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- This drawing is to be read in conjunction with the architects and landscape architects drawings.
- Do not scale from this drawing

P01 25.03.24 Issued for NRW

Rev	Date	Description

Client:
Plant & Robinson Construction

Project:
Lower Farm Barns

Drawing Title:
Drainage Discharge

Drawing No:
285-LST-XX-XX-DR-D-0001

Drawn By:	GD	Date:	20.09.2022
Checked By:	LS	Date:	25.03.2024
Drawing Scale:	1:200	Sheet Size:	A1

Revision P01 Status S2

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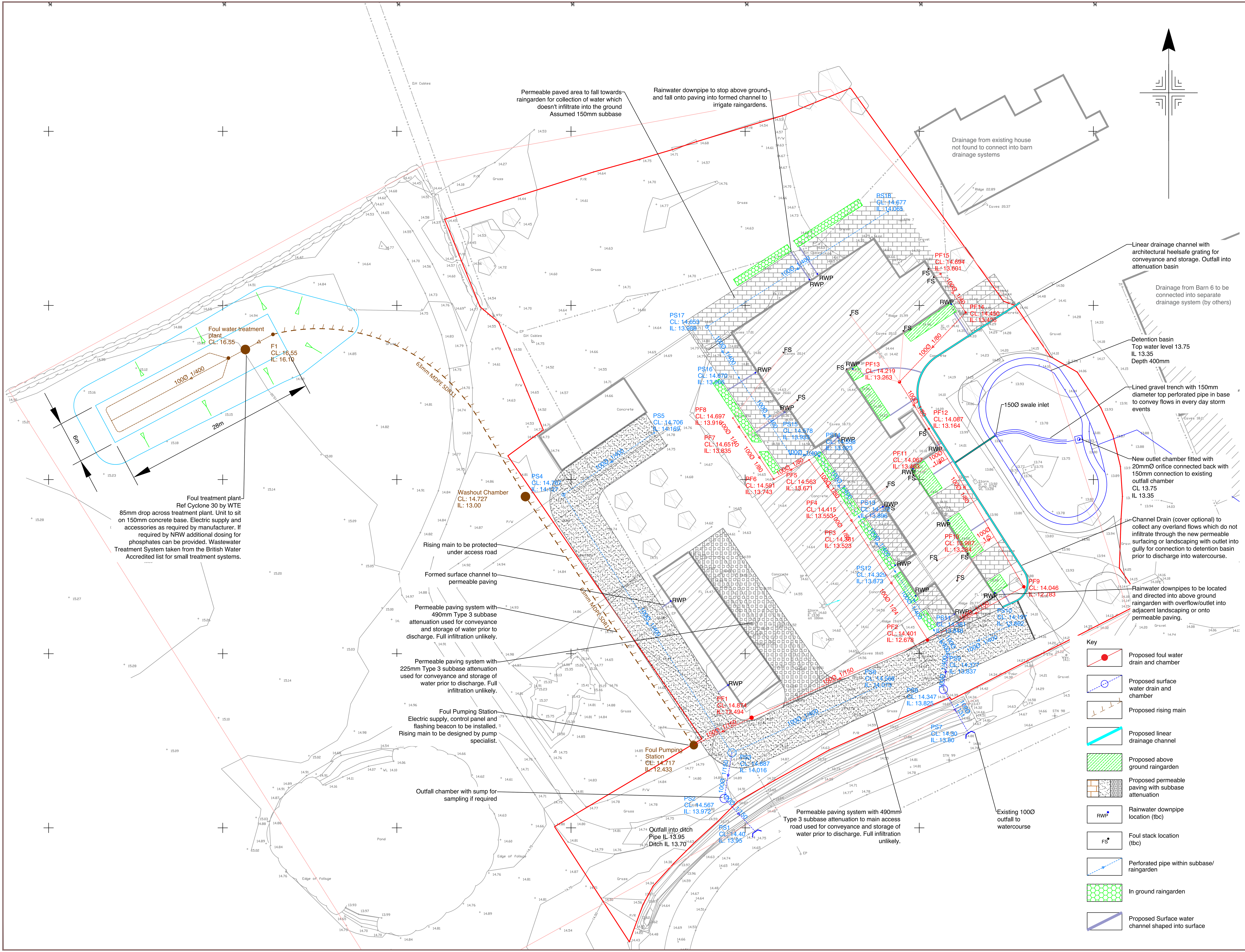
CAD FILE NAME: C:\Users\Lisa Sawyer\Land Studio Ltd\Company SP - Documents\Company Data\05 Projects\285 Lower Farm Barns\01 CAD REVIT\285-LST-XX-XX-DR-D-0001.dwg



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- This drawing has been developed using information provided to Land Studio by a number of third parties. Land Studio can not accept responsibility for the accuracy of the information shown and derived from third-party information.
- This drawing is to be read in conjunction with the architects and landscape architects drawings.
- All levels should be checked on site and conflicts reported to the engineer.
- Do not scale from this drawing.
- All levels are in metres above ordnance datum UNO.
- Final foul stack and rainwater downpipe locations are assumed at this stage and therefore subject to change. The strategy for discharge though will remain the same.
- No existing below ground services are envisaged. Existing below ground drainage servicing the barns has been traced where possible and indicated on this drawing.
- On site surface water drainage has been designed up to and including the 1 in 100 year storm event plus 45% climate change. Exceedance flows are directed away from the buildings within the proposed levels design.
- Where below ground pipe junctions connect at an oblique angle, connections are to be installed as per the oblique junction arrangement detail to prevent future blockages.
- Pipes are not designed for construction traffic; contractor will take necessary precautions to protect pipes during construction.
- It is assumed that all above ground drainage connections at each house are roddable and vented from above ground.

Material Specification

- Concrete for general drainage works designated mix Gen 3 to BS 8500 - 1:2006, BS EN 206 - 1:2013.
- Polypropylene inspection chambers to be in accordance with BS7158 or BS EN 13598-1 or agreement certified. OSMA ref 6D928 or similar approved.
- All chamber covers to be minimum B125 double sealed and lockable. D400 to be used in trafficked areas.
- For pipes with more than 1200mm cover below external ground level to have Class S surround U.N.O. in accordance with Building Regulations Document H.
- For pipes with less than 1200mm cover to crown pipe bedding to be Class Z surround or protective cover slab U.N.O. in accordance with Building Regulations Document H.
- All surface water pipes to be HDPE structured wall to BS EN 1401-1, kitemarked, agrement certified or CE marked U.N.O.
- All domestic foul water pipes to be vitrified clay to BS EN 295-1:1991/BS 65 as appropriate, kitemarked, agrement certified or CE marked U.N.O.
- All perforated pipes to be 110mm PVC-U wrapped in geotextile to BS 4962.
- All foul branch connections to be DN110 at 1:40 minimum gradient U.N.O.
- All surface water branches to be DN150 at 1:80 minimum gradient U.N.O.
- Root protection barriers to be installed where drainage trenches are within 5m of existing or proposed trees.

Attenuation Volume Split

- Detention Basin 115m3
- Access Road Subbase (East) 100m3
- Access Road Subbase (West) 195m3

Total - 410m3 (required storage 256m3)

- Additional storage not included for in calculations at this stage within above ground rain gardens and permeable paving build up.

Rev	Date	Description
P03	22.03.24	Specification of Sewage Treatment Plant amended
P02	21.02.24	Inclusion of Drainage Mound
P01	26.09.22	Discharge of planning condition

Client:
Plant & Robinson Construction

Project:
Lower Farm Barns

Drawing Title:
Drainage General Arrangement

Drawing No:
285-LST-XX-XX-DR-D-0100

Drawn By:	GD	Date:	20.09.2022
Checked By:	LS	Date:	22.03.2024
Drawing Scale:	1:200	Sheet Size:	A1
Revision	P03	Status	S2

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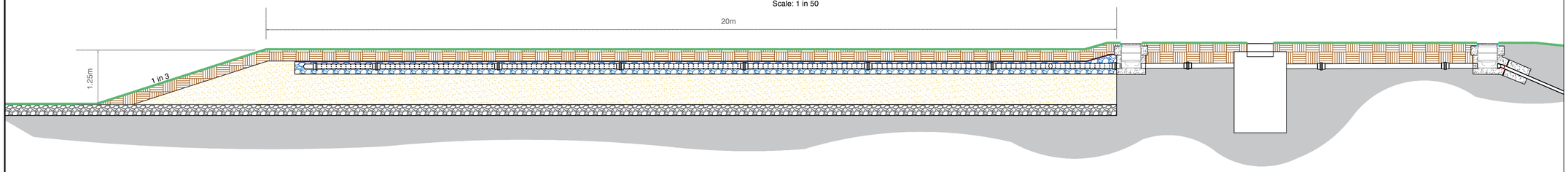
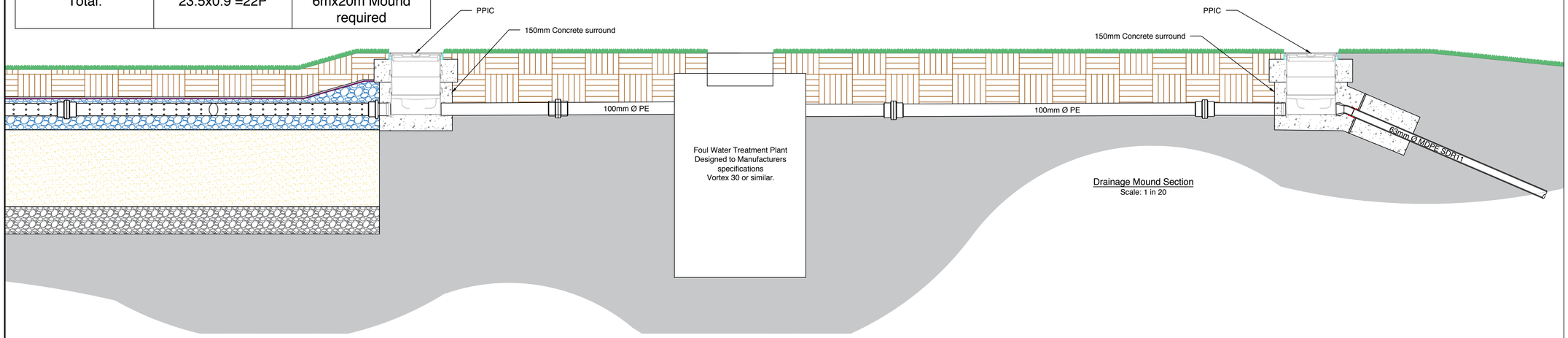
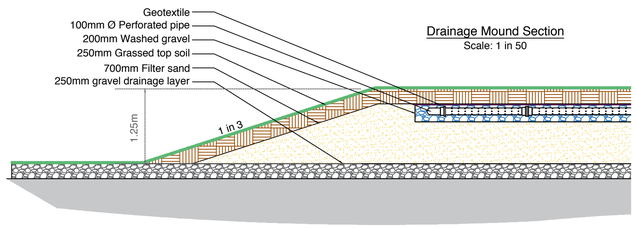
Drainage Mound Section
Scale: 1 in 50



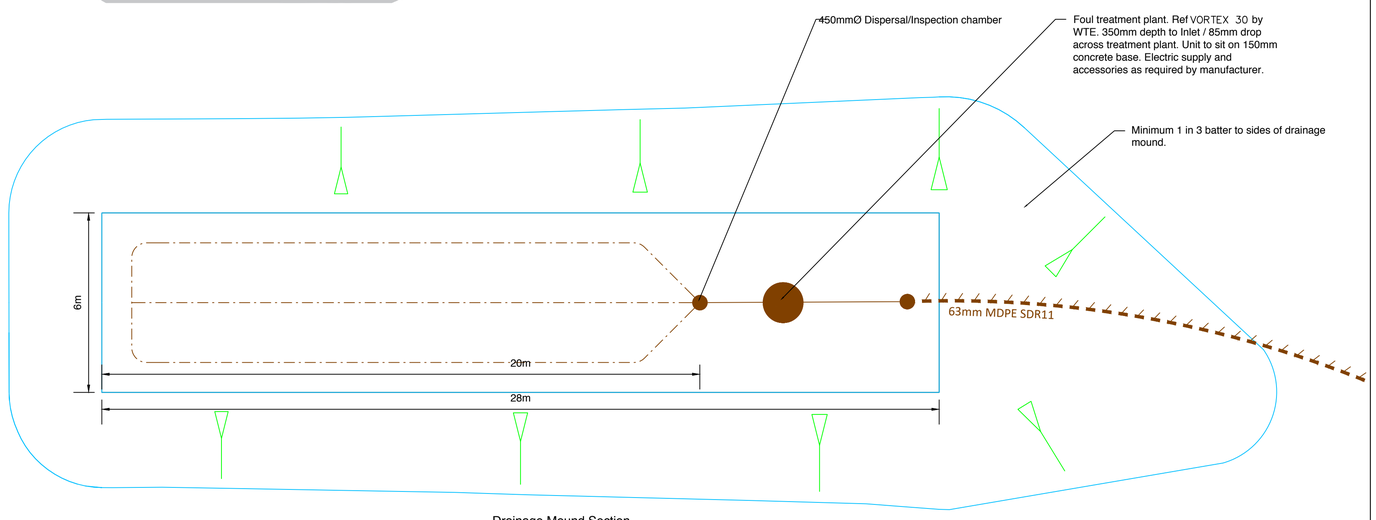
Mound Calculations		
Occupants per dwelling	+2 for P Value	At= PxVpx0.2
3.5	5.5	Vp=27
3	5	22x27x0.2=118.8
2.5	4.5	120msqm
2	4	$\frac{120}{6}$=20
2.5	4.5	
Total:	23.5x0.9 =22P	6mx20m Mound required



Drainage Mound Section
Scale: 1 in 20



Drainage Mound Section
Scale: 1 in 50



Drainage Mound Section
Scale: 1 in 100

Notes

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· This drawing is to be read alongside Landscape Architectural and Drainage General Arrangement drawings.
· Only figured dimensions are to be taken from this drawing. Dimensions should not be scaled from this drawing, as scaling of this drawing cannot be assured.

Rev	Date	Description
P01	21.02.24	Issued For Review

Client:
Plant & Robinson Construction

Project:
Lower Farm Barns

Drawing Title:
Drainage Mound Sections

Drawing No:
285-LST-XX-XX-DR-D-0401

Drawn By: GD	Date: 21.02.24
Checked By: LS	Date: 21.02.24
Drawing Scale: As Indicated	Sheet Size: A1

Revision P01 Status S2

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SLADEN ASSOCIATES

Environmental and Geotechnical Consultants

UNIT 5, NETHERTON WORKSHOPS, NEW ROAD,
HIGHLEY, BRIDGNORTH, SHROPSHIRE, WV16 6NN
TEL: 01746 860222 FAX: 01746 862330

1 March 2024

Mr P Robinson
Elm Cottage
Lower Barns
Malpas
Cheshire
SY14 7LB

Dear Phil

Re: Soakaway Testing at Lower Farm Barns, Bowling Bank, Wrexham

Further to your instruction, we undertook three soakaway tests to assess the suitability of drainage fields for use in waste water treatment (BS 6297:2007 + A1:2008) and a trial pit (TP A) to establish the underlying geology. The soakaway test pits were hand excavated and a machine excavator was used for TP A. The tests were undertaken in general accordance with BS 6297 methodology.

Figure 1, attached, shows the site location and the work was undertaken on 25th January 2024. Detailed logs of the trial pits are attached, together with Figure 2 showing the test hole locations.

The study area is shown by maps published by the British Geological Survey to be underlain by the Kinnerton Sandstone Formation of Triassic Age. The solid geology is shown to be overlain by Glacial Till, with River Terrace Deposits present approximately 160m to the east.

The trial pits on site have identified River Terrace Deposits, below topsoil, and these were found to extend to at least 600mm below ground level in all the trial pits. These marginal deposits were found to be cohesive, with very limited granular inclusions. The River Terrace Deposits were underlain by cohesive Glacial Till in TP A to the base at 1.9m. The bedrock was not encountered in any of the trial pits.

A groundwater monitoring standpipe was installed in TP A and this was monitored on 1st February and encountered water at 1.78m below ground level.

Soakaway Tests

The three soakaway pits were excavated to 0.6m and were filled with 300mm of water. None of the pits drained over the monitoring period of 3 hours.

The results of the test are summarised as follows:

Location	Depth of Water at Start of Test (mm)	Depth of Water After Three Hours	Derived Infiltration Rate
TP1	300	285	Fail
TP2	300	265	Fail
TP 3	300	230	Fail

Extrapolating the drop in water depth after three hours resulted in test failures, as the pits need to have empted by 6 hours.

The strata tested is not suitable for field drainage for waste water treatment.

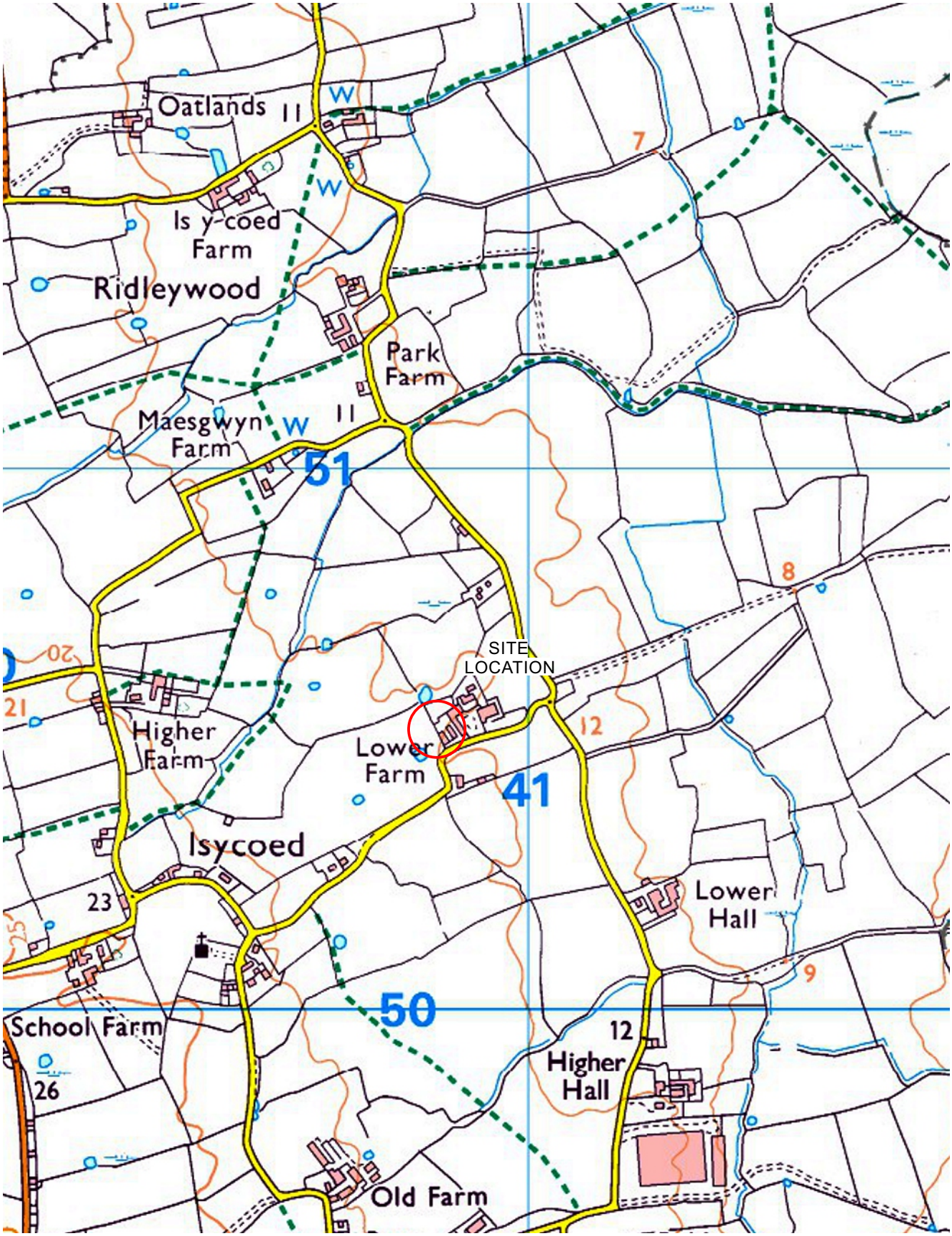
All the strata encountered within the trial pits on site would have a very low permeability, typically in the range 1 x 10-7 to 1 x 10-9 m/s.

We trust the above meets your present requirements, should you need any additional information, please do not hesitate to contact our office.

Yours sincerely

G L Dorrell BEng, FGS
Director

Attachments:
Figure 1 Location Plan
Figure 2 Site Layout Plan
Trial Pit Logs



SITE LOCATION PLAN

SLADEN ASSOCIATES	Report No 24-2659	Project Lower Farm Barns Bowling Bank Is-Y-Coed	Figure **1**

SITE LAYOUT PLAN

SLADEN ASSOCIATES	Report No 24-2659	Project Lower Farm Barns, Bowling Bank, Is-Y-Coed	Figure **2**

SLADEN ASSOCIATES

Unit 5, Netherton Workshops, Highley, Bridgnorth, Shropshire, WV16 6NN Tel:01746 860222 Fax:01746 862330

Trial Pit No: A

Equipment & Methods	Job No: 23-2659			
Machine Excavator	Project: Lower Barns Farm, Bowling Bank, Wrexham			
Carried out for	Ground Level	Coordinates		Date
Plant & Robinson Construction	0	E N		25-01-24

Descriptions	Legend	Depth	Reduced Level	Samples/Tests/Notes: Depth	Sample Type	Sample No.	Test	Field Records
Soft to firm brown sandy CLAY with much root. (TOPSOIL)		0.25	-0.25					
Firm light orangey brown slightly gravelly CLAY. Gravels are fine to medium rounded to sub rounded quartz and sandstone. Occasional clayey sand lenses. (RIVER TERRACE DEPOSITS)		0.60	-0.60					
Firm to stiff, becoming stiff orange brown becoming red brown and grey slightly sandy, slightly gravelly CLAY. Gravels are medium to coarse rounded to subrounded quartz and sandstone. (GLACIAL TILL)								
End of Trial Pit		1.90	-1.90					

Additional Comments
Groundwater: slight seepage 0.6m.
Pit sides stable during excavation.
Groundwater/gas monitoring standpipe installed to 1.9m.

Logged by GLD

Figure

SLADEN ASSOCIATES

Unit 5, Netherton Workshops, Highley, Bridgnorth, Shropshire, WV16 6NN Tel:01746 860222 Fax:01746 862330

Trial Pit No: 1

Equipment & Methods	Job No: 23-2659			
Machine Excavator	Project: Lower Barns Farm, Bowling Bank, Wrexham			
Carried out for	Ground Level	Coordinates		Date
Plant & Robinson Construction	0	E N		25-01-24

Descriptions	Legend	Depth	Reduced Level	Samples/Tests/Notes: Depth	Sample: Type	Sample: No.	Test	Field Records
Soft dark brown sandy CLAY with much root. (TOPSOIL)								
		0.25	-0.25					
Soft to firm brown silty CLAY with some roots. (RIVER TERRACE DEPOSITS)								
		0.40	-0.40					
Firm orangey brown CLAY. (RIVER TERRACE DEPOSITS)								
		0.60	-0.60					
End of Trial Pit								

Additional Comments
Groundwater: none encountered.
Pit sides stable during excavation.
Soakaway test conducted in excavation.

Logged by GLD

Figure

SLADEN ASSOCIATES

Unit 5, Netherton Workshops, Highley, Bridgnorth, Shropshire, WV16 6NN Tel:01746 860222 Fax:01746 862330

Trial Pit No: 2

Equipment & Methods	Job No: 23-2659			
Machine Excavator	Project: Lower Barns Farm, Bowling Bank, Wrexham			
Carried out for	Ground Level	Coordinates		Date
Plant & Robinson Construction	0	E N		25-01-24

Descriptions	Legend	Depth	Reduced Level	Samples/Tests/Notes: Depth	Sample: Type	Sample: No.	Test	Field Records
Soft to firm brown sandy CLAY with much root. (TOPSOIL)		0.20	-0.20					
Firm brown silty CLAY with some roots. (RIVER TERRACE DEPOSITS)		0.40	-0.40					
Firm light brown and orangey brown CLAY. (RIVER TERRACE DEPOSITS)		0.60	-0.60					
End of Trial Pit								

Additional Comments
Groundwater: none encountered.
Pit sides stable during excavation.
Soakaway test conducted in excavation.

Logged by GLD

Figure

SLADEN ASSOCIATES

Unit 5, Netherton Workshops, Highley, Bridgnorth, Shropshire, WV16 6NN Tel:01746 860222 Fax:01746 862330

Trial Pit No: 3

Equipment & Methods	Job No: 23-2659			
Machine Excavator	Project: Lower Barns Farm, Bowling Bank, Wrexham			
Carried out for	Ground Level	Coordinates		Date
Plant & Robinson Construction	0	E N		25-01-24

Descriptions	Legend	Depth	Reduced Level	Samples/Tests/Notes: Depth	Sample: Type	Sample: No.	Test	Field Records
Soft to firm brown sandy CLAY with much root. (TOPSOIL)								
		0.20	-0.20					
Firm orangey brown and grey slightly sandy CLAY. (RIVER TERRACE DEPOSITS)								
		0.60	-0.60					
End of Trial Pit								

Additional Comments
Groundwater: none encountered.
Pit sides stable during excavation.
Soakaway test conducted in excavation.

Logged by GLD

Figure

Lower Farm Barns

Phosphate Calculation Check

Nutrient From Wastewater

Water infrastructure information		
Description of required information	**Data entry column - user inputs required**	**Additional data entry column - user inputs may be required**
Date of first occupancy (dd/mm/yyyy):	01/01/2025	
Average occupancy rate (people/dwelling or people/unit):	2.40	
Water usage (litres/person/day):	120	
Development proposal (dwellings/units):	5	
Wastewater treatment works:	Package Treatment Plant user defined	
Current wastewater treatment works P permit (mg TP/litre):	**Enter value in cell C10**	4.5
Current wastewater treatment works N permit (mg TN/litre):	**Enter value in cell C11**	3.6

Final calculation of nutrient load from wastewater	
Description of values generated	**Values generated**
Wastewater nutrient loading	
Additional population (people):	**12.00**
Wastewater by development (litres/day):	**1440.00**
Annual wastewater TP load (kg TP/yr):	**2.37**
Annual wastewater TN load (kg TN/yr):	**1.89**

The Annual Wastewater TP load = 2.37 kg/yr

Wastewater treatment plant spec – Cyclone by WTE

Certificate

387.01C03

WTE Ltd
Blackberry Farm, Fog Lane, Ellerton, York, YO42 4PU, United Kingdom

EN 12566-3, Annex B
Small wastewater treatment systems for up to 50 PT

Small wastewater treatment system Cyclone
MBBR (Moving Bed Biofilm Reactor)

Test report PIA2021-387B22-02

Evaluation of the nominal sequences of the 38-week testing

Nominal organic daily load (influent)	0.22 kg BOD_5/d
Nominal hydraulic daily load	0.60 m³/d
Material	High-density polyethylene

Treatment efficiency

	Efficiency	Effluent
COD	94.7 %	46 mg/l
BOD_5	97.7 %	8 mg/l
TN_b	50.2 %	30 mg/l
NH_4-N*	91.5 %	3.6 mg/l
P_{tot}	38.9 %	4.5 mg/l
SS	97.9 %	8 mg/l

Evaluation of the complete 38-week testing

Electrical consumption	0.41 kWh/d
Number of desludging	0

** determined for temperatures ≥ 12 ° C in the bioreactor*

Tested by:

PIA – Prüfinstitut für Abwassertechnik GmbH
(PIA GmbH)
Hergenrather Weg 30
52074 Aachen, Germany

This document replaces neither the declaration of performance nor the CE marking.

Notified Body
No.: 1739

PIA - Sustainable Certification
geprüft - tested - testé

Martina Wermter August 2021

Nutrients From Current Land Use

Current land use information			
Description of required information	**Data entry column - user inputs required**		
Operational catchment:	Dee		
Soil drainage type:	Impeded drainage		
Annual average rainfall (mm):	650.1 - 675		
Within nitrate vulnerable zone (NVZ):	No		
Current land uses			
Existing land use type(s) - user inputs required	**Area (ha) - user inputs required**	**Annual phosphorus nutrient export (kg TP/yr)**	**Annual nitrogen nutrient export (kg TN/yr)**
Dairy	2.70	**2.58**	**51.50**

Based on the dairy farm land which includes fields only in the ownership of our land owner (2.7ha) the current situation produced 2.58 kg/yr

Nutrient From Future Land Use

Future land uses			
New land use type(s) - user inputs required	**Area (ha) - user inputs required**	**Annual phosphorus nutrient export (kg TP/yr)**	**Annual nitrogen nutrient export (kg TN/yr)**
Residential urban land	0.30	**0.40**	**3.69**
Greenspace	2.40	**0.05**	**7.20**

Based on the proposed situation land useage using the say area will produce 0.45kg /yr

The total annual phosphorus load to mitigate within the site is 0.66kg /yr ((2.58-2.37)+0.45)

Surface water SuDS features have been installed to reduce phosphates within the surface water design. These include the following

- Permeable paving (38% removal)
- Detention Basin (28% removal)
- Bioswale (44% removal)

SuDS information				
New land use type(s) within SuDS catchment area – user inputs required	**SuDS catchment area (ha) – user inputs**	**Percentage of flow entering the SuDS (%) – user inputs**	**Annual phosphorus inputs to SuDS feature(s)**	**Annual nitrogen inputs to SuDS**
Residential urban land	0.30	100.00	**0.40**	**3.69**
Residential urban land	0.20	100.00	**0.26**	**2.46**
Greenspace	1.20	50.00	**0.02**	**3.60**

Name of SuDS feature(s) – user inputs required	**TP removal rate for features – user specified (%) – user**	**TN removal rate for features – user specified (%) – user inputs**	**Annual phosphorus load removed by SuDS**
Permeable Paving	38.00		**0.15**
Detention Basin	28.00		**0.07**
Bioswales	44.00		**0.01**

0.66 kg/yr – 0.23 kg/yr = 0.43 kg/yr

The phosphorus load can only be reduced further by implementation of a dosing system to the sewage treatment plant which can be achieved in the Cyclone Treatment Plant if required. This would then provdie a system which is neutrient neutral.