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HIRWAUN ROAD, PENYWAUN

DRAINAGE STRATEGY REPORT

prepared for

Newydd Housing Association

Date: February 2024

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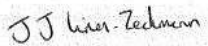
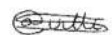
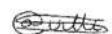
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DRAINAGE STRATEGY

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	Function Title	Company	Name
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2			
3			

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References

- 1 [CIRIA – The SuDS Manual \(C753\)](#)
- 2 [UK SUDS \(www.uksuds.com\)](http://www.uksuds.com)
- 3 [Welsh Water Asset Plans](#)
- 4 [Google Maps](#)
- 5 [Ordnance Survey Mapping](#)
- 6 [BRE Digest 365 Soakaway Design](#)
- 7 [NRW Online Flood Risk Map](#)

Abbreviations

DCWW	DWR Cymru Welsh Water
A.O.D.	Above Ordnance Datum
EA	Environment Agency
FW	Foul Water
SW	Surface Water
SuDS	Sustainable Drainage Systems
l/s	Litres Per Second
SAB	Suds Approval Body

This document has been created during the design stage of the project and should not be used as a replacement for the final operation and maintenance requirements of the proposed works. It shall remain relative only to those features identified on the attached plan. This document is intended to support the development of the official operation and maintenance document which shall be the responsibility of the principal contractor.

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1.0 INTRODUCTION

- 1.1 QuadConsult Ltd was commissioned to produce a drainage strategy for a proposed a proposed residential development off Hirwaun Road, Penywaun by Oliver Evans of Newydd Housing Association.
- 1.2 This report will draw upon information supplied by the Client and that available within the public domain including the local authority Planning Portal.
- 1.3 The aim of this report is to demonstrate that a suitable site-specific surface and foul water drainage strategy can be implemented to service the proposed development.

2.0 SITE LOCATION & DESCRIPTION

- 2.1 The site is located in the North of Hirwaun Road, Penywaun, nearest post code is CF44 9DE, site coordinates 297513, 204568.
- 2.2 The existing site topography (Appendix 1) falls in a western direction with an approximate level range of 207.10 – 203.79m which has been confirmed by means of a topographical survey undertaken by Usk Land Surveys. The majority of the site is currently open green space to the east with a concrete hardstanding located to the south west corner. The site boundaries are bounded to the south with the main carriageway, the north with greenfield / woodland, and an existing estate road and car park to the east and west. Nearest watercourses were identified by the ground investigation which noted the River Cynon located approximately 430m north of the site and a small in-land river running east 67m north of the site.
- 2.3 The wider site boundary is 0.599ha with the development area being 0.24ha.

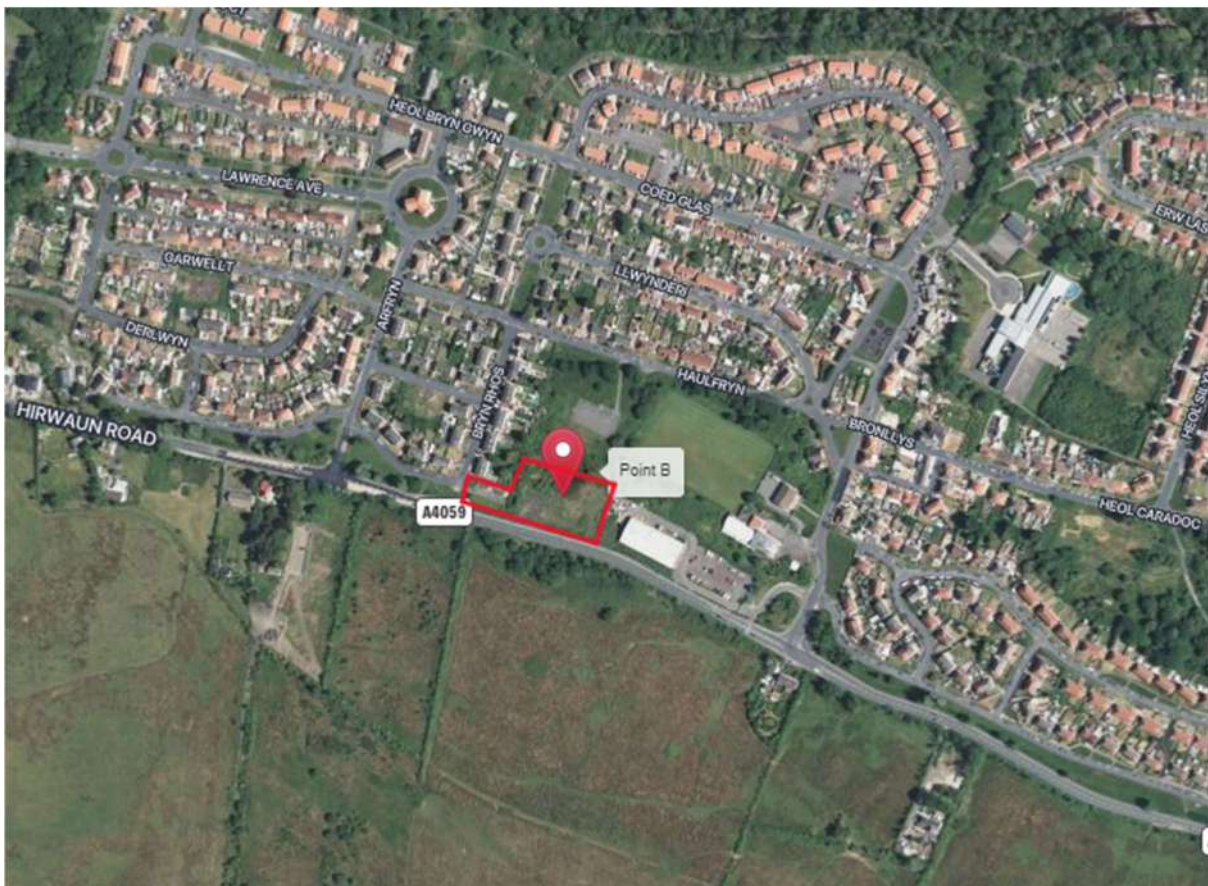


Figure 1: Site location plan

3.0 EXISTING DRAINAGE

3.1 Land Drainage

No existing land drainage is evident on the topographical survey.

3.2 Overland Flow & Exceedance Routes

Existing exceedance, overland flow paths would follow the existing topography and discharge flows onto the existing highway south of the land parcel.

3.3 Surface Water Drainage Network

Welsh Water Asset plans show there is a surface water sewers located to the West of the site running South to East along Bryn Rhos (Refer to Appendix 9).

3.4 Foul Water Drainage Network

No existing foul drainage is located around the site.

3.5 Combined / Other Drainage

Welsh Water Asset plans show there is a combined sewers located to the West of the site running South to East along Bryn Rhos (Refer to Appendix 9).

4.0 EXISTING FLOOD RISK

NRW development advice mapping indicates the development parcel is within a Flood Zone A – At little or no risk of fluvial or coastal / tidal flooding.

4.1 Flood Risk from Rivers

NRW flood mapping (Refer to Appendix 3) indicates little / no risk of flooding from main Rivers.

4.2 Flood Risk from Sea

NRW flood mapping (Refer to Appendix 3) indicates little / no risk of flooding from the Sea.

4.3 Flood Risk from Surface Water & Small Watercourses

NRW flood mapping (Refer to Appendix 3) indicates a high risk of flooding with a 1 in 30 year (3%) chance flooding on the lower south west area of the site. The area with the recorded flooding covers the hardstanding of the demolished garages and the top of Ger y Bont. A CCTV survey has been carried out along the storm network located along Ger Y Bont running South to North and identified several complications with the highway storm drainage (Refer to Appendix 2). A collapsed storm drain was identified, along with significant debris fully blocking the main storm drainage 59m north of the flood location. We suspect the blockage identified during the CCTV survey is a contributing factor to the 1 in 30 year flood event. Completion of maintenance works by the local authority to repair pipework and remove the blockage will reduce the risk of flooding.

4.4 Flood Risk from Reservoir

NRW flood mapping (Refer to Appendix 3) indicates no risk of flooding from the Reservoirs.

4.5 Other Flood Risk (Mines, Piped Network, etc)

NRW flood mapping (Refer to Appendix 3) indicates no recorded flood events.

5.0 APPLICATION OF DRAINAGE HIERARCHY

5.1 Discharge to Ground

Infiltration tests were conducted to BRE365 infiltration testing across the site by Terra Firma in February of 2023. However, it was confirmed that the soil build up is constructed from made ground. As this is the case, the soak away results are discarded due to uneven displacement of the surface water which can result in washing away of fines across the site. Therefore, infiltration is deemed not feasible at the site.

5.2 Discharge to Surface Water Body

An existing local watercourse lies 67m to the north of the site and comprises of an in land river with the direction of flow to the East. The Afon Cynon / River Cynon is approximately 430m further to the North with the direction of flow to the East. The site mapping indicates that a direct connection to the in-land river to the North will require crossing third party land of which ownership is unclear. Also due to the topography of the site sitting on a plateau typically 15-20m above the water course, the infrastructure to construct the drainage and tie into the water course would not be viable for a development of this size. Therefore, connecting to a surface water body is deemed not feasible at the site.

5.3 Discharge to Surface Water Sewer (1. Highway Sewer, 2. Other SW Sewer)

An existing highway sewer has been identified as a possible connection point. Capacity and discharge rates would need to be confirmed with local highway authority / SAB will be sort if this option were to be pursued.

Existing Welsh Water surface water sewers are noted to surround the site. Capacity and discharge rates would need to be confirmed with DCWW / SAB if this option were to be pursued.

6.0 PROPOSED DRAINAGE STRATEGY

The proposed development consists of 17 dwellings with associated infrastructure including public open spaces and vehicular / pedestrian access arrangements.

6.1 Surface Water

The surface water drainage for the proposal will comply with SAB/SuDS protocols, and work within the site layout & constraints of the proposed development.

The proposed surface water discharge rate from the development will be 11.35 l/s, based on a 100-year storm event with 40% allowance for climate change. An allowance of 10% increase in development catchment through urban creep has also been included.

The proposed development will be attenuated in a pond at the West of the site, where a flow control device will limit the final discharge rate.

Green spaces will be utilized and located adjacent to dwellings for a combination of planters, rain gardens, and bio-retention areas. These features will intercept flows from impermeable areas, conveying and treating the flow before it enters the pipe network.

Surface water, after treatment from the SuDS features, will be collected and attenuated in a pond to the West of the site which will then discharge from the pond with a flow rate of 11.35 l/s through a flow control device before connecting to the existing sewer.

The proposed 11.35l/s is based on current greenfield rate of 11.35l/s. This is based on a catchment for the 0.599ha positively drained area (0.24ha development area). Following the Drainage hierarchy set out in section 5.0, Infiltration testing indicates that infiltration is not feasible as also there is no possible watercourse connection. The final connection will be into the local authorities surface water sewers located west of the site along Ger Y Bont.

Under the current Welsh Government policy, any surface water infrastructure conveying flows from more than 1 curtilage requires adoption by the local authority SAB.

Open market plots will fall under this arrangement. Council & housing association developments can be treated as a single curtilage where houses are to be kept under their ownership and not offered for open market sales in the future.

Any infrastructure being adopted by the local authority SAB will be subject to commuted sums calculated for the lifetime maintenance and end of life replacement construction costs. Under a single development curtilage, the surface water elements can be kept private. In both instances the adopted / private network must be maintained in accordance with the project maintenance schedule and CIRIA SuDs manual guidance.

6.2 Foul Drainage

A pre planning enquiry will be required to allow DCWW to confirm capacity and preferred connection point. The proposed dwellings (17 in total) could connect directly into the DCWW foul sewer on the perimeter of the site. A section 104 application with Welsh Water would be required for any sewers conveying flows from more than 1 dwelling or crossing land boundaries. A Section 106 agreement is required to allow a connection into any of the existing DCWW assets. The average proposed Foul discharge rates for the development are as follows: -

Based on SFA 7th edition: - $\frac{17 \times 4000}{24 \times 60 \times 60} = 0.787 \text{ l/s}$

6.3 Land Drainage

Existing historic aco drainage is located on a hard surface to the south west of the site which was identified on the topographical survey. As this area of the site is to be developed no diversions are envisaged.

6.4 Other Drainage

A private storm and foul drainage system runs across the front of the site running east to west, with on-site manholes located to the south of the site. It is presumed that these are live networks form the commercial premises to the East of the development. Consultation is underway to determine ownership of the drainage.

7.0 COMPLIANCE WITH NATIONAL SUDS STANDARDS

7.1 Standard S1 – Surface Water Destination

Priority Level 1 – Reuse of Rainwater

The use of SuDS planters, Rain gardens & Rain Butts are proposed to intercept roof runoff and act as a point of source control. This will allow a limited re-use of rainwater and to facilitate the planter and associated flora.

Priority Level 2 – Infiltration to Ground

SI investigation report, conducted by Terra Firms, indicates that infiltration was feasible at the site. However, it was confirmed that the soil build up is constructed from made ground. As this is the case, the soak away results are discarded due to uneven displacement of the surface water which can result in washing away of fines across the site. Therefore, infiltration is deemed not feasible at the site.

Priority Level 3 – Discharge to Water Body

There are no watercourses in the immediate vicinity and deemed not appropriate for this development.

Priority Level 4 – Discharge to Surface Water Sewer, Highway Drain, or other System

Possible applicable for this development. / Attenuation with control discharge based on agreed rate. Further investigation required.

Priority Level 5: Discharge to a Combined Sewer

Deemed not required for this development. / Attenuation with control discharge based on agreed rate

7.2 Standard S2 – Surface Water Runoff Hydraulic Control

It is proposed that the attenuation system be designed such that it is sufficient to store critical storm duration flows in the 100yr+40% event. Calculations are appended. As noted above there have been no reductions made to the sizing of the attenuation to reflect reductions afforded by the rain gardens or operation of the SuDS planters. Therefore, allowing for a worst-case scenario. An allowance of 10% increase in permeable catchment has also been included for future urban creep where applicable.

First 5mm Interception

Interception mechanisms will be required to ensure compliance with the requirement of zero runoff for the first 5mm rainfall for 80% of storm events during the summer and 50% in winter.

The provision of SuDS planter features and rain gardens along with flows through permeable drive subbase will contribute to the objective of first 5mm interception. Deemed to comply with the SAB standards.

Exceedance/Blockage

Any exceedance flows will follow surface topography. The topography is such that any excess flows will be directed in a south direction towards the existing highway.

7.3 Standard S3 – Water Quality

The proposed SuDS treatment train devices (SuDS planters, Rain Gardens, Permeable paving, and Detention Basin) will deliver the requisite cleansing and filtration of runoff for this residential (low pollution hazard level) development.

7.4 Standard S4 – Amenity

The soft suds features (SuDS planters, Rain Gardens and Detention Basin) will be carefully designed and integrated into the landscaping scheme for the development, to promote aesthetics and well-being as well as any designed drainage function.

7.5 Standard S5 – Biodiversity

The soft suds features (Bio-Retention Planters, Rain Gardens etc) will be carefully designed with gradients/profiles, planting species and soil properties selected to ensure suitable habitat is delivered to promote biodiversity. Planting information is included within the SUDS planting information. These proposals will augment the green infrastructure element of the design proposals to demonstrate a robust response to this Standard.

7.6 Standard S6 - Construction, Operation and Maintenance and Structural Integrity

Much of the infrastructure maintenance will be dealt with at a property level as many of the systems employed are contained within a single curtilage application. The online attenuation within the shared drive sub-base) will be offered for adoption through the SAB application process if agreed during pre-SAB discussions. All of the proposed SuDS infrastructure is in accessible areas for ease of maintenance. The surface water network including any land drainage will be designed to be fully roddable and jettable, with suitably positioned rodding eyes and mini-access chambers.

The SuDS devices are low maintenance surface/shallow items with established regular maintenance regimes.

The proposed design solution has been designed in accordance with the SuDS manual and is generally served by shallow SuDs features and accessible details. There are no inherent safety issues with the proposed scheme.

The Tenant will manage the on-property drainage infrastructure. The principal issue is the management of the SuDS planters, which primarily involves periodic inspection to check the overflows are clear and ensure the free-flowing operation. These inspections will also serve to monitor the build-up of any silt in the system to facilitate any cleaning required.

8.0 SUMMARY & RECOMMENDATIONS

8.1 SUMMARY

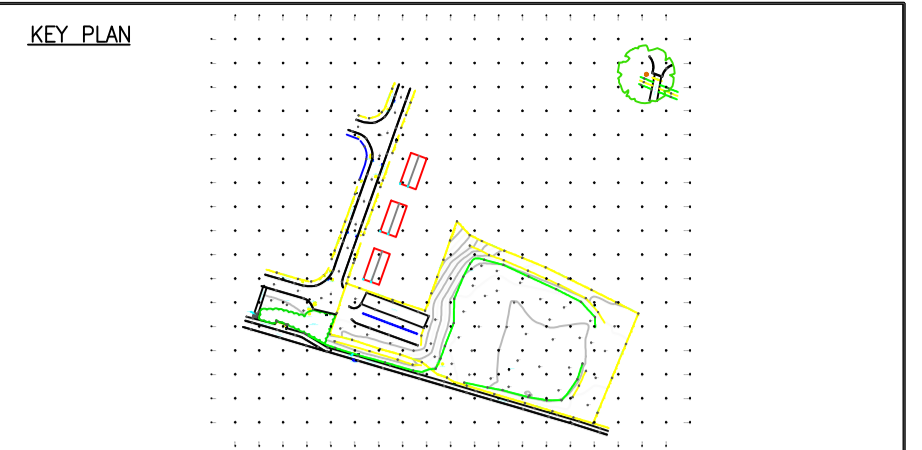
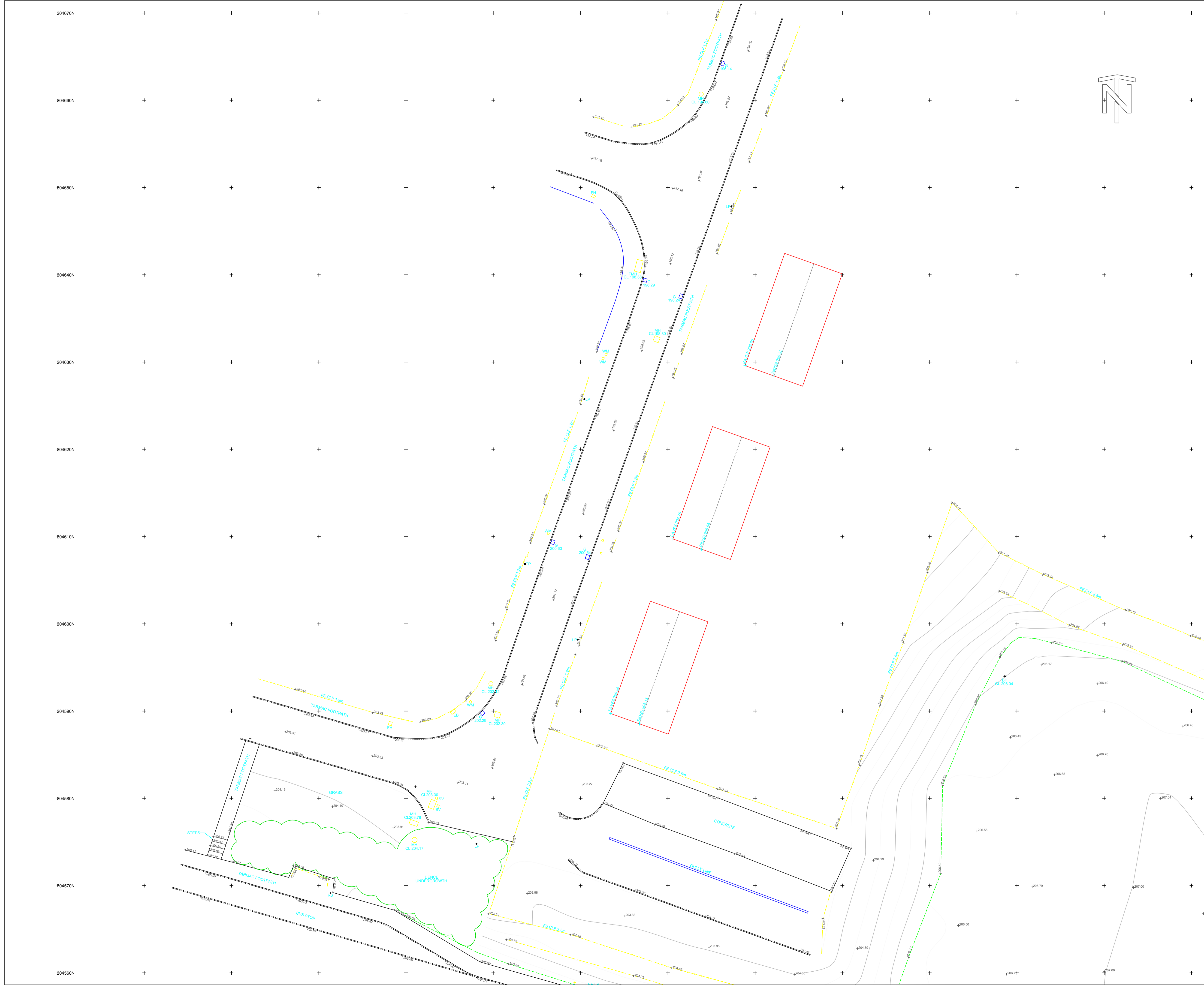
The proposed development will follow current Welsh Government, local authority, and Welsh Water guidance in relation to drainage strategy. Any element of the proposed foul network conveying flows from more than one dwelling will be offered to DCWW through the Section 104 application process. The surface water network will follow the principles set out in the Ciria SuDs manual (C753) and Local SAB requirements. The surface water will be collected, treated, and discharged to a viable source at an acceptable rate following SAB hierarchy guidance. Where appropriate, surface water elements will be adopted by the local authority through SAB application process.

8.2 RECOMMENDATIONS

The following actions are recommended to allow a robust suitable site-specific surface and foul water drainage strategy can be implemented to service the proposed development.

- Discussion / Pre-Planning application to DCWW to determine capacity and potential connection points for foul drainage.
- PreSAB application with local authority to initiate dialogue to confirm discharge rates and connection point together with any mitigation measures that may be required.
- Determine ownership, condition and capacity of the storm and foul main running East to West across the south of the site for potential foul tie in connection.

APPENDIX 1 – EXISTING SITE SURVEY



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Revision	By	Checked	Approved	Date	Description

SURVEY LEGEND	
AB	AIR BRICK
AV	AIR VALVE
B	BOLLARD
BB	BELUSHI BEACON
BDY	BOUNDARY
BH	BOREHOLE
BE	BED LEVEL
BRK	BRICKWORK
BS	BUS STOP
BM	BENCH MARK
BW	BRICK WALL
BWF	BARBED WIRE FENCE
CBF	CLOSE BOARDED FENCE
CF	CORRUGATED IRON FENCE
CL	COVER LEVEL
CLP	CHAIN LINK FENCE
CONC	CONCRETE
CP	CONCRETE POST
CPF	CONCRETE PILING FENCE
CR	CYCLE RACK
CTV	CABLE T.V. MANHOLE
CUL	CULVERT
DK	DROP KERB
DL	DECK LEVEL
DP	DOWNPIPE
DPC	DAMP PROOF COURSE
DR	DRAIN
DWB	DOG WASTE BIN
EA	ENVIRONMENT AGENCY
EB	ELECTRICITY BOX
ECP	ELECTRIC CABLE FENCE
EGP	ELECTRICITY CABLE PIT
EMH	ELECTRICITY MANHOLE
EP	ELECTRICITY POLE
ER	EARTHING ROD
ETL	ELECTRICITY TRANSMISSION LINE
FB	FLOWER BED
FBR	FOOTBRIDGE
FHM	FIRE HYDRANT MARKER
FL	FLOOR LEVEL
FP	FENCE POST
FWM	FUUL WATER MANHOLE
G	GULLY
GL	GROUND LEVEL
GP	GATE POST
GM	GAS MARKER
GV	GAS VALVE
HW	HEAD WALL
IC	INSPECTION CHAMBER
IL	INSERT LEVEL
IRF	IRON RAILING FENCE
IRFV	INTERLOCKED FENCE
JB	JUNCTION BOX
KIB	KERB INLET GULLY
LB	LEFT BANK
LFB	LIFEBUOY
LP	LAMP POST
MB	MOORING BOLLARD
MF	MISCELLANEOUS FENCING
MH	MANHOLE
MKR	MARKER
MP	MOORING PILE
MSF	METAL RAILING FENCE
MS	MILE STONE
NBA	NATIONAL PARKS AUTHORITY
OHC	OVERHEAD CABLE
OS	ORDNANCE SURVEY
OSR	OPEN STEEL RAILINGS
P	PILLAR BOX
PM	PARKING METER
PO	POST
PPF	POST & RAIL FENCE
PTM	PARKING TICKET MACHINE
PWF	POST & WIRE FENCE
RB	RIGHT BANK
RE	ROODING EYE
RS	ROAD SIGN
RTW	RETAINING WALL
RWP	RAINWATER PIPE
SC	STOP COCK
SDP	STAND PIPE
SK	SKANKWAY
SL	SOFTTT LEVEL
SMH	SURFACE WATER MANHOLE
SMP	SHEET METAL PILING
SP	SIGN POST
STN	STATION
SV	SLUCE VALVE
SWP	SOIL VENT PIPE
SWF	SHEEP WIRE FENCE
TBM	TEMPORARY BENCH MARK
TCP	TELEPHONE CALL BOX/POST
TC	TELECOM CABINET
TMH	TELECOM MANHOLE
THL	THRESHOLD LEVEL
TL	TRAFFIC LIGHT
TLB	TRAFFIC LIGHT BOX
TP	TELEGRAPH POLE
TR	TREE TRUMP
TRS	TIMBER RUBBING STRIP
TS	TREE STUMP
TSR	TUBULAR STEEL RAILINGS
VP	VENT PIPE
WB	WASTE BIN
WL	WATER LEVEL/WATER LINE
WM	WATER METER
WMF	WIRE MESH FENCE
WP	WOODEN POST
WPR	WOODEN POST & RAIL FENCE
WV	WATER VALVE
WY	WATER YARD
YC	YARD GULLY

(Abbreviations apply to survey data only)

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STN2	297402.12 204586.84	203.51			

NATIONAL GRID.	CONTROL USED:	VALUE(M)
TYPE	REFERENCE	

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Housing Association

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TEL: 01291 673491 MOB: 0787 2560386
EMAIL: jonbarton@usklandsurvey.co.uk

Project: **Hirwaun Road
Topographical Survey**

Site: **Hirwaun Road
Aberdare
CF44 9HW**

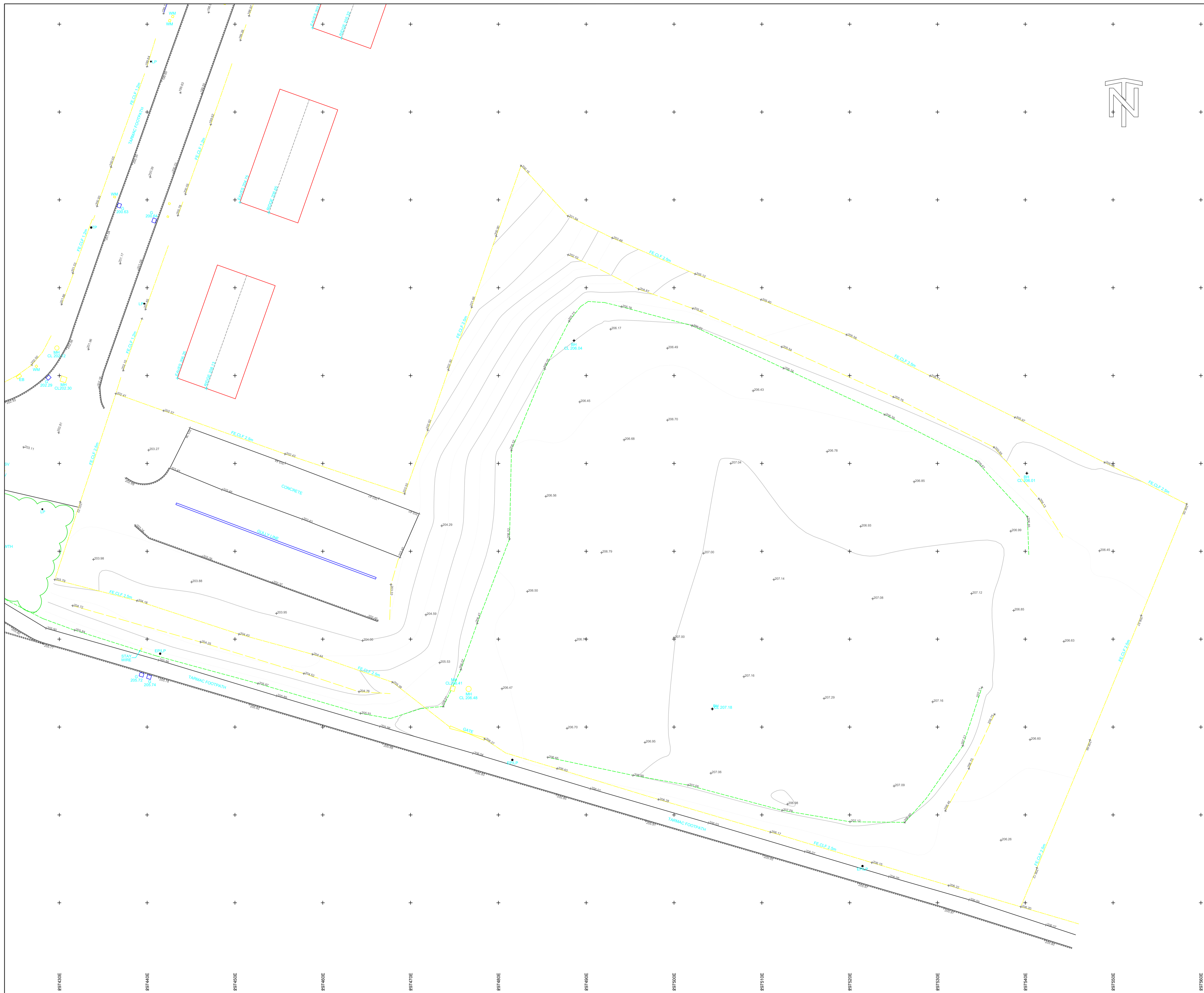
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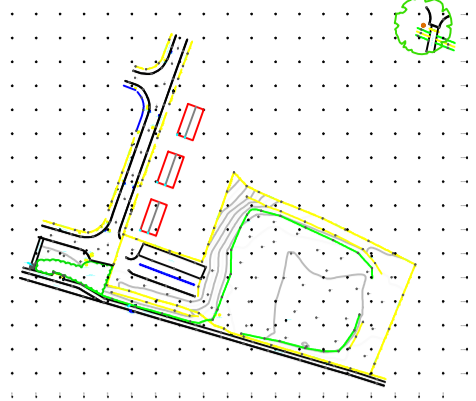
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KEY PLAN



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MH	MANHOLE
MKR	MARKER
MP	MOORING PILE
MSF	METAL RAILING FENCE
MS	MILE STONE
NBA	NATIONAL POWER AUTHORITY
NCB	NOTICE BOARD
OHC	OVERHEAD CABLE
OS	ORDNANCE SURVEY
OSR	OPEN STEEL RAILINGS
P	PILLAR BOX
PF	PARKING METER
PO	POST
PRF	POST & RAIL FENCE
PTM	PARKING TICKET MACHINE
PWF	POST & WIRE FENCE
RB	RIGHT BANK
RE	ROODING EYE
RS	ROAD SIGN
RSM	RETAINING WALL
RWP	RAINWATER PIPE
SC	STOP COCK
SDP	STAND PIPE
SK	SKAMWAY
SL	SOFTTT LEVEL
SMH	SURFACE WATER MANHOLE
SMP	SHEET METAL PILING
SP	SOIL VENT PIPE
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WL	WATER LEVEL/WATER LINE
WM	WATER METER
WMF	WIRE MESH FENCE
WP	WOODEN POST
WPR	WOODEN POST & RAIL FENCE
WV	WATER VALVE
YG	YARD GULLY

(Abbreviations apply to survey data only)

STN	CO-ORDINATES	LEVEL	STN	CO-ORDINATES	LEVEL
STN1	297421.07	204581.32	203.29		
STN2	297402.12	204586.84	203.51		

NATIONAL GRID	CONTROL USED:	VALUE(M)
TYPE	REFERENCE	

ALL LEVELS RELATE TO ORDNANCE DATUM NEWLYN.

Client
Cymdeithas Tai Newydd
Housing Association

Usk Land Survey
No.40 ABERGAVENNY ROAD, USK, NP15 1SB
TEL: 01291 673491 MOB: 0787 2560386
EMAIL: jonbarton@usklandsurvey.co.uk

Project
**Hirwaun Road
Topographical Survey**

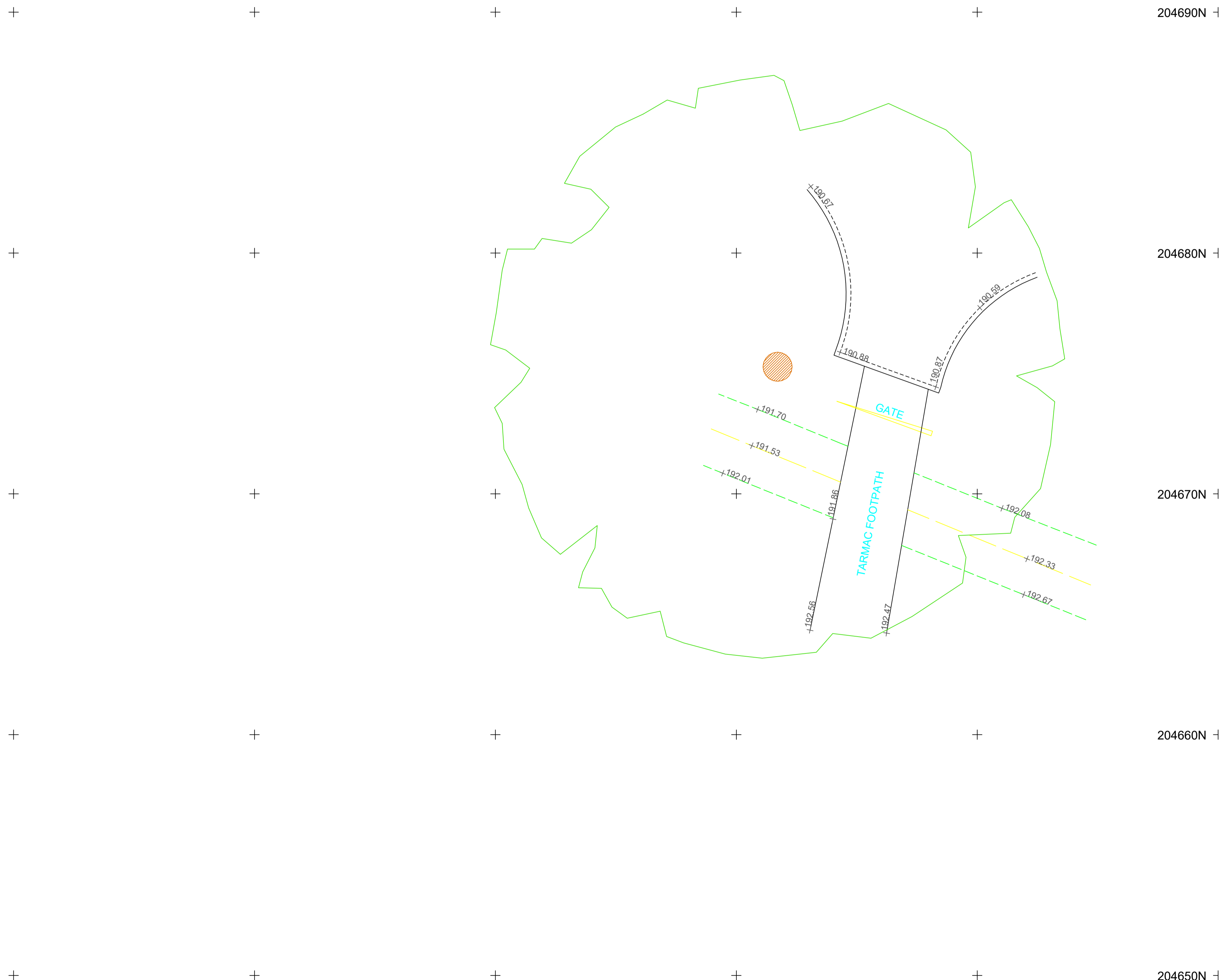
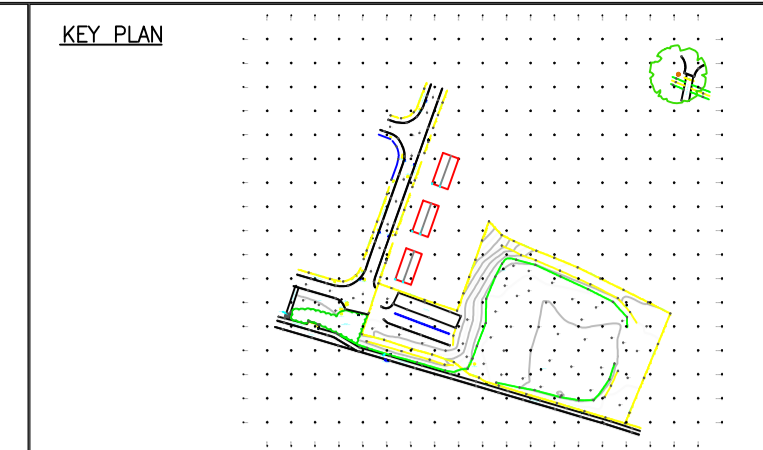
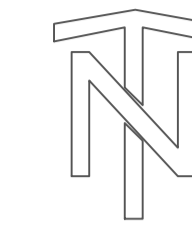
Site
Hirwaun Road
Aberdare
CF44 9HW

Surveyed by J.Barton Date: APR 2023
Checked by J.Barton Date: APR 2023
Drawn by J.Barton Date: APR 2023

Drawing No. _____ Revision _____
Sheet 2

Drawing Scale: 1:200 Job Ref 1471
CAD Filename: .1471.dwg Plot Scale: 1=1
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297530E - 297540E - 297550E - 297560E - 297570E -



- Notes:
- This drawing is copyright and its use or reproduction without the written permission of Usk Land Survey is prohibited.
 - Due to unavoidable inaccuracies during the reproduction process these drawings should not be scaled. Where dimensions are critical Usk Land Survey should be requested to confirm dimensions based on survey information. Scales appearing at the base of this plan are for indicative purposes only.
 - This plan has been prepared in accordance with B.S. 1192, Part 1 in relation to scale and dimension. Tolerances permitted within the British Standard should be observed.
 - All dimensions and particulars should be checked on site. Any discrepancies should be reported to Usk Land Survey before any work commences.

Revision	By	Checked	Approved	Date	Description
----------	----	---------	----------	------	-------------

SURVEY LEGEND			
AB	AIR BRICK	LP	LAMP POST
AV	AIR VALVE	MB	MOORING BOLLARD
B	BOLLARD	MF	MISCELLANEOUS FENCING
BB	BELISHA BEACON	MH	MANHOLE
BBY	BOUNDARY MARKER	MKR	MARKER
BH	BOREHOLE	MP	MOORING PILE
BL	BED LEVEL	MSF	METAL RAILING FENCE
BRK	BRICKWORK	MS	MILE STONE
BS	BUS STOP	NB	NOTICE BOARD
BM	BENCH MARK	NBA	NATIONAL POWER AUTHORITY
BW	BRICK WALL	OHC	OVERHEAD CABLE
BWF	BARBED WIRE FENCE	OS	ORDNANCE SURVEY
CBF	CLOSE BOARDED FENCE	OSR	OPEN STEEL RAILINGS
CF	CORRUGATED IRON FENCE	P	PILLAR BOX
CL	COVER LEVEL	PI	PARKING METER
CLP	CHAIN LINK FENCE	PO	POST
CONC	CONCRETE	PPF	POST & RAIL FENCE
CP	CONCRETE POST	PTM	PARKING TICKET MACHINE
CPF	CONCRETE PALING FENCE	PWF	POST & WIRE FENCE
CR	CYCLE RACK	RB	RIGHT BANK
CTV	CABLE T.V. MANHOLE	RE	RODDING EYE
CUL	CULVERT	RE	RODDING EYE
DK	DROP KERB	RS	ROAD SIGN
DL	DECK LEVEL	RTW	RETAINING WALL
DP	DOWNPIPE	RWP	RAINWATER PIPE
DPC	DAMP PROOF COURSE	SC	STOP COCK
DR	DRAIN	SDP	STAND PIPE
DWB	DIG WASTE BIN	SK	SKANKWAY
EA	ENVIRONMENT AGENCY	SL	SOFTTT LEVEL
EB	ELECTRICITY BOX	SMH	SURFACE WATER MANHOLE
ECF	ELECTRIC CABLE FENCE	SMP	SHEET METAL PILING
ECN	ELECTRICITY CABLE PIT	SP	SIGN POST
EMH	ELECTRICITY MANHOLE	STN	STATION
EP	ELECTRICITY POLE	SV	SLUCE VALVE
ER	EARTHING ROD	SVP	SOIL VENT PIPE
ETL	ELECTRICITY TRANSMISSION LINE	SWF	SHEEP WIRE FENCE
FB	FLOWER BED	TBM	TEMPORARY BENCH MARK
FBR	FOOTBRIDGE	TBR/TCR	TELEPHONE CALL BOX/POST
FC	FENCE POST	TC	TELECOM CABINET
FHM	FIRE HYDRANT MARKER	TMH	TELECOM MANHOLE
FL	FLOOR LEVEL	TL	THRESHOLD LEVEL
FP	FENCE POST	TL	TRAFFIC LIGHT
FWM	FOWL WATER MANHOLE	TLB	TRAFFIC LIGHT BOX
G	GULLY	TP	TELEGRAPH POLE
GL	GROUND LEVEL	TRS	TIMBER RUBBER STRIP
GP	GATE POST	TS	TREE STUMP
GM	GAS MARKER	TSR	TUBULAR STEEL RAILINGS
GV	GAS VALVE	VP	VENT PIPE
HW	HEAD WALL	WB	WASTE BIN
IC	INSPECTION CHAMBER	WL	WATER LEVEL/WATER LINE
IL	INSERT LEVEL	WM	WATER METER
IRF	IRON RAILING FENCE	WMF	WIRE MESH FENCE
IRFV	INTERLOCKED FENCE	WP	WOODEN POST
JB	JUNCTION BOX	WFR	WOODEN POST & RAIL FENCE
KIG	KERB INLET GULLY	WV	WATER VALVE
LB	LEFT BANK	YD	YARD GULLY
LFB	LIFEBUOY	YC	YARD GULLY

(Abbreviations apply to survey data only)

STN	CO-ORDINATES	LEVEL	STN	CO-ORDINATES	LEVEL
STN1	297421.07 204581.32	203.29			
STN2	297402.12 204586.84	203.51			

NATIONAL GRID.	CONTROL USED:	TYPE	REFERENCE	VALUE(M)
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Client: Cymdeithas Tai Newydd Housing Association

Usk Land Survey
 No.40 ABERGAVENNY ROAD, USK, NP15 1SB
 TEL: 01291 673491 MOB: 0787 2560386
 EMAIL: jonbarton@usklandsurvey.co.uk

Project: Hirwaun Road Topographical Survey

Site: Hirwaun Road, Aberdare, CF44 9HW

Surveyed by J.Barton Date: APR 2023
 Checked by J.Barton Date: APR 2023
 Drawn by J.Barton Date: APR 2023

Drawing No. Sheet 3

Drawing Scale: 1:100 Job Ref: 1471
 CAD Filename: .1471.dwg Plot Scale: 1=1

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APPENDIX 2 – EXISTING DRAINAGE SURVEY



DRAINTECH

helping to improve the drainage network

Drainage Survey Report

Job Number : 17568

Project Number: 1

Project Name: Bryn Rhos/Hirwaun Road CCTV Drainage Survey

Company: Quad Consult

Site Date: 16-11-2023

Draintech Surveys Ltd | Atlantic House | Chamwood Park | Bridgend | CF31 3PL | 01656 767001 | www.draintech.co.uk



Table of Contents

Project Name	Project Number	Project Date
17568 BRYN RHOS HIRWAUN	1	16/11/2023

Project Information	P-1
Section Item 1: SMH1 > SMH2 (SMH1X)	1
Section Item 2: SMH2 > SMH3 (SMH2X)	2
Section Item 3: SMH3 > SMH4 (SMH3X)	4
Section Item 4: UNKNOWN > SMH2 (UNKNOWNX)	7
Section Item 5: SMH4 > SMH5 (SMH4X)	9
Section Item 6: SMH4 > SMH5 (SMH4X)	11
Section Item 7: SMH5 > SMH6 (SMH5X)	12

Project Information

Project Name	Project Number	Project Date
17568 BRYN RHOS HIRWAUN	1	16/11/2023

Client

Company: Quad Consult
Contact: Meurig Hughes

Site

Company: Draintech Surveys Ltd
Contact: Mark Allen

Contractor

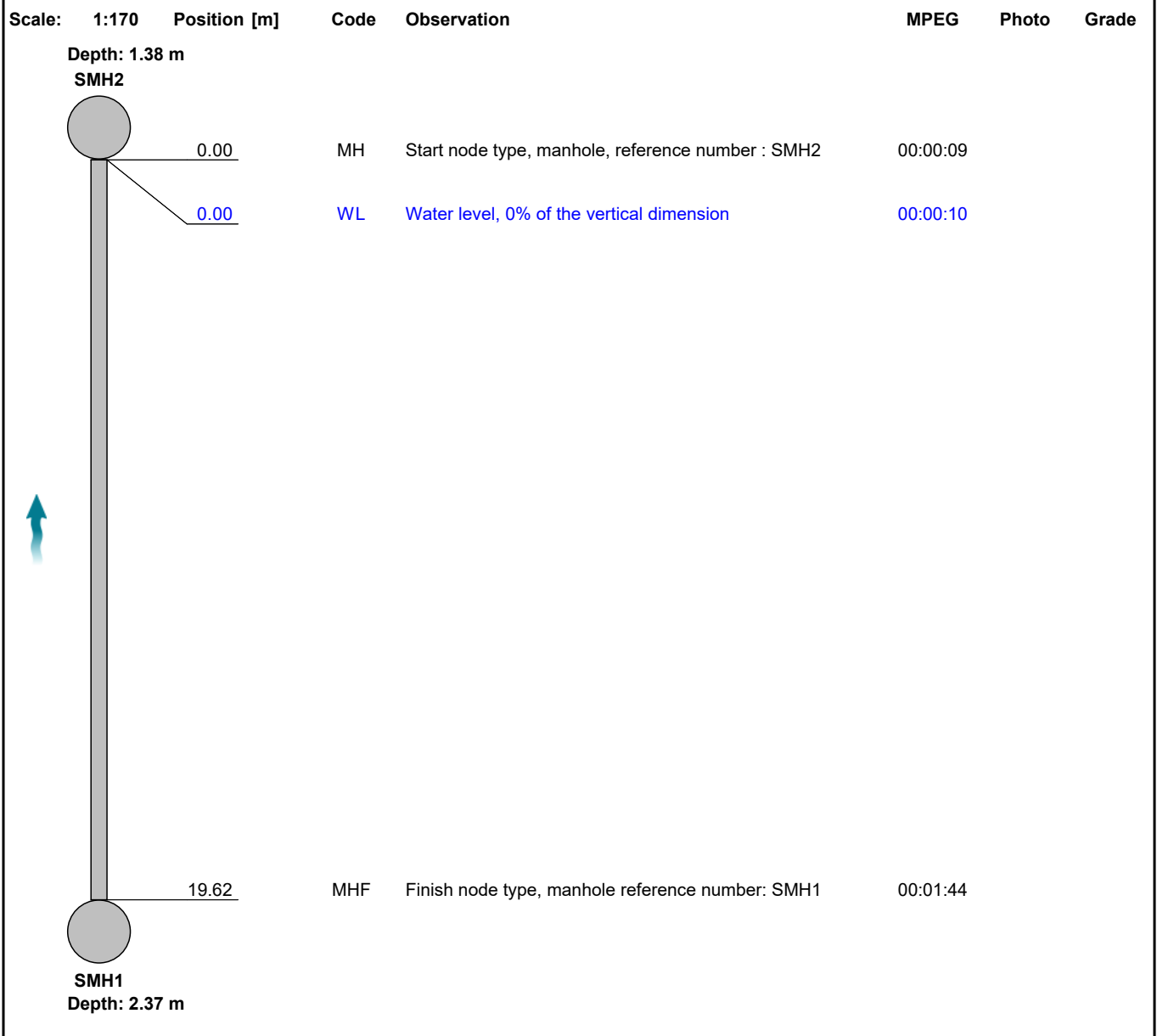
Company: Draintech Surveys Ltd
Department: Processing Co-Ordinator
Street: Atlantic House, Charnwood Park
County: Bridgend
Post Code: CF31 3PL
Phone: 01656 767001

Section Inspection - 16/11/2023 - SMH1X

Item No. 1	Insp. No. 1	Date 16/11/23	Time 9:46	Client's Job Ref 1	Weather No Rain Or Snow	Pre Cleaned Yes	PLR SMH1X
Operator DRAINTECH MA		Vehicle CF71 HNW		Camera Mini Cam	Preset Length Not Specified	Criticality Grade Category C	Alternative ID Not Specified

Town or Village:	Hirwaun	Inspection Direction:	Upstream	Upstream Node:	SMH1
Road:	Bryn Rhos	Inspected Length:	19.62 m	Upstream Pipe Depth:	2.370 m
Location:	Road	Total Length:	19.62 m	Downstream Node:	SMH2
Surface Type:	Unknown	Joint Length:	1.00 m	Downstream Pipe Depth:	1.380 m
Use:	Surface water	Pipe Shape:	Circular	Dia/Height:	300 mm
Type of Pipe:	Gravity drain/sewer	Pipe Material:	Vitrified clay pipe (i.e. all clayware)	Lining Type:	No Lining
Flow Control:	No flow control	Lining Material:	No Lining		
Year Constructed:	Not Specified				
Inspection Purpose:	Routine inspection of condition				

Comments:
Recommendations: None specified



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	0	0.0	0.0	0.0	1.0

Section Inspection - 28/11/2023 - SMH2X

Item No. 2	Insp. No. 1	Date 28/11/23	Time 9:12	Client's Job Ref 1	Weather No Rain Or Snow	Pre Cleaned Yes	PLR SMH2X
Operator DRAINTECH MA		Vehicle CF71 HNW		Camera Mini Cam	Preset Length Not Specified	Criticality Grade Category C	Alternative ID Not Specified

Town or Village:	Hirwaun	Inspection Direction:	Downstream	Upstream Node:	SMH2
Road:	Bryn Rhos	Inspected Length:	2.84 m	Upstream Pipe Depth:	1.380 m
Location:	Road	Total Length:	2.84 m	Downstream Node:	SMH3
Surface Type:	Unknown	Joint Length:	1.00 m	Downstream Pipe Depth:	1.550 m
Use:	Surface water	Pipe Shape:	Circular	Flow Control:	No flow control
Type of Pipe:	Gravity drain/sewer	Dia/Height:	300 mm	Year Constructed:	Not Specified
Flow Control:	No flow control	Pipe Material:	Vitrified clay pipe (i.e. all clayware)	Inspection Purpose:	Routine inspection of condition
Year Constructed:	Not Specified	Lining Type:	No Lining	Lining Material:	No Lining

Comments:
Recommendations: None specified

Scale:	1:50	Position [m]	Code	Observation	MPEG	Photo	Grade
		0.00	MH	Start node type, manhole, reference number : SMH2	00:00:00		
		0.00	WL	Water level, 05% of the vertical dimension	00:00:07		
		0.20	FMJ	Fracture, multiple at joint, from 7 to 5 o'clock	00:00:12	2-1-3A	4
		0.20	H	Hole in drain/sewer, from 11 to 4 o'clock	00:00:22	2-1-4A	5
		0.20	CXI	Connection intruding, at 10 o'clock, diameter 150mm, intrusion 05%	00:00:39		5
		1.49	LR	Line deviates right	00:01:02		
		2.84	MHF	Finish node type, manhole reference number: SMH3	00:01:08		

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	245.0	107.5	245.0	5.0	1	10.0	4.4	10.0	5.0

Section Pictures - 28/11/2023 - SMH2X

Item No.	Inspection Direction	PLR	Client's Job Ref	Contractor's Job Ref
2	Downstream	SMH2X	1	17568



2-1-3A, 00:00:12, 0.20 m
Fracture, multiple at joint, from 7 to 5 o'clock



2-1-4A, 00:00:22, 0.20 m
Hole in drain/ sewer, from 11 to 4 o'clock

Section Inspection - 16/11/2023 - SMH3X

Item No. 3	Insp. No. 1	Date 16/11/23	Time 10:21	Client's Job Ref 1	Weather No Rain Or Snow	Pre Cleaned Yes	PLR SMH3X
Operator DRAINTECH MA		Vehicle CF71 HNW		Camera Mini Cam	Preset Length Not Specified	Criticality Grade Category C	Alternative ID Not Specified

Town or Village:	Hirwaun	Inspection Direction:	Downstream	Upstream Node:	SMH3
Road:	Bryn Rhos	Inspected Length:	70.32 m	Upstream Pipe Depth:	1.550 m
Location:	Road	Total Length:	70.32 m	Downstream Node:	SMH4
Surface Type:	Unknown	Joint Length:	1.00 m	Downstream Pipe Depth:	1.260 m
Use:	Surface water	Pipe Shape:	Circular		
Type of Pipe:	Gravity drain/sewer	Dia/Height:	375 mm		
Flow Control:	No flow control	Pipe Material:	Vitrified clay pipe (i.e. all clayware)		
Year Constructed:	Not Specified	Lining Type:	No Lining		
Inspection Purpose:	Routine inspection of condition	Lining Material:	No Lining		

Comments:
Recommendations: None specified

Scale:	1:351	Position [m]	Code	Observation	MPEG	Photo	Grade																																																																																																									
<div style="display: flex; align-items: center;"> <div style="flex: 1;"> <p>Depth: 1.55 m</p> </div> <table border="1" style="margin-left: 10px; border-collapse: collapse;"> <tr> <td style="width: 10%;">0.00</td> <td style="width: 5%;">MH</td> <td style="width: 45%;">Start node type, manhole, reference number : SMH3</td> <td style="width: 10%;">00:00:08</td> <td></td> <td></td> <td></td> </tr> <tr> <td style="color: blue;">0.00</td> <td style="color: blue;">WL</td> <td style="color: blue;">Water level, 0% of the vertical dimension</td> <td style="color: blue;">00:00:12</td> <td></td> <td></td> <td></td> </tr> <tr> <td style="color: green;">1.16</td> <td style="color: green;">S01 DEEJ</td> <td style="color: green;">Attached deposits, encrustation at joint, from 7 to 5 o'clock, 5% cross-sectional area loss, Start: PATCHY</td> <td style="color: green;">00:00:27</td> <td></td> <td></td> <td></td> </tr> <tr> <td style="color: black;">17.51</td> <td style="color: black;">JN</td> <td style="color: black;">Junction, at 2 o'clock, diameter 150mm</td> <td style="color: black;">00:01:56</td> <td></td> <td></td> <td></td> </tr> <tr> <td style="color: red;">19.64</td> <td style="color: red;">H</td> <td style="color: red;">Hole in drain/sewer, from 3 to 5 o'clock</td> <td style="color: red;">00:02:50</td> <td></td> <td></td> <td style="color: red;">4</td> </tr> <tr> <td style="color: red;">19.64</td> <td style="color: red;">H</td> <td style="color: red;">Hole in drain/sewer, from 7 to 8 o'clock</td> <td style="color: red;">00:02:56</td> <td></td> <td style="color: red;">3-1-6A</td> <td style="color: red;">4</td> </tr> <tr> <td style="color: black;">20.56</td> <td style="color: black;">JN</td> <td style="color: black;">Junction, at 2 o'clock, diameter 150mm</td> <td style="color: black;">00:03:15</td> <td></td> <td></td> <td></td> </tr> <tr> <td style="color: black;">29.32</td> <td style="color: black;">JN</td> <td style="color: black;">Junction, at 12 o'clock, diameter 375mm: CAPPED</td> <td style="color: black;">00:04:45</td> <td></td> <td></td> <td></td> </tr> <tr> <td style="color: green;">34.94</td> <td style="color: green;">IDJ</td> <td style="color: green;">Infiltration, dripping at joint, at 2 o'clock</td> <td style="color: green;">00:05:30</td> <td></td> <td></td> <td></td> </tr> <tr> <td style="color: green;">34.94</td> <td style="color: green;">DEEJ</td> <td style="color: green;">Attached deposits, encrustation at joint, from 1 to 5 o'clock, 10% cross-sectional area loss</td> <td style="color: green;">00:05:38</td> <td></td> <td></td> <td style="color: green;">3</td> </tr> <tr> <td style="color: green;">36.41</td> <td style="color: green;">DEEJ</td> <td style="color: green;">Attached deposits, encrustation at joint, from 3 to 11 o'clock, 25% cross-sectional area loss</td> <td style="color: green;">00:05:50</td> <td></td> <td></td> <td style="color: green;">4</td> </tr> <tr> <td style="color: red;">38.40</td> <td style="color: red;">S02 CMJ</td> <td style="color: red;">Cracks, multiple at joint, from 6 to 6 o'clock, Start</td> <td style="color: red;">00:06:39</td> <td></td> <td></td> <td></td> </tr> <tr> <td style="color: green;">38.79</td> <td style="color: green;">DEEJ</td> <td style="color: green;">Attached deposits, encrustation at joint, from 3 to 6 o'clock, 15% cross-sectional area loss</td> <td style="color: green;">00:06:44</td> <td></td> <td></td> <td style="color: green;">3</td> </tr> <tr> <td style="color: red;">39.85</td> <td style="color: red;">H</td> <td style="color: red;">Hole in drain/sewer, from 9 to 3 o'clock</td> <td style="color: red;">00:07:34</td> <td></td> <td style="color: red;">3-1-14A</td> <td style="color: red;">5</td> </tr> <tr> <td style="color: red;">40.19</td> <td style="color: red;">F02 CMJ</td> <td style="color: red;">Cracks, multiple at joint, from 6 to 6 o'clock, End</td> <td style="color: red;">00:07:57</td> <td></td> <td></td> <td style="color: red;">3</td> </tr> </table> </div>								0.00	MH	Start node type, manhole, reference number : SMH3	00:00:08				0.00	WL	Water level, 0% of the vertical dimension	00:00:12				1.16	S01 DEEJ	Attached deposits, encrustation at joint, from 7 to 5 o'clock, 5% cross-sectional area loss, Start: PATCHY	00:00:27				17.51	JN	Junction, at 2 o'clock, diameter 150mm	00:01:56				19.64	H	Hole in drain/sewer, from 3 to 5 o'clock	00:02:50			4	19.64	H	Hole in drain/sewer, from 7 to 8 o'clock	00:02:56		3-1-6A	4	20.56	JN	Junction, at 2 o'clock, diameter 150mm	00:03:15				29.32	JN	Junction, at 12 o'clock, diameter 375mm: CAPPED	00:04:45				34.94	IDJ	Infiltration, dripping at joint, at 2 o'clock	00:05:30				34.94	DEEJ	Attached deposits, encrustation at joint, from 1 to 5 o'clock, 10% cross-sectional area loss	00:05:38			3	36.41	DEEJ	Attached deposits, encrustation at joint, from 3 to 11 o'clock, 25% cross-sectional area loss	00:05:50			4	38.40	S02 CMJ	Cracks, multiple at joint, from 6 to 6 o'clock, Start	00:06:39				38.79	DEEJ	Attached deposits, encrustation at joint, from 3 to 6 o'clock, 15% cross-sectional area loss	00:06:44			3	39.85	H	Hole in drain/sewer, from 9 to 3 o'clock	00:07:34		3-1-14A	5	40.19	F02 CMJ	Cracks, multiple at joint, from 6 to 6 o'clock, End	00:07:57			3
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40.19	F02 CMJ	Cracks, multiple at joint, from 6 to 6 o'clock, End	00:07:57			3																																																																																																										

Section Inspection - 16/11/2023 - SMH3X

Item No. 3	Insp. No. 1	Date 16/11/23	Time 10:21	Client's Job Ref 1	Weather No Rain Or Snow	Pre Cleaned Yes	PLR SMH3X
Operator DRAINTECH MA		Vehicle CF71 HNW		Camera Mini Cam	Preset Length Not Specified	Criticality Grade Category C	Alternative ID Not Specified

Scale:	1:351	Position [m]	Code	Observation	MPEG	Photo	Grade
	40.80	CMJ	Cracks, multiple at joint, from 10 to 2 o'clock	00:08:07		3	
	41.20	DEEJ	Attached deposits, encrustation at joint, from 8 to 5 o'clock, 10% cross-sectional area loss	00:08:17		3	
	49.11	JN	Junction, at 2 o'clock, diameter 150mm	00:09:08			
	51.52	JN	Junction, at 2 o'clock, diameter 150mm	00:09:36			
	54.64	CCJ	Crack, circumferential at joint, from 10 to 12 o'clock	00:10:22		2	
	70.32	F01 DEEJ	Attached deposits, encrustation at joint, from 7 to 5 o'clock, 5% cross-sectional area loss, End: PATCHY	00:12:32		2	
70.32	MHF	Finish node type, manhole reference number: SMH4	00:12:34				

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
6	165.0	6.5	455.0	5.0	5	5.0	1.2	81.0	4.0

Section Pictures - 16/11/2023 - SMH3X

Item No.	Inspection Direction	PLR	Client's Job Ref	Contractor's Job Ref
3	Downstream	SMH3X	1	17568



3-1-6A, 00:02:56, 19.64 m
 Hole in drain/sewer, from 7 to 8 o'clock



3-1-14A, 00:07:34, 39.85 m
 Hole in drain/sewer, from 9 to 3 o'clock

Section Inspection - 28/11/2023 - UNKNOWNX

Item No. 4	Insp. No. 1	Date 28/11/23	Time 9:19	Client's Job Ref 1	Weather No Rain Or Snow	Pre Cleaned Yes	PLR UNKNOWNX
Operator DRAINTECH MA		Vehicle CF71 HNW		Camera Mini Cam	Preset Length Not Specified	Criticality Grade Category C	Alternative ID Not Specified

Town or Village:	Hirwaun	Inspection Direction:	Upstream	Upstream Node:	UNKNOWN
Road:	Bryn Rhos	Inspected Length:	4.72 m	Upstream Pipe Depth:	
Location:	Road	Total Length:	4.72 m	Downstream Node:	SMH2
Surface Type:	Unknown	Joint Length:	1.00 m	Downstream Pipe Depth:	1.380 m
Use:	Surface water	Pipe Shape:	Circular		
Type of Pipe:	Gravity drain/sewer	Dia/Height:	300 mm		
Flow Control:	No flow control	Pipe Material:	Vitrified clay pipe (i.e. all clayware)		
Year Constructed:	Not Specified	Lining Type:	No Lining		
Inspection Purpose:	Routine inspection of condition	Lining Material:	No Lining		

Comments:
Recommendations: None specified

Scale:	1:50	Position [m]	Code	Observation	MPEG	Photo	Grade																																																
<div style="display: flex; align-items: flex-start;"> <div style="flex: 1;"> <p>Depth: 1.38 m SMH2</p> </div> <table border="1" style="margin-left: 10px; border-collapse: collapse;"> <tr> <td style="width: 10%; text-align: right;">0.00</td> <td style="width: 10%;">MH</td> <td style="width: 40%;">Start node type, manhole, reference number : SMH2</td> <td style="width: 10%;">00:00:00</td> <td style="width: 10%;"></td> <td style="width: 10%;"></td> </tr> <tr> <td style="text-align: right;">0.00</td> <td>WL</td> <td>Water level, 0% of the vertical dimension</td> <td>00:00:07</td> <td></td> <td></td> </tr> <tr> <td style="text-align: right;">0.00</td> <td>REM</td> <td>General remark: Video header incorrect, please see report</td> <td>00:00:08</td> <td></td> <td></td> </tr> <tr> <td style="text-align: right;">0.20</td> <td>FCJ</td> <td>Fracture, circumferential at joint, from 2 to 10 o'clock</td> <td>00:00:11</td> <td></td> <td style="text-align: center;">3</td> </tr> <tr> <td style="text-align: right;">2.14</td> <td>SC</td> <td>Dimension changes, 225mm high</td> <td>00:00:21</td> <td></td> <td></td> </tr> <tr> <td style="text-align: right;">4.72</td> <td>JDL</td> <td>Joint displaced, large</td> <td>00:00:52</td> <td></td> <td style="text-align: center;">1</td> </tr> <tr> <td style="text-align: right;">4.72</td> <td>SV</td> <td>Soil visible beyond defect</td> <td>00:00:55</td> <td></td> <td></td> </tr> <tr> <td style="text-align: right;">4.72</td> <td>SA</td> <td>Survey abandoned: UNABLE TO PASS</td> <td>00:00:59</td> <td></td> <td style="text-align: center;">4-1-8A</td> </tr> </table> </div>								0.00	MH	Start node type, manhole, reference number : SMH2	00:00:00			0.00	WL	Water level, 0% of the vertical dimension	00:00:07			0.00	REM	General remark: Video header incorrect, please see report	00:00:08			0.20	FCJ	Fracture, circumferential at joint, from 2 to 10 o'clock	00:00:11		3	2.14	SC	Dimension changes, 225mm high	00:00:21			4.72	JDL	Joint displaced, large	00:00:52		1	4.72	SV	Soil visible beyond defect	00:00:55			4.72	SA	Survey abandoned: UNABLE TO PASS	00:00:59		4-1-8A
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STR No. Def	STR Peak	STR Mean	STR Total	STR Grade	SER No. Def	SER Peak	SER Mean	SER Total	SER Grade																																														
2	40.0	8.9	42.0	3.0	0	0.0	0.0	0.0	1.0																																														

Section Pictures - 28/11/2023 - UNKNOWNX

Item No.	Inspection Direction	PLR	Client's Job Ref	Contractor's Job Ref
4	Upstream	UNKNOWNX	1	17568



4-1-8A, 00:00:59, 4.72 m
Survey abandoned, UNABLE TO PASS

Section Inspection - 28/11/2023 - SMH4X

Item No. 5	Insp. No. 1	Date 28/11/23	Time 9:28	Client's Job Ref 1	Weather No Rain Or Snow	Pre Cleaned Yes	PLR SMH4X
Operator DRAINTECH MA		Vehicle CF71 HNW		Camera Mini Cam	Preset Length Not Specified	Criticality Grade Category C	Alternative ID Not Specified

Town or Village:	Hirwaun	Inspection Direction:	Upstream	Upstream Node:	SMH4
Road:	Bryn Rhos	Inspected Length:	59.94 m	Upstream Pipe Depth:	1.260 m
Location:	Road	Total Length:	59.94 m	Downstream Node:	SMH5
Surface Type:	Unknown	Joint Length:	1.00 m	Downstream Pipe Depth:	1.920 m
Use:	Surface water	Pipe Shape:	Circular		
Type of Pipe:	Gravity drain/sewer	Dia/Height:	375 mm		
Flow Control:	No flow control	Pipe Material:	Vitrified clay pipe (i.e. all clayware)		
Year Constructed:	Not Specified	Lining Type:	No Lining		
Inspection Purpose:	Routine inspection of condition	Lining Material:	No Lining		

Comments:
Recommendations: None specified

Scale:	1:519	Position [m]	Code	Observation	MPEG	Photo	Grade																																																																																																
<div style="display: flex; align-items: flex-start;"> <div style="flex: 1;"> <p>Depth: 1.92 m SMH5</p> </div> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 10%;"></td> <td style="width: 10%;">0.00</td> <td style="width: 10%;">MH</td> <td style="width: 10%;">Start node type, manhole, reference number : SMH5</td> <td style="width: 10%;">00:00:00</td> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td>0.00</td> <td>WL</td> <td>Water level, 0% of the vertical dimension</td> <td>00:00:10</td> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td>0.00</td> <td>S01 DEEJ</td> <td>Attached deposits, encrustation at joint, from 7 to 5 o'clock, 5% cross-sectional area loss, Start: PATCHY</td> <td>00:02:29</td> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td>16.24</td> <td>JN</td> <td>Junction, at 12 o'clock, diameter 375mm: CAPPED</td> <td>00:02:03</td> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td>26.46</td> <td>JN</td> <td>Junction, at 10 o'clock, diameter 150mm</td> <td>00:03:04</td> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td>29.71</td> <td>JN</td> <td>Junction, at 10 o'clock, diameter 150mm</td> <td>00:03:38</td> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td>29.84</td> <td>SS</td> <td>Surface damage, spalling, from 10 to 12 o'clock</td> <td>00:04:07</td> <td></td> <td></td> <td style="text-align: center;">2</td> </tr> <tr> <td></td> <td>39.96</td> <td>JN</td> <td>Junction, at 12 o'clock, diameter 375mm: CAPPED</td> <td>00:05:18</td> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td>58.72</td> <td>JN</td> <td>Junction, at 10 o'clock, diameter 150mm</td> <td>00:08:15</td> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td>59.94</td> <td>F01 DEEJ</td> <td>Attached deposits, encrustation at joint, from 7 to 5 o'clock, 5% cross-sectional area loss, End: PATCHY</td> <td>00:09:52</td> <td></td> <td></td> <td style="text-align: center;">2</td> </tr> <tr> <td></td> <td>59.94</td> <td>JN</td> <td>Junction at 10 o'clock, diameter: 150mm: STEEL ROD THROUGH GULLY HOLDING DEBRIS BACK</td> <td>00:10:04</td> <td></td> <td>5-1-11A</td> <td></td> </tr> <tr> <td></td> <td>59.94</td> <td>SA</td> <td>Survey abandoned: NEEDS MORE CLEANING</td> <td>00:10:10</td> <td></td> <td>5-1-12A</td> <td></td> </tr> </table> </div>									0.00	MH	Start node type, manhole, reference number : SMH5	00:00:00					0.00	WL	Water level, 0% of the vertical dimension	00:00:10					0.00	S01 DEEJ	Attached deposits, encrustation at joint, from 7 to 5 o'clock, 5% cross-sectional area loss, Start: PATCHY	00:02:29					16.24	JN	Junction, at 12 o'clock, diameter 375mm: CAPPED	00:02:03					26.46	JN	Junction, at 10 o'clock, diameter 150mm	00:03:04					29.71	JN	Junction, at 10 o'clock, diameter 150mm	00:03:38					29.84	SS	Surface damage, spalling, from 10 to 12 o'clock	00:04:07			2		39.96	JN	Junction, at 12 o'clock, diameter 375mm: CAPPED	00:05:18					58.72	JN	Junction, at 10 o'clock, diameter 150mm	00:08:15					59.94	F01 DEEJ	Attached deposits, encrustation at joint, from 7 to 5 o'clock, 5% cross-sectional area loss, End: PATCHY	00:09:52			2		59.94	JN	Junction at 10 o'clock, diameter: 150mm: STEEL ROD THROUGH GULLY HOLDING DEBRIS BACK	00:10:04		5-1-11A			59.94	SA	Survey abandoned: NEEDS MORE CLEANING	00:10:10		5-1-12A	
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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
1	20.0	0.3	20.0	2.0	1	1.0	1.0	60.0	3.0

Section Pictures - 28/11/2023 - SMH4X

Item No.	Inspection Direction	PLR	Client's Job Ref	Contractor's Job Ref
5	Upstream	SMH4X	1	17568



5-1-11A, 00:10:04, 59.94 m
Junction at 10 o'clock, diameter: 150mm, STEEL ROD
THROUGH GULLY HOLDING DEBRIS BACK



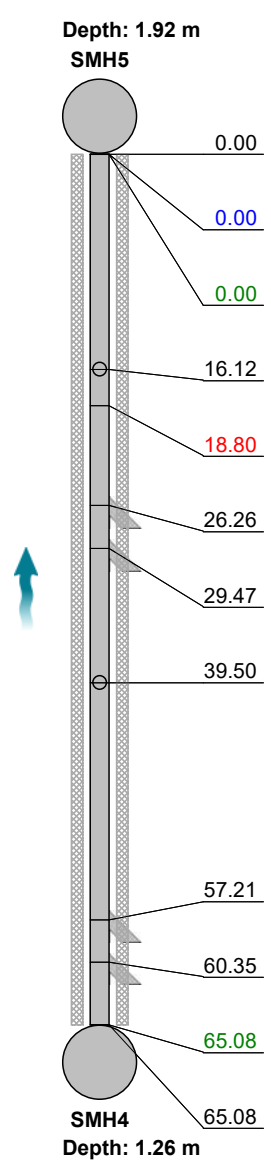
5-1-12A, 00:10:10, 59.94 m
Survey abandoned, NEEDS MORE CLEANING

Section Inspection - 16/11/2023 - SMH4X

Item No. 6	Insp. No. 1	Date 16/11/23	Time 14:48	Client's Job Ref 1	Weather No Rain Or Snow	Pre Cleaned Yes	PLR SMH4X
Operator DRAINTECH MA		Vehicle CF71 HNW		Camera Mini Cam	Preset Length Not Specified	Criticality Grade Category C	Alternative ID Not Specified

Town or Village:	Hirwaun	Inspection Direction:	Upstream	Upstream Node:	SMH4
Road:	Bryn Rhos	Inspected Length:	65.08 m	Upstream Pipe Depth:	1.260 m
Location:	Road	Total Length:	65.08 m	Downstream Node:	SMH5
Surface Type:	Unknown	Joint Length:	1.00 m	Downstream Pipe Depth:	1.920 m
Use:	Surface water	Pipe Shape:	Circular		
Type of Pipe:	Gravity drain/sewer	Dia/Height:	375 mm		
Flow Control:	No flow control	Pipe Material:	Vitrified clay pipe (i.e. all clayware)		
Year Constructed:	Not Specified	Lining Type:	No Lining		
Inspection Purpose:	Routine inspection of condition	Lining Material:	No Lining		

Comments:
Recommendations: None specified

Scale:	1:564	Position [m]	Code	Observation	MPEG	Photo	Grade																																																																																																																								
<div style="display: flex; align-items: center;"> <div style="flex: 1;">  </div> <table border="1" style="margin-left: 10px; border-collapse: collapse;"> <tr> <td style="width: 10%;">Depth: 1.92 m</td> <td colspan="7"></td> </tr> <tr> <td>SMH5</td> <td colspan="7"></td> </tr> <tr> <td>0.00</td> <td>MH</td> <td>Start node type, manhole, reference number : SMH5</td> <td>00:00:09</td> <td colspan="4"></td> </tr> <tr> <td>0.00</td> <td>WL</td> <td>Water level, 05% of the vertical dimension</td> <td>00:00:11</td> <td colspan="4"></td> </tr> <tr> <td>0.00</td> <td>S01 DEEJ</td> <td>Attached deposits, encrustation at joint, from 7 to 5 o'clock, 5% cross-sectional area loss, Start: PATCHY</td> <td>00:00:19</td> <td colspan="4"></td> </tr> <tr> <td>16.12</td> <td>JN</td> <td>Junction, at 12 o'clock, diameter 375mm: CAPPED</td> <td>00:01:43</td> <td colspan="4"></td> </tr> <tr> <td>18.80</td> <td>SS</td> <td>Surface damage, spalling, from 10 to 2 o'clock</td> <td>00:02:03</td> <td colspan="4" style="text-align: right;">2</td> </tr> <tr> <td>26.26</td> <td>JN</td> <td>Junction, at 10 o'clock, diameter 150mm</td> <td>00:02:43</td> <td colspan="4"></td> </tr> <tr> <td>29.47</td> <td>JN</td> <td>Junction, at 10 o'clock, diameter 150mm</td> <td>00:03:20</td> <td colspan="4"></td> </tr> <tr> <td>39.50</td> <td>JN</td> <td>Junction, at 12 o'clock, diameter 375mm</td> <td>00:04:32</td> <td colspan="4"></td> </tr> <tr> <td>57.21</td> <td>JN</td> <td>Junction, at 10 o'clock, diameter 150mm</td> <td>00:07:54</td> <td colspan="4"></td> </tr> <tr> <td>60.35</td> <td>JN</td> <td>Junction, at 10 o'clock, diameter 150mm</td> <td>00:08:27</td> <td colspan="4"></td> </tr> <tr> <td>65.08</td> <td>F01 DEEJ</td> <td>Attached deposits, encrustation at joint, from 7 to 5 o'clock, 5% cross-sectional area loss, End: PATCHY</td> <td>00:09:04</td> <td colspan="4" style="text-align: right;">2</td> </tr> <tr> <td>65.08</td> <td>MHF</td> <td>Finish node type, manhole reference number: SMH4</td> <td>00:09:05</td> <td colspan="4"></td> </tr> <tr> <td>SMH4</td> <td colspan="7">Depth: 1.26 m</td> </tr> </table> </div>								Depth: 1.92 m								SMH5								0.00	MH	Start node type, manhole, reference number : SMH5	00:00:09					0.00	WL	Water level, 05% of the vertical dimension	00:00:11					0.00	S01 DEEJ	Attached deposits, encrustation at joint, from 7 to 5 o'clock, 5% cross-sectional area loss, Start: PATCHY	00:00:19					16.12	JN	Junction, at 12 o'clock, diameter 375mm: CAPPED	00:01:43					18.80	SS	Surface damage, spalling, from 10 to 2 o'clock	00:02:03	2				26.26	JN	Junction, at 10 o'clock, diameter 150mm	00:02:43					29.47	JN	Junction, at 10 o'clock, diameter 150mm	00:03:20					39.50	JN	Junction, at 12 o'clock, diameter 375mm	00:04:32					57.21	JN	Junction, at 10 o'clock, diameter 150mm	00:07:54					60.35	JN	Junction, at 10 o'clock, diameter 150mm	00:08:27					65.08	F01 DEEJ	Attached deposits, encrustation at joint, from 7 to 5 o'clock, 5% cross-sectional area loss, End: PATCHY	00:09:04	2				65.08	MHF	Finish node type, manhole reference number: SMH4	00:09:05					SMH4	Depth: 1.26 m						
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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
1	20.0	0.3	20.0	2.0	1	1.0	1.0	66.0	3.0

Section Inspection - 17/11/2023 - SMH5X

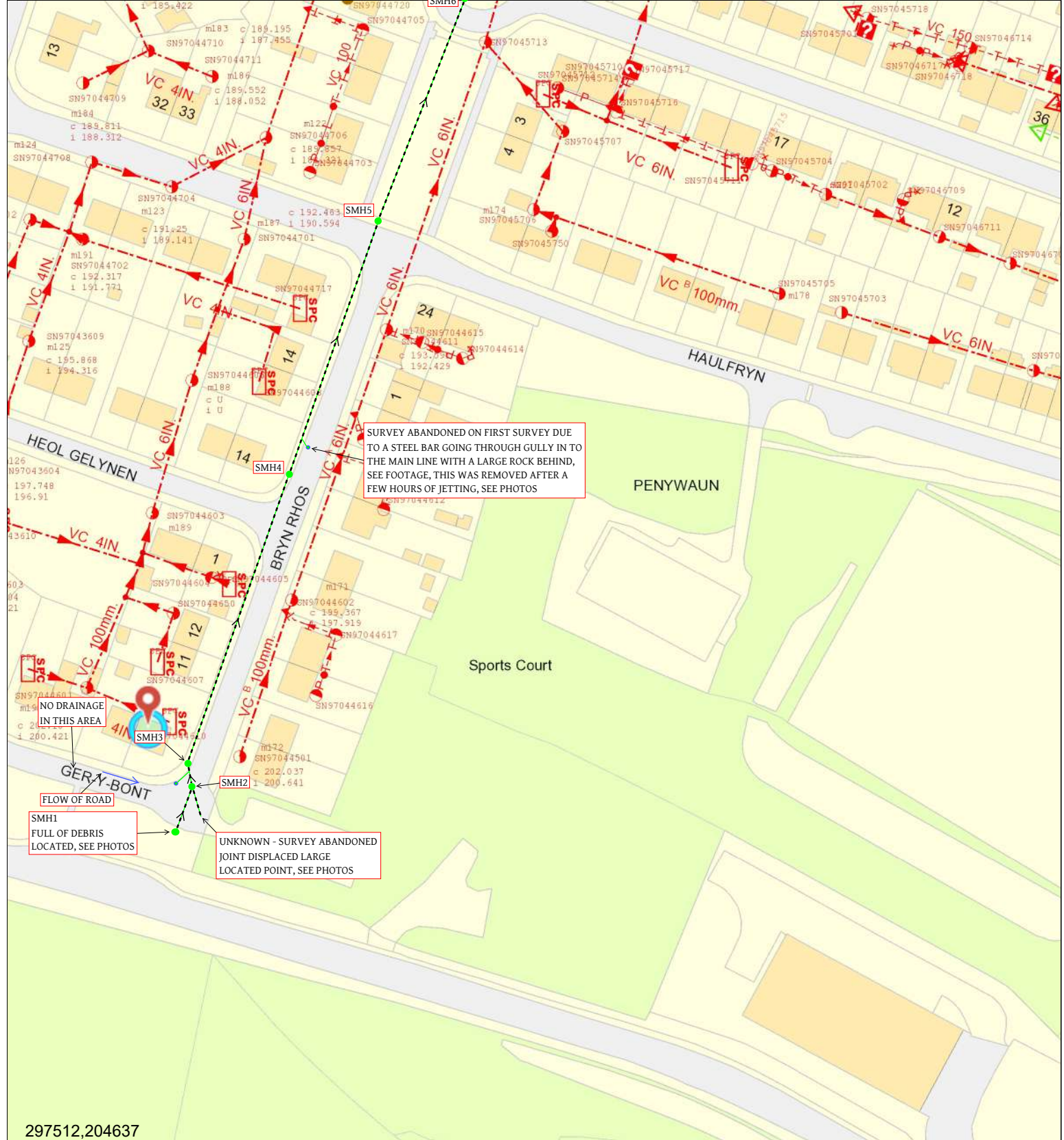
Item No. 7	Insp. No. 1	Date 17/11/23	Time 10:08	Client's Job Ref 1	Weather No Rain Or Snow	Pre Cleaned Yes	PLR SMH5X
Operator DRAINTECH MA		Vehicle CF71 HNW		Camera Mini Cam	Preset Length Not Specified	Criticality Grade Category C	Alternative ID Not Specified

Town or Village:	Hirwaun	Inspection Direction:	Upstream	Upstream Node:	SMH5
Road:	Bryn Rhos	Inspected Length:	66.39 m	Upstream Pipe Depth:	1.920 m
Location:	Road	Total Length:	66.39 m	Downstream Node:	SMH6
Surface Type:	Unknown	Joint Length:	1.00 m	Downstream Pipe Depth:	1.260 m
Use:	Surface water	Pipe Shape:	Circular		
Type of Pipe:	Gravity drain/sewer	Dia/Height:	375 mm		
Flow Control:	No flow control	Pipe Material:	Vitrified clay pipe (i.e. all clayware)		
Year Constructed:	Not Specified	Lining Type:	No Lining		
Inspection Purpose:	Routine inspection of condition	Lining Material:	No Lining		

Comments:
Recommendations: None specified

Scale:	1:575	Position [m]	Code	Observation	MPEG	Photo	Grade																																																																																																		
<div style="display: flex; align-items: center;"> <div style="flex: 1;"> </div> <table border="1" style="margin-left: 10px; border-collapse: collapse;"> <tr> <td style="text-align: center;">Depth: 1.26 m SMH6</td> <td style="text-align: center;">0.00</td> <td style="text-align: center;">MH</td> <td>Start node type, manhole, reference number : SMH6</td> <td style="text-align: center;">00:00:12</td> <td></td> <td></td> </tr> <tr> <td></td> <td style="text-align: center;">0.00</td> <td style="text-align: center;">WL</td> <td>Water level, 05% of the vertical dimension</td> <td style="text-align: center;">00:00:13</td> <td></td> <td></td> </tr> <tr> <td></td> <td style="text-align: center;">2.00</td> <td style="text-align: center;">CCJ</td> <td>Crack, circumferential at joint, from 10 to 2 o'clock</td> <td style="text-align: center;">00:00:43</td> <td></td> <td style="text-align: center;">2</td> </tr> <tr> <td></td> <td style="text-align: center;">3.61</td> <td style="text-align: center;">CLJ</td> <td>Crack, longitudinal at joint, at 2 o'clock</td> <td style="text-align: center;">00:00:58</td> <td></td> <td style="text-align: center;">2</td> </tr> <tr> <td></td> <td style="text-align: center;">16.45</td> <td style="text-align: center;">CXI</td> <td>Connection intruding, at 10 o'clock, diameter 150mm, intrusion 05%</td> <td style="text-align: center;">00:02:21</td> <td></td> <td style="text-align: center;">5</td> </tr> <tr> <td></td> <td style="text-align: center;">17.90</td> <td style="text-align: center;">JN</td> <td>Junction, at 2 o'clock, diameter 150mm</td> <td style="text-align: center;">00:03:09</td> <td></td> <td></td> </tr> <tr> <td></td> <td style="text-align: center;">17.93</td> <td style="text-align: center;">CXI</td> <td>Connection intruding, at 2 o'clock, diameter 150mm, intrusion 05%</td> <td style="text-align: center;">00:02:42</td> <td></td> <td style="text-align: center;">5</td> </tr> <tr> <td></td> <td style="text-align: center;">18.14</td> <td style="text-align: center;">JN</td> <td>Junction, at 10 o'clock, diameter 150mm</td> <td style="text-align: center;">00:02:48</td> <td></td> <td></td> </tr> <tr> <td></td> <td style="text-align: center;">23.45</td> <td style="text-align: center;">JN</td> <td>Junction, at 12 o'clock, diameter 375mm</td> <td style="text-align: center;">00:03:45</td> <td></td> <td></td> </tr> <tr> <td></td> <td style="text-align: center;">42.54</td> <td style="text-align: center;">JN</td> <td>Junction, at 12 o'clock, diameter 375mm</td> <td style="text-align: center;">00:05:37</td> <td></td> <td></td> </tr> <tr> <td></td> <td style="text-align: center;">44.29</td> <td style="text-align: center;">S01 DEEJ</td> <td>Attached deposits, encrustation at joint, from 7 to 5 o'clock, 5% cross-sectional area loss, Start: PATCHY</td> <td style="text-align: center;">00:06:01</td> <td></td> <td></td> </tr> <tr> <td></td> <td style="text-align: center;">48.28</td> <td style="text-align: center;">DEEJ</td> <td>Attached deposits, encrustation at joint, from 6 to 10 o'clock, 10% cross-sectional area loss</td> <td style="text-align: center;">00:06:35</td> <td></td> <td style="text-align: center;">3</td> </tr> <tr> <td></td> <td style="text-align: center;">66.39</td> <td style="text-align: center;">F01 DEEJ</td> <td>Attached deposits, encrustation at joint, from 7 to 5 o'clock, 5% cross-sectional area loss, End: PATCHY</td> <td style="text-align: center;">00:14:48</td> <td></td> <td style="text-align: center;">2</td> </tr> <tr> <td></td> <td style="text-align: center;">66.39</td> <td style="text-align: center;">MHF</td> <td>Finish node type, manhole reference number: SMH5</td> <td style="text-align: center;">00:14:50</td> <td></td> <td></td> </tr> </table> </div>								Depth: 1.26 m SMH6	0.00	MH	Start node type, manhole, reference number : SMH6	00:00:12				0.00	WL	Water level, 05% of the vertical dimension	00:00:13				2.00	CCJ	Crack, circumferential at joint, from 10 to 2 o'clock	00:00:43		2		3.61	CLJ	Crack, longitudinal at joint, at 2 o'clock	00:00:58		2		16.45	CXI	Connection intruding, at 10 o'clock, diameter 150mm, intrusion 05%	00:02:21		5		17.90	JN	Junction, at 2 o'clock, diameter 150mm	00:03:09				17.93	CXI	Connection intruding, at 2 o'clock, diameter 150mm, intrusion 05%	00:02:42		5		18.14	JN	Junction, at 10 o'clock, diameter 150mm	00:02:48				23.45	JN	Junction, at 12 o'clock, diameter 375mm	00:03:45				42.54	JN	Junction, at 12 o'clock, diameter 375mm	00:05:37				44.29	S01 DEEJ	Attached deposits, encrustation at joint, from 7 to 5 o'clock, 5% cross-sectional area loss, Start: PATCHY	00:06:01				48.28	DEEJ	Attached deposits, encrustation at joint, from 6 to 10 o'clock, 10% cross-sectional area loss	00:06:35		3		66.39	F01 DEEJ	Attached deposits, encrustation at joint, from 7 to 5 o'clock, 5% cross-sectional area loss, End: PATCHY	00:14:48		2		66.39	MHF	Finish node type, manhole reference number: SMH5	00:14:50		
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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	10.0	0.3	20.0	2.0	4	10.0	0.7	45.0	5.0



297512,204637

Draintech Surveys Ltd
Job/Plan Ref: 17568 - 01 - 001

Scale: 1:1250

19/10/2023

EXACT LOCATION OF ALL APPARATUS TO BE DETERMINED ON SITE

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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 (AC) or Pitch Fibre (PF)) 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

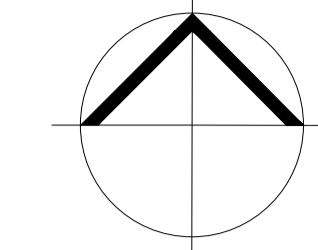
Dwr Cymru Cyfyngedig ('the Company') gives this information as to the position of its underground apparatus by way of general guidance only and on the strict understanding that it is based on the best information available and no warranty as to its correctness is relied upon in the event of excavations or other works made in the vicinity of the company's apparatus 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 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.

LEGEND

	Sluice Valve		Gravity Sewer
	Air Valve SINGLE		Rising Main
	Tap		Outfall
	Pressure Reducing Valve		Pumping Station
	Meter		Lampole
	Bulk Meter		Combined Sewer Overflow
	Fire Hydrant		Special Purpose Chamber
	Cap		Treatment Works
	Non Dwr Cymru Main		Private Sewer Transfer
	Existing Distribution Main		Lateral Drain
	Inspection Chamber		Sewer symbol colour indicates the sewer type.

RED - Contained
GREEN - Surface Water
BROWN - Foul

APPENDIX 3 – PROPOSED SITE LAYOUT



HOUSING MIX	
2 PERSON 1 BEDROOM FLATS - DGR	- 6
4 PERSON 2 BEDROOM HOUSE - DQ	- 11
TOTAL	- 17

STRENGTHS

- CLOSE PROXIMITY TO MAIN ROADS OFFERING SUSTAINABLE PUBLIC TRANSPORT
- CLOSE PROXIMITY TO MAIN EXISTING PUBLIC OPENS SPACES, SPORTS GROUNDS AND SPORTS CENTRE.
- PART OF AN EXISTING URBAN DEVELOPMENT AREA.
- SURFACE WATER CHANNELS AND DISCHARGE PRESENT TO ASSIST SUDDS DESIGN

WEAKNESSES

- TOPOGRAPHY
- EXISTING ADIT PRESENT AND DISSECTING THE SITE
- EXISTING SERVICES WITH EASEMENTS ON PERIMETER OF SITE.

OPPORTUNITIES

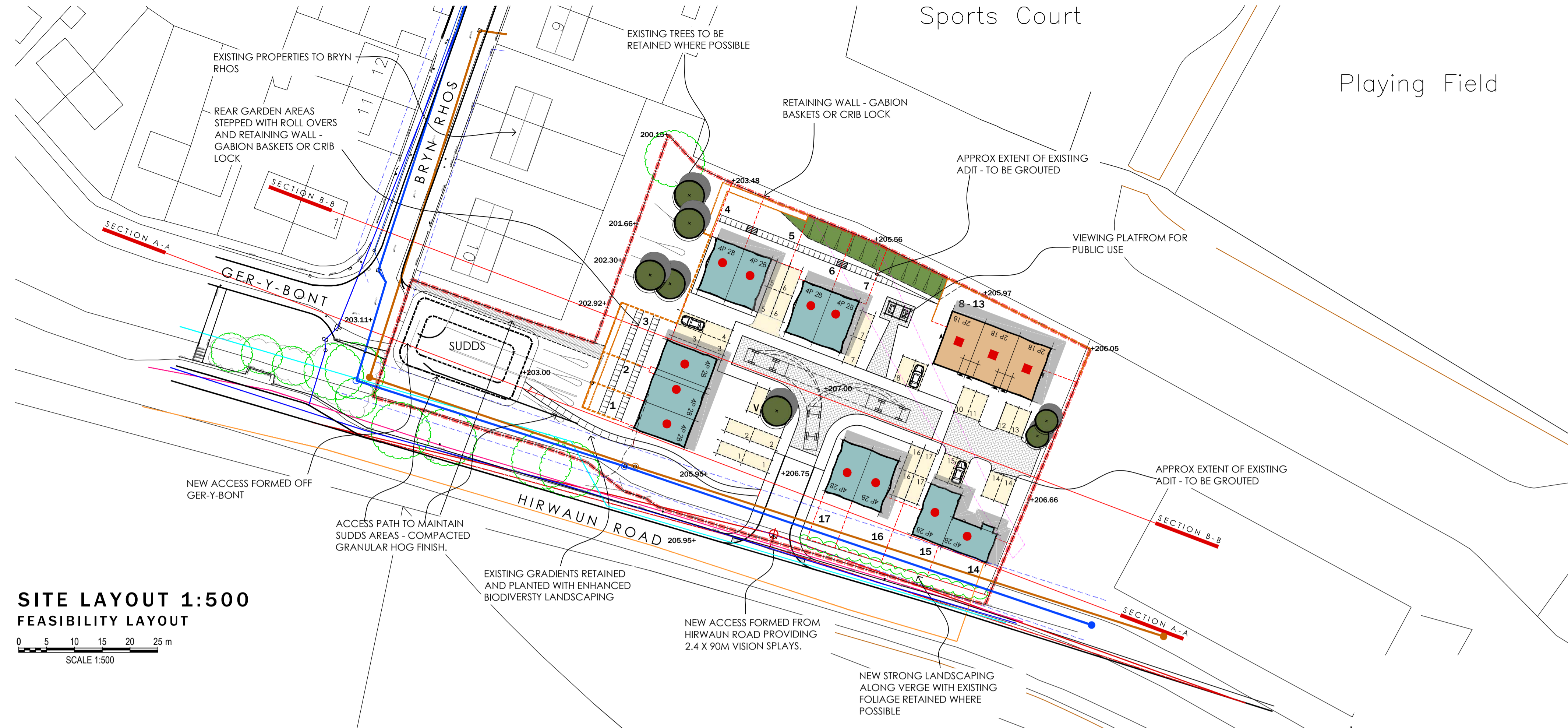
- TO INCORPORATE EXISTING HEDGEROWS AND MATURE TREES INTO THE DESIGN.
- TO PROMOTE SUSTAINABLE SURFACE WATER DRAINAGE DESIGN (SUDDS)
- TO ENCOURAGE A MIX OF HOUSE TYPES TO REFLECT PROVISION FOUND LOCALLY.
- TO USE RENEWABLE AND LOW- OR ZERO-CARBON TECHNOLOGIES.
- TO PROVIDE AFFORDABLE HOMES TO STRENGTHEN THE DIVERSITY OF HOUSING TENURE IN THE AREA.
- TO ACHIEVE A HIGH QUALITY DEVELOPMENT WITH A STRONG IDENTITY, ACTIVITY AND A STRONG SENSE OF PLACE.
- TO PROMOTE HOME WORKING OPPORTUNITIES WITHIN EACH DWELLING.
- POTENTIAL FOR RESIDENTS TO LIVE AND WORK IN CLOSE PROXIMITY REDUCING THE NEED TO TRAVEL.
- TO USE NEW PLANTING AND LANDSCAPE BUFFERS TO SOFTEN THE VISUAL IMPACT OF NEW DEVELOPMENT ON THE LANDSCAPE.

THREATS

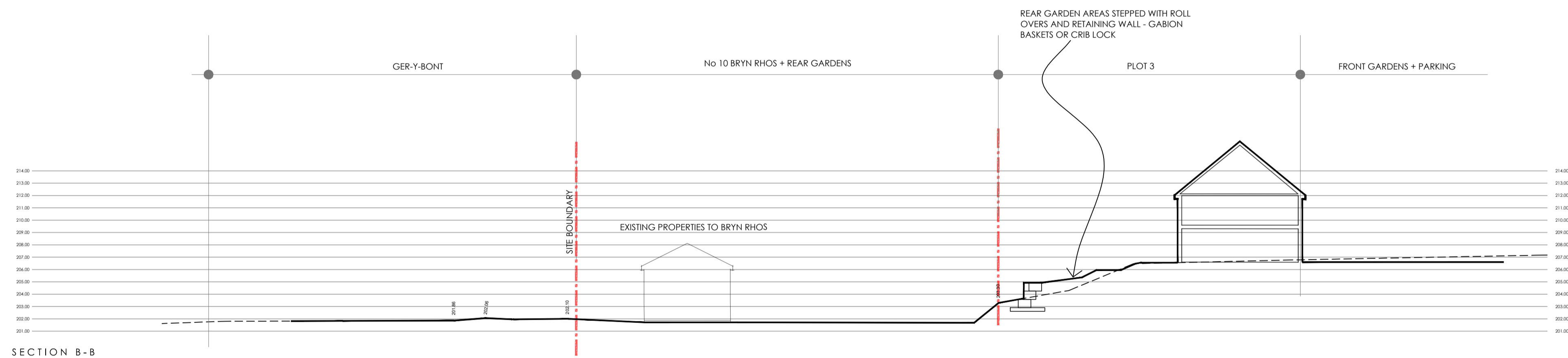
- POTENTIAL TRAFFIC GENERATION FROM THE SCHEME.
- LOSS OF TREES AND ECOLOGY
- LOSS OF ECOLOGICAL FEATURES.
- LOSS OF GREEN SPACES

DESIGN STRATEGIES AND OBJECTIVES HAVE BEEN DEVELOPED FROM THE SWOT ANALYSIS THAT SEEK TO BUILD ON EXISTING STRENGTHS, MATCH STRENGTHS WITH OPPORTUNITIES AND REMOVE WEAKNESSES. PARTICULAR ATTENTION HAS BEEN GIVEN TO WEAKNESSES THAT CAN BE MATCHED WITH THREATS, AS IN SUCH CASES THE THREATS ARE MOST LIKELY TO BE REALISED.

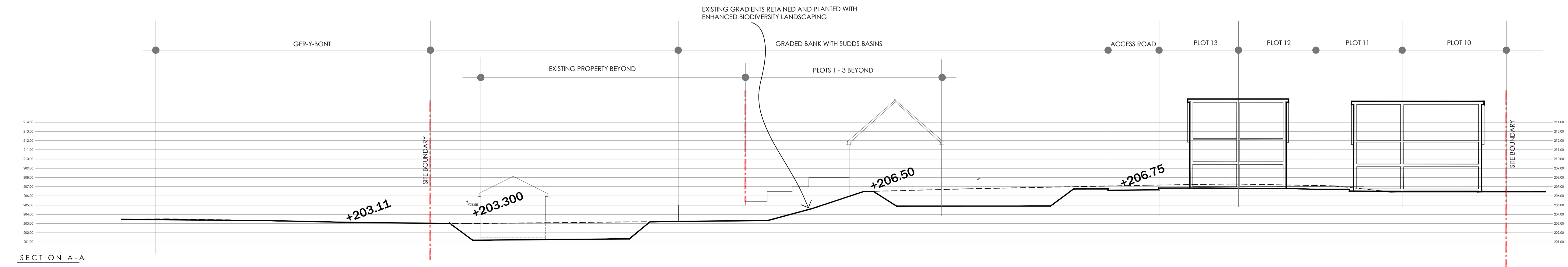
PLOT SCHEDULE	
AFFORDABLE	
	4 PERSON 2 BEDROOM HOUSE TYPE
	5 PERSON 3 BEDROOM HOUSE TYPE
	2 PERSON 1 BEDROOM BUNGALOW TYPE
	LINES THIS DENOTE 1.8M HIGH TIMBER FENCING
	LINES THIS DENOTE NEW BRICK FACED 1.8M HIGH BOUNDARY/RETAINING WALLS



SITE LAYOUT 1:500
FEASIBILITY LAYOUT
0 5 10 15 20 25 m
SCALE 1:500



SECTION B-B



SECTION A-A

SITE SECTIONS 1:250
FEASIBILITY LAYOUT
0 2.5 5 7.5 10 12.5 m
SCALE 1:250

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Revisions
REV. A - MARCH 24
PLOTS 4&5 RELOCATED AND RETAINING WALLS UPDATED.
REV. B - APRIL 24
REAR GARDENS OF PLOTS 4&5 REDESIGNED TO PROVIDE SUDDS BASIN AREA.

Scale	Revision	Date	Checked
1:500 @ A1	B	Feb 24	KWL

Drawing No	Drawing Title
LTS400.03.04	Feasibility Layout

Drawing Purpose
Feasibility

Client
Newydd Housing Association

Job Title
Land off Hirwaun Road

APPENDIX 4– FLOOD RISK MAP

Flood Risk Maps
Hiwaun Road, Penywaun - NRW Flood M

Legend

Flood Risk from Rivers

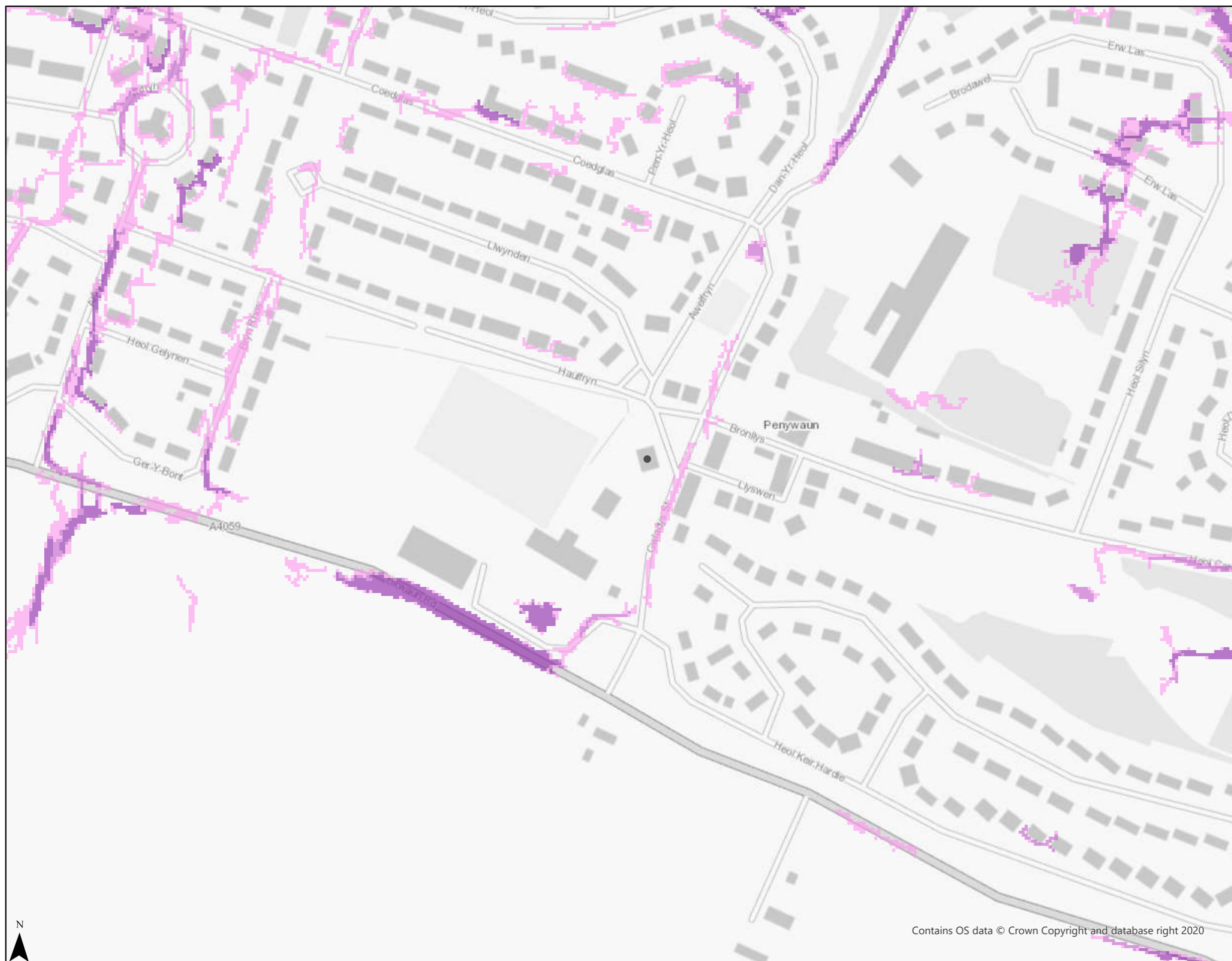
- High
- Medium
- Low

Flood Risk from the Sea

- High
- Medium
- Low

Flood Risk from Surface Water & Small Watercourses

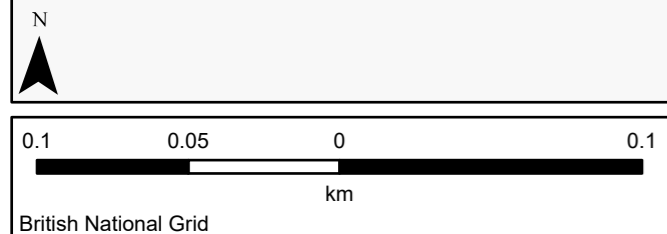
- High
- Medium
- Low
- Risk Level Under Review



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Scale at A3: 1:2,500

Date: 13/02/2024

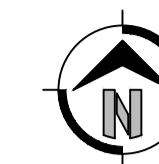


Disclaimer

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

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APPENDIX 5 – PROPOSED DRAINAGE STRATEGY PLAN

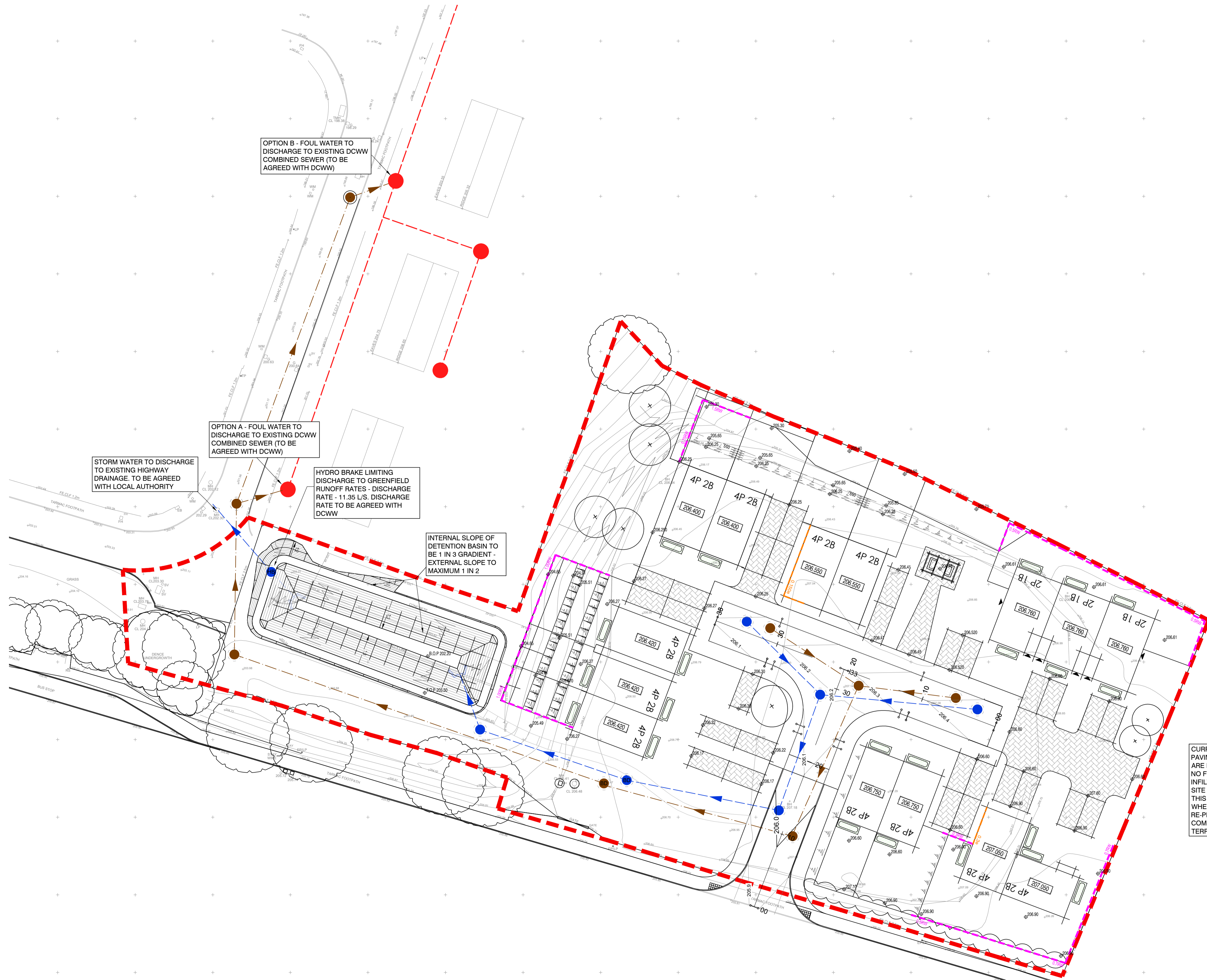


GENERAL NOTES

1. This drawing is to be read in conjunction with and checked against all other drawings, engineering details, specifications and any structural, geotechnical or other specialist document provided.
2. Any discrepancies within all relevant drawings are to be reported to QuadConsult Ltd immediately.
3. All dimensions and levels are in metres, U.N.O..
4. Do not scale from this drawing - use figured dimensions only.
5. This drawing is schematic for clarity only, positions of pipe runs and manholes may vary on site due to site conditions.
6. Surface water drainage subject to S104 / SAB approval where appropriate with the relevant authority.
7. Foul Drainage subject to S104 approval with relevant water authority.
8. All private drainage to be installed in accordance with Part H of building regulations and the developers warranty provider.
9. The contractor is at risk if construction is progressed without relevant S104, S106, S278, S38, OWC etc agreement being in place with the relevant authorities.

LEGEND

- SITE BOUNDARY
- RAIN GARDEN
- PERMEABLE PAVING
- SW MH / SEWER
- FLOW CONTROL DEVICE
- BACKDROP MANHOLE
- DRAINAGE FLOW DIRECTION
- FOUL WATER SEWER AND MANHOLE (ADOPTABLE)
- SLAB LEVEL
- SPOT LEVEL
- UNDER BUILD
- RETAINING WALL
- EXISTING DCWW COMBINED SEWER



CURRENT PERMEABLE PAVING AND RAIN GARDENS ARE LINED. THIS IS DUE TO NO FEASIBILITY OF INFILTRATION ACROSS THE SITE DUE TO MADE GROUND. THIS CAN BE REVIEWED WHEN THE SITE IS RE-PROFILED AND COMPACTED AS PER THE TERRA FIRMA REPORT.

2	10.04.24	ISSUE FOR PRE-PLANNING	JLZ
1	27.03.24	UPDATED TO LATEST ARCHITECT LAYOUT	JLZ
0	14.03.24	FIRST ISSUE	JLZ
Rev	Date	Description	By

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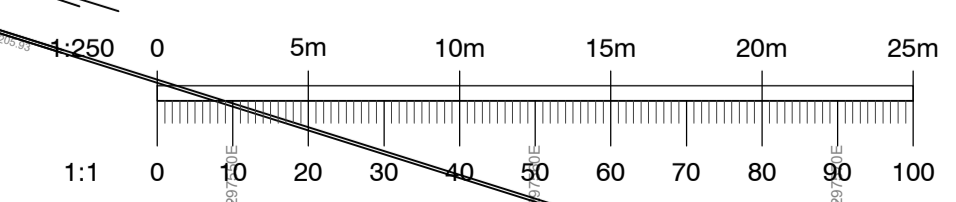
Consulting Civil & Structural Engineers

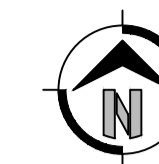
Client:

Project: **HIRWAUN ROAD PENYWAUN**
Title: **DRAINAGE STRATEGY**

Drawing Status: **PLANNING**

Designed by	Drawn by	Checked by	Date	Scale @ A1 size
JLZ	JLZ	ACV	12.03.24	1:250
Drawing No				
22135-C-002-2				

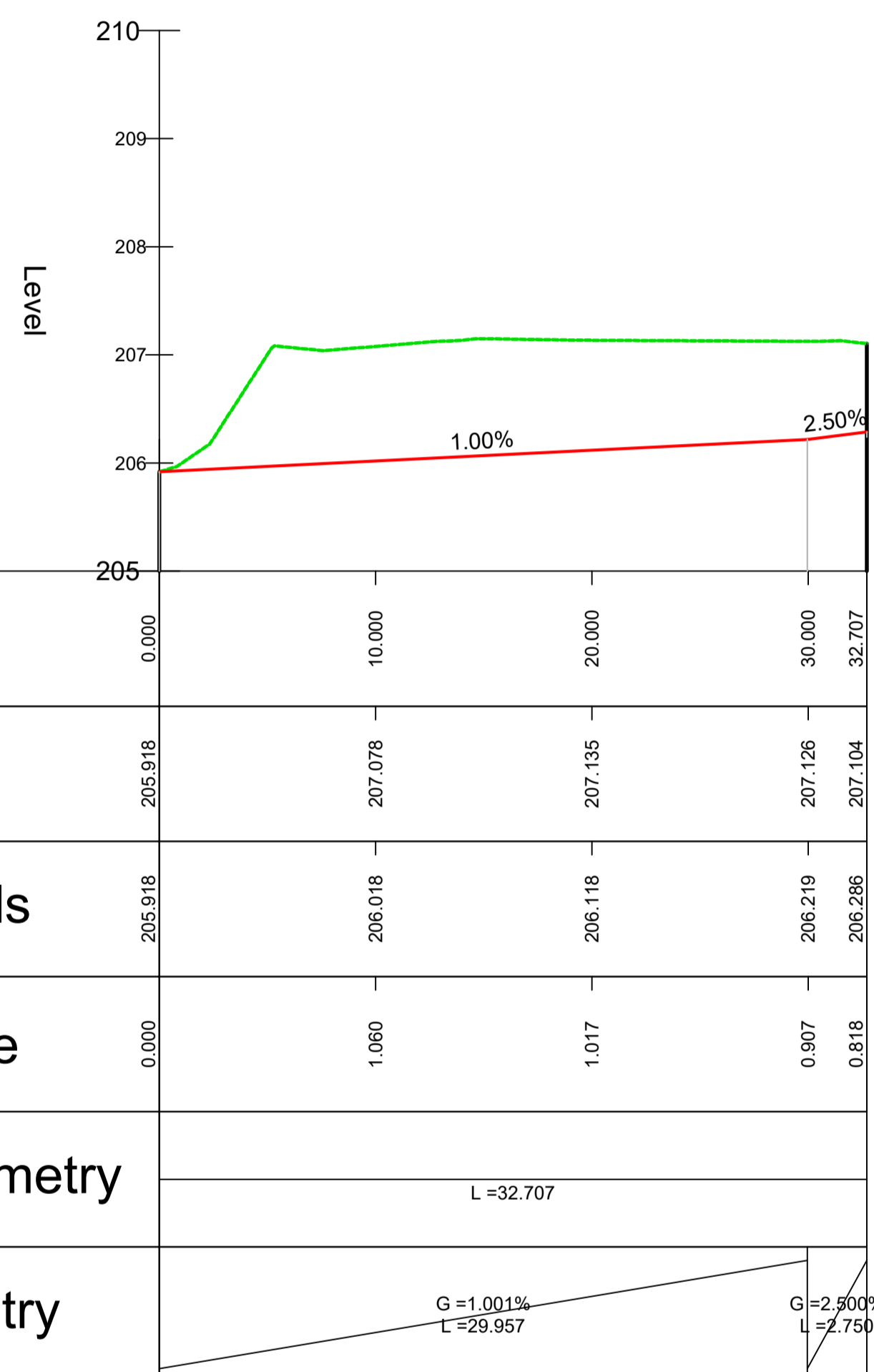




GENERAL NOTES

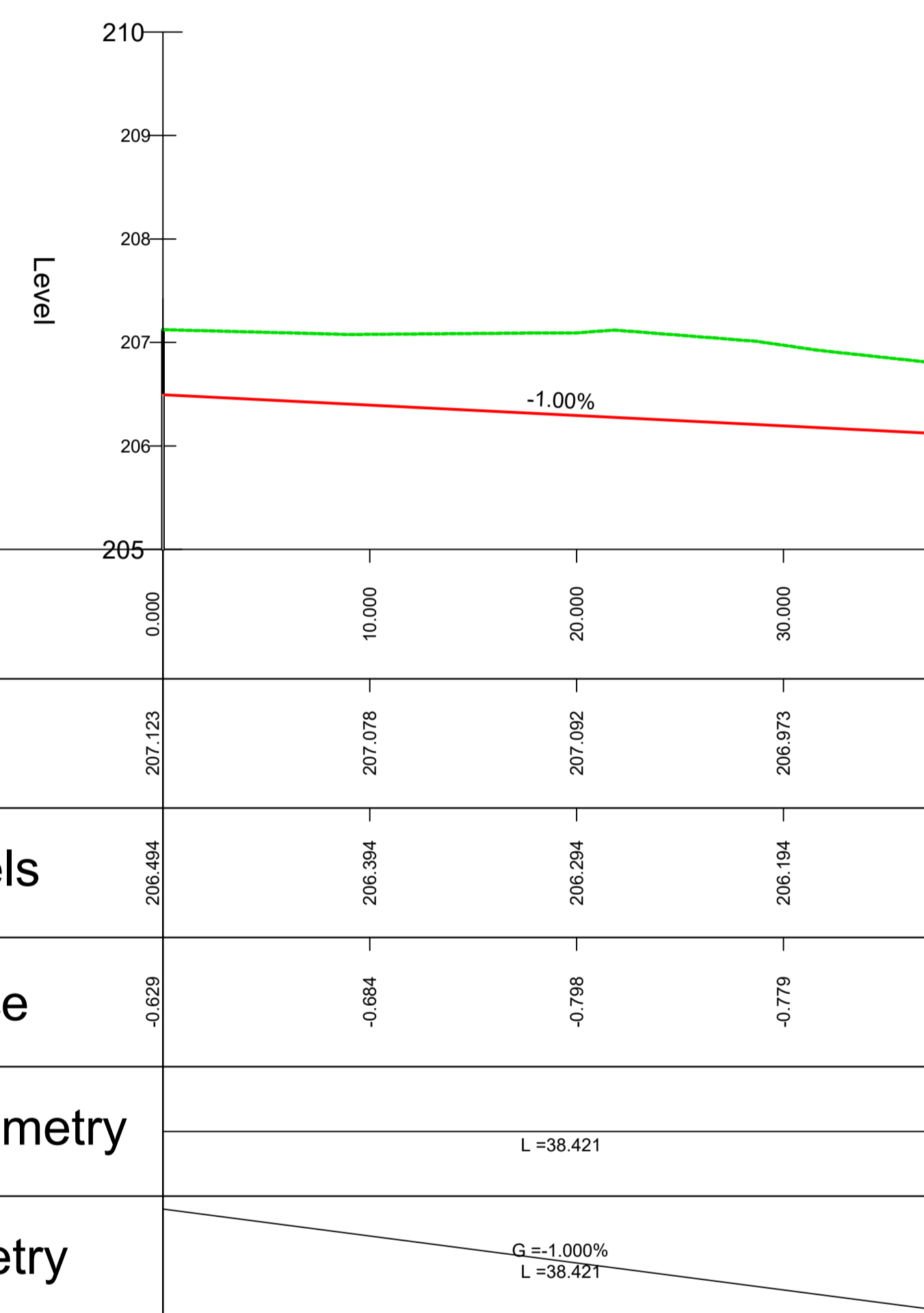
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8. All private drainage to be installed in accordance with Part H of building regulations and the developers warranty provider.
9. The contractor is at risk if construction is progressed without relevant S104, S106, S278, S38, OWC etc agreement being in place with the relevant authorities.

ROAD 1 - LONGSECTION
SCALE: H 1:250,V 1:50. DATUM: 205.000



Chainage	Existing Levels	Proposed Levels	Level Difference	Horizontal Geometry	Vertical Geometry
0.000	205.918	205.918	0.000	L = 32.707	G = 1.001% L = 29.957
10.000	207.078	206.018	1.060		
20.000	207.135	206.118	1.017		
30.000	207.126	206.219	0.907		
32.707	207.104	206.286	0.818		G = 2.500% L = 2.750

ROAD 2 - LONGSECTION
SCALE: H 1:250,V 1:50. DATUM: 205.000



Chainage	Existing Levels	Proposed Levels	Level Difference	Horizontal Geometry	Vertical Geometry
0.000	207.123	206.484	-0.629	L = 38.421	G = -1.000% L = 38.421
10.000	207.078	206.394	-0.684		
20.000	207.092	206.294	-0.798		
30.000	206.973	206.194	-0.779		
38.421	206.778	206.110	-0.668		

Rev	Date	Description	By
1	10.04.24	ISSUE FOR PRE-PLANNING	JLZ
0	27.03.24	FIRST ISSUE	JLZ

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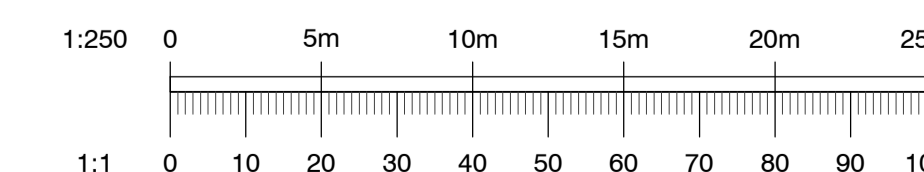
Project
HIRWAUN ROAD PENYWAUN

Title
HIGHWAY LONGSECTION

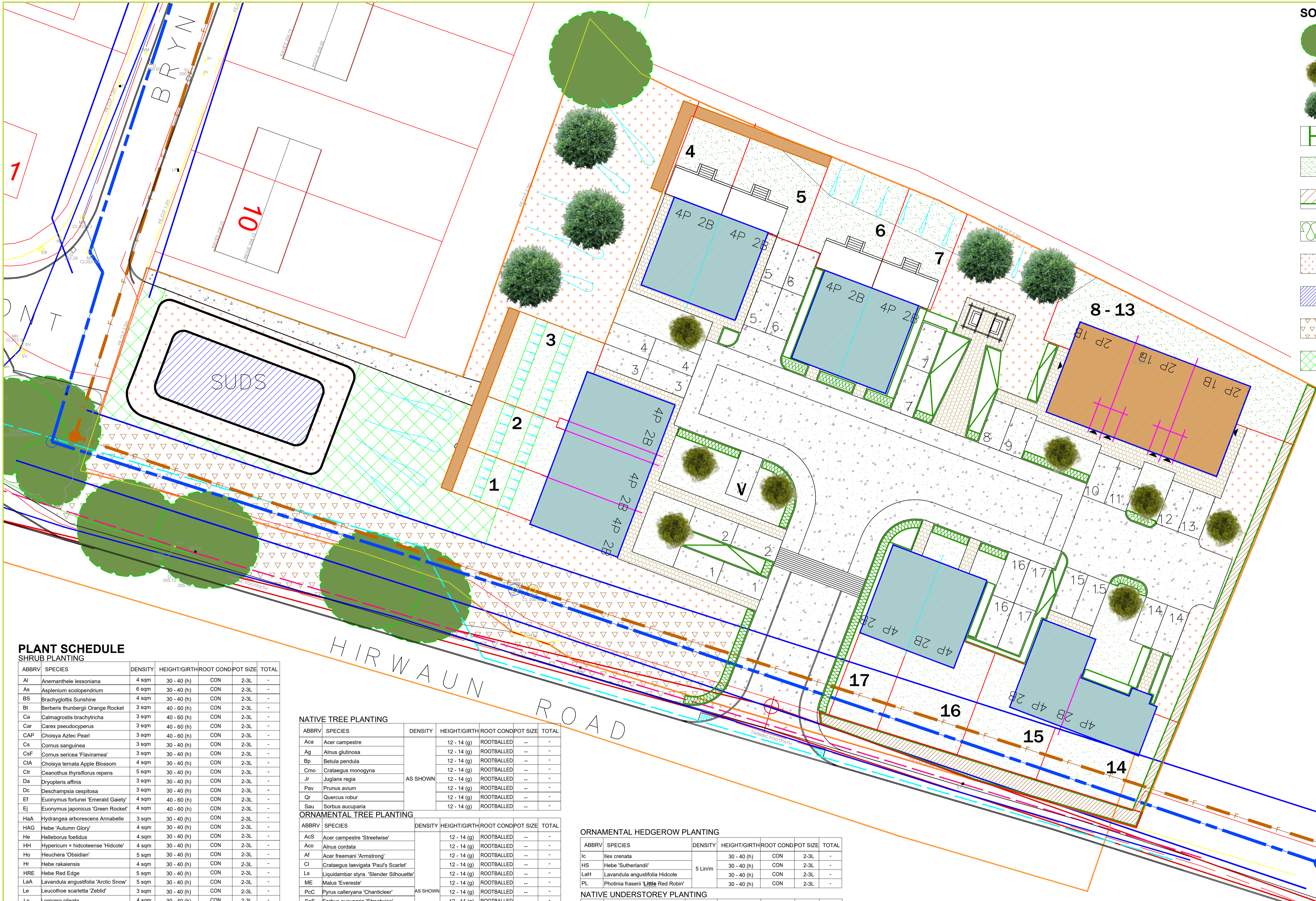
Drawing Status
PLANNING

Designed by	Drawn by	Checked by	Date	Scale @ A1 size
JLZ	JLZ	ACV	12.03.24	1:250

Drawing No
22135-C-003-1



APPENDIX 6 – PROPOSED LANDSCAPE ARCHITECTS LAYOUT AND SCHEDULE



SOFT LANDSCAPE KEY:

- EXISTING TREES TO BE RETAINED
- PROPOSED STREET TREE PLANTING (Refer to schedule for species)
- PROPOSED NATIVE TREE PLANTING (Refer to schedule for species)
- PROPOSED SHRUB PLANTING (Refer to schedule for species/densities)
- PROPOSED GRASS TURF (Areas to be turfed with Rolawn Medallion)
- PROPOSED NATIVE HEDGEROW PLANTING (Refer to schedule for species/densities)
- PROPOSED ORNAMENTAL HEDGEROW PLANTING (Refer to schedule for species/densities)
- PROPOSED WILDFLOWER HABITAT 1 (Emorsgate EM1 Meadow Mix)
- PROPOSED WILDFLOWER HABITAT 2 (Emorsgate EM8 Wetland Mix)
- EXISTING LANDSCAPE WITHIN EASEMENT RETAINED
- PROPOSED NATIVE UNDERSTOREY (Refer to plant schedule for species / densities)

PLANT SCHEDULE
SHRUB PLANTING

ABBRV	SPECIES	DENSITY	HEIGHT/GIRTH	ROOT COND	POT SIZE	TOTAL
Al	Anemathete lessoriana	4 sqm	30 - 40 (h)	CON	2-3L	-
As	Asplenium scolopendrium	6 sqm	30 - 40 (h)	CON	2-3L	-
BS	Brachyglottis Sunshine	4 sqm	30 - 40 (h)	CON	2-3L	-
Bt	Berberis thunbergii Orange Rocket	3 sqm	40 - 60 (h)	CON	2-3L	-
Ca	Calmagrostis brachytricha	3 sqm	40 - 60 (h)	CON	2-3L	-
Car	Carex pseudocyperus	3 sqm	40 - 60 (h)	CON	2-3L	-
CAP	Choisya Aztec Pearl	3 sqm	40 - 60 (h)	CON	2-3L	-
Cs	Cornus sanguinea	3 sqm	30 - 40 (h)	CON	2-3L	-
CsF	Cornus sericea 'Flaviramea'	3 sqm	30 - 40 (h)	CON	2-3L	-
CA	Choisya ternata Apple Blossom	4 sqm	30 - 40 (h)	CON	2-3L	-
Cr	Ceanothus thyrsiflorus repens	5 sqm	30 - 40 (h)	CON	2-3L	-
Da	Dryopteris affinis	3 sqm	30 - 40 (h)	CON	2-3L	-
Dc	Deschampsia cespitosa	3 sqm	30 - 40 (h)	CON	2-3L	-
Ef	Euonymus fortunei 'Emerald Gaiety'	4 sqm	40 - 60 (h)	CON	2-3L	-
Ej	Euonymus japonicus 'Green Rocket'	4 sqm	40 - 60 (h)	CON	2-3L	-
HaA	Hydrangea arborescens Annabelle	3 sqm	30 - 40 (h)	CON	2-3L	-
HAG	Hebe 'Autumn Glory'	4 sqm	30 - 40 (h)	CON	2-3L	-
He	Helleborus foetidus	4 sqm	30 - 40 (h)	CON	2-3L	-
HH	Hypericum x hidcoteense 'Hidcote'	4 sqm	30 - 40 (h)	CON	2-3L	-
Ho	Heuchera 'Obsidian'	5 sqm	30 - 40 (h)	CON	2-3L	-
Hr	Hebe rakaiensis	4 sqm	30 - 40 (h)	CON	2-3L	-
HRE	Hebe Red Edge	5 sqm	30 - 40 (h)	CON	2-3L	-
LaA	Lavandula angustifolia 'Arctic Snow'	5 sqm	30 - 40 (h)	CON	2-3L	-
Le	Leucothoe scarletta 'Zebid'	3 sqm	30 - 40 (h)	CON	2-3L	-
Lp	Lonicera pileata	4 sqm	30 - 40 (h)	CON	2-3L	-
Me	Mahonia eurhymenocarpa 'Soft Caress'	3 sqm	30 - 40 (h)	CON	2-3L	-
PBB	Phormium Bronze Baby	4 sqm	30 - 40 (h)	CON	2-3L	-
PF	Pieris 'Flaming Silver'	4 sqm	30 - 40 (h)	CON	2-3L	-
PPE	Potentilla fruticosa 'Elizabeth'	4 sqm	30 - 40 (h)	CON	2-3L	-
PIOL	Prunus laurocerasus 'Otto Luyken'	4 sqm	30 - 40 (h)	CON	2-3L	-
Ps	Polystichum setiferum	4 sqm	30 - 40 (h)	CON	2-3L	-
Ra	Ruscus aculeatus	3 sqm	30 - 40 (h)	CON	2-3L	-
RB	Rhododendron bloombux	4 sqm	30 - 40 (h)	CON	2-3L	-
Ro	Rosmarinus officinalis	4 sqm	40 - 60 (h)	CON	2-3L	-
SI	Salix lanata	3 sqm	40 - 60 (h)	CON	2-3L	-
Sc	Sarcococca hookeriana var. digyna	4 sqm	30 - 40 (h)	CON	2-3L	-
Sj	Skimmia japonica 'Rubella'	4 sqm	30 - 40 (h)	CON	2-3L	-
Sop	Salvia officinalis Purpurascens	5 sqm	30 - 40 (h)	CON	2-3L	-
Vd	Viburnum davidii	3 sqm	30 - 40 (h)	CON	2-3L	-

NATIVE TREE PLANTING

ABBRV	SPECIES	DENSITY	HEIGHT/GIRTH	ROOT COND	POT SIZE	TOTAL
Aca	Acer campestre	AS SHOWN	12 - 14 (g)	ROOTBALLED	--	--
Ag	Alnus glutinosa	AS SHOWN	12 - 14 (g)	ROOTBALLED	--	--
Bp	Betula pendula	AS SHOWN	12 - 14 (g)	ROOTBALLED	--	--
Cmo	Crataegus monogyna	AS SHOWN	12 - 14 (g)	ROOTBALLED	--	--
Jr	Juglans regia	AS SHOWN	12 - 14 (g)	ROOTBALLED	--	--
Pav	Prunus avium	AS SHOWN	12 - 14 (g)	ROOTBALLED	--	--
Qr	Quercus robur	AS SHOWN	12 - 14 (g)	ROOTBALLED	--	--
Sav	Sorbus aucuparia	AS SHOWN	12 - 14 (g)	ROOTBALLED	--	--

ORNAMENTAL TREE PLANTING

ABBRV	SPECIES	DENSITY	HEIGHT/GIRTH	ROOT COND	POT SIZE	TOTAL
AcS	Acer campestre 'Streetwise'	AS SHOWN	12 - 14 (g)	ROOTBALLED	--	--
Aco	Alnus cordata	AS SHOWN	12 - 14 (g)	ROOTBALLED	--	--
Af	Acer freemanii 'Armstrong'	AS SHOWN	12 - 14 (g)	ROOTBALLED	--	--
Cl	Crataegus laevigata 'Paul's Scarlet'	AS SHOWN	12 - 14 (g)	ROOTBALLED	--	--
Ls	Liquidambar styraciflua 'Slender Silhouette'	AS SHOWN	12 - 14 (g)	ROOTBALLED	--	--
ME	Malus 'Evereste'	AS SHOWN	12 - 14 (g)	ROOTBALLED	--	--
PcC	Pyrus calleryana 'Chanticleer'	AS SHOWN	12 - 14 (g)	ROOTBALLED	--	--
SaS	Sorbus aucuparia 'Streetwise'	AS SHOWN	12 - 14 (g)	ROOTBALLED	--	--
TcG	Tilia cordata 'Greenspire'	AS SHOWN	12 - 14 (g)	ROOTBALLED	--	--
UN	Ulmus 'New Horizon'	AS SHOWN	12 - 14 (g)	ROOTBALLED	--	--
Zs	Zelkova serrata 'Green vase'	AS SHOWN	12 - 14 (g)	ROOTBALLED	--	--

NATIVE HEDGEROW PLANTING

ABBRV	SPP. & PERCENTAGE IN MIX	DENSITY	HEIGHT/GIRTH	ROOT COND	POT SIZE	TOTAL
AS KEY	Acer campestre (10%)	5 per lin/m	40 - 60 (h)	ROOT CELL	-	-
	Crataegus monogyna (20%)		40 - 60 (h)	ROOT CELL	-	-
	Corylus avellana (40%)		40 - 60 (h)	ROOT CELL	-	-
	Euonymus europaeus (5%)		40 - 60 (h)	ROOT CELL	-	-
	Ilex aquifolium (10%)		40 - 60 (h)	ROOT CELL	-	-
	Prunus spinosa (10%)		40 - 60 (h)	ROOT CELL	-	-
	Sambucus nigra (5%)		40 - 60 (h)	ROOT CELL	-	-

(Hedgerows to be planted as double staggered rows 1m apart)

ORNAMENTAL HEDGEROW PLANTING

ABBRV	SPECIES	DENSITY	HEIGHT/GIRTH	ROOT COND	POT SIZE	TOTAL
Ic	Ilex crenata	5 Lin/m	30 - 40 (h)	CON	2-3L	-
HS	Hebe 'Sutherlandii'	5 Lin/m	30 - 40 (h)	CON	2-3L	-
LaH	Lavandula angustifolia Hidcote	5 Lin/m	30 - 40 (h)	CON	2-3L	-
PL	Photinia fraserii 'Little Red Robin'	5 Lin/m	30 - 40 (h)	CON	2-3L	-

NATIVE UNDERSTOREY PLANTING

ABBRV	SPP. & PERCENTAGE IN MIX	DENSITY	HEIGHT/GIRTH	ROOT COND	POT SIZE	TOTAL
AS KEY	Acer campestre (15%)	1 sqm	40 - 60 (h)	BR	-	-
	Cornus sanguinea (5%)		40 - 60 (h)	BR	-	-
	Crataegus monogyna (30%)		40 - 60 (h)	BR	-	-
	Corylus avellana (30%)		40 - 60 (h)	BR	-	-
	Ilex aquifolium (10%)		40 - 60 (h)	BR	-	-
	Sorbus aucuparia (5%)		40 - 60 (h)	BR	-	-
	Viburnum opulus (5%)		40 - 60 (h)	BR	-	-

SPECIMEN SHRUB PLANTING

ABBRV	SPECIES	DENSITY	HEIGHT/GIRTH	ROOT COND	POT SIZE	TOTAL
CF	Cornus florida rubra	AS SHOWN	60 - 80 (h)	CON	7-10L	-
Po	Physocarpus opulifolius 'Diabolo'	AS SHOWN	60 - 80 (h)	CON	7-10L	-

This indicative plant schedule contains a palette of suitable species. Please note that some of the listed species may be omitted and additional species may be added. Refer to detailed landscape proposals drawing for finalised planting schedules

NOTES:
Existing retained trees to be protected in accordance with BS5837:2012. Protection measures to be implemented prior to any construction operations on site
Drawing was produced in colour at a scale of 1:200 @ A1. Do not rely on monochrome or scaled copies

TDA
THE GRANARY
NEWLAND FAWR FARM
LLANGAN
CF35 5DN
TEL: 01446 789367

CLIENT
NEWYDD HOUSING ASSOCIATION

DRAWING NUMBER TDA.2955.01	SCALE 1:200 @ A1
DRAWN RHC/AMP	DATE APRIL 2024

PROJECT
LAND OFF HIRWAUN ROAD

DRAWING TITLE
OUTLINE LANDSCAPE PROPOSALS

APPENDIX 7 – EXISTING DISCHARGE RATES

Calculated by:

Site name:

Site location:

Site Details

Latitude:

Longitude:

Reference:

Date:

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.

Runoff estimation approach

Site characteristics

Total site area (ha):

Methodology

Q_{BAR} estimation method:

SPR estimation method:

Notes

(1) Is $Q_{BAR} < 2.0$ l/s/ha?

When Q_{BAR} is < 2.0 l/s/ha then limiting discharge rates are set at 2.0 l/s/ha.

Soil characteristics

	Default	Edited
SOIL type:	5	5
HOST class:	N/A	N/A
SPR/SPRHOST:	0.53	0.53

(2) Are flow rates < 5.0 l/s?

Where flow rates are less than 5.0 l/s consent for discharge is usually set at 5.0 l/s if blockage from vegetation and other materials is possible. Lower consent flow rates may be set where the blockage risk is addressed by using appropriate drainage elements.

Hydrological characteristics

	Default	Edited
SAAR (mm):	1803	1803
Hydrological region:	9	9
Growth curve factor 1 year:	0.88	0.88
Growth curve factor 30 years:	1.78	1.78
Growth curve factor 100 years:	2.18	2.18
Growth curve factor 200 years:	2.46	2.46

(3) Is $SPR/SPRHOST \leq 0.3$?

Where groundwater levels are low enough the use of soakaways to avoid discharge offsite would normally be preferred for disposal of surface water runoff.

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Default Edited

Q_{BAR} (l/s):	11.35	11.35
1 in 1 year (l/s):	9.99	9.99
1 in 30 years (l/s):	20.21	20.21
1 in 100 year (l/s):	24.75	24.75
1 in 200 years (l/s):	27.93	27.93

This report was produced using the greenfield runoff tool developed by HR Wallingford and available at 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 www.uksuds.com/terms-and-conditions.htm. The outputs from this tool are estimates of 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, CEH, Hydrosolutions or any other organisation for the use of this data in the design or operational characteristics of any drainage scheme.

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APPENDIX 8 – INFILTRATION TEST RESULTS

Infiltration Tests















Infiltration tests were conducted to BRE365 infiltration testing across the site by Terra Firma in February of 2023. However, it was confirmed that the soil build up is constructed from made ground. As this is the case, the soak away results are discarded due to uneven displacement of the surface water which can result in washing away of fines across the site. Therefore, infiltration is deemed not feasible at the site.

APPENDIX 9 – WELSH WATER ASSET MAPS

Hirwaun Road



LEGEND

NOTE: Water main symbol colour indicates the type:
LIGHT BLUE - Trunk
DARK BLUE - Distribution
YELLOW - Raw Water

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.

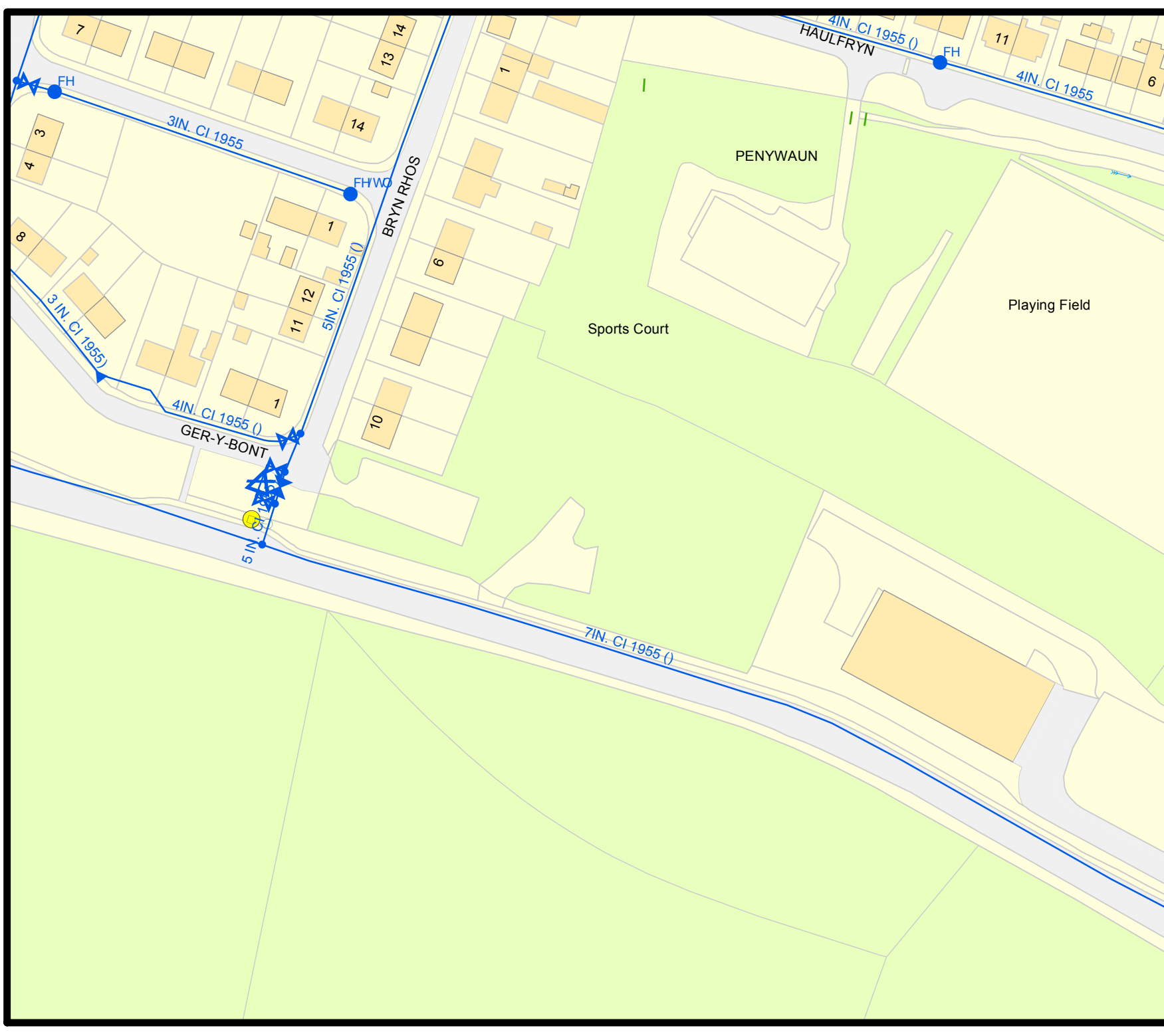
Dŵr Cymru Cŵr (Welsh Water) (the Company) issues this information as to the position of its underground apparatus by way of general guidance only and on the understanding that it is based on the best information available and is not warranty as to its correctness or relied upon in the event of excavations or other works made in the vicinity of the company's apparatus. The error of locating apparatus before carrying out any excavations are entirely on you. The information which is supplied by the Company is done so in accordance with statutory requirements of sections 103 and 109 of the Water Industry Act 1989 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 whereabouts of water mains, service pipes, sewer, fuel lines or other apparatus and any other apparatus laid before 1 September 1989, or if they are, the direction of their position and depth may not be accurate. It must be understood that the furnishing of this information is entirely without prejudice to the provisions of the New Roads and Street Works Act 1991 and the Company's liability is compensated for any damage to its apparatus.

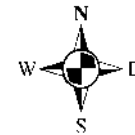
Service pipes are not generally shown but their presence should be anticipated.

**EXACT LOCATIONS OF ALL APPARATUS
TO BE DETERMINED ON SITE.**

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Map scale: 1:1250
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LEGEND(Representative of most common features)

Waste networks	
Foul chamber	Surface water chamber
Combined chamber	Combined sewer overflow
Special purpose chamber	Treatment works
Pumping station	Sewer symbol (color indicates type)
Outfall	Lamphole
Storm Overflow	Riding main
Gravity sewer	Private sewer
Private sewer subject to Sect. 104 adoption agreement	Private Sewer Transfer
Lateral Drain	Inspection Chamber

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.

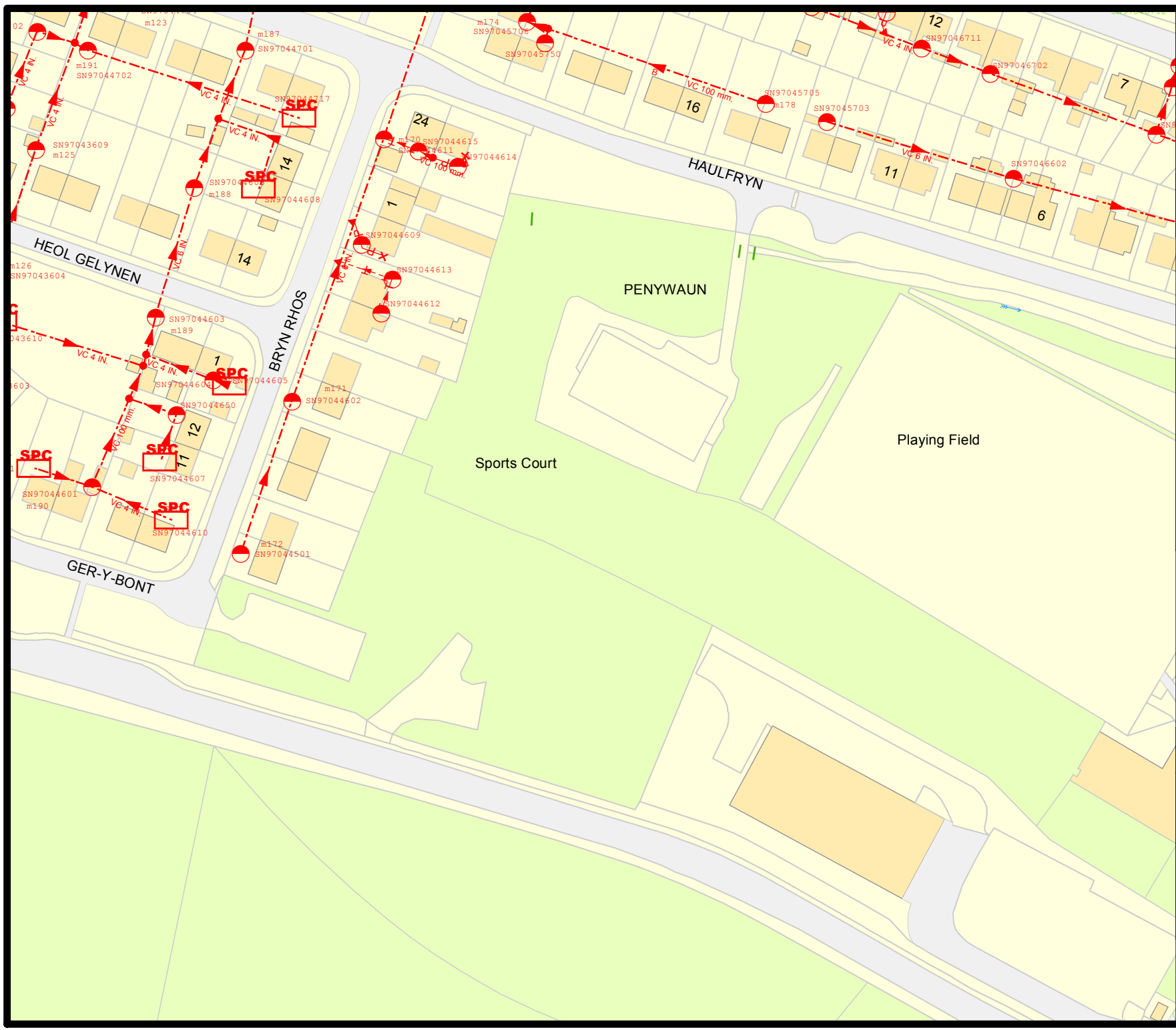
Dŵr Cymru Cyf (referred to as the Company) agrees this information as to the position of its underground apparatus by way of general guidance only and on the understanding that it is based on the best information available and is not warranted as to its correctness in the event of excavations or other works made in the vicinity of the company's apparatus. The error of locating apparatus before carrying out any excavations are entirely on you. The information supplied by the Company is done so in accordance with statutory requirements of sections 103 and 109 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 water mains, service pipes, lateral drains or disposal main and any other underground apparatus laid before 1 September 1950, or if they do, the position of such apparatus may not be accurate. It must be understood that the furnishing of this information is entirely without prejudice to the provisions of the New Roads and Street Works Act 1991 and the Company's liability is 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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 Printed on: 10 Mar 2022




APPENDIX 10 – PROPOSED SURFACE WATER CALCULATIONS

QuadConsult Ltd		Page 1
Columbus House Greenmeadow Springs Business... Cardiff, CF15 7NE		
Date 13/03/2024 07:52 File 22135-QSE Green Field.SRCX	Designed by windes Checked by	
Innovyze	Source Control 2020.1.3	

Summary of Results for 100 year Return Period (+40%)

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
15 min Summer	204.090	0.590	11.4	40.1	O K
30 min Summer	204.235	0.735	11.4	58.3	O K
60 min Summer	204.339	0.839	11.4	73.9	O K
120 min Summer	204.387	0.887	11.4	81.9	O K
180 min Summer	204.394	0.894	11.4	83.0	O K
240 min Summer	204.391	0.891	11.4	82.5	O K
360 min Summer	204.368	0.868	11.4	78.6	O K
480 min Summer	204.334	0.834	11.4	73.1	O K
600 min Summer	204.294	0.794	11.4	66.8	O K
720 min Summer	204.248	0.748	11.4	60.2	O K
960 min Summer	204.127	0.627	11.4	44.4	O K
1440 min Summer	203.898	0.398	11.4	21.7	O K
2160 min Summer	203.698	0.198	11.0	8.4	O K
2880 min Summer	203.650	0.150	9.6	5.9	O K
4320 min Summer	203.621	0.121	7.4	4.6	O K
5760 min Summer	203.607	0.107	6.2	4.0	O K
7200 min Summer	203.598	0.098	5.4	3.6	O K
8640 min Summer	203.592	0.092	4.8	3.3	O K
10080 min Summer	203.587	0.087	4.4	3.1	O K
15 min Winter	204.141	0.641	11.4	46.1	O K
30 min Winter	204.294	0.794	11.4	66.9	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	114.353	0.0	51.4	22
30 min Summer	84.439	0.0	76.0	35
60 min Summer	59.609	0.0	107.3	60
120 min Summer	39.855	0.0	143.5	96
180 min Summer	30.884	0.0	166.8	130
240 min Summer	25.723	0.0	185.2	166
360 min Summer	19.786	0.0	213.7	236
480 min Summer	16.372	0.0	235.7	304
600 min Summer	14.109	0.0	254.0	372
720 min Summer	12.480	0.0	269.6	438
960 min Summer	10.261	0.0	295.5	562
1440 min Summer	7.785	0.0	336.3	782
2160 min Summer	5.920	0.0	383.6	1108
2880 min Summer	4.887	0.0	422.2	1468
4320 min Summer	3.758	0.0	487.0	2200
5760 min Summer	3.147	0.0	543.8	2880
7200 min Summer	2.746	0.0	593.1	3672
8640 min Summer	2.455	0.0	636.4	4280
10080 min Summer	2.233	0.0	675.4	5096
15 min Winter	114.353	0.0	57.6	23
30 min Winter	84.439	0.0	85.1	35

QuadConsult Ltd		Page 2
Columbus House Greenmeadow Springs Business... Cardiff, CF15 7NE		
Date 13/03/2024 07:52 File 22135-QSE Green Field.SRCX	Designed by windes Checked by	
Innovyze	Source Control 2020.1.3	

Summary of Results for 100 year Return Period (+40%)

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m ³)	Status
60 min Winter	204.411	0.911	11.4	86.0	O K
120 min Winter	204.463	0.963	11.4	95.4	O K
180 min Winter	204.464	0.964	11.4	95.7	O K
240 min Winter	204.453	0.953	11.4	93.5	O K
360 min Winter	204.408	0.908	11.4	85.5	O K
480 min Winter	204.349	0.849	11.4	75.5	O K
600 min Winter	204.279	0.779	11.4	64.7	O K
720 min Winter	204.192	0.692	11.4	52.5	O K
960 min Winter	203.962	0.462	11.4	27.2	O K
1440 min Winter	203.677	0.177	10.8	7.3	O K
2160 min Winter	203.633	0.133	8.4	5.1	O K
2880 min Winter	203.616	0.116	7.0	4.4	O K
4320 min Winter	203.598	0.098	5.4	3.6	O K
5760 min Winter	203.588	0.088	4.5	3.2	O K
7200 min Winter	203.581	0.081	3.9	2.9	O K
8640 min Winter	203.576	0.076	3.5	2.7	O K
10080 min Winter	203.572	0.072	3.2	2.6	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m ³)	Discharge Volume (m ³)	Time-Peak (mins)
60 min Winter	59.609	0.0	120.2	62
120 min Winter	39.855	0.0	160.7	102
180 min Winter	30.884	0.0	186.8	140
240 min Winter	25.723	0.0	207.4	180
360 min Winter	19.786	0.0	239.3	254
480 min Winter	16.372	0.0	264.0	328
600 min Winter	14.109	0.0	284.4	400
720 min Winter	12.480	0.0	301.9	472
960 min Winter	10.261	0.0	331.0	572
1440 min Winter	7.785	0.0	376.7	752
2160 min Winter	5.920	0.0	429.7	1100
2880 min Winter	4.887	0.0	472.9	1460
4320 min Winter	3.758	0.0	545.4	2196
5760 min Winter	3.147	0.0	609.1	2920
7200 min Winter	2.746	0.0	664.3	3616
8640 min Winter	2.455	0.0	712.8	4272
10080 min Winter	2.233	0.0	756.4	5024

Columbus House
Greenmeadow Springs Business...
Cardiff, CF15 7NE



Date 13/03/2024 07:52
File 22135-QSE Green Field.SRCX

Designed by windes
Checked by

Innovyze Source Control 2020.1.3

Rainfall Details

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	100	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	21.000	Shortest Storm (mins)	15
Ratio R	0.200	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+40

Time Area Diagram

Total Area (ha) 0.240

Time (mins)	Area	Time (mins)	Area	Time (mins)	Area
From:	To:	From:	To:	From:	To:
0	4	0.080	4	8	0.080
				8	12
					0.080

APPENDIX 11 – RAINWATER HARVESTING VIABILITY STATEMENT

Rainwater Harvesting Viability Assessment

The developer has confirmed there is no requirement for rainwater harvesting for the proposed development from the point of construction or throughout the design life of the development.

The proposed site is currently within easy connectivity to the Welsh Water potable water network. Caerphilly is not currently or likely to be in the future classed as in danger of suffering regular drought water rationing. Welsh Water draft Drought Plan 2020 also states the unlikelihood of any water rationing being realised within the next 30. Welsh Water highlight 2018 as being a very hot year with increased demand on their network but like other parts of the UK did not have to introduce any restriction in the form of hosepipe bans or limited access to the potable water supply.

References:

<https://www.dwrcymru.com/en/our-services/water/water-resources/draft-drought-plan-2020>

APPENDIX 12 – PROPOSED POLLUTION REMOVAL CALCULATIONS

POLLUTION REMOVAL & WATER QUALITY MANAGEMENT SCHEDULE

CIRIA 753 The SuDS Manual Chapter 26, provides design advice to meet water quality standards by adopting the SuDS train treatment mechanism and thereby reduce the risk of pollution by evaluating potential pollution hazards at the outset.

As the proposed drainage strategy proposes to discharge runoff to ground, Chapter 26.3 'Protecting Groundwater' is particularly relevant.

Runoff from residential roofing and pedestrian areas is viewed as low risk (Table 4.3) and the proposed site layout provides the opportunity to introduce SuDS into the scheme to reduce potential contaminant risk still further. For example, the use of porous paving reduces flow velocities and increase retention times promoting a level of absorption into the upper soils (intergranular flow) prior to discharge to ground (fracture flow).

We propose to apply a simple qualitative method to assess the risk (Simple Index Approach) and proposed mitigation measures as defined in Table 26.1 CIRIA SuDS Manual.

$$\text{Total SuDS Mitigation Index} = \text{Mitigation Index}_1 + 0.5 \text{ Mitigation Index}_2$$

Plot Discharge - Assuming a roof/hard surface split of 70/30 and using a weighted mean:

Residential Roof 0.5 (70%)	Pollution Hazard Level (Very Low)	Total Suspended Solids (0.2)	Metals (0.2)	Hydrocarbons (0.05)
Weighted value		0.14	0.14	0.035
Individual Property Driveways & Homezones (30%)	Pollution Hazard Level (Low)	Total Suspended Solids (0.5)	Metals (0.4)	Hydrocarbons (0.4)
Weighted value		0.15	0.12	0.12
Total hazard Index		0.29	0.26	0.155

Development Highway only - using a weighted mean:

Weighted value		0.00	0.00	0.00
Private Drive (100%)	Pollution Hazard Level (Low)	Total Suspended Solids (0.5)	Metals (0.4)	Hydrocarbons (0.4)
Weighted value		0.5	0.4	0.4
Total hazard Index		0.5	0.4	0.4

Comparing against the mitigation indices shown below.

SuDS Individual Component Mitigation Indices

	Suspended Solids	Metals	Hydrocarbons
Bioretention Planter	0.8	0.8	0.8
Rain Garden (Swale)	0.5	0.6	0.6
Pervious Pavement	0.7	0.6	0.7

However, within the outline drainage scheme a multi staged treatment is proposed for the majority of the site where practical, creating a Suds Management Train improving treatment locally and further reducing risk with the best and worst case outlined within Table 4.

Table 4 – Total SuDS Mitigation Index

Total SuDS Mitigation Index = Mitigation Index₁ + 0.5 Mitigation Index₂

	Suspended Solids	Metals	Hydrocarbons
SCENARIO 1 (Roof Runoff) Bioretention – Pervious Paving	1.15	1.10	1.15
SCENARIO 2 (Roof Runoff) Rain Garden – Pervious Paving	0.85	0.9	0.65
SCENARIO 3 (Driveway Runoff) Pervious Paving	0.7	0.6	0.7
SCENARIO 4 (Shared Drive) Pervious Paving	0.7	0.6	0.7
Comparison with Hazard Index	ALL PASS >0.29-0.5	ALL PASS >0.26-0.4	ALL PASS >0.155-0.4

APPENDIX 13 – SURFACE WATER MAINTENANCE SCHEDULE

Maintenance Plan for the surface water system.

To ensure the surface water systems to function as intended it is important appropriate maintenance arrangements are in place.

The surface water from the proposed development will be maintained in accordance to CIRIA C753 Chapter 32.

Storm Water Maintenance Management Schedule (CIRIA C753 – The SuDS Manual)

Operation and maintenance activity	SuDS component												
	Pond	Wetland	Detention basin	Infiltration basin	Soakaway	Infiltration trench	Filter drain	Modular storage	Pervious pavement	Swale/bioretentation/ trees	Filter strip	Green roofs	Proprietary treatment systems
Regular maintenance													
Inspection	■	■	■	■	■	■	■	■	■	■	■	■	■
Litter and debris removal	■	■	■	■	□	■	■	□	■	■	■		□
Grass cutting	■	■	■	■	□	■	■	□	□	■	■		
Weed and invasive plant control	□	□	□	□		□	□		□		□	■	
Shrub management (including pruning)	□	□	□	□					□	□	□		
Shoreline vegetation management	■	■	□										
Aquatic vegetation management	■	■	□										
Occasional maintenance													
Sediment management ¹	■	■	■	■	■	■	■	■	■	■	■		■
Vegetation replacement	□	□	□	□						□	□	■	
Vacuum sweeping and brushing									■				
Remedial maintenance													
Structure rehabilitation /repair	□	□	□	□	□	□	□	□	□	□	□	□	
Infiltration surface reconditioning				□	□	□	□		□	□	□		

Key

- will be required
- may be required

Notes

1 Sediment should be collected and managed in pre-treatment systems, upstream of the main device.

Proposed Site SuDS Features

1. Pervious Surfacing
2. Bio Retention Planter / Rain Garden
3. Piped Network Elements
4. Detention Basin

The maintenance management will be highlighted in 3 categories: -

Regular Maintenance

Regular maintenance comprises tasks that are likely to be required regularly to maintain and observe the drainage system typically on a monthly programme.

- Inspection - (Elements - 1, 2, 3, 4)
- Litter and Debris Removal - (Elements - 1, 2, 3,4)
- Grass Cutting - (Elements – 2,4)
- Shrub Management - (Elements – 2,4)

Occasional Maintenance

Occasional maintenance comprises tasks that are likely to be required periodically, but on a much less frequent and predictable basis than the regular tasks, typically annually.

- Sediment management - (Elements - 1, 2, 3,4)
- Catchpit / Silt trap cleaning - (Elements - 3)
- Pipe jetting if required - (Elements – 1, 3)
- Vegetation Replacement - (Elements – 2, 4)
- Vacuum Sweeping and Brushing - (Elements - 1)

Remedial Maintenance

Remedial maintenance describes the intermittent tasks that may be required to rectify faults associated with the system, although the likelihood of faults can be minimised by good design, construction, and regular maintenance activities. Where remedial work is found to be necessary, it is likely to be due to site-specific characteristics or unforeseen events, and so timings are difficult to predict.

- Structure Rehabilitation / Repair - (Elements - 1, 2, 3, 4)

Site Specific Maintenance Plan

1. Permeable Surfacing

Maintenance to be carried in accordance with Ciria Suds Manual (Chapter 20 & Table 20.1.5) and to include but not limited to the following actions: -

- Annual visual inspections to be undertaken of the pervious system with litter and debris removed.
- Brush / Vacuum, replacing any lost jointing material every year. Sediment management to be undertaken at the same time. Upstream chamber of discharge pipe to be inspected and cleaned yearly.
- Remedial maintenance will be undertaken intermittently following the outcome of monthly inspections if required. This may consist of the following items –
 - Weed control
 - Replacement of damaged blocks
 - Repair any rutting
 - Cleaning for aesthetics of the paving blocks
 - De-icing during winter months
 - Inspection of ponding during or following heavy rainfall

2. Bioretention Planting / Rain Gardens

Site specific method statement

Maintenance to be carried in accordance with Ciria Suds Manual (Chapter 18 & Table 18.3) and to include but not limited to the following actions: -

- Quarterly visual inspections to be undertaken along with litter and debris removed. planting inspection to be undertaken at the same time but will be less frequent during winter months.
- Remedial maintenance will be undertaken intermittently following the outcome of quarterly inspections if required. This may consist of the following items –
 - Weed control
 - Replacement of damaged planting
 - Structure Rehabilitation / Repair
 - Surface Reconditioning

3. Piped Network

- Gully / catchpit / channel drain cleaning and pipe jetting to be undertaken typically every year. If a blockage is present and flooding occurs, cleaning and clearing the blockage should be undertaken immediately. If item is defective, this should also be repaired or replaced.

4. Detention Basin

Site specific method statement

Maintenance to be carried in accordance with Ciria Suds Manual (Chapter 22 & Table 22.1) and to include but not limited to the following actions: -

- Monthly visual inspections to be undertaken along with litter and debris removed. planting inspection to be undertaken at the same time but will be less frequent during winter months.
- Remedial maintenance will be undertaken intermittently following the outcome of Annually inspections if required. This may consist of the following items –
 - Weed control
 - Replacement of damaged planting
 - Structure Rehabilitation / Repair
 - Surface Reconditioning
 - Removal of Sediment
 - Erosion repair
 - Repair of inlet and outlets