17		2 / 2
15.41	DEEJ	Attached deposits, encrustation at joint at 10 o'clock, 5% cross-sectional area loss	00:05:30		3
15.45	FCJ	Fracture, circumferential at joint from 10 o'clock to 2 o'clock	00:05:37	9	3 / 2
17.68	CCJ	Crack, circumferential at joint from 3 o'clock to 4 o'clock	00:06:14		2 / 2
17.86	JN	Junction at 2 o'clock, 100mm dia	00:06:22		
18.52	WL	Water level, 20% of the vertical dimension	00:06:28		
19.32	DEEJ	Attached deposits, encrustation at joint from 10 o'clock to 2 o'clock, 5% cross-sectional area loss	00:06:39		3
20.02	DEEJ	Attached deposits, encrustation at joint at 3 o'clock, 5% cross-sectional area loss	00:06:48		3
21.04	WL	Water level, 10% of the vertical dimension	00:06:58		
21.53	DEEJ	Attached deposits, encrustation at joint from 9 o'clock to 12 o'clock, 5% cross-sectional area loss	00:07:05		3
23.12	DEEJ	Attached deposits, encrustation at joint from 2 o'clock to 3 o'clock, 5% cross-sectional area loss	00:07:28		3
23.50	WL	Water level, 20% of the vertical dimension	00:07:34		
24.54	WL	Water level, 10% of the vertical dimension	00:07:48		
24.59	DEEJ	Attached deposits, encrustation at joint from 1 o'clock to 5 o'clock, 5% cross-sectional area loss	00:07:51		3
25.60	DEE	Attached deposits, encrustation from 2 o'clock to 5 o'clock, 5% cross-sectional area loss	00:08:00		3
25.60	JN	Junction at 2 o'clock, 100mm dia	00:08:01		
27.86	DEE	Attached deposits, encrustation at 9 o'clock, 5% cross-sectional area loss	00:08:27		3

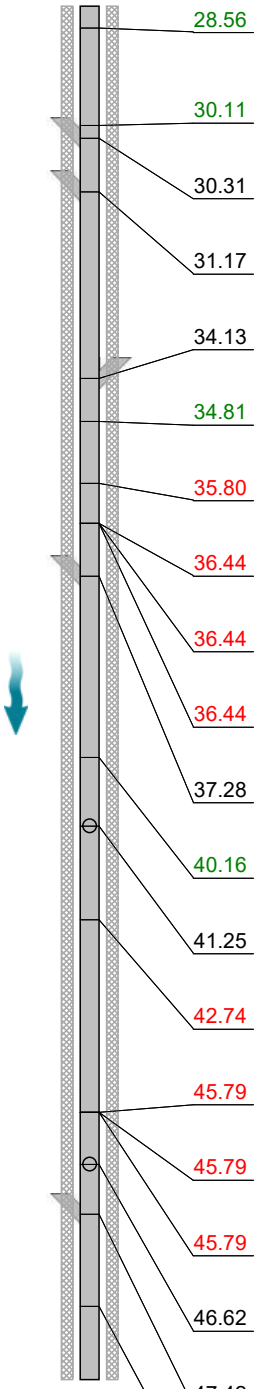
Draintech Surveys Ltd

Section Inspection - 25/01/2024 - MHF1X

Item No.	Insp. No.	Date	Time	Client`s Job Ref	Weather	Pre Cleaned	PLR
1	1	25/01/24	11:02	Not Specified	Rain	No	MHF1X

Operator	Vehicle	Camera	Preset Length	Legal Status	Alternative ID
DRAINTECH JS	Not Specified	Not Specified	Not Specified	Not Specified	Not Specified

Scale: 1:120



Position [m]	Code	Observation	MPEG	Photo	Grade
28.56	DEEJ	Attached deposits, encrustation at joint from 3 o'clock to 5 o'clock, 5% cross-sectional area loss	00:08:36		3
30.11	DEE	Attached deposits, encrustation from 7 o'clock to 11 o'clock, 5% cross-sectional area loss	00:09:00		3
30.31	CN	Connection other than junction at 2 o'clock, 100mm dia	00:09:06		
31.17	JN	Junction at 2 o'clock, 150mm dia	00:09:21		
34.13	JN	Junction at 9 o'clock, 150mm dia	00:09:47		
34.81	DEEJ	Attached deposits, encrustation at joint from 7 o'clock to 10 o'clock, 5% cross-sectional area loss	00:09:54		3
35.80	CLJ	Crack, longitudinal at joint at 12 o'clock	00:10:09		2 / 2
36.44	FLJ	Fracture, longitudinal at joint at 3 o'clock	00:10:36	10	3 / 2
36.44	CLJ	Crack, longitudinal at joint at 10 o'clock	00:10:41		2 / 2
36.44	CCJ	Crack, circumferential at joint from 10 o'clock to 3 o'clock	00:10:44		2 / 2
37.28	JN	Junction at 2 o'clock, 150mm dia	00:10:52		
40.16	DEEJ	Attached deposits, encrustation at joint at 9 o'clock, 5% cross-sectional area loss	00:11:17		3
41.25	JN	Junction at 12 o'clock, 100mm dia	00:11:30		
42.74	CLJ	Crack, longitudinal at joint at 9 o'clock	00:11:53		2 / 2
45.79	CLJ	Crack, longitudinal at joint at 9 o'clock	00:12:20		2 / 2
45.79	CLJ	Crack, longitudinal at joint at 11 o'clock	00:12:23		2 / 2
45.79	FLJ	Fracture, longitudinal at joint at 3 o'clock	00:12:27	11	3 / 2
46.62	CN	Connection other than junction at 12 o'clock, 100mm dia	00:12:39		
47.42	JN	Junction at 2 o'clock, 150mm dia	00:12:54		
48.88	CCJ	Crack, circumferential at joint from 11 o'clock to 3 o'clock	00:13:12		2 / 2

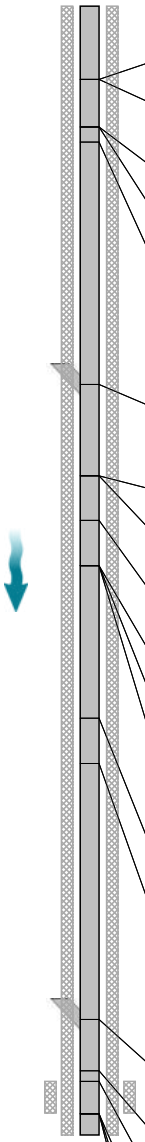
Draintech Surveys Ltd

Section Inspection - 25/01/2024 - MHF1X

Item No.	Insp. No.	Date	Time	Client`s Job Ref	Weather	Pre Cleaned	PLR
1	1	25/01/24	11:02	Not Specified	Rain	No	MHF1X

Operator	Vehicle	Camera	Preset Length	Legal Status	Alternative ID
DRAINTECH JS	Not Specified	Not Specified	Not Specified	Not Specified	Not Specified

Scale: 1:120



Position [m]		Code	Observation	MPEG	Photo	Grade
51.21		CLJ	Crack, longitudinal at joint at 9 o'clock	00:13:41		2 / 2
51.21		CCJ	Crack, circumferential at joint from 8 o'clock to 12 o'clock	00:13:45		2 / 2
51.97		IR	Infiltration, running at 12 o'clock	00:13:56	12	
51.97		FLJ	Fracture, longitudinal at joint at 11 o'clock	00:13:59	13	3 / 2
52.21		CLJ	Crack, longitudinal at joint at 4 o'clock	00:14:09		2 / 2
56.06		JN	Junction at 2 o'clock, 150mm dia	00:14:48		
57.51		CSJ	Cracks, spiral at joint from 10 o'clock to 11 o'clock	00:15:04		3 / 2
57.51		CLJ	Crack, longitudinal at joint at 1 o'clock	00:15:06		2 / 2
58.22		CSJ	Cracks, spiral at joint from 11 o'clock to 12 o'clock	00:15:18		3 / 2
58.94		CLJ	Crack, longitudinal at joint at 12 o'clock	00:15:28		2 / 2
58.94		CLJ	Crack, longitudinal at joint at 10 o'clock	00:15:29		2 / 2
58.94		CCJ	Crack, circumferential at joint from 8 o'clock to 12 o'clock	00:15:30		2 / 2
61.37		CLJ	Crack, longitudinal at joint at 10 o'clock	00:15:49		2 / 2
62.09		CLJ	Crack, longitudinal at joint at 9 o'clock	00:15:58		2 / 2
66.15		JN	Junction at 2 o'clock, 150mm dia	00:16:29		
66.97		CC	Crack, circumferential from 11 o'clock to 2 o'clock	00:16:41		2 / 2
67.14	S02	CLJ	Crack, longitudinal at joint at 12 o'clock, start	00:16:46		
67.65	F02	CLJ	Crack, longitudinal at joint at 12 o'clock, finish	00:16:58		2 / 2
67.65		FLJ	Fracture, longitudinal at joint at 12 o'clock	00:16:59	14	3 / 2
67.65		CCJ	Crack, circumferential at joint from 2 o'clock to 5 o'clock	00:17:22		2 / 2

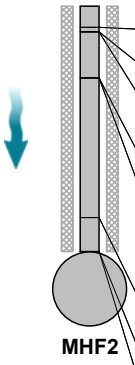
Draintech Surveys Ltd

Section Inspection - 25/01/2024 - MHF1X

Item No.	Insp. No.	Date	Time	Client`s Job Ref	Weather	Pre Cleaned	PLR
1	1	25/01/24	11:02	Not Specified	Rain	No	MHF1X

Operator	Vehicle	Camera	Preset Length	Legal Status	Alternative ID
DRAINTECH JS	Not Specified	Not Specified	Not Specified	Not Specified	Not Specified

Scale: 1:120



Position [m]		Code	Observation	MPEG	Photo	Grade
68.33		RFJ	Roots, fine at joint	00:17:33		2
68.40		CSJ	Cracks, spiral at joint from 11 o'clock to 12 o'clock	00:17:39		3 / 2
68.40		FSJ	Fracture, spiral at joint from 12 o'clock to 1 o'clock	00:17:40	15	4 / 2
69.13		RFJ	Roots, fine at joint	00:17:55		2
69.14		WL	Water level, 20% of the vertical dimension	00:18:00		
71.36		WL	Water level, 10% of the vertical dimension	00:18:17		
71.90	F01	DEG	Attached deposits, grease from 7 o'clock to 5 o'clock, 5% cross-sectional area loss, finish: PATCHY	00:18:29		3
71.90		MHF	Finish node, manhole, reference: MHF2	00:18:30		

Depth: 1.44 m

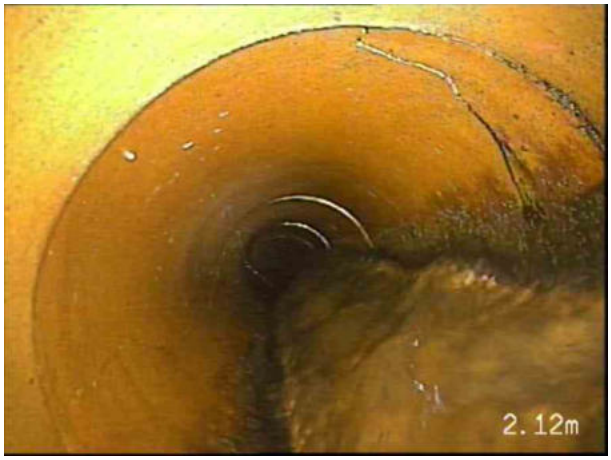
Construction Features					Miscellaneous Features				
Structural Defects					Service & Operational Observations				
STR No. Def	STR Peak	STR Mean	STR Total	STR Grade	SER No. Def	SER Peak	SER Mean	SER Total	SER Grade
41	120.0	14.9	1070.0	4.0	58	8.0	5.0	358.0	4.0

Section Pictures - 25/01/2024 - MHF1X

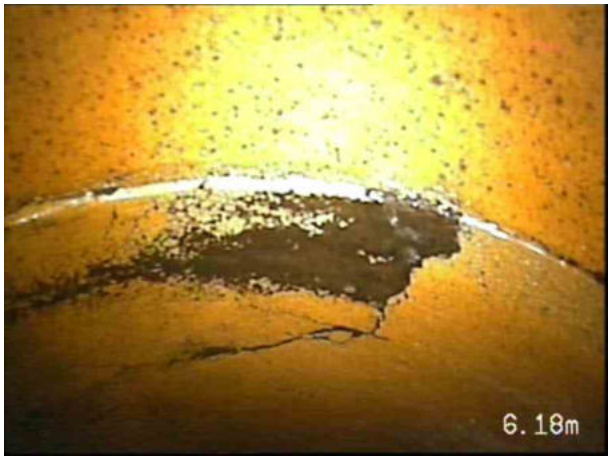
Item No.	Inspection Direction	PLR	Client`s Job Ref	Contractor`s Job Ref
1	Downstream	MHF1X		18075

1, 00:00:46, 1.39 m
Fracture, longitudinal at joint at 4 o'clock

2, 00:00:52, 1.39 m
Fracture, longitudinal at joint at 2 o'clock

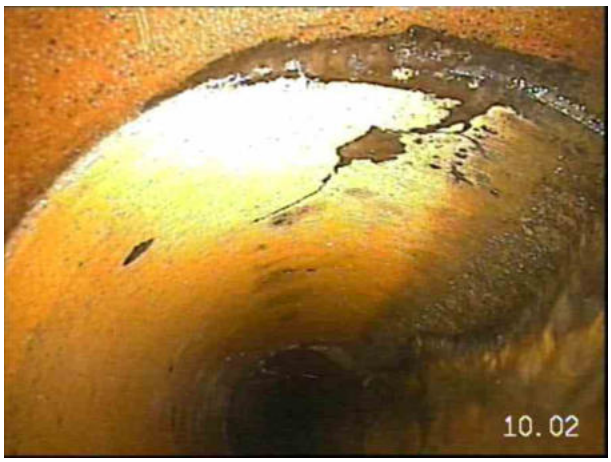


3, 00:01:10, 2.12 m
Fracture, circumferential at joint from 2 o'clock to 4 o'clock



4, 00:02:32, 6.18 m
Fracture, spiral at joint from 8 o'clock to 10 o'clock

5, 00:03:33, 10.02 m
Fracture, longitudinal at joint at 10 o'clock

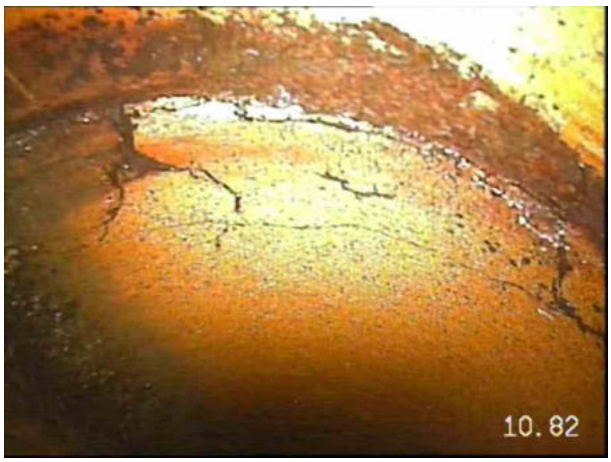


6, 00:03:50, 10.02 m
Fracture, spiral at joint from 1 o'clock to 3 o'clock

Section Pictures - 25/01/2024 - MHF1X

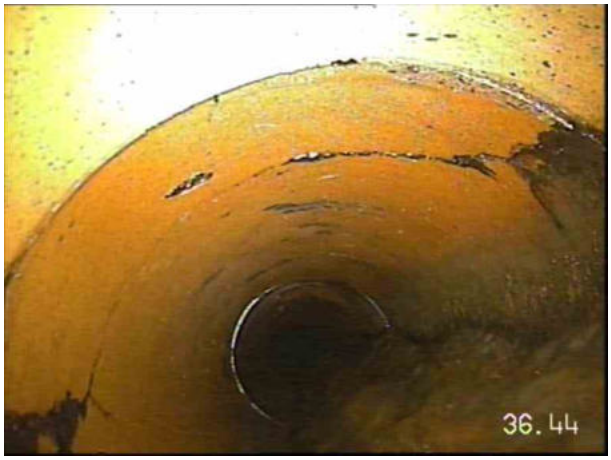
Item No.	Inspection Direction	PLR	Client`s Job Ref	Contractor`s Job Ref
1	Downstream	MHF1X		18075

7, 00:04:14, 10.72 m
Fracture, circumferential at joint from 9 o'clock to 2 o'clock



8, 00:04:26, 10.82 m
Fracture, longitudinal at joint at 9 o'clock

9, 00:05:37, 15.45 m
Fracture, circumferential at joint from 10 o'clock to 2 o'clock



10, 00:10:36, 36.44 m
Fracture, longitudinal at joint at 3 o'clock

11, 00:12:27, 45.79 m
Fracture, longitudinal at joint at 3 o'clock

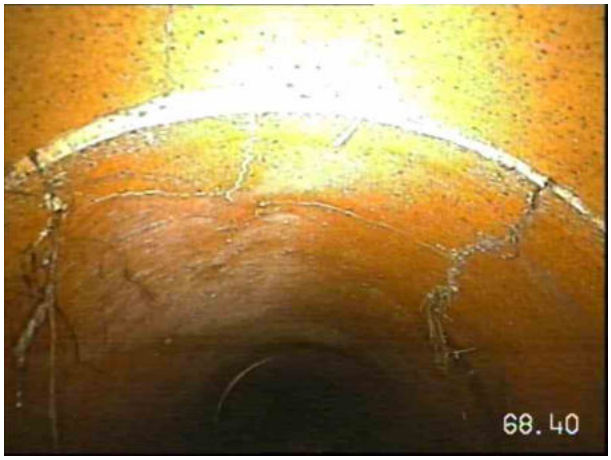
12, 00:13:56, 51.97 m
Infiltration, running at 12 o'clock

Section Pictures - 25/01/2024 - MHF1X

Item No.	Inspection Direction	PLR	Client`s Job Ref	Contractor`s Job Ref
1	Downstream	MHF1X		18075

13, 00:13:59, 51.97 m
Fracture, longitudinal at joint at 11 o'clock

14, 00:16:59, 67.65 m
Fracture, longitudinal at joint at 12 o'clock



15, 00:17:40, 68.40 m
Fracture, spiral at joint from 12 o'clock to 1 o'clock

Draintech Surveys Ltd

Section Inspection - 25/01/2024 - MHF2X

Item No.	Insp. No.	Date	Time	Client`s Job Ref	Weather	Pre Cleaned	PLR
2	1	25/01/24	11:53	Not Specified	Rain	No	MHF2X

Operator	Vehicle	Camera	Preset Length	Legal Status	Alternative ID
DRAINTECH JS	Not Specified	Not Specified	Not Specified	Not Specified	Not Specified

Town or Village:	Cwmgors	**Inspection Direction:**	Downstream	**Upstream Node:**	MHF2
Road:	Former Swelco Factory	**Inspected Length:**	88.84 m	**Upstream Pipe Depth:**	1.440 m
Location:		**Total Length:**	88.84 m	**Downstream Node:**	MHF3
Surface Type:		**Joint Length:**		**Downstream Pipe Depth:**	

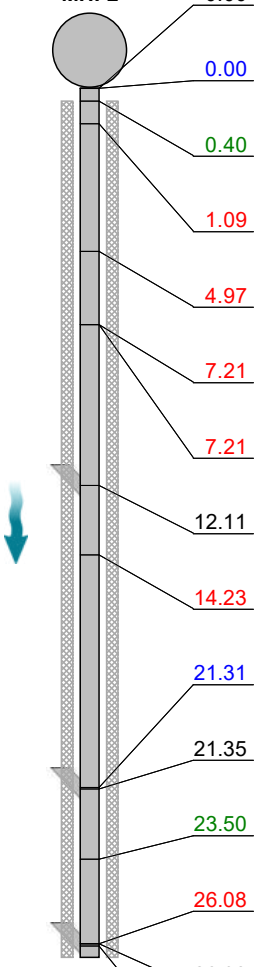
Use:	Foul	**Pipe Shape:**	Circular
Type of Pipe:		**Dia/Height:**	225 mm
Flow Control:	No flow control	**Pipe Material:**	Vitrified clay
Year Constructed:	Not Specified	**Lining Type:**	No Lining
Inspection Purpose:	Sample condition survey	**Lining Material:**	No Lining

Comments:
Recommendations:

Scale: 1:230

Depth: 1.44 m

MHF2



Position [m]		Code	Observation	MPEG	Photo	Grade
0.00		MH	Start node, manhole, reference: MHF2	00:00:00		
0.00		WL	Water level, 10% of the vertical dimension	00:00:08		
0.40	S01	DEG	Attached deposits, grease from 7 o'clock to 5 o'clock, 5% cross-sectional area loss, start	00:00:12		
1.09		FMJ	Fractures, multiple at joint from 10 o'clock to 1 o'clock	00:00:21	1	4 / 2
4.97		CCJ	Crack, circumferential at joint from 9 o'clock to 3 o'clock	00:00:58		2 / 2
7.21		CSJ	Cracks, spiral at joint from 2 o'clock to 3 o'clock	00:01:24		3 / 2
7.21		FLJ	Fracture, longitudinal at joint at 12 o'clock	00:01:25	2	3 / 2
12.11		JN	Junction at 2 o'clock, 150mm dia	00:01:58		
14.23		CSJ	Cracks, spiral at joint from 8 o'clock to 10 o'clock	00:02:12		3 / 2
21.31		WL	Water level, 5% of the vertical dimension	00:02:57		
21.35		JN	Junction at 2 o'clock, 150mm dia	00:03:01		
23.50		RFJ	Roots, fine at joint	00:03:16		2
26.08		CLJ	Crack, longitudinal at joint at 2 o'clock	00:03:37		2 / 2
26.08		CN	Connection other than junction at 2 o'clock, 100mm dia	00:03:42		
26.14		DEF	Attached deposits, fouling from 2 o'clock to 5 o'clock, 5% cross-sectional area loss	00:03:48		3

Draintech Surveys Ltd

Section Inspection - 25/01/2024 - MHF2X

Item No.	Insp. No.	Date	Time	Client`s Job Ref	Weather	Pre Cleaned	PLR
2	1	25/01/24	11:53	Not Specified	Rain	No	MHF2X

Operator	Vehicle	Camera	Preset Length	Legal Status	Alternative ID
DRAINTECH JS	Not Specified	Not Specified	Not Specified	Not Specified	Not Specified

Scale: 1:230

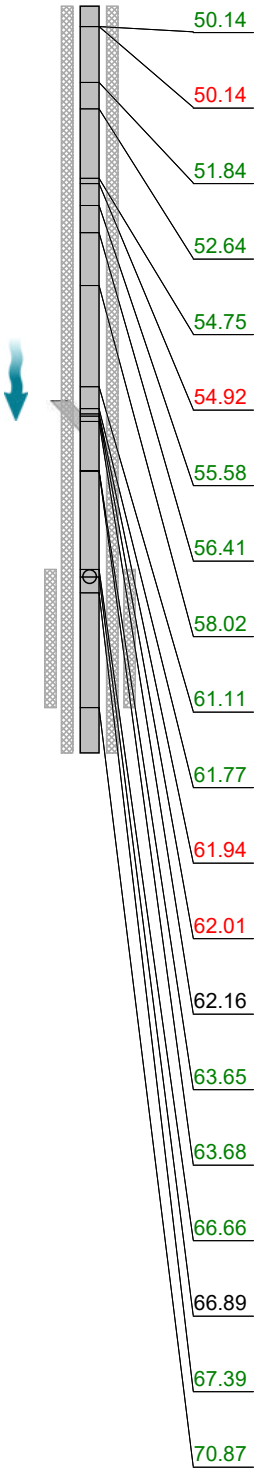
Position [m]		Code	Observation	MPEG	Photo	Grade
26.83		BJ	Broken pipe at joint from 1 o'clock to 2 o'clock	00:04:00	3	4
28.30		RFJ	Roots, fine at joint	00:04:25		2
33.04		CLJ	Crack, longitudinal at joint at 1 o'clock	00:04:59		2 / 2
33.12		JN	Junction at 12 o'clock, 100mm dia	00:05:04		
33.67		RFJ	Roots, fine at joint	00:05:12		2
34.72		JN	Junction at 2 o'clock, 150mm dia	00:05:22		
35.81		CS	Cracks, spiral from 11 o'clock to 1 o'clock	00:05:46		3 / 2
35.87		RF	Roots, fine	00:05:50		2
36.03		RFJ	Roots, fine at joint	00:05:54		2
36.77		RFJ	Roots, fine at joint	00:06:02		2
37.68		FSJ	Fracture, spiral at joint from 10 o'clock to 2 o'clock	00:06:18	4	4 / 2
37.68		RFJ	Roots, fine at joint	00:06:20		2
38.41		RFJ	Roots, fine at joint	00:06:31		2
39.04	S02	RF	Roots, fine, start	00:06:39		
41.08	F02	RF	Roots, fine, finish	00:06:54		2
42.17		DEEJ	Attached deposits, encrustation at joint at 8 o'clock, 5% cross-sectional area loss	00:07:05		3
42.64		RF	Roots, fine	00:07:13		2
45.50		JN	Junction at 12 o'clock, 100mm dia	00:07:36		
48.86		RF	Roots, fine	00:08:06		2

Draintech Surveys Ltd

Section Inspection - 25/01/2024 - MHF2X

Item No.	Insp. No.	Date	Time	Client`s Job Ref	Weather	Pre Cleaned	PLR
2	1	25/01/24	11:53	Not Specified	Rain	No	MHF2X
Operator		**Vehicle**		**Camera**	**Preset Length**	**Legal Status**	**Alternative ID**
DRAINTECH JS		Not Specified		Not Specified	Not Specified	Not Specified	Not Specified

Scale: 1:230



Position [m]		Code	Observation	MPEG	Photo	Grade
50.14		RFJ	Roots, fine at joint	00:08:18		2
50.14		FCJ	Fracture, circumferential at joint from 7 o'clock to 2 o'clock	00:08:21	5	3 / 2
51.84		RFJ	Roots, fine at joint	00:08:44		2
52.64		RF	Roots, fine	00:09:06		2
54.75		RFJ	Roots, fine at joint	00:09:23		2
54.92		BJ	Broken pipe at joint from 8 o'clock to 2 o'clock	00:09:33	6	4
55.58		RF	Roots, fine	00:09:43		2
56.41		RFJ	Roots, fine at joint	00:09:51		2
58.02		RFJ	Roots, fine at joint	00:10:04		2
61.11		RFJ	Roots, fine at joint	00:10:26		2
61.77		RF	Roots, fine	00:10:36		2
61.94		BJ	Broken pipe at joint from 2 o'clock to 4 o'clock	00:10:41	7	4
62.01		BJ	Broken pipe at joint from 11 o'clock to 4 o'clock	00:10:50	8	4
62.16		JN	Junction at 2 o'clock, 150mm dia	00:10:57		
63.65		DEEJ	Attached deposits, encrustation at joint from 4 o'clock to 5 o'clock, 5% cross-sectional area loss	00:11:14		3
63.68		RF	Roots, fine	00:11:19		2
66.66	S03	RF	Roots, fine, start	00:11:43		
66.89		JN	Junction at 12 o'clock, 100mm dia	00:11:49		
67.39		RM	Roots, mass, 10% cross-sectional area loss	00:11:58	9	3
70.87	F03	RF	Roots, fine, finish	00:12:35		2

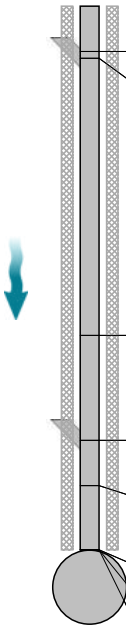
Draintech Surveys Ltd

Section Inspection - 25/01/2024 - MHF2X

Item No.	Insp. No.	Date	Time	Client`s Job Ref	Weather	Pre Cleaned	PLR
2	1	25/01/24	11:53	Not Specified	Rain	No	MHF2X

Operator	Vehicle	Camera	Preset Length	Legal Status	Alternative ID
DRAINTECH JS	Not Specified	Not Specified	Not Specified	Not Specified	Not Specified

Scale: 1:230



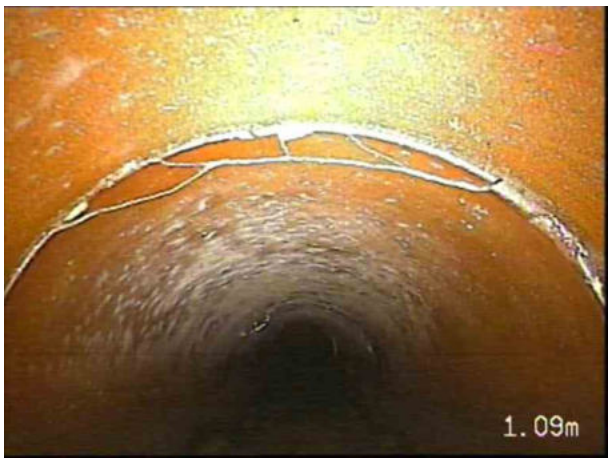
Position [m]		Code	Observation	MPEG	Photo	Grade
73.66		BJ	Broken pipe at joint from 2 o'clock to 5 o'clock	00:12:56	10	4
73.86		JN	Junction at 2 o'clock, 100mm dia	00:13:05		
82.30		RTJ	Roots, tap at joint	00:13:55		4
85.49		JN	Junction at 2 o'clock, 100mm dia	00:14:18		
86.87		IRJ	Infiltration, running at joint at 9 o'clock	00:14:29	11	
88.84		JN	Junction at 6 o'clock, 225mm dia	00:14:52		
88.84	F01	DEG	Attached deposits, grease from 7 o'clock to 5 o'clock, 5% cross-sectional area loss, finish	00:14:54		3
88.84		OCF	Finish node, other special chamber, reference: MHF3: MADE IT TO BACK DROP	00:14:55		

Depth: m

Construction Features					Miscellaneous Features				
Structural Defects					Service & Operational Observations				
STR No. Def	STR Peak	STR Mean	STR Total	STR Grade	SER No. Def	SER Peak	SER Mean	SER Total	SER Grade
15	80.0	8.9	790.0	4.0	38	9.0	4.6	409.0	4.0

Section Pictures - 25/01/2024 - MHF2X

Item No.	Inspection Direction	PLR	Client`s Job Ref	Contractor`s Job Ref
2	Downstream	MHF2X		18075



1, 00:00:21, 1.09 m
Fractures, multiple at joint from 10 o'clock to 1 o'clock

2, 00:01:25, 7.21 m
Fracture, longitudinal at joint at 12 o'clock

3, 00:04:00, 26.83 m
Broken pipe at joint from 1 o'clock to 2 o'clock

4, 00:06:18, 37.68 m
Fracture, spiral at joint from 10 o'clock to 2 o'clock

5, 00:08:21, 50.14 m
Fracture, circumferential at joint from 7 o'clock to 2 o'clock

6, 00:09:33, 54.92 m
Broken pipe at joint from 8 o'clock to 2 o'clock

Section Pictures - 25/01/2024 - MHF2X

Item No.	Inspection Direction	PLR	Client`s Job Ref	Contractor`s Job Ref
2	Downstream	MHF2X		18075

7, 00:10:41, 61.94 m
Broken pipe at joint from 2 o'clock to 4 o'clock

8, 00:10:50, 62.01 m
Broken pipe at joint from 11 o'clock to 4 o'clock

9, 00:11:58, 67.39 m
Roots, mass, 10% cross-sectional area loss

10, 00:12:56, 73.66 m
Broken pipe at joint from 2 o'clock to 5 o'clock

11, 00:14:29, 86.87 m
Infiltration, running at joint at 9 o'clock

Draintech Surveys Ltd

Section Inspection - 25/01/2024 - MHS1X

Item No.	Insp. No.	Date	Time	Client`s Job Ref	Weather	Pre Cleaned	PLR
3	1	25/01/24	13:25	Not Specified	Rain	No	MHS1X

Operator	Vehicle	Camera	Preset Length	Legal Status	Alternative ID
DRAINTECH JS	Not Specified	Not Specified	Not Specified	Not Specified	Not Specified

Town or Village:	Cwmgors	**Inspection Direction:**	Upstream	**Upstream Node:**	MHS1
Road:	Former Swelco Factory	**Inspected Length:**	18.15 m	**Upstream Pipe Depth:**	
Location:		**Total Length:**	18.15 m	**Downstream Node:**	OUTFALL
Surface Type:		**Joint Length:**		**Downstream Pipe Depth:**	

Use:	Surface water	**Pipe Shape:**	Circular
Type of Pipe:		**Dia/Height:**	225 mm
Flow Control:	No flow control	**Pipe Material:**	Vitrified clay
Year Constructed:	Not Specified	**Lining Type:**	No Lining
Inspection Purpose:	Sample condition survey	**Lining Material:**	No Lining

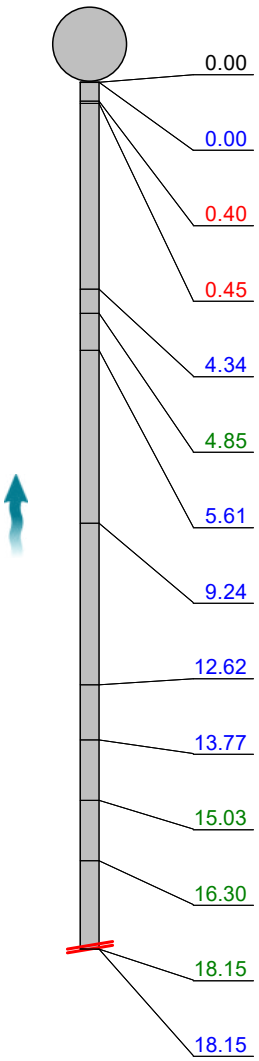
Comments: MHS1 - UTL - UNABLE TO LOCATE

Recommendations:

Scale: 1:158

Depth: m

OUTFALL



Position [m]	Code	Observation	MPEG	Photo	Grade
0.00	OF	Start node, outfall, reference: OUTFALL	00:00:00		
0.00	WL	Water level, 10% of the vertical dimension	00:00:08		
0.40	CL	Crack, longitudinal at 12 o'clock	00:00:17		2 / 2
0.45	CMJ	Cracks, multiple at joint from 10 o'clock to 3 o'clock	00:00:25	1	3 / 2
4.34	WL	Water level, 5% of the vertical dimension	00:01:03		
4.85	DER	Settled deposits, coarse, 5% cross-sectional area loss	00:01:10		3
5.61	WL	Water level, 10% of the vertical dimension	00:01:19		
9.24	WL	Water level, 5% of the vertical dimension	00:01:44		
12.62	WL	Water level, 10% of the vertical dimension	00:02:21		
13.77	WL	Water level, 20% of the vertical dimension	00:02:32		
15.03	RFJ	Roots, fine at joint	00:02:43		2
16.30	RF	Roots, fine	00:02:55		2
18.15	RM	Roots, mass, 15% cross-sectional area loss: UNDER FLOW	00:04:01		3
18.15	SA	Survey abandoned: UNABLE TO GET THROUGH ROOTS. ROOT CUTTER REQUIRED	00:04:03		

Construction Features					Miscellaneous Features				
Structural Defects					Service & Operational Observations				
STR No. Def	STR Peak	STR Mean	STR Total	STR Grade	SER No. Def	SER Peak	SER Mean	SER Total	SER Grade
2	50.0	2.8	50.0	3.0	6	4.0	0.6	10.0	3.0

Section Pictures - 25/01/2024 - MHS1X

Item No.	Inspection Direction	PLR	Client`s Job Ref	Contractor`s Job Ref
3	Upstream	MHS1X		18075

1, 00:00:25, 0.45 m
Cracks, multiple at joint from 10 o'clock to 3 o'clock

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Job/Plan ref: 20373 - 01 - 001

Scale: 1:1250

15/05/2025

EXACT LOCATION OF ALL APPARATUS TO BE DETERMINED ON SITE

Dŵr Cymru
Welsh Water

N
W E
S

LEGEND

- Sluice Valve
- Air Valve SINGLE
- Tap
- Pressure Reducing Valve
- Meter
- Bulk Meter
- Fire Hydrant
- Cap
- Non Dwr Cymru
- Existing Distribution Main
- Inspection Chamber
- Gravity Sewer
- Rising Main
- Outfall
- Pumping Station
- Lamphole
- Combined Sewer Overflow
- Special Purpose Chamber
- Treatment Works
- Private Sewer Transfer
- Lateral Drain

NB:
Sewer symbol colour indicates the sewer type.

RED - Combined
GREEN - Surface Water
BROWN - Foul

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Whilst every reasonable effort has been taken to correctly record the pipe material of DCWW assets, there is a possibility that in some cases pipe material (other than Asbestos cement or Pitch Fibre) may be found to be asbestos cement (AC) or Pitch Fibre (PF) . It is therefore advisable that the possible presence of AC or PF pipes be anticipated and considered as part of any risk assessment prior to excavation

Dwr Cymru Cyfyngedig ('the Company') gives this infirmation as to the position of its underground apparatus by way of general guidance only and on the strict understanding that it is based on the best information available and no warranty as to its correctness is relied upon in the event of excavations or other works made in the vicinity of the company's apparatus and any onus of locating the apparatus before carrying out any excavations rests entirely on you. The information which is supplied hereby by the company, is done so in accordance with statutory requirements of sections 198 and 199 of the Water Industry Act 1991 based particular, but without prejudice to be generality of that foregoing, it should be noted that the records that are available to the company may not disclose the existence of a drain sewer or disposal main laid before 1 September 1989, or if they do, the particulars thereof including their position underground may not be accurate. It must be understood that the furnishing of thisinformation is entirely without prejudice to the provision of the New Roads and Street Works Act 1991 and the company's right to be compensated for any damageto its apparatus.

DRAINTECH

helping to improve the drainage network

Drainage Survey Report

Job Number : 20373

Project Number: 1

Project Name: CCTV Survey of Existing Culvert - Cwmgors

Company: Spring Design

Site Date: 16-05-2025

DRAINTECH
Cleaning • Surveys • Lining • Civils

DRIANTECH SURVEYS LIMITED

Table of Contents

Project Name	Project Number	Project Date
20373 - 01 - Existing culvert cwmgors	1	27/05/2025

Project Information P-1

Section Item 1: INLET > OUTFALL (INLETX) 1

Section Item 2: INLET > OUTFALL (INLETX) 2

DRAINTECH SURVEYS LIMITED

Project Information

Project Name	Project Number	Project Date
20373 - 01 - Existing culvert cwmgors	1	27/05/2025

Client

Company: Spring Design
Contact: Richard John

Site

Company: Draintech Surveys LTD
Contact: Jack Jones

Contractor

Company: DRIANTECH SURVEYS LIMITED

DRAINTECH
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DRIANTECH SURVEYS LIMITED

Section Inspection - 20/05/2025 - INLETX

Item No.	Insp. No.	Date	Time	Client`s Job Ref	Weather	Pre Cleaned	PLR
1	1	20/05/25	12:48	1	No Rain Or Snow	No	INLETX

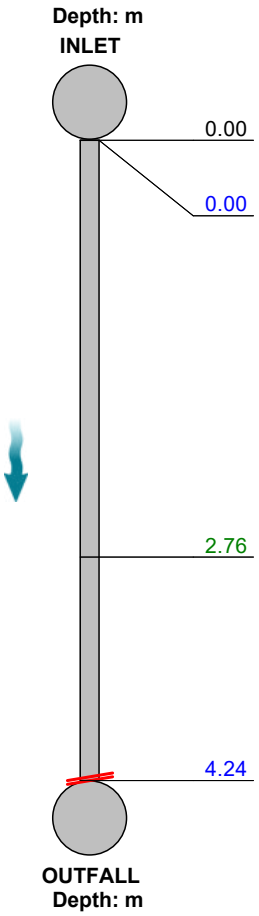
Operator	Vehicle	Camera	Preset Length	Legal Status	Alternative ID
DRAINTECH JS	Not Specified	Not Specified	Not Specified	Not Specified	Not Specified

Town or Village:	Cwmgors	**Inspection Direction:**	Downstream	**Upstream Node:**	INLET
Road:	Works Off Heol Y Gors	**Inspected Length:**	4.24 m	**Upstream Pipe Depth:**	
Location:	Difficult access	**Total Length:**	4.24 m	**Downstream Node:**	OUTFALL
Surface Type:	Unknown	**Joint Length:**		**Downstream Pipe Depth:**	

Use:	Culverted watercourse	**Pipe Shape:**	Arched (with flat bottom)		
Type of Pipe:	Gravity drain/sewer	**Dia/Height:**	900 mm	**Width:**	950 mm
Flow Control:	No flow control	**Pipe Material:**	Brick		
Year Constructed:	Not Specified	**Lining Type:**	No Lining		
Inspection Purpose:	Sample survey to determine asset condition	**Lining Material:**	No Lining		

Comments:
Recommendations: None specified

Scale: 1:50



Position [m]	Code	Observation	MPEG	Photo	Grade
0.00	OC	Start node type, other special chamber, reference number : INLET: START	00:00:00		
0.00	WL	Water level, 25% of the vertical dimension			
2.76	DER	Settled deposits, coarse, 25% cross-sectional area loss: LARGE ROCK AND STONES			4
4.24	SA	Survey abandoned: UNABLE TO PASS THE LARGE ROCK			

Construction Features					Miscellaneous Features				
Structural Defects					Service & Operational Observations				
STR No. Def	STR Peak	STR Mean	STR Total	STR Grade	SER No. Def	SER Peak	SER Mean	SER Total	SER Grade
0	0.0	0.0	0.0	1.0	1	5.0	1.2	5.0	4.0

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Section Inspection - 20/05/2025 - INLETX

Item No.	Insp. No.	Date	Time	Client`s Job Ref	Weather	Pre Cleaned	PLR
2	1	20/05/25	12:47	1	No Rain Or Snow	No	INLETX

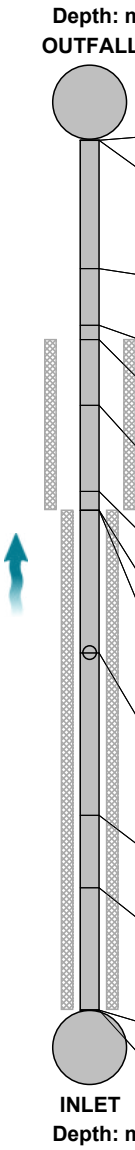
Operator	Vehicle	Camera	Preset Length	Legal Status	Alternative ID
DRAINTECH JS	Not Specified	Not Specified	Not Specified	Not Specified	Not Specified

Town or Village:	Cwmgors	**Inspection Direction:**	Upstream	**Upstream Node:**	INLET
Road:	Works Off Heol Y Gors	**Inspected Length:**	30.31 m	**Upstream Pipe Depth:**	
Location:	Difficult access	**Total Length:**	30.31 m	**Downstream Node:**	OUTFALL
Surface Type:	Unknown	**Joint Length:**		**Downstream Pipe Depth:**	

Use:	Culverted watercourse	**Pipe Shape:**	Arched (with flat bottom)		
Type of Pipe:	Gravity drain/sewer	**Dia/Height:**	900 mm	**Width:**	950 mm
Flow Control:	No flow control	**Pipe Material:**	Brick		
Year Constructed:	Not Specified	**Lining Type:**	No Lining		
Inspection Purpose:	Sample survey to determine asset condition	**Lining Material:**	No Lining		

Comments:
Recommendations: None specified

Scale: 1:263



Position [m]		Code	Observation	MPEG	Photo	Grade
0.00		OC	Start node type, other special chamber, reference number : OUTFALL: START	00:00:00		
0.00		WL	Water level, 30% of the vertical dimension			
4.48		WL	Water level, 25% of the vertical dimension			
6.45		WL	Water level, 15% of the vertical dimension			
6.96	S01	DER	Settled deposits, coarse, 15% cross-sectional area loss, Start			
9.24		WL	Water level, 10% of the vertical dimension			
12.24		WL	Water level, 5% of the vertical dimension			
12.90	F01	DER	Settled deposits, coarse, 15% cross-sectional area loss, End			3
12.90	S02	DER	Settled deposits, coarse, 20% cross-sectional area loss, Start			
17.87		CXP	Connection defective, position incorrect, at 12 o'clock, diameter 100mm			
23.53		DEE	Attached deposits, encrustation, from 7 to 10 o'clock, 5% cross-sectional area loss			2
26.05		DEE	Attached deposits, encrustation, from 1 to 3 o'clock, 5% cross-sectional area loss			2
30.31	F02	DER	Settled deposits, coarse, 20% cross-sectional area loss, End			3
30.31		OCF	Finish node type, other special chamber reference number: INLET: SURVEY OVERLAP			

Construction Features					Miscellaneous Features				
Structural Defects					Service & Operational Observations				
STR No. Def	STR Peak	STR Mean	STR Total	STR Grade	SER No. Def	SER Peak	SER Mean	SER Total	SER Grade
0	0.0	0.0	0.0	1.0	4	4.0	1.6	50.0	3.0

Appendix C

Soil Infiltration Testing

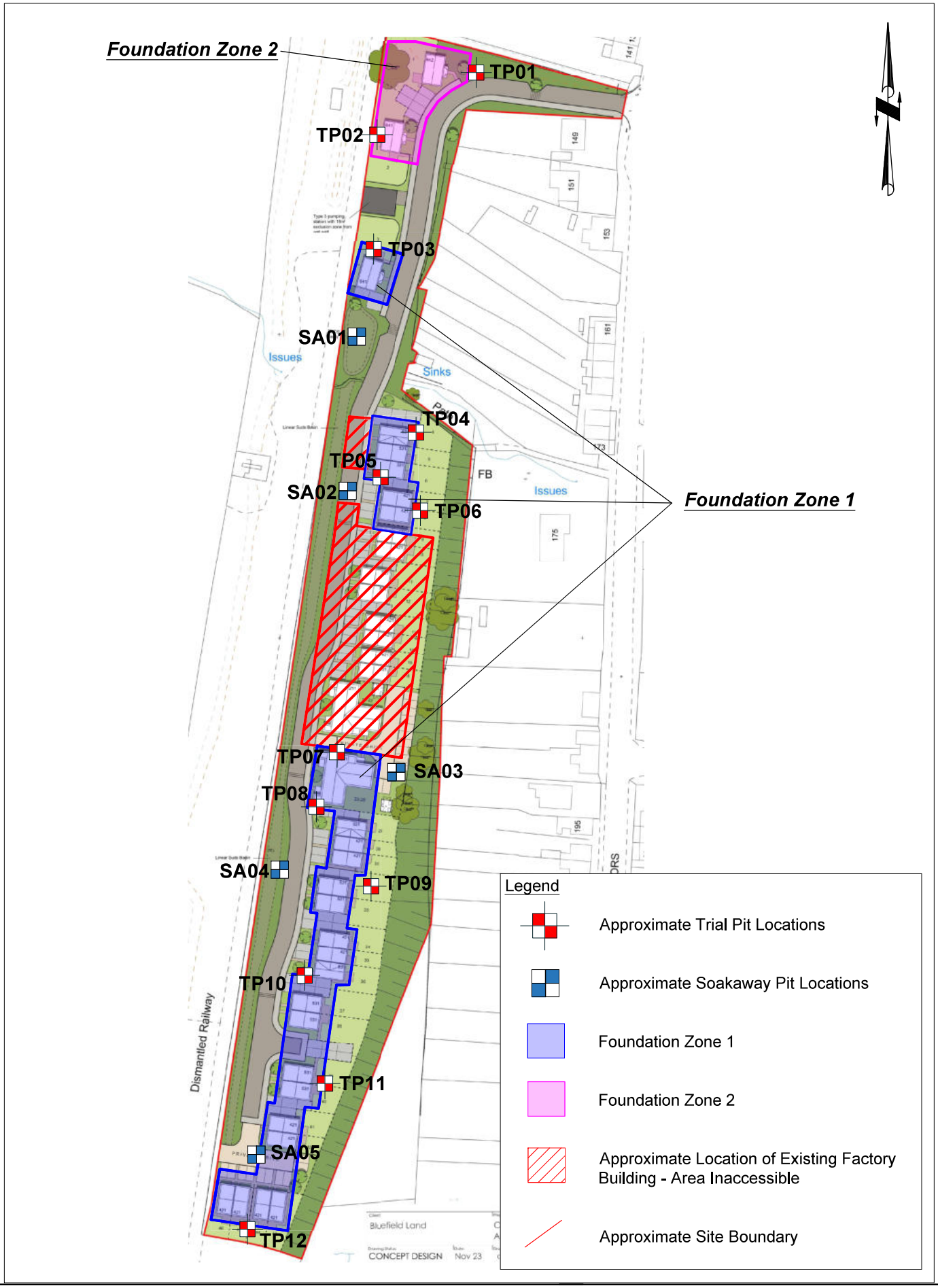


Figure 4: Foundation Zones

Project: Cwmgors, Neath Port Talbot	Job No.: 14301	Intégral Géotechnique	Integral House, 7 Beddau Way, Castlegate Business Park, Caerphilly, CF83 2AX. Tel: 029 2080 7991
Client: Bluefield Land Limited	Scale: 1:1200 at A3		

APPENDIX B

SOIL INFILTRATION TEST RESULTS

BRE365 SOIL INFILTRATION RATE TEST - SA01

14301 Cwmgors, Neath Port Talbot

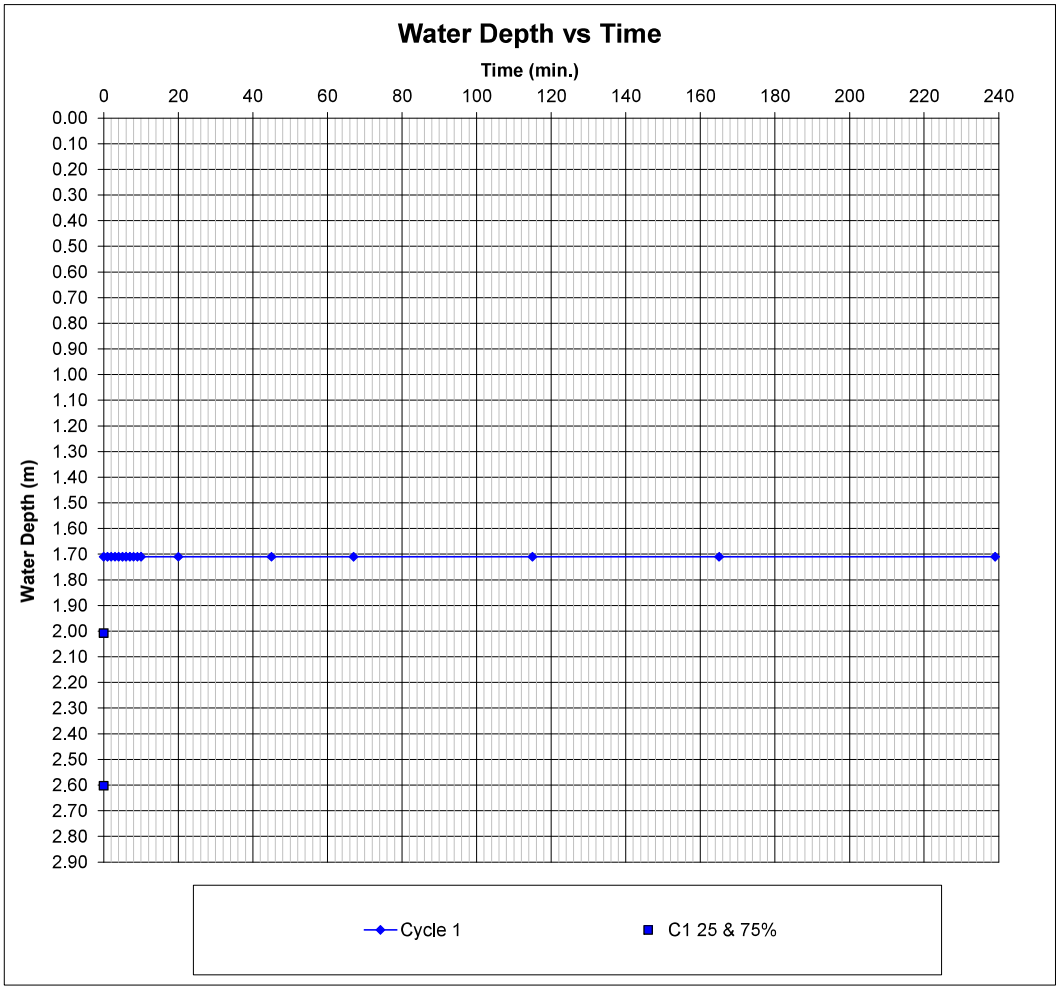
Trial Pit Information	
Length (m)	2.20
Width (m)	0.80
Depth (m)	2.90
Groundwater	2.85
Weather Conditions	Sunny
Date	04-Sep-24

Remarks

1. Groundwater rising from bottom of trial pit to 2.85m bgl after 20 mins.
2. Trial pit generally stable in the short term.
3. Negligible infiltration observed.
4. Insufficient infiltration in order to calculate design rate

Cycle 1		Cycle 2		Cycle 3	
Time (min)	Depth (m)	Time (min)	Depth (m)	Time (min)	Depth (m)
0	1.71				
1	1.71				
2	1.71				
3	1.71				
4	1.71				
5	1.71				
6	1.71				
7	1.71				
8	1.71				
9	1.71				
10	1.71				
20	1.71				
45	1.71				
67	1.71				
115	1.71				
165	1.71				
239	1.71				

Final Excavation Depth (m)	Cycle 1	Cycle 2	Cycle 3
At end of testing cycle	2.90		
Water Depths (m)			
Water depth at start of test	1.71		
Water depth at end of test	1.71		
Effective depth (measured)	0.00		
% Effective storage depth	0.00		
Effective Storage Depths (m)			
Effective storage depth (100%)	1.19		
Effective storage depth (75%)	0.89		
Effective storage depth (50%)	0.60		
Effective storage depth (25%)	0.30		
Outflow Time (min)			
Time for measured outflow	239		
Time for 100% outflow			
Time for 75-25% outflow			
Volume of Outflow (m^3)			
Over measured effective depth	0.00		
Over 100% effective depth	2.09		
From 75% - 25% effective depth	1.05		
Surface Area (m^2)			
For 100% effective storage	8.90		
For 50% effective storage	5.33		
Over measured depth	1.76		
Soil Infiltration Rate (m/s)	**Cycle 1**	**Cycle 2**	**Cycle 3**
Over 100% effective depth	#DIV/0!		
Over measured depth	0.0E+00		
Over 75% - 25% effective depth	**#DIV/0!**		



Intégral Géotechnique

BRE365 SOIL INFILTRATION RATE TEST - SA02

14301 Cwmgors, Neath Port Talbot

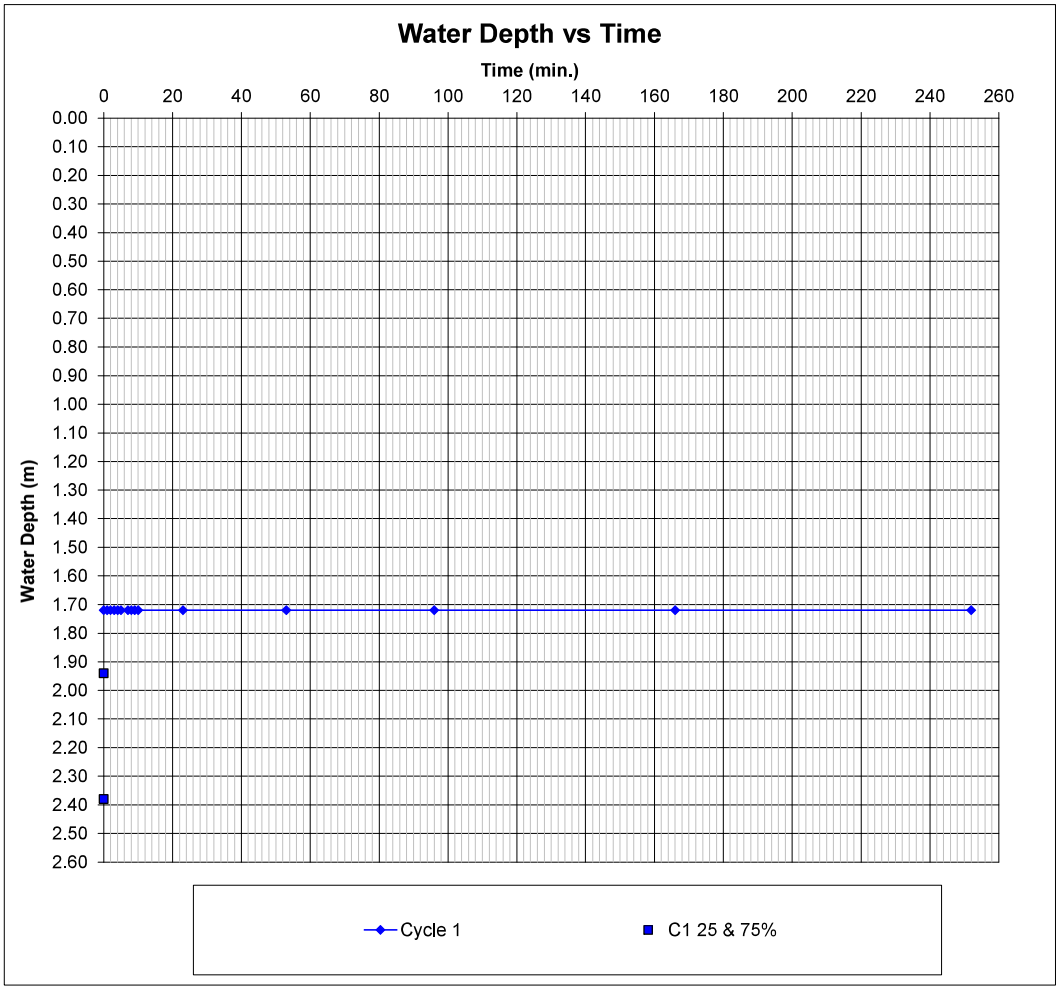
Trial Pit Information	
Length (m)	2.10
Width (m)	0.90
Depth (m)	2.60
Groundwater	1.1
Weather Conditions	Sunny
Date	04-Sep-24

Remarks

1. Minor groundwater seepage at 1.1m bgl.
2. Groundwater rising from bottom of trial pit to 2.55m bgl after 20 mins.
3. Trial pit generally stable in the short term.
4. Negligible infiltration observed.
5. Insufficient infiltration in order to calculate design rate

Cycle 1		Cycle 2		Cycle 3	
Time (min)	Depth (m)	Time (min)	Depth (m)	Time (min)	Depth (m)
0	1.72				
1	1.72				
2	1.72				
3	1.72				
4	1.72				
5	1.72				
7	1.72				
8	1.72				
9	1.72				
10	1.72				
23	1.72				
53	1.72				
96	1.72				
166	1.72				
252	1.72				

Final Excavation Depth (m)	Cycle 1	Cycle 2	Cycle 3
At end of testing cycle	2.60		
Water Depths (m)			
Water depth at start of test	1.72		
Water depth at end of test	1.72		
Effective depth (measured)	0.00		
% Effective storage depth	0.00		
Effective Storage Depths (m)			
Effective storage depth (100%)	0.88		
Effective storage depth (75%)	0.66		
Effective storage depth (50%)	0.44		
Effective storage depth (25%)	0.22		
Outflow Time (min)			
Time for measured outflow	252		
Time for 100% outflow			
Time for 75-25% outflow			
Volume of Outflow (m^3)			
Over measured effective depth	0.00		
Over 100% effective depth	1.66		
From 75% - 25% effective depth	0.83		
Surface Area (m^2)			
For 100% effective storage	7.17		
For 50% effective storage	4.53		
Over measured depth	1.89		
Soil Infiltration Rate (m/s)	**Cycle 1**	**Cycle 2**	**Cycle 3**
Over 100% effective depth	#DIV/0!		
Over measured depth	0.0E+00		
Over 75% - 25% effective depth	**#DIV/0!**		



Intégral Géotechnique

BRE365 SOIL INFILTRATION RATE TEST - SA03

14301 Cwmgors, Neath Port Talbot

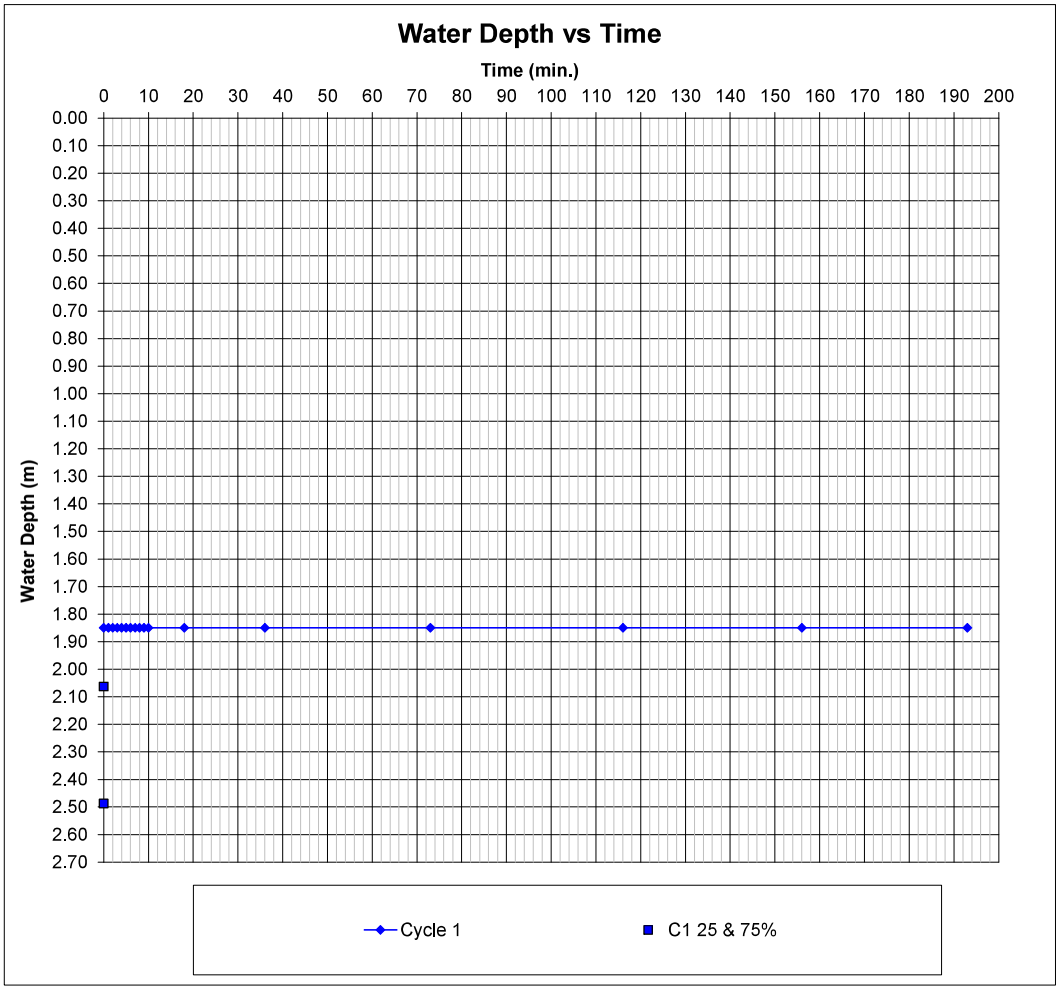
Trial Pit Information	
Length (m)	2.30
Width (m)	0.70
Depth (m)	2.70
Groundwater	Dry
Weather Conditions	Light Rain
Date	05-Sep-24

Remarks

1. No groundwater encountered.
2. Trial pit generally stable in the short term.
3. Negligible infiltration observed.
4. Insufficient infiltration in order to calculate design rate

Cycle 1		Cycle 2		Cycle 3	
Time (min)	Depth (m)	Time (min)	Depth (m)	Time (min)	Depth (m)
0	1.85				
1	1.85				
2	1.85				
3	1.85				
4	1.85				
5	1.85				
6	1.85				
7	1.85				
8	1.85				
9	1.85				
10	1.85				
18	1.85				
36	1.85				
73	1.85				
116	1.85				
156	1.85				
193	1.85				

Final Excavation Depth (m)	Cycle 1	Cycle 2	Cycle 3
At end of testing cycle	2.70		
Water Depths (m)			
Water depth at start of test	1.85		
Water depth at end of test	1.85		
Effective depth (measured)	0.00		
% Effective storage depth	0.00		
Effective Storage Depths (m)			
Effective storage depth (100%)	0.85		
Effective storage depth (75%)	0.64		
Effective storage depth (50%)	0.43		
Effective storage depth (25%)	0.21		
Outflow Time (min)			
Time for measured outflow	193		
Time for 100% outflow			
Time for 75-25% outflow			
Volume of Outflow (m^3)			
Over measured effective depth	0.00		
Over 100% effective depth	1.37		
From 75% - 25% effective depth	0.68		
Surface Area (m^2)			
For 100% effective storage	6.71		
For 50% effective storage	4.16		
Over measured depth	1.61		
Soil Infiltration Rate (m/s)	**Cycle 1**	**Cycle 2**	**Cycle 3**
Over 100% effective depth	#DIV/0!		
Over measured depth	0.0E+00		
Over 75% - 25% effective depth	**#DIV/0!**		



Intégral Géotechnique

BRE365 SOIL INFILTRATION RATE TEST - SA04

14301 Cwmgors, Neath Port Talbot

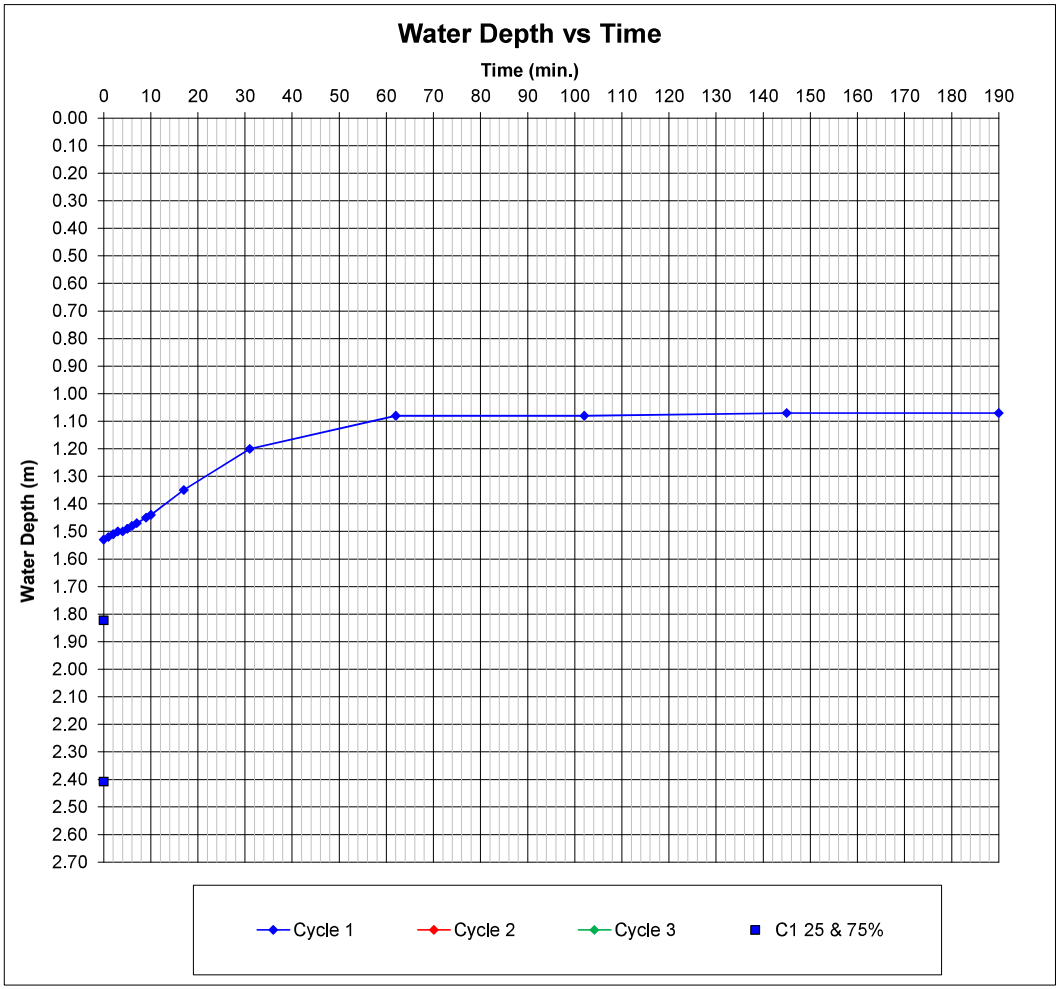
Trial Pit Information	
Length (m)	2.20
Width (m)	0.70
Depth (m)	2.70
Groundwater	0.65
Weather Conditions	Light Rain
Date	05-Sep-24

Remarks

1. Major groundwater inflow at 0.65m bgl.
2. Trial pit generally stable in the short term.
3. Negligible infiltration observed.
4. Insufficient infiltration in order to calculate design rate
5. Rise in water level observed due to grounwater inflow.

Cycle 1		Cycle 2		Cycle 3	
Time (min)	Depth (m)	Time (min)	Depth (m)	Time (min)	Depth (m)
0	1.53				
1	1.52				
2	1.51				
3	1.50				
4	1.50				
5	1.49				
6	1.48				
7	1.47				
9	1.45				
10	1.44				
17	1.35				
31	1.20				
62	1.08				
102	1.08				
145	1.07				
190	1.07				

Final Excavation Depth (m)	Cycle 1	Cycle 2	Cycle 3
At end of testing cycle	2.70		
Water Depths (m)			
Water depth at start of test	1.53		
Water depth at end of test	1.53		
Effective depth (measured)	0.00		
% Effective storage depth	0.00		
Effective Storage Depths (m)			
Effective storage depth (100%)	1.17		
Effective storage depth (75%)	0.88		
Effective storage depth (50%)	0.59		
Effective storage depth (25%)	0.29		
Outflow Time (min)			
Time for measured outflow	190		
Time for 100% outflow			
Time for 75-25% outflow			
Volume of Outflow (m^3)			
Over measured effective depth	0.00		
Over 100% effective depth	1.80		
From 75% - 25% effective depth	0.90		
Surface Area (m^2)			
For 100% effective storage	8.33		
For 50% effective storage	4.93		
Over measured depth	1.54		
Soil Infiltration Rate (m/s)	**Cycle 1**	**Cycle 2**	**Cycle 3**
Over 100% effective depth	#DIV/0!		
Over measured depth	0.0E+00		
Over 75% - 25% effective depth	**#DIV/0!**		



Intégral Géotechnique

BRE365 SOIL INFILTRATION RATE TEST - SA05

14301 Cwmgors, Neath Port Talbot

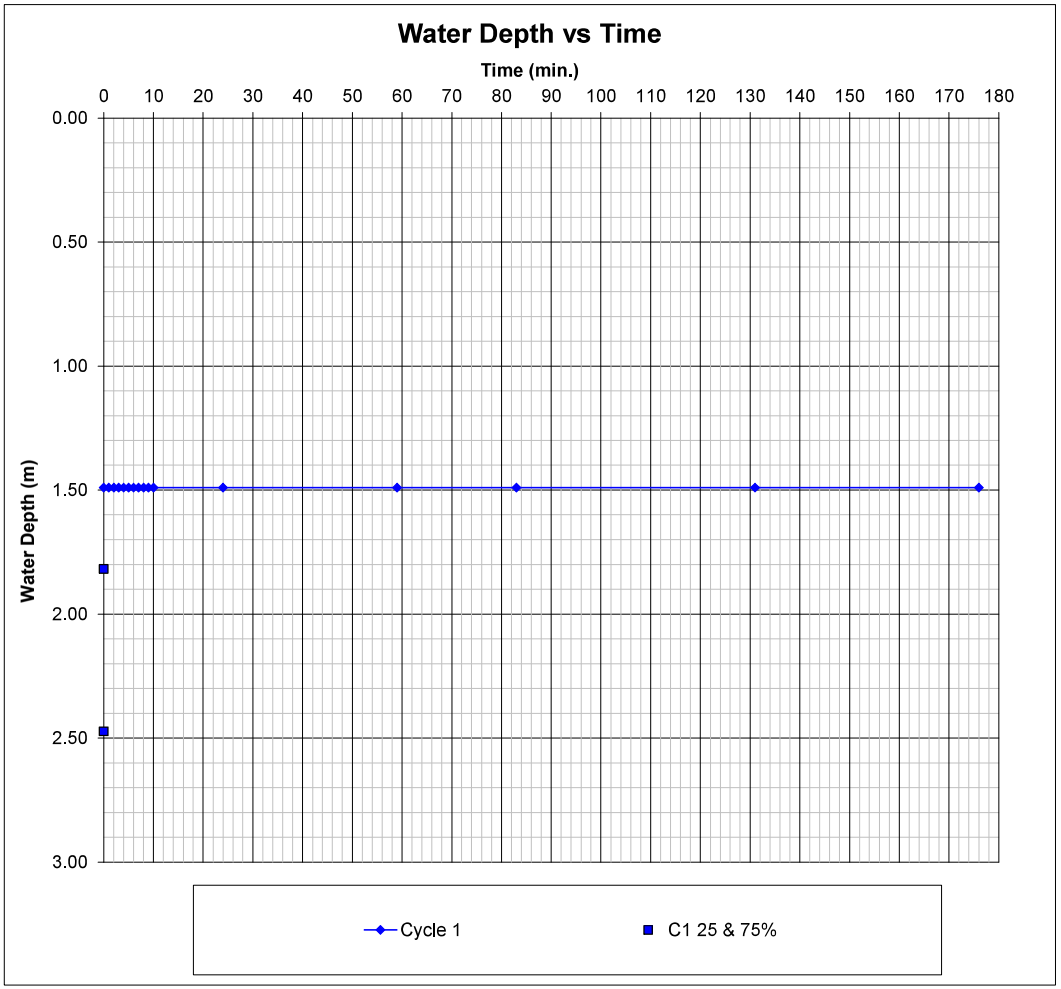
Trial Pit Information	
Length (m)	2.40
Width (m)	0.70
Depth (m)	2.80
Groundwater	2.75
Weather Conditions	Light Rain
Date	05-Sep-24

Remarks

1. Groundwater rising from bottom of trial pit to 2.75m bgl after 20 mins.
2. Trial pit generally stable in the short term.
3. Negligible infiltration observed.
4. Insufficient infiltration in order to calculate design rate

Cycle 1		Cycle 2		Cycle 3	
Time (min)	Depth (m)	Time (min)	Depth (m)	Time (min)	Depth (m)
0	1.49				
1	1.49				
2	1.49				
3	1.49				
4	1.49				
5	1.49				
6	1.49				
7	1.49				
8	1.49				
9	1.49				
10	1.49				
24	1.49				
59	1.49				
83	1.49				
131	1.49				
176	1.49				

Final Excavation Depth (m)	Cycle 1	Cycle 2	Cycle 3
At end of testing cycle	2.80		
Water Depths (m)			
Water depth at start of test	1.49		
Water depth at end of test	1.49		
Effective depth (measured)	0.00		
% Effective storage depth	0.00		
Effective Storage Depths (m)			
Effective storage depth (100%)	1.31		
Effective storage depth (75%)	0.98		
Effective storage depth (50%)	0.66		
Effective storage depth (25%)	0.33		
Outflow Time (min)			
Time for measured outflow	176		
Time for 100% outflow			
Time for 75-25% outflow			
Volume of Outflow (m^3)			
Over measured effective depth	0.00		
Over 100% effective depth	2.20		
From 75% - 25% effective depth	1.10		
Surface Area (m^2)			
For 100% effective storage	9.80		
For 50% effective storage	5.74		
Over measured depth	1.68		
Soil Infiltration Rate (m/s)	**Cycle 1**	**Cycle 2**	**Cycle 3**
Over 100% effective depth	#DIV/0!		
Over measured depth	0.0E+00		
Over 75% - 25% effective depth	**#DIV/0!**		



Intégral Géotechnique

Appendix D

Greenfield Runoff Rate Estimation

Greenfield runoff rate estimation tool

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

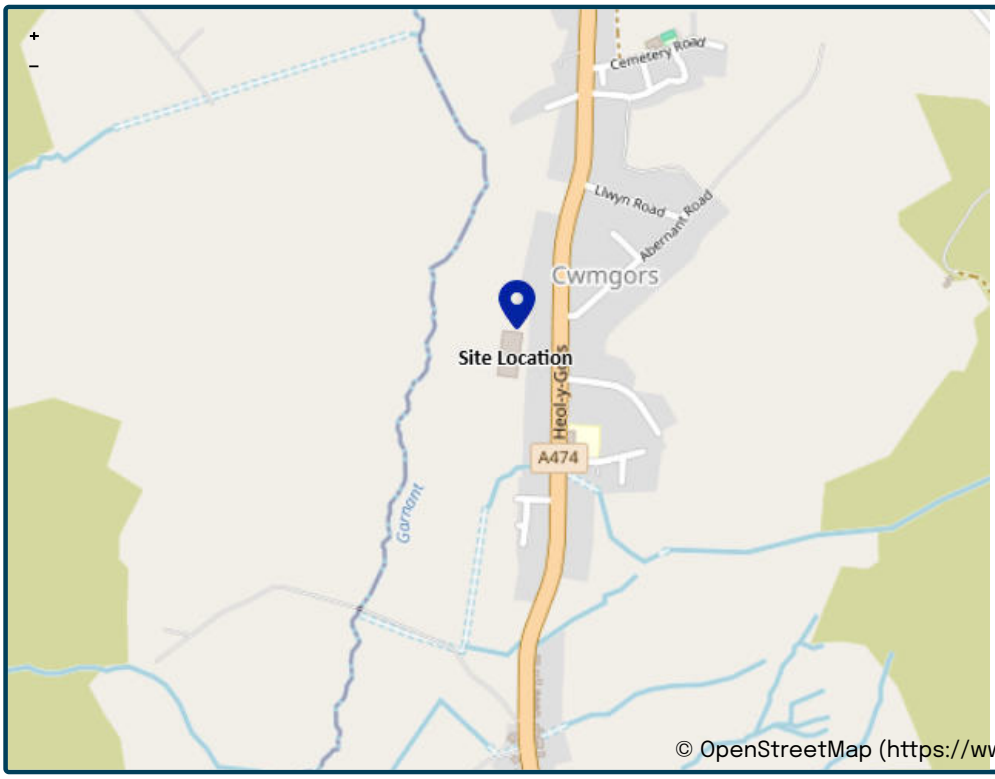
This is an estimation of the greenfield runoff rates that are used to meet normal best practice criteria in line with Environment Agency guidance "Rainfall runoff management for developments", SC030219 (2013), the SuDS Manual C753 (CIRIA, 2015) and the non-statutory standards for SuDS (Defra, 2015). This information on greenfield runoff rates may be the basis for setting consents for the drainage of surface water runoff from sites.

Project details

Date	14/05/2025
Calculated by	RMJ
Reference	2625
Model version	2.0.0

Location

Site name	Former Swelco Site
Site location	Cwmgors



© OpenStreetMap (https://www.openstreetmap.org/copyright) contributors.

Site easting	270338
Site northing	210608

Site details

Total site area (ha)	1 ha

Greenfield runoff

Method

Method	IH124

IH124

	My value		Map value	
SAAR (mm)	1716	mm		1716
How should SPR be derived?	WRAP soil type			
WRAP soil type	5			3
SPR	0.53			
QBar (IH124) (l/s)	17.9	l/s		

Growth curve factors

	My value	Map value
Hydrological region	9	9
1 year growth factor	0.88	
2 year growth factor	0.93	
10 year growth factor	1.42	
30 year growth factor	1.78	
100 year growth factor	2.18	
200 year growth factor	2.46	

Results

Method	IH124	
Flow rate 1 year (l/s)	15.7	l/s
Flow rate 2 year (l/s)	16.6	l/s
Flow rate 10 years (l/s)	25.4	l/s
Flow rate 30 years (l/s)	31.8	l/s
Flow rate 100 years (l/s)	39	l/s
Flow rate 200 years (l/s)	44	l/s

Disclaimer

This report was produced using the Greenfield runoff rate estimation tool (2.0.0) developed by HR Wallingford and available at uksuds.com (https://www.uksuds.com/). The use of this tool is subject to the UK SuDS terms and conditions and licence agreement, which can both be found at uksuds.com/terms-conditions (https://www.uksuds.com/terms-conditions). The outputs from this tool have been used to estimate Greenfield runoff rates. The use of these results is the responsibility of the users of this tool. No liability will be accepted by HR Wallingford, the Environment Agency, Centre for Ecology and Hydrology, Wallingford Hydrosolutions or any other organisation for the use of these data in the design or operational characteristics of any drainage scheme.

Appendix E

Flood Maps

Notes:

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6. Additional site investigation required in order to confirm whether there is a requirement for clean capping to gardens. This may affect proposed development levels somewhat.

KEY

- Overland exceedance flow routes
- Emergency flood evacuation/escape route
- 18.70 Proposed Ground Level
- 300hw Masonary Retaining Wall (Height Indicated)
- 300hw Exposed Facing Brickwork (Height Indicated)
- 1 in 2 max Embankment
- 64.300 Finished Floor Level
- 3 Steps (No. Indicated)
- Domestic storm water drainage
- Silt trap (on outlet from permeable pavements)
- Type 4 SW Inspection Chamber
- Type 3 SW Inspection Chamber
- Domestic storm water drainage (Adoptable SAB)
- Silt trap (on outlet from permeable pavements SAB)
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- Type 3 SW Inspection Chamber (Adoptable SAB)
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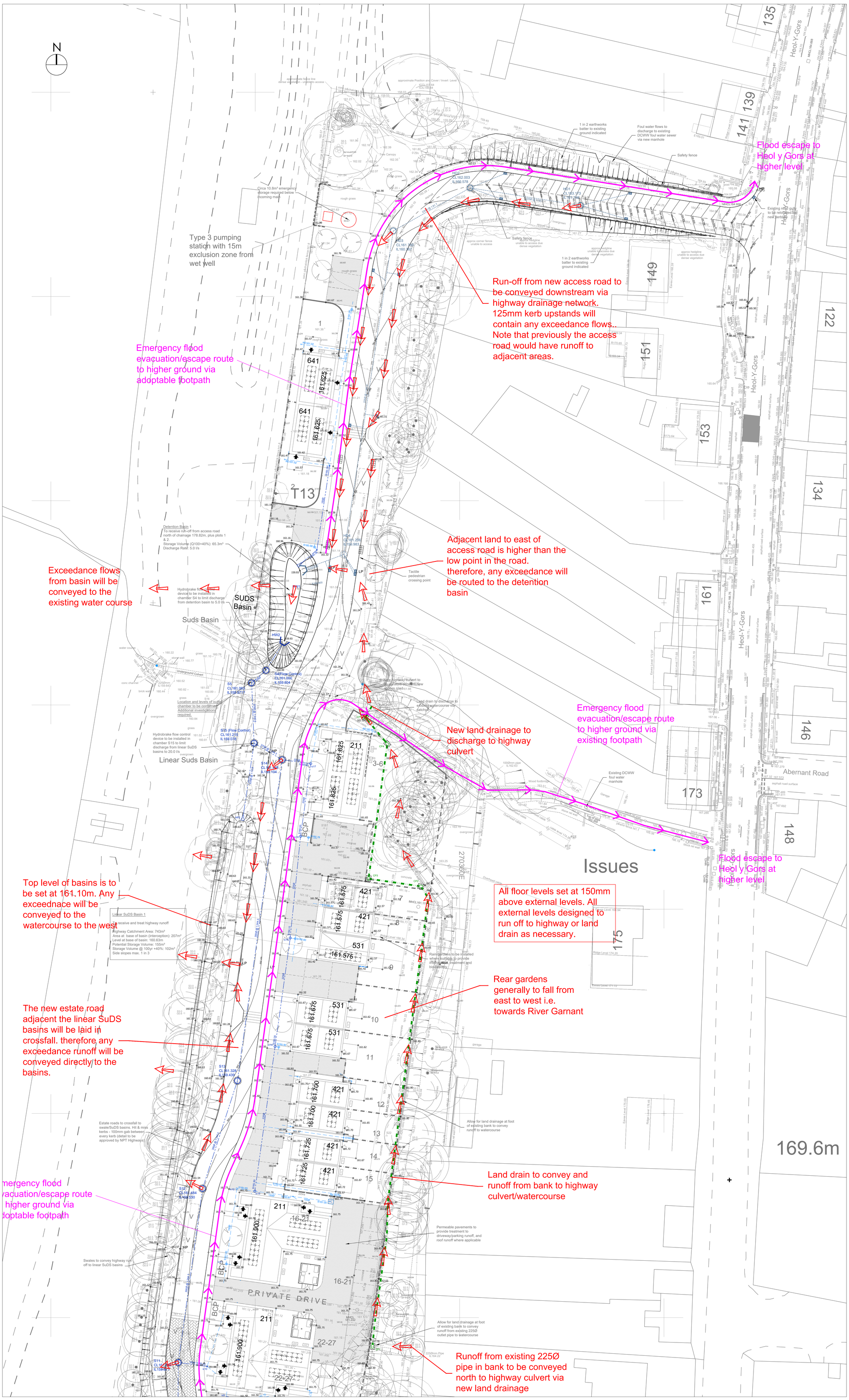
- Highway Drain Manhole (Adoptable S.38)
- Highway Gully & 150Ø Connection (Adoptable S.38)
- Porous asphalt driveway
- Land drainage (french drain with perforated pipe)



Status:

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rev	date	description	by
A	May 2025	Minor updates to site layout; Plots 1 & 2 relocated, general plot handings	RMJ
B	Aug 2025	Minor updates to site layout; Emergency flood evacuation/ escape route added.	RMJ

Drawn:	RMJ	Client:	Bluefield Land
Checked:	RMJ	Project:	Cwmgors, Ammanford
Date:	May 2025	Title:	Flood Exceedance Paths - Sheet 1 of 2
Scale:	1:250 @ A0	Ref:	2625-748-1 Rev: B

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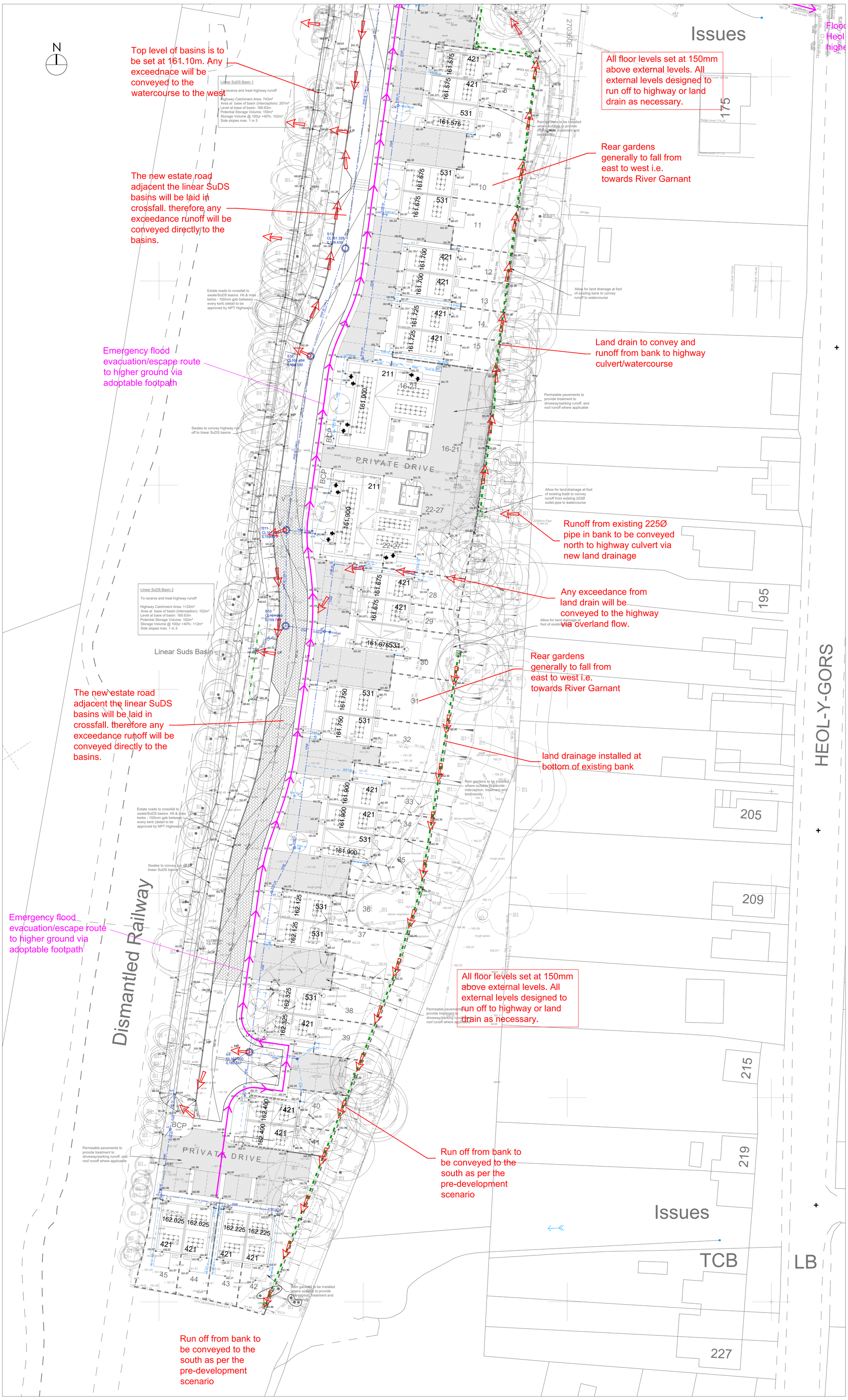

KEY

- Overland exceedance flow routes
- Emergency flood evacuation/escape route
- Proposed Ground Level
- Masonary Retaining Wall (Height Indicated)
- Exposed Facing Brickwork (Height Indicated)
- 1 in 2 max Embankment
- 64.300 Finished Floor Level
- Steps (No. Indicated)
- Domestic storm water drainage
- Silt trap (on outlet from permeable pavements)
- Type 4 SW Inspection Chamber
- Type 3 SW Inspection Chamber
- Domestic storm water drainage (Adoptable SAB)
- Silt trap (on outlet from permeable pavements SAB)
- Type 4 SW Inspection Chamber (Adoptable SAB)
- Type 3 SW Inspection Chamber (Adoptable SAB)
- Storm Water Manhole (Adoptable SAB)
- Highway Drain (Adoptable S.38)
- Highway Drain Manhole (Adoptable S.38)
- Highway Gully & 150Ø Connection (Adoptable S.38)
- Porous asphalt driveway
- Land drainage (french drain with perforated pipe)

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Drawn:	RMJ	Client:	Bluefield Land
Checked:	RMJ	Project:	Cwmgors, Ammanford
Date:	May 2025	Title:	Flood Exceedance Paths - Sheet 2 of 2
Scale:	1:250 @ A0	Ref:	2625-748-2 Rev: B

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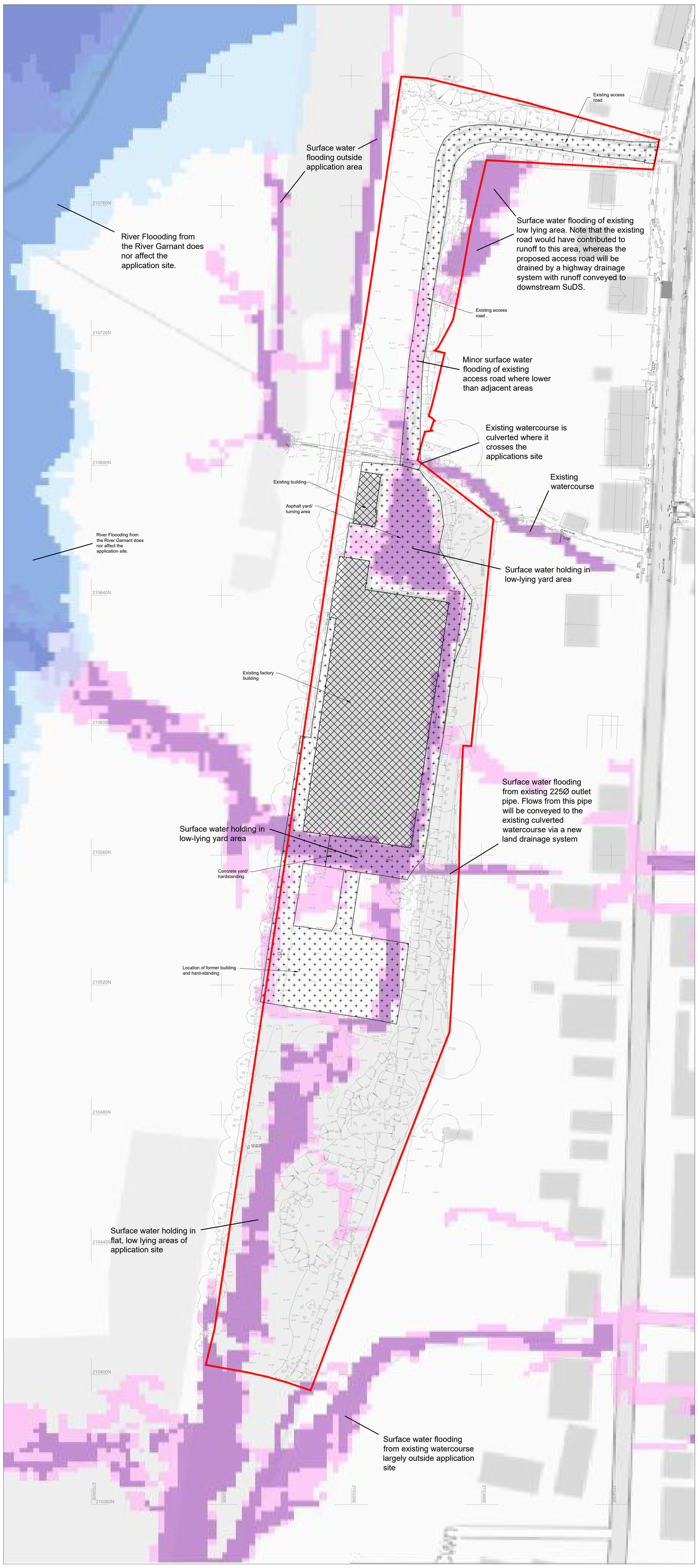

Overlay of 'NRW Flood Map for Planning' over Site Topographical Survey
Scale 1:500

Analysis of existing on-site low-lying/surface water ponding areas and flood volumes based on site topographical survey
Scale 1:500

Legend

TAN15 Defended Zones
- Rivers
- Sea
- Rivers and Sea

Rivers and Sea
- Flood Zone 3
- Flood Zone 2

Surface Water and Small Watercourses
- Flood Zone 3
- Flood Zone 2
- Recorded Flood Extents

KEY
- Application Site Boundary
- Existing Site Buildings
- Existing Access Road & Hardstandings

N

Legend

TAN15 Defended Zones
- Rivers
- Sea
- Rivers and Sea

Rivers and Sea
- Flood Zone 3
- Flood Zone 2

Surface Water and Small Watercourses
- Flood Zone 3
- Flood Zone 2
- Recorded Flood Extents

KEY
- Application Site Boundary
- Existing Ground Contours (based on site topographical survey)
- Existing Ground Surface Fall Direction
- Existing low-lying areas prone to ponding/flooding from surface water flows (based on analysis of topo survey)

N

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rev	date	description	by
A	July 2025	Flood area and volume analysis plan added.	RMJ

Status: **APPROVAL**

Drawn: RMJ
Checked: RMJ
Date: May 2025
Scale: 1:500

Client: Bluefield Land
Project: Heol y Gors, Cwmgors
Title: NRW Flood Map Overlay & Flood Analysis
Ref: 2625-750
Rev: A

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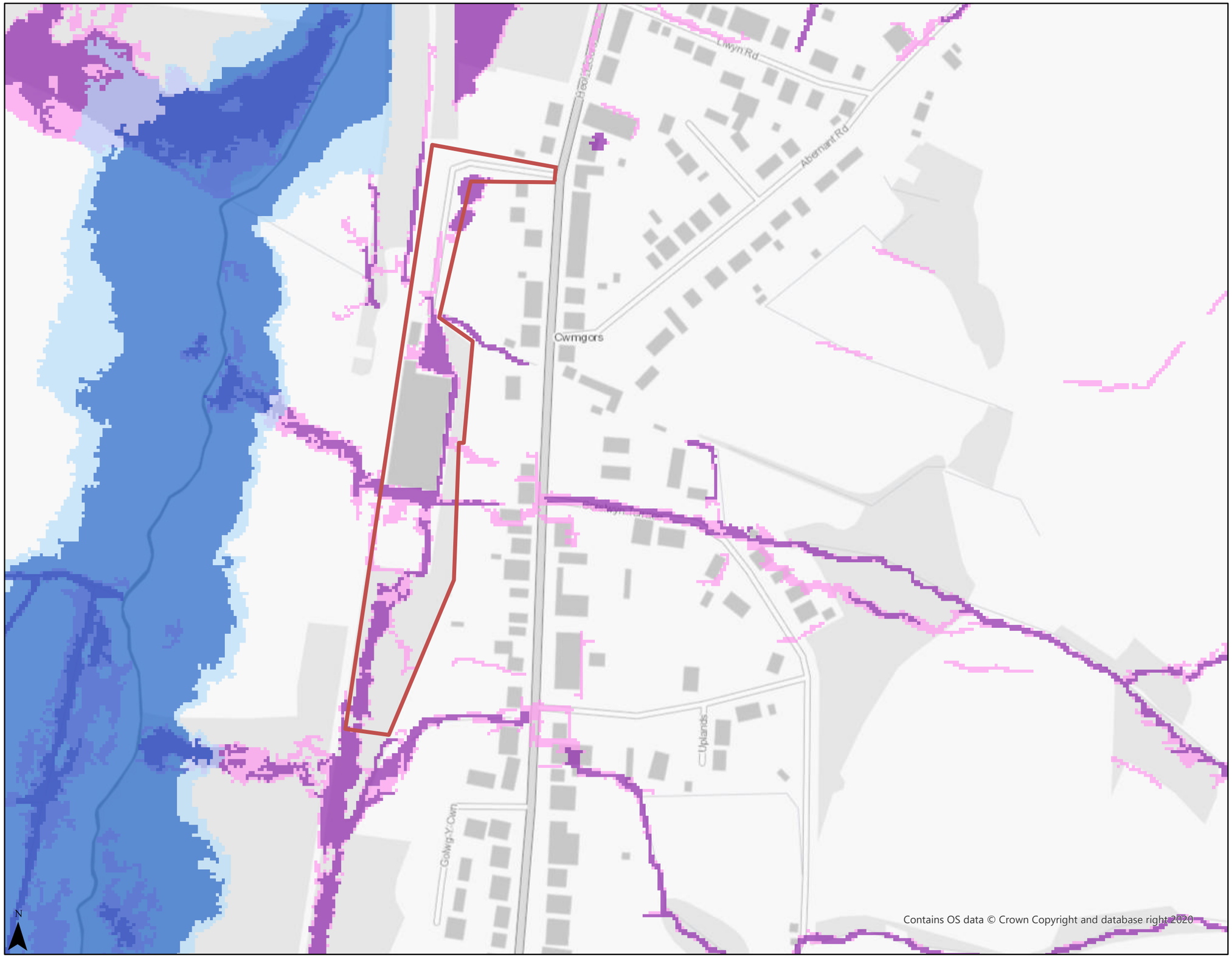
Cyfoeth Naturiol Cymru
Natural Resources Wales

Flood Map for Planning - Basic

Heol y Gors, Cwmgors



Legend

TAN15 Defended Zones

- Rivers
- Sea
- Rivers and Sea

Rivers and Sea

- Flood Zone 3
- Flood Zone 2

Surface Water and Small Watercourses

- Flood Zone 3
- Flood Zone 2
- Recorded Flood Extents

Scale at A3: 1:2,500

Date: 14/05/2025

0.1 0.05 0 0.1
km

British National Grid

Disclaimer

https://naturalresources.wales/flooding/disclaimer-for-our-flood-and-coastal-erosion-risk-maps/?lang=en

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Appendix F

Proposed Engineering Layouts

Notes:

1. All information provided on this drawing is intended for preliminary engineering appraisal purposes only. NOT FOR CONSTRUCTION
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6. Additional site investigation required in order to confirm whether there is a requirement for clean capping to gardens. This may affect proposed development levels somewhat.

KEY

- Proposed Ground Level
- Masonary Retaining Wall (Height Indicated)
- Exposed Facing Brickwork (Height Indicated)
- 1 in 2 max Embankment
- Finished Floor Level
- Steps (No. Indicated)
- Existing Foul Water Drain/Sewer
- Domestic storm water drainage
- Silt trap (on outlet from permeable pavements)
- Type 4 SW Inspection Chamber
- Type 3 SW Inspection Chamber
- Domestic storm water drainage (Adoptable SAB)
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- Highway Drain Manhole (Adoptable S.38)
- Highway Gully & 150ø Connection (Adoptable S.38)
- Foul Water Drain (Non-Adoptable)
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- Foul Water Sewer (Adoptable)
- Type 4 FW Inspection Chamber (Adoptable)
- Type 3 FW Inspection Chamber (Adoptable)
- Foul Water Manhole (Adoptable)
- Porous asphalt driveway
- Rain Garden to provide interception and Treatment
- Swale and linear SuDS basins to provide interception, treatment and storage of highway runoff
- Water Butt
- GreenBlue Urban SuDSPod o.s.a to intercept and attenuate roof runoff where appropriate
- Land drainage and catchpit
- Existing tree root protection area
- Marshalls Eden Kerb Highway outlet to Linear SuDS Basin

EXISTING & PROPOSED SURFACE WATER DISCHARGE RATES

Note: NPT SAB have requested that proposed development discharge rates be restricted to the pre-development greenfield rate and not the pre-development brownfield rate.
Therefore, the proposed discharge rate will be restricted to the pre-development Qbar greenfield rate for all storms up-to-and-including the 100 year +40% storm event. :-

Pre-development Greenfield Catchment Area* = 1.3966ha
*based on total; site area minus proposed site areas continuing to runoff as per pre-development scenario (see above)

Allowable Greenfield Runoff Rates (1.3966ha)

Qbar	= 25.0 l/s
1 in 1yr	= 21.9 l/s
1 in 30yr	= 44.4 l/s
1 in 100yr	= 54.5 l/s

Rates calculated using HR Wallingford 'Greenfield runoff rate estimation'

Post-Development
Approx Impermeable Area = 0.781ha

Post-Development peak flow rate

1 in 1yr	= 24.9 l/s (+3.0 l/s)
1 in 30yr	= 24.9 l/s (-19.5 l/s)
1 in 100yr	= 25.0 l/s (-29.5 l/s)
1 in 100yr +40%	= 25.0 l/s

Discharge Volume (100yr 360mins)

*Post-Dev - 1 in 100yr (360mins) = 498.7m³

Total Volume +/- = +197.7m³ *Note: All flows restricted to pre-development Brownfield Qbar rate. Therefore, discharge volumes are provided for information only.

SuDS Measures

The above post-development flow rates are based on a traditional piped system with a 5 minute concentration time.

However, all runoff is to be conveyed to pass through a SuDS feature which will further reduce the above discharge rates and volume.

The SuDS components will effectively increase concentration time, reduce flow velocities and rates, and providing significant volume losses through evaporation and evapotranspiration.

Losses are difficult to quantify and will vary depending on plant species, level of saturation and varied ground conditions across the site.

Status:

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rev	date	description	by
G	Mar 2025	Highway batters updated	RMJ
H	May 2025	Linear SuDS ponds updated; additional levels and land drainage added to rear of plots 3 to 33.	RMJ
I	May 2025	Minor alterations to site layout: Plots 1 & 2 relocated, plot handings generally revised.	RMJ
J	July 2025	Levels and land drainage to rear boundaries of plots 3 to 42 revised; Hway outlets to linear basin indicated; Proposed discharge rates updated.	RMJ
K	July 2025	Minor layout changes incorporated; decelaration lane adj site access to be omitted/replaced by footway; forward visibility splay added at bend opposite pumping station; vehicular crossovers added.	RMJ

Drawn:	RMJ	Client:	Bluefield Land
Checked:	RMJ	Project:	Cwmgors, Ammanford
Date:	Nov. 2024	Title:	Engineering Layout - Sheet 1 of 2
Scale:	1:250 @ A0	Ref:	2625-505-1 Rev: K

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F	May 2025	Linear SuDS ponds updated; additional levels and land drainage added to rear of plots 3 to 33.	RMJ
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H	July 2025	Levels and land drainage to rear boundaries of plots 3 to 42 revised; Hway outlets to linear basin indicated; Proposed discharge rates updated.	RMJ
I	July 2025	Minor layout changes incorporated; turning head layout revised; vehicular crossovers added.	RMJ

Drawn:	RMJ	Client:	Bluefield Land
Checked:	RMJ	Project:	Cwmgors, Ammanford
Date:	Nov. 2023	Title:	Engineering Layout - Sheet 2 of 2
Scale:	1:250 @ A0	Ref:	2625-505-2 Rev: I

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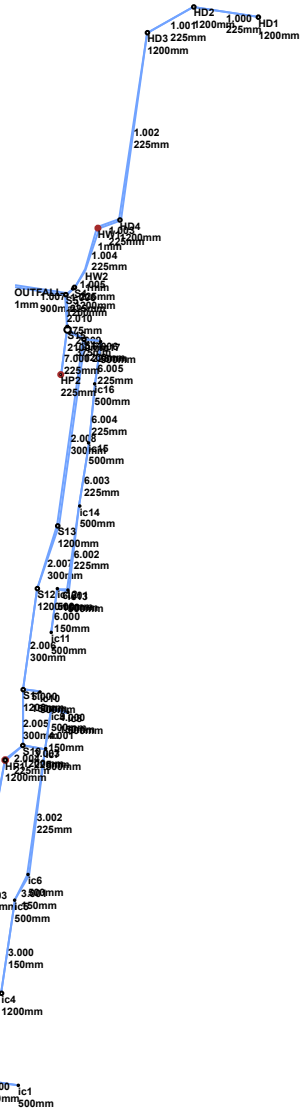
Appendix G

Causeway Flow Surface Water Design Reports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1.001
1200mm
1.000
225mm
HD1
1200mm
HD3
225mm
1200mm
1.002
225mm
HD4
HW1
1.004
225mm
HW2
OUTFALL
1mm
900mm
2.010
HP2
225mm
6.005
225mm
ic16
500mm
6.004
225mm
6.003
225mm
ic14
500mm
S13
1200mm
6.002
225mm
6.000
150mm
ic11
500mm
2.008
300mm
2.005
3.002
225mm
ic6
500mm
3.000
150mm
ic4
1200mm
out1
500mm
2.001
150mm
ic2
500mm
2.000
150mm
ic1
500mm

Design Settings

Rainfall Methodology	FSR	Maximum Time of Concentration (mins)	30.00
Return Period (years)	5	Maximum Rainfall (mm/hr)	50.0
Additional Flow (%)	10	Minimum Velocity (m/s)	1.00
FSR Region	England and Wales	Connection Type	Level Soffits
M5-60 (mm)	20.000	Minimum Backdrop Height (m)	0.200
Ratio-R	0.200	Preferred Cover Depth (m)	1.200
CV	0.750	Include Intermediate Ground	✓
Time of Entry (mins)	5.00	Enforce best practice design rules	✓

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Width (mm)	Easting (m)	Northing (m)	Depth (m)
HD1	0.018	5.00	163.173	1240	675	270383.685	210777.826	1.425
HD2	0.019	5.00	162.003	1240	675	270362.059	210781.272	1.425
HD3	0.049	5.00	161.780	1240	675	270347.015	210772.858	1.413
HD4	0.050	5.00	161.206	1240	675	270337.342	210709.478	1.223
HW1	0.023	5.00	160.890	1		270329.969	210706.741	0.955
HW2	0.000		160.890	1		270325.723	210692.621	1.044
S4	0.000		161.000	1200		270322.099	210686.775	1.196
S5	0.000		161.063	1245	1470	270319.251	210684.321	2.092
OUTFALL	0.000		160.060	1		270302.037	210687.157	1.250
ic1	0.017	5.00	162.100	500		270303.315	210417.903	0.910
ic2	0.005	5.00	161.963	500		270280.437	210421.095	1.013
ic3	0.041	5.00	161.872	500		270282.213	210433.821	1.052
out1	0.000		161.100	1		270283.055	210440.593	0.545
HP1	0.112	5.00	161.100	450	450	270298.928	210527.505	1.199
S10	0.000		161.248	1240	675	270304.820	210532.422	1.500
S11	0.000		161.430	1240	675	270304.941	210551.232	1.759
S12	0.000		161.484	1200		270309.692	210585.283	1.954
S13	0.000		161.328	1200		270316.510	210606.401	1.889
S14	0.000		161.458	1350		270325.279	210669.279	2.354
S15	0.000		161.215	2100		270319.772	210672.515	2.137
HP2	0.074	5.00	161.100	225		270317.522	210657.396	0.470
ic4	0.039	5.00	162.000	1240	675	270297.703	210448.915	1.333
ic5	0.000		161.920	500		270302.080	210480.291	1.570
ic6	0.060	5.00	161.790	500		270306.560	210488.956	1.620
ic7	0.008	5.00	161.550	500		270312.472	210531.354	1.670
ic8		5.00	161.514	500		270319.914	210543.593	0.874
ic9	0.018	5.00	161.636	500		270314.289	210544.378	1.146
ic10	0.001	5.00	161.726	500		270310.584	210550.444	1.196
ic11	0.052	5.00	161.750	500		270314.327	210570.522	0.750
ic12	0.000		161.734	500		270316.384	210585.266	0.884
ic13	0.092	5.00	161.734	500		270319.929	210584.772	1.234
ic14	0.043	5.00	161.517	500		270323.883	210613.108	1.217
ic15	0.007	5.00	161.454	500		270326.845	210634.360	1.304
ic16			161.610	500		270328.867	210654.272	1.610
ic17			161.705	500		270330.852	210668.502	1.805

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Links

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	T of C (mins)	Rain (mm/hr)
1.000	HD1	HD2	21.899	0.600	161.748	160.578	1.170	18.7	225	5.12	50.0
1.001	HD2	HD3	17.237	0.600	160.578	160.367	0.211	81.7	225	5.32	50.0
1.002	HD3	HD4	64.114	0.600	160.367	159.983	0.384	167.0	225	6.38	50.0
1.003	HD4	HW1	7.865	0.600	159.983	159.935	0.048	163.8	225	6.51	50.0
1.004	HW1	HW2	14.745	0.600	159.935	159.846	0.089	165.7	225	6.75	50.0
1.005	HW2	S4	6.878	0.600	159.846	159.804	0.042	163.8	225	6.86	50.0
1.006	S4	S5	3.759	0.600	159.804	159.646	0.158	23.8	225	6.88	50.0
1.007	S5	OUTFALL	17.446	0.600	158.971	158.810	0.161	108.4	900	9.76	49.9
2.000	ic1	ic2	23.100	0.600	161.190	160.950	0.240	96.2	150	5.38	50.0
2.001	ic2	ic3	12.849	0.600	160.950	160.820	0.130	98.8	150	5.59	50.0
2.002	ic3	out1	6.824	0.600	160.820	160.630	0.190	35.9	150	5.66	50.0
2.003	out1	HP1	88.350	0.600	160.555	159.901	0.654	135.1	225	6.97	50.0
2.004	HP1	S10	7.674	0.600	159.901	159.823	0.078	98.4	225	7.06	50.0
2.005	S10	S11	18.810	0.600	159.748	159.671	0.077	244.3	300	7.38	50.0
2.006	S11	S12	34.381	0.600	159.671	159.530	0.141	244.3	300	7.95	50.0
2.007	S12	S13	22.191	0.600	159.530	159.439	0.091	244.3	300	8.32	50.0
2.008	S13	S14	63.487	0.600	159.439	159.179	0.260	244.3	300	9.38	50.0
2.009	S14	S15	6.387	0.600	159.104	159.078	0.026	245.7	375	9.47	50.0
2.010	S15	S5	11.817	0.600	159.078	159.041	0.037	319.4	375	9.66	50.0
3.000	ic4	ic5	31.680	0.600	160.667	160.350	0.317	99.9	150	5.53	50.0
3.001	ic5	ic6	9.755	0.600	160.350	160.245	0.105	92.9	150	5.68	50.0
3.002	ic6	ic7	42.808	0.600	160.170	159.880	0.290	147.6	225	6.35	50.0

Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)	Pro Depth (mm)	Pro Velocity (m/s)
1.000	3.038	120.8	2.7	1.200	1.200	0.018	0.0	23	1.261
1.001	1.448	57.6	5.5	1.200	1.188	0.037	0.0	47	0.923
1.002	1.009	40.1	12.8	1.188	0.998	0.086	0.0	87	0.900
1.003	1.018	40.5	20.3	0.998	0.730	0.136	0.0	113	1.020
1.004	1.013	40.3	23.7	0.730	0.819	0.159	0.0	124	1.053
1.005	1.019	40.5	23.7	0.819	0.971	0.159	0.0	123	1.057
1.006	2.693	107.1	23.7	0.971	1.192	0.159	0.0	72	2.175
1.007	3.009	1914.4	108.4	1.192	0.350	0.728	0.0	143	1.672
2.000	1.024	18.1	2.5	0.760	0.863	0.017	0.0	38	0.723
2.001	1.011	17.9	3.3	0.863	0.902	0.022	0.0	44	0.773
2.002	1.685	29.8	9.4	0.902	0.320	0.063	0.0	58	1.494
2.003	1.123	44.6	9.4	0.320	0.974	0.063	0.0	70	0.893
2.004	1.318	52.4	26.1	0.974	1.200	0.175	0.0	112	1.316
2.005	1.001	70.8	44.7	1.200	1.459	0.300	0.0	173	1.057
2.006	1.001	70.8	44.9	1.459	1.654	0.301	0.0	174	1.058
2.007	1.001	70.8	44.9	1.654	1.589	0.301	0.0	174	1.058
2.008	1.001	70.8	44.9	1.589	1.979	0.301	0.0	174	1.058
2.009	1.151	127.1	73.8	1.979	1.762	0.495	0.0	205	1.193
2.010	1.008	111.3	84.8	1.762	1.647	0.569	0.0	246	1.106
3.000	1.005	17.8	5.8	1.183	1.420	0.039	0.0	59	0.900
3.001	1.043	18.4	5.8	1.420	1.395	0.039	0.0	58	0.924
3.002	1.074	42.7	14.8	1.395	1.445	0.099	0.0	91	0.976

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Links

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	T of C (mins)	Rain (mm/hr)
3.003	ic7	S10	7.726	0.600	159.880	159.823	0.057	135.5	225	6.46	50.0
4.000	ic8	ic9	5.680	0.600	160.640	160.490	0.150	37.9	150	5.06	50.0
4.001	ic9	ic7	13.150	0.600	160.490	159.955	0.535	24.6	150	5.17	50.0
5.000	ic10	S11	5.698	0.600	160.530	159.821	0.709	8.0	150	5.03	50.0
6.000	ic11	ic12	14.887	0.600	161.000	160.850	0.150	99.2	150	5.25	50.0
6.001	ic12	ic13	3.579	0.600	160.850	160.520	0.330	10.8	150	5.27	50.0
6.002	ic13	ic14	28.611	0.600	160.500	160.300	0.200	143.1	225	5.70	50.0
6.003	ic14	ic15	21.457	0.600	160.300	160.150	0.150	143.0	225	6.03	50.0
6.004	ic15	ic16	20.014	0.600	160.150	160.000	0.150	133.4	225	6.33	50.0
6.005	ic16	ic17	14.368	0.600	160.000	159.900	0.100	143.7	225	6.55	50.0
6.006	ic17	S14	5.627	0.600	159.900	159.254	0.646	8.7	225	6.57	50.0
7.000	HP2	S15	15.286	0.600	160.630	159.228	1.402	10.9	225	5.06	50.0

Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)	Pro Depth (mm)	Pro Velocity (m/s)
3.003	1.121	44.6	18.6	1.445	1.200	0.125	0.0	102	1.073
4.000	1.640	29.0	0.0	0.724	0.996	0.000	0.0	0	0.000
4.001	2.039	36.0	2.7	0.996	1.445	0.018	0.0	28	1.205
5.000	3.576	63.2	0.1	1.046	1.459	0.001	0.0	6	0.724
6.000	1.008	17.8	7.8	0.600	0.734	0.052	0.0	69	0.975
6.001	3.076	54.4	7.8	0.734	1.064	0.052	0.0	38	2.197
6.002	1.091	43.4	21.5	1.009	0.992	0.144	0.0	112	1.089
6.003	1.091	43.4	27.9	0.992	1.079	0.187	0.0	131	1.157
6.004	1.130	44.9	28.9	1.079	1.385	0.194	0.0	131	1.198
6.005	1.088	43.3	28.9	1.385	1.580	0.194	0.0	135	1.164
6.006	4.460	177.3	28.9	1.580	1.979	0.194	0.0	61	3.308
7.000	3.985	158.4	11.0	0.245	1.762	0.074	0.0	40	2.316

Simulation Settings

Rainfall Methodology	FSR	Analysis Speed	Normal
FSR Region	England and Wales	Skip Steady State	x
M5-60 (mm)	20.000	Drain Down Time (mins)	240
Ratio-R	0.200	Additional Storage (m³/ha)	20.0
Summer CV	0.750	Check Discharge Rate(s)	x
Winter CV	0.840	Check Discharge Volume	x

Storm Durations

15	30	60	120	180	240	360	480	600	720	960	1440

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Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
1	0	0	0
2	0	0	0
30	0	0	0
100	0	0	0
100	40	0	0

Node S4 Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	✓	Sump Available	✓
Invert Level (m)	159.804	Product Number	CTL-SHE-0104-5000-1086-5000
Design Depth (m)	1.086	Min Outlet Diameter (m)	0.150
Design Flow (l/s)	5.0	Min Node Diameter (mm)	1200

Node S15 Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	✓	Sump Available	✓
Invert Level (m)	159.078	Product Number	CTL-SHE-0184-2000-2022-2000
Design Depth (m)	2.022	Min Outlet Diameter (m)	0.225
Design Flow (l/s)	20.0	Min Node Diameter (mm)	1800

Node HP1 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	160.630
Side Inf Coefficient (m/hr)	0.00000	Porosity	1.00	Time to half empty (mins)	192

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	179.4	0.0	0.470	494.6	0.0

Node HP2 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	160.630
Side Inf Coefficient (m/hr)	0.00000	Porosity	1.00	Time to half empty (mins)	180

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	179.4	0.0	0.470	494.6	0.0

Node HW1 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	159.930
Side Inf Coefficient (m/hr)	0.00000	Porosity	1.00	Time to half empty (mins)	216

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	31.5	0.0	0.960	155.2	0.0

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Results for 1 year Critical Storm Duration. Lowest mass balance: 98.57%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	HD1	10	161.768	0.020	2.0	0.0219	0.0000	OK
15 minute winter	HD2	10	160.618	0.040	4.1	0.0441	0.0000	OK
15 minute winter	HD3	11	160.440	0.073	9.5	0.1114	0.0000	OK
15 minute winter	HD4	11	160.083	0.100	14.5	0.1650	0.0000	OK
60 minute winter	HW1	44	160.072	0.137	11.5	5.6481	0.0000	OK
60 minute winter	HW2	46	160.071	0.225	7.9	0.0000	0.0000	OK
60 minute winter	S4	46	160.070	0.266	5.9	0.3010	0.0000	SURCHARGED
30 minute summer	S5	21	159.045	0.074	25.0	0.1350	0.0000	OK
30 minute summer	OUTFALL	21	158.881	0.070	24.9	0.0000	0.0000	OK
15 minute winter	ic1	10	161.223	0.032	1.9	0.0185	0.0000	OK
15 minute winter	ic2	11	160.987	0.037	2.5	0.0109	0.0000	OK
15 minute winter	ic3	10	160.873	0.053	6.9	0.0513	0.0000	OK
15 minute winter	out1	11	160.613	0.058	6.8	0.0000	0.0000	OK
15 minute winter	HP1	11	160.002	0.101	18.7	0.2092	0.0000	OK
60 minute winter	S10	45	159.930	0.182	21.8	0.1521	0.0000	OK
60 minute winter	S11	45	159.928	0.257	21.9	0.2150	0.0000	OK
60 minute winter	S12	44	159.926	0.396	21.9	0.4484	0.0000	SURCHARGED
60 minute winter	S13	45	159.924	0.485	22.5	0.5488	0.0000	SURCHARGED
60 minute winter	S14	44	159.920	0.816	33.2	1.1674	0.0000	SURCHARGED
60 minute winter	S15	44	159.919	0.841	25.8	2.9129	0.0000	SURCHARGED
120 minute summer	HP2	70	160.653	0.022	5.1	4.2685	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	HD1	1.000	HD2	2.0	0.631	0.016	0.0710	
15 minute winter	HD2	1.001	HD3	4.0	0.525	0.069	0.1364	
15 minute winter	HD3	1.002	HD4	9.2	0.661	0.230	0.8993	
15 minute winter	HD4	1.003	HW1	14.2	0.888	0.352	0.1261	
60 minute winter	HW1	1.004	HW2	7.9	0.610	0.195	0.4788	
60 minute winter	HW2	1.005	S4	5.9	0.341	0.145	0.2734	
60 minute winter	S4	Hydro-Brake®	S5	5.0				
30 minute summer	S5	1.007	OUTFALL	24.9	1.056	0.013	0.4122	48.1
15 minute winter	ic1	2.000	ic2	1.9	0.608	0.103	0.0708	
15 minute winter	ic2	2.001	ic3	2.4	0.545	0.133	0.0567	
15 minute winter	ic3	2.002	out1	6.8	1.304	0.229	0.0357	
15 minute winter	out1	2.003	HP1	6.7	0.530	0.149	1.1225	
15 minute winter	HP1	2.004	S10	18.3	1.131	0.348	0.1239	
60 minute winter	S10	2.005	S11	21.8	0.847	0.308	1.0238	
60 minute winter	S11	2.006	S12	21.9	0.854	0.309	2.3144	
60 minute winter	S12	2.007	S13	22.5	0.863	0.317	1.5627	
60 minute winter	S13	2.008	S14	19.5	0.686	0.275	4.4707	
60 minute winter	S14	2.009	S15	23.8	0.538	0.187	0.7045	
60 minute winter	S15	Hydro-Brake®	S5	20.0				
120 minute summer	HP2	7.000	S15	3.3	1.165	0.021	0.3196	

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Results for 1 year Critical Storm Duration. Lowest mass balance: 98.57%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	ic4	10	160.718	0.051	4.4	0.0727	0.0000	OK
15 minute winter	ic5	11	160.401	0.051	4.3	0.0101	0.0000	OK
15 minute winter	ic6	11	160.246	0.076	10.8	0.0713	0.0000	OK
15 minute winter	ic7	11	159.972	0.092	13.4	0.0268	0.0000	OK
15 minute summer	ic8	1	160.640	0.000	0.0	0.0000	0.0000	OK
15 minute winter	ic9	10	160.514	0.024	2.0	0.0124	0.0000	OK
30 minute winter	ic10	20	160.535	0.005	0.1	0.0010	0.0000	OK
15 minute winter	ic11	10	161.064	0.064	5.8	0.1020	0.0000	OK
15 minute winter	ic12	10	160.883	0.033	5.7	0.0064	0.0000	OK
15 minute winter	ic13	10	160.596	0.096	16.0	0.1617	0.0000	OK
15 minute winter	ic14	11	160.414	0.114	20.5	0.1026	0.0000	OK
15 minute winter	ic15	11	160.265	0.115	21.1	0.0349	0.0000	OK
15 minute winter	ic16	11	160.120	0.120	21.2	0.0234	0.0000	OK
15 minute winter	ic17	10	159.955	0.055	21.1	0.0107	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	ic4	3.000	ic5	4.3	0.821	0.242	0.1661	
15 minute winter	ic5	3.001	ic6	4.3	0.828	0.232	0.0505	
15 minute winter	ic6	3.002	ic7	10.7	0.796	0.250	0.5781	
15 minute winter	ic7	3.003	S10	13.4	0.936	0.301	0.1109	
15 minute summer	ic8	4.000	ic9	0.0	0.000	0.000	0.0051	
15 minute winter	ic9	4.001	ic7	2.0	1.081	0.055	0.0240	
30 minute winter	ic10	5.000	S11	0.1	0.661	0.002	0.0274	
15 minute winter	ic11	6.000	ic12	5.7	1.158	0.321	0.0750	
15 minute winter	ic12	6.001	ic13	5.7	1.019	0.105	0.0211	
15 minute winter	ic13	6.002	ic14	15.7	0.874	0.363	0.5155	
15 minute winter	ic14	6.003	ic15	20.4	1.011	0.471	0.4338	
15 minute winter	ic15	6.004	ic16	21.2	1.018	0.473	0.4180	
15 minute winter	ic16	6.005	ic17	21.1	1.519	0.488	0.2038	
15 minute winter	ic17	6.006	S14	21.1	2.731	0.119	0.1312	

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Results for 2 year Critical Storm Duration. Lowest mass balance: 98.57%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	HD1	10	161.771	0.023	2.6	0.0248	0.0000	OK
15 minute winter	HD2	10	160.624	0.046	5.4	0.0505	0.0000	OK
15 minute winter	HD3	11	160.451	0.084	12.4	0.1281	0.0000	OK
60 minute winter	HD4	46	160.120	0.137	12.5	0.2267	0.0000	OK
60 minute winter	HW1	46	160.120	0.185	14.3	8.2024	0.0000	OK
60 minute winter	HW2	46	160.118	0.272	7.8	0.0000	0.0000	SURCHARGED
60 minute winter	S4	46	160.117	0.313	5.9	0.3541	0.0000	SURCHARGED
240 minute winter	S5	160	159.045	0.074	25.0	0.1350	0.0000	OK
240 minute winter	OUTFALL	160	158.881	0.070	25.0	0.0000	0.0000	OK
15 minute winter	ic1	10	161.227	0.037	2.5	0.0212	0.0000	OK
15 minute winter	ic2	11	160.992	0.042	3.1	0.0125	0.0000	OK
15 minute winter	ic3	10	160.881	0.061	9.0	0.0597	0.0000	OK
15 minute winter	out1	11	160.622	0.067	8.9	0.0000	0.0000	OK
60 minute winter	HP1	47	160.304	0.403	16.2	0.8338	0.0000	SURCHARGED
60 minute winter	S10	47	160.302	0.554	27.6	0.4640	0.0000	SURCHARGED
60 minute winter	S11	47	160.301	0.630	27.7	0.5276	0.0000	SURCHARGED
60 minute winter	S12	47	160.300	0.770	27.8	0.8704	0.0000	SURCHARGED
60 minute winter	S13	47	160.298	0.859	24.5	0.9719	0.0000	SURCHARGED
60 minute winter	S14	47	160.295	1.191	37.2	1.7042	0.0000	SURCHARGED
60 minute winter	S15	47	160.294	1.216	29.8	4.2134	0.0000	SURCHARGED
60 minute winter	HP2	40	160.656	0.026	6.9	4.9421	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	HD1	1.000	HD2	2.6	0.679	0.021	0.0861	
15 minute winter	HD2	1.001	HD3	5.3	0.569	0.091	0.1650	
15 minute winter	HD3	1.002	HD4	12.0	0.707	0.299	1.0973	
60 minute winter	HD4	1.003	HW1	12.2	0.798	0.301	0.2366	
60 minute winter	HW1	1.004	HW2	7.8	0.605	0.195	0.5503	
60 minute winter	HW2	1.005	S4	5.9	0.366	0.146	0.2735	
60 minute winter	S4	Hydro-Brake®	S5	5.0				
240 minute winter	S5	1.007	OUTFALL	25.0	1.056	0.013	0.4122	187.3
15 minute winter	ic1	2.000	ic2	2.4	0.660	0.134	0.0853	
15 minute winter	ic2	2.001	ic3	3.1	0.582	0.174	0.0690	
15 minute winter	ic3	2.002	out1	8.9	1.393	0.299	0.0436	
15 minute winter	out1	2.003	HP1	8.7	0.564	0.195	1.3755	
60 minute winter	HP1	2.004	S10	16.1	1.098	0.307	0.3052	
60 minute winter	S10	2.005	S11	27.6	0.912	0.390	1.3246	
60 minute winter	S11	2.006	S12	27.8	0.891	0.393	2.4211	
60 minute winter	S12	2.007	S13	24.5	0.892	0.346	1.5627	
60 minute winter	S13	2.008	S14	21.6	0.684	0.305	4.4707	
60 minute winter	S14	2.009	S15	26.3	0.643	0.207	0.7045	
60 minute winter	S15	Hydro-Brake®	S5	20.0				
60 minute winter	HP2	7.000	S15	4.4	0.932	0.028	0.3232	

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Results for 2 year Critical Storm Duration. Lowest mass balance: 98.57%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	ic4	10	160.726	0.059	5.7	0.0836	0.0000	OK
15 minute winter	ic5	11	160.409	0.059	5.6	0.0116	0.0000	OK
60 minute winter	ic6	48	160.306	0.136	9.2	0.1276	0.0000	OK
60 minute winter	ic7	48	160.303	0.423	11.8	0.1236	0.0000	SURCHARGED
15 minute summer	ic8	1	160.640	0.000	0.0	0.0000	0.0000	OK
15 minute winter	ic9	10	160.518	0.028	2.6	0.0141	0.0000	OK
60 minute summer	ic10	33	160.535	0.005	0.1	0.0010	0.0000	OK
15 minute winter	ic11	10	161.075	0.075	7.6	0.1185	0.0000	OK
15 minute winter	ic12	10	160.888	0.038	7.5	0.0074	0.0000	OK
15 minute winter	ic13	10	160.612	0.112	20.8	0.1886	0.0000	OK
15 minute winter	ic14	11	160.435	0.135	26.7	0.1217	0.0000	OK
60 minute winter	ic15	48	160.299	0.149	17.9	0.0452	0.0000	OK
60 minute winter	ic16	47	160.298	0.298	17.9	0.0583	0.0000	SURCHARGED
60 minute winter	ic17	47	160.296	0.396	17.9	0.0776	0.0000	SURCHARGED

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	ic4	3.000	ic5	5.6	0.876	0.314	0.2013	
15 minute winter	ic5	3.001	ic6	5.5	0.886	0.301	0.0611	
60 minute winter	ic6	3.002	ic7	9.2	0.762	0.215	1.3888	
60 minute winter	ic7	3.003	S10	11.5	0.900	0.258	0.3073	
15 minute summer	ic8	4.000	ic9	0.0	0.000	0.000	0.0062	
15 minute winter	ic9	4.001	ic7	2.6	1.138	0.072	0.0570	
60 minute summer	ic10	5.000	S11	0.1	0.661	0.002	0.0506	
15 minute winter	ic11	6.000	ic12	7.5	1.241	0.419	0.0910	
15 minute winter	ic12	6.001	ic13	7.4	1.029	0.137	0.0264	
15 minute winter	ic13	6.002	ic14	20.5	0.926	0.473	0.6329	
15 minute winter	ic14	6.003	ic15	26.6	1.064	0.614	0.5366	
60 minute winter	ic15	6.004	ic16	17.9	0.973	0.397	0.6768	
60 minute winter	ic16	6.005	ic17	17.9	1.455	0.413	0.5714	
60 minute winter	ic17	6.006	S14	17.9	2.295	0.101	0.2238	

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Results for 30 year Critical Storm Duration. Lowest mass balance: 98.57%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	HD1	10	161.779	0.031	4.9	0.0335	0.0000	OK
15 minute winter	HD2	10	160.641	0.063	10.1	0.0693	0.0000	OK
15 minute winter	HD3	11	160.487	0.120	23.3	0.1832	0.0000	OK
120 minute winter	HD4	94	160.353	0.370	16.5	0.6123	0.0000	SURCHARGED
120 minute winter	HW1	94	160.352	0.417	18.0	24.8096	0.0000	SURCHARGED
120 minute winter	HW2	94	160.351	0.505	6.7	0.0000	0.0000	SURCHARGED
120 minute winter	S4	94	160.350	0.546	5.5	0.6171	0.0000	SURCHARGED
15 minute summer	S5	10	159.045	0.074	24.9	0.1351	0.0000	OK
720 minute winter	OUTFALL	375	158.881	0.070	25.0	0.0000	0.0000	OK
15 minute winter	ic1	10	161.242	0.052	4.7	0.0296	0.0000	OK
15 minute winter	ic2	11	161.009	0.059	6.0	0.0174	0.0000	OK
15 minute winter	ic3	10	160.912	0.092	17.1	0.0894	0.0000	OK
120 minute winter	out1	90	160.760	0.205	7.7	0.0000	0.0000	OK
120 minute winter	HP1	90	160.758	0.857	35.6	30.3850	0.0000	SURCHARGED
120 minute winter	S10	92	160.757	1.009	26.4	0.8442	0.0000	SURCHARGED
120 minute winter	S11	92	160.754	1.083	26.3	0.9064	0.0000	SURCHARGED
120 minute winter	S12	92	160.750	1.220	24.1	1.3803	0.0000	SURCHARGED
120 minute winter	S13	92	160.748	1.309	20.6	1.4802	0.0000	SURCHARGED
120 minute winter	S14	96	160.741	1.637	29.6	2.3430	0.0000	SURCHARGED
120 minute winter	S15	94	160.740	1.662	29.5	5.7586	0.0000	SURCHARGED
120 minute winter	HP2	94	160.741	0.111	14.6	24.3773	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	HD1	1.000	HD2	4.9	0.816	0.040	0.1344	
15 minute winter	HD2	1.001	HD3	9.9	0.663	0.172	0.2615	
15 minute winter	HD3	1.002	HD4	22.6	0.809	0.564	1.8004	
120 minute winter	HD4	1.003	HW1	15.3	0.731	0.378	0.3128	
120 minute winter	HW1	1.004	HW2	6.7	0.587	0.168	0.5864	
120 minute winter	HW2	1.005	S4	5.5	0.369	0.136	0.2735	
120 minute winter	S4	Hydro-Brake®	S5	5.0				
15 minute summer	S5	1.007	OUTFALL	24.9	1.055	0.013	0.4119	81.5
15 minute winter	ic1	2.000	ic2	4.6	0.781	0.256	0.1368	
15 minute winter	ic2	2.001	ic3	5.9	0.672	0.330	0.1137	
15 minute winter	ic3	2.002	out1	16.9	1.611	0.566	0.0714	
120 minute winter	out1	2.003	HP1	7.3	0.501	0.164	3.4338	
120 minute winter	HP1	2.004	S10	-16.5	1.083	-0.315	0.3052	
120 minute winter	S10	2.005	S11	26.2	0.867	0.370	1.3246	
120 minute winter	S11	2.006	S12	24.1	0.843	0.340	2.4211	
120 minute winter	S12	2.007	S13	20.6	0.837	0.291	1.5627	
120 minute winter	S13	2.008	S14	17.3	0.663	0.244	4.4707	
120 minute winter	S14	2.009	S15	25.7	0.444	0.202	0.7045	
120 minute winter	S15	Hydro-Brake®	S5	20.0				
120 minute winter	HP2	7.000	S15	8.3	1.018	0.052	0.4529	

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Results for 30 year Critical Storm Duration. Lowest mass balance: 98.57%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
30 minute winter	ic4	21	160.824	0.157	9.2	0.2226	0.0000	SURCHARGED
30 minute winter	ic5	21	160.776	0.426	9.2	0.0836	0.0000	SURCHARGED
60 minute winter	ic6	38	160.761	0.591	17.3	0.5539	0.0000	SURCHARGED
120 minute winter	ic7	88	160.757	0.877	14.9	0.2562	0.0000	SURCHARGED
120 minute winter	ic8	88	160.758	0.118	0.2	0.0231	0.0000	OK
120 minute winter	ic9	88	160.758	0.268	2.7	0.1365	0.0000	SURCHARGED
120 minute winter	ic10	92	160.754	0.224	0.8	0.0477	0.0000	SURCHARGED
30 minute winter	ic11	21	161.156	0.156	12.2	0.2467	0.0000	SURCHARGED
30 minute winter	ic12	21	161.112	0.262	12.2	0.0513	0.0000	SURCHARGED
30 minute winter	ic13	21	161.097	0.597	33.9	1.0064	0.0000	SURCHARGED
30 minute winter	ic14	21	161.020	0.720	43.4	0.6505	0.0000	SURCHARGED
30 minute winter	ic15	21	160.921	0.771	43.9	0.2343	0.0000	SURCHARGED
30 minute winter	ic16	20	160.827	0.827	38.6	0.1620	0.0000	SURCHARGED
30 minute winter	ic17	20	160.759	0.859	37.7	0.1684	0.0000	SURCHARGED

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
30 minute winter	ic4	3.000	ic5	9.2	0.986	0.518	0.5577	
30 minute winter	ic5	3.001	ic6	9.6	0.989	0.521	0.1717	
60 minute winter	ic6	3.002	ic7	15.1	0.842	0.355	1.7025	
120 minute winter	ic7	3.003	S10	14.4	0.888	0.323	0.3073	
120 minute winter	ic8	4.000	ic9	0.5	0.043	0.016	0.0921	
120 minute winter	ic9	4.001	ic7	2.4	1.031	0.066	0.2315	
120 minute winter	ic10	5.000	S11	1.5	0.661	0.023	0.1003	
30 minute winter	ic11	6.000	ic12	12.2	1.397	0.684	0.2621	
30 minute winter	ic12	6.001	ic13	12.2	1.086	0.224	0.0630	
30 minute winter	ic13	6.002	ic14	33.3	0.995	0.767	1.1379	
30 minute winter	ic14	6.003	ic15	42.3	1.131	0.976	0.8534	
30 minute winter	ic15	6.004	ic16	38.6	1.178	0.860	0.7960	
30 minute winter	ic16	6.005	ic17	37.7	1.675	0.872	0.5714	
30 minute winter	ic17	6.006	S14	33.6	2.388	0.189	0.2238	

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Results for 100 year Critical Storm Duration. Lowest mass balance: 98.57%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	HD1	10	161.783	0.035	6.3	0.0379	0.0000	OK
15 minute winter	HD2	10	160.650	0.072	13.0	0.0791	0.0000	OK
15 minute winter	HD3	11	160.508	0.141	30.1	0.2154	0.0000	OK
120 minute winter	HD4	114	160.496	0.513	21.6	0.8491	0.0000	SURCHARGED
120 minute winter	HW1	114	160.496	0.560	24.1	38.5086	0.0000	SURCHARGED
120 minute winter	HW2	114	160.494	0.648	6.3	0.0000	0.0000	SURCHARGED
120 minute winter	S4	116	160.494	0.690	5.4	0.7799	0.0000	SURCHARGED
120 minute winter	S5	244	159.045	0.074	25.0	0.1352	0.0000	OK
120 minute winter	OUTFALL	244	158.881	0.071	25.0	0.0000	0.0000	OK
15 minute winter	ic1	10	161.250	0.059	6.0	0.0339	0.0000	OK
15 minute winter	ic2	11	161.018	0.068	7.7	0.0200	0.0000	OK
15 minute winter	ic3	10	160.930	0.110	21.9	0.1077	0.0000	OK
120 minute winter	out1	88	160.845	0.290	10.0	0.0000	0.0000	FLOOD RISK
120 minute winter	HP1	92	160.843	0.942	45.1	55.4236	0.0000	FLOOD RISK
120 minute winter	S10	92	160.841	1.092	28.3	0.9144	0.0000	SURCHARGED
120 minute winter	S11	94	160.837	1.166	26.4	0.9763	0.0000	SURCHARGED
120 minute winter	S12	96	160.833	1.303	25.0	1.4734	0.0000	SURCHARGED
120 minute winter	S13	100	160.830	1.391	22.0	1.5729	0.0000	SURCHARGED
180 minute winter	S14	140	160.823	1.719	30.9	2.4598	0.0000	SURCHARGED
180 minute winter	S15	140	160.822	1.744	30.8	6.0411	0.0000	SURCHARGED
180 minute winter	HP2	140	160.823	0.192	20.4	47.5713	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	HD1	1.000	HD2	6.3	0.875	0.052	0.1613	
15 minute winter	HD2	1.001	HD3	12.8	0.704	0.222	0.3171	
15 minute winter	HD3	1.002	HD4	29.2	0.842	0.728	2.1119	
120 minute winter	HD4	1.003	HW1	20.4	0.705	0.505	0.3128	
120 minute winter	HW1	1.004	HW2	6.3	0.599	0.155	0.5864	
120 minute winter	HW2	1.005	S4	5.4	0.361	0.133	0.2735	
120 minute winter	S4	Hydro-Brake®	S5	5.0				
120 minute winter	S5	1.007	OUTFALL	25.0	1.057	0.013	0.4127	333.5
15 minute winter	ic1	2.000	ic2	5.9	0.830	0.326	0.1643	
15 minute winter	ic2	2.001	ic3	7.5	0.700	0.422	0.1389	
15 minute winter	ic3	2.002	out1	21.6	1.688	0.727	0.0874	
120 minute winter	out1	2.003	HP1	9.3	0.510	0.209	3.5138	
120 minute winter	HP1	2.004	S10	-19.6	1.103	-0.374	0.3052	
120 minute winter	S10	2.005	S11	26.3	0.894	0.371	1.3246	
120 minute winter	S11	2.006	S12	25.0	0.863	0.353	2.4211	
120 minute winter	S12	2.007	S13	22.0	0.842	0.310	1.5627	
120 minute winter	S13	2.008	S14	17.6	0.678	0.249	4.4707	
180 minute winter	S14	2.009	S15	30.8	0.403	0.242	0.7045	
180 minute winter	S15	Hydro-Brake®	S5	20.0				
180 minute winter	HP2	7.000	S15	-12.2	1.131	-0.077	0.5805	

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Results for 100 year Critical Storm Duration. Lowest mass balance: 98.57%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
30 minute winter	ic4	20	161.078	0.411	12.0	0.5838	0.0000	SURCHARGED
30 minute winter	ic5	20	160.962	0.612	11.0	0.1199	0.0000	SURCHARGED
30 minute winter	ic6	20	160.922	0.752	27.8	0.7043	0.0000	SURCHARGED
120 minute winter	ic7	90	160.842	0.962	18.9	0.2809	0.0000	SURCHARGED
120 minute winter	ic8	90	160.842	0.202	2.1	0.0397	0.0000	SURCHARGED
120 minute winter	ic9	90	160.842	0.352	2.9	0.1797	0.0000	SURCHARGED
120 minute winter	ic10	94	160.837	0.307	1.7	0.0655	0.0000	SURCHARGED
30 minute winter	ic11	21	161.658	0.658	16.0	1.0409	0.0000	FLOOD RISK
30 minute winter	ic12	21	161.570	0.720	14.7	0.1410	0.0000	FLOOD RISK
30 minute winter	ic13	21	161.537	1.037	40.6	1.7489	0.0000	FLOOD RISK
30 minute winter	ic14	21	161.392	1.092	46.5	0.9861	0.0000	FLOOD RISK
30 minute winter	ic15	21	161.203	1.053	46.4	0.3201	0.0000	FLOOD RISK
30 minute winter	ic16	21	161.010	1.010	45.7	0.1979	0.0000	SURCHARGED
30 minute winter	ic17	21	160.861	0.961	45.5	0.1884	0.0000	SURCHARGED

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
30 minute winter	ic4	3.000	ic5	11.0	1.024	0.617	0.5577	
30 minute winter	ic5	3.001	ic6	10.4	1.025	0.566	0.1717	
30 minute winter	ic6	3.002	ic7	25.3	0.906	0.592	1.7025	
120 minute winter	ic7	3.003	S10	18.8	0.903	0.422	0.3073	
120 minute winter	ic8	4.000	ic9	-2.1	-0.189	-0.073	0.1000	
120 minute winter	ic9	4.001	ic7	2.5	1.049	0.070	0.2315	
120 minute winter	ic10	5.000	S11	-1.6	0.661	-0.025	0.1003	
30 minute winter	ic11	6.000	ic12	14.7	1.403	0.827	0.2621	
30 minute winter	ic12	6.001	ic13	13.9	1.078	0.255	0.0630	
30 minute winter	ic13	6.002	ic14	35.3	1.006	0.813	1.1379	
30 minute winter	ic14	6.003	ic15	44.6	1.139	1.027	0.8534	
30 minute winter	ic15	6.004	ic16	45.7	1.194	1.018	0.7960	
30 minute winter	ic16	6.005	ic17	45.5	1.681	1.051	0.5714	
30 minute winter	ic17	6.006	S14	45.4	2.451	0.256	0.2238	

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Results for 100 year +40% CC Critical Storm Duration. Lowest mass balance: 98.57%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	HD1	10	161.789	0.041	8.9	0.0448	0.0000	OK
30 minute summer	HD2	20	160.736	0.157	17.6	0.1738	0.0000	OK
30 minute summer	HD3	19	160.726	0.359	40.4	0.5500	0.0000	SURCHARGED
240 minute winter	HD4	192	160.723	0.740	19.3	1.2247	0.0000	SURCHARGED
240 minute winter	HW1	192	160.722	0.787	21.7	65.5947	0.0000	FLOOD RISK
240 minute winter	HW2	192	160.721	0.875	5.7	0.0000	0.0000	FLOOD RISK
240 minute winter	S4	192	160.720	0.916	5.2	1.0357	0.0000	FLOOD RISK
30 minute winter	S5	164	159.045	0.074	25.0	0.1352	0.0000	OK
30 minute winter	OUTFALL	164	158.881	0.071	25.0	0.0000	0.0000	OK
15 minute winter	ic1	10	161.262	0.072	8.4	0.0412	0.0000	OK
30 minute summer	ic2	20	161.176	0.226	10.5	0.0666	0.0000	SURCHARGED
30 minute summer	ic3	19	161.138	0.317	29.5	0.3098	0.0000	SURCHARGED
240 minute winter	out1	180	160.975	0.420	9.1	0.0000	0.0000	FLOOD RISK
240 minute winter	HP1	184	160.974	1.072	33.3	103.4860	0.0000	FLOOD RISK
240 minute winter	S10	184	160.971	1.223	22.8	1.0240	0.0000	FLOOD RISK
240 minute winter	S11	184	160.969	1.298	19.7	1.0867	0.0000	SURCHARGED
240 minute winter	S12	184	160.965	1.435	19.4	1.6231	0.0000	SURCHARGED
240 minute winter	S13	184	160.962	1.523	17.1	1.7229	0.0000	SURCHARGED
240 minute winter	S14	188	160.956	1.852	37.5	2.6508	0.0000	SURCHARGED
240 minute winter	S15	192	160.954	1.876	37.4	6.4993	0.0000	FLOOD RISK
240 minute winter	HP2	188	160.955	0.325	28.8	94.7386	0.0000	FLOOD RISK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	HD1	1.000	HD2	8.8	0.964	0.073	0.3083	
30 minute summer	HD2	1.001	HD3	17.1	0.741	0.298	0.5986	
30 minute summer	HD3	1.002	HD4	33.6	0.867	0.837	2.5499	
240 minute winter	HD4	1.003	HW1	18.4	0.672	0.455	0.3128	
240 minute winter	HW1	1.004	HW2	5.7	0.582	0.141	0.5864	
240 minute winter	HW2	1.005	S4	5.2	0.330	0.128	0.2735	
240 minute winter	S4	Hydro-Brake®	S5	5.0				
30 minute winter	S5	1.007	OUTFALL	25.0	1.057	0.013	0.4128	237.6
15 minute winter	ic1	2.000	ic2	8.3	0.889	0.461	0.2847	
30 minute summer	ic2	2.001	ic3	10.1	0.689	0.563	0.2262	
30 minute summer	ic3	2.002	out1	27.1	1.711	0.910	0.1201	
240 minute winter	out1	2.003	HP1	8.9	0.478	0.200	3.5138	
240 minute winter	HP1	2.004	S10	-13.8	1.006	-0.263	0.3052	
240 minute winter	S10	2.005	S11	19.6	0.842	0.276	1.3246	
240 minute winter	S11	2.006	S12	19.4	0.826	0.275	2.4211	
240 minute winter	S12	2.007	S13	17.1	0.789	0.241	1.5627	
240 minute winter	S13	2.008	S14	15.3	0.664	0.216	4.4707	
240 minute winter	S14	2.009	S15	37.4	0.420	0.294	0.7045	
240 minute winter	S15	Hydro-Brake®	S5	20.0				
240 minute winter	HP2	7.000	S15	-18.3	1.043	-0.116	0.6079	

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Results for 100 year +40% CC Critical Storm Duration. Lowest mass balance: 98.57%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
30 minute summer	ic4	20	161.562	0.895	18.5	1.2727	0.0000	SURCHARGED
30 minute summer	ic5	20	161.303	0.953	22.4	0.1869	0.0000	SURCHARGED
30 minute summer	ic6	19	161.220	1.050	39.4	0.9836	0.0000	SURCHARGED
240 minute winter	ic7	184	160.973	1.093	17.5	0.3191	0.0000	SURCHARGED
30 minute winter	ic8	20	160.980	0.340	1.8	0.0666	0.0000	SURCHARGED
30 minute winter	ic9	20	160.980	0.490	7.7	0.2497	0.0000	SURCHARGED
240 minute winter	ic10	184	160.969	0.439	0.3	0.0935	0.0000	SURCHARGED
30 minute winter	ic11	17	161.750	0.750	22.4	1.1873	4.3737	FLOOD
30 minute winter	ic12	17	161.734	0.884	15.5	0.1733	0.5083	FLOOD
15 minute summer	ic13	11	161.734	1.234	53.5	2.0818	0.2825	FLOOD
30 minute winter	ic14	17	161.517	1.217	59.7	1.0990	3.2050	FLOOD
60 minute winter	ic15	38	161.320	1.170	50.0	0.3557	0.0000	FLOOD RISK
60 minute winter	ic16	38	161.120	1.119	48.7	0.2194	0.0000	SURCHARGED
60 minute winter	ic17	39	160.970	1.070	48.6	0.2096	0.0000	SURCHARGED

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
30 minute summer	ic4	3.000	ic5	15.4	1.064	0.870	0.5577	
30 minute summer	ic5	3.001	ic6	16.0	1.029	0.869	0.1717	
30 minute summer	ic6	3.002	ic7	38.8	0.975	0.908	1.7025	
240 minute winter	ic7	3.003	S10	17.4	0.823	0.391	0.3073	
30 minute winter	ic8	4.000	ic9	-1.8	-0.105	-0.063	0.1000	
30 minute winter	ic9	4.001	ic7	6.6	1.172	0.183	0.2315	
240 minute winter	ic10	5.000	S11	1.1	0.661	0.018	0.1003	
30 minute winter	ic11	6.000	ic12	15.5	1.409	0.869	0.2621	
30 minute winter	ic12	6.001	ic13	14.5	1.071	0.267	0.0630	
15 minute summer	ic13	6.002	ic14	43.9	1.103	1.011	1.1379	
30 minute winter	ic14	6.003	ic15	47.8	1.201	1.101	0.8534	
60 minute winter	ic15	6.004	ic16	48.7	1.226	1.085	0.7960	
60 minute winter	ic16	6.005	ic17	48.6	1.527	1.123	0.5714	
60 minute winter	ic17	6.006	S14	48.3	2.371	0.273	0.2238	

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Appendix H

DCWW Correspondence & Sewer Plan

Developer Services
PO Box 3146
Cardiff
CF30 0EH

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Fax: +44 (0)2920 740472
E.mail: developer.services@dwrcymru.com

Gwasanaethau Datblygu
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E.bost: developer.services@dwrcymru.com

Amity Planning Consultants
Creative Quarter 8A
Morgan Arcade
Cardiff
United Kingdom
CF10 1AF

Date: 07/01/2025
Our Ref: PPA0009149

Dear Sir/Madam

Grid Ref: 270329 210590
Site Address: Former Swelco Factory, West of Heol Y Gors Cwmgors
Development: Article 2D - Proposed development

I refer to your pre-planning enquiry received relating to the above site, seeking our views on the capacity of our network of assets and infrastructure to accommodate your proposed development. Having reviewed the details submitted I can provide the following comments which should be taken into account within any future planning application for the development.

Firstly, we note that the proposal relates to the 45 residential dwellings, and acknowledge the site comprises of a potential windfall development with no allocated status in the Local Development Plan (LDP). Accordingly, whilst it does not appear an assessment has been previously undertaken of the public sewerage system, we offer the following comments as part of our appraisal of this development.

Public Sewerage Network

The proposed development site is located in the immediate vicinity of a foul sewerage system, which drains to Garnswllt Waste water Treatment Works (WwTW).

This site is crossed by a public foul sewer with the approximate position being marked on the attached Statutory Public Sewer Record. In accordance with the Water Industry Act 1991, Dwr Cymru Welsh Water requires access to its apparatus at all times in order to carry out maintenance and repairs. However, having regard to Drawing No (02)100 Rev E, it appears the proposed development would be situated outside the protection zone of the public sewer measured 3 metres either side of the centreline and therefore acceptable in principle. Please note, the distance specified for this protection zone is indicative and based on industry standard guidelines. However, the depth of the asset will need to be verified on

site which may infer a greater protection zone. For completeness, we recommend the developer refer to their title deeds to confirm if there are any covenants or restrictions associated with the asset(s) crossing the proposed development site.

Accordingly, it is recommended that the developer contact our Plan and Protect team (PlanandProtect@dwrcymru.com) to carry out a survey to verify the location of this asset and establish its relationship to the proposed development, which should be referred to in the [Drawing], for the purposes of any forthcoming planning application. Further information regarding Asset Protection is provided in the attached Advice & Guidance note as well as our Developer Services website, which offers guidance on building SuDS features over or near to our assets at https://developers.dwrcymru.com/en/help-advice/regulation-to-be-aware-of/sustainable-drainage-systems.

You are also advised that some public sewers and lateral drains may not be recorded on our maps of public sewers because they were originally privately owned and were transferred into public ownership by nature of the Water Industry (Schemes for Adoption of Private Sewers) Regulations 2011. The presence of such assets may affect the proposal. In order to assist you may contact Dwr Cymru Welsh Water on 0800 085 3968 to establish the location and status of the apparatus in and around your site. Please be mindful that under the Water Industry Act 1991 Dwr Cymru Welsh Water has rights of access to its apparatus at all times

Surface Water Drainage

As of 7th January 2019, this proposed development is subject to Schedule 3 of the Flood and Water Management Act 2010. The development therefore requires approval of Sustainable Drainage Systems (SuDS) features, in accordance with the 'Statutory standards for sustainable drainage systems – designing, constructing, operating and maintaining surface water drainage systems'. As highlighted in these standards, the developer is required to explore and fully exhaust all surface water drainage options in accordance with a hierarchy preferring infiltration (PL2) and, where infiltration is not possible, disposal to a surface water body (PL3), in liaison with the Lead Local Flood Authority and/or Natural Resources Wales, or surface water sewer or highway drain (PL4) in liaison with the riparian owner and/or Local Highways Authority. Please be advised that due to capacity constraints with the downstream public sewerage network, under no circumstances would we allow surface water runoff highway run-off from the proposed development to communicate directly or indirectly with the public combined sewerage system. Please note, no amount of land drainage run-off is permitted to discharge directly or indirectly into the public sewerage system.

Furthermore, Planning Policy Wales (PPW) acknowledges that discharge of surface water to foul sewers is prohibited and highlights that any additional surface water from new developments should not be discharged to combined systems because of the risk of pollution when combined systems overflow (Para 6.6.3). Moreover, PPW recognises the challenges faced from rainfall intensity causing surface water flooding and diffuse pollution (Para 6.6.14) along with the importance of well-maintained sewerage networks (Para 6.6.15), particularly as a result of run-off from built surfaces and the sewage discharges from overloaded sewers (Para 6.6.16).

It is therefore recommended that the developer consult with Neath Port Talbot County Council as the determining SuDS Approval Body (SAB), in relation to their proposals for SuDS features. Please note, DCWW is a statutory consultee to the SAB application process and will provide comments to any SuDS proposals by response to SAB consultation. Please refer to further detailed advice relating to surface water management included in our attached Advice & Guidance note and our Developer Services website at https://developers.dwrcymru.com/en/help-advice/regulation-to-be-aware-of/sustainable-drainage-systems.

Foul Water Drainage – Sewerage Network

We have considered the impact of foul flows generated by the proposed development and concluded that flows can be accommodated within the public sewerage system. We advise that the flows should be connected to the 225mm foul sewer located in Heol y Gors.

Should a planning application be submitted for this development we will seek to control these points of communication via appropriate planning conditions and therefore recommend that any drainage layout or strategy submitted as part of your application takes this into account. However, should you wish for an alternative connection point to be considered please provide further information to us in the form of a drainage strategy, preferably in advance of a planning application being submitted.

You may need to apply to Dwr Cymru Welsh Water for any connection to the public sewer under Section 106 of the Water industry Act 1991. However, if the connection to the public sewer network is either via a lateral drain (i.e. a drain which extends beyond the connecting property boundary) or via a new sewer (i.e. serves more than one property), it is now a mandatory requirement to first enter into a Section 104 Adoption Agreement (Water Industry Act 1991). The design of the sewers and lateral drains must also conform to the Welsh Ministers Standards for Foul Sewers and Lateral Drains and conform with the publication "Sewers for Adoption"- 7th Edition. Further information can be obtained via the Developer Services pages of www.dwrcymru.com.

SEWEAGE TREATMENT

No problems are envisaged with the Waste Water Treatment Works for the treatment of domestic discharges from this site.

WATER SUPPLY

Capacity is currently available in the water supply system to accommodate the development. Initial indications are that a connection can be made from the 6'' diameter CI watermain in 270418, 210652 location. We reserve the right however to reassess our position as part of the formal application for the provision of new water mains under Section 41 and Section 51 of the Water Industry Act (1991) to ensure there is sufficient capacity available to serve the development without causing detriment to existing customers' supply as demands upon our water systems change continually.

I trust the above information is helpful and will assist you in forming water and drainage strategies that should accompany any future planning application. I also attach copies of our water and sewer extract plans for the area, and a copy of our Planning Guidance Note which provides further information on our approach to the planning process, making connections to our systems and ensuring any existing public assets or infrastructure located within new development sites are protected.

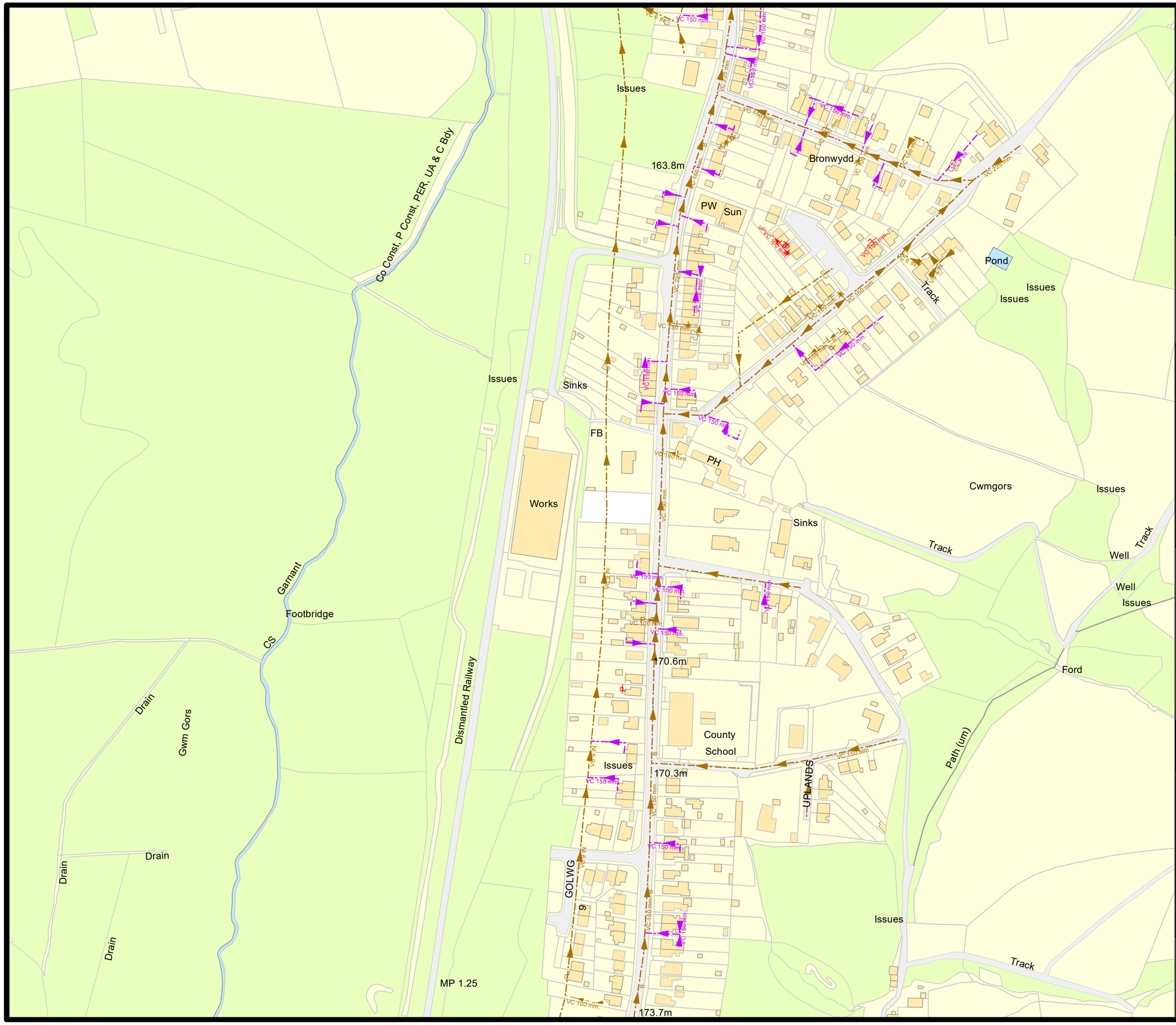
Please note that our response is based on the information provided in your enquiry and should the information change we reserve the right to make a new representation. Should you have any queries or wish to discuss any aspect of our response please do not hesitate to contact our dedicated team of planning officers, either on 0800 917 2652 or via email at **developer.services@dwrcymru.com**

Please quote our reference number in all communications and correspondence.

Yours faithfully,

Rhys Evans
Planning Liaison Manager
Developer Services

***Please Note** that demands upon the water and sewerage systems change continually; consequently the information given above should be regarded as reliable for a maximum period of 12 months from the date of this letter.*



Dŵr Cymru
Welsh Water

PPA0009149

N
W E
S

LEGEND(Representative of most common features)

Waste network:

- Foul chamber
- Surface water chamber
- Combined chamber
- Combined sewer overflow
- Special purpose chamber
- Treatment works
- Pumping station
- Outfall
- Lamphole
- Storm Overflow
- Rising main
- Gravity sewer
- Private sewer
- Private sewer subject to Sect. 104 adoption agreement
- Private Sewer Transfer
- Lateral Drain
- Inspection Chamber

N8: Sewer symbol colour indicates the type.
RED - Combined
GREEN - Surface Water
BROWN - Foul
Purple - Former S24 sewers (for indicative purposes only)

Notes:

Whilst every reasonable effort has been taken to correctly record the pipe material of DCWW assets, there is a possibility that in some cases pipe material (other than Asbestos Cement or Pitch Fibre) may be found to be asbestos cement (AC) or Pitch Fibre (PF) . It is therefore advisable that the possible presence of AC or PF pipes be anticipated and considered as part of any risk assessment prior to excavation

Dŵr Cymru Cyfyngedig ('the Company') gives this information as to the position of its underground apparatus by way of general guidance only and on the strict understanding that it is based on the best information available and no warranty as to its correctness is relied upon in the event of excavations or other works made in the vicinity of the company's apparatus. The onus of locating apparatus before carrying out any excavations rests entirely on you. The information which is supplied by the Company, is done so in accordance with statutory requirements of sections 198 and 199 of the Water Industry Act 1991 which is based upon the best Information available and, in particular, but without prejudice to the generality of the foregoing, it should be noted that the records that are available to the Company may not disclose the existence of a water main, service pipe, sewer, lateral drain or disposal main and any associated apparatus laid before 1 September 1989, or, if they do, the particulars thereof including their position underground may not be accurate. It must be understood that the furnishing of this information is entirely without prejudice to the provision of the New Roads and Street Works Act 1991 and the Company's right to be compensated for any damage to its apparatus.

Service pipes are not generally shown but their presence should be anticipated.

EXACT LOCATIONS OF ALL APPARATUS TO BE DETERMINED ON SITE.

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Map scale:	1:2500
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