Proposed PFS Redevelopment

Woodland Service Station
Fleetwood Road North
Thornton-Cleveleys FY5 4BL

Drainage Strategy Report
P15701-DSR-01 rev -

Client: Penny Petroleum Ltd

Date: 22 September 2023

Project No: P15701

Goodson Associates
Basilica - Studio Eleven
2 King Charles St
Leeds
LS1 6LS

Email: office@goodsonsleeds.com
Web: www.goodsonsleeds.com

Revision: –		**Signature**	**Date**
Prepared by:	Nigel Batty		22/09/2023
Checked by:	Tom Beckley		22/09/2023
Revision Notes:	Issued for Planning Approval		

Goodson Associates
Basilica - Studio Eleven
2 King Charles St
Leeds
LS1 6LS

Contents **Page**

1.0 Introduction

Goodson Associates (Leeds) Ltd have been appointed by Penny Petroleum Ltd to prepare a Drainage Strategy for the proposed Petrol Filling Station (PFS) redevelopment at the Woodland Service Station site in Thornton-Cleveleys.

The proposed redevelopment will include the removal of the existing PFS Shop building, alterations to the existing garage building to become an extended PFS and Retail Shop, the introduction of a car wash and two new Jet Wash bays, and associated hardstanding amendments to parking, trafficked, and landscaped areas.

The purpose of this report is to describe, in principle, the design approach of the foul and surface water drainage systems for the redevelopment.

2.0 Existing Site

2.1 General Description

The site is located off the B5268 Fleetwood Road North in the centre of a residential area known as Thornton-Cleveleys just north of Blackpool and to the south of Fleetwood (Grid Ref: 333622,442804, Post Code: FY5 4BL). Figure 1.0 shows an aerial photograph of the area with the approximate site boundary highlighted in red.

The site is approximately 0.136ha in area, is roughly rectangular in shape, and currently contains an existing Petrol Filling Station and associated garage workshop building. The site is bounded to the south by local shops and associated off-road parking, to the west by Fleetwood Road North with Langdale Close and residential properties beyond, to the north by a driveway serving a residential property, and to the east by a watercourse along with trees to either embankment and Woodland Avenue and residential properties beyond.

Figure 1.0 - Aerial photograph showing approximate site boundary

2.2 Site Topography

A topographical survey covering the area of the site and the adjacent road, buildings and watercourse to the east was completed by RJP Surveying Consultants Ltd. This indicates that the site is generally flat with a slightly elevated PFS Shop at around 5.75m AOD and nominal falls to the site perimeters, with levels ranging from 4.83m AOD to the southeastern corner of the site and 5.54m AOD midway along the northern boundary. The survey also includes the watercourse to the east, picking up an upstream water level of 2.77m AOD close to the southeast corner of the site.

A copy of the RJP topographical survey is provided in the Section 7.0 appendices.

2.3 Ground Conditions

Both from publicly available borehole records in the wider area and from historic boreholes taken on site (extracts included in the Section 7.0 Appendices to this report) the site ground conditions are shown to consist of made ground overlaying clay and boulder clay.

A Phase I Environmental Desk Study report has been provided by Geo^2 for this Planning application and recommends that given the historic use of the site as a PFS and previous contamination investigations on site that the use of soakaway / infiltration drainage for this site would not be appropriate or suitable, an extract of this report is also included in the Section 7.0 Appendices.

2.4 Existing Natural Drainage Features

The closest surface water feature is the watercourse immediately to the east, which is a tributary to the River Wyre located around 1.5km further to the east. The watercourse is referenced as Hillylaid Pool by the Environment Agency, though appears to be known locally as Royles Brook. There are various pools and ponds in the local area and some occasional interconnecting watercourses, with the Irish Sea located around 2.5km due west of the site.

2.5 Existing Drainage Infrastructure

United Utilities records for the area have been obtained and indicate both foul and storm sewers present in the area. A 300mm diameter foul sewer is shown within Fleetwood Road North to the west of the site boundary, and a 225mm diameter storm sewer is shown to run very close to the site boundary and possibly within the site boundary to the west. This sewer directs stormwater a short distance northwards before discharging it into the Hillylaid Pool watercourse to the east. An extract of the United Utilities sewer record plan is provided in Figure 2.0 below with a full copy included in the Section 7.0 appendices.

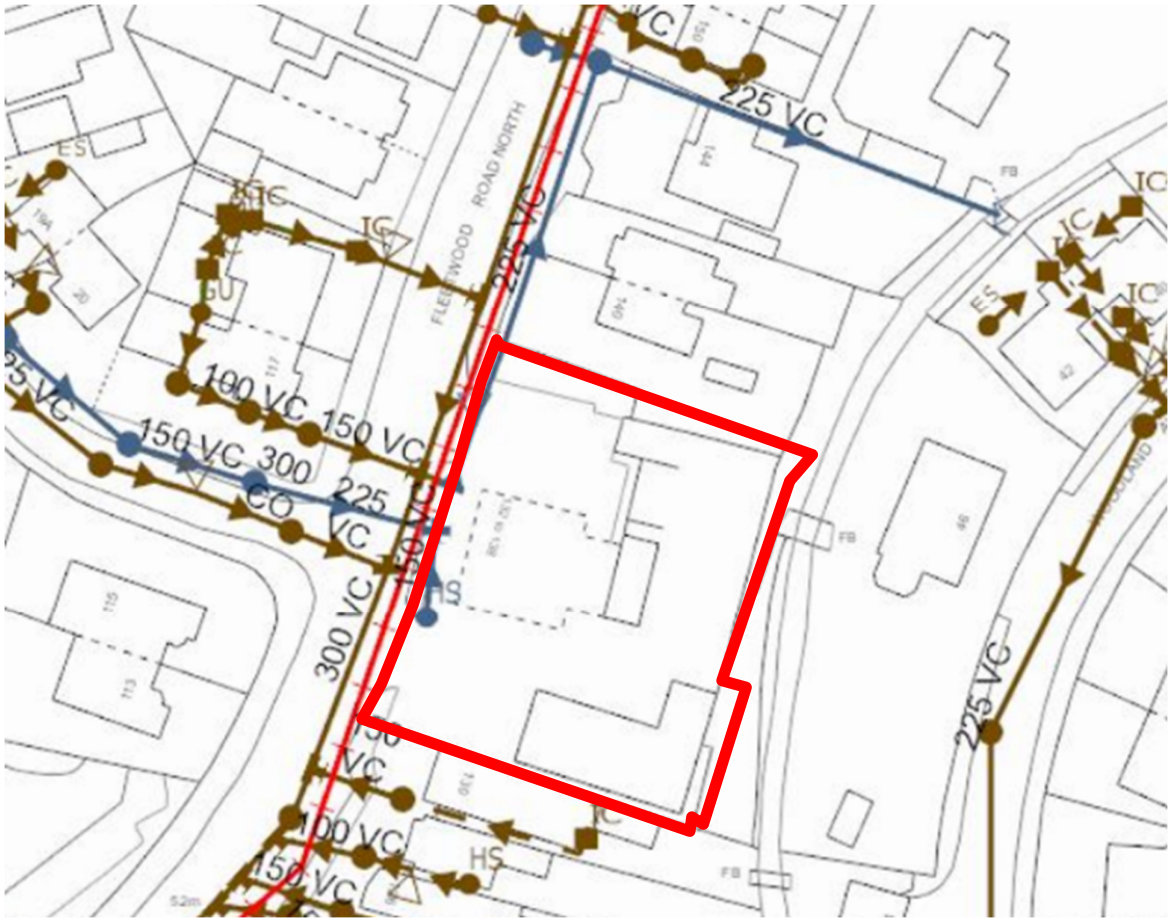


Figure 2.0 – Extract of the United Utilities Sewer Record Plan

3.0 Consultation

Consultation has taken place with various sources to obtain relevant information on the proposed development. These are:

- The design team to obtain details of the proposed development
- The Environment Agency to obtain relevant information in relation to flood mapping and flood zones (refer to Section 5.0)

- United Utilities for their sewerage infrastructure record drawings in the area local to the development site (refer to Section 2.5)

4.0 Proposed Development

The proposed redevelopment involves the removal of the existing PFS Shop and the upgrade and extension of the existing adjacent garage building to function as a replacement PFS Shop, along with alterations to the external areas and associated car washing facilities, parking, trafficked, and landscaped areas.

The developable area of the site is approximately 1.36ha, a copy of the architect's proposed layout plan is included in the Section 7.0 appendices.

5.0 Flood Risk Assessment

5.1 Flood Zone

A copy of the Environment Agency Flood Map for Planning is included in Figure 3.0 below, which identifies the site to be located wholly within an area designated as Flood Zone 3 i.e. high probability of flooding.

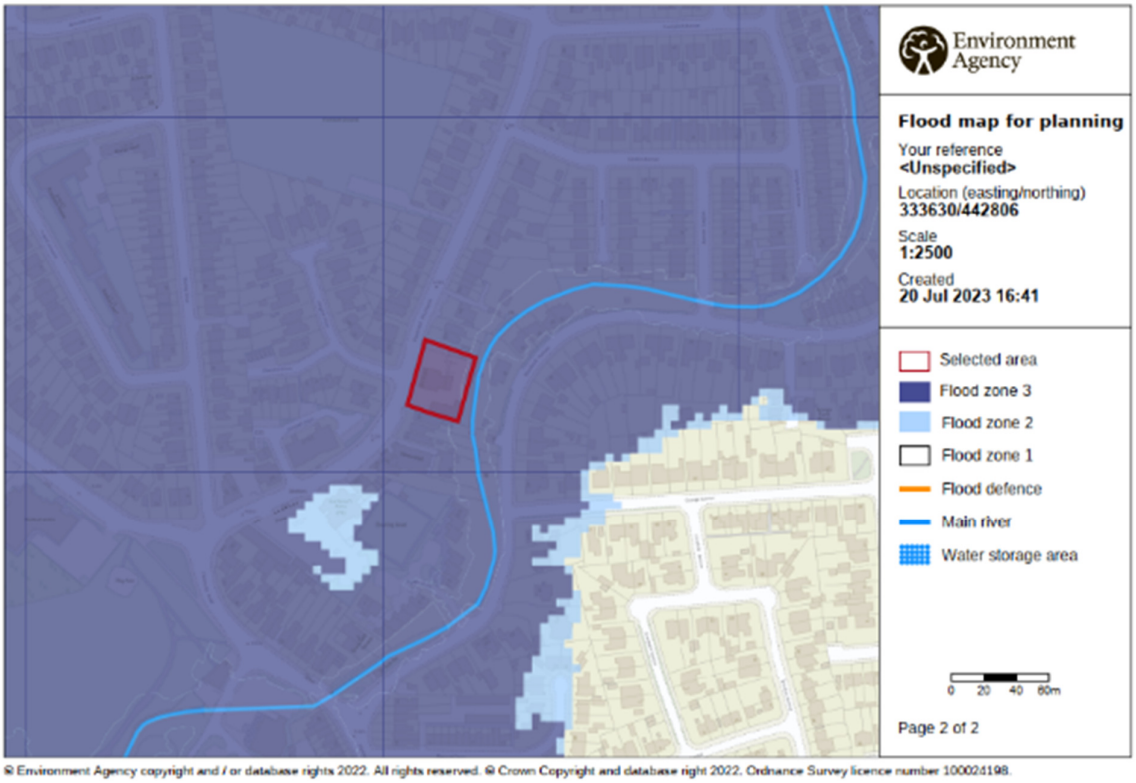


Figure 3.0 Flood Risk from Rivers and the Sea

5.2 Fluvial Flooding

Based on Figure 3.0 above, there are fluvial sources of flooding in the area which could potentially affect the development, though from the Geo² Desk Study report the area is shown as benefitting from flood defence protection measures. A separate Flood Risk Assessment Report is provided by flood risk specialist NSugg Ltd as part of this Planning application.

5.3 Surface Water Flooding

A copy of the Environment Agency map showing the extent of surface water flooding is included in Figure 4.0 below. This indicates the site generally has a very low risk of surface water flooding (less than 0.1% annual probability of flooding), but with a small, localised area of low risk flooding (between 0.1% and 1% annual probability) within Fleetwood Road North just off site to the north west.

The proposed development will be designed to current surface water standards, and the buildings will be set at a slightly higher level to that of the surrounding ground levels with external areas generally falling away from buildings to minimise surface water flood risk to the new development. The risk from pluvial (surface water) flooding to the development is therefore considered to be low and acceptable.

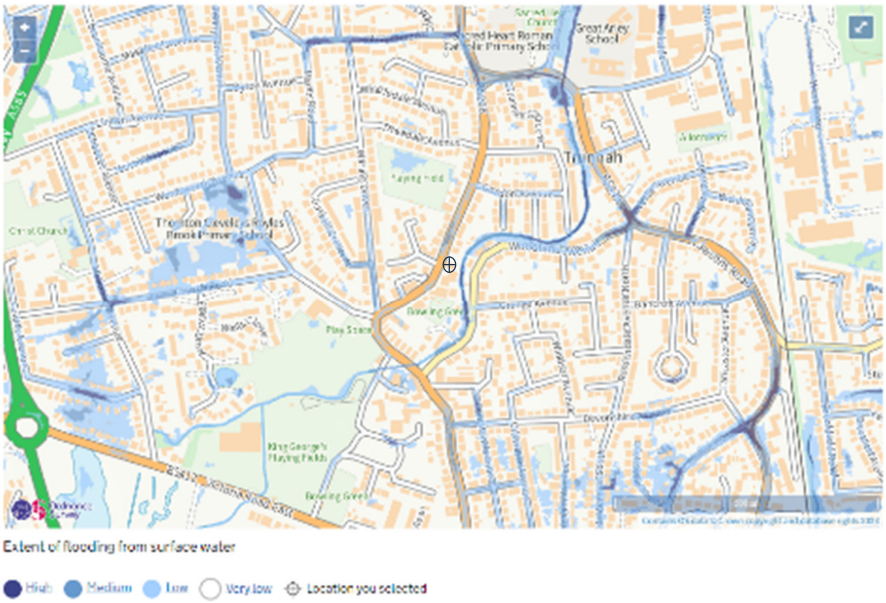


Figure 4.0: Flood Risk from Surface Water

5.4 Flooding from Open Drainage Ditches

Other than the previously highlighted watercourse to the east of the site, there are no apparent open drainage ditch features in close proximity to the site. The risk to the development from flooding due to drainage ditches is therefore deemed to be low and acceptable.

5.5 Groundwater Flooding

There are no proposed basements or considerably deep permanent excavation works as part of the proposed development so the risk of potential groundwater flooding is considered to be low and acceptable.

5.6 Flood Risk from Existing Water and Sewerage Services

The wider area water and sewerage infrastructure located around the site (refer to Section 2.5) is owned and maintained by United Utilities, and so should be managed adequately to minimise flood risk to the local area. From the Wyre Council website there are localised areas categorised as Critical Drainage Areas (CDA), however from the maps available on the website the proposed site is located close to but outside a CDA to the east. The flooding risk to the development and local area from this source is therefore deemed to be low and acceptable.

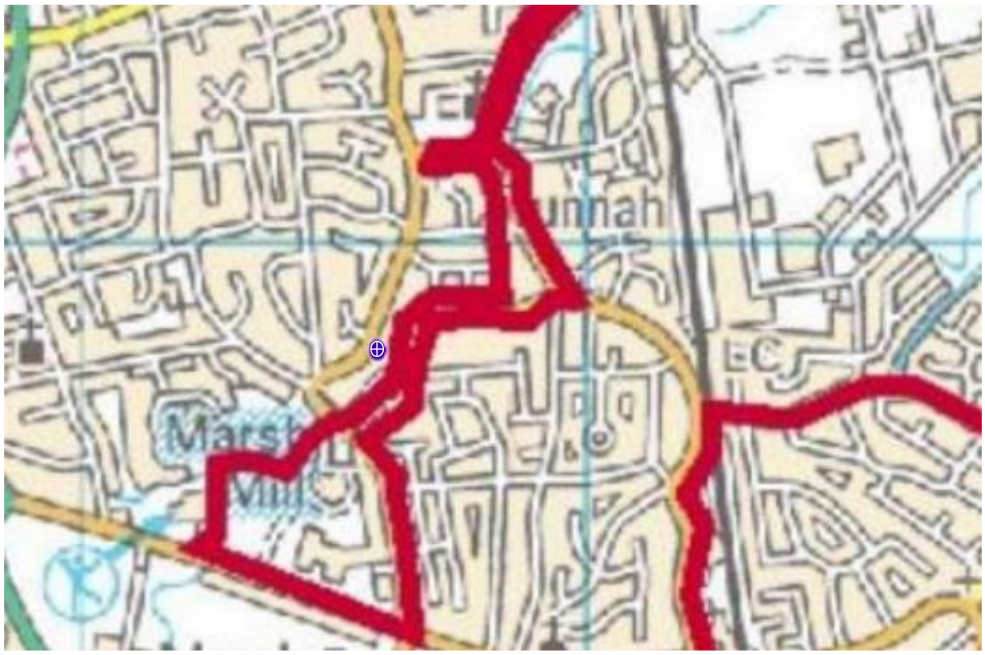


Figure 5.0: Critical Drainage Area (CDA) Map Extract

5.7 Flood Risk from Proposed Drainage Services

Proposed drainage will be designed to current standards, with recommendations for maintenance provided in accordance with best practice, all as described in Section 6.0 of this report. The flood risk from proposed drainage services is therefore considered to be low and acceptable.

5.8 Flooding from Reservoirs, Canals and Other Artificial Sources

There are no known reservoirs or canals in the immediate vicinity of the site. A copy of the Environment Agency map showing the extent of flooding from reservoirs is presented in Figure 6.0 below. This shows the proposed site is outside the maximum extent of flooding from reservoirs, and therefore not considered to be at risk. The risk to the development from this type of flooding is therefore deemed to be low and acceptable.

Figure 6.0: Maximum Extent of Flooding from Reservoirs

6.0 Site Drainage

A CCTV survey of the existing drainage network has been carried out to investigate the existing drainage arrangements in this area, relevant extracts are included in the Section 7.0 appendices. This indicates that surface water is currently collected and discharged in two ways, the rear area of the site discharges via a piped outfall into the Hillylaid Pool watercourse, and the front area of the site appears to be connected into the PFS foul system discharging into the foul sewer within Fleetwood Road North.

The CCTV survey has also confirmed that existing foul drainage from the garage is discharged separately into the foul sewer within Fleetwood Road North.

The UU sewer record plan indicates an adopted storm sewer running close to or just inside the site boundary along the front of the site, however the cctv survey (or two previous drainage surveys for the site) failed to locate this within the site boundary.

It is proposed that the site redevelopment will be designed with separate foul and surface water drainage systems, each discharging via the existing arrangements but with all storm drainage being directed into the storm system.

6.1 Foul Drainage

United Utilities have been consulted regarding the discharge of foul water from the proposed site to their sewer system. A Pre-Planning Sewerage Enquiry was made to United Utilities and their response confirmed that discharge into their existing 300mm diameter foul sewer within Fleetwood Road North is acceptable. A copy of the PPSE response is provided in the Section 7.0 appendices.

Foul water flows from the redevelopment will therefore re-use the existing foul sewer connection arrangements serving the site.

6.2 Surface Water System

6.2.1 Site Assessment

Based on the aerial photograph provided in Section 2.1, the development site currently comprises the a PFS forecourt and convenience store, a garage workshop building, a hand car wash area and associated parking and hardstanding areas.

The calculated storm water discharge rate for an historically designed 1:1 year storm event and the existing drained impermeable area of 0.136ha is 18.9 litres / second:

2.78 x 0.136 x 50 = 18.9 l/s

6.2.2 Run-off Destination

The SuDS hierarchy set out in Requirement H3 of the Building Regulations has been used for the surface water drainage design. This establishes the consideration of surface water disposal in the following order:

- Infiltration to the ground
- Discharge to watercourse
- Discharge to surface water sewer
- Discharge to highway drainage
- Discharge to combined sewer

Based on the site ground conditions detailed in Section 2.3, soakaway or infiltration drainage solutions are not considered feasible or appropriate options for this site.

Based on Section 2.4 and the existing surface water discharge method described previously, it is proposed to discharge surface water from the redevelopment via the existing discharge connection pipe into the Hillylaid Pool watercourse to the east of the site.

6.2.3 Flood Risk

In line with current guidelines, the surface water drainage system will be designed for the critical 1:100-year return period storm event, with an additional allowance for climate change (see Section 6.2.4). The proposed drainage system has been designed so that there should be no above ground on-site flooding for the 100-year event plus Climate Change event.

6.2.4 Climate Change

In accordance with BS EN 1990:2002 Table 2.1, the working life for the buildings on the proposed development could be classified as Category 4 (indicative design working life of 50 years).

Based on the current Wyre Management Catchment peak rainfall allowances guidelines, the anticipated climate change to the 1% peak rainfall intensity for the proposed site location and use (with indicative design working life as above) is 50%.

6.2.5 Urban Creep

As the proposed development is to be commercial (not residential), no additional allowance will be included in the surface water drainage design for urban creep.

6.2.6 Peak Flow Control

Surface water design flows have been calculated for the proposed development with an impermeable area of 0.128ha. This is a reduction in the existing impermeable drained area at 0.136ha (refer to Section 6.2.1).

Surface water from roofs and hardstanding areas will be collected and directed towards the eastern boundary, before discharging into the Hillylaid Pool watercourse as is the current situation. The existing off-site discharge pipe may need to be partly re-laid to connect with the new (lower) attenuated on-site drainage to avoid the need for a pump.

A drainage CCTV survey of the existing discharge pipe was not possible due to the current poor condition of this pipe, a full clean-up and survey is required prior to finalising the detailed design. However the topographic survey has provided an upstream water level of 2.77m AOD providing a target outlet invert level of 3.07m AOD which is sufficient for the drainage design proposals to function without the need for a pump.

6.2.7 Volume Control

It is proposed to discharge storm water from the new site at a reduced rate from existing to reduce downstream flood risk. A maximum discharge rate of 5 litres / second is proposed which represents a 74% reduction on the calculated 18.9 l/s rate for the 1:1 year storm event for the existing site. Having assessed various discharge rate options for the site, rates less than 5 l/s will require further (deeper) attenuation storage tanks which will need a pump to allow it to discharge from site, which under SuDS guidelines is to be avoided where possible.

To accommodate the reduced storm water discharge rate, storage will be provided in the form of attenuation tanks. MicroDrainage calculations provided in the Section 7.0 appendices determine that a minimum 47.2m^3 of storage will be required to achieve the specified 5 l/s discharge rate for the 100-year return period storm event plus climate change. An attenuation tank has therefore been designed to provide 48.6m^3 of attenuation volume, with the discharge from this controlled by a suitable flow control device.

6.2.8 Pollution Control

The risk of pollution entering the wider drainage network will be minimised in several ways:

- Sealed drainage: Rainfall run-off from roofs should discharge directly to the sealed below ground drainage network (i.e. no gullies)
- Silt traps: Gullies and the inspection chamber immediately prior to the attenuation tanks and flow control manhole/pump station manhole will contain a silt trap to collect silt, pollutants, and debris.
- Petrol Interceptor: A full retention petrol interceptor has been included in the drainage network, located immediately prior to the flow control manhole and discharge into the Hillylaid Pool watercourse.

6.2.9 Designing for Exceedance

From the drainage modelling and site topography, should extreme storms exceed the design allowance or there be a malfunction of the drainage system, exceedance routing would direct storm water away from the proposed development, beyond low points in the southeastern and northwestern corners of the site. The indicative flood exceedance routing is shown on the drainage layout plan in the Section 7.0 appendices.

6.3 Maintenance

The drainage pipework is designed with self-cleansing gradients to minimise the requirement for maintenance. However, regular inspection and maintenance of the drainage network is important to identify areas which may be blocked or reduced in capacity and not function correctly, and therefore increase the level of flood risk to the development and wider area.

Appropriate procedures should be outlined to establish responsibility for operation and maintenance of the drainage and SuDS network on the site; this will typically be the facility operating management team. A suitable maintenance strategy will be adopted by those responsible for operation/maintenance to ensure the drainage network is inspected regularly and cleaned when required, with the routine maintenance and cleansing regime formally documented. An operation and maintenance schedule is provided on the drainage layout plan, a copy of which should be included in an O&M manual for ease of reference.

The drainage system should be inspected at least twice a year, with the system also being inspected after any major storm event. Sediment deposition is likely in catch pits, silt traps and in the attenuation tank. When required a clean-up operation should be carried out to remove all silt, litter, vegetation, sewerage debris and larger objects, and to repair any damaged part of the network.

The maintenance regime should incorporate all components within the drainage network, including gullies, drainage channels, manholes, pipes, flow control units, pump stations, attenuation tanks, forecourt separators, and storage/attenuation ponds.

Appropriate health and safety procedures and equipment should be used when accessing manholes, and work carried out by trained and competent operators. Confined space certificates must be held by any personnel entering a manhole and the appropriate permits should be obtained from the Maintenance Manager prior to any access.

6.4 Flood Mitigation Measures

The proposed development is shown to lie within a Zone 3 area of 'high probability of flooding', though is reported to benefit from area wide flood defence protection measures. A full assessment of the site flood risks is provided in the NSugg Ltd Flood Risk Assessment Report.

7.0 Drawings and Calculations

Site Layout Proposals (ADS Design Ltd)

Topographic Survey (RJP Surveying Consultants Ltd)

Site Investigation Report Extracts (Geo² Ltd)

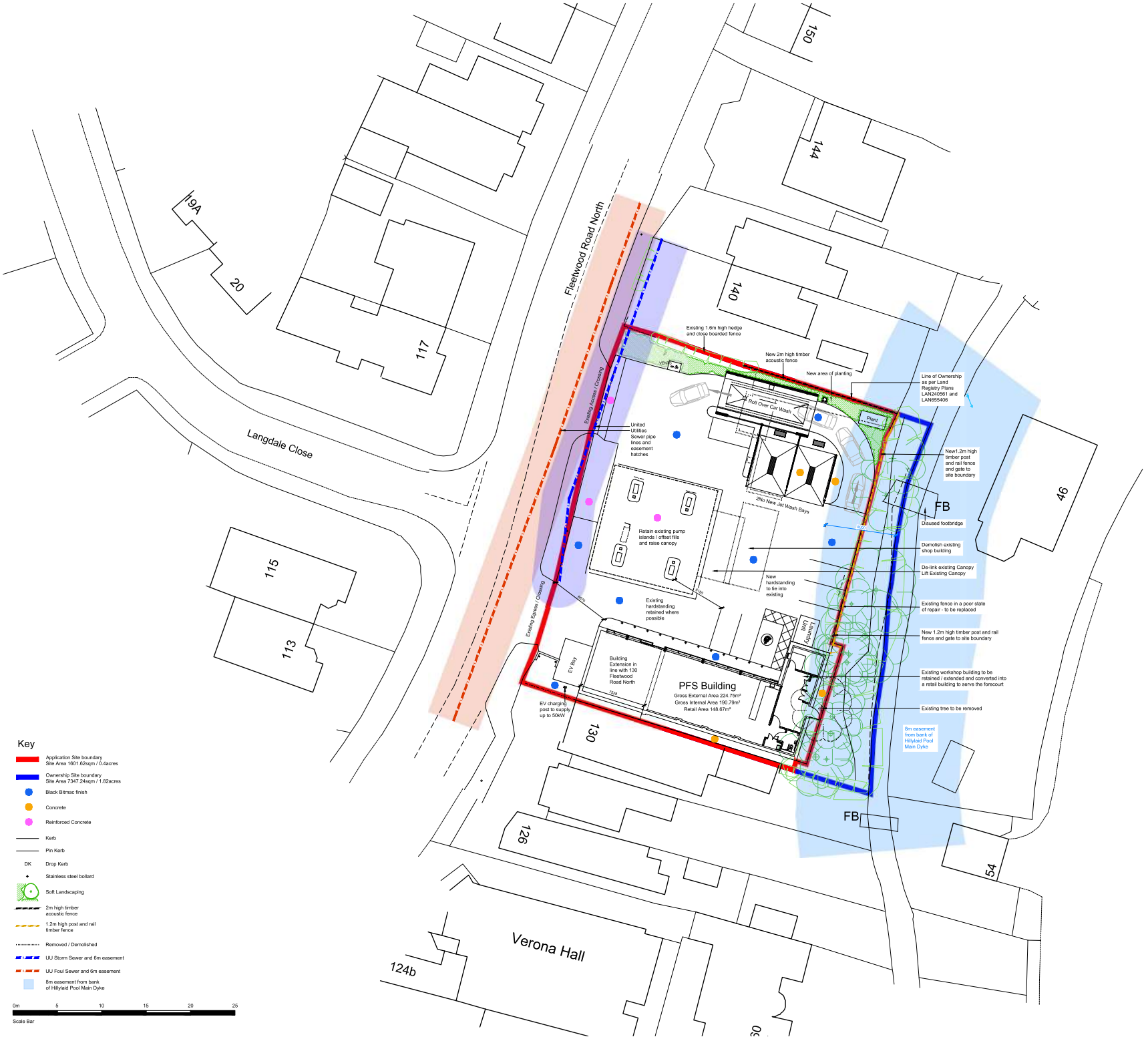
PPSE Correspondence and Sewer Records (United Utilities)

CCTV Survey Information extracts (Avion Maa and Dr Drainage)

P15701-500 Drainage Layout Plan (Goodson Associates)

P15701-501 Impermeable Area Plan (Goodson Associates)

P15701 MicroDrainage Network Modelling Calculations (Goodson Associates)



Key

- Application Site boundary — Site Area 1601.62sqm / 0.4acres
- Ownership Site boundary — Site Area 7347.24sqm / 1.82acres
- Black Bitmac finish
- Concrete
- Reinforced Concrete
- Kerb
- Pin Kerb
- DK Drop Kerb
- Stainless steel bollard
- Soft Landscaping
- 2m high timber acoustic fence
- 1.2m high post and rail timber fence
- Removed / Demolished
- UU Storm Sewer and 6m easement
- UU Foul Sewer and 6m easement
- 8m easement from bank of Hillylaid Pool Main Dyke

0m 5 10 15 20 25

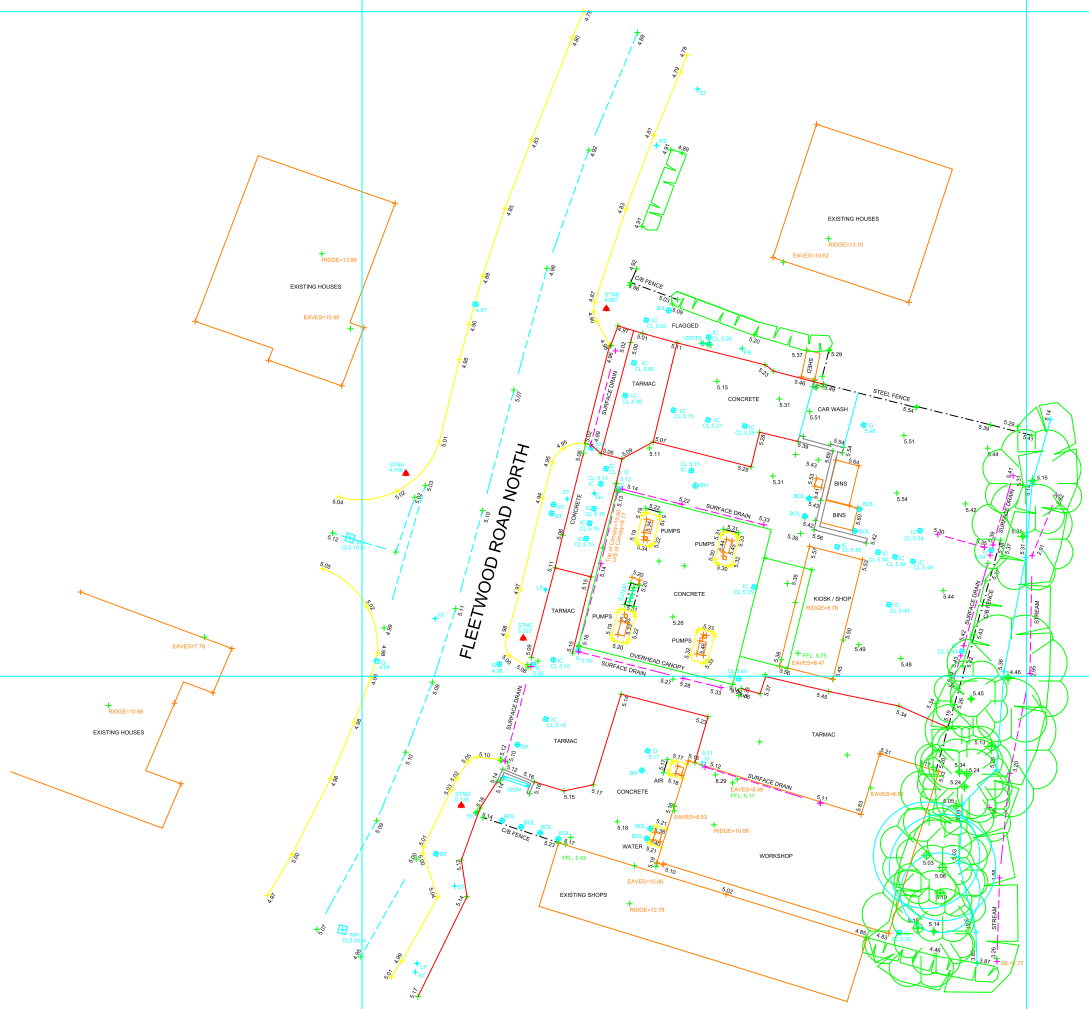
Scale Bar

E	11.09.23	PARKING SPACE ADDED
D	07.09.23	BUILDING ENTRANCE MOVED
C	07.09.23	BUILDING EXTENDED PARKING REVISED VENTS AS EXISTING
B	17.08.23	ATM REMOVED. LAUNDRY ROTATED
A	16.08.23	EV, AW AND LAUNDRY POSITIONS REVISED. CAR WASH AND WASH BAYS POSITION REVISED

REVISIONS ^

CLIENT	PENNY PETROLEUM
PROJECT	WOODLAND S/STN FLEETWOOD ROAD FY5 4BL
TITLE	PROPOSED SITE LAYOUT
DATE	14.08.23
SCALE	1:200 @ A1
JOB ID	2067
DWG	6e

ADS DESIGN
+44 (0)1943 464152
ADS-DESIGN.NET



N

W RJP E

S

COORDINATED STATIONS

STATION	EASTING	NORTHING	LEVEL (m)
A	333603.305	442815.268	4.740
B	333618.387	442827.662	4.961
C	333612.138	442802.872	5.223
D	333607.472	442790.288	5.138

ABBREVIATIONS

AV	AIR VALVE/VENT	IC	INSPECT CHAMBER
BOL	BOLLARD	IL	INVERT LEVEL
BB	BELISHA BEACON	JKW	JAPANESE KNOTT WEED
BM	BENCH MARK	LH	LAMP HOLE
BL	BED LEVEL	LP	LAMP POST
BS	BUS STOP	NP	NAME PLATE
BT	BRITISH TELECOM	MH	MANHOLE
CL	COVER LEVEL	PS	POST/SIGN POST
DI	DILAPIDATED	PB	POST BOX
DIs	DISUSED	PX	UNKNOWN SERVICE
EL	EAVES LEVEL	RE	RODDING EYE
ELE	ELEC JUNCT. BOX	RL	RIDGE LEVEL
EP	ELECTRICITY POLE	RS	ROAD SIGN
FH	FIRE HYDRANT	ST	STOP TAP
FL	FLOOR LEVEL	TH	TRIAL HOLE
FDS	FULL OF SEDIMENT	TL	TRAFFIC LIGHT
FP	FLAG POLE	TP	TELEGRAPH POLE
G	GULLY	TV	CABLE TV BOX
GM	GAS METER	UN	UNABLE TO LIFT
GV	GAS VALVE	WM	WATER METER

SYMBOLS

	SURVEY STATION		TREE
—E—	O\H ELEC CABLE		BENCH MARK
—T—	O\H PHONE LINE		TRIAL PIT
	CANOPY\HEDGE		BOREHOLE

NOTES

A) ONLY MANHOLES AND SERVICES VISIBLE AT TIME OF SURVEY SHOWN

B) O/S GRID USED AND ORIENTATED TO TRUE NORTH

C) LEVELS IN METRES RELATED TO G.P.S.

D) DRAINAGE INFORMATION MUST BE CHECKED PRIOR TO WORK COMMENCING

Rev	Description	Date

PROPOSED DEVELOPMENT AT WOODLAND PFS, THORNTON

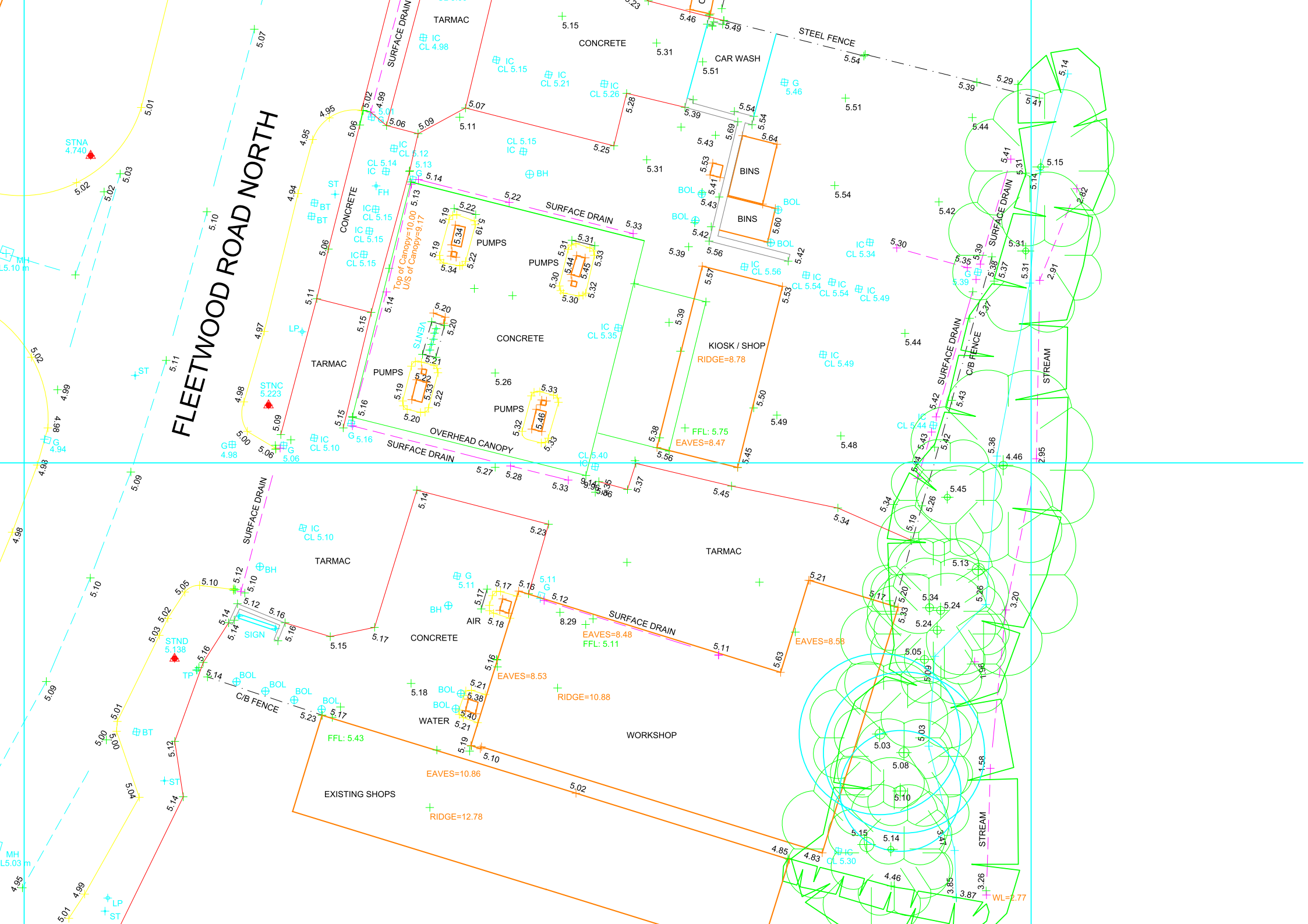
ARCHITECTURAL DESIGN LTD

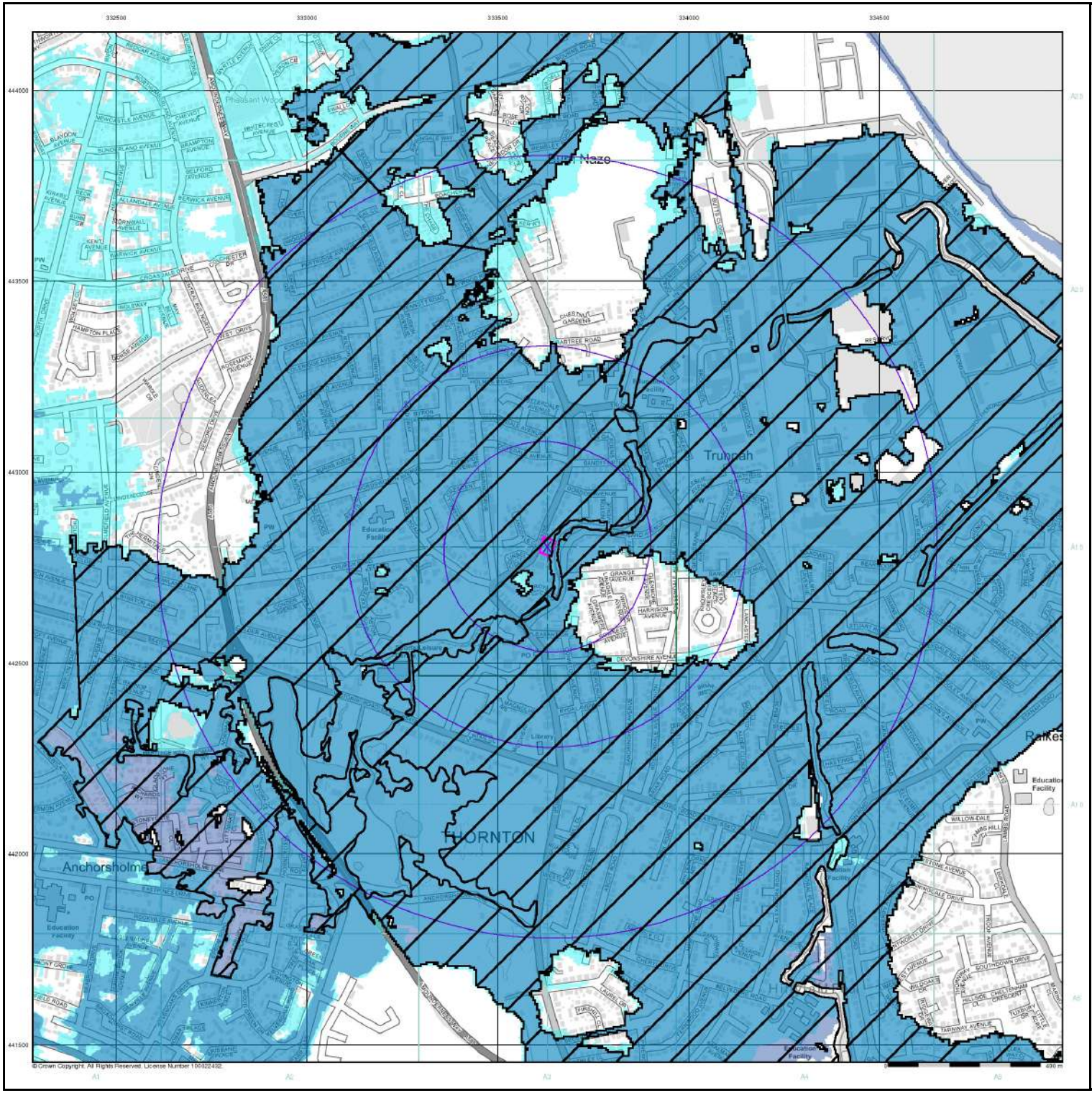
TOPOGRAPHICAL SURVEY

AD066 / T00

Surveyed	AB/OJ
Drawn	SF
Date	JUNE 2023
Scale	1:200 @ A1

RJP Surveying Consultants Ltd
LAND SURVEYORS & SITE ENGINEERS
AYREFIELD COTTAGE
AYREFIELD ROAD
ROBY MILL
UPHOLLAND
LANCASHIRE
WN8 0QP
TEL: 01257 251554
MOBILE: 07710 308709
WEBSITE : www.rjpsurveyors.co.uk
E-MAIL: mail@rjpsurveyors.co.uk


FLEETWOOD ROAD NORTH
TARMAC
CONCRETE
CAR WASH
STEEL FENCE
SURFACE DRAIN
BINS
PUMPS
OVERHEAD CANOPY
KIOSK / SHOP
RIDGE=8.78
FFL: 5.75
EAVES=8.47
C/B FENCE
STREAM
AIR
SIGN
WATER
WORKSHOP
EXISTING SHOPS
EAVES=8.48
FFL: 5.11
EAVES=8.53
RIDGE=10.88
FFL: 5.43
EAVES=10.86
RIDGE=12.78
WL=2.77



Envirocheck®

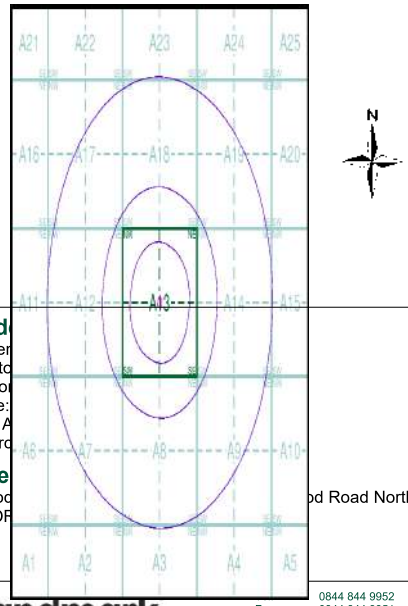
General

- Specified Site
- Specified Buffer(s)
- Bearing Reference Point

Agency and Hydrological (Flood)

- Extreme Flooding from Rivers or Sea without Defences (Zone 2)
- Flooding from Rivers or Sea without Defences (Zone 3)
- Area Benefiting from Flood Defence
- Flood Water Storage Areas
- Flood Defence

Flood Map - Slice A



Ord
Order
Custo
Natio
Slice:
Site A
Searc

Site
Wood od Road North,
THOR

Landmark INFORMATION GROUP
Fax: 0844 844 9952
Web: 0844 844 9951
www.envirocheck.co.uk

BOREHOLE LOG

BOREHOLE No. MW1

Client: RONTEC SERVICE STATIONS 1A LTD.

Project No:	Date:	Ground Level:	Co-ordinates:
409.03953.00001.011	20/03/12	5.44maOD	

Project: WOODLANDS SERVICE STATION

Sheet: 1 of 1

SAMPLES & TESTS							STRATA				
Depth	Type No	HS(ppm)	HV(kPa)	PP(kPa)	SPT-N	Water	Reduced Level	Legend (Thick-ness)	Depth	DESCRIPTION	Instrument/ Backfill
							5.29		0.15	Asphalt	
							5.14		0.30	Concrete	
0.50	ES	<1					4.74		(0.40) 0.70	MADE GROUND: Very soft dark grey slightly gravelly silty CLAY. Gravel is sub angular to sub rounded brick.	
1.00		<1								Soft light grey silty CLAY. (TIDAL FLAT DEPOSITS)	
1.30	ES	<1									
						▼1				1.80 Becoming wet	
2.00		<1									
2.50		<1							(3.80)		
3.00		<1									
3.30	ES	<1									
4.00		1									
4.20	ES	1									
4.50		<1					0.94		4.50	Borehole complete at 4.50m	

Boring Progress and Water Observations				Casing		Chiselling			Water Added		General Remarks
Date	Time	Depth	Water Dpt	Depth	Dia. mm	From	To	Hours	From	To	1. Hand dug trial pit to 1.2m. 2. Hole unstable at 4m. 3. Well screen noted to be silted, prior to sampling.

All dimensions in metres	Contractor : Endeavour Drilling Ltd	Method:	Logged By:	Approved By:
Scale 1:43.75	Plant: Terrier 2002	Hole Size: 110mm tapering with depth	SMJ	

Form SLR AGS3 UK BH File 120405 409.03953.00001.0011 XBHLOGS.GPJ 04-05-12

BOREHOLE LOG

BOREHOLE No. MW2

Client: RONTEC SERVICE STATIONS 1A LTD.

Project No:	Date:	Ground Level:	Co-ordinates:
409.03953.00001.011	20/03/12	5.42maOD	

Project: WOODLANDS SERVICE STATION

Sheet: 1 of 1

SAMPLES & TESTS							STRATA				
Depth	Type No	HS(ppm)	HV(kPa)	PP(kPa)	SPT-N	Water	Reduced Level	Legend (Thick-ness)	Depth	DESCRIPTION	Instrument/ Backfill
							5.27		0.15	Asphalt	
							5.12		0.30	Concrete	
0.50	ES	11					4.62		(0.50) 0.80	MADE GROUND: Very soft dark grey slightly gravelly silty CLAY. Gravel is sub angular to sub rounded brick. Slight Hydrocarbon odour.	
1.00		30				1				Soft light grey silty CLAY. Slight hydrocarbon odour decreasing with depth. (TIDAL FLAT DEPOSITS)	
1.30	ES	37								1.30 Becoming wet.	
2.00		23									
2.70	ES	2									
3.00		2							(5.20)		
3.50		3									
4.00		1									
4.50	ES	3									
5.00		2									
5.50		<1									
6.00		1					-0.58		6.00	Borehole complete at 6.00m	

Boring Progress and Water Observations				Casing		Chiselling			Water Added		General Remarks
Date	Time	Depth	Water Dpt	Depth	Dia. mm	From	To	Hours	From	To	1. Hand dug trial pit to 1.2m. 2. Hole unstable at 5m. 3. Well screen noted to be silted, prior to sampling.

All dimensions in metres	Contractor : Endeavour Drilling Ltd.	Method:	Logged By:	Approved By:
Scale 1:43.75	Plant: Terrier 2002	Hole Size: 110mm tapering with depth	SMJ	

Form SLR A3S3 UK BH File 120405 409.03953.00001.0011 XBHLOGS.GPJ 04-05-12

SLR Consulting Ltd, 19 Hollingworth Court, Turkey Mill,, Maidstone, Kent, ME14 5PP, Tel: , Fax:

LOGGING HAS BEEN CARRIED OUT IN ACCORDANCE WITH BS5930

BOREHOLE LOG

BOREHOLE No. MW3

Client: RONTEC SERVICE STATIONS 1A LTD.

Project No:	Date:	Ground Level:	Co-ordinates:
409.03953.00001.011	20/03/12	5.25maOD	

Project: WOODLANDS SERVICE STATION

Sheet: 1 of 1

SAMPLES & TESTS							STRATA				
Depth	Type No	HS(ppm)	HV(kPa)	PP(kPa)	SPT-N	Water	Reduced Level	Legend (Thick-ness)	Depth	DESCRIPTION	Instrument/ Backfill
							5.10		0.15	Asphalt	
							4.95		0.30	Concrete	
							4.75		0.50	MADE GROUND: Granular subbase.	
0.70	ES	<1					4.45		0.80	MADE GROUND: Very soft dark grey slightly gravelly silty CLAY. Gravel is sub angular to sub rounded brick.	
1.00	ES	<1								Soft light brown silty CLAY. (TIDAL FLAT DEPOSITS)	
1.50		<1									
2.00		<1									
2.50	ES	<1				▼1			(3.20)	2.50 Becoming wet	
3.00		<1									
3.50	ES	<1									
4.00		<1					1.25		4.00		
										Borehole complete at 4.00m	

Boring Progress and Water Observations				Casing		Chiselling			Water Added		General Remarks
Date	Time	Depth	Water Dpt	Depth	Dia. mm	From	To	Hours	From	To	1. Hand dug trial pit to 1.2m.

All dimensions in metres	Contractor : Endeavour Drilling Ltd.	Method:	Logged By:	Approved By:
Scale 1:43.75	Plant: Terrier 2002	Hole Size: 110mm tapering with depth	SMJ	

SLR Consulting Ltd, 19 Hollingworth Court, Turkey Mill,, Maidstone, Kent, ME14 5PP, Tel: , Fax:

LOGGING HAS BEEN CARRIED OUT IN ACCORDANCE WITH BS5930

11 The Mending Rooms
Sunny Bank Mills
Town St., Farsley, LS28 5UJ
0113 257 5397

Borehole Log

Borehole No. **SB1**

Sheet 1 of 1

Project Name:	Woodlands, Thornton Cleveleys	Project No. 0981	Co-ords:
Location:	Thornton Cleveleys	Location Details:	South east corner of site
Client:	Penny Petroleum	Level:	Dates: 18/12/2019
Hole Type	WS	Scale	1:50
Logged By	PP		

Well	Water Strikes	Sample and In Situ Testing Depth (m)	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
					0.10			Concrete
		0.30	PID	PID=0	0.30			MG - Brown/red, brick and pot cobbles in a soft clay matrix
					0.40			MG - Pink/brown, heavily weathered shale
					0.50			MG - Black, tarmac based gravel
		0.80	PID	PID=1	0.80			MG - White/brown, quartzite gravel with occasional cobbles
					0.90			MG - Black, loose gravelly sand
								MG - Orange, sandstone and brick cobbles
					1.30			No returns
	▼				2.00			Brown/grey, soft, plastic, mottled CLAY, becomes very soft and wet at 2.5m
		2.30	PID	PID=0				
		2.80	PID	PID=0				
		3.30	PID	PID=0				
		3.80	PID	PID=0				
					4.00			End of Borehole at 4.00m

1 2 3 4 5 6 7 8 9 10

Remarks
End in firm clays

11 The Mending Rooms
Sunny Bank Mills
Town St., Farsley, LS28 5UJ
0113 257 5397

Borehole Log

Borehole No. **SB3**

Sheet 1 of 1

Project Name:	Woodlands, Thornton Cleveleys	Project No. 0981	Co-ords:
Location:	Thornton Cleveleys	Location Details:	Adjacent to shop and tank 4
Client:	Penny Petroleum	Level:	Dates: 18/12/2019
Hole Type: WS	Scale: 1:50	Logged By: PP	

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
					0.20			Tarmac
					0.25			MG - Black, soft, gravelly silt with occasional rootlets
	▼	0.50	PID	PID=263				Brown/grey, firm to stiff, dry, friable SILT. Strong hydrocarbon odour within.
		0.80	PID	PID=588				
		1.30	PID	PID=1277				
		1.80	PID	PID=5000	1.70			Grey/brown, soft, plastic, wet CLAY. Very strong hydrocarbon odour present.
		2.30	PID	PID=1707				
		2.80	PID	PID=527				
		3.30	PID	PID=854				
		3.80	PID	PID=434	3.70			Grey/brown, wet, silty sandy CLAY. Very strong hydrocarbon odour present.
					4.00			Grey/brown, soft, plastic, wet CLAY. Very strong hydrocarbon odour present.
		4.30	PID	PID=428				
		4.80	PID	PID=75	4.80			Red/brown, stiff, plastic, gravelly CLAY. Gravels is rounded and of mixed lithologies.
					5.00			End of Borehole at 5.00m

Remarks

Required depth reached

11 The Mending Rooms
Sunny Bank Mills
Town St., Farsley, LS28 5UJ
0113 257 5397

Borehole Log

Borehole No. **SB4**

Sheet 1 of 1

Project Name:	Woodlands, Thornton Cleveleys	Project No. 0981	Co-ords:
Location:	Thornton Cleveleys	Location Details:	East of forecourt
Client:	Penny Petroleum	Level:	Dates: 18/12/2019
Hole Type	WS	Scale	1:50
Logged By	PP		

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
					0.20			Concrete
	▼	0.30	PID	PID=159	0.25			MG - Black, wet, clayey gravel
		0.80	PID	PID=903				Brown/grey, sandy SILT. Wet from 0.8m, hydrocarbon odour present.
		1.30	PID	PID=705	1.30			Brown/grey, soft, plastic, sandy SILT. Slight hydrocarbon odour.
		1.80	PID	PID=265				
		2.30	PID	PID=59				
		2.80	PID	PID=47				
		3.30	PID	PID=375				
		3.80	PID	PID=53	3.70			Brown, compact, wet, slightly sandy SILT. Slight hydrocarbon odour.
		4.30	PID	PID=209	4.10			Brown/grey, soft, plastic, sandy SILT. Slight hydrocarbon odour.
		4.80	PID	PID=11	4.80			Red/brown, very stiff CLAY.
					5.00			End of Borehole at 5.00m

Remarks

Required depth reached

11 The Mending Rooms
Sunny Bank Mills
Town St., Farsley, LS28 5UJ
0113 257 5397

Borehole Log

Borehole No. **SB6**

Sheet 1 of 1

Project Name:	Woodlands, Thornton Cleveleys	Project No. 0981	Co-ords:
Location:	Thornton Cleveleys	Location Details:	North of forecourt and USTs
Client:	Penny Petroleum	Dates:	18/12/2019
Hole Type	WS	Scale	1:50
Logged By	PP		

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
					0.10			Tarmac
		0.30	PID	PID=16	0.15			Concrete
					0.40			MG - Black/grey, slightly sandy gravel fill of mixed lithologies, gravels are fine and angular
		0.80	PID	PID=2363				Brown, stiff to firm, plastic CLAY, becoming softer with depth. Very strong hydrocarbon odour.
		1.30	PID	PID=5000				
		1.80	PID	PID=2135	1.80			Brown, very soft, plastic, wet, slightly silty CLAY. Hydrocarbon odour present.
		2.30	PID	PID=187				
		2.80	PID	PID=56				
		3.30	PID	PID=128				
		3.80	PID	PID=101	3.70			Brown, compact, friable SILT
		4.30	PID	PID=302	4.00			Brown, compact, very soft, friable SILT
		4.80	PID	PID=58	4.80			Red/brown, very stiff CLAY.
					5.00			End of Borehole at 5.00m

Remarks

Required depth reached

11 The Mending Rooms
Sunny Bank Mills
Town St., Farsley, LS28 5UJ
0113 257 5397

Borehole Log

Borehole No. **SB7**

Sheet 1 of 1

Project Name:	Woodlands, Thornton Cleveleys	Project No. 0981	Co-ords:
Location:	Thornton Cleveleys	Location Details:	South of USTs
Client:	Penny Petroleum	Dates:	18/12/2019

Hole Type: WS
Scale: 1:50
Logged By: PP

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
					0.10			Tarmac
		0.30	PID	PID=8				MG - Brown, angular, sandstone gravel.
					0.40			Brown, gravelly SILT. Slight hydrocarbon odour present
		0.80	PID	PID=171				
		1.30	PID	PID=572				
					1.50			Brown, plastic, very soft, wet, silty CLAY. Hydrocarbon odour present between 2.0-3.0m
		1.80	PID	PID=444				
		2.30	PID	PID=469				
		2.80	PID	PID=424				
		3.30	PID	PID=379				
		3.80	PID	PID=15				
		4.30	PID	PID=153				
		4.80	PID	PID=46	4.70			Red/brown, very stiff CLAY.
					5.00			End of Borehole at 5.00m

Remarks
Required depth reached

8.0 Conclusions and Recommendations

8.1 Conclusions

A Phase I Preliminary Risk Assessment of the site known as Woodlands Service Station, located at Fleetwood Road North, Thornton-Cleveleys, FY5 4BL was undertaken, prior to proposed redevelopment of the site as a PFS.

The purpose of the assessment was to evaluate the potential for risk to be posed to human health and sensitive environmental receptors from historical and current use of the site.

Historical phases of investigation have identified low levels of contamination within soils, but perched groundwater recorded elevated concentrations of hydrocarbons that present a potential risk to controlled waters and also to site end users from volatile hydrocarbons in localised areas of the site.

Consequently, Geo^2 consider there to be a **Moderate / Low** risk to groundwater, neighbouring residents and site end users from shallow hydrocarbon contamination. A **Moderate** risk to site end users from volatile hydrocarbons in perched groundwater and to the nearby surface water receptor is considered appropriate.

Due to historic reports having recorded hydrocarbon contamination within the perched groundwater, infiltration or soakaway drainage is therefore not considered appropriate as a part of the site's redevelopment due to the risk of spreading hydrocarbon contamination off site. Furthermore, the shallow perched groundwater table and underlying clay superficial deposits would not be likely suitable ground conditions for infiltration or soakaway drainage on site.

8.2 Recommendations

The following measures are recommended to address the identified risks:

- Recent stock reconciliation records to be reviewed.
- Groundwater monitoring from all available monitoring wells on site, with the environmental chemical analysis results compared against the 2019 Geo^2 water sampling results and current threshold levels, with the risk assessment reviewed and updated. Sampling of the water in the nearby Royles Brook should also be undertaken.
- Vapour monitoring within existing buildings on site should be undertaken to confirm current ground conditions do not present a risk to current site users and that the Vapour Recovery System located on the western boundary of the site is still operational.
- Further intrusive investigation works may be required to delineate any plumes of hydrocarbon contamination within the perched groundwater.
- If significant hydrocarbon contamination is confirmed within the perched groundwater through the recommended sampling, a QRA and Remediation Strategy may be required with remediation targets to be agreed with the relevant authorities.
- When development works take place on site, a watching brief should be imposed to ensure that any impacts unidentified in the site investigation can be characterised and treated appropriately. Any unidentified contaminated material should be considered in the event of a redevelopment as costs for offsite disposal of these materials may be significant.

United Utilities
Water for the North West

How to contact us:

United Utilities Water Limited
Property Searches
Haweswater House
Lingley Mere Business Park
Great Sankey
Warrington
WA5 3LP

Telephone: 0370 7510101

E-mail: propertysearches@uuplc.co.uk

Goodsons Associates Leeds

Fountain House
4 South Parade, Goodsons Associates Leeds
Leeds,
LS1 5QX

FAO:

Your Ref: P15701 Woodland Services
Our Ref: UUPS-ORD-512182
Date: 22/08/2023

Dear Sirs

Location: BP SERVICE STATION 132-138 FLEETWOOD ROAD NORTH, THORNTON-CLEVELEYS, FY5 4BL

I acknowledge with thanks your request dated 21/08/2023 for information on the location of our services.

Please find enclosed plans showing the approximate position of United Utilities' apparatus known to be in the vicinity of this site.

The enclosed plans are being provided to you subject to the United Utilities terms and conditions for both the wastewater and water distribution plans which are shown attached.

If you are planning works anywhere in the North West, please read United Utilities' access statement before you start work to check how it will affect our network. http://www.unitedutilities.com/work-near-asset.aspx .

I trust the above meets with your requirements and look forward to hearing from you should you need anything further.

If you have any queries regarding this matter please contact us .

Yours Faithfully,

Karen McCormack
Property Searches Manager

United Utilities Water Limited
Registered In England & Wales No. 2366678
Registered Office Haweswater House, Lingley Mere Business Park,
Lingley Green Avenue, Great Sankey, Warrington, WA5 3LP

Water for the North West

TERMS AND CONDITIONS - WASTEWATER AND WATER DISTRIBUTION PLANS

These provisions apply to the public sewerage, water distribution and telemetry systems (including sewers which are the subject of an agreement under Section 104 of the Water Industry Act 1991 and mains installed in accordance with the agreement for the self construction of water mains) (UUWL apparatus) of United Utilities Water Limited "(UUWL)".

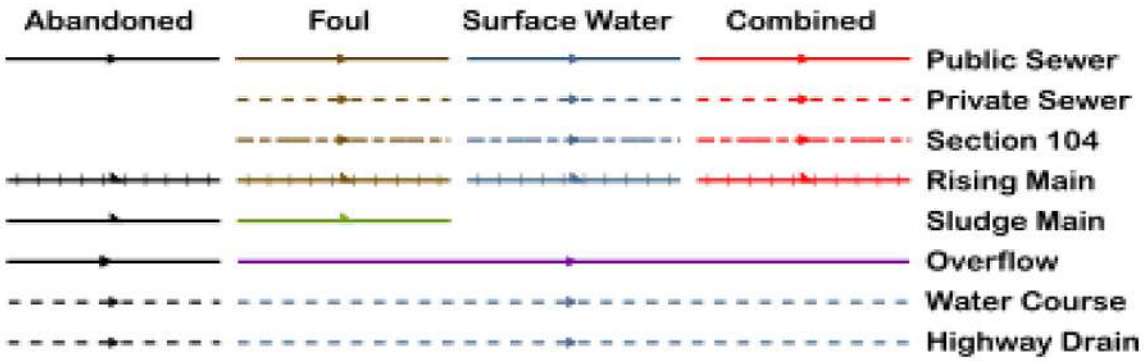
TERMS AND CONDITIONS:

- This Map and any information supplied with it is issued subject to the provisions contained below, to the exclusion of all others and no party relies upon any representation, warranty, collateral contract or other assurance of any person (whether party to this agreement or not) that is not set out in this agreement or the documents referred to in it.
- This Map and any information supplied with it is provided for general guidance only and no representation, undertaking or warranty as to its accuracy, completeness or being up to date is given or implied.
- In particular, the position and depth of any UUWL apparatus shown on the Map are approximate only. UUWL strongly recommends that a comprehensive survey is undertaken in addition to reviewing this Map to determine and ensure the precise location of any UUWL apparatus. The exact location, positions and depths should be obtained by excavation trial holes.
- The location and position of private drains, private sewers and service pipes to properties are not normally shown on this Map but their presence must be anticipated and accounted for and you are strongly advised to carry out your own further enquiries and investigations in order to locate the same.
- The position and depth of UUWL apparatus is subject to change and therefore this Map is issued subject to any removal or change in location of the same. The onus is entirely upon you to confirm whether any changes to the Map have been made subsequent to issue and prior to any works being carried out.
- This Map and any information shown on it or provided with it must not be relied upon in the event of any development, construction or other works (including but not limited to any excavations) in the vicinity of UUWL apparatus or for the purpose of determining the suitability of a point of connection to the sewerage or other distribution systems.
- No person or legal entity, including any company shall be relieved from any liability howsoever and whensoever arising for any damage caused to UUWL apparatus by reason of the actual position and/or depths of UUWL apparatus being different from those shown on the Map and any information supplied with it.
- If any provision contained herein is or becomes legally invalid or unenforceable, it will be taken to be severed from the remaining provisions which shall be unaffected and continue in full force and affect.
- This agreement shall be governed by English law and all parties submit to the exclusive jurisdiction of the English courts, save that nothing will prevent UUWL from bringing proceedings in any other competent jurisdiction, whether concurrently or otherwise.

United Utilities Water Limited
Registered In England & Wales No. 2366678
Registered Office Haweswater House, Lingley Mere Business Park,
Lingley Green Avenue, Great Sankey, Warrington, WA5 3LP

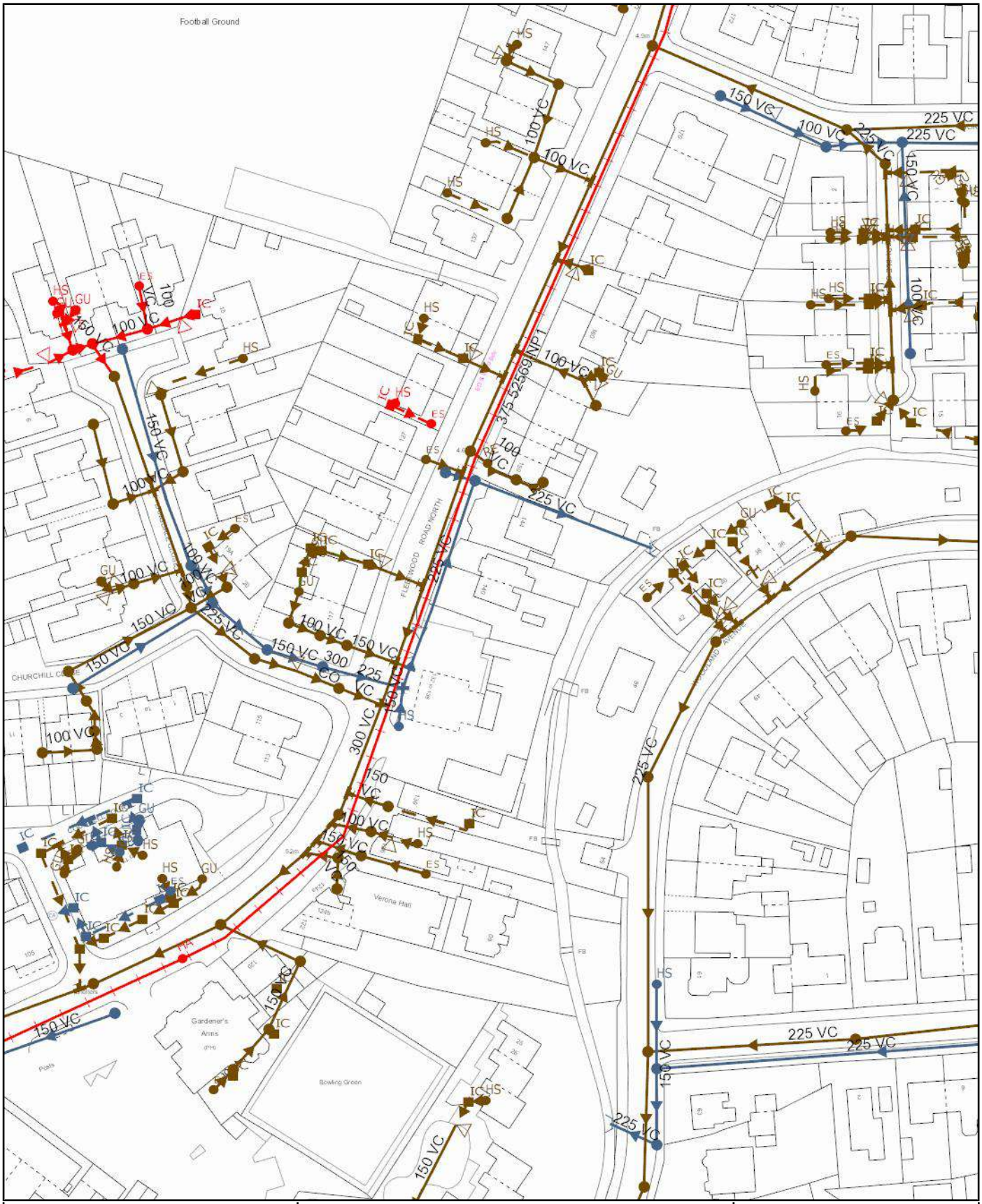
United Utilities
Water for the North West

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
- VC 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:	1:1250	**SEWER RECORDS**	United Utilities Water for the North West
Date:	22/08/2023		

Address or Site Reference: BP SERVICE STATION 132-138 FLEETWOOD ROAD NORTH, THORNTON-CLEVELEYS, FY5 4BL

Printed by: Property Searches

Nigel Batty

Subject: P15701: Penny Petroleum - Woodland Service Station, 132-138 Fleetwood Rd N, Thornton-Cleveleys FY5 4BL. UU reference - 04548229.

From: seweradoptions@uuplc.co.uk <seweradoptions@uuplc.co.uk>
Sent: 29 August 2023 14:22
To: Phillip Harrington <phil@goodsonsleeds.com>
Subject: RE: Our reference - 04548229 - Woodland Service Station, 132-138 Fleetwood Rd N, Thornton-Cleveleys FY5 4BL

Good afternoon Phillip,

Pre Development Enquiry for: Woodland Service Station, 132 – 138 Fleetwood Road, Thornton- Cleveleys FY5 4BL UU Reference Number : 04548229

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 300mm diameter public foul water sewer within Fleetwood Road North located to the West of your proposed development at 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.

Waterbody

If an evidence based assessment has been carried out and confirms that infiltration is not feasible, we recommend that you contact the Lead Local Flood Authority and/or Environment Agency to discuss a point of discharge to the watercourse located East of the proposed site.

We would encourage you to identify and engage with any third party landowner and riparian owner to agree access and discharge rights to the water body if this is not in your ownership.

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.

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 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

---------- Original Message ----------
From: seweradoptions@uuplc.co.uk [seweradoptions@uuplc.co.uk]
Sent: 24/08/2023 13:43
To: phil@goodsonsleeds.com
Subject: Our reference - 04548229 - Woodland Service Station, 132-138 Fleetwood Rd N, Thornton-Cleveleys FY5 4BL

United Utilities
Water for the North West

Good Afternoon Phillip

PRE DEVELOPMENT APPLICATION AT: Woodland Service Station, 132-138 Fleetwood Rd N, Thornton-Cleveleys FY5 4BL

UU Ref: 04548229

Please accept this email as receipt of your application received on 21st August 2023 for the above development. This has now been logged on our system and the job reference is 04548229 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 10 working days from date of receipt.

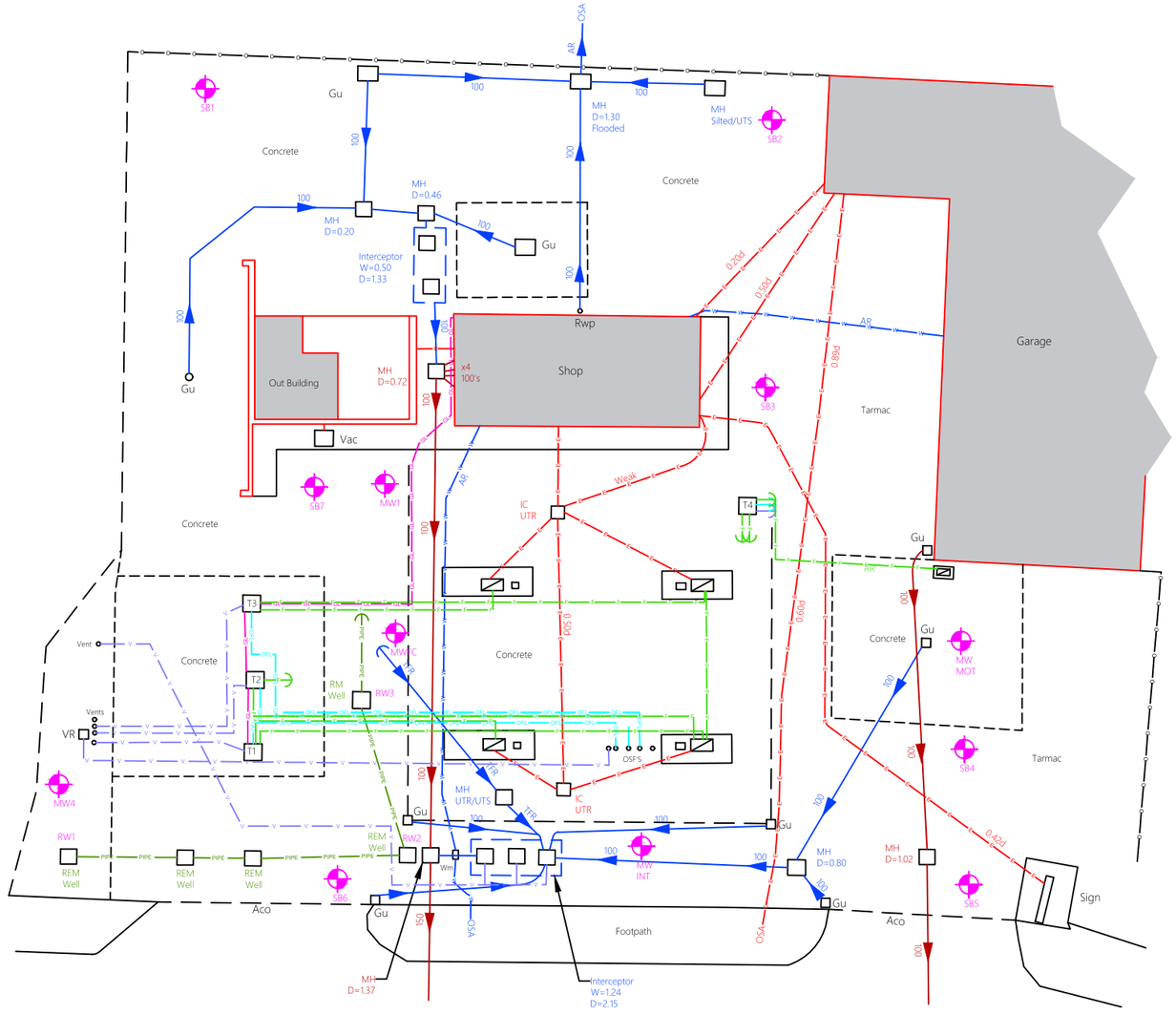
Kind regards

United Utilities
Water for the North West

Amanda Harding
Customer Advisor Advanced
Developer Services & Metering
Customer Services
Direct Tel: 01925 233186
Tel: 0345 072 6067
unitedutilities.com

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

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



LEGEND

- Foul Drainage
- Surface Drainage
- Combined Drainage
- Electricity
- Electricity High Voltage
- Electricity Low Voltage
- Gas
- Ground Probing Radar
- Water
- Cable Television
- Close Circuit Television
- Communication
- British Telecom
- Compressed Air
- Offset Fill-Line
- Oil Pipe
- Pipe
- Ventilation
- Fuel Line
- Vapour Recovery
- Gauge Line
- Telemetry
- Fibre Optics
- Unknown
- Fence
- Edge of Canopy
- Gully Run

End Of Trace

Do Not Drill / Banded Pipes

T TANK* - W= Water F=Foam P=Product C=Concrete U=Unknown

Borehole

Trial Pit Location

Excavated Area

Window Sample

Soil Vapour Sample

ABBREVIATIONS

AR	Assumed Route	MW	Monitoring Well
BO	Bollard	NPV	No Pipes Visible
BO/ILL	Illuminated Bollard	OH	Overhead Service
BH	Borehole	OSA	Off Survey Area
BTB	British Telecom Box	OSBM	Ordnance Survey Bench Mark
BTIC	British Telecom Cover	PR	Pipe Riser
C/BOX	Control Box	P	Post
C/B FENCE	Closeboard Fence	P&R FENCE	Post & Rail Fence
CR	Cable Riser	RET WALL	Retaining Wall
CATV	Cable TV	RWP	Rain Water Pipe
CP	Catch Pit	RS	Road Sign
Co	Concrete	RE	Rodding Eye
CON	Conifer	S/A	Soakaway
CL	Cover Level	S/BIRCH	Silver Birch
d	Depth (in metres)	SAP	Sapling
D/CHAN	Drainage Channel	SEC FENCE	Security Fence
DP	Down Pipe	SL	Spot Light
ER	Earth Rod	SP	Soil Pipe
EIC	Electricity IC	ST	Stop Tap
EP	Electricity Pole	SV	Sluice Valve
EOC	Edge of Canopy	SVP	Soil Vent Pipe
EOT	End of Trace	SVS	Soil Vapour Sample
F/BED	Flower Bed	TBM	Temporary Bench Mark
FH	Fire Hydrant	TFR	Taken From Records
FS	Fire Switch	TL	Traffic Light
GV	Gas Valve	TP	Telegraph Pole
G	Gully	TS	Traffic Sensor
GPR	Ground Probing Radar	UTL	Unable to Locate
G/RUN	Gully Run	UTR	Unable to Raise
HT	Height	UTS	Unable to Survey
H/CHESTNUT	Horse Chestnut	UTT	Unable to Trace
H/THORN	Hawthorn	VR	Vapour Recovery
IC	Inspection Cover	VP	Vent Pipe
IL	Invert Level	WM	Water Meter
INT	Interceptor	WFC	Water Filled Chamber
KO	Kerb Outlet	WP	Waste Pipe
LP	Lamp Post	WR	Water Riser
LC	Lighting Column	WS	Window Sample
LH	Lamp Hole	U/S	Underside
MH	Manhole Cover		Pipe Diameter

General Notes:

No service guides at time of survey.

Utt some Fuel,Offset and vents, PE fittings.

Water to site, AR.

Tank Schedule

Tank	Depth(m)	Fuel	Capacity(ltrs)	Pumps
1	-	Diesel	23022	-
2	-	Unleaded	23022	-
3	-	Ult.unleaded	9124	-
4	-	Ultimate Diesel	13351	-

Avoin Maa Surveys Ltd

32 Doncaster Road, Barnsley, South Yorkshire, S70 1TL.
Tel: 01226 292 377 Mobile: 07969 360287
E-Mail: scott@avoinmaasurveys.com & info@avoinmaasurveys.com
Website: www.avoinmaasurveys.com

Client

Geo2 Remediation Limited
11 The Mending Rooms, Surrey Bank Mills, Town St,
Farsley, Leeds, LS28 5UJ.

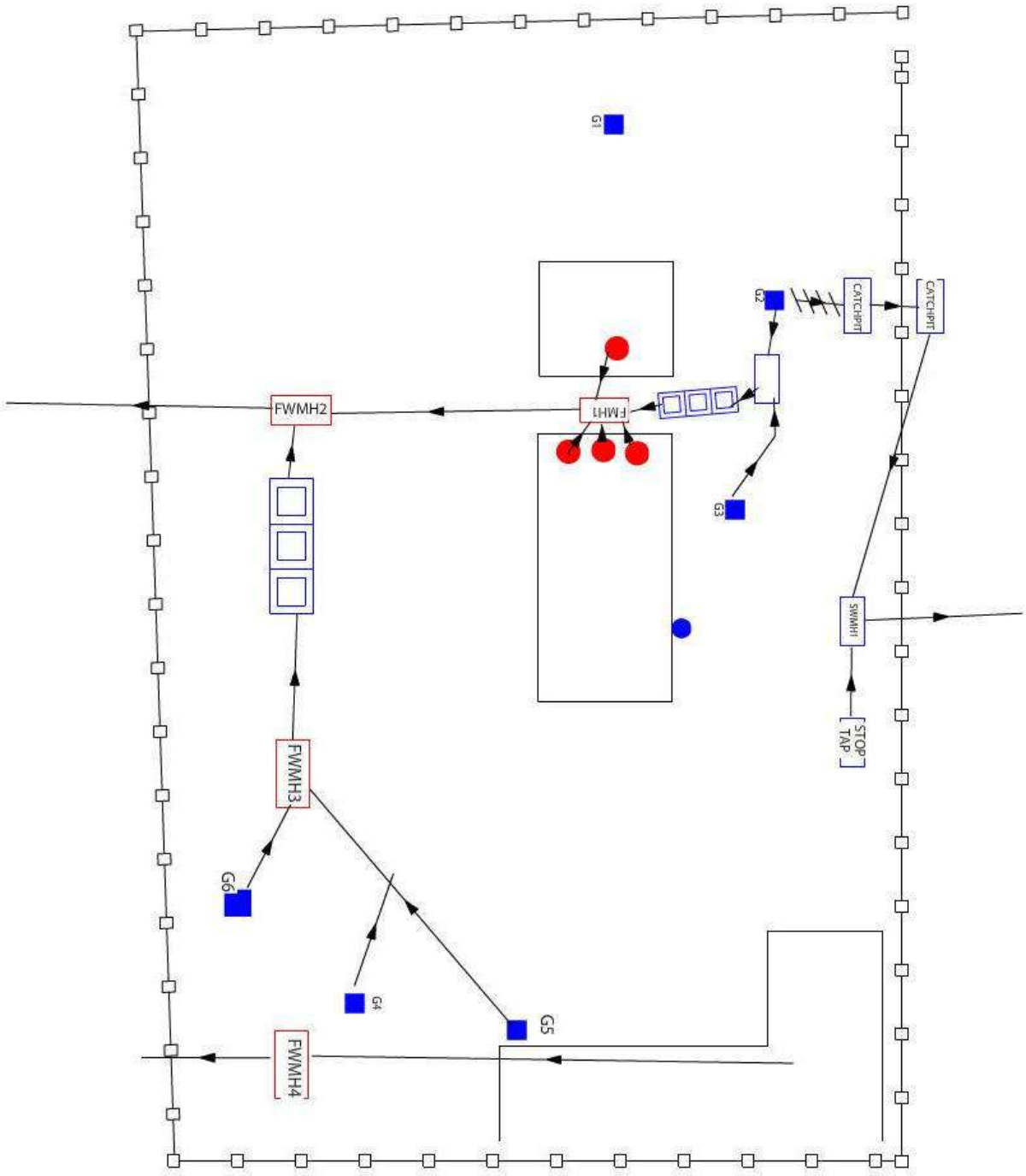
Site Location

Woodland PFS
Fleetwood Road
Thornton-Cleveleys, FY5 4BL

Surveyed by AC	Drawn by AC	Approved by -
Drawing No. 1219/GEO2/7235		Revision -
Scale 1:100@ A1	Date 19/12/2019	Sheet No. 1 of 1

Job Number	Surveyed by (Operator)	Base Unit	Date
7	**COREY LEWIS**	**19F9EMGOGS**	**14/09/2023**

This sketch is not to scale and does not represent the exact routing of the drainage system



CCTV Inspection Report

Dr Drainage
Unit 4, 10 Chancellor Street
Leeds
West Yorkshire
LS6 2TE

Surveyed by (Operator)	Job Number	Pipe Length Reference(PLR)	Date	Pre Cleaned
COREY LEWIS	**7**	**FWMH1 X**	**14/09/2023**	**HPWJ to clean prior to survey**
Weather	Customer Present	Service Grade/Structural Grade	Base Unit	Section Number
1 - Dry		**0/0**	**19F9EMGOGS**	**11**

Road **Woodlands Service Station**
Place **Fleetwood Road**
Location **FY5 4BL**

Division
District
Location Details

Purpose
Duty **Foul**
Catchment

Shape/Size **100mm**
Material **Vitrified clay**
Category

Start Node **FWMH1**
End Node **FWMH2**
Total length **16.62 metres**

Scale **1:0.87**
Direction **Downstream**

View via iTouch Live | Download

Start Node Ref:FWMH1 | I/L :2.98mm | Depth: 0.5mm

Position	Code	Description	Photo	Type/Grade
0.00	MH	Start node type, manhole, reference FWMH1	8516712	Comment / 0
0.00	WL	Water level 0% height/diameter	8516718	Comment / 0
16.62	MHF	Finish node type, manhole, reference FWMH2	8516724	Comment / 0

End Node Ref:FWMH2 | I/L :mm

CCTV Inspection Photos

Dr Drainage
Unit 4, 10 Chancellor Street
Leeds
West Yorkshire
LS6 2TE

Job Number	Surveyed by (Operator)	Base Unit	Date
7	**COREY LEWIS**	**19F9EMGOGS**	**14/09/2023**

Start node type, manhole, reference FWMH1

Water level 0% height/diameter

Finish node type, manhole, reference FWMH2

CCTV Inspection Report

Dr Drainage
Unit 4, 10 Chancellor Street
Leeds
West Yorkshire
LS6 2TE

Surveyed by (Operator)	Job Number	Pipe Length Reference(PLR)	Date	Pre Cleaned
COREY LEWIS	**7**	**FWMH2 X**	**14/09/2023**	**HPWJ to clean prior to survey**
Weather	Customer Present	Service Grade/Structural Grade	Base Unit	Section Number
1 - Dry		**0/5**	**19F9EMGOGS**	**12**

Road **Woodlands Service Station**
Place **Fleetwood Road**
Location **FY5 4BL**

Division
District
Location Details

Purpose
Duty **Foul**
Catchment

Shape/Size **100mm**
Material **Vitrified clay**
Category

Start Node **FWMH2**
End Node **MAIN**
Total length **5.9 metres**

Scale **1:0.31**
Direction **Downstream**

View via iTouch Live | Download

Start Node Ref:FWMH2 | I/L :1.40mm | Depth: 2.0mm

Position	Code	Description	Photo	Type/Grade
0.00	MH	Start node type, manhole, reference BURIED MH	8516887	Comment / 0
0.00	WL	Water level 0% height/diameter	8516888	Comment / 0
3.55	JD	Joint displaced 30mm	8516889	Structural / 5
5.90	OFF	Finish node type, outfall, reference MAIN	8516913	Comment / 0

End Node Ref:MAIN | I/L :mm

CCTV Inspection Photos

Dr Drainage
Unit 4, 10 Chancellor Street
Leeds
West Yorkshire
LS6 2TE

Job Number	Surveyed by (Operator)	Base Unit	Date
7	**COREY LEWIS**	**19F9EMGOGS**	**14/09/2023**

Start node type, manhole, reference BURIED MH

Water level 0% height/diameter

Joint displaced 30mm

Finish node type, outfall, reference MAIN

Dr Drainage
Unit 4, 10 Chancellor Street
Leeds
West Yorkshire
LS6 2TE

CCTV Inspection Report

Surveyed by (Operator)	Job Number	Pipe Length Reference(PLR)	Date	Pre Cleaned
COREY LEWIS	**7**	**FWMH4 X**	**14/09/2023**	**HPWJ to clean prior to survey**
Weather	Customer Present	Service Grade/Structural Grade	Base Unit	Section Number
1 - Dry		**0/0**	**19F9EMGOGS**	**18**

Road **Woodlands Service Station**
Place **Fleetwood Road**
Location **FY5 4BL**

Division
District
Location Details

Purpose
Duty **Foul**
Catchment

Shape/Size **100mm**
Material **Vitrified clay**
Category

Start Node **FWMH4**
End Node **UNKNOWN**
Total length **10.57 metres**

Scale **1:0.55**
Direction **Downstream**

View via iTouch Live | Download

Start Node Ref:FWMH4 | I/L :0.92mm | Depth: 1.4mm

Position	Code	Description	Photo	Type/Grade
0.00	MH	Start node type, manhole, reference FWMH4	8517239	Comment / 0
0.00	WL	Water level 0% height/diameter	8517240	Comment / 0
9.52	LR	Line of drain/sewer deviates right	8517244	Comment / 0
10.57	OCF	Finish node type, other special chamber, reference UNKNOWN	8517249	Comment / 0

End Node Ref:UNKNOWN | I/L :mm

CCTV Inspection Photos

Dr Drainage
Unit 4, 10 Chancellor Street
Leeds
West Yorkshire
LS6 2TE

Job Number	Surveyed by (Operator)	Base Unit	Date
7	**COREY LEWIS**	**19F9EMGOGS**	**14/09/2023**

Start node type, manhole, reference FWMH4

Water level 0% height/diameter

Line of drain/sewer deviates right

Finish node type, other special chamber, reference UNKNOWN

DO NOT SCALE, IF IN DOUBT ASK. DO NOT INTERROGATE CAD BASE

DRAINAGE NOTES:

1. THIS DRAWING HAS TO BE READ IN CONJUNCTION WITH ALL RELEVANT ARCHITECTS & ENGINEERS DRAWINGS AND SPECIFICATIONS.
2. FOR DRAINAGE DETAILS REFER TO DRAWING PXXXXX.
3. FOR LOCATION OF ALL R.W.P's & INTERNAL POP-UP's REFER TO ARCHITECTS DRAWING. ALL DOWN PIPES TO BE FITTED WITH ACCESS HANDHOLES ABOVE F.F.L. OR GROUND LEVEL.
4. ALL GULLY CONNECTIONS TO BE 150Ø U.N.O. ALL S.V.P. CONNECTIONS TO BE MINIMUM 100Ø OR TO MATCH S.V.P. DOWNPIPE IF GREATER. ALL R.W.P. CONNECTIONS TO BE 150Ø OR TO MATCH R.W.P. DOWNPIPE.
5. ALL PIPES UP TO 450Ø TO BE UPVC PIPES. PIPES GREATER THAN 450Ø TO BE CONCRETE.
6. PIPES UNDER ROADS HAVING 1200mm OR LESS COVER ARE TO BE ENCASED IN CONCRETE IN ACCORDANCE WITH THE MANUFACTURERS RECOMMENDATIONS.
7. MANHOLE COVER LEVELS ARE INDICATIVE AND SHOULD BE SET TO SUIT FINISHED ROAD LEVEL AND CAMBER.
8. ALL EXTERNAL MANHOLES WITHIN ROADS TO BE FITTED WITH LOADCLASS D400 COVERS U.N.O. ALL EXTERNAL MANHOLES WITHIN SOFT LANDSCAPING TO BE FITTED WITH LOADCLASS B125 COVERS U.N.O. ALL IN ACCORDANCE WITH BS EN 124:2015 (ALL PARTS).
9. INVERT LEVELS OF EXISTING DRAINS AND MANHOLES TO BE CONFIRMED ON SITE PRIOR TO COMMENCING OPERATIONS. NO EXISTING SEWER MANHOLE TO BE OPENED OR ENTERED WITHOUT THE PERMISSION OF THE LOCAL AUTHORITY DRAINAGE DEPARTMENT AND THE ATTENDANCE OF SEWER PERSON AS REQUIRED.
10. DRAINAGE DESIGN AND INSTALLATION TO BE TO THE SATISFACTION OF THE LOCAL BUILDING CONTROL DEPARTMENT AND TO COMPLY WITH BS EN 752:2017, BS EN 1610:2015, BS EN 12056-1:2000, BS EN 12056-2:2000 and BS EN 12056-3:2000.
11. ADOPTABLE DRAINAGE WORKS TO BE CARRIED OUT IN ACCORDANCE WITH THE LATEST EDITION OF 'SEWERS FOR ADOPTION'.
12. ALL SUDS COMPONENTS TO BE MAINTAINED IN ACCORDANCE WITH CIRIA C 768.
13. SURFACE WATER ATTENUATION CRATES TO BE WAVIN AQUACELL PLUS OR SIMILAR APPROVED. TO BE INSTALLED IN LINE WITH MANUFACTURES SPECIFICATION.

SURFACE WATER ATTENUATION

PROPOSED IMPERMEABLE AREA: 1280m² (0.128Ha)

EXISTING IMPERMEABLE AREA: 1360m² (0.136 Ha)

SITE AREA: 1360m² (0.136 Ha)

EXISTING SW RUN-OFF: 2.78 x 0.136 x 50 = 18.9 L/S

DISCHARGE RATE: 18.9 L/S - 74% = 5.0 L/S

CELLULAR TANK DIMENSIONS: 16m x 4.0m x 0.8m x 0.95 = 48.6m³

STORM EVENT: 1 IN 100YR + 50% CLIMATE CHANGE

CDM NOTES

1. ACCESS AND EGRESS TO THE SITE FROM BUSY ROAD.
2. POTENTIAL GROUND INSTABILITY IN DEEP EXCAVATIONS
3. NO HEAVY PLANT OR STOCK PILES PERMITTED OVER OR WITHIN 3m OF THE CONSTRUCTED TANK.
4. TANK TO BE FULLY PROTECTED FROM SILT AND DEBRIS INGRESS DURING CONSTRUCTION, AND TO BE INSPECTED AND MAINTAINED DURING OPERATION AS DETAILED ABOVE
5. TANKS NOT DESIGNED TO RESIST UPLIFT UNTIL FULLY BACKFILLED
6. EXISTING SERVICES IDENTIFIED ON SITE.
7. ADEQUATE SEGREGATION HOARDING REQUIRED TO SEPARATE PUBLIC FROM THE CONSTRUCTION SITE.
8. ADEQUATE MEASURES REQUIRED TO CONTROL NOISE, DUST, FUMES & VIBRATION.

REV.	DATE.	REVISION.	BY.	CHK.
–		FIRST ISSUE.	PH	NB
-	-	-	-	-

Penny Petroleum

Proposed Petrol Filling Station at Woodland S/Stn
Fleetwood Road N, Thornton-Cleveleys

Drawing Title: Drainage Layout Plan

OPERATION AND MAINTENANCE REQUIREMENTS FOR ATTENUATION STORAGE TANKS

MAINTENANCE SCHEDULE	REQUIRED ACTION	TYPICAL FREQUENCY
REGULAR MAINTENANCE	INSPECT & IDENTIFY ANY AREAS THAT ARE NOT OPERATING CORRECTLY. IF REQUIRED, TAKE REMEDIAL ACTION	MONTHLY FOR 3 MONTHS THEN ANNUALLY
	REMOVE DEBRIS FROM THE CATCHMENT SURFACE (WHERE IT MAY CAUSE RISK TO PERFORMANCE)	MONTHLY
	REMOVE SEDIMENT FROM PRE-TREATMENT ROAD GULLIES & SILT TRAP MANHOLE	MONTHLY FOR 3 MONTHS THEN ANNUALLY OR AS REQUIRED
REMEDIAL ACTIONS	REPAIR/REHABILITATE INLETS, OUTLETS, OVERFLOWS & VENTS	AS REQUIRED
MONITORING	INSPECT/CHECK ALL INLETS, OUTLETS, VENTS & OVERFLOWS TO ENSURE THAT THEY ARE IN GOOD CONDITION & OPERATING AS DESIGNED	ANNUALLY
	CCTV SURVEY INSIDE OF TANK FOR SEDIMENT BUILD-UP & REMOVE IF NECESSARY	AFTER CONSTRUCTION, 1 YEAR, & THEN EVERY 5 YEARS OR AS REQUIRED

Goodson Associates
Tel: +44 (0)113 369 7925
Fax: -
Email: leeds@goodsons.com
Web: www.goodsons.com
Consulting Civil, Structural & Transportation Engineers
Fountain House, 4 South Parade,
Leeds, LS1 5QX
Also at Aberdeen, Edinburgh and Glasgow.

PLANNING

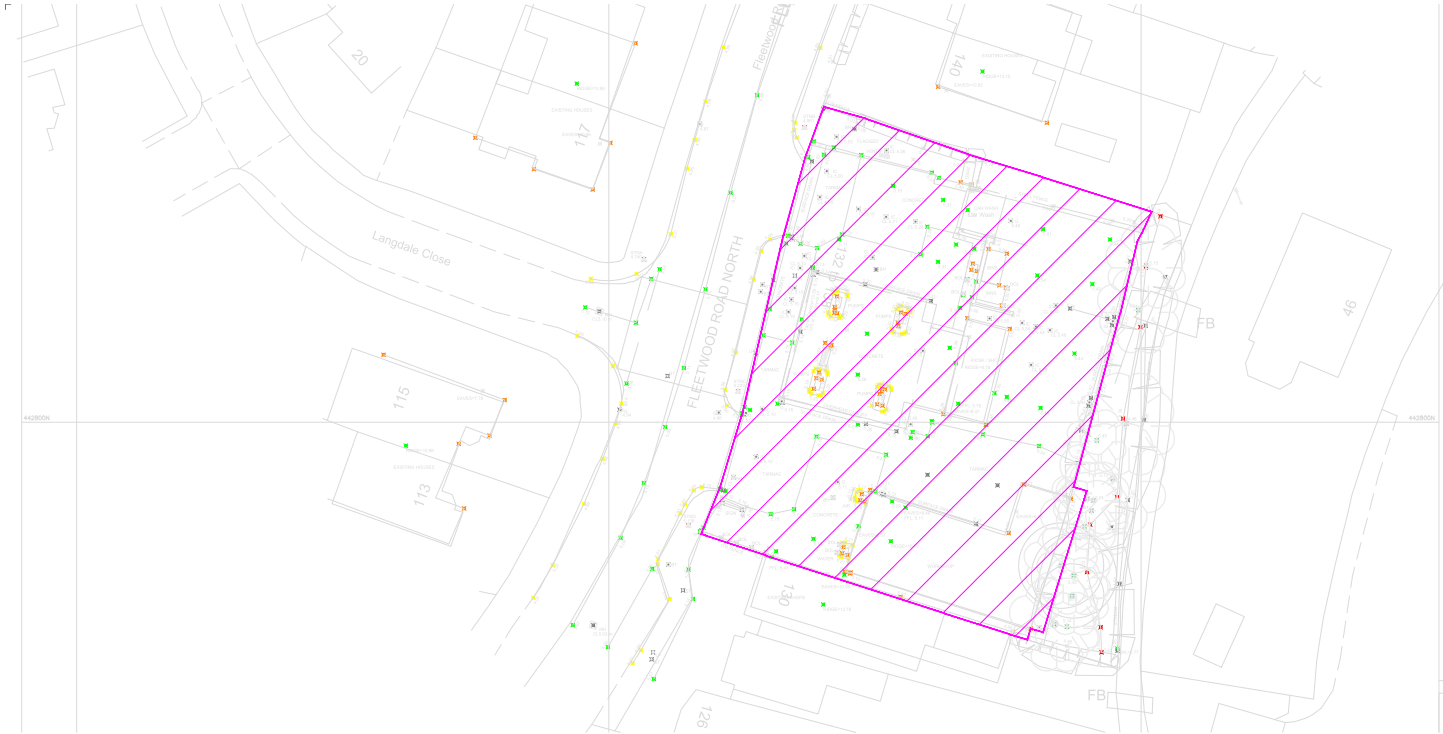
DATE CREATED:	SCALE:	
Sept. '23'	1:200	@ A1

CONTRACT No:	DRAWING No:	REV:
P15701	500	-

DO NOT SCALE, IF IN DOUBT ASK. DO NOT INTERROGATE CAD BASE

EXISTING IMPERMEABLE AREA:1360m² (0.136 Ha)
EXISTING SW RUN-OFF: 2.78 x 0.136 x 50 = 18.9 L/S - 74% = 5.0 L/S

PROPOSED IMPERMEABLE AREA: 1280m² (0.128 Ha)



COORDINATED STATIONS

STATION	EASTING	NORTHING	LEVEL (m)
A	333603.305	442815.268	4.740
B	333618.387	442827.682	4.961
C	333612.138	442803.872	5.233
D	333607.472	442790.288	5.138

ABBREVIATIONS

AV	AIR VALVE/VENT	IC	INSPECT CHAMBER
BOL	BOLLARD	IL	INVERT LEVEL
BB	BELISHA BEACON	JKW	JAPANESE KNOTT WEED
BM	BENCH MARK	LH	LAMP HOLE
BL	BUD LEVEL	LP	LAMP POST
BT	BT MANHOLE	NP	NAME PLATE
CL	CENTRE LINE	MH	MANHOLE
DE	DILAPIDATED	PS	POST/SIGN POST
DM	DISUSED	PB	POST BOX
EL	EAVES LEVEL	PX	UNKNOWN SERVICE
ELE	ELEC JUNCT. BOX	RE	RODDING EYE
EP	ELECTRICITY POLE	RL	RIDGE LEVEL
FH	FIRE HYDRANT	RS	ROAD SIGN
FL	FLOOR LEVEL	ST	STOP TAP
FOS	FULL OF SEDIMENT	TH	TRIAL HOLE
FP	FLAG POLE	TS	TRAFFIC LIGHT
G	GULLY	TP	TELEPHONE POLE
GM	GAS METER	TV	CABLE TV BOX
GV	GAS VALVE	UG	UNABLE TO LIFT
		WM	WATER METER

SYMBOLS

SURVEY STATION, TREE, E — O/H ELEC CABLE, BENCH MARK, T — O/H PHONE LINE, TRIAL PIT, CANOPY\HEDGE, BOREHOLE

NOTES

A) ONLY MANHOLES AND SERVICES VISIBLE AT TIME OF SURVEY SHOWN

B) O/S GRID USED AND ORIENTATED TO TRUE NORTH

C) LEVELS IN METRES RELATED TO G.P.S.

D) DRAINAGE INFORMATION MUST BE CHECKED PRIOR TO WORK COMMENCING

Rev	Description	Date

PROPOSED DEVELOPMENT AT WOODLAND PFS, THORNTON

REV.	DATE.	REVISION.	BY.	CHK.
–		FIRST ISSUE.	PH	NB
-	-	-	-	-

Penny Petroleum

Proposed Petrol Filling Station at Woodland S/Stn
Fleetwood Road N, Thornton-Cleveleys

Impermeable Area Plan

Goodson Associates

Tel: +44 (0)113 369 7925
Fax: -
Email: leeds@goodsons.com
Web: www.goodsons.com

Consulting Civil, Structural & Transportation Engineers
Fountain House, 4 South Parade,
Leeds, LS1 5QX
Also at Aberdeen, Edinburgh and Glasgow.

PLANNING

DATE CREATED:	Sept. '23'	SCALE:	1:250 @ A1
CONTRACT No:	DRAWING No:	REV:	
P15701	501	-	

Summary of Results for 100 year Return Period (+50%)

Half Drain Time : 87 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
15 min Summer	0.419	0.419	0.0	5.0	5.0	25.5	O K
30 min Summer	0.549	0.549	0.0	5.0	5.0	33.4	O K
60 min Summer	0.649	0.649	0.0	5.0	5.0	39.5	O K
120 min Summer	0.677	0.677	0.0	5.0	5.0	41.2	O K
180 min Summer	0.662	0.662	0.0	5.0	5.0	40.2	O K
240 min Summer	0.632	0.632	0.0	5.0	5.0	38.4	O K
360 min Summer	0.550	0.550	0.0	5.0	5.0	33.5	O K
480 min Summer	0.473	0.473	0.0	5.0	5.0	28.8	O K
600 min Summer	0.404	0.404	0.0	5.0	5.0	24.6	O K
720 min Summer	0.344	0.344	0.0	5.0	5.0	20.9	O K
960 min Summer	0.250	0.250	0.0	5.0	5.0	15.2	O K
1440 min Summer	0.148	0.148	0.0	4.7	4.7	9.0	O K
2160 min Summer	0.105	0.105	0.0	3.9	3.9	6.4	O K
2880 min Summer	0.088	0.088	0.0	3.1	3.1	5.3	O K
4320 min Summer	0.071	0.071	0.0	2.3	2.3	4.3	O K
5760 min Summer	0.062	0.062	0.0	1.8	1.8	3.8	O K
7200 min Summer	0.056	0.056	0.0	1.5	1.5	3.4	O K
8640 min Summer	0.051	0.051	0.0	1.3	1.3	3.1	O K
10080 min Summer	0.048	0.048	0.0	1.2	1.2	2.9	O K
15 min Winter	0.477	0.477	0.0	5.0	5.0	29.0	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	125.838	0.0	30.1	23
30 min Summer	84.653	0.0	40.6	36
60 min Summer	54.441	0.0	52.2	62
120 min Summer	33.880	0.0	65.0	100
180 min Summer	25.325	0.0	72.9	134
240 min Summer	20.469	0.0	78.6	168
360 min Summer	15.040	0.0	86.6	234
480 min Summer	12.093	0.0	92.8	298
600 min Summer	10.202	0.0	97.9	360
720 min Summer	8.874	0.0	102.2	420
960 min Summer	7.115	0.0	109.2	534
1440 min Summer	5.201	0.0	119.8	756
2160 min Summer	3.794	0.0	131.1	1104
2880 min Summer	3.030	0.0	139.6	1472
4320 min Summer	2.202	0.0	152.1	2188
5760 min Summer	1.754	0.0	161.6	2936
7200 min Summer	1.469	0.0	169.2	3672
8640 min Summer	1.270	0.0	175.6	4400
10080 min Summer	1.124	0.0	181.2	5128
15 min Winter	125.838	0.0	33.7	23

Summary of Results for 100 year Return Period (+50%)

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
30 min Winter	0.628	0.628	0.0	5.0	5.0	38.2	O K
60 min Winter	0.743	0.743	0.0	5.0	5.0	45.2	O K
120 min Winter	0.776	0.776	0.0	5.0	5.0	47.2	O K
180 min Winter	0.753	0.753	0.0	5.0	5.0	45.8	O K
240 min Winter	0.709	0.709	0.0	5.0	5.0	43.1	O K
360 min Winter	0.593	0.593	0.0	5.0	5.0	36.1	O K
480 min Winter	0.463	0.463	0.0	5.0	5.0	28.1	O K
600 min Winter	0.358	0.358	0.0	5.0	5.0	21.8	O K
720 min Winter	0.273	0.273	0.0	5.0	5.0	16.6	O K
960 min Winter	0.166	0.166	0.0	4.8	4.8	10.1	O K
1440 min Winter	0.106	0.106	0.0	3.9	3.9	6.4	O K
2160 min Winter	0.082	0.082	0.0	2.9	2.9	5.0	O K
2880 min Winter	0.071	0.071	0.0	2.3	2.3	4.3	O K
4320 min Winter	0.059	0.059	0.0	1.7	1.7	3.6	O K
5760 min Winter	0.051	0.051	0.0	1.3	1.3	3.1	O K
7200 min Winter	0.047	0.047	0.0	1.1	1.1	2.8	O K
8640 min Winter	0.043	0.043	0.0	1.0	1.0	2.6	O K
10080 min Winter	0.040	0.040	0.0	0.9	0.9	2.4	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
30 min Winter	84.653	0.0	45.4	37
60 min Winter	54.441	0.0	58.5	62
120 min Winter	33.880	0.0	72.8	106
180 min Winter	25.325	0.0	81.7	142
240 min Winter	20.469	0.0	88.0	182
360 min Winter	15.040	0.0	97.0	258
480 min Winter	12.093	0.0	104.0	320
600 min Winter	10.202	0.0	109.6	378
720 min Winter	8.874	0.0	114.5	434
960 min Winter	7.115	0.0	122.3	538
1440 min Winter	5.201	0.0	134.1	750
2160 min Winter	3.794	0.0	146.8	1104
2880 min Winter	3.030	0.0	156.3	1472
4320 min Winter	2.202	0.0	170.4	2200
5760 min Winter	1.754	0.0	181.0	2976
7200 min Winter	1.469	0.0	189.5	3648
8640 min Winter	1.270	0.0	196.6	4408
10080 min Winter	1.124	0.0	203.0	5088

Rainfall Details

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	100	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	18.000	Shortest Storm (mins)	15
Ratio R	0.350	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+50

Time Area Diagram

Total Area (ha) 0.128

Time From:	(mins) To:	Area (ha)	Time From:	(mins) To:	Area (ha)	Time From:	(mins) To:	Area (ha)
0	4	0.043	4	8	0.043	8	12	0.043

Model Details

Storage is Online Cover Level (m) 2.000

Cellular Storage Structure

Invert Level (m) 0.000 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	64.0	0.0	0.801	0.0	0.0
0.800	64.0	0.0	2.000	0.0	0.0

Hydro-Brake® Optimum Outflow Control

Unit Reference	MD-SHE-0107-5000-0900-5000
Design Head (m)	0.900
Design Flow (l/s)	5.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	107
Invert Level (m)	0.000
Minimum Outlet Pipe Diameter (mm)	150
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	0.900	5.0
Flush-Flo™	0.271	5.0
Kick-Flo®	0.590	4.1
Mean Flow over Head Range	-	4.3

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	3.6	1.200	5.7	3.000	8.8	7.000	13.1
0.200	4.9	1.400	6.1	3.500	9.4	7.500	13.6
0.300	5.0	1.600	6.5	4.000	10.1	8.000	14.0
0.400	4.9	1.800	6.9	4.500	10.6	8.500	14.4
0.500	4.6	2.000	7.2	5.000	11.2	9.000	14.8
0.600	4.1	2.200	7.6	5.500	11.7	9.500	15.2
0.800	4.7	2.400	7.9	6.000	12.2		
1.000	5.2	2.600	8.2	6.500	12.7		