JOB NAME	Cleator Moor Activity Centre
JOB No.	L2763
DATE	July '23

DRAINAGE STRATEGY

FURNESS PARTNERSHIP
www.furnesspartnership.com

London
Bradford

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CONTENTS

SCHEDULE OF APPENDICES

REVISION	DATE	ISSUE STATUS	PREPARED BY	CHECKED BY
P1	26.07.23	FOR REVIEW	M.H	C.J.H

1 INTRODUCTION

1.1 This document has been prepared by Furness Partnership and sets out the proposed drainage strategy for the redevelopment of Cleator Moor Activity Centre. This strategy should be read in conjunction with the following appended documentation:

- Existing Site Plan: 10319-RL-XX-ZZ-DR-A-P0002_A3
- Existing Topographical Survey: 5441_CTS 240522 214FD
- Proposed Site Plan: 10319-RL-XX-ZZ-DR-A-P2002_DRAFT
- Furness Partnership Existing / Proposed Impermeable Areas:
  - L2763-FUR-XX-XX-DR-D-0901 (P1)
  - L2763-FUR-XX-XX-DR-D-0902 (P2)
- Furness Partnership Drainage Drawings:
  - L2763-FUR-XX-XX-DR-D-0911 (P2)
  - L2763-FUR-XX-XX-DR-D-0921 (P2)
  - L2763-FUR-XX-XX-DR-D-0931 (P1)
  - L2763-FUR-XX-XX-DR-D-0932 (P2)
- United Utilities Pre-Planning Enquiry Response & Sewer Map Records
- GEOL Ground Investigation / Falling Head Test Extract
- Furness Partnership MicroDrainage Surface Water Hydraulic Calculations
- Furness Partnership SuDS Maintenance Schedule

2 EXISTING SITE DETAILS & PROPOSED DEVELOPMENT

2.1 The existing site extends over an area of brownfield land off Backwyndham Street, Cleator Moor. The site currently comprises Cleator Moor Activity Centre with associated car parking and an all-weather pitch.

2.2 The total development area is approx. 0.75ha

Fig 2.1 – Site map showing approximate development boundary

2.3 Levels within the site fall gradually from east to west. Levels to the east of the activity centre are circa 86 m falling to circa 80m adjacent to the all-weather pitch to the west of the site.

2.4 The proposed development involves resurfacing the existing hardstanding/car parking areas and constructing a single storey extension to the existing activity centre to house a new fitness gym, multipurpose studio, and changing facilities. The all-weather pitch is to be retained and is not part of the proposed development.

3 FLOOD RISK STATEMENT

3.1 A Flood Risk Assessment has been carried out by GEOL Consultants, dated April 2023, and the reader is referred to this report for further details regarding the risk of flooding to the site. Conclusions from the report state that the site is not considered to be at significant risk from fluvial flooding as it lies wholly within a Zone 1 flood risk area. The site is also not considered to be at risk from tidal flooding, pluvial flooding, flooding from artificial sources of water (reservoirs, canals, etc.), groundwater flooding, or flooding from public sewers; and there are no records of any historical flooding. Provided a suitable drainage strategy is implemented to accommodate the increase in post-development impermeable area, the development will not have an adverse impact on any nearby watercourses, floodplains, and areas of flood storage capacity, nor will the development result in flooding of adjacent sites.

4 SURFACE WATER DRAINAGE

EXISTING

4.1 The existing site comprises a mixture of greenfield (parkland) and brownfield (buildings / car parking / hardstanding) land.

4.2 United Utilities asset plans show that there are several combined sewers within and adjacent to the site boundary. There is a 225mm United Utilities combined sewer in the site access road and a 375mm United Utilities combined sewer adjacent to the existing leisure centre. These two sewers connect at the site entrance and discharge into the 375mm diameter combined public sewer in Quarry Road.

4.3 A drainage survey has been carried out to confirm where the existing surface water from the site discharges to. The drainage survey shows that the existing site surface water drainage discharges into the 225mm United Utilities combined sewer within the site boundary.

4.4 The nearest watercourse is Nor Brook, 460 m to the north of the site boundary.

4.5 The existing impermeable area within the site boundary is approx. 2425 m².

4.6 The existing surface water discharge rate for a 1 in 1 year event (60minute event) has been calculated as 19.9 l/s for the 1 in 1-year return period (60minute event) acting over the existing impermeable area.

PROPOSED

4.7 The surface water discharge from the proposed development will be made up from the following elements:

- Building Roof Area
- Access Roads
- Paved Areas around new development
- Car Parking Bays

4.8 The total proposed impermeable area within the site boundary is approx. 5030 m².

Surface Water Discharge Hierarchy

4.9 The recommended surface water discharge hierarchy set out in the CIRIA SuDS Manual is to utilise soakaways, or infiltration as the preferred option, followed by discharging to an appropriate watercourse. If these options are not feasible then the final option is to discharge to an existing surface water sewer, followed by discharge into a combined public sewer.

4.10 In accordance with the surface water discharge hierarchy, soakaways were initially considered for the discharge of surface water from the new development. Falling head tests have been carried out across the site however they failed due to high groundwater levels. The groundwater on site has been measured at up to 0.12 m below ground level. This is not sufficient to provide at least 1m freeboard between the worst-case groundwater level and the underside of any soakaway structure. Soakaways are not therefore proposed for the discharge of surface water from the site.

4.11 If soakaways are not suitable the next step in the discharge hierarchy is to consider discharge into a watercourse. The closest watercourse is Nor Brook, 460 m to the north of the site boundary. Discharging directly into this watercourse is not economical or practical as it would require crossing significant portions of built-up, third-party land. Discharge into Nor Brook is not therefore proposed for the discharge of surface water from the site.

4.12 The next step in the discharge hierarchy is to discharge into a public surface water sewer, followed by discharge to a public combined sewer. A pre-development enquiry has been submitted to United Utilities to confirm whether they have any assets adjacent to the site boundary. Their response and asset maps are appended to this report. United Utilities have confirmed that the 225mm public combined sewer within the site is suitable to connect into provided the discharge rate is limited to a rate agreed with the Lead Local Flood Authority (LLFA) although not exceeding 34.1 l/s. Formal approval to connect into the public drainage network will be agreed with United Utilities through the submission of an S106 application.

SuDS Considerations

4.13 SuDS have been considered when producing this drainage strategy to provide effective surface water treatment and slow down the rate of surface water runoff in accordance with National Planning Policy recommendations and the North West SuDS Pro-Forma guidance. The following sustainable drainage systems have been considered:

- Porous Pavement: Porous/permeable surfaces are proposed for the car park construction as they can provide an effective way to reduce the flow rate of surface water runoff and give the necessary 2-stage treatment required to remove hydrocarbons prior to discharge into the receiving water body.

- Detention Basin: A detention basin is proposed as there are sufficient landscaped areas within the site boundary, and they provide additional amenity benefits compared to underground storage tanks.

Simple Index Approach & Maintenance Schedule

4.14 In accordance with the CIRIA SuDS Manual, to deliver adequate treatment using SuDS, the selected SuDS components should have a total pollution mitigation index (for each contaminant type) that equals or exceeds the pollution hazard index (for each contaminant type).

4.15 The land usage and pollution hazard levels for the site are shown in Table 4.1.

Table 4.1 Pollution hazard indices for different land use classifications (CIRIA SuDS Manual)

Land Use	Pollution Hazard Level	Total Suspended Solids (TSS)	Metals	Hydrocarbons
Activity Centre Roof	Low	0.3	0.2	0.05
Car Parking Areas & Access Roads	Medium	0.7	0.6	0.7

4.16 The SuDS components used for treatment on the site and their mitigation indices are shown in Table 4.2.

Table 4.2 Indicative SuDS mitigation indices for discharges to surface waters (CIRIA SuDS Manual)

	Mitigation indices			
Land use to be treated	**Type of SuDS treatment component**	**TSS**	**Metals**	**Hydrocarbons**
Activity Centre Roof	Detention Basin	0.5	0.5	0.6
	Total	**0.5**	**0.5**	**0.6**
Car Parking Areas & Access Roads	Permeable pavement	0.7	0.6	0.7
	Detention Basin*	0.25	0.25	0.3
	Total	**0.95**	**0.85**	**1.0**
Car Parking Areas & Access Roads where permeable paving in not possible	Proprietary Oil Separator - Designed & tested to BS EN858 to address each of the contaminant types to acceptable levels for frequent events up to the 1 in 1 year return period, for inflow concentrations relevant to the contributing drainage area.			
	Detention Basin*	0.25	0.25	0.3
	Total	**>0.7**	**>0.6**	**>0.7**

** mitigation index reduced by 50% where it is combined in series with other components*

4.17 As the total SuDS mitigation index ≥ pollution hazard index for each proposed land use within the site, the proposed treatment is sufficient.

4.18 Surface water runoff from external paved vehicular areas will be collected in trapped gullies/sumps and pass through a class 1 bypass separator to remove oils and silts in accordance with guidance set out in the CIRIA SuDS Manual.

4.19 A suitable maintenance plan for all SuDS features can be found in the Appendix and should be developed and implemented by the operator once the drainage proposals have been installed to ensure sufficient operation and treatment is maintained throughout the design life of the development.

Design Criteria

4.20 The surface water from the proposed development will discharge into the 225mm combined United Utilities combined sewer within the site boundary.

4.21 It is proposed that the development surface water discharge rate is limited to 4.6l/s (Qbar) for all rainfall events up to and including the 1 in 100-year return period in accordance with LLFA guidance.

4.22 A detention basin is proposed to accommodate all surface water discharge from the site and will have sufficient capacity to attenuate flows up to and including the 1 in 100-year return period plus a 40% allowance for climate change.

4.23 All private surface water drains will be designed and constructed in accordance with BS EN 752:2017 and Building Regulations Approved Document H.

4.24 A 10% increase in impermeable area has not been included to account for urban creep (i.e., future extensions & increased hardstanding areas). This is because the site is a commercial development, and any future expansion will be subject to additional planning approval which will ensure adequate drainage is provided.

5 FOUL WATER DRAINAGE

EXISTING

5.1 The existing site foul drainage infrastructure comprises sewage from the existing activity centre.

5.2 United Utilities asset plans show that there are several combined sewers within and adjacent to the site boundary. There is a 225mm United Utilities combined sewer in the site access road and a 375mm United Utilities combined sewer adjacent to the existing leisure centre. These two sewers connect at the site entrance and discharge into the 375mm diameter combined public sewer in Quarry Road.

5.3 A drainage survey has been carried out to confirm where the existing foul water from the site discharges to. The drainage survey shows that the existing site foul water drainage discharges into the 375mm United Utilities combined sewer within the site boundary.

PROPOSED

Discharge Method

5.4 A pre-development enquiry has been submitted to United Utilities to confirm whether they have any assets adjacent to the site boundary. Their response and asset maps are appended to this report. United Utilities have confirmed that the 225mm public combined sewer within the site is suitable to connect into and has sufficient capacity for the proposed development however it is proposed to keep the existing foul drainage connection point into the 375mm sewer instead. United Utilities have been contacted to confirm that this approach is acceptable. Formal approval to connect into the public drainage network will be agreed with United Utilities through the submission of an S106 application.

Design Criteria

5.5 The foul water from the proposed development will discharge into the 375mm combined public sewer within the site boundary (subject to United Utilities approval). If this is not acceptable then the existing site foul drainage will continue to discharge into the 375mm combined sewer and any new foul drainage will discharge into the 225mm diameter combined sewer within the site boundary.

5.6 New foul drains will be provided to serve all foul producing appliances within the proposed development. All drains will be designed in accordance with BS EN 752:2017 and Building Regulations Approved Document H.

APPENDIX A – ARCHITECTURAL INFORMATION

This line should measure 70mm when printed correctly

Responsibility is not accepted for errors made by others in scaling from this drawing. Use only figured dimensions and report any discrepancies or omissions to the Architect immediately.

Rev	Date	By	Chk	Description

DRAFT

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Registered Office: England No. 06658029

Project Name
Cleator Moor Activity Centre

Client Name
Towns Fund Copeland Borough Council

Drawing Title
Existing Site Plan

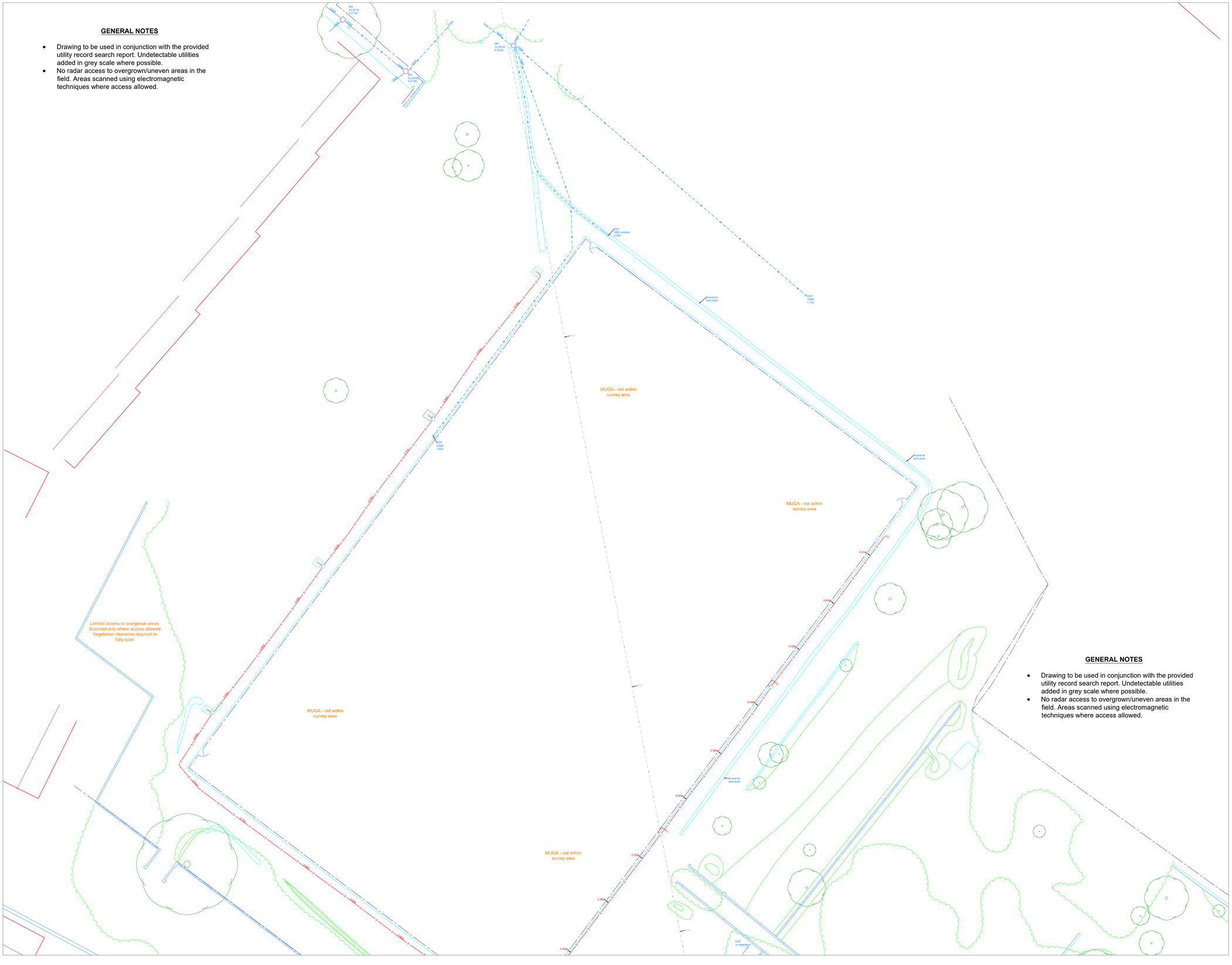
Scale	Project No.
1 : 500 • A1	10319

Status	Purpose Of Issue
A3	Issued for Planning

Project	Org	Vol	Level	Form	Role
10319	RL	XX	ZZ	DR	A

Number **P0002** **Revision**

02/06/2023 13:01:39



GENERAL NOTES

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- No radar access to overgrown/uneven areas in the field. Areas scanned using electromagnetic techniques where access allowed.

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ABBREVIATIONS

AR	ASSUMED ROUTE	NFI	NO FURTHER INFORMATION
BD	BACKDROP	NTA	NO TRANSMITTER ACCESS
BTIC	BRITISH TELECOM CHAMBER	OSA	OUTSIDE SURVEY AREA
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N

No.	Revision/Issue	By	Date
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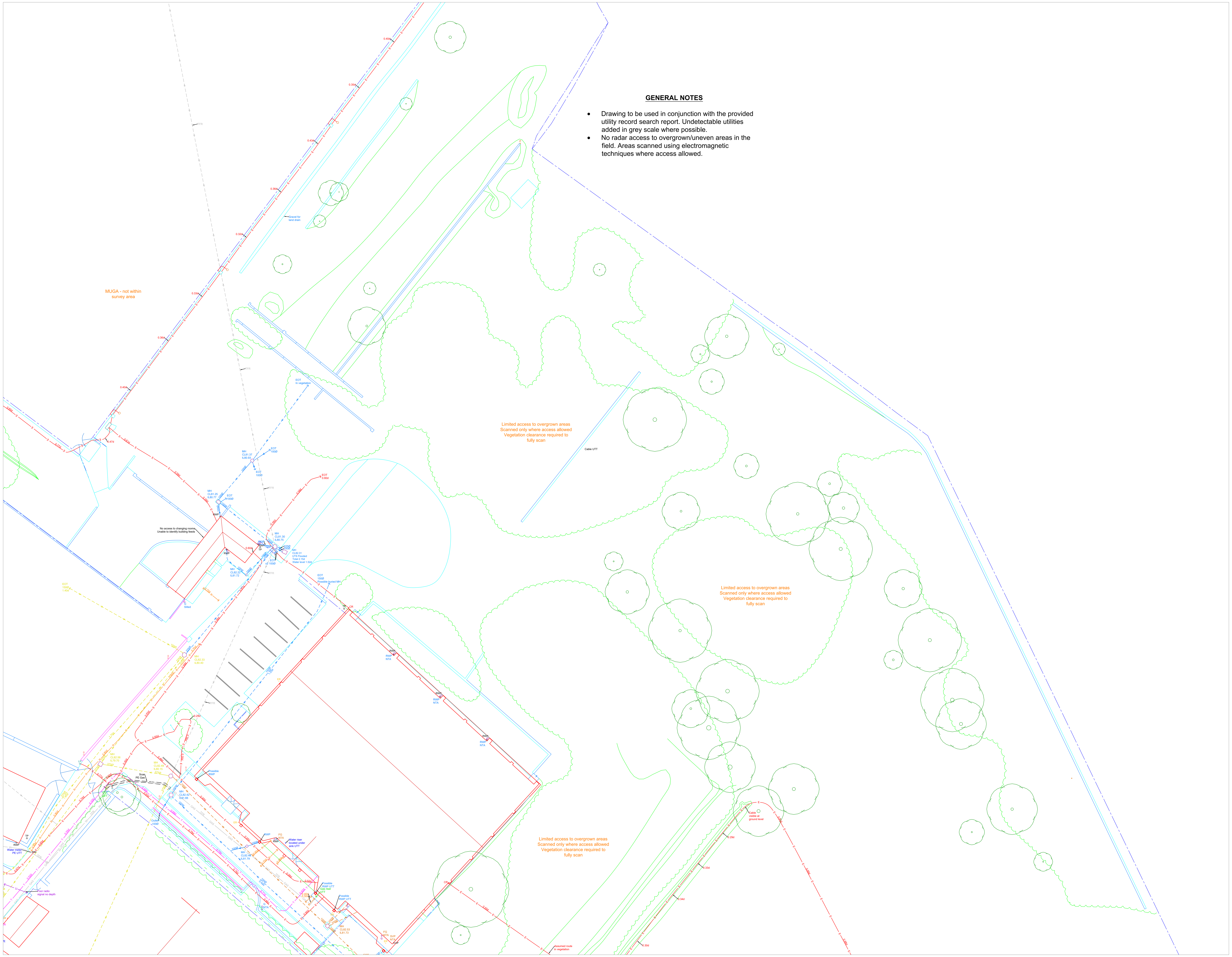
Project Name and Address

Cleator Moor Activity Centre
Cleator Moor
Cumbria
CA25 5AN

30-05-2022

Discovery Surveys Drawing No: CTS 240522 214	Sheet: 2of4
CT Surveys Drawing No: 5441CM	
Scale: 1:200@A0	

Client	Drawn	Approved
Furness Partnership	JH	SR



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CATV — CATV — CATV	CABLE TELEVISION
CCTV — CCTV — CCTV	CLOSED CIRCUIT TELEVISION
COM — COM — COM	COMMUNICATIONS CABLE
A — A — A — A	COMPRESSED AIR
- - - - - -	DUCTING
E — E — E — E	ELECTRIC CABLE
EA — EA — EA	EARTH CABLE
— → — → —	FOUL WATER SEWER
— → — → —	COMBINED WATER SEWER
— → — → —	SURFACE WATER SEWER
F — F — F — F	FUEL PIPE
GAS — GAS — GAS	GAS PIPE
GL — GL — GL — GL	GAUGE LINE
— H — H —	HEATING
O — O — O — O	OFFSET FILL PIPE
R — R — R — R	RADAR TRACE
T — T — T — T	TELECOMS CABLE
TL — TL — TL	TRAFFIC LIGHT CABLE
U — U — U — U	UNIDENTIFIED SERVICE
VR — VR — VR	VAPOUR RECOVERY
V — V — V — V	VENT PIPE
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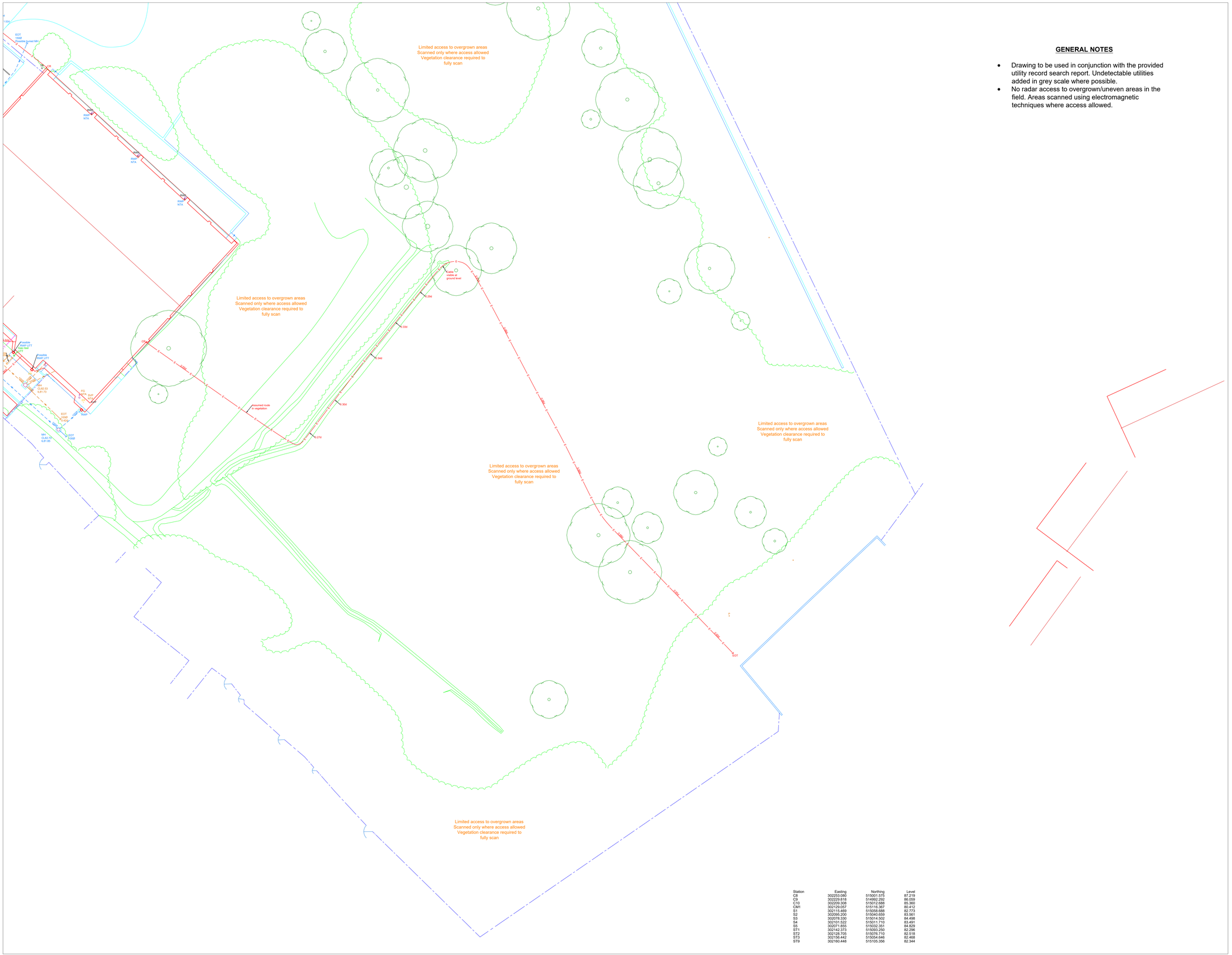

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Station	Easting	Northing	Level
C8	302253.080	515001.575	87.219
C9	302229.818	514992.292	86.059
C10	302209.308	515012.688	85.360
CM1	302129.057	515116.367	80.412
S1	302115.469	515058.688	82.773
S2	302095.200	515040.659	83.561
S3	302078.330	515014.502	84.498
S4	302101.522	515011.710	83.491
S5	302071.855	515032.351	84.829
ST1	302142.373	515093.250	82.296
ST2	302126.705	515076.710	82.518
ST3	302156.442	515054.846	82.468
ST9	302160.448	515105.356	82.344

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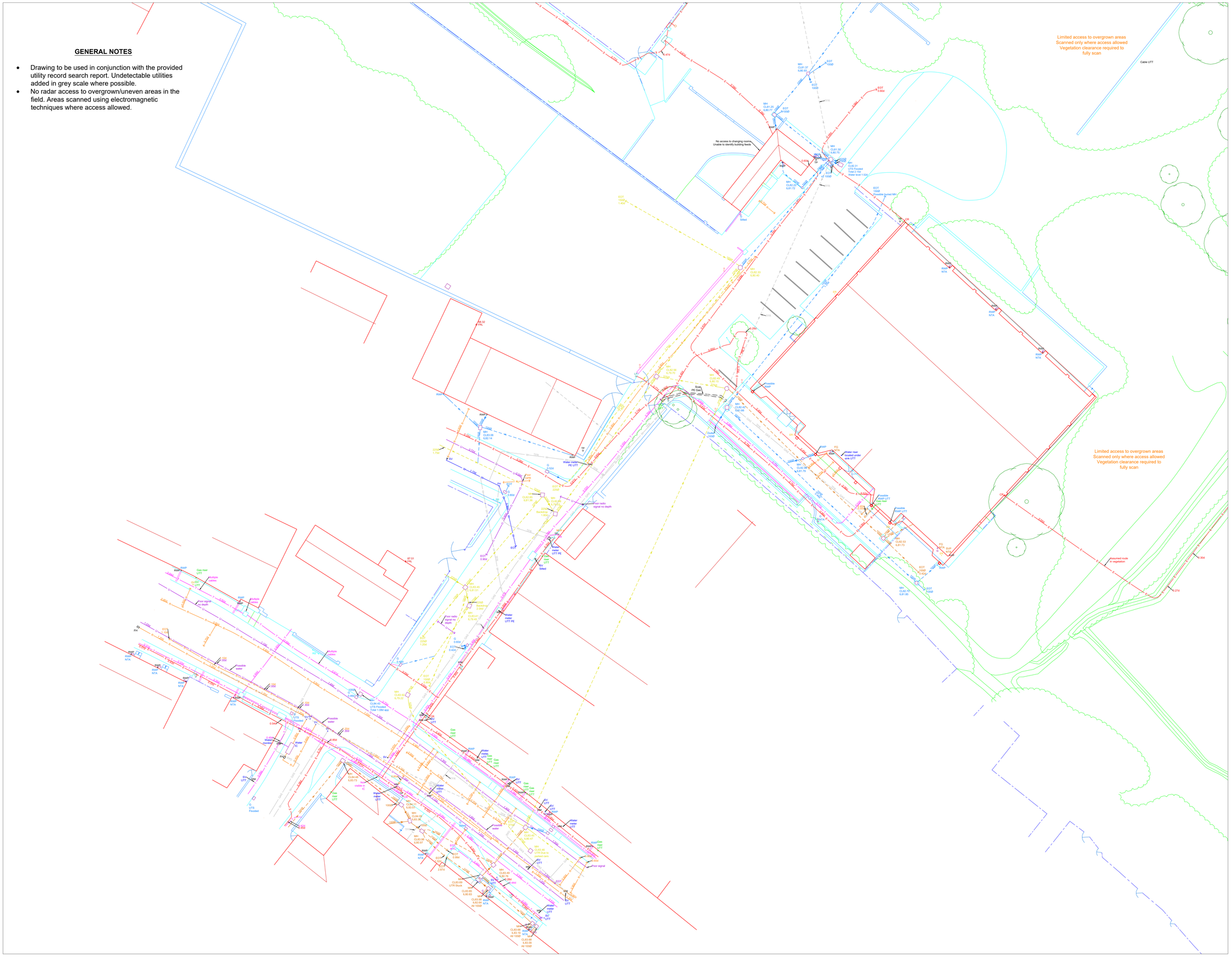

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Disclaimer

The location of under ground services shown on this drawing has been determined using electro-magnetic and GPR radar techniques and visual observations. No guarantee can be given that all services have been shown on the drawing. The relevant service drawings should be obtained from the appropriate service providers company and used in conjunction with this drawing. No guarantee can be given to the accuracy and completeness of any service provider record information shown in this drawing and no liability will be accepted for any losses that arise due to a lack of accuracy in any service providers record information. Reference should also be made to historical plans and as built drawings. Excavations in the vicinity of services should be carried out with due diligence ref: HSG47 document. Location accuracy is determined by referring to manufacturers guidelines for the systems deployed. Reference should be made to the latest version of Discovery Surveys Ltd site procedures document for utility location surveys.

ABBREVIATIONS

AR	ASSUMED ROUTE	NFI	NO FURTHER INFORMATION
BD	BACKDROP	NTA	NO TRANSMITTER ACCESS
BTIC	BRITISH TELECOM CHAMBER	OSA	OUTSIDE SURVEY AREA
CI	CAST IRON	PE	POLYETHALINE
CL	COVER LEVEL	PR	PIPE RISER
CO	CONCRETE	PVC	POLYVINYL CHLORIDE
CP	CABLE PIT	RE	RODDING EYE
CR	CABLE RISER	RWP	RAINWATER PIPE
d	DEPTH IN METRES	SV	STOP VALVE
EM	EARTH MAT	SVP	SOIL VENT PIPE
EP	ELECTRICITY POLE	TFR	TAKEN FROM RECORDS
EOT	END OF TRACE	TP	TELEGRAPH POLE
FE	FENCE EARTH POINT	UDI	UNRELIABLE DEPTH INFO'
FH	FIRE HYDRANT	UTL	UNABLE TO LOCATE
G	GULLY	UTR	UNABLE TO RAISE
GPR	TRACED BY G.P.R.	UTS	UNABLE TO SURVEY
GV	GAS VALVE	UTT	UNABLE TO TRACE
GR	GAS RISER	WL	WATER LEVEL
IC	INSPECTION CHAMBER	WR	WATER RISER
IL	INVERT LEVEL	VP	VENT PIPE
LP	LAMP POST	VR	VAPOUR RECOVERY
MH	MANHOLE	WM	WATER METER
MCW	MAINS COLD WATER	WO	WASH OUT VALVE
ND	NO DEPTH (Unable to acquire depth)	WWP	WASTE WATER PIPE

LEGEND

CATV	CABLE TELEVISION
CCTV	CLOSED CIRCUIT TELEVISION
COM	COMMUNICATIONS CABLE
A	COMPRESSED AIR
	DUCTING
E	ELECTRIC CABLE
EA	EARTH CABLE
	FOUL WATER SEWER
	COMBINED WATER SEWER
	SURFACE WATER SEWER
F	FUEL PIPE
GAS	GAS PIPE
Gp	GAUGE LINE
H	HEATING
O	OFFSET FILL PIPE
R	RADAR TRACE
T	TELECOMS CABLE
TL	TRAFFIC LIGHT CABLE
U	UNIDENTIFIED SERVICE
VR	VAPOUR RECOVERY
V	VENT PIPE
W	WATER PIPE
	SURVEY BOUNDARY
	END OF TRACE (Signal lost, unless stated otherwise)

N

No.	Revision/Issue	By	Date
-	-	-	-

Discovery Surveys Ltd
Winning Post Centre
MoorendsThorne
Doncaster
DN8 4PB

Project Name and Address

Cleator Moor Activity Centre
Cleator Moor
Cumbria
CA25 5AN

30-05-2022

Discovery Surveys Drawing No	CTS 240522 214
CT Surveys Drawing No	5441CM
Scale	1:200@A0
Sheet	1of4

Client	Drawn	Approved
Furness Partnership	JH	SR

This line should measure 70mm when printed correctly

Responsibility is not accepted for errors made by others in scaling from this drawing. Use only figured dimensions and report any discrepancies or omissions to the Architect immediately.

Rev	Date	By	Chk	Description

DRAFT

Roberts Limbrick
03333 405 500
mail@robertslimbrick.com
robertslimbrick.com
Registered Office: England No. 06658029

Project Name
Cleator Moor Activity Centre

Client Name
Towns Fund Copeland Borough Council

Drawing Title
Proposed Site Plan

Scale	Project No.
1 : 500 • A1	10319

Status	Purpose Of Issue
A3	Issued for Planning

Project	Org	Vol	Level	Form	Role
10319	RL	XX	ZZ	DR	A

Number **P2002**

Revision

Key
Ownership Boundary

0 5 10 25 m

N
S

22/05/2023 10:42:47

APPENDIX B – DRAINAGE DRAWINGS

General Notes

EXISTING CHANGING ROOMS

EXISTING ACTIVITY CENTRE

Ex.SWMH CL:81.370 IL:80.930
Ex.SWMH CL:81.300 IL:80.770
Ex.SWMH CL:82.300 IL:80.750
Ex.SWMH CL:82.310 IL:FLOODED
Ex.SWMH CL:82.220 IL:81.720
Ex.SWMH POSSIBLE BURIED CHAMBER
Ex.UUMH CL:82.330 IL:80.400
Ex.UUMH CL:82.560 IL:79.700
Ex.UUMH CL:82.490 IL:80.420–100ø IL:80.150–375ø
Ex.SWMH CL:82.420 IL:81.660
Ex.SWMH CL:82.480 IL:81.790
Ex.FWMH CL:82.530 IL:81.730
Ex.SWMH CL:82.700 IL:81.850
Ex.UUMH CL:82.850 IL:81.360
Ex.UUMH CL:82.880 IL:79.530
Ex.UUMH CL:83.450 IL:81.510
Ex.UUMH CL:83.410 IL:79.450
CM1 80.412

150ø UNITED UTILITIES COMBINED SEWER
225ø UNITED UTILITIES COMBINED SEWER
375ø UNITED UTILITIES COMBINED SEWER
100ø
Ex.RWP
Ex.RWP/G

CLEATOR MOOR AUTO & BODY REPAIRS- brick and cladded building
-CLEATOR MOOR ACTIVITY CENTRE- brick, timber & cladded building
KIRKLAND CARPETS & BED CENTRE- render building
WYNDHAM STREET
brick house
area of overgrown brambles
area of trees and bushes
area of bushes & trees
area of overgrown bushes & trees
area of overgrown brambles & trees
rough tarmac/ gravel
brick setts
tarmac
grass
gravel
concrete
unable to locate banking and due to densely overgrown brambles

EXISTING IMPERMEABLE AREAS

ACTIVITY CENTRE IMPERMEABLE AREA: 1460m^2
CHANGING ROOMS IMPERMEABLE AREA: 65m^2
CAR PARK & HARDSTANDING IMPERMEABLE AREA: 900m^2

TOTAL: 2425m^2

EXISTING DISCHARGE RATE: 19.9 l/s (1in1 YEAR 60 MINUTE EVENT)
[SEE MICRODRAINAGE CALCS]

LEGEND.

- EXISTING FOUL SEWERS
- EXISTING FOUL RISING MAIN
- EXISTING COMBINED SEWERS
- ABANDONED SEWER TO BE REMOVED
- EXISTING COMBINED SEWERS
- EXISTING SURFACE WATER SEWERS
- EXISTING SURFACE WATER RISING MAIN

EXISTING DRAINAGE LAYOUT

SCALE: 1:250

Rev	Date	Comment	By	Check
P1	23.06.23	ISSUED FOR APPROVAL.	M.H	C.J.H

Status Code: S3
Drawing Status: FOR APPROVAL

This drawing may only be used for construction/manufacture if status is CONSTRUCTION

Furness Partnership
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Bradford The Paper Hall, Anne Gate, Bradford, BD1 4EQ tel: 01274 392092 e-mail: mail@furnesspartnership.com

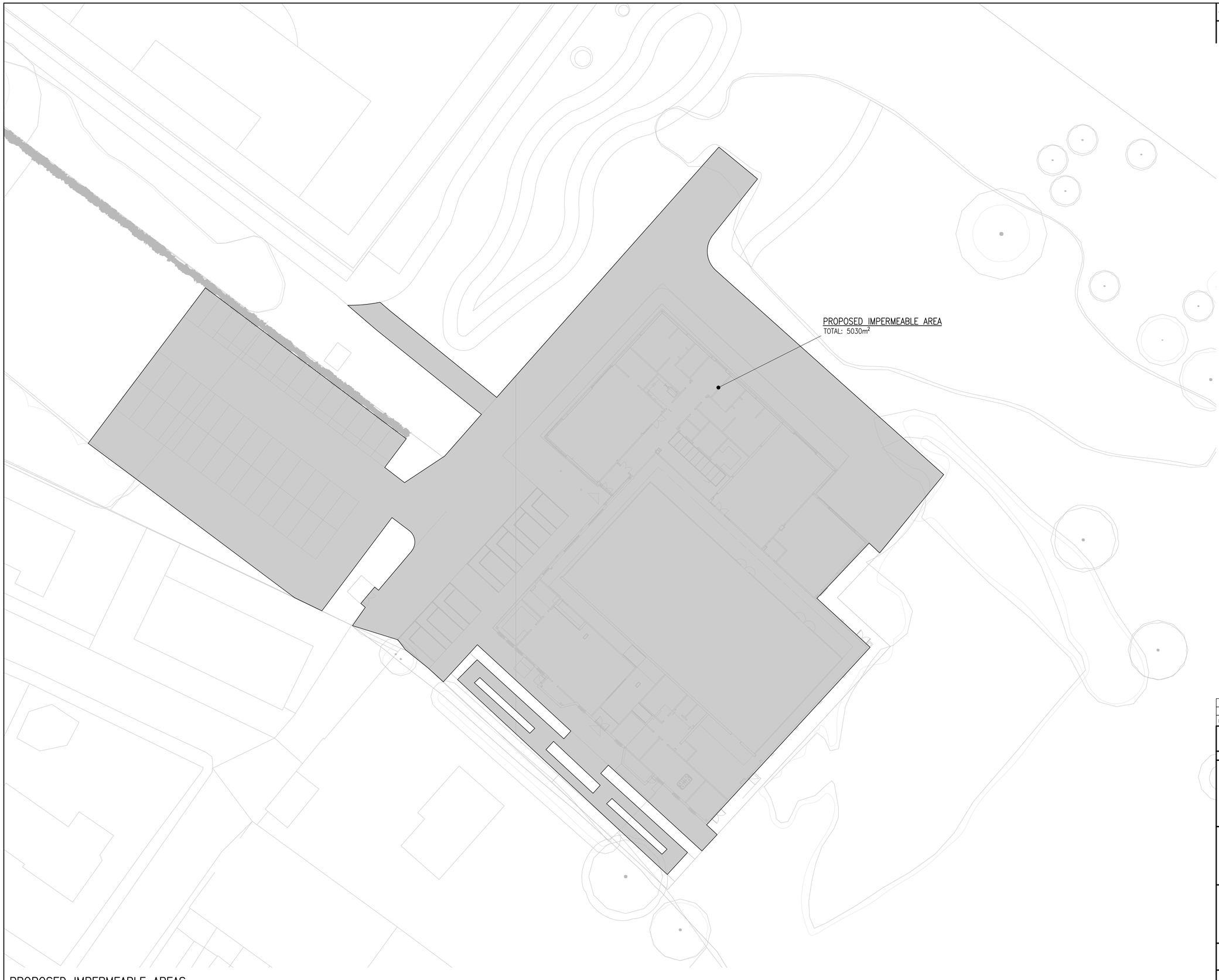
Project: CLEATOR MOOR ACTIVITY CENTRE

Drawing Title: EXISTING DRAINAGE LAYOUT & IMPERMEABLE AREAS

FP Job No.	Drawn	Date	Checked	Scale @ A1
L2763	M.H	JUN '23	C.J.H	1:250

PROJECT	OPERATOR	ZONE / VOLUME	LEVEL / LOCATION	FILE TYPE	ROLE	SHEET No.	Rev.
L2763	FUR	XX	XX	DR	D	0901	P1

General Notes



PROPOSED IMPERMEABLE AREAS
SCALE: 1:250

Rev	Date	Comment	By	Check
P2	26.07.23	ISSUED FOR PLANNING APPROVAL.	M.H	C.J.H
P1	23.06.23	ISSUED FOR APPROVAL.	M.H	C.J.H

Status Code: S3

Drawing Status: FOR APPROVAL

This drawing may only be used for construction/manufacture if status is CONSTRUCTION

Furness Partnership
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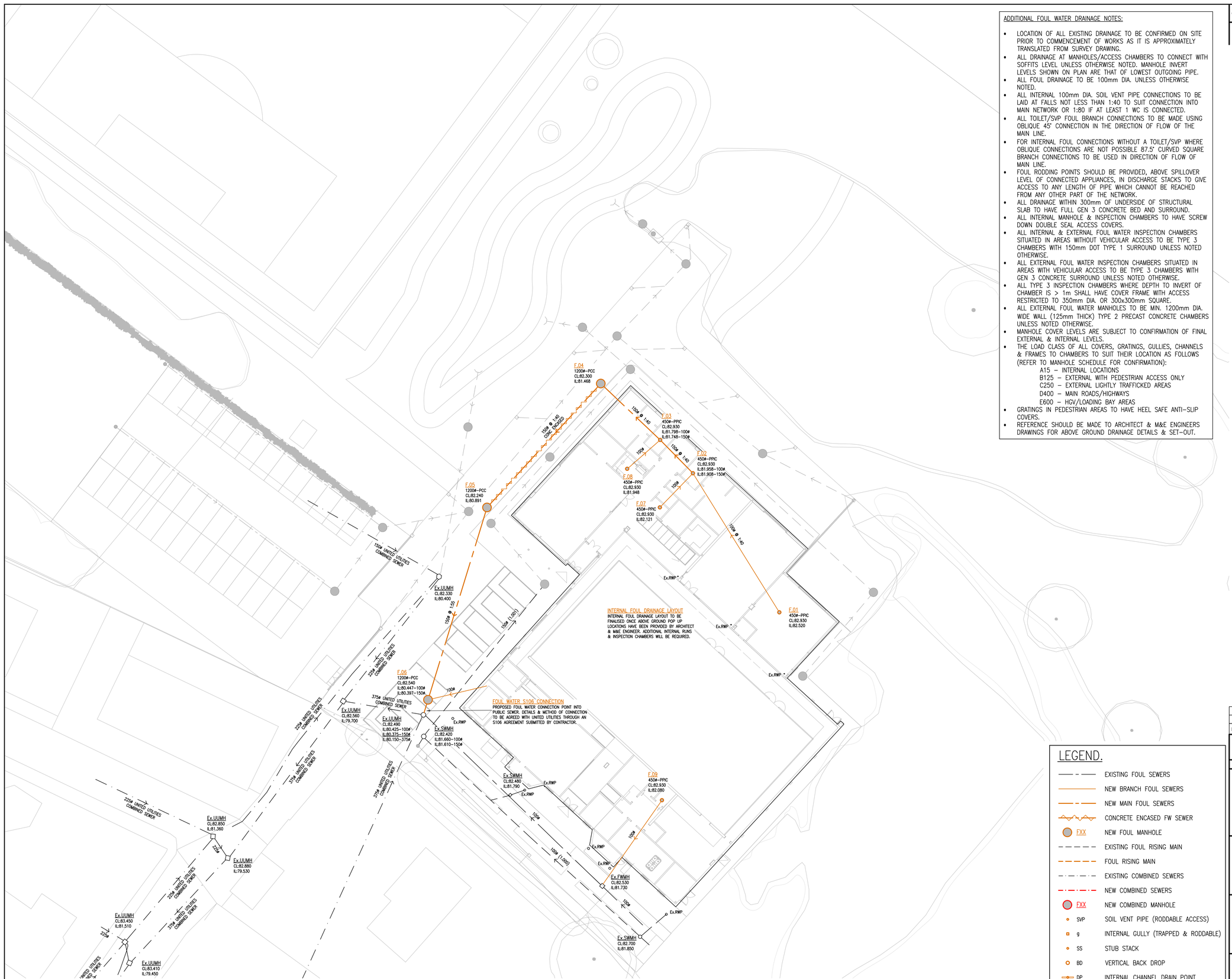
tel: 01274 392092
e-mail: mail@furnesspartnership.com

Project: CLEATOR MOOR ACTIVITY CENTRE

Drawing Title: PROPOSED IMPERMEABLE AREAS

FP Job No.	Drawn	Date	Checked	Scale @ A1
L2763	M.H	JUN '23	C.J.H	1:250

PROJECT	OPERATOR	ZONE / VOLUME	LEVEL / LOCATION	FILE TYPE	ROLE	SHEET No.	Rev.
L2763	FUR	XX	XX	DR	D	0902	P2



PROPOSED FOUL WATER DRAINAGE LAYOUT

SCALE: 1:250

ADDITIONAL FOUL WATER DRAINAGE NOTES:

- LOCATION OF ALL EXISTING DRAINAGE TO BE CONFIRMED ON SITE PRIOR TO COMMENCEMENT OF WORKS AS IT IS APPROXIMATELY TRANSLATED FROM SURVEY DRAWING.
- ALL DRAINAGE AT MANHOLES/ACCESS CHAMBERS TO CONNECT WITH SOFFITS LEVEL UNLESS OTHERWISE NOTED. MANHOLE INVERT LEVELS SHOWN ON PLAN ARE THAT OF LOWEST OUTGOING PIPE.
- ALL FOUL DRAINAGE TO BE 100mm DIA. UNLESS OTHERWISE NOTED.
- ALL INTERNAL 100mm DIA. SOIL VENT PIPE CONNECTIONS TO BE LAID AT FALLS NOT LESS THAN 1:40 TO SUIT CONNECTION INTO MAIN NETWORK OR 1:80 IF AT LEAST 1 WC IS CONNECTED.
- ALL TOILET/SVP FOUL BRANCH CONNECTIONS TO BE MADE USING OBLIQUE 45° CONNECTION IN THE DIRECTION OF FLOW OF THE MAIN LINE.
- FOR INTERNAL FOUL CONNECTIONS WITHOUT A TOILET/SVP WHERE OBLIQUE CONNECTIONS ARE NOT POSSIBLE 87.5° CURVED SQUARE BRANCH CONNECTIONS TO BE USED IN DIRECTION OF FLOW OF MAIN LINE.
- FOUL RODDING POINTS SHOULD BE PROVIDED, ABOVE SPILLOVER LEVEL OF CONNECTED APPLIANCES, IN DISCHARGE STACKS TO GIVE ACCESS TO ANY LENGTH OF PIPE WHICH CANNOT BE REACHED FROM ANY OTHER PART OF THE NETWORK.
- ALL DRAINAGE WITHIN 300mm OF UNDERSIDE OF STRUCTURAL SLAB TO HAVE FULL GEN 3 CONCRETE BED AND SURROUND.
- ALL INTERNAL MANHOLE & INSPECTION CHAMBERS TO HAVE SCREW DOWN DOUBLE SEAL ACCESS COVERS.
- ALL INTERNAL & EXTERNAL FOUL WATER INSPECTION CHAMBERS SITUATED IN AREAS WITHOUT VEHICULAR ACCESS TO BE TYPE 3 CHAMBERS WITH 150mm DOT TYPE 1 SURROUND UNLESS NOTED OTHERWISE.
- ALL EXTERNAL FOUL WATER INSPECTION CHAMBERS SITUATED IN AREAS WITH VEHICULAR ACCESS TO BE TYPE 3 CHAMBERS WITH GEN 3 CONCRETE SURROUND UNLESS NOTED OTHERWISE.
- ALL TYPE 3 INSPECTION CHAMBERS WHERE DEPTH TO INVERT OF CHAMBER IS > 1m SHALL HAVE COVER FRAME WITH ACCESS RESTRICTED TO 350mm DIA. OR 300x300mm SQUARE.
- ALL EXTERNAL FOUL WATER MANHOLES TO BE MIN. 1200mm DIA. WIDE WALL (125mm THICK) TYPE 2 PRECAST CONCRETE CHAMBERS UNLESS NOTED OTHERWISE.
- MANHOLE COVER LEVELS ARE SUBJECT TO CONFIRMATION OF FINAL EXTERNAL & INTERNAL LEVELS.
- THE LOAD CLASS OF ALL COVERS, GRATINGS, GULLIES, CHANNELS & FRAMES TO CHAMBERS TO SUIT THEIR LOCATION AS FOLLOWS (REFER TO MANHOLE SCHEDULE FOR CONFIRMATION):
  - A15 – INTERNAL LOCATIONS
  - B125 – EXTERNAL WITH PEDESTRIAN ACCESS ONLY
  - C250 – EXTERNAL LIGHTLY TRAFFICKED AREAS
  - D400 – MAIN ROADS/HIGHWAYS
  - E600 – HGV/LOADING BAY AREAS
- GRATINGS IN PEDESTRIAN AREAS TO HAVE HEEL SAFE ANTI–SLIP COVERS.
- REFERENCE SHOULD BE MADE TO ARCHITECT & M&E ENGINEERS DRAWINGS FOR ABOVE GROUND DRAINAGE DETAILS & SET–OUT.

General Notes

1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL RELEVANT ARCHITECTS AND ENGINEERS DRAWINGS AND SPECIFICATIONS.
2. ALL DRAINAGE TO BE TO THE SATISFACTION OF THE LOCAL AUTHORITY BUILDING CONTROL AND MAIN DRAINAGE SECTIONS ON MATTERS INVOLVING PUBLIC SEWERS.
3. ALL PIPEWORK, BENDS AND JUNCTIONS TO BE EXTRA STRENGTH VITRIFIED CLAY TO BS 65:1991, BS EN 295 OR PVCu TO BS EN 1401 TO BE AGREED WITH RELEVANT AUTHORITY.
4. INVERT LEVELS ON EXISTING DRAINS & OUTFALLS TO BE CHECKED PRIOR TO COMMENCEMENT OF WORKS.
5. TRENCH WIDTHS GENERALLY:– AS SMALL AS PRACTICABLE BUT NOT LESS THAN PIPE DIAMETER +300mm OR LARGER IF SPECIFIED. TRENCH SIDES MUST BE VERTICAL FROM BOTTOM UP TO 300mm ABOVE CROWN OF PIPE.
6. WHERE DRAINAGE PIPES HAVE LESS THAN 1.2m COVER IN TRAFFICKED AREAS AND LESS THAN 600mm UNDER LANDSCAPED AREAS PIPES SHALL HAVE A FULL CLASS Z CONCRETE SURROUND. CONCRETE PROTECTION TO BE DISCONTINUED AT EACH PIPE JOINT WITH COMPRESSIBLE MATERIAL. ALL OTHER FLEXIBLE PIPES TO HAVE CLASS S GRANULAR BEDDING DETAIL UNLESS OTHERWISE NOTED. ALL OTHER RIGID PIPES TO HAVE CLASS B GRANULAR BEDDING DETAIL UNLESS OTHERWISE NOTED.
7. GRANULAR BEDDING:
   - 10mm SINGLE SIZED COARSE AGGREGATE SHALL BE USED ON PIPES NOT EXCEEDING 140mm DIAMETER.
   - 2–14mm WELL GRADED COARSE AGGREGATE MAY BE USED ON PIPES EXCEEDING 140mm BUT NOT EXCEEDING 400mm DIAMETER.
   - 4–20mm WELL GRADED COARSE AGGREGATE MAY BE USED ON PIPES EXCEEDING 400mm DIAMETER.
   - THE DEPTH OF GRANULAR BEDDING UNDER THE PIPES SHALL BE X/6 OR 150mm, WHICHEVER IS GREATER, WHERE X=EXTERNAL DIAMETER OF THE PIPE.
8. ADOPTABLE PUBLIC SEWERS TO BE CONSTRUCTED IN ACCORDANCE WITH SEWERS FOR ADOPTION, 7th EDITION, SEPTEMBER 2012.
9. ALL PRIVATE DRAINAGE WORKS SHALL BE IN ACCORDANCE WITH "THE BUILDING REGULATIONS APPROVED DOCUMENT H" AND BRITISH STANDARD BS EN 752.
10. ALL NEW DRAINAGE TO BE TESTED PRIOR TO BACKFILL OF THE TRENCHES & PRIOR TO HANDOVER TO THE SATISFACTION OF THE BUILDING CONTROL INSPECTOR.
11. THE CONTRACTOR MUST LIAISE WITH THE LOCAL AUTHORITY MAIN DRAINAGE SECTION PRIOR TO COMMENCEMENT OF WORK ON PUBLIC DRAINAGE.
12. TRENCH BACKFILL SHALL BE COMPACTED IN LAYERS NOT EXCEEDING 250mm ONCE 300mm COVER HAS BEEN PROVIDED TO THE TOP OF PIPE.
13. THE CONTRACTOR SHALL ALLOW IN HIS RATES FOR MAINTAINING FLOW IN PUBLIC SEWERS AT ALL TIMES DURING DIVERSION WORKS INCLUDING TEMPORARY PUMPING AND ALSO KEEPING EXCAVATIONS FREE FROM GROUNDWATER INCLUDING PUMPING AND FORMATION OF TEMPORARY SUMPS.
14. THE CONTRACTOR SHALL MAKE PROVISIONS FOR AND LIAISE WITH ALL RELEVANT STATUTORY BODIES FOR THE MANAGEMENT OF TRAFFIC WHILE CARRYING OUT WORKS IN THE PUBLIC HIGHWAY.
15. THE CONTRACTOR IS TO SATISFY HIMSELF TO THE POSITION AND AND DEPTH OF THE PUBLIC UTILITIES AND ALLOW FOR TEMPORARY SUPPORT, PROTECTION AND DIVERSION WORKS AS NECESSARY. THE CONTRACTOR SHALL ALSO INCLUDE FOR ANY TRIAL PIT EXCAVATIONS NECESSARY.
16. BACKFILL TO EXCAVATIONS IN PUBLIC HIGHWAYS TO BE WELL COMPACTED GRANULAR TYPE 1 TO CL.803 OF THE DTp SPECIFICATION FOR HIGHWAY WORKS 2009.
17. ALL EXTERNAL GULLIES TO BE 375mm DIA. MINIMUM, PRECAST CONCRETE, HEAVY DUTY, KITE MARKED & ANTI–THEFT.

LEGEND.

- EXISTING FOUL SEWERS
- NEW BRANCH FOUL SEWERS
- NEW MAIN FOUL SEWERS
- CONCRETE ENCASED FW SEWER
- FXX NEW FOUL MANHOLE
- EXISTING FOUL RISING MAIN
- FOUL RISING MAIN
- EXISTING COMBINED SEWERS
- NEW COMBINED SEWERS
- FXX NEW COMBINED MANHOLE
- SVP SOIL VENT PIPE (RODDABLE ACCESS)
- g INTERNAL GULLY (TRAPPED & RODDABLE)
- SS STUB STACK
- BD VERTICAL BACK DROP
- DP INTERNAL CHANNEL DRAIN POINT
- RE RODDING EYE
- ABANDONED SEWER TO BE REMOVED

Rev	Date	Comment	By	Check
P2	26.07.23	ISSUED FOR PLANNING APPROVAL.	M.H	C.J.H
P1	23.06.23	ISSUED FOR APPROVAL.	M.H	C.J.H

Status Code: S3 — Drawing Status: FOR APPROVAL

This drawing may only be used for construction/manufacture if status is CONSTRUCTION

Furness Partnership
Consulting Structural/Civil Engineers
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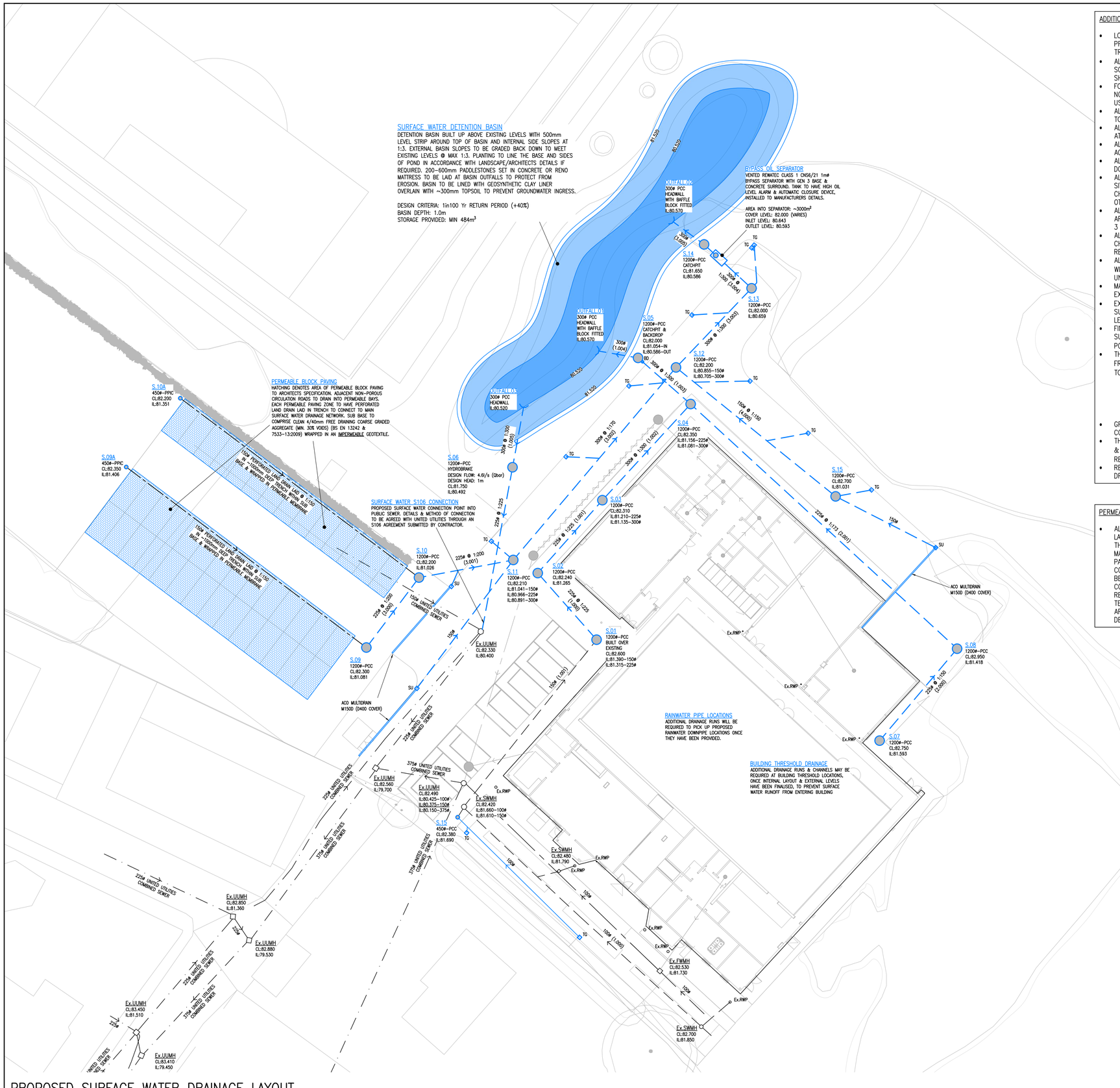
■ Bradford The Paper Hall, Arme Gate, Bradford, BD1 4EQ tel: 01274 392092 e-mail: mail@furnesspartnership.com

Project: CLEATOR MOOR ACTIVITY CENTRE

Drawing Title: PROPOSED FOUL WATER DRAINAGE LAYOUT

FP Job No.	Drawn	Date	Checked	Scale @ A1
L2763	M.H	JUN '23	C.J.H	1:250

PROJECT	OPERATOR	ZONE / VOLUME	LEVEL / LOCATION	FILE TYPE	ROLE	SHEET No.	Rev.
L2763	FUR	XX	XX	DR	D	0911	P2



PROPOSED SURFACE WATER DRAINAGE LAYOUT

SCALE: 1:250

ADDITIONAL SURFACE WATER DRAINAGE NOTES:

- LOCATION OF ALL EXISTING DRAINAGE TO BE CONFIRMED ON SITE PRIOR TO COMMENCEMENT OF WORKS AS IT IS APPROXIMATELY TRANSLATED FROM SURVEY DRAWING.
- ALL DRAINAGE AT MANHOLES/ACCESS CHAMBERS TO CONNECT WITH SOFFITS LEVEL UNLESS OTHERWISE NOTED. MANHOLE INVERT LEVELS SHOWN ON PLAN ARE THAT OF LOWEST OUTGOING PIPE.
- FOR SURFACE WATER DRAINAGE WHERE OBLIQUE CONNECTIONS ARE NOT POSSIBLE 87.5° CURVED SQUARE BRANCH CONNECTIONS TO BE USED IN DIRECTION OF FLOW OF MAIN LINE.
- ALL DRAINAGE WITHIN 300mm OF UNDERSIDE OF STRUCTURAL SLAB TO HAVE FULL GEN 3 CONCRETE BED AND SURROUND.
- ALL PROPOSED SURFACE WATER DRAINAGE TO BE 150mm DIA. LAID AT FALLS NOT LESS THAN 1:150 UNLESS OTHERWISE NOTED.
- ALL RAINWATER DOWNPIPES THAT DO NOT CONNECT DIRECTLY TO AN ACCESS POINT SHALL HAVE A RODDING FACILITY FITTED.
- ALL INTERNAL MANHOLE & INSPECTION CHAMBERS TO HAVE SCREW DOWN DOUBLE SEAL ACCESS COVERS.
- ALL INTERNAL & EXTERNAL SURFACE WATER INSPECTION CHAMBERS SITUATED IN AREAS WITHOUT VEHICULAR ACCESS TO BE TYPE 3 CHAMBERS WITH 150mm DOT TYPE 1 SURROUND UNLESS NOTED OTHERWISE.
- ALL EXTERNAL SURFACE WATER INSPECTION CHAMBERS SITUATED IN AREAS WITH VEHICULAR ACCESS TO BE TYPE 3 CHAMBERS WITH GEN 3 CONCRETE SURROUND UNLESS NOTED OTHERWISE.
- ALL TYPE 3 INSPECTION CHAMBERS WHERE DEPTH TO INVERT OF CHAMBER IS > 1m SHALL HAVE COVER FRAME WITH ACCESS RESTRICTED TO 350mm DIA. OR 300x300mm SQUARE.
- ALL EXTERNAL SURFACE WATER MANHOLES TO BE MIN. 1200mm DIA. WIDE WALL (125mm THICK) TYPE 2 PRECAST CONCRETE CHAMBERS UNLESS NOTED OTHERWISE.
- MANHOLE COVER LEVELS ARE SUBJECT TO CONFIRMATION OF FINAL EXTERNAL & INTERNAL LEVELS.
- EXTERNAL GULLY/CHANNEL POSITIONS SHOWN ARE INDICATIVE AND SUBJECT TO CHANGE FOLLOWING CONFIRMATION OF FINAL EXTERNAL LEVELS.
- FINAL GULLY POSITIONS TO SUIT SITE LOW POINTS WITH SUFFICIENT SURFACE FALLS TO ENSURE SURFACE WATER DRAINS WITHOUT PONDING (MINIMUM SURFACE FALL OF 1:60 IS RECOMMENDED).
- THE LOAD CLASS OF ALL COVERS, GRATINGS, GULLIES, CHANNELS & FRAMES TO CHAMBERS TO SUIT THEIR LOCATION AS FOLLOWS (REFER TO MANHOLE SCHEDULE FOR CONFIRMATION):
  - A15 – INTERNAL LOCATIONS
  - B125 – EXTERNAL WITH PEDESTRIAN ACCESS ONLY
  - C250 – EXTERNAL LIGHTLY TRAFFICKED AREAS
  - D400 – MAIN ROADS/HIGHWAYS
  - E600 – HGV/LOADING BAY AREAS
- GRATINGS IN PEDESTRIAN AREAS TO HAVE HEEL SAFE ANTI-SLIP COVERS.
- THE CONSTRUCTION OF ALL EXISTING GULLIES, MANHOLE CHAMBERS & THEIR COVERS & GRATINGS TO BE 'MADE GOOD' OR REPAIRED/REPLACED TO SUIT REVISED LEVEL/LOCATION.
- REFERENCE SHOULD BE MADE TO ARCHITECT & M&E ENGINEERS DRAWINGS FOR ABOVE GROUND DRAINAGE DETAILS & SET-OUT.

PERMEABLE SUB-BASE NOTES:

- ALL PERMEABLE COARSE GRADED AGGREGATE SUB-BASES TO BE LAID IN 100-150mm LAYERS AND COMPACTED TO ENSURE THAT THE MAXIMUM DENSITY IS ACHIEVED FOR THE PARTICULAR MATERIAL TYPE AND GRADING WITHOUT CRUSHING THE INDIVIDUAL PARTICLES OR REDUCING THE VOID RATIO BELOW 30%. CONVENTIONAL ROLLERS CAN BE USED BUT THESE SHOULD NOT BE VIBRATING. THE AGGREGATES ARE RELATIVELY SELF COMPACTING AND HEAVY VIBRATING COMPACTION IS NOT USUALLY REQUIRED. PERMEABLE SUB-BASES SHALL NOT BE USED AS TEMPORARY ACCESS ROADS OR AS HARD STANDING STORAGE AREAS. SITE TRIALS ARE TO BE UNDERTAKEN IF NECESSARY TO DETERMINE THE APPROPRIATE CONSTRUCTION METHODOLOGY.

LEGEND.

- ABANDONED SEWER TO BE REMOVED
- EXISTING COMBINED SEWERS
- NEW COMBINED SEWERS
- FXX NEW COMBINED MANHOLE
- EXISTING SURFACE WATER SEWERS
- NEW SURFACE WATER SEWERS
- CONCRETE ENCASED SW SEWER
- SXX NEW SURFACE WATER MANHOLE
- EXISTING SURFACE WATER RISING MAIN
- SURFACE WATER RISING MAIN
- NEW LAND DRAINS
- BD VERTICAL BACK DROP
- PETROL INTERCEPTOR
- DRAINAGE CHANNEL
- G ROAD GULLY
- TG TRAPPED ROAD GULLY
- SU TRAPPED SUMP UNIT
- RWP RAIN WATER PIPE
- RE RODDING EYE
- DT PERMAVOID 150 DISTRIBUTION TANKS

General Notes

1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL RELEVANT ARCHITECTS AND ENGINEERS DRAWINGS AND SPECIFICATIONS.
2. ALL DRAINAGE TO BE TO THE SATISFACTION OF THE LOCAL AUTHORITY BUILDING CONTROL AND MAIN DRAINAGE SECTIONS ON MATTERS INVOLVING PUBLIC SEWERS.
3. ALL PIPEWORK, BENDS AND JUNCTIONS TO BE EXTRA STRENGTH VITRIFIED CLAY TO BS 65:1991, BS EN 295 OR PVCu TO BS EN 1401 TO BE AGREED WITH RELEVANT AUTHORITY.
4. INVERT LEVELS ON EXISTING DRAINS & OUTFALLS TO BE CHECKED PRIOR TO COMMENCEMENT OF WORKS.
5. TRENCH WIDTHS GENERALLY:- AS SMALL AS PRACTICABLE BUT NOT LESS THAN PIPE DIAMETER +300mm OR LARGER IF SPECIFIED. TRENCH SIDES MUST BE VERTICAL FROM BOTTOM UP TO 300mm ABOVE CROWN OF PIPE.
6. WHERE DRAINAGE PIPES HAVE LESS THAN 1.2m COVER IN TRAFFICKED AREAS AND LESS THAN 600mm UNDER LANDSCAPED AREAS PIPES SHALL HAVE A FULL CLASS Z CONCRETE SURROUND. CONCRETE PROTECTION TO BE DISCONTINUED AT EACH PIPE JOINT WITH COMPRESSIBLE MATERIAL. ALL OTHER FLEXIBLE PIPES TO HAVE CLASS S GRANULAR BEDDING DETAIL UNLESS OTHERWISE NOTED. ALL OTHER RIGID PIPES TO HAVE CLASS B GRANULAR BEDDING DETAIL UNLESS OTHERWISE NOTED.
7. GRANULAR BEDDING:
   - 10mm SINGLE SIZED COARSE AGGREGATE SHALL BE USED ON PIPES NOT EXCEEDING 140mm DIAMETER.
   - 2-14mm WELL GRADED COARSE AGGREGATE MAY BE USED ON PIPES EXCEEDING 140mm BUT NOT EXCEEDING 400mm DIAMETER.
   - 4-20mm WELL GRADED COARSE AGGREGATE MAY BE USED ON PIPES EXCEEDING 400mm DIAMETER.
   - THE DEPTH OF GRANULAR BEDDING UNDER THE PIPES SHALL BE X/6 OR 150mm, WHICHEVER IS GREATER, WHERE X=EXTERNAL DIAMETER OF THE PIPE.
8. ADOPTABLE PUBLIC SEWERS TO BE CONSTRUCTED IN ACCORDANCE WITH SEWERS FOR ADOPTION, 7th EDITION, SEPTEMBER 2012.
9. ALL PRIVATE DRAINAGE WORKS SHALL BE IN ACCORDANCE WITH "THE BUILDING REGULATIONS APPROVED DOCUMENT H" AND BRITISH STANDARD BS EN 752.
10. ALL NEW DRAINAGE TO BE TESTED PRIOR TO BACKFILL OF THE TRENCHES & PRIOR TO HANDOVER TO THE SATISFACTION OF THE BUILDING CONTROL INSPECTOR.
11. THE CONTRACTOR MUST LIAISE WITH THE LOCAL AUTHORITY MAIN DRAINAGE SECTION PRIOR TO COMMENCEMENT OF WORK ON PUBLIC DRAINAGE.
12. TRENCH BACKFILL SHALL BE COMPACTED IN LAYERS NOT EXCEEDING 250mm ONCE 300mm COVER HAS BEEN PROVIDED TO THE TOP OF PIPE.
13. THE CONTRACTOR SHALL ALLOW IN HIS RATES FOR MAINTAINING FLOW IN PUBLIC SEWERS AT ALL TIMES DURING DIVERSION WORKS INCLUDING TEMPORARY PUMPING AND ALSO KEEPING EXCAVATIONS FREE FROM GROUNDWATER INCLUDING PUMPING AND FORMATION OF TEMPORARY SUMPS.
14. THE CONTRACTOR SHALL MAKE PROVISIONS FOR AND LIAISE WITH ALL RELEVANT STATUTORY BODIES FOR THE MANAGEMENT OF TRAFFIC WHILE CARRYING OUT WORKS IN THE PUBLIC HIGHWAY.
15. THE CONTRACTOR IS TO SATISFY HIMSELF TO THE POSITION AND AND DEPTH OF THE PUBLIC UTILITIES AND ALLOW FOR TEMPORARY SUPPORT, PROTECTION AND DIVERSION WORKS AS NECESSARY. THE CONTRACTOR SHALL ALSO INCLUDE FOR ANY TRIAL PIT EXCAVATIONS NECESSARY.
16. BACKFILL TO EXCAVATIONS IN PUBLIC HIGHWAYS TO BE WELL COMPACTED GRANULAR TYPE 1 TO CL.803 OF THE DTp SPECIFICATION FOR HIGHWAY WORKS 2009.
17. ALL EXTERNAL GULLIES TO BE 375mm DIA. MINIMUM, PRECAST CONCRETE, HEAVY DUTY, KITE MARKED & ANTI-THEFT.

Rev	Date	Comment	By	Check
P2	26.07.23	ISSUED FOR PLANNING APPROVAL.	M.H	C.J.H
P1	23.06.23	ISSUED FOR APPROVAL.	M.H	C.J.H

Status Code: S3
Drawing Status: FOR APPROVAL

This drawing may only be used for construction/manufacture if status is CONSTRUCTION

Furness Partnership
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Bradford The Paper Hall, Anne Gate, Bradford, BD1 4EQ tel: 01274 392092 e-mail: mail@furnesspartnership.com

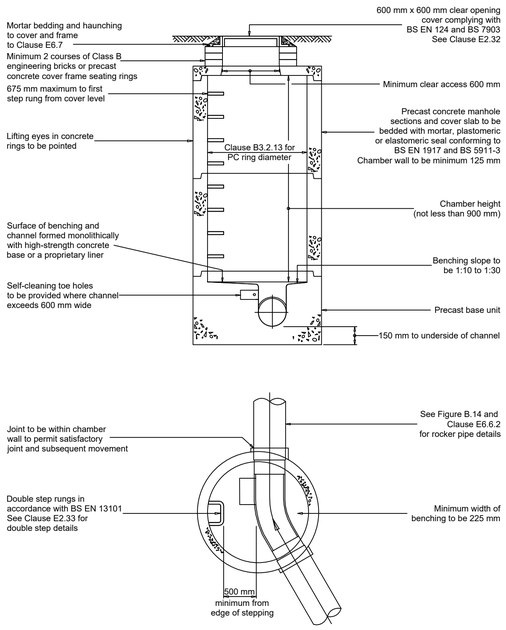
Project: CLEATOR MOOR ACTIVITY CENTRE

Drawing Title: PROPOSED SURFACE WATER DRAINAGE LAYOUT

FP Job No.	Drawn	Date	Checked	Scale @ A1
L2763	M.H	JUN '23	C.J.H	1:250

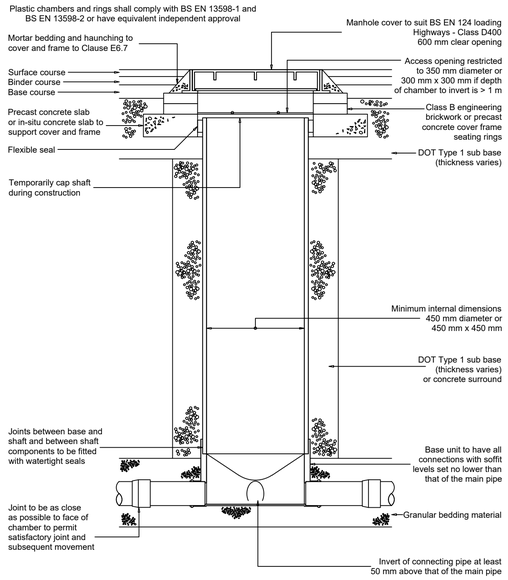
PROJECT	OPERATOR	ZONE / VOLUME	LEVEL / LOCATION	FILE TYPE	ROLE	SHEET No.	Rev.
L2763	FUR	XX	XX	DR	D	0921	P2

FIGURE B.13
TYPICAL MANHOLE DETAIL - TYPE 2 (Alternative construction detail)
Maximum depth from cover level to soffit of pipe 3.0 m



Not to scale

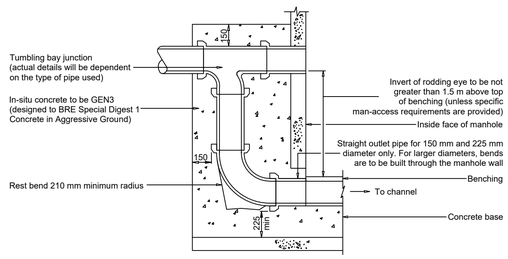
FIGURE B.16
TYPICAL INSPECTION CHAMBER DETAIL - TYPE 3 (Flexible material detail)
Maximum depth from cover level to soffit of pipe
in areas subject to vehicle loading 3 m, non-entry



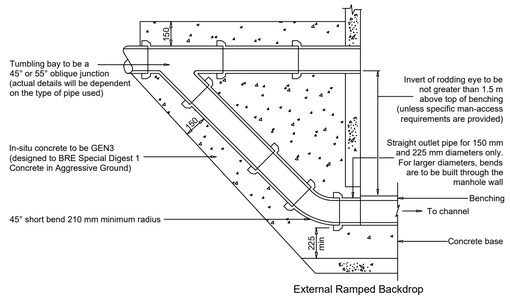
Note: Where the access chamber is in the highway the Highway Authority can have specific requirements

Not to scale

FIGURE B.15
TYPICAL VERTICAL AND RAMPED BACKDROP DETAIL
Note: Steeper gradients are preferred to the use of backdrops.
Type of backdrop to be used to be agreed with Undertaker.



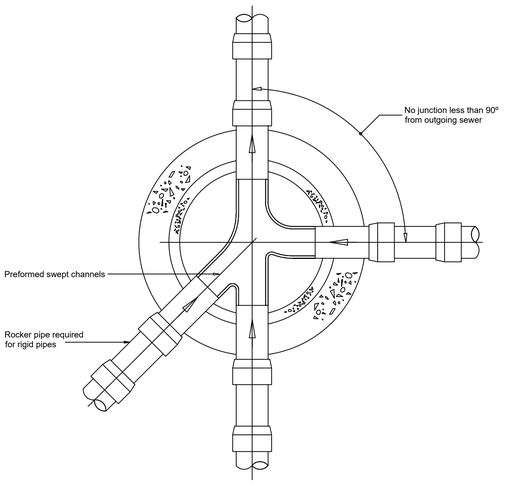
External Vertical Backdrop



External Ramped Backdrop

Not to scale, dimensions in millimetres

FIGURE B.14
TYPICAL ARRANGEMENT OF PIPE JUNCTIONS WITHIN MANHOLES



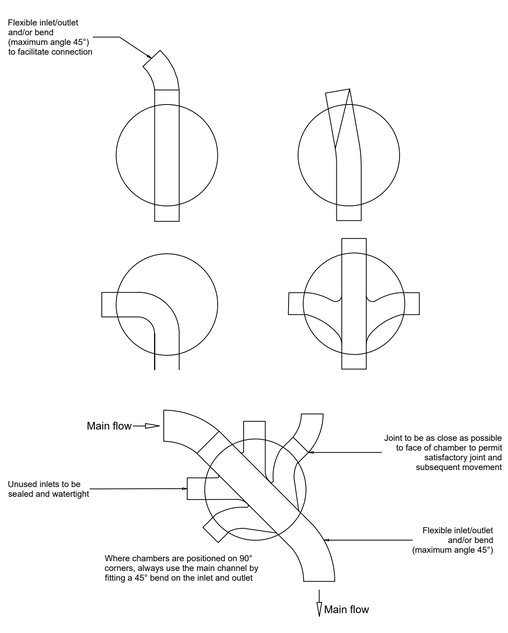
Sectional Plan

Rigid pipes built into manhole should have a flexible joint as close as feasible to the external face of the structure and the length of the next rocker pipe should be as shown.

Nominal diameter (mm)	Maximum effective length (m)
150 - 600	0.6
601 - 750	1.00
over 750	1.25

All pipes entering the bottom of the manhole to have soffits level.

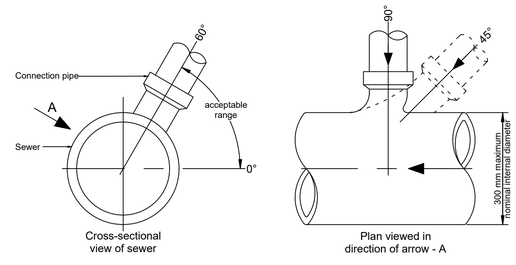
FIGURE B.20
ALTERNATIVE BASE LAYOUTS FOR TYPE 3 CHAMBERS



Note: Where a bend is used immediately outside the manhole, this may be used as the rocker pipe

Not to scale

FIGURE B.24
CONNECTIONS TO SEWER



General Notes

Rev	Date	Comment	By	Check
P1	23.06.23	ISSUED FOR APPROVAL.	M.H	C.J.H

Status Code: S3
Drawing Status: FOR APPROVAL

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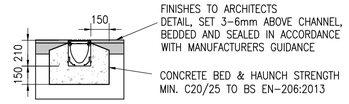
Project: CLEATOR MOOR ACTIVITY CENTRE

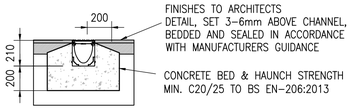
Drawing Title: PROPOSED SURFACE WATER DRAINAGE DETAILS SHEET 1 OF 2

FP Job No.	Drawn	Date	Checked	Scale @ A1
L2763	M.H	JUN '23	C.J.H	N/A

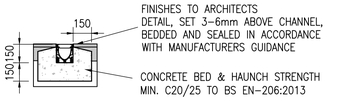
PROJECT	OPERATOR	ZONE / VOLUME	LEVEL / LOCATION	FILE TYPE	ROLE	SHEET No.	Rev.
L2763	FUR	XX	XX	DR	D	0931	P1



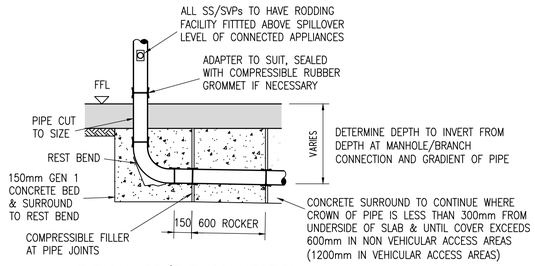
TYPICAL ACO MULTIDRAIN M150D 0.0J DETAIL WITH GRATING TO LOAD CLASS B125/C250.



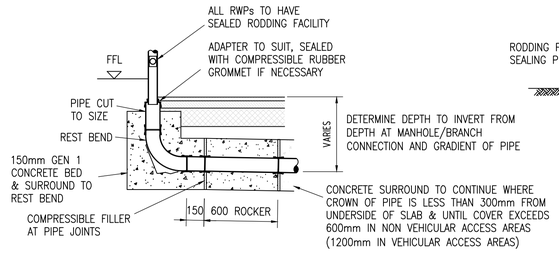
TYPICAL ACO MULTIDRAIN M150D 0.0J DETAIL WITH GRATING TO LOAD CLASS D400.



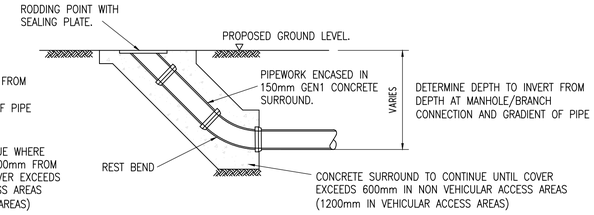
TYPICAL ACO MULTIDRAIN M100PPD 0.0J DETAIL WITH GRATING TO LOAD CLASS B125/C250.



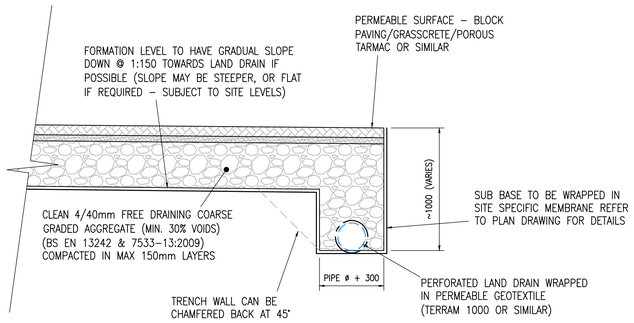
TYPICAL SS/SVP CONNECTION



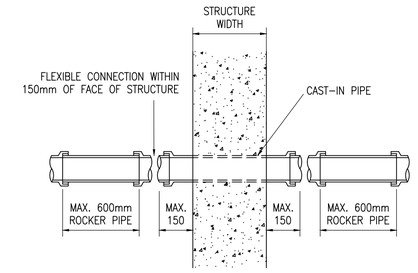
TYPICAL RWP CONNECTION



EXTERNAL RODDING EYE DETAIL

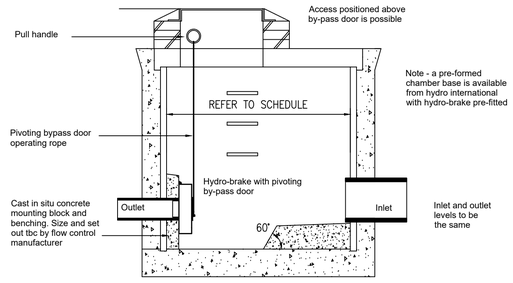


TYPICAL CAR PARK LAND DRAIN DETAIL

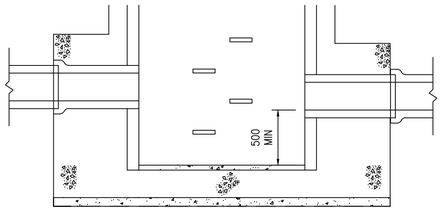


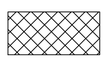
PLAN SHOWING PIPE PENETRATION THROUGH STRUCTURE (ROCKER OPTION)

TYPICAL HYDROBRAKE MANHOLE DETAIL
REFER TO HYDRO INTERNATIONAL DRAWINGS FOR SITE SPECIFIC DETAILS

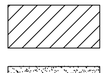


TYPICAL CATCHPIT MANHOLE DETAIL

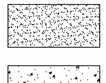




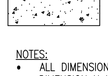
- UNDER SOFT LANDSCAPING – CLASS 8 MATERIAL TO S.H.W CLAUSE 503.3 (iv).
- UNDER HARD LANDSCAPING/BUILDING SLAB – DOT TYPE 1.



CLASS 8 MATERIAL TO S.H.W CLAUSE 503.3 (iv). (I.E. BACKFILL WITH NO LUMPS OF CLAY OR STONE LARGER THAN 40mm)

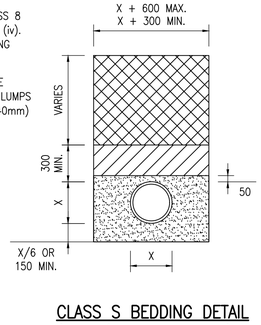


GRANULAR MATERIAL TO S.H.W. CLAUSE 503.3 (i). SEE TABLE 5/3.

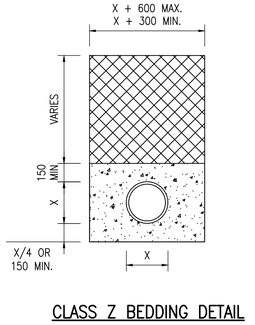


GEN 1 OR ST 2 CONCRETE TO S.H.W. CLAUSE 503.3 (iii).

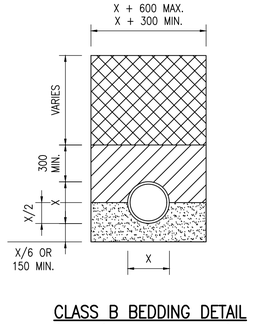
NOTES:
- ALL DIMENSIONS ARE IN MILLIMETRES.
- DIMENSION X IS THE EXTERNAL PIPE DIAMETER.
- THE MIN/MAX WIDTH OF TRENCH APPLIES ON & BELOW A LINE 300mm ABOVE THE TOP OF THE PIPE. ABOVE THE 300mm LINE TRENCH BACKFILL MATERIAL SHALL BE AS DESCRIBED IN CLAUSE 505 OF S.H.W.
- CONCRETE SURROUND MAY EXTEND TO SIDES OF TRENCH OR BE OF MINIMUM WIDTH TO PROVIDE 150mm COVER AT EACH SIDE OF THE PIPE.
- UNTIL THERE IS 300mm COVER OVER CROWN OF PIPE, COMPACT GRANULAR & BACKFILL MATERIAL BY HAND IN 100mm THICK LAYERS.



CLASS S BEDDING DETAIL (uPVC/FLEXIBLE PIPES)
FOR USE WHEN COVER TO SOFFIT OF PIPE IS GREATER THAN 600mm IN NON–TRAFFICKED AREAS AND GREATER THAN 1200mm IN AREAS WITH VEHICULAR ACCESS.



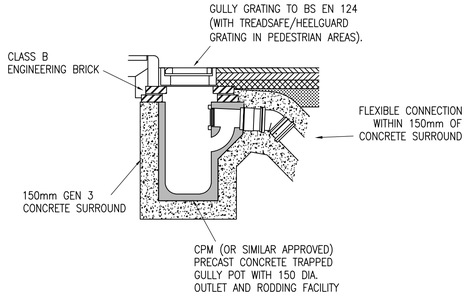
CLASS Z BEDDING DETAIL (ALL PIPES)
FOR USE WHEN COVER TO SOFFIT OF PIPE IS LESS THAN 600mm IN NON–TRAFFICKED AREAS AND LESS THAN 1200mm IN AREAS WITH VEHICULAR ACCESS. MIN. 18mm COMPRESSIBLE BOARD AT ALL PIPE JOINTS



CLASS B BEDDING DETAIL (CLAY/CONCRETE ONLY)
FOR USE WHEN COVER TO SOFFIT OF PIPE IS GREATER THAN 600mm IN NON–TRAFFICKED AREAS AND GREATER THAN 1200mm IN AREAS WITH VEHICULAR ACCESS.

CLASS S/B GRANULAR BEDDING MATERIAL – S.H.W 503 (i) TABLE 5/3 [BS EN 13242] –		
NOMINAL PIPE DIAMETER (mm)	SINGLE SIZED COARSE AGGREGATE (mm)	GRADED COARSE AGGREGATE (mm)
NOT EXCEEDING 140	4/10	–
EXCEEDING 140 BUT NOT EXCEEDING 400	4/10, 6/10 OR 10/20	2/14 OR 4/20
EXCEEDING 400	4/10, 6/14, 10/20 OR 20/40	2/14, 4/20 OR 4/40

CLASS Z COMPRESSIBLE FILLER BOARD DETAILS	
NOMINAL PIPE DIAMETER (mm)	THICKNESS OF COMPRESSIBLE FILLER (mm)
LESS THAN 450	18
450 – 1200	36
GREATER THAN 1200	54



TYPICAL PRECAST CONCRETE ROAD GULLY DETAIL

General Notes

Rev	Date	Comment	By	Check
P2	26.07.23	ISSUED FOR PLANNING APPROVAL.	M.H	C.J.H
P1	23.06.23	ISSUED FOR APPROVAL.	M.H	C.J.H

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Project: CLEATOR MOOR ACTIVITY CENTRE

Drawing Title: PROPOSED SURFACE WATER DRAINAGE DETAILS SHEET 2 OF 2

FP Job No.	Drawn	Date	Checked	Scale @ A1
L2763	M.H	JUN '23	C.J.H	N/A

PROJECT	OPERATOR	ZONE / VOLUME	LEVEL / LOCATION	FILE TYPE	ROLE	SHEET No.	Rev.
L2763	FUR	XX	XX	DR	D	0932	P2

APPENDIX C – LOCAL WATER AUTHORITY CONSULTATION & DOCUMENTS

Michael Herbert

From: seweradoptions@uuplc.co.uk
Sent: 15 June 2023 11:06
To: Michael Herbert
Subject: Pre Development Enquiry for: Cleator Moor Activity Centre, Cumbria CA25 5AN
UU Reference Number : 04132027

Follow Up Flag: Follow up
Flag Status: Flagged

Good morning Michael,

Pre Development Enquiry for: Cleator Moor Activity Centre, Cumbria CA25 5AN UU Reference Number : 04132027

We have carried out an assessment of your application which is based on the information provided. This pre-development advice on your drainage strategy will be valid for 12 months. Your drainage strategy will need to be reviewed by other competent authorities as part of the planning process, and we advise that you carry out the necessary site investigations to confirm the viability of your proposals.
If your investigations require access to our public sewer network, we ask that you contact our network engineers with a request for an access certificate via our main contact telephone number 0345 6723 723 or refer to the link below:
https://www.unitedutilities.com/builders-developers/working-near-our-assets/

Foul Water
Foul flow from this site will be allowed to drain into the public foul water/combined sewer system.
Our preferred point of discharge would be to the 225mm diameter public combined sewer within Quarry Road located to South of your proposed development at a an unrestricted rate.
If you are able to identify an alternative, more suitable point of discharge, we request that you contact us at your earliest convenience so that we can assess suitability.
In accordance with our infrastructure plans we may ask you to change your point of connection. Therefore please contact us when you are ready to formalise your drainage proposals, we would suggest before you submit for Full Planning.

Surface Water
All surface water flow from the proposed development should drain in-line with the drainage hierarchy, as outlined in Paragraph 80, (Reference ID: 7-080-20150323), of the National Planning Practice Guidance. We also recommend you prioritise the use of multi-functional sustainable drainage systems for the management of surface water in accordance with national planning policy.
Generally, the aim should be to discharge surface run off as high up the following hierarchy of drainage options as reasonably practicable.
This is outlined as follows, in order of priority:

1. **into the ground (infiltration);**
2. **to a surface waterbody;**
3. **to a surface water sewer or highway drain;**
4. **to a combined sewer.**

For guidance, The **North West SuDS Pro-Forma** provides information on the appropriate evidence required at each stage of the hierarchy, to demonstrate how each level has been discounted.
The Lead Local Flood Authority has responsibility for all surface water drainage concerns and their input to your proposal is critical. You should also consider whether it is necessary to discuss your proposal with the Environment Agency, or Internal Drainage Board (if operating in your area).
The Local Planning Authority are the determining authority for any application for planning permission and the appropriate authority for determining cost viability of a proposed drainage scheme, such assessments are outside of the jurisdiction of United Utilities.

Infiltration
Surface water runoff generated from this development should discharge to the ground via infiltration system where feasible.
A detailed evidence based feasibility assessment must be carried out in line with Chapter 25 of the CIRIA SuDS Manual 2015 to determine whether infiltration is a suitable method of surface water disposal.
Particular attention must be paid to Ground Water Source Protection Zones to ensure that the risk of pollution to these valuable resources is not compromised. Details can be obtained from the government website:
https://www.gov.uk/guidance/groundwater-source-protection-zones-spzs#find-groundwater-spzs
If your site is in a Groundwater Source Protection Zone, you should have regard to the Environment Agency's approach to Groundwater Protection. Information on this is available via the link below:
https://www.gov.uk/government/publications/groundwater-protection-position-statements
Please note that such a location could have implications for the principle of your development and the need for additional mitigating measures to protect the groundwater environment and public water supply in the detailed design of your site.

Highway Drainage
If an evidence based assessment has been carried out and confirms that infiltration is not feasible, we recommend that you investigate the possibility of draining surface water to the highway drain where this ultimately discharges to a watercourse, by contacting the relevant Highway Authority.

Public Sewer
In accordance with the hierarchy of drainage options within the National Planning Practice Guidance, both discharge to ground via infiltration and discharge to a waterbody should be discounted prior to consideration of discharging surface water to the public sewer system. Evidence should be provided to demonstrate how these have been discounted, as outlined in the North West SuDS pro-forma.
Once evidence is provided as outlined above, United Utilities will consider a connection to the 225mm diameter public combined sewer within Quarry Road at a pass forward flow to be agreed by the Lead Local Flood Authority. United Utilities request that any agreed rate does not exceed 34.1 l/s.
Please note the given discharge rate is based on the full site area as the specifics of the area being developed are not yet clear. If there are significant areas of the site that will not be developed, the discharge rate should be reduced accordingly. (Delete as appropriate)

As a Water Company, we have no obligation to accept highway drainage into our public sewer network. However, should your proposals include runoff from highways, we would request that consideration is given to SuDS components that deliver source control are incorporated within the design of the scheme to reduce the volume and frequency of discharges of these flows to the public sewer.

Levels
For low-lying sites, (where the ground level of the site or the level of a basement is below the ground level at the point where the drainage connects to the public sewer), care should be taken to ensure that the property is not at increased risk of flooding. If these circumstances exist, we recommend that you contact us to discuss further. It could affect the detailed design of your site and result in the need to incorporate appropriate mitigating measures in your drainage scheme.

Land drainage / Overland flows / track drainage
United Utilities have no obligation, and furthermore we do not accept land drainage, overland flows or track drainage into the pubic sewerage network under any circumstances

Existing Wastewater Assets Crossing the Site

According to our public sewer records there is abandoned public sewer located within your site boundary. We would advise extra precaution is in place when working near this abandoned asset.

According to our public sewer records there are public sewers located within your site boundary. We will require unrestricted access to the sewer for maintenance purposes, we would ask that you maintain a minimum clearance of 6m which is measured 3m from the centre line of the pipe unless there happens to be a formal easement agreement in place, in which case the specified easement width would apply. If you cannot achieve this then you may wish to consider diverting and or abandoning the public sewer.
Please be aware that any proposed diversion may require modelling. This process may take up to 6 months in order to reach an acceptable design.
Please refer to the link below to obtain full details of the processes involved with sewer diversions:
https://www.unitedutilities.com/builders-developers/larger-developments/wastewater/sewer-diversions/

Existing Water Assets Crossing the Site
It is the developer responsibility to identify utilities on-site. Where clean water assets are shown on our records, we recommend that you contact our Water Pre-Development Team, via the following email address: DeveloperServicesWater@uuplc.co.uk. Further information for this service can be found on our website via the link below:
https://www.unitedutilities.com/builders-developers/larger-developments/pre-development/water-pre-dev/

Connection Application
Although we may discuss and agree discharge points and rates in principle, please be aware that you will have to apply for a formal sewer connection. This is so that we can assess the method of construction, Health & Safety requirements and to ultimately inspect the connection when it is made. Details of the application process and the form itself can be obtained from our website by following the link below:
https://www.unitedutilities.com/builders-developers/wastewater-services/sewer-connections/sewer-connection/
We recommend that the detailed design should confirm the locations of all utilities in the area and ensure that any proposed drainage solution considers routing and clash checks where required.
If we can be of any further assistance please don't hesitate to contact us further.

Kind regards,

United Utilities
Water for the North West

Eireann Thompson
Assistant Developer Engineer
Developer Services & Metering
Customer Services
Mobex: 07553074138
unitedutilities.com

Did you know we now have a live chat facility available to you Mon to Friday 8 -5pm. You just click on the orange live chat box on our webpage and one of our advisors will be ready to chat to you and help you with your enquiry https://www.unitedutilities.com/builders-developers/ or you can email us at

developerserviceswater@uuplc.co.uk

If you have received a great service today why not tell us?
Visit: unitedutilities.com/wow

---------- Original Message ----------
From: seweradoptions@uuplc.co.uk [seweradoptions@uuplc.co.uk]
Sent: 05/06/2023 09:48
To: m.herbert@furnesspartnership.com
Subject: 04132027 Cleator Moor Activity Centre Off Wyndham Street, Cleator Moor, Whitehaven, Cumb

Dear Michael

PRE DEVELOPMENT APPLICATION AT: – UU Ref 04132027

Please accept this email as receipt of your application received on 2/6/2023 for the above development. This has now been logged on our system and the job reference is 04132027 we would ask that you quote this reference in all future correspondence.

I have reviewed your application (and attachments) and can confirm this is suitable to be passed to Ashleigh Bellerby for technical assessment. You will receive their response within 8 working days.

Kind regards

Kind regards Jill

United Utilities
Water for the North West

Jill Ellis
Customer Advisor Advanced
Developer Services & Metering
Customer Services
Direct Tel: 01925 233 064
Tel: 0345 072 6067
unitedutilities.com

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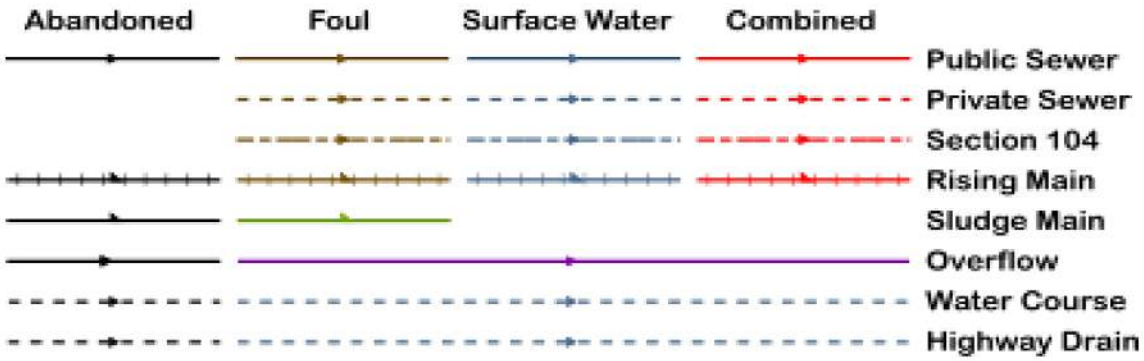
Did you know we now have a live chat facility available to you Mon to Friday 8 -5pm. You just click on the orange live chat box on our webpage and one of our advisors will be ready to chat to you and help you with your enquiry https://www.unitedutilities.com/builders-developers/ or you can email us at WastewaterDeveloperServices@uuplc.co.uk

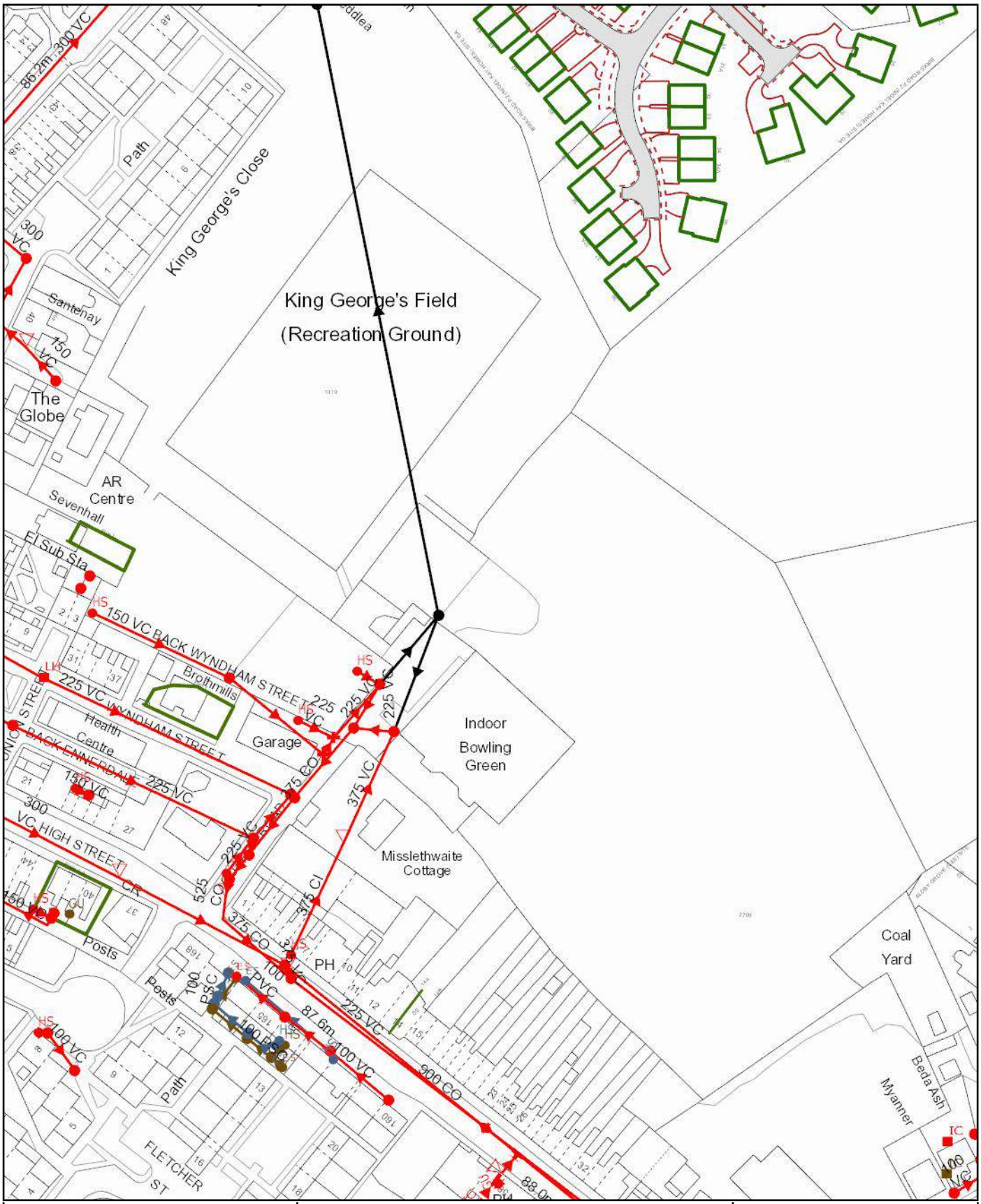
United Utilities
Water for the North West

Wastewater Symbology



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

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



Scale:	1:1609	**SEWER RECORDS**	United Utilities Water for the North West
Date:	05/04/2022		
Address or Site Reference:	BROTHMILLS WYNDHAM STREET, CLEATOR MOOR, CA25 5AN		
Printed by:	Property Searches		

The position of the underground apparatus shown on this plan is approximate only and is given in accordance with the best information currently available. United Utilities Water will not accept liability for any loss or damage caused by the actual position being different from those shown.

APPENDIX D – GROUND INVESTIGATION EXTRACT / SOAKAWAY TEST RESULTS

PHASE II GROUND INVESTIGATION REPORT

CLEATOR MOOR ACTIVITY CENTRE, CLEATOR MOOR, CUMBRIA, CA25 5AN

PREPARED FOR ALLIANCE LEISURE SERVICES LIMITED

GEOL CONSULTANTS LTD

4.0 Ground Conditions (Cont'd)

4.2 Foundation Details (Cont'd)

Trial pit location	Foundation details
TP01	The existing building wall extended to a depth of 0.70m below current ground levels, where a concrete footing was encountered. The concrete was noted to project out from the existing building wall by 0.20m and was noted to be 0.30m in thickness and based within the natural stiff clay deposits
TP02	The existing building wall extended to a depth of 0.80m below current ground levels, where a concrete footing was encountered. The concrete footing was noted to project out from the existing building wall 1.60m and was noted to be 0.30m in thickness and based within the natural stiff clay deposits

4.3 Groundwater

During the investigation works BH01, BH02 and BH03 remained dry, whereas BH04, BH05, BH06 and BH07 noted water at depths ranging between 0.60m and 3.00m below ground level. Post fieldwork monitoring encountered water levels in BH01, BH03 and BH07 to range between 0.12m and 1.94m below ground levels.

Therefore, water ingresses may occur within construction related excavations, and it would be prudent to allow for the introduction of temporary groundwater control techniques (i.e. sump pumping) to take care of any localised ingresses of groundwater during the construction period, especially during the wetter periods of the year. It should also be noted that instability within such excavations is also likely to occur because of water inflow.

Adequate lateral trench support may also be required for excavations, to prevent trench wall collapse or over excavation, as well as to create a safe working environment, and any excavations on this site should remain open for as short a period as possible, since the initial made ground and superficial deposits could be susceptible to deterioration, if left open to the natural elements for any significant period of time.

5.0 Insitu Geotechnical Testing (Cont'd)

5.2 Insitu TRL Dynamic Cone Penetrometer Tests (Cont'd)

The results have identified, where new hardstanding surfacing is to be constructed and where the initial ground deposits are used as an undisturbed subgrade (in their present condition) a typical equivalent CBR design value of 5% can be adopted for design purposes for the deposits present below 0.45m, although loose spots may be present due to the nature of the soil ground. The achievable CBR values for the area investigated should improve under compaction and therefore higher CBR values may be attainable.

It is advised that any topsoil deposits are removed prior to construction.

5.3 Insitu Variable (Falling) Head Permeability Tests

Insitu variable (falling) head permeability tests were completed at the locations of BH01, BH03 and BH07, to assess the permeability characteristics of the underlying natural deposits for determining the suitability of using conventional soakaways / SuDS as part of the drainage design scheme for the site.

Due to the impermeable nature of the natural deposits (cohesive strata) there was no discharge of water during the monitoring test period, therefore a permeability value (k) could not be calculated, due to the test 'failing'. Therefore, the tests indicate the natural deposits have a practically impermeable soil permeability classification and practically impervious drainage characteristic.

6.0 Laboratory Testing

6.1 Determination of Chemical Attack on Buried Concrete

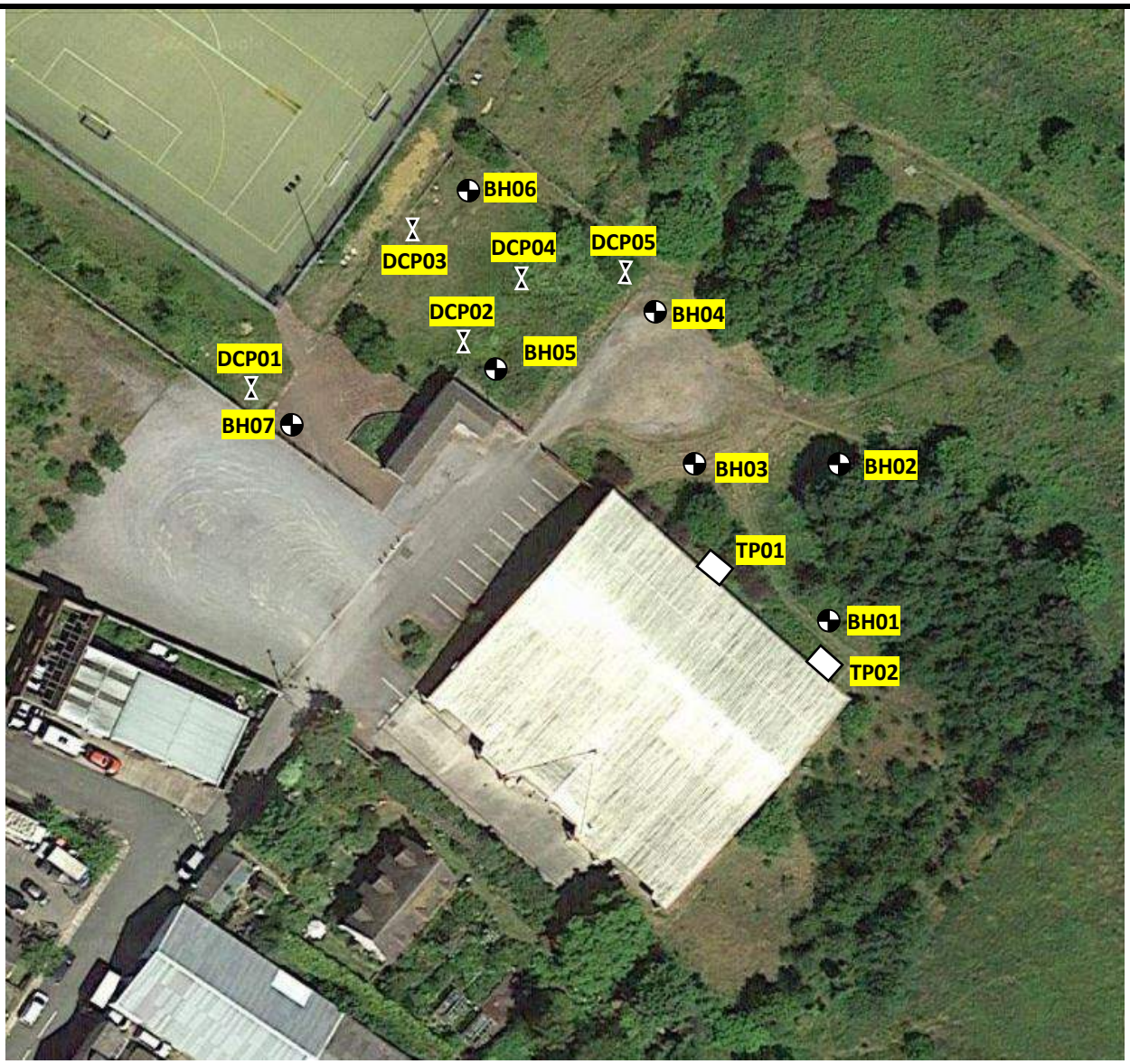
Ten representative samples of the soil deposits encountered at the windowless sampling borehole and trial pit locations were tested by Derwentside Environmental Testing Services Limited (DETS) to determine their pH value and soluble sulphate levels, so these materials can be classified in accordance with the guidance BRE Special Digest 1:2005, Concrete in Aggressive Ground. The results of the tests are contained in the DETS Certificate of Analysis Report (reference 22-21498), a copy of which can be seen in Appendix III.

APPENDIX II

Investigation Location Plan
Borehole Record Sheets
DCP Record Sheets &
Foundation Detail Sheets

Tectonic House, Unit 11, Queens Court North
Third Avenue, Team Valley Trading Estate
Gateshead, Tyne and Wear
NE11 0BU

Tectonic House, Unit 11 Queens Court North
Third Avenue, Team Valley Trading Estate
Tyne & Wear
NE11 0BU
Tel: 0191 477 2020
Email: enquiries@geolconsultants.co.uk



Key:

BH01 – Windowless Sampling Borehole

TP01 – Manually Excavated Foundation Trial Pit

DCP01 – Dynamic Cone Penetrometer Test

INVESTIGATION LOCATION PLAN

Report Type: Phase II Ground Investigation Report
Site Address: Cleator Moor Activity Centre, Cleator Moor, Cumbria, CA25 5AN
Project No.: GEOL22-8472

APPENDIX IV

Ground Gas Monitoring Record Sheet

Tectonic House, Unit 11, Queens Court North
Third Avenue, Team Valley Trading Estate
Gateshead, Tyne and Wear
NE11 0BU

Ground Gas Monitoring Record Sheet

Visit	Date	Time	Equipment	Weather	Site Engineer	Comments	Borehole Position	Gas Flow (l/hr)	Atmospheric Pressure (mbar)	Atmospheric Pressure Trend	Methane (% v/v)		Methane (% LEL)		Carbon Dioxide (% v/v)		Oxygen (% v/v)		Hydrocarbons (GFM 435 only)		Other Gases (PPM)			Depth to Water (m bgl)	Depth to Base (m bgl)
											Initial	Steady	Initial	Steady	Initial	Steady	Initial	Steady	Hex %	PID Cf	PID (Isobutylene)	H_2S	CO		
1	26/10/2022	16:30	GFM436	Overcast, wet & windy	IH	Bailed out BH1 & 7 after monitoring. *Bung valves left open BH3 & 7. Closed, waited for 30 mins before monitoring*	1	<0.1	1002	Rising 997 - 1003		0.0		0.0		0.8		18.8	0.003	1.0		0	0	0.71	3.88
							3	<0.1	1002			0.0		0.0		0.0		20.4	0.000	1.0		0	0	1.75	4.86
							7	<0.1	1002			0.0		0.0		0.0		20.6	0.000	1.0		0	0	0.27	3.46
2	10/11/2022	13:55	GFM436	Overcast, wet & windy	IH	Bailed out BH1 & 7 after monitoring	1	<0.1	996	Rising 987 - 1009		0.0		0.0		1.0		17.5	0.002	1.0		0	11	0.68	3.88
							3	<0.1	996			0.0		0.0		1.2		12.5	0.003	1.0		30	45	1.58	4.86
							7	<0.1	996			0.0		0.0		4.0		13.1	0.002	1.0		230	961	0.19	3.46
3	14/12/2022	13:10	GFM436	Sunny, Cold	IH	Bailed out BH1 & 7 after monitoring	1	<0.1	996	Rising 1009 - 1012		0.0		0.0		0.6		19.6	0.029	1.0		0	10	1.31	3.88
							3	<0.1	996			0.0		0.0		1.9		5.2	0.029	1.0		0	27	1.94	4.86
							7	<0.1	998			0.0		0.0		4.2		13.2	0.025	1.0		70	887	0.49	3.46
4	22/12/2022	13:30	GFM436	Overcast, wet	IH	Bailed out all BH's after monitoring	1	<0.1	985	Rising 995 - 1001		0.0		0.0		0.7		19.5	0.024	1.0		0	0	0.78	3.88
							3	<0.1	985			0.0		0.0		0.0		7.6	0.024	1.0		0	106	0.57	4.86
							7	<0.1	986			0.0		0.0		4.9		15.5	0.021	1.0		0	11	0.39	3.46
5	10/01/2023	10:15	GFM436	Raining, windy (very wet ground)	IH		1	<0.1	981	Rising 983 - 997		0.0		0.0		0.9		17.3	0.023	1.0		0	0	1.22	3.88
							3	<0.1	981			0.0		0.0		2.2		1.9	0.022	1.0		0	0	1.22	4.86
							7	<0.1	981			0.0		0.0		5.1		10.6	0.002	1.0		0	0	0.12	3.46
6																									

Tectonic House,
Unit 11,
Queens Court,
Third Avenue,
Team Valley Trading Estate, Gateshead,
NE11 0BU
Tel. 0191 477 2020
Email: enquiries@geolconsultants.co.uk

APPENDIX E – HYDRAULIC SURFACE WATER CALCULATIONS

GREENFIELD RUNOFF RATE CALCUATION (Qbar)

ICP SUDS Mean Annual Flood

Input

Return Period (years)	1	Soil	0.450
Area (ha)	0.503	Urban	0.000
SAAR (mm)	1320	Region Number	Region 10

Results l/s

QBAR Rural	4.6
QBAR Urban	4.6
Q1 year	4.0
Q1 year	4.0
Q30 years	7.9
Q100 years	9.7

EXISITING 1 IN 1 YEAR DISCHARGE RATE CALCUATION

Summary of Results for 1 year Return Period

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
15 min Summer	80.977	0.227	18.3	0.4	O K
30 min Summer	81.010	0.260	20.2	0.4	O K
60 min Summer	81.005	0.255	19.9	0.4	O K
120 min Summer	80.955	0.205	16.5	0.3	O K
180 min Summer	80.933	0.183	14.0	0.3	O K
240 min Summer	80.918	0.168	12.3	0.3	O K
360 min Summer	80.897	0.147	10.0	0.2	O K
480 min Summer	80.884	0.134	8.6	0.2	O K
600 min Summer	80.875	0.125	7.6	0.2	O K
720 min Summer	80.867	0.117	6.8	0.2	O K
960 min Summer	80.853	0.103	5.8	0.1	O K
1440 min Summer	80.838	0.088	4.5	0.1	O K
2160 min Summer	80.829	0.079	3.6	0.1	O K
2880 min Summer	80.823	0.073	3.0	0.1	O K
4320 min Summer	80.815	0.065	2.4	0.1	O K
5760 min Summer	80.809	0.059	2.0	0.1	O K
7200 min Summer	80.805	0.055	1.7	0.1	O K
8640 min Summer	80.802	0.052	1.6	0.1	O K
10080 min Summer	80.799	0.049	1.4	0.1	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	23.411	0.0	14.2	14
30 min Summer	16.224	0.0	19.6	21
60 min Summer	11.025	0.0	26.7	36
120 min Summer	7.438	0.0	36.0	66
180 min Summer	5.896	0.0	42.8	96
240 min Summer	5.002	0.0	48.4	126
360 min Summer	3.922	0.0	57.0	186
480 min Summer	3.299	0.0	63.9	246
600 min Summer	2.885	0.0	69.8	308
720 min Summer	2.587	0.0	75.1	368
960 min Summer	2.180	0.0	84.4	488
1440 min Summer	1.709	0.0	99.2	716
2160 min Summer	1.341	0.0	116.8	1072
2880 min Summer	1.131	0.0	131.4	1448
4320 min Summer	0.884	0.0	154.0	2160
5760 min Summer	0.741	0.0	172.2	2880
7200 min Summer	0.647	0.0	187.8	3544
8640 min Summer	0.575	0.0	200.5	4384
10080 min Summer	0.521	0.0	211.7	5096

Summary of Results for 1 year Return Period

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
15 min Winter	80.980	0.230	18.5	0.4	O K
30 min Winter	80.999	0.249	19.6	0.4	O K
60 min Winter	80.957	0.207	16.7	0.3	O K
120 min Winter	80.917	0.167	12.2	0.3	O K
180 min Winter	80.896	0.146	9.9	0.2	O K
240 min Winter	80.882	0.132	8.4	0.2	O K
360 min Winter	80.865	0.115	6.7	0.2	O K
480 min Winter	80.852	0.102	5.6	0.1	O K
600 min Winter	80.843	0.093	4.9	0.1	O K
720 min Winter	80.837	0.087	4.4	0.1	O K
960 min Winter	80.830	0.080	3.8	0.1	O K
1440 min Winter	80.822	0.072	2.9	0.1	O K
2160 min Winter	80.814	0.064	2.3	0.1	O K
2880 min Winter	80.808	0.058	1.9	0.1	O K
4320 min Winter	80.802	0.052	1.6	0.1	O K
5760 min Winter	80.798	0.048	1.3	0.1	O K
7200 min Winter	80.794	0.044	1.1	0.1	O K
8640 min Winter	80.791	0.041	1.0	0.0	O K
10080 min Winter	80.790	0.040	0.9	0.0	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Winter	23.411	0.0	14.2	14
30 min Winter	16.224	0.0	19.6	21
60 min Winter	11.025	0.0	26.7	36
120 min Winter	7.438	0.0	36.0	66
180 min Winter	5.896	0.0	42.8	94
240 min Winter	5.002	0.0	48.4	128
360 min Winter	3.922	0.0	57.0	184
480 min Winter	3.299	0.0	63.9	244
600 min Winter	2.885	0.0	69.8	308
720 min Winter	2.587	0.0	75.1	362
960 min Winter	2.180	0.0	84.4	478
1440 min Winter	1.709	0.0	99.2	718
2160 min Winter	1.341	0.0	116.8	1084
2880 min Winter	1.131	0.0	131.4	1436
4320 min Winter	0.884	0.0	154.0	2204
5760 min Winter	0.741	0.0	172.2	2784
7200 min Winter	0.647	0.0	187.8	3656
8640 min Winter	0.575	0.0	200.5	4160
10080 min Winter	0.521	0.0	211.7	4992

Rainfall Details

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	1	Cv (Summer)	1.000
Region	England and Wales	Cv (Winter)	1.000
M5-60 (mm)	17.500	Shortest Storm (mins)	15
Ratio R	0.258	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+0

Time Area Diagram

Total Area (ha) 0.242

Time From:	(mins) To:	Area (ha)	Time From:	(mins) To:	Area (ha)	Time From:	(mins) To:	Area (ha)
0	4	0.081	4	8	0.081	8	12	0.080

Model Details

Storage is Online Cover Level (m) 82.300

Pipe Structure

Diameter (m)	0.150	Length (m)	10.000
Slope (1:X)	60.000	Invert Level (m)	80.750

Pipe Outflow Control

Diameter (m)	0.150	Entry Loss Coefficient	0.500
Slope (1:X)	61.4	Coefficient of Contraction	0.600
Length (m)	21.500	Upstream Invert Level (m)	80.750
Roughness k (mm)	0.600		

PROPOSED NETWORK HYDRAULIC CALCUATIONS

STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for Storm

Pipe Sizes STANDARD Manhole Sizes STANDARD

FSR Rainfall Model - England and Wales

Return Period (years)	1	PIMP (%)	100
M5-60 (mm)	17.300	Add Flow / Climate Change (%)	0
Ratio R	0.255	Minimum Backdrop Height (m)	0.200
Maximum Rainfall (mm/hr)	50	Maximum Backdrop Height (m)	1.500
Maximum Time of Concentration (mins)	30	Min Design Depth for Optimisation (m)	1.200
Foul Sewage (l/s/ha)	0.000	Min Vel for Auto Design only (m/s)	1.00
Volumetric Runoff Coeff.	1.000	Min Slope for Optimisation (1:X)	500

Designed with Level Soffits

Time Area Diagram for Storm

Time (mins)	Area (ha)	Time (mins)	Area (ha)
0-4	0.261	4-8	0.242

Total Area Contributing (ha) = 0.503

Total Pipe Volume (m³) = 13.694

Network Design Table for Storm

« - Indicates pipe capacity < flow

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
1.000	11.100	0.050	222.0	0.110	5.00	0.0	0.600	o	225	Pipe/Conduit	
1.001	12.200	0.055	221.8	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
1.002	16.400	0.054	303.7	0.022	0.00	0.0	0.600	o	300	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
1.000	37.24	5.21	81.315	0.110	0.0	0.0	0.0	0.87	34.7	14.8
1.001	36.63	5.44	81.265	0.110	0.0	0.0	0.0	0.87	34.7	14.8
1.002	35.86	5.75	81.135	0.132	0.0	0.0	0.0	0.90	63.4	17.1

Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
2.000	15.100	0.100	151.0	0.103	5.00	0.0	0.600	o	225	Pipe/Conduit	
2.001	45.400	0.262	173.3	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
1.003	8.800	0.027	325.9	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit	
1.004	10.500	0.066	159.1	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit	
3.000	11.000	0.055	200.0	0.072	5.00	0.0	0.600	o	225	Pipe/Conduit	
3.001	12.000	0.060	200.0	0.071	0.00	0.0	0.600	o	225	Pipe/Conduit	
3.002	31.700	0.186	170.4	0.060	0.00	0.0	0.600	o	300	Pipe/Conduit	
4.000	25.800	0.176	146.6	0.046	5.00	0.0	0.600	o	150	Pipe/Conduit	
3.003	13.700	0.046	297.8	0.019	0.00	0.0	0.600	o	300	Pipe/Conduit	
3.004	8.100	0.073	111.0	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit	
3.005	24.100	0.066	365.2	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit	
1.005	13.900	0.028	496.4	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
2.000	37.17	5.24	81.518	0.103	0.0	0.0	0.0	1.06	42.2	13.8
2.001	35.26	6.00	81.418	0.103	0.0	0.0	0.0	0.99	39.4	13.8
1.003	34.88	6.17	81.081	0.235	0.0	0.0	0.0	0.87	61.2	29.6
1.004	34.56	6.31	80.586	0.235	0.0	0.0	0.0	1.24	87.9	29.6
3.000	37.27	5.20	81.081	0.072	0.0	0.0	0.0	0.92	36.6	9.7
3.001	36.70	5.42	81.026	0.143	0.0	0.0	0.0	0.92	36.6	19.0
3.002	35.61	5.86	80.891	0.203	0.0	0.0	0.0	1.20	84.9	26.1
4.000	36.44	5.52	81.031	0.046	0.0	0.0	0.0	0.83	14.6	6.1
3.003	35.02	6.11	80.705	0.268	0.0	0.0	0.0	0.91	64.0	33.9
3.004	34.81	6.20	80.659	0.268	0.0	0.0	0.0	1.49	105.5	33.9
3.005	33.74	6.69	80.586	0.268	0.0	0.0	0.0	0.82	57.7	33.9
1.005	33.07	7.02	80.520	0.503	0.0	0.0	0.0	0.70	49.4«	60.1

Free Flowing Outfall Details for Storm

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
1.005		81.750	80.492	80.492	0	0

Simulation Criteria for Storm

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

Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 1 Number of Storage Structures 3 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model	FSR	Profile Type	Summer
Return Period (years)	1	Cv (Summer)	1.000
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	17.300	Storm Duration (mins)	30
Ratio R	0.255		

Online Controls for Storm

Hydro-Brake® Optimum Manhole: BASIN, DS/PN: 1.005, Volume (m³): 3.4

Unit Reference	MD-SHE-0101-4600-1000-4600
Design Head (m)	1.000
Design Flow (l/s)	4.6
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	101
Invert Level (m)	80.520
Minimum Outlet Pipe Diameter (mm)	150
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.000	4.6	Kick-Flo®	0.633	3.7
Flush-Flo™	0.293	4.6	Mean Flow over Head Range	-	4.0

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

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	3.4	1.200	5.0	3.000	7.7	7.000	11.5
0.200	4.5	1.400	5.4	3.500	8.3	7.500	11.9
0.300	4.6	1.600	5.7	4.000	8.8	8.000	12.2
0.400	4.5	1.800	6.0	4.500	9.3	8.500	12.6
0.500	4.4	2.000	6.3	5.000	9.8	9.000	12.9
0.600	4.0	2.200	6.6	5.500	10.2	9.500	13.3
0.800	4.1	2.400	6.9	6.000	10.7		
1.000	4.6	2.600	7.2	6.500	11.1		

Storage Structures for Storm

Porous Car Park Manhole: S.09, DS/PN: 3.000

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	10.0
Membrane Percolation (mm/hr)	1000	Length (m)	35.0
Max Percolation (l/s)	97.2	Slope (1:X)	0.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	81.870	Cap Volume Depth (m)	0.350

Porous Car Park Manhole: S.10, DS/PN: 3.001

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	5.0
Membrane Percolation (mm/hr)	1000	Length (m)	35.0
Max Percolation (l/s)	48.6	Slope (1:X)	0.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	81.720	Cap Volume Depth (m)	0.350

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

Invert Level (m) 80.520

Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	309.0	1.000	685.0

1 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

Simulation Criteria

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

Number of Input Hydrographs 0	Number of Offline Controls 0	Number of Time/Area Diagrams 0
Number of Online Controls 1	Number of Storage Structures 3	Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model	FSR	Ratio R	0.255
Region	England and Wales	Cv (Summer)	1.000
M5-60 (mm)	17.300	Cv (Winter)	1.000

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

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880
Return Period(s) (years)	1, 30, 100
Climate Change (%)	40, 40, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
1.000	S.01	15 Summer	1	+40%	30/15 Summer				81.454
1.001	S.02	15 Summer	1	+40%	30/15 Summer				81.403
1.002	S.03	15 Summer	1	+40%	30/15 Summer				81.327
2.000	S.07	15 Summer	1	+40%	30/15 Summer				81.633
2.001	S.08	15 Summer	1	+40%	30/15 Summer				81.532
1.003	S.04	15 Summer	1	+40%	30/15 Summer				81.305
1.004	S.05	960 Summer	1	+40%	30/15 Summer				80.835
3.000	S.09	15 Summer	1	+40%	30/15 Summer				81.200
3.001	S.10	15 Summer	1	+40%	30/15 Summer				81.177
3.002	S.11	15 Summer	1	+40%	30/15 Summer				81.029
4.000	S.15	15 Summer	1	+40%	30/15 Summer				81.116
3.003	S.12	15 Summer	1	+40%	30/15 Summer				80.912
3.004	S.13	960 Summer	1	+40%	30/15 Summer				80.838
3.005	S.14	960 Summer	1	+40%	30/15 Summer				80.836

1 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	S.01	-0.086	0.000	0.69			20.2	OK	
1.001	S.02	-0.087	0.000	0.68			20.2	OK	
1.002	S.03	-0.108	0.000	0.42			22.8	OK	
2.000	S.07	-0.110	0.000	0.51			19.0	OK	
2.001	S.08	-0.111	0.000	0.49			18.4	OK	
1.003	S.04	-0.076	0.000	0.91			40.7	OK	
1.004	S.05	-0.051	0.000	0.12			7.7	OK	
3.000	S.09	-0.106	0.000	0.42		5	13.0	OK	
3.001	S.10	-0.074	0.000	0.77		6	24.1	OK	
3.002	S.11	-0.162	0.000	0.42			32.6	OK	
4.000	S.15	-0.065	0.000	0.60			8.4	OK	
3.003	S.12	-0.093	0.000	0.81			42.9	OK	
3.004	S.13	-0.121	0.000	0.13			8.8	OK	
3.005	S.14	-0.050	0.000	0.17			8.7	OK	

1 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
1.005	BASIN	960 Summer	1	+40%	1/600 Summer				80.834

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
1.005	BASIN	0.014	0.000	0.14			4.6	SURCHARGED	

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

Simulation Criteria

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

Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 1 Number of Storage Structures 3 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model	FSR	Ratio R	0.255
Region	England and Wales	Cv (Summer)	1.000
M5-60 (mm)	17.300	Cv (Winter)	1.000

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

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880
Return Period(s) (years)	1, 30, 100
Climate Change (%)	40, 40, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
1.000	S.01	15 Summer	30	+40%	30/15 Summer				81.801
1.001	S.02	15 Summer	30	+40%	30/15 Summer				81.674
1.002	S.03	15 Summer	30	+40%	30/15 Summer				81.540
2.000	S.07	15 Summer	30	+40%	30/15 Summer				81.952
2.001	S.08	15 Summer	30	+40%	30/15 Summer				81.817
1.003	S.04	15 Summer	30	+40%	30/15 Summer				81.483
1.004	S.05	960 Summer	30	+40%	30/15 Summer				81.216
3.000	S.09	15 Summer	30	+40%	30/15 Summer				81.780
3.001	S.10	15 Summer	30	+40%	30/15 Summer				81.726
3.002	S.11	15 Summer	30	+40%	30/15 Summer				81.565
4.000	S.15	15 Summer	30	+40%	30/15 Summer				81.675
3.003	S.12	15 Summer	30	+40%	30/15 Summer				81.385
3.004	S.13	960 Summer	30	+40%	30/15 Summer				81.218
3.005	S.14	960 Summer	30	+40%	30/15 Summer				81.217

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

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	S.01	0.261	0.000	1.60			47.0	SURCHARGED	
1.001	S.02	0.184	0.000	1.56			46.6	SURCHARGED	
1.002	S.03	0.105	0.000	1.02			54.9	SURCHARGED	
2.000	S.07	0.209	0.000	1.15			42.7	SURCHARGED	
2.001	S.08	0.174	0.000	1.09			41.2	SURCHARGED	
1.003	S.04	0.102	0.000	2.12			94.9	SURCHARGED	
1.004	S.05	0.330	0.000	0.24			15.6	SURCHARGED	
3.000	S.09	0.474	0.000	0.95		4	29.3	SURCHARGED	
3.001	S.10	0.475	0.000	1.75		4	54.7	SURCHARGED	
3.002	S.11	0.374	0.000	1.01			78.0	SURCHARGED	
4.000	S.15	0.494	0.000	1.25			17.4	SURCHARGED	
3.003	S.12	0.380	0.000	1.88			99.7	SURCHARGED	
3.004	S.13	0.259	0.000	0.25			17.0	SURCHARGED	
3.005	S.14	0.331	0.000	0.33			16.9	SURCHARGED	

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

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
1.005	BASIN	960 Summer	30	+40%	1/600 Summer				81.214

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
1.005	BASIN	0.394	0.000	0.14			4.6	SURCHARGED	

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

Simulation Criteria

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

Number of Input Hydrographs	0	Number of Offline Controls	0	Number of Time/Area Diagrams	0
Number of Online Controls	1	Number of Storage Structures	3	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FSR	Ratio R	0.255
Region	England and Wales	Cv (Summer)	1.000
M5-60 (mm)	17.300	Cv (Winter)	1.000

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

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880
Return Period(s) (years)	1, 30, 100
Climate Change (%)	40, 40, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
1.000	S.01	15 Summer	100	+40%	30/15 Summer				82.080
1.001	S.02	15 Summer	100	+40%	30/15 Summer				81.874
1.002	S.03	15 Summer	100	+40%	30/15 Summer				81.658
2.000	S.07	15 Summer	100	+40%	30/15 Summer				82.308
2.001	S.08	15 Summer	100	+40%	30/15 Summer				82.092
1.003	S.04	30 Summer	100	+40%	30/15 Summer				81.571
1.004	S.05	960 Winter	100	+40%	30/15 Summer				81.390
3.000	S.09	30 Summer	100	+40%	30/15 Summer				81.873
3.001	S.10	30 Summer	100	+40%	30/15 Summer				81.821
3.002	S.11	15 Summer	100	+40%	30/15 Summer				81.679
4.000	S.15	15 Summer	100	+40%	30/15 Summer				82.010
3.003	S.12	15 Summer	100	+40%	30/15 Summer				81.495
3.004	S.13	960 Winter	100	+40%	30/15 Summer				81.393
3.005	S.14	960 Winter	100	+40%	30/15 Summer				81.391

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

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	S.01	0.540	0.000	2.02			59.4	SURCHARGED	
1.001	S.02	0.384	0.000	1.96			58.5	SURCHARGED	
1.002	S.03	0.223	0.000	1.28			68.9	SURCHARGED	
2.000	S.07	0.565	0.000	1.44			53.7	SURCHARGED	
2.001	S.08	0.449	0.000	1.37			51.6	SURCHARGED	
1.003	S.04	0.190	0.000	2.67			119.6	SURCHARGED	
1.004	S.05	0.504	0.000	0.20			12.7	SURCHARGED	
3.000	S.09	0.567	0.000	1.26		6	38.9	SURCHARGED	
3.001	S.10	0.570	0.000	2.05		4	64.1	SURCHARGED	
3.002	S.11	0.488	0.000	1.07			83.3	SURCHARGED	
4.000	S.15	0.829	0.000	1.68			23.4	SURCHARGED	
3.003	S.12	0.490	0.000	2.06			109.0	SURCHARGED	
3.004	S.13	0.434	0.000	0.20			13.8	SURCHARGED	
3.005	S.14	0.505	0.000	0.27			13.8	FLOOD RISK	

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

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
1.005	BASIN	960 Winter	100	+40%	1/600 Summer				81.389

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
1.005	BASIN	0.569	0.000	0.14			4.6	FLOOD RISK	

Technical Specification

Control Point	Head (m)	Flow (l/s)
Primary Design	1.000	4.600
Flush-Flo™	0.293	4.595
Kick-Flo®	0.633	3.726
Mean Flow		3.999

Hydro-Brake® Optimum Flow Control including:

- 3 mm grade 304L stainless steel
- Integral stainless steel pivoting by-pass door allowing clear line of sight through to outlet, c/w stainless steel operating rope
- Beed blasted finish to maximise corrosion resistance
- Stainless steel fixings
- Rubber gasket to seal outlet
- Indicative Weight: 10 kg

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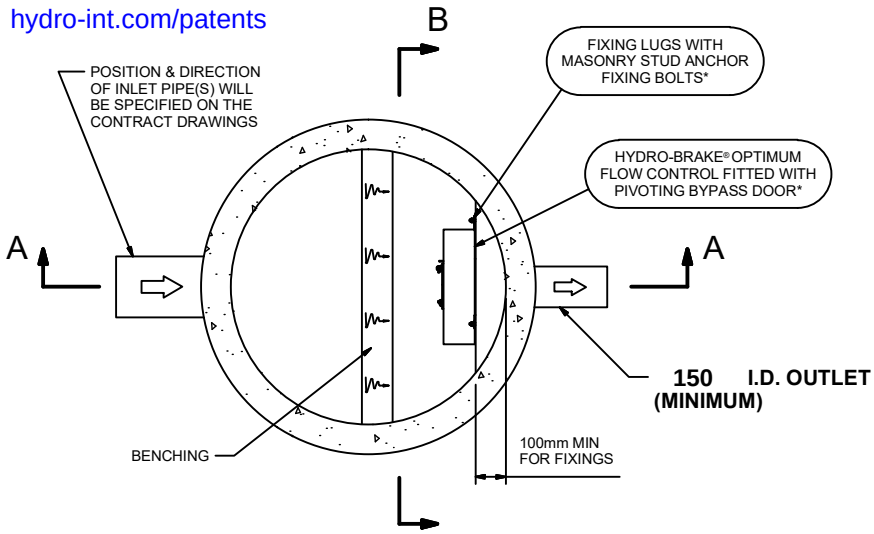

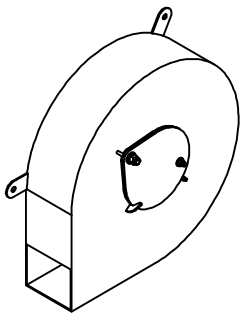

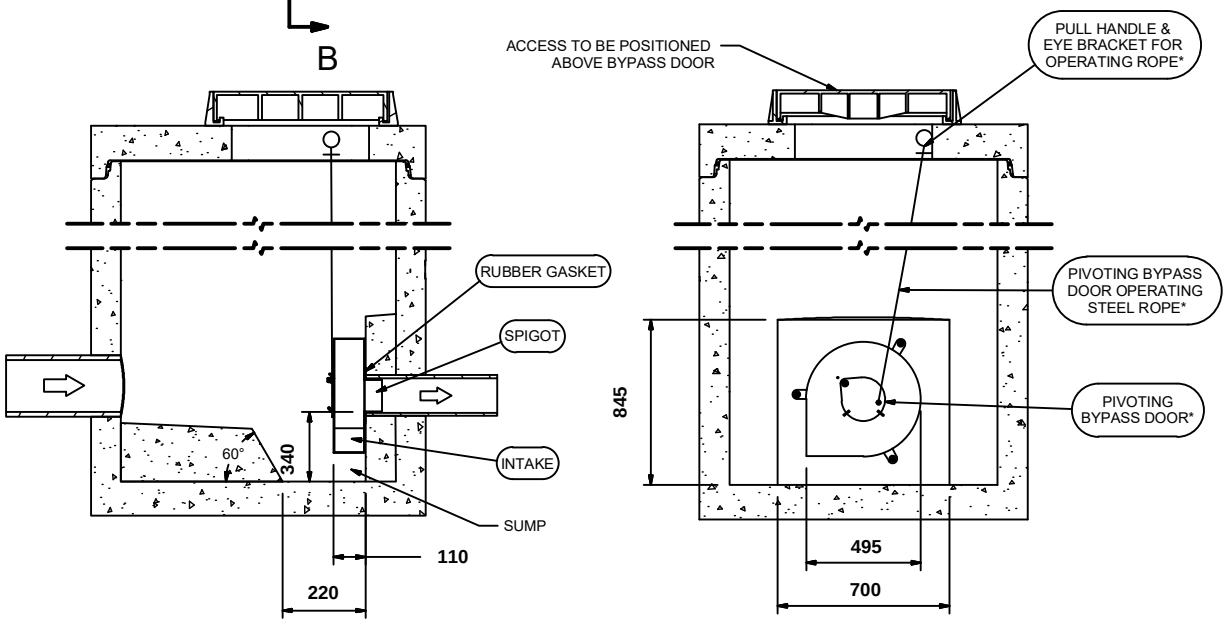

SECTION A-A

SECTION B-B

IMPORTANT:
LIMIT OF HYDRO INTERNATIONAL SUPPLY
THE DEVICE WILL BE HANDED TO SUIT SITE CONDITIONS
FOR SITE SPECIFIC DETAILS AND MINIMUM CHAMBER SIZE REFER TO HYDRO INTERNATIONAL
ALL CIVIL AND INSTALLATION WORK BY OTHERS
* WHERE SUPPLIED
HYDRO-BRAKE® FLOW CONTROL & HYDRO-BRAKE® OPTIMUM FLOW CONTROL ARE REGISTERED TRADEMARKS FOR FLOW CONTROLS DESIGNED AND MANUFACTURED EXCLUSIVELY BY HYDRO INTERNATIONAL

THIS DESIGN LAYOUT IS FOR ILLUSTRATIVE PURPOSES ONLY. NOT TO SCALE.

DESIGN ADVICE

The head/flow characteristics of this SHE-0101-4600-1000-4600 Hydro-Brake® Optimum Flow Control are unique. Dynamic hydraulic modelling evaluates the full head/flow characteristic curve.
The use of any other flow control will invalidate any design based on this data and could constitute a flood risk.

Hydro International®

DATE	26/07/2023 12:53
SITE	Cleator Moor
DESIGNER	Michael Herbert
REF	L2673

SHE-0101-4600-1000-4600
Hydro-Brake® Optimum

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APPENDIX F – SuDS MAINTENANCE SCHEDULE

Project Title:	Cleator Moor Activity Centre		
Furness Ref:	L2763	**Date:**	July '23

Proposed SuDS Maintenance Schedule

The following maintenance schedule has been produced in line with CIRIA C753 'The SuDS Manual' recommendations for Cleator Moor Activity Centre. Prior to the completion of the development, ownership & maintenance responsibility for the site drainage network should be clearly defined and agreed between the client, operator, & maintenance contractor/local authority.

Party Responsible for Implementing Maintenance Schedule: ***Copeland Borough Council***
Refer to following drawings for details: ***L2763-FUR-XX-XX-DR-D-0921 (P2), 0931 (P1), 0932 (P2)***

Table 1 – Pipe, Manhole & Gully Maintenance Schedule

Maintenance Schedule	***Action***	***Frequency***
Regular Maintenance	Cleaning of gutters and filters on downpipes and brushing/sweeping of leaves debris that may cause blockages in gullies.	Annually
	Inspect for sediment and debris in pre-treatment components (i.e., catchpits and gully silt traps), and inside manhole rings.	Annually (or as required)
Occasional Maintenance	Remove sediment/debris from pre-treatment components (i.e., catchpits).	As required, based on regular inspections
Remedial Actions	Trimming of roots that may be causing blockages and patch repair of pipework that has cracked or deformed.	As required
	Repair/rehabilitate manhole and gully inlets & outlets.	As required
Monitoring	Inspect silt traps and note rate of sediment accumulation	Monthly in 1st year, then annually
	Check to ensure gullies and manholes are emptying fully.	Annually

Table 2 – Permeable Paving Maintenance Schedule – *Permeable paving supplier should be contacted once confirmed for product specific maintenance requirements*

Maintenance Schedule	***Action***	***Frequency***
Regular Maintenance	Brushing and vacuuming (standard cosmetic sweep over whole surface)	Once a year, after autumn leaf fall, or reduced frequency as required, based on site –specific observations of clogging or manufacturer's recommendations – areas where water runs onto pervious surface from adjacent impermeable areas are most at risk.
Occasional Maintenance	Removal of weeds or management using glyphosate applied directly to weeds by applicator rather than spraying.	As required
Remedial Actions	Remediate any landscaping which, through vegetation maintenance or soil slip, has been raised to within 50mm of the level of paving.	As required
	Remedial work to any depressions, rutting and cracked or broken blocks considered detrimental to the structural performance or a hazard to users, and replace lost jointing material	As required
	Rehabilitation of surface and upper substructure by remedial sweeping.	Every 10 to 15 years or as required (if infiltration performance is reduced due to significant clogging)

Table 3 – Oil Separator Maintenance Schedule – *Oil Separator supplier should be contacted once confirmed for product specific maintenance requirements*

Maintenance Schedule	***Action***	***Frequency***
Routine Maintenance	Remove litter and debris and inspect for sediment, oil and grease accumulation	Six monthly
	Remove sediment, oil, grease and floating debris.	As necessary - indicated by system inspections or immediately following significant spill
Remedial Actions	Replace malfunctioning parts or structures.	As required
Monitoring	Inspect for evidence of poor operation.	Six monthly
	Inspect sediment accumulation rates and establish appropriate removal frequencies	Monthly during first half year of operation, then every six months

Table 8 – Detention Basin Maintenance Schedule

Maintenance Schedule	***Action***	***Frequency***
Regular Maintenance	Remove litter, debris and trash	Monthly
	Cut grass - for landscaped areas and access routes	Monthly during growing season) or as required
	Cut grass - meadow grass in and around basin	Half yearly: spring (before nesting season) and autumn
	Manage other vegetation and remove nuisance plants	Monthly at start, then as required
	Inspect inlets, outlets and overflows for blockages, and clear if required.	Monthly
	Inspect banksides, structures, pipework etc. for evidence of physical damage	Monthly
	Inspect inlets and facility surface for silt accumulation. Establish appropriate silt removal frequencies.	Monthly (for first year), then annually or as required
	Check any penstocks and other mechanical devices	Annually
	Tidy all dead growth before start of growing season	Annually
	Remove sediment from inlets, outlet and forebay	Annually (or as required)
	Manage wetland plants in outlet pool – where provided	Annually
Occasional Maintenance	Reseed areas of poor vegetation growth	Annually, or as required
	Prune and trim trees and remove cuttings	Every 2 years, or as required
	Remove sediment from inlets, outlets, forebay and main basin when required	Every 5 years, or as required (likely to be minimal requirements where effective upstream source control is provided)
Remedial Actions	Repair erosion or other damage by reseeding or re-turfing	As required
	Realignment of rip-rap	As required
	Repair/rehabilitation of inlets, outlets and overflows	As required
	Relevel uneven surfaces and reinstate design levels	As required

PREMIER TECH

COMMISSIONING & MAINTENANCE GUIDE

REWATEC™

CNSB Bypass Separators

Commissioning & Maintenance Manual

Rewatec CNSB Bypass Separators

Class One & Class Two – BS EN 858

Version: Rev 7

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To Safeguard Warranty Please Ensure You Are Using The Latest Installation Manual.

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Introduction

The primary function of oil/water separators is to separate oil, petrol, diesel and other hydrocarbon contaminants from waste water and retain the separated liquids. These separated liquids must be removed regularly, using a licensed effluent disposal contractor (your contracted service provider), to ensure that the separator operates as efficiently as possible.

All Rewatec bypass separators include for silt storage and hydrocarbon seperation within the unit.

The process of hydrocarbon separation is achieved by flow of the contaminated liquid through the coalescing filter, which is housed in the main body of the separator. The passage of hydrocarbons through the coalescing filter causes the formation of large hydrocarbon 'bubbles'. Theses 'bubbles' then 'break away' from the filter and rise to the top of the main chamber. The treated water outlet is from the base of the main chamber, hence causing the separated hydrocarbons to be retained within the unit untill they are removed during maintenance.

REGULAR MAINTENANCE OF SEPARATOR EQUIPMENT WILL ENSURE IT OPERATES AS INTENDED WITH MINIMUM RISK OF POLLUTION TO THE ENVIRONMENT.

Maintenance Inspections

Separators are used in widely varying circumstances where some will require frequent maintenance and others will have substantially longer intervals before any maintenance (emptying) is required. However, for every separator regular maintenance inspections should be carried out to determine whether or not there is a need to remove the accumulated oil, petrol, diesel, etc., or sediment. The owner of the Rewatec bypass separator is responsible for its operation and ensuring that the effluent quality does not breach any Discharge Consent Standards. It is advisable to set up a 'Service Agreement' with an effluent disposal contractor who can provide 'automatic' and regular maintenance and advise you if any problems with the system occur. The owner is reminded that the existence of a 'Service Agreement' does not necessarily transfer responsibility for general maintenance which must be conducted in accordance with this guide.

The *Environment Agency** has determined that separators shall be inspected at least every six months to establish whether or not emptying is necessary, and a log shall be maintained. Additional equipment for separators provided by Premier Tech Aqua Ltd such as an Alarm System which will give warning of the accumulation of oil, petrol, diesel, etc., but should not be used to replace regular inspections.

To keep your Rewatec bypass separator in top condition, we recommend regular servicing by Premier Tech Water and Environment's service partners.

*"Use and Design of Oil Separators in Surface Water Drainage Systems: PPG3"

Maintenance Procedures

1.0 Health and Safety

Section 6(a) of the United Kingdom Health and Safety at Work Act 1974 requires manufacturers to advise their customers on the safety and handling precautions to be observed when installing, operating, maintaining and servicing their products.

The maintenance procedures described here should be read and fully understood by the operator (competant person) before commencing work. Appropriate personal protective equipment should be used (gloves, goggles, waterproof clothing etc.,) particularly when handling filters which have been in contact with oil and oily sediment.

Before any work commences always identify the separator and its associated manhole covers, and cone off or erect barriers around the entire area.

DO NOT ENTER THE TANK

2.0 Commissioning the Separator Following Installation

2.1 Sediment and other construction debris can accumulate in the separator during its installation and whilst associated works are in progess. If this has ocurred, isolate the separator from the drainage system remove the sediment as follows.

2.2 Slowly lift out the coalescing filter asembly. This should be lifted at a rate of 20mm per second (1.2m per minute), until clear of the water, ensuring that most of the residual water is drained from the coalescing filter. This will reduce the weight of the assembly.

NOTE: This assembly could weigh up to 55kgs and should be handled by two persons unless a mechanical hoist (recommended) is being used.

2.3 Remove this coalescing filter pod assembly to a place of safe keeping.

2.4 Fill the separator with clean water up to the outlet invert level.

2.5 Slowly lower the filter assembly into the separator until it is firmly located inside the tank.

3.0 Maintenance

3.1 If, following maintenance inspections, the separator is found to be storing the maximum volume of oil, petrol, diesel etc,. or the maximum volume of sediment, inform your licensed effluent disposal contractor who will arrange emptying. Before making arrangements, check that you are registered with the Environment Agency, as required under the new Hazardous Waste Regulations 2005, where hazardous waste producers must be registeder before any waste can be removed.

The following are guidelines only for determining the maximum storage volumes of oil and sediment.

a) Multiply the maximum flowrate for which the separator has been designed (l/sec) by 15. This will be the maximum storage volume of hydrocarbonss in litres e.g. a CNSB15 separator is designed for a 15 l/sec flowrate, therefore, can store 225 litres.

b) Where no specific sediment volumes have been determined for the separator, or where no sediment has been expected to accumulate in the system, the maximum stored depth of sediment should not exceed 20% of the depth of the separator barrel e.g. a 1.8m diameter separator should not store more than 360mm depth of sediment.

3.2 Apply the Health and Safety requirements detailed in Section 1 before commencing any work.

3.3 Isolate the separator from the drainage system either by closing closing pre-installed valves in the upstream and downstream manholes or by securely fitting proprietry pipeline stoppers.

3.4 Slowly lift out the coalescing filter pod assembly.This should be lifted at a rate of 20mm per second (1.2m per minute), until clear of the water, ensuring that most of the residual water is drained from the coalescing filter. This will also reduce the combined overall weight of the assembly.

NOTE: This assembly could weigh up to 55kgs and should be handled by two persons unless a mechanical hoist (recommended) is being used.

3.5 Remove the coalescing Filter Pod assembly to a place of safe keeping.

3.6 Using a licensed effluent disposal contractor (your contracted service provider) carry out the following:

Remove the oil, petrol, diesel etc., from the surface of the liquid, leaving as much of the cleaner water as possible in the separator. Remove the sediment from the bottom of the separator taking great care in and around the filter outlet housing on the base to ensure that it does not become damaged, again leaving as much of the cleaner water as possible in the separator

3.7 Move the filter pod assembly to a convenient position *upstream* of the separator so that any polluted water washed from the filter will be directed back to the separator.

Wash the filter using a low pressure hose.If the Coalescing Filter has become 'blinded' with sediment or it is too dirty to clean or has become damaged, replace it by contacting Darcy Spillcare (Services) Ltd. Tel: 0800 0370 899.

3.8 Fill the separator with clean water up to the outlet invert level

3.9 Slowly lower the filter pod assembly into the separator and push home to ensure it is fully seated and sealed.

3.10 Check that the Alarm probe has not been damaged and that the alarm system is working.

3.11 Replace the manhole covers and remove the cones and/or barriers from the worksite.

REMEMBER – if the alarm system activates due to the accumulation of oil, petrol, diesel etc., do not delay in contacting your licensed effluent disposal contractor.