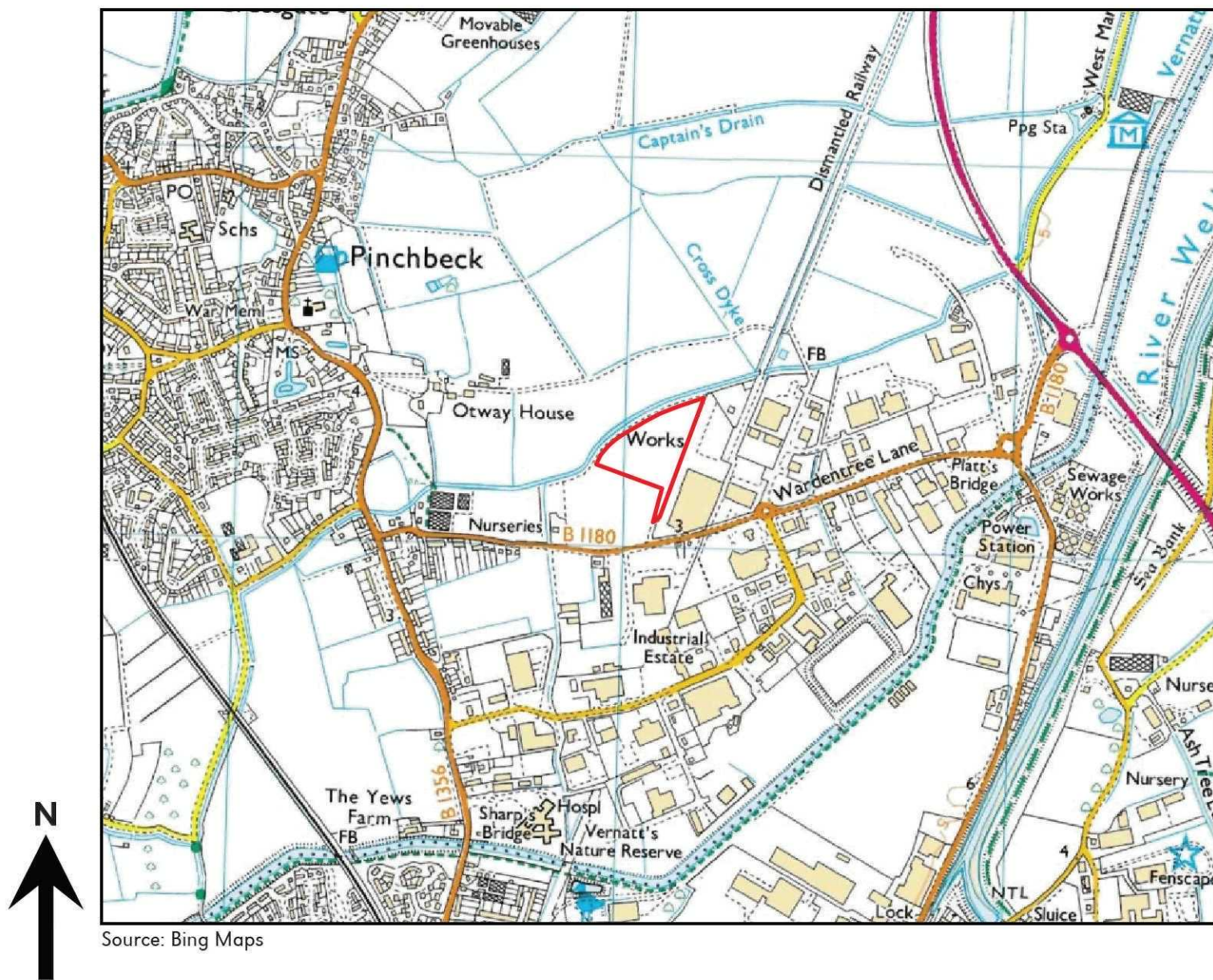


DRAWINGS APPENDIX

CONTENTS

Drawing No. 19597/800	- Site Location Plan
Drawing No. 19597/801	- Topographical Survey
Drawing No. 19597/802	- Proposed Site Plan Showing Schematic Drainage Layout
Drawing No. 19597/803	- Environment Agency Flood Map (Fluvial & Tidal)
Drawing No. 19597/804	- British Geological Survey Superficial Geology Map
Drawing No. 19597/805	- British Geological Survey Bedrock Geology Map
Drawing No. 19597/806	- British Geological Survey Hydrogeology Map



Source: Bing Maps

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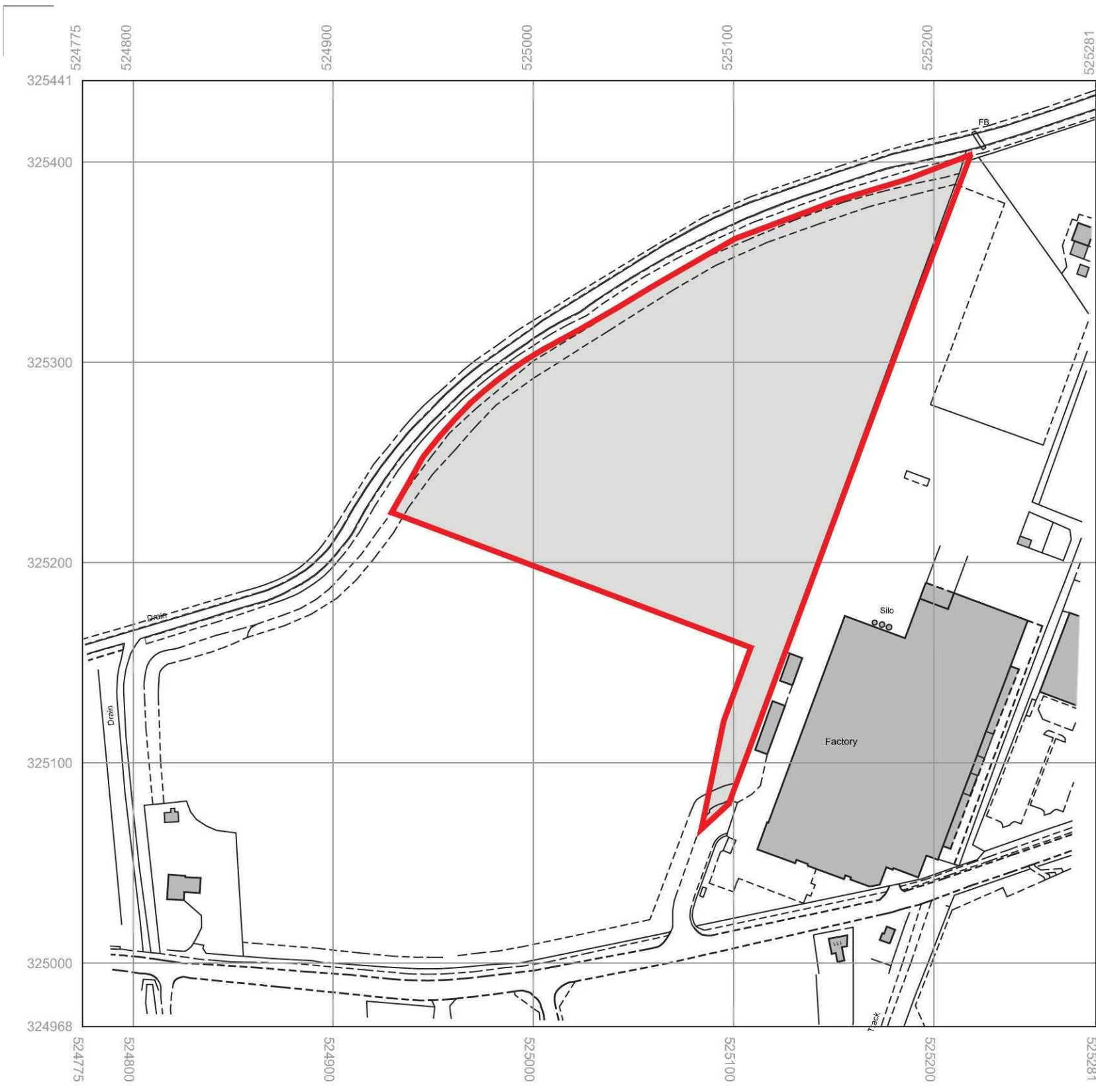
Project
Proposed AD Plant
North of Warentree Lane
Spalding
Lincolnshire

Drawing Title
Site Location Plan

Scale N.T.S	Date April 2015	Drawn By SVH
----------------	--------------------	-----------------

Drawing No. 19597/800

Rev 0



Site location plan
Scale 1:2500

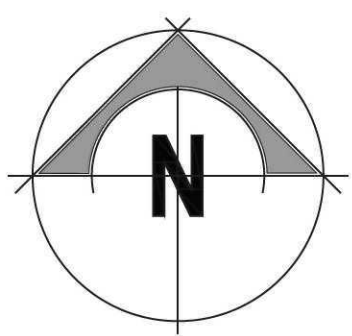
**Ordnance Survey
Master Map Data**

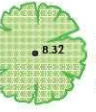
This product contains data surveyed at one or more of the following scales: 1/1250, 1/2500 & 1/10000
The representation of a road, track or path is no evidence of a right of way. The alignment of tunnels is approximate
Heights are given in metres above Datum.

Produced DEC 2014 from Ordnance Survey digital mapping and incorporating surveyed revision available at this date
This Site map product does not contain all recorded map information.

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- Survey Notes**
- All levels and coordinates relate to a GPS derived datum. Control was established using Ordnance Survey's Active GPS Network OSG832(36). Translated from ETRS89 using OSGM02 and OSTN02 models. Control station information may not be shown on this drawing, please contact Plandescil Ltd should you require assistance.
 - All levels shown adjacent to kerb lines have been taken at channel face unless stated otherwise
 - Not all existing services are necessarily shown on this drawing. All services that could be located at the time of the survey have been positioned but should be taken as approximate and used as a guide to their presence. Clarification of all underground routes should be confirmed by the individual service provider and prior to project construction.
 - Land ownership boundaries and legal title extents have not been identified in this survey. Fences have been surveyed at post positions and changes of direction. Hedges located at face or line of main stem, see drawing note to specify.
 - Not all trees have been surveyed, trees shown as below have been fixed by trunk position. Level relates to ground at base of trunk.

Areas of dense trees and vegetation have been shown by the approximate ground coverage and have no trunk positioning

 - This survey has been merged with Ordnance Survey Master Map Data. Boundaries and physical objects have only been fixed where level information is present. See Licence details No. AL100005917 All Ordnance Survey mapping is subject to their own accuracy and tolerances.
 - The information presented in this survey is a recording of what was present and accessible at the time of survey. Areas of the site not surveyed are represented by Ordnance Survey mapping.

0	22.04.15	MJH	First Issue
Rev	Date	Chkd	Description

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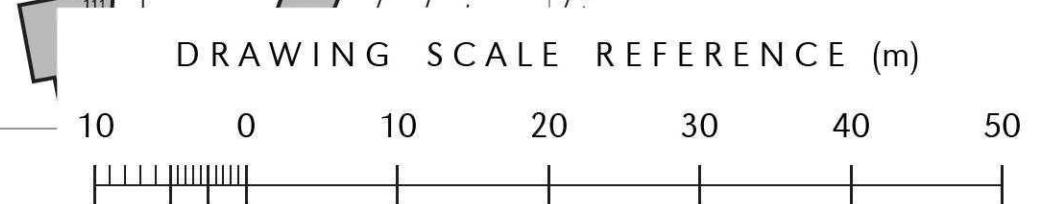
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Client
EnviTec

Project
**Land off Wardentree Lane
Spalding
Lincolnshire.**

Drawing Title
**TOPOGRAPHICAL SURVEY
DECEMBER 2014**

Scale	U.N.O.	Date	Drawn By
1:750 (A1)		April 2015	MG/MH
Drawing No.	19597/801	Rev	0



KEY

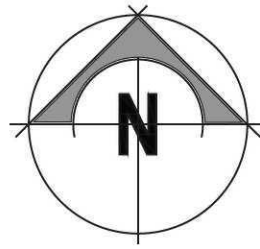
- 1 Digester Tank, 35.90mØ (2No.)
- 2 Post Digester / Liquid Residue, 35.90mØ (2No.)
- 3 Condensate Pit
- 4 Liquid Waste Tank (4No.)
- 5 Recirculation Pit (2No.)
- 6 Gas Flare
- 7 Site Office
- 8 Weighbridge - 18m x 3m (1No.)
- 9 Pasturisation Container
- 10 Technical Building / Reception Hall - 65m x 40m
- 11 Gas Upgrading System
- 12 Separator & Dry Digestate Storage
- 13 Digestate Removal Station
- 14 Cooling Unit
- 15 Transformer
- 16 Concrete Apron
- 17 Site Entrance
- 18 Access Road
- 19 CHP
- 20 Material Handling Area
- 21 Compressed Gas Filling Station
- 22 Compressor(3No.)
- 23 GEU
- 24 Propane Tanks
- 25 Car Parking
- 26 Comms Dish
- 27 Biofilter
- 28 Provision for Future Storage
- 29 Provision for Future Compressor(2No.)
- 30 High Pressure Gas Storage
- 31 Security Gates
- 32 Connection to existing ITS Pipe
- 33 HV Switchroom
- 34 Dispenser(4No.)
- 35 Attenuation Pond
- 36 Storage Pond(2No.)

LEGEND:

- Concrete Surface
- Asphalt Surface
- DFT Type 1 Surface
- Gravel Footpath
- Landscaping Bunds
- Pond
- Red Line Boundary (3.61 Ha)

DRAINAGE KEY

- Surface Water Drain
- Shut-off Valve
- Overland Flow Routes



Note:

1. All dimensions noted are in millimetres unless stated otherwise.
2. All levels noted are in metres U.N.O Above Ordnance Datum.
3. Do not scale from this drawing, if dimensions are not clear ask.
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PRELIMINARY

Rev	Date	Chkd	Description
0	27-04-15	MJH	First Issue

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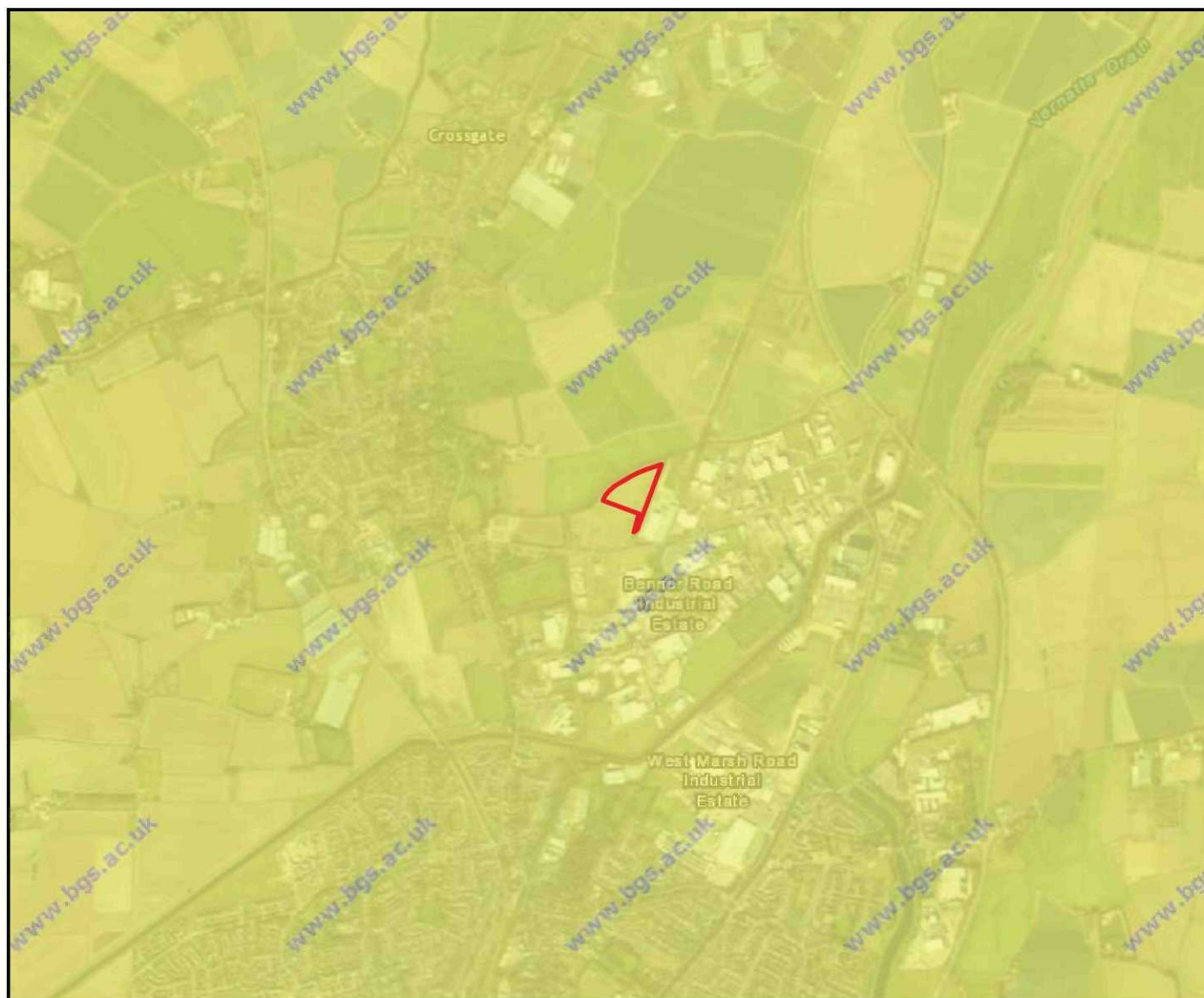
Project

Proposed AD Plant
Spalding
Lincolnshire

Drawing Title

Proposed Site Plan Showing
Schematic Drainage Layout

Scale	U.N.O.	Date	Drawn By
1:500 (A1)		April 2015	MJH
Drawing No.	19597/802	Rev	0



'Contains British Geological Survey materials © NERC [2015]'

Legend

 Tidal Flat Deposits
(Clay & Silt)

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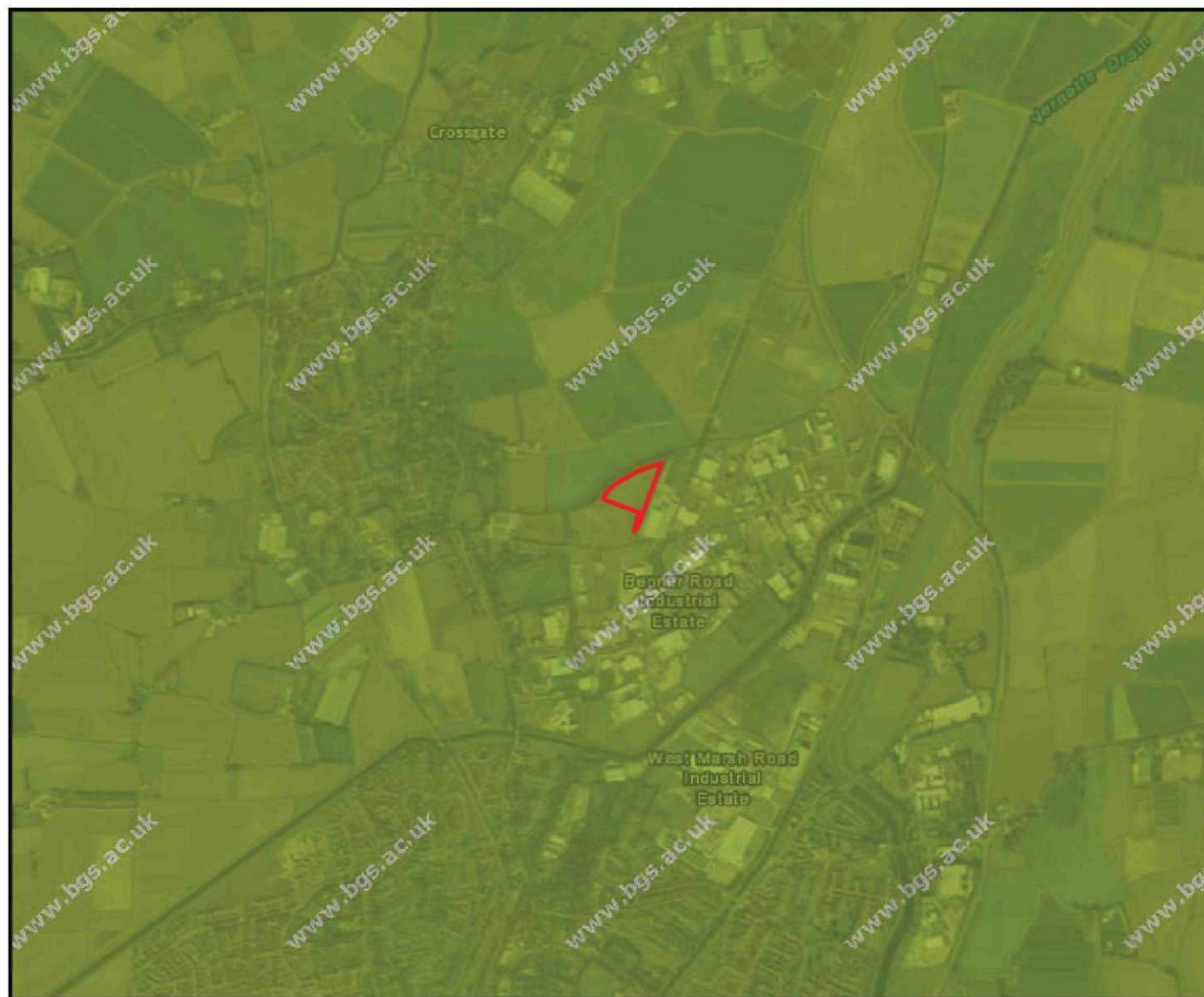
Client
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Project
Proposed AD Plant
North of Warentree Lane
Spalding
Lincolnshire

Drawing Title
British Geological Survey
Superficial Geology Map

Scale N.T.S	Date April 2015	Drawn By SVH
----------------	--------------------	-----------------

Drawing No. 19597/804	Rev 0
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Legend

 Oxford Clay Formation
(Mudstone)

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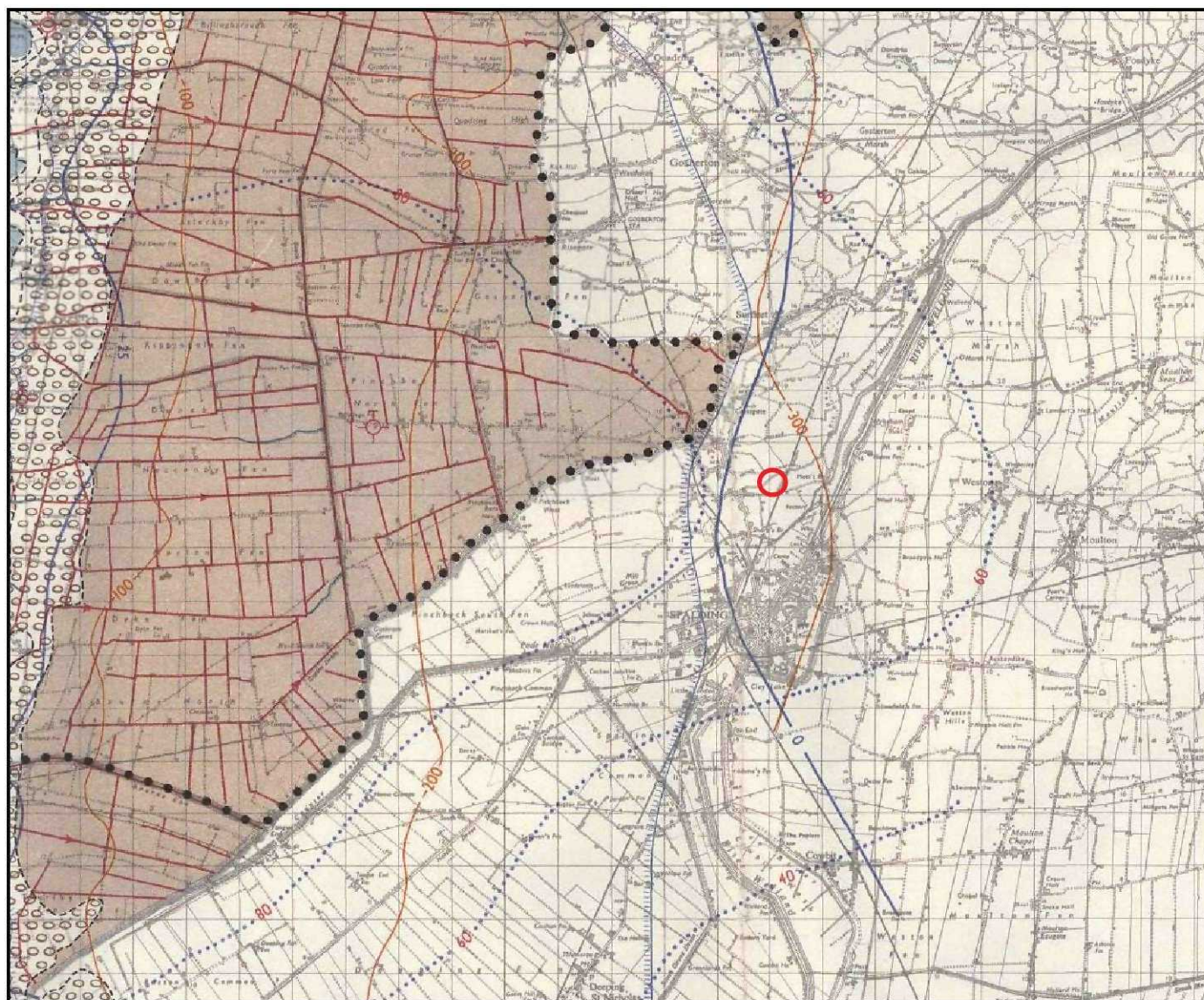
Client
Envitec

Project
Proposed AD Plant
North of Wardentree Lane
Spalding
Lincolnshire

Drawing Title
British Geological Survey
Bedrock Geology Map

Scale N.T.S	Date April 2015	Drawn By SVH
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Drawing No. 19597/805	Rev 0
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Legend

— Contours of the water table or pressure surface

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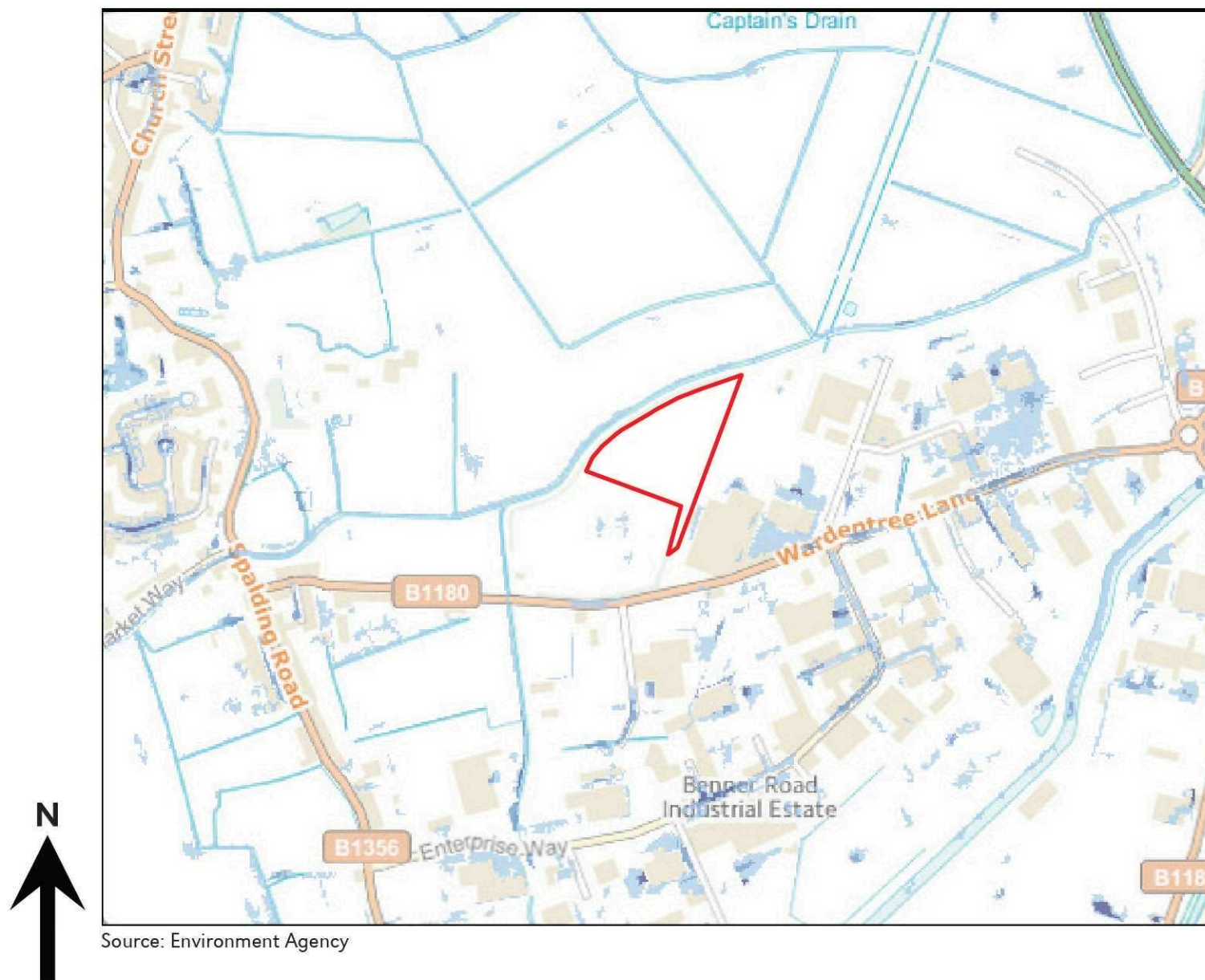
Client
Envitec

Project
Proposed AD Plant
North of Wardentree Lane
Spalding
Lincolnshire

Drawing Title
British Geological Survey
Hydrogeology Map

Scale N.T.S.	Date April 2015	Drawn By SVH
-----------------	--------------------	-----------------

Drawing No. 19597/806	Rev 0
--------------------------	----------



Source: Environment Agency

Legend

- Very Low
(less than 1 in 1000
(0.1%))
- Low
(between 1 in 1000
(0.1%) & 1 in 100 (1%))
- Medium
(between 1 in 100 (1%)
& 1 in 30 (3.3%))
- High
(Greater than 1 in 30
(3.3%))

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Project
Proposed AD Plant
North of Wardentree Lane
Spalding
Lincolnshire

Drawing Title
Environment Agency Surface
Water Flooding Map

Scale N.T.S	Date April 2015	Drawn By SVH
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Drawing No. 19597/810	Rev 0
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APPENDIX A

CONTENTS

Extract from A F Howland Associates Ground Investigation, January 2015.....	1-11
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A F Howland Associates Geotechnical Engineers

Site
SPALDING AD PLANT

Borehole
Number
BH01

Boring Method Cable Percussion	Casing Diameter 200mm cased to 8.80m 150mm cased to 16.00m		Ground Level (mOD) 2.98	Client Envitec Biogas AG	Job Number 14.374
	Location 525012 E 325236 N		Dates 06/12/2014- 08/12/2014	Engineer Plandescil	Sheet 1/3

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.50	D1						Soft to firm brown silty CLAY		
1.00	D2						... becoming very soft greyish brown and slightly sandy		
1.50-1.95 1.50-1.95	B1 U1 No Recovery	1.40	DRY	16 blows		(3.50)	... becoming very silty		
2.50-2.95 2.50-2.95	SPT N=1 D3	2.40	DRY	1,0/0,0,1,0					
3.00	D4								
3.50 3.50-3.95	W1 D5			Slow(1) at 3.50m, rose to 3.24m in 20 mins, not sealed.	-0.52	3.50	Brown slightly clayey sandy SILT		▼1
3.50-3.95 4.00	SPT N=6 D6	3.50	DRY	1,0/1,1,2,2					▼1
4.50-4.95 4.50-4.95	SPT N=9 D7	4.50	3.10	1,1/2,2,2,3					
5.50	D8					(3.30)			
6.00-6.45 6.00-6.45	SPT N=8 D9	6.00	4.30	1,0/1,2,2,3					
7.00	D10				-3.82	6.80	Medium dense light grey silty fine SAND. With black specks and rare shell fragments in places		
7.50-7.95 7.50-7.95	SPT N=21 D11	7.50	3.90	2,3/4,5,6,6					
8.50	D12								
9.00-9.45 9.00-9.45	SPT N=26 D13	8.50	4.10	2,4/4,6,7,9		(4.40)			
				06/12/2014:4.10m 07/12/2014:3.10m					

Remarks

1. Location CAT scanned prior to excavation.
2. Hand dug inspection pit to 1.20 m.
3. Groundwater struck at 3.50 m and rose to 3.37 m in 5 mins., 3.29 m in 10 mins., 3.28 m in 15 mins. and 3.24 m in 20 mins.
4. Water added from 3.00 m to 9.00 m approx 210 litres
5. SPT Hammer Energy Ratio = 71.32%

Scale
(approx)
1:50

Logged
By
AHm

Figure No.
14.374.BH01



A F Howland Associates Geotechnical Engineers

Site
SPALDING AD PLANT

Borehole
Number
BH01

Boring Method Cable Percussion	Casing Diameter 200mm cased to 8.80m 150mm cased to 16.00m		Ground Level (mOD) 2.98	Client Envitec Biogas AG	Job Number 14.374
	Location 525012 E 325236 N		Dates 06/12/2014- 08/12/2014	Engineer Plandescil	Sheet 2/3

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
10.00	D14						Medium dense light grey silty fine to medium SAND. With black specks and rare shell fragments in places		
10.50-10.95 10.50-10.95	SPT N=31 D15	10.50	3.10	3,4/6,7,8,10					
11.20	D16				-8.22	11.20 (0.70)	Very soft to soft grey silty CLAY		
12.00-12.45 12.00-12.45	SPT(C) N=6 B2	12.00	10.30	1,0/1,1,2,2	-8.92	11.90 (1.30)	Loose grey clayey gravelly fine to medium SAND. Gravel is subangular to subrounded fine to medium and rare coarse flint and mudstone. Occasional pockets of firm grey clay		
13.20	D17				-10.22	13.20 (0.20)	Firm grey mottled light brown silty slightly gravelly CLAY. Gravel is subangular mainly medium mudstone		
13.50-13.95 13.50-13.95	SPT(C) N=17 B3	13.50	7.30	2,3/3,4,4,6	-10.42	13.40 (2.20)	Medium dense greyish brown slightly silty gravelly fine to coarse SAND. Gravel is subangular to subrounded predominantly fine and occasional medium flint. Occasional shell fragments		
15.00-15.45 15.00-15.45	SPT(C) N=28 B4	15.00	7.30	3,4/5,6,8,9			... gravel becoming fine to medium and a little coarse flint		
15.60	D18				-12.62	15.60	Stiff grey silty gravelly CLAY. Gravel is subangular to rounded fine to coarse chalk, flint and mudstone		
16.50-16.95	U2	16.00	16.10	74 blows					
16.95-17.05	D19								
18.00-18.42 18.00-18.45	SPT 50/265 D20	16.00	17.10	6,7/10,12,16,12		(4.80)			
19.00	D21								
19.50-19.95	U3	16.00	18.70	100 blows					

Remarks

Scale
(approx)
1:50

Logged
By
AHm

Figure No.
14.374.BH01



A F Howland Associates Geotechnical Engineers

Site
SPALDING AD PLANT

Borehole
Number
BH01

Boring Method Cable Percussion	Casing Diameter 200mm cased to 8.80m 150mm cased to 16.00m		Ground Level (mOD) 2.98	Client Envitec Biogas AG	Job Number 14.374
	Location 525012 E 325236 N		Dates 06/12/2014- 08/12/2014	Engineer Plandescil	Sheet 3/3

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
19.95-20.05	D22						Stiff grey silty gravelly CLAY. Gravel is subangular to rounded fine to coarse chalk, flint and mudstone		
20.40	D23				-17.42	20.40	Very stiff fissured grey slightly silty CLAY. With rare shell fossil fragments and 1 no. intact fossil		
21.00-21.33 21.00-21.45	SPT 50/180 D24	16.00	19.50	9,10/17,23,10					
22.00	D25					(4.60)			
23.00	D26								
24.00 24.00-24.45	D27 U4	16.00	22.90	100 blows					
24.45-24.55	D28								
				07/12/2014:3.90m	-22.02	25.00	Complete at 25.00m		

Remarks

Scale
(approx)
1:50

Logged
By
AHm

Figure No.
14.374.BH01



A F Howland Associates Geotechnical Engineers

Site
SPALDING AD PLANT

Borehole
Number
BH02

Boring Method Cable Percussion	Casing Diameter 200mm cased to 8.80m 150mm cased to 15.20m		Ground Level (mOD) 2.94	Client Envitec Biogas AG	Job Number 14.374
	Location 525112 E 325226 N		Dates 08/12/2014- 09/12/2014	Engineer Plandescil	Sheet 1/2

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.50	D1						Soft to firm brown silty CLAY. With occasional fine roots		
1.00	D2						... becoming soft and slightly sandy to 2.00 m.		
1.50-1.95 1.50-1.95	SPT N=6 D3		DRY	1,0/1,1,2,2		(3.50)	... becoming very silty and silt in places		
2.00	D4								
2.50-2.95	U1	2.40	DRY	16 blows					
2.95-3.05 3.10	D5 W1			Slow(1) at 3.10m, rose to 2.87m in 20 mins, not sealed. 1,1/0,1,1,2	-0.56	3.50	Brown slightly clayey sandy SILT		
3.50-3.95 3.50-3.95	SPT N=4 B1	3.50	3.10						
4.50-4.95 4.50-4.95	SPT N=3 B2	4.50	4.10	1,0/1,1,0,1		(2.00)			
5.50	D6				-2.56	5.50	Loose brownish grey silty fine SAND. With black specks		
6.00-6.45 6.00-6.45	SPT N=6 D7	6.00	5.30	1,0/1,1,2,2					
7.00	D8						... becoming very silty in places		
7.50-7.95 7.50-7.95	SPT N=19 D9	7.50	4.70	2,3/4,4,5,6			... becoming medium dense		
8.50	D10								
9.00-9.45 9.00-9.45	SPT N=23 D11	8.80	5.30	2,4/4,5,6,8 08/12/2014:5.30m 09/12/2014:3.40m					

Remarks

1. Location CAT scanned prior to excavation.
2. Hand dug inspection pit to 1.20 m.
3. Groundwater struck at 3.10 m and rose to 3.03 m in 5 mins., 2.96 m in 10 mins., 2.91 m in 15 mins. and 2.87 m in 20 mins.
4. Water added from 3.10 m to 9.00 m approx 200 litres
5. SPT Hammer Energy Ratio = 71.32%

Scale
(approx)

1:50

Logged
By

AHm

Figure No.

14.374.BH02



A F Howland Associates Geotechnical Engineers

Site
SPALDING AD PLANT

Borehole
Number
BH02

Boring Method Cable Percussion	Casing Diameter 200mm cased to 8.80m 150mm cased to 15.20m		Ground Level (mOD) 2.94	Client Envitec Biogas AG	Job Number 14.374
	Location 525112 E 325226 N		Dates 08/12/2014- 09/12/2014	Engineer Plandescil	Sheet 2/2

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness) (8.80)	Description	Legend	Water
10.00	D12						Medium dense brownish grey silty fine to medium SAND. With black specks		
10.50-10.95 10.50-10.95	SPT N=26 D13	10.50	4.70	2,3/5,6,7,8					
11.50	D14								
12.00-12.45 12.00-12.45	SPT N=21 D15	12.00	6.30	2,3/4,5,6,6			Greyish brown slightly silty gravelly fine to coarse SAND. Gravel is subangular to subrounded fine to medium flint and mudstone. Small pockets of grey clay		
13.00	D16								
13.50-13.95 13.50-13.95	SPT N=23 D17	13.50	5.30	1,3/4,6,6,7					
15.00-15.45	B3				-11.36	14.30	Stiff grey silty gravelly CLAY. Gravel is subangular to rounded fine to coarse mainly chalk and occasional flint and mudstone		
						(0.90)			
					-12.26	15.20			
16.00 16.00-16.45 16.00-16.45	D18 B4 SPT N=42	15.20	4.30	09/12/2014:4.30m 3,5/8,10,11,13		(1.25)	Complete at 16.45m		
					-13.51	16.45			

Remarks

Scale
(approx)
1:50

Logged
By
AHm

Figure No.
14.374.BH02



A F Howland Associates Geotechnical Engineers

Site
SPALDING AD PLANT

Number
WS01

Excavation Method Tracked Window Sampling Rig, Dando Terrier 2002.	Dimensions 102mm to 2.00m 87mm to 4.00m	Ground Level (mOD) 2.93	Client Envitec Biogas AG	Job Number 14.374
	Location 525035 E 325281 N	Dates 09/12/2014	Engineer Plandescil	Sheet 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	
0.00-1.00	D1	DRY	IP 120/S 2,2	1.63	(1.30)	Soft to firm brown silty CLAY			
					... slightly sandy				
1.00-1.57 1.00-1.30 1.00-1.45 1.00-2.00	SPT D3 D2 L1		T 2,2,2,2		1.30	Brown slightly clayey very sandy SILT			
1.30-2.00	N=8 D4								
2.00-2.45 2.00-2.45 2.00-3.00	SPT N=0 D5 L2		IP 450 Test Failed		(1.70)	... becoming greyish brown			
2.50-3.00	D6		IP 0/S 2,2 T 2,2,2,2		-0.07	3.00	Loose grey silty fine SAND		
3.00-3.45 3.00-3.45 3.00-4.00	SPT N=8 D7 L3								
3.50-4.00	D8		Moderate / Fast(1) at 3.50m, rose to 1.42m in 20 mins, not sealed.		(1.00)				
			09/12/2014:1.45m		-1.07	4.00	Complete at 4.00m		

Remarks

1. Location CAT scanned prior to excavation.
2. Hand dug inspection pit to 1.00 m.
3. Groundwater struck at 3.50 m and rose to 1.45 m in 5 mins., 1.42 m in 10 mins. and 15 mins. and 20 mins.
4. SPT Hammer Energy Ratio = 62.50%

Scale
(approx)

1:25

Logged
By

AHm

Figure No.

14.374.WS01



A F Howland Associates Geotechnical Engineers

Site
SPALDING AD PLANT

Number
WS02

Excavation Method Tracked Window Sampling Rig, Dando Terrier 2002.	Dimensions 87mm to 4.00m	Ground Level (mOD) 2.96	Client Envitec Biogas AG	Job Number 14.374
	Location 525091 E 325262 N	Dates 09/12/2014	Engineer Plandescil	Sheet 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.00-1.00	D1					Firm becoming soft brown silty CLAY		
1.00-1.45 1.00-2.00 1.00-2.00	U1 D2 L1			1.96	1.00	Very soft and friable in places, brown mottled grey, silty slightly sandy CLAY. With occasional dark brown decayed roots		
2.00-2.45 2.00-3.00	D3 L2			0.96	2.00	Light mottled grey clayey slightly sandy SILT. With rare shell fragments		
2.00-2.45 2.20-3.00	SPT N=0 D4	1.98	Moderate (1) at 2.00m, rose to 1.87m in 20 mins, not sealed. IP 450 Test Failed			... becoming greyish brown		
3.00-3.55 3.00-3.45 3.00-4.00	SPT D5 L3 N=10	1.86	IP 100/S 3,2 T 4,2,2,2			... becoming sandy		
3.50-4.00	D6			-0.54	3.50	Grey silty fine SAND		
					(0.50)			
				-1.04	4.00	Complete at 4.00m		
			09/12/2014:1.86m					

Remarks

1. Location CAT scanned prior to excavation.
2. Hand dug inspection pit to 1.00 m.
3. Groundwater struck at 2.00 m and rose to 1.98 m in 5 mins., 1.93 m in 10 mins. and 1.91 in 15 mins. and 1.87m in 20 mins.
4. SPT Hammer Energy Ratio = 62.50%

Scale
(approx)

1:25

Logged
By

AHm

Figure No.

14.374.WS02



A F Howland Associates Geotechnical Engineers

Site
SPALDING AD PLANT

Number
WS03

Excavation Method Tracked Window Sampling Rig, Dando Terrier 2002.	Dimensions 102mm to 2.00m 87mm to 4.00m	Ground Level (mOD) 2.98	Client Envitec Biogas AG	Job Number 14.374
	Location 525128 E 325248 N	Dates 09/12/2014	Engineer Plandescil	Sheet 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.00-1.00	D1	DRY	10 blows	1.48	(1.50)	Soft to firm brown silty slightly sandy CLAY		
1.00-1.45 1.00-2.00	U1 L1					... becoming soft		
1.50-2.00	D2				1.50	Brown slightly clayey sandy SILT		
2.00-2.55 2.00-2.45 2.00-3.00	SPT D3 L2 N=9				(1.00)			
2.50-3.00	D4				2.50	Loose grey silty fine SAND		
3.00-3.48 3.00-3.45 3.00-4.00	SPT D5 L3 N=7				(1.50)			
3.40-4.00	D6							
			09/12/2014:	-1.02	4.00	Complete at 4.00m		

Remarks

1. Location CAT scanned prior to excavation.
2. Hand dug inspection pit to 1.00 m.
3. Groundwater not encountered. Samples damped
4. SPT Hammer Energy Ratio = 62.50%

Scale
(approx)
1:25

Logged
By
AHm

Figure No.
14.374.WS03



A F Howland Associates Geotechnical Engineers

Site
SPALDING AD PLANT

Number
WS05

Excavation Method Tracked Window Sampling Rig, Dando Terrier 2002.	Dimensions 102mm to 2.00m 87mm to 4.00m	Ground Level (mOD) 3.01	Client Envitec Biogas AG	Job Number 14.374
	Location 525145 E 325338 N	Dates 09/12/2014	Engineer Plandescil	Sheet 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.00-1.00	D1					Soft to firm brown silty slightly sandy CLAY. With occasional roots		
1.00-1.45 1.00-2.00	U1 L1	DRY	10 blows		(1.50)	... becoming soft and sandy in places		
1.50-2.00	D2			1.51	1.50	Brown slightly clayey very sandy SILT		▼1
2.00-2.57 2.00-2.45 2.00-3.00	SPT D3 L2		IP 120/S 1,1		(0.90)			
	N=6		T 1,2,1,2	0.61	2.40	Grey silty fine SAND		
2.50-3.00	D4							
3.00-3.45 3.00-4.00	D5 L3		Moderate(1) at 3.00m, rose to 1.69m in 20 mins, not sealed.			... becoming very loose greyish brown and slightly clayey		▼1
3.00-3.69	SPT	2.03	IP 240/S 1,1		(1.60)			
3.50-4.00	D6 N=3		T 0,1,1,1					
			09/12/2014:1.46m	-0.99	4.00	Complete at 4.00m		

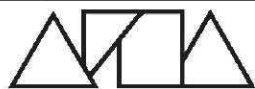
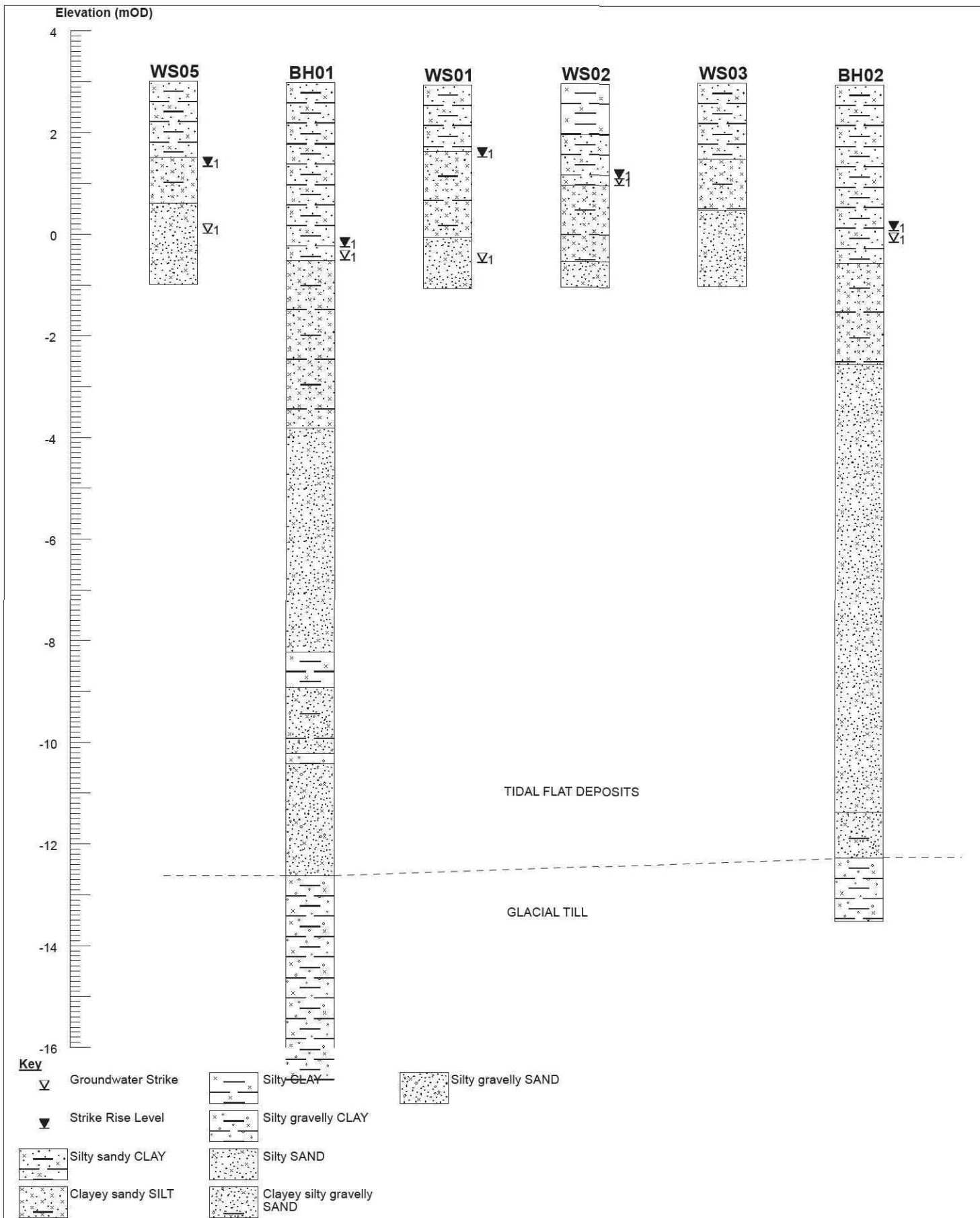
Remarks

1. Location CAT scanned prior to excavation.
2. Hand dug inspection pit to 1.00 m.
3. Groundwater struck at 3.00 m and rose to 2.03 m in 5 mins., 1.75 m in 10 mins., 1.73 m in 15 mins. and 1.69 m in 20 mins.
4. SPT Hammer Energy Ratio = 62.50%

Scale
(approx)
1:25

Logged
By
AHm

Figure No.
14.374.WS05



A F Howland Associates
Geotechnical Engineers

Nominal Section

Site SPALDING AD PLANT	Date Drawn 08/01/2015	Date Checked	Sheet 1/1	Job Number 14.374
Client Envitec Biogas AG	Drawn By	Checked By	Scale 1:100[V]	Figure No. 14.374/03

APPENDIX B

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ICP SUDS Mean Annual Flood

Input

Return Period (years) 2 SAAR (mm) 579 Urban 0.000
Area (ha) 1.815 Soil 0.300 Region Number Region 5

Results 1/s

QBAR Rural 2.6
QBAR Urban 2.6

Q2 years 2.4

Q1 year 2.3
Q30 years 6.4
Q100 years 9.4

Predicted Surface Water Runoff Rates from the Proposed Development Prior to Mitigation

Average Rainfall Intensities (i) for Listed Storm Events

Storm Event	i (mm/hr)
1 year 15 mins	29.381
30 year 15 mins	72.014
100 year 15 mins	93.284
1 year 360 mins	3.511
30 year 360 mins	8.826
100 year 360 mins	12.291

$$Q_p = 2.78 C_v CR i A$$

Predicted Proposed Surface Water Runoff Rates

Proposed Impermeable Area (A) Hectares: 1.815
Cv: 0.75, CR: 1.3

Storm Event	1 in 1 year event	1 in 30 year event	1 in 100 year event
2015 (15 mins)	144.54	354.28	458.92
2015 (360 mins)	17.27	43.42	60.47

Predicted Proposed Surface Water Runoff Rates (Including 30% Climate Change)

Storm Event	1 in 1 year event	1 in 30 year event	1 in 100 year event
2090 (15 mins)	187.90	460.56	596.59
2090 (360 mins)	22.45	56.45	78.61

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Rainfall Details

Rainfall Model	FEH
Return Period (years)	100
Site Location	GB 522700 325900 TF 22700 25900
C (1km)	-0.021
D1 (1km)	0.309
D2 (1km)	0.277
D3 (1km)	0.232
E (1km)	0.310
F (1km)	2.494
Summer Storms	Yes
Winter Storms	Yes
Cv (Summer)	0.750
Cv (Winter)	0.840
Shortest Storm (mins)	15
Longest Storm (mins)	10080
Climate Change %	+30

Time Area Diagram

Total Area (ha) 1.815

Time (mins)	Area
From:	To: (ha)

0	4 1.815
---	---------

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Model Details

Storage is Online Cover Level (m) 2.000

Tank or Pond Structure

Invert Level (m) 0.000

Depth (m)	Area (m ²)	Depth (m)	Area (m ²)
0.000	575.0	2.000	1300.0

Hydro-Brake Optimum® Outflow Control

Unit Reference	MD-SHE-0094-5000-1800-5000
Design Head (m)	1.800
Design Flow (l/s)	5.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Diameter (mm)	94
Invert Level (m)	0.000
Minimum Outlet Pipe Diameter (mm)	150
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.800	5.0	Kick-Flo®	0.838	3.5
Flush-Flo™	0.411	4.4	Mean Flow over Head Range	-	4.1

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	3.0	1.200	4.1	3.000	6.3	7.000	9.5
0.200	4.0	1.400	4.4	3.500	6.8	7.500	9.8
0.300	4.3	1.600	4.7	4.000	7.3	8.000	10.1
0.400	4.4	1.800	5.0	4.500	7.7	8.500	10.4
0.500	4.4	2.000	5.2	5.000	8.1	9.000	10.7
0.600	4.3	2.200	5.5	5.500	8.4	9.500	11.0
0.800	3.7	2.400	5.7	6.000	8.8		
1.000	3.8	2.600	5.9	6.500	9.1		

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Summary of Results for 1 year Return Period

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m ³)	Status
15 min Summer	0.175	0.175	3.9	105.0	O K
30 min Summer	0.212	0.212	4.1	128.5	O K
60 min Summer	0.254	0.254	4.2	155.4	O K
120 min Summer	0.298	0.298	4.3	184.7	O K
180 min Summer	0.323	0.323	4.3	201.4	O K
240 min Summer	0.339	0.339	4.4	212.2	O K
360 min Summer	0.357	0.357	4.4	224.3	O K
480 min Summer	0.367	0.367	4.4	230.9	O K
600 min Summer	0.373	0.373	4.4	235.3	O K
720 min Summer	0.377	0.377	4.4	238.1	O K
960 min Summer	0.377	0.377	4.4	238.0	O K
1440 min Summer	0.368	0.368	4.4	231.6	O K
2160 min Summer	0.345	0.345	4.4	216.2	O K
2880 min Summer	0.320	0.320	4.3	199.3	O K
4320 min Summer	0.265	0.265	4.2	162.7	O K
5760 min Summer	0.220	0.220	4.1	133.9	O K
7200 min Summer	0.186	0.186	4.0	111.9	O K
8640 min Summer	0.159	0.159	3.8	95.1	O K
10080 min Summer	0.139	0.139	3.7	82.5	O K
15 min Winter	0.195	0.195	4.0	117.8	O K
30 min Winter	0.236	0.236	4.2	144.2	O K
60 min Winter	0.283	0.283	4.3	174.8	O K
120 min Winter	0.334	0.334	4.4	208.5	O K
180 min Winter	0.363	0.363	4.4	228.3	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m ³)	Discharge Volume (m ³)	Time-Peak (mins)
15 min Summer	31.561	0.0	99.3	19
30 min Summer	19.550	0.0	124.1	33
60 min Summer	12.110	0.0	160.7	62
120 min Summer	7.501	0.0	199.7	122
180 min Summer	5.668	0.0	226.7	182
240 min Summer	4.646	0.0	248.0	240
360 min Summer	3.511	0.0	281.3	356
480 min Summer	2.878	0.0	307.6	412
600 min Summer	2.467	0.0	329.5	476
720 min Summer	2.175	0.0	348.5	542
960 min Summer	1.766	0.0	377.0	674
1440 min Summer	1.318	0.0	420.3	952
2160 min Summer	0.983	0.0	478.7	1364
2880 min Summer	0.798	0.0	518.2	1760
4320 min Summer	0.585	0.0	567.4	2512
5760 min Summer	0.469	0.0	611.0	3232
7200 min Summer	0.395	0.0	643.1	3960
8640 min Summer	0.343	0.0	670.1	4664
10080 min Summer	0.305	0.0	692.5	5344
15 min Winter	31.561	0.0	111.8	18
30 min Winter	19.550	0.0	139.6	33
60 min Winter	12.110	0.0	180.3	62
120 min Winter	7.501	0.0	224.1	120
180 min Winter	5.668	0.0	254.3	178

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Summary of Results for 1 year Return Period

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
240 min Winter	0.382	0.382	4.4	241.4	O K
360 min Winter	0.405	0.405	4.4	257.4	O K
480 min Winter	0.416	0.416	4.4	265.4	O K
600 min Winter	0.422	0.422	4.4	269.0	O K
720 min Winter	0.424	0.424	4.4	271.1	O K
960 min Winter	0.422	0.422	4.4	269.4	O K
1440 min Winter	0.405	0.405	4.4	257.5	O K
2160 min Winter	0.367	0.367	4.4	231.4	O K
2880 min Winter	0.327	0.327	4.3	204.0	O K
4320 min Winter	0.246	0.246	4.2	150.3	O K
5760 min Winter	0.186	0.186	4.0	112.0	O K
7200 min Winter	0.144	0.144	3.7	86.0	O K
8640 min Winter	0.118	0.118	3.5	69.9	O K
10080 min Winter	0.105	0.105	3.1	62.0	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
240 min Winter	4.646	0.0	278.1	236
360 min Winter	3.511	0.0	315.4	348
480 min Winter	2.878	0.0	344.7	456
600 min Winter	2.467	0.0	369.2	554
720 min Winter	2.175	0.0	390.4	578
960 min Winter	1.766	0.0	422.2	732
1440 min Winter	1.318	0.0	470.2	1038
2160 min Winter	0.983	0.0	536.4	1472
2880 min Winter	0.798	0.0	580.6	1900
4320 min Winter	0.585	0.0	636.2	2640
5760 min Winter	0.469	0.0	684.5	3352
7200 min Winter	0.395	0.0	720.5	4032
8640 min Winter	0.343	0.0	750.9	4664
10080 min Winter	0.305	0.0	776.5	5344

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Summary of Results for 30 year Return Period

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
15 min Summer	0.513	0.513	4.4	335.1	O K
30 min Summer	0.591	0.591	4.4	392.8	O K
60 min Summer	0.676	0.676	4.4	458.5	O K
120 min Summer	0.766	0.766	4.4	531.2	O K
180 min Summer	0.820	0.820	4.4	576.0	O K
240 min Summer	0.859	0.859	4.4	608.1	O K
360 min Summer	0.909	0.909	4.4	651.3	O K
480 min Summer	0.940	0.940	4.4	678.7	O K
600 min Summer	0.961	0.961	4.4	696.8	O K
720 min Summer	0.974	0.974	4.4	708.9	O K
960 min Summer	0.979	0.979	4.4	713.4	O K
1440 min Summer	0.963	0.963	4.4	699.3	O K
2160 min Summer	0.927	0.927	4.4	667.0	O K
2880 min Summer	0.891	0.891	4.4	635.6	O K
4320 min Summer	0.793	0.793	4.4	552.8	O K
5760 min Summer	0.703	0.703	4.4	479.6	O K
7200 min Summer	0.622	0.622	4.4	416.6	O K
8640 min Summer	0.549	0.549	4.4	361.1	O K
10080 min Summer	0.482	0.482	4.4	312.5	O K
15 min Winter	0.568	0.568	4.4	375.6	O K
30 min Winter	0.653	0.653	4.4	440.6	O K
60 min Winter	0.746	0.746	4.4	514.9	O K
120 min Winter	0.847	0.847	4.4	598.2	O K
180 min Winter	0.907	0.907	4.4	649.7	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	99.443	0.0	313.1	19
30 min Summer	58.637	0.0	352.1	34
60 min Summer	34.575	0.0	462.6	64
120 min Summer	20.387	0.0	543.9	124
180 min Summer	14.968	0.0	595.9	184
240 min Summer	12.021	0.0	633.0	244
360 min Summer	8.826	0.0	673.7	362
480 min Summer	7.088	0.0	676.9	482
600 min Summer	5.980	0.0	670.7	602
720 min Summer	5.204	0.0	662.6	722
960 min Summer	4.141	0.0	646.5	960
1440 min Summer	3.001	0.0	616.1	1424
2160 min Summer	2.175	0.0	1057.4	1752
2880 min Summer	1.731	0.0	1117.5	2132
4320 min Summer	1.232	0.0	1164.9	2896
5760 min Summer	0.968	0.0	1262.6	3640
7200 min Summer	0.802	0.0	1308.5	4400
8640 min Summer	0.689	0.0	1346.6	5184
10080 min Summer	0.605	0.0	1378.1	5856
15 min Winter	99.443	0.0	342.0	19
30 min Winter	58.637	0.0	364.8	34
60 min Winter	34.575	0.0	517.3	64
120 min Winter	20.387	0.0	605.3	122
180 min Winter	14.968	0.0	656.2	180

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Summary of Results for 30 year Return Period

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
240 min Winter	0.949	0.949	4.4	686.4	O K
360 min Winter	1.005	1.005	4.4	736.5	O K
480 min Winter	1.041	1.041	4.4	769.3	O K
600 min Winter	1.066	1.066	4.4	791.9	O K
720 min Winter	1.083	1.083	4.4	807.8	O K
960 min Winter	1.093	1.093	4.4	817.7	O K
1440 min Winter	1.087	1.087	4.4	811.3	O K
2160 min Winter	1.046	1.046	4.4	773.4	O K
2880 min Winter	1.002	1.002	4.4	733.6	O K
4320 min Winter	0.887	0.887	4.4	632.0	O K
5760 min Winter	0.751	0.751	4.4	518.9	O K
7200 min Winter	0.627	0.627	4.4	420.7	O K
8640 min Winter	0.518	0.518	4.4	338.3	O K
10080 min Winter	0.423	0.423	4.4	270.1	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
240 min Winter	12.021	0.0	680.3	240
360 min Winter	8.826	0.0	680.8	358
480 min Winter	7.088	0.0	672.1	474
600 min Winter	5.980	0.0	663.0	590
720 min Winter	5.204	0.0	654.7	708
960 min Winter	4.141	0.0	640.8	934
1440 min Winter	3.001	0.0	618.2	1384
2160 min Winter	2.175	0.0	1180.0	1988
2880 min Winter	1.731	0.0	1236.0	2248
4320 min Winter	1.232	0.0	1182.6	3196
5760 min Winter	0.968	0.0	1414.1	3984
7200 min Winter	0.802	0.0	1465.6	4760
8640 min Winter	0.689	0.0	1508.7	5456
10080 min Winter	0.605	0.0	1544.5	6152

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Micro Drainage	Source Control 2015.1	

Summary of Results for 100 year Return Period (+30%)

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m ³)	Status
15 min Summer	0.920	0.920	4.4	661.0	O K
30 min Summer	1.035	1.035	4.4	763.4	O K
60 min Summer	1.158	1.158	4.4	879.0	O K
120 min Summer	1.288	1.288	4.4	1007.0	O K
180 min Summer	1.365	1.365	4.4	1086.1	O K
240 min Summer	1.420	1.420	4.5	1142.9	O K
360 min Summer	1.493	1.493	4.6	1222.0	O K
480 min Summer	1.542	1.542	4.7	1275.3	O K
600 min Summer	1.576	1.576	4.7	1313.6	O K
720 min Summer	1.601	1.601	4.7	1341.8	O K
960 min Summer	1.621	1.621	4.8	1364.3	O K
1440 min Summer	1.626	1.626	4.8	1370.1	O K
2160 min Summer	1.593	1.593	4.7	1332.0	O K
2880 min Summer	1.550	1.550	4.7	1284.6	O K
4320 min Summer	1.447	1.447	4.5	1172.5	O K
5760 min Summer	1.362	1.362	4.4	1082.8	O K
7200 min Summer	1.287	1.287	4.4	1005.3	O K
8640 min Summer	1.216	1.216	4.4	935.5	O K
10080 min Summer	1.150	1.150	4.4	870.9	O K
15 min Winter	1.010	1.010	4.4	740.7	O K
30 min Winter	1.134	1.134	4.4	855.6	O K
60 min Winter	1.267	1.267	4.4	985.7	O K
120 min Winter	1.408	1.408	4.5	1130.6	O K
180 min Winter	1.492	1.492	4.6	1220.8	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m ³)	Discharge Volume (m ³)	Time-Peak (mins)
15 min Summer	195.246	0.0	340.1	19
30 min Summer	113.107	0.0	325.4	34
60 min Summer	65.524	0.0	687.7	64
120 min Summer	37.958	0.0	679.6	124
180 min Summer	27.581	0.0	679.6	184
240 min Summer	21.989	0.0	683.9	244
360 min Summer	15.978	0.0	700.2	364
480 min Summer	12.739	0.0	714.7	482
600 min Summer	10.685	0.0	724.4	602
720 min Summer	9.256	0.0	731.1	722
960 min Summer	7.312	0.0	735.7	962
1440 min Summer	5.245	0.0	732.4	1440
2160 min Summer	3.762	0.0	1398.0	2100
2880 min Summer	2.972	0.0	1378.9	2420
4320 min Summer	2.093	0.0	1319.4	3156
5760 min Summer	1.632	0.0	2128.1	3976
7200 min Summer	1.346	0.0	2191.1	4760
8640 min Summer	1.149	0.0	2238.6	5616
10080 min Summer	1.006	0.0	2223.4	6448
15 min Winter	195.246	0.0	328.3	19
30 min Winter	113.107	0.0	324.1	34
60 min Winter	65.524	0.0	682.5	64
120 min Winter	37.958	0.0	684.2	122
180 min Winter	27.581	0.0	696.5	182

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Date March 2015 File 19597 Attenuation.srcx	Designed by MJH Checked by	
Micro Drainage Source Control 2015.1		

Summary of Results for 100 year Return Period (+30%)

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
240 min Winter	1.552	1.552	4.7	1286.1	O K
360 min Winter	1.633	1.633	4.8	1378.0	O K
480 min Winter	1.688	1.688	4.9	1441.1	O K
600 min Winter	1.727	1.727	4.9	1487.3	O K
720 min Winter	1.756	1.756	4.9	1522.3	O K
960 min Winter	1.783	1.783	5.0	1554.5	O K
1440 min Winter	1.800	1.800	5.0	1574.9	O K
2160 min Winter	1.781	1.781	5.0	1552.6	O K
2880 min Winter	1.739	1.739	4.9	1502.2	O K
4320 min Winter	1.620	1.620	4.8	1363.1	O K
5760 min Winter	1.515	1.515	4.6	1246.0	O K
7200 min Winter	1.416	1.416	4.5	1139.2	O K
8640 min Winter	1.321	1.321	4.4	1039.9	O K
10080 min Winter	1.228	1.228	4.4	946.9	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
240 min Winter	21.989	0.0	712.7	240
360 min Winter	15.978	0.0	735.1	358
480 min Winter	12.739	0.0	748.9	476
600 min Winter	10.685	0.0	757.9	594
720 min Winter	9.256	0.0	763.8	712
960 min Winter	7.312	0.0	766.7	944
1440 min Winter	5.245	0.0	760.1	1400
2160 min Winter	3.762	0.0	1453.9	2072
2880 min Winter	2.972	0.0	1449.9	2704
4320 min Winter	2.093	0.0	1389.1	3332
5760 min Winter	1.632	0.0	2381.9	4272
7200 min Winter	1.346	0.0	2449.0	5184
8640 min Winter	1.149	0.0	2464.5	6056
10080 min Winter	1.006	0.0	2337.0	6960

APPENDIX C

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Letter from Environment Agency dated 7 October 2014.....	1-2
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Plandescil Ltd
42-44 Connaught Road
Attleborough
Norfolk
NR17 2BW

Our ref: AN/2015/121326/01-L01

Date: 27 March 2015

Dear Sir/Madam

**Proposed anaerobic digestion plant
Land off Wardentree Lane, Spalding**

Thank you for your recent enquiry, which was received on 11 March 2015. Having looked at your proposed scheme we have identified the following areas that we feel need to be addressed as part of a planning application and these are set out below in our Preliminary Opinion of your proposal.

Flood Risk

The proposed site lies within an area identified at risk of flooding. The Environment Agency requests that the proposal is accompanied by a Flood Risk Assessment (FRA) which contains evidence that appropriate mitigation measures, including flood resilience techniques, have been incorporated into the development. Please refer to the following document for information on flood resilience and resistance techniques to be included: 'Improving Flood Performance of New Buildings - Flood Resilient Construction' (Department for Communities and Local Government, 2007).

The local planning authority (LPA) will need to be satisfied that the proposed development is in accordance with all flood risk requirements of the National Planning Policy Framework.

The hazard mapping contained within South Holland's Strategic FRA affects the proposed site. This hazard mapping shows the consequences should a breach or overtopping of the defences occur. The results show the likely flood depths and overall hazard to the proposed site. We strongly recommend that you consider this information as it will form an important part of any FRA, and will assist in the production of any Flood Warning and Evacuation Plan.

The FRA should contain evidence to justify the chosen finished floor levels (FFL) of the development. FFL should be raised as high as practicable for 'less vulnerable' development, but a minimum of 300mm above existing ground levels. If this is not practicable then an area of safe refuge will need to be incorporated that is located about the maximum flood depths. Alternatively, an appropriate flood warning and evacuation strategy will need to be submitted to, and approved in writing by, the LPA.

Finally, we would support the recommendation of a FRA advising that the site owners will register with the free Floodline Warnings Direct Service. More information on this service can be found at the following link: <https://fwd.environment-agency.gov.uk/app/olr/home>.

Review of Documentation and Further Work

We do have a voluntary charged-for service where we can provide more detailed pre-application advice. As part of this service we can provide a dedicated project manager to act as a single point of contact to coordinate any problems, data requests or review technical documents. Should you wish us to undertake a detailed review of any FRA (or any subsequent revision to take on the board our comments above) or want further advice to address these issues, we can do this as part of our charged service.

Please note that this response is based on the information you have provided at this time and if this changes in the future we would need to consider our position again.

Yours sincerely

Mr Rob Millbank
Sustainable Places - Planning Advisor

Direct dial 01522 785868

Direct e-mail rob.millbank@environment-agency.gov.uk

APPENDIX D

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Surface Water Maintenance Schedule.....	1
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Surface Water Maintenance Schedule

Feature	Schedule	Required action	Frequency
Pond, Filter Drain	Regular maintenance	Litter and debris removal.	Monthly (or as required).
Filter Drain		Remove weeds on the Filter Drain surface.	Monthly (at start, then as required).
Pond, Filter Drain		Grass cutting – for landscaped areas and access routes.	Monthly (during growing season), or as required.
Pond		Manage other vegetation and remove nuisance plants.	Monthly (at start, then as required).
Drainage	Occasional maintenance	Remove silt and leaf build up from gullies, manholes, gutters etc.	Annually (or as required).
Gully/ Slot Drain		Remove sediment from trap.	Annually (or as required).
Pond		Remove sediment from catchpit manhole when 50% full.	As required.
Filter Drain		At locations with high pollution loads, remove surface geotextile and replace, and wash or replace filter media.	Five yearly.
Pond	Remedial actions	Repair erosion or other damage.	As required.
Pond		Re-level uneven surfaces and reinstate design levels.	As required.
Pond		Repair/rehabilitation of inlets.	As required.
Filter Drain		If clogging occurs, replace geotextiles and clean & replace filter media.	As required.
Filter Drain, Gully, Slot Drain		Inspect inlets, outlets and inspection points for blockages, clogging, standing water and structural damage.	Six monthly.
Filter Drain		Clear perforated pipework of blockages.	As required.
Filter Drain		Rehabilitate infiltration or filtration surfaces.	As required.
Pond	Monitoring	Inspect inlets for blockages and clear if required.	Monthly.
Pond		Inspect bank sides, structures, pipework, etc for evidence of physical damage.	Monthly.
Pond, Gully, Filter Drain		Inspect inlets and pre-treatment systems for silt accumulation. Establish appropriate silt removal frequencies.	Half yearly.
Ditch Outlet		Check outlet for blockages	Three monthly
Gully/ Slot Drain		Check for blockages to grates and outlets.	Annually.
Drainage		Check gullies, manholes, gutters, for silt and leaf build up.	Annually.