

**Design Strategy and Details of  
Proposed Site Drainage Scheme**

**Job No. 24727**

**Attleborough AD Plant  
Attleborough, Norfolk  
NR17 1AE**

**Client: Attleborough AD Plant Limited**

**Prepared By: Danica Davis**

**December 2021**

**Revision 0**



## REPORT CONTROL SHEET

**Client:** Attleborough AD Plant Limited

**Job No.:** 24727

**Project Name:** Attleborough AD Plant,  
Attleborough,  
Norfolk,  
NR17 1AE

Issue		
Revision 0	December 2021	<b>Report Prepared by:</b>  Danica Davis B.Sc (Hons)  Graduate Technician
		<b>Report Reviewed &amp; Authorised by:</b>  Oliver Jones B.Sc(Hons), CEng MIET, EngTech MICE, GCInstCES, AMIMechE  Director - Projects

## CONDITIONS OF INVESTIGATION & REPORTING

This report and its findings should be considered in relation to the terms of the brief and objectives agreed between Plandescil Ltd and the Client.

The details contained in this report are based upon information provided by others and upon the assumption that all relevant information has been provided by those parties from whom it has been requested and that such information is accurate. Information obtained by Plandescil Ltd has not been independently verified by Plandescil Ltd, unless otherwise stated in the report.

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**DRAWINGS, CALCULATIONS AND SPECIFICATIONS APPENDIX**  
(Listed in 6.0 APPENDIX DETAILS AND DRAWINGS)



## **1.0 BACKGROUND INFORMATION AND ANAEROBIC DIGESTION LAYOUT**

- 1.1** Plandescil Ltd have been commissioned to provide the construction specification and details for the civil engineering elements associated with the proposed food waste processes and upgraded existing crop based processes at Attleborough Anaerobic Digestion Plant in Attleborough, Norfolk. This appointment was received by the client, Attleborough AD Plant Limited. The new food waste processing plant and the existing crop-based processing plant are to be entirely segregated from a process perspective. Nevertheless, both sites share a common drainage system and secondary containment bund structure. Both food waste and crop-based plants will be operated by Eco Verde Energy.
- 1.2** This report provides design rationale for the drainage philosophy at Attleborough AD Plant, along with requirements for operation and maintenance. The corresponding drainage design drawings, schedules and construction details accompany this report in the Appendix.
- 1.3** The existing site consists of an existing crop based Anaerobic Digestion Plant, including 2No. existing silage clamps, 3No. existing digester tanks, 1No. existing digestate lagoon and 1No. existing dirty water holding pond. The proposed site is to incorporate a new reception building which will be used for the processing of food waste. The reception building is to have its own drainage system, which has been detailed by Plandescil Ltd and designed by others. The proposed site will also include the installation of 4No. fermenter / post-fermenter tanks, as well as other processing tanks comprising; 1No. Ferric Chloride Tank, 4No. Pre-Storage Tanks and 3No. Pasteurisation Tanks. The 12No. new tanks will be constructed within a proposed CIRIA C736 reinforced concrete secondary containment bund. 2No. new lined digestate lagoons and 1No. new lined surface water attenuation pond are also included in the new site proposals, as well as the reinstatement and re-lining of the existing dirty water holding pond. Additionally, 1No. lined sump pit style leachate tank is proposed to collect leachate water run-off from the existing silage clamps and dirty water run-off from trafficked hardstanding areas to the north of the site.
- 1.4** Attleborough AD Plant Limited instructed Plandescil Ltd to undertake the civil engineering design of the proposed secondary containment bund, hardstanding areas and site drainage for the Attleborough Anaerobic Digestion Facility located in Attleborough, Norfolk.
- 1.5** The site drainage has been designed in accordance with best practice guidelines, using the experience Plandescil has gained from working in the Anaerobic Digestion Industry for more than 10 years.
- 1.6** The surface water microdrainage calculations are provided in the Appendix, the design is based on a 1-in-100-year event plus 40% for climate change.

## 2.0 DESIGN & METHODOLOGY OF DRAINAGE SYSTEM

- 2.1 The Attleborough AD Plant drainage currently consists of a mixed surface and leachate system, discharging to a lined pond to the west of the site. There are 4No. existing leachate sumps in front of the silage clamps (at the south), which drain to a series of manholes before discharging to the existing dirty water pond. To incorporate the new AD facilities at the site, a new, separated, drainage system has been designed by Plandescil Ltd, which includes the addition of a lined surface water attenuation pond, 2No. digestate lagoons, and 1No. leachate tank. The existing dirty water pond will also be reprofiled and lined in its existing location.
- 2.2 The aim of the drainage scheme proposed for the Anaerobic Digestion Plant is to remove all clean and dirty water from the sites hardstanding areas as quick as possible; achieved through segregated drainage systems. A dirty water system has been designed for the crop-based process material storage areas on the site, where vehicle movements are prevalent and surface water contamination is possible. A leachate system has been designed, at the request of the site operator, to collect concentrated leachate water from the silage clamps for reuse within the AD process. Meanwhile, a separate clean system has been proposed for areas of the site where surface water is thought to be free from potential contamination.
- 2.3 The proposed leachate water system is comprised of a combination of sumps and manholes to collect the leachate water run-off from the silage clamps. The leachate system has been designed without the requirement for valves and remains open all year round. This design consideration mitigates the potential for contamination of surface water through potential errors during the plant's operation.
- 2.4 The existing silage clamps floor surfacing levels have been designed to ensure water run-off migrates towards the 4No. leachate sumps to the south of the clamps. The existing drainage channel is to be reinstated as per Plandescil drawing 24727/552 Rev 0, it has been designed with a 2m wide asphalt or concrete V-channel and 4No. new leachate sump pits within the channel.
- 2.5 The leachate system discharges to the proposed leachate tank, as shown on Plandescil drawing No. 24727/552 Rev 0, which can be directly pumped into the process tanks located within the secondary containment bund for use within the AD process tanks if required. Otherwise, the leachate discharges to the proposed lined dirty water lagoon to the west of the bund to be stored.

The below ground level leachate tank is to be of in situ reinforced concrete construction, with a 19.8m<sup>3</sup> storage capacity. The tank is to be 18m X 1m in plan area, with depths varying between 1.2m (East) to 1.0m (West). The internal concrete tank walls are to be lined with a sealed 2mm MDPE membrane. The covered tank has been designed with a single vent, and 5 No. 63mm Ø MDPE monitoring points positioned externally 0.5m from the outer wall face of the tank. The monitoring points are to extend to a minimum of 1.5m below the underside

of the tank foundation, with open ends. The monitoring points are to be manually tested regularly for any signs of contamination with a probe by the site operators.

A high-level overflow leachate gravity pipe is to discharge water to the adjacent dirty water pond in circumstances where there is no requirement for the leachate water to be used in the process. Otherwise, the leachate tank will discharge via a pumped above ground route to the process area, to be utilised within the various storage tanks, where deemed applicable during site operations.

To aid in cleaning of the solid material from the leachate tank, a fall on the base on the sump has been designed.

- 2.6** To maximise robustness and longevity of the leachate system, all leachate and dirty water manholes are to be fully coated internally with bitumen paint, preventing deterioration of the pre-cast concrete rings. Furthermore, UPVC foul water pipe has been specified for all gravity leachate pipework on the site to mitigate the potential for any future leakages at joint locations.
- 2.7** Where surface water contamination is expected to occur on the hardstanding areas of the site, a dirty water drainage system has been proposed. The concrete apron in the north of the site is to be drained by a traditional system of gullies and manholes, discharging to the lined dirty water lagoon, as shown in Plandescil drawing No. 24727/552 Rev 0. UPVC foul water pipe has been specified for all dirty water drainage.
- 2.8** The containment structure drainage and construction details of the bund are explained in a separate report prepared by Plandescil. The report confirms that any liquid within the containment bund cannot be discharged until it has been tested and is certified as clean to be released to the surface water system.
- 2.9** The containment bund floor slab has been designed with surface falls to allow for the drainage of liquid towards the primary reinforced concrete bund floor sump, constructed at 3.20m length, 1.20m width and 1.60m depth. Pre-formed MDPE chambers with reinforced concrete surrounds are specified for the remaining intermediate sump pits, installed around the bund floor perimeter, acting as a buffer to the primary sump pit and discharge point. Shallow prefabricated 'Polycon' drainage channels within the containment bund concrete floor will be installed to direct the surface water flow towards the primary containment floor sump. All sump pits and drainage channels will be fully sealed and encased in structural concrete.

Containment bund liquid captured within the primary in-situ reinforced concrete drainage sump will be routinely checked, and visually and olfactorily tested prior to being discharged from this location. If the primary containment sump water is tested as 'clean', the liquid will discharge to the lined surface water attenuation pond, via the pumped route shown on Plandescil drawing No. 24727/552 Rev 0.

- 2.10** The surface water drainage system has been designed with capacity to allow for the clean internal bund drainage to be pumped into the attenuation pond at a rate of 2l/sec via a manually operated pump, instead of fully discharging as per a normal rainfall event. Operationally, no liquid will be discharged out of the containment bund during a contamination event. In circumstances where the containment bund water is tested as dirty and cannot be discharged, the captured water will be pumped directly back into the food waste site process tanks.
- 2.11** The reception building internal drainage has not been designed by Plandescil Ltd, however the general principles are described below for convenience. Refer to Plandescil Ltd drawing No. 24727/011 Rev B. All liquid within the reception building is considered to be dirty water and is therefore collected, stored and/or pumped back into the AD process. All drainage within the reception building will be subject to bespoke design for construction detailing purposes. Manholes will be either MDPE, UPVC or concrete rings, coated with 2 coats bitumen paint for extra protection. This will then be reviewed and reapplied in the maintenance schedules.
- 2.12** Dirty water drainage from the reception building will drain to the 3.0m deep mixing pit, fully contained within the building. A pumped connection from the mixing pit to the secondary contained pre-storage (buffer) or fermenter tanks within the containment bund is proposed, should the liquid be required in the AD process.
- Pumped connections from the containment bund sump, and the leachate tank pump in the north west of the site, also allow dirty water to be pumped into the mixing pit of the reception building.
- 2.13** The surface water drainage of the site is designed with a lined attenuation pond to the south, where all surface water from the reception building roof, hardstanding areas, and containment bund (clean) will be collected and stored. The proposed attenuation pond discharges to the clients ditch on-site via a gravity driven route with a hydrobrake flow control valve, at a max flow rate of 4l/s. See Plandescil documents '24727 – Infiltration Pond Size Micro Drainage Calculations – Rev 0' and '24727 – Infiltration Pond Size Micro Drainage Calculations -- Pump Failure - Rev 0' for the drainage design calculations.
- 2.14** The surface water drainage of the site is divided into the following separate areas:
- **Containment Bund Perimeter Drain** - A surface water perforated filter drain pipe is installed around the entire external containment bund perimeter, linked by a series of inspection chambers and discharging to the clean water system, via a gravity outfall pipe into the lined surface water attenuation pond. The perimeter filter drain has been designed to relieve any hydrostatic pressure from the external face of the containment bund wall.

- Roads and Hardstanding Areas - Where contamination is not expected, the asphalt roads and hardstanding areas are to be drained via a perimeter asphalt formed channel and sump. The clean water captured by this system outfalls to the lined attenuation pond, first passing through an NSBE010 Kingspan oil and silt separator. Half-battered kerbs are to be installed around the perimeter of all hardstanding areas and the surface levels are designed to ensure the water flows towards the designed surface water system. Refer to the Kingspan separator drawing in the appendix.
- Roof Area of the Reception Building – all roof water will be discharged via gutters and downpipes into gravity pipes or ACO drains and finally out-falling to the lined attenuation pond. There is no requirement to test this rainwater.

### **3.0 REVIEW PERIODS DURING CONSTRUCTION**

3.1 The construction of the drainage will be reviewed at numerous stages throughout the construction phase. The Design Engineers, Plandescil, are responsible for visually inspecting the following elements of construction:

- CCTV survey post installation of the drainage prior to occupation.
- 1 year post completion of the site including a CCTV and defects survey.
- Every year post completion should the client request this as a CCTV and defect survey.

### **4.0 AD PLANT MAINTENANCE REGIME- GENERAL OVERVIEW**

4.1 Attleborough AD Plant's proposed maintenance regime consists of daily visual leak inspections within the bund and weekly inspections of the containment bund structure. The daily inspection will be carried out by the Client's site operative who will look for visual signs of leakage coming from the storage tanks or mechanical equipment located within the containment bund. If any tanks are found to be leaking, repair works will be undertaken by trained personnel immediately to prevent any contamination of surface water within the containment bund.

4.2 The weekly inspections will require the site operative to visually inspect the containment bund walls and floor for any signs of cracking within the concrete. If any cracks are found, remedial works will immediately be undertaken using Sikaflex resin injection 'Sikadur 52' to fill and seal the cracks. This process will be carried out by a trained operative or specialist.

4.3 Any liquid which falls within the containment bund will be drained and collected into the primary sump pit within the bund. A manual switch operated pump will be located within the sump which will drain any liquid into the process. Prior to the pump being engaged by the site operative a visual and odour inspection will be carried out to check for any contamination to the liquid.

- 4.4 If the captured sump water is determined to be clean, the liquid will be pumped to the surface water system to the west at a rate of 2l/s and finally out-falling to the attenuation surface water pond to the south of the bund. The containment bund drainage system has made an allowance for a pumped connection to the mixing pit within the reception building, so that if needed or determined to be dirty, the liquid could be back into the system as required.
- 4.5 The drainage system on site will be checked yearly. The site operators will check for sediment build up in manholes and pipes.
- 4.6 The drains will be jetted where required. Manholes will be sludge gulped and checked for any signs of wear and tear, the joints will be resealed and the internal chambers painted with bitumen paint if required.
- 4.7 The silage clamps will be inspected when empty, the surface should be pressure washed clean and inspected for damage and repaired if required.

The walls should be sheeted with plastic as per the manufacturer's guidance to aid in the life expectancy of the walls. The walls should also be pressure washed clean before refilling. If the bitumen paint to the lower portion of the walls has been worn away this should be reapplied for sheeting, approximately every 3 years.

- 4.8 Refer to the 'Surface Water Maintenance Schedule' in the Appendix for the maintenance details proposed for the clean water system.

## 5.0 APPENDIX DETAILS AND DRAWINGS EXPLAINED

### 5.1 Plandescil Ltd Details

<u>Drawing No.</u>	<u>Title</u>	<u>Comments</u>
24727/550 Rev 0	Proposed Site Layout	General site overview with plant items in key
24727/551 Rev 0	Proposed Site Levels Layout	General site levels overview for all surfacing
24727/552 Rev 0	Proposed Drainage Layout	General site drainage overview with key
24727/011 Rev B	Proposed Internal Drainage Layout	Drainage layout for internal reception building with key
24727/082 Rev B	Proposed Sump Pit R.C.Plans, Elevations & Details	Containment sump general and reinforced concrete details
24727/100 Rev C	Leachate Tank Details -	Leachate tank reinforced concrete details
24727/101 Rev C	Typical Hardstanding & Drainage Details	General construction details for hardstanding areas, and surface and leachate water drainage systems
24727/104 Rev 0	Typical Containment Bund Drainage Details	Containment bund drainage sump details
24727/300 Rev C	Drainage Survey Sheet 1 of 2	Existing site drainage plan
24727/301 Rev 0	Drainage Survey Sheet 2 of 2	Existing site drainage plan

#### Document Title

24727 -082-A-01-BS – Sump Pit Bar Bending Schedule

24727 - Surface Water Maintenance Schedule - Rev 0

24727 – Infiltration Pond Size Micro Drainage Calculations – Rev 0

24727 – Infiltration Pond Size Micro Drainage Calculations - Pump Failure – Rev 0

### 5.2 Kingspan Separator Details

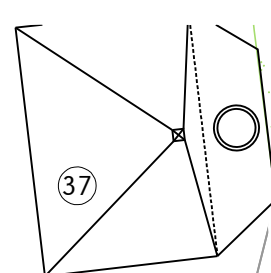
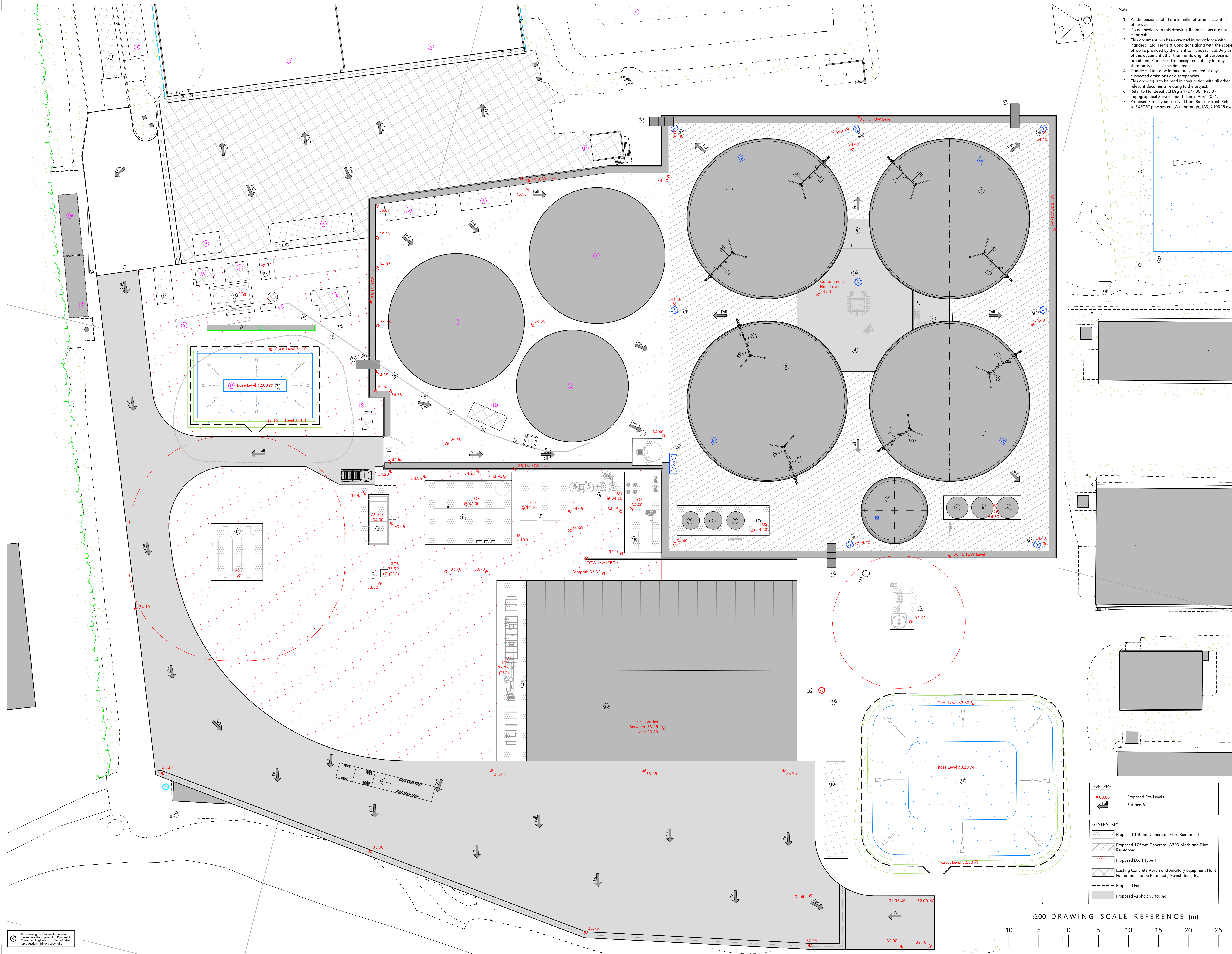
<u>Item</u>	<u>Comments</u>
Klargester drawing sheet	Kingspan Klargester bypass separator drawing NSBE010 – NSBE030

# APPENDIX

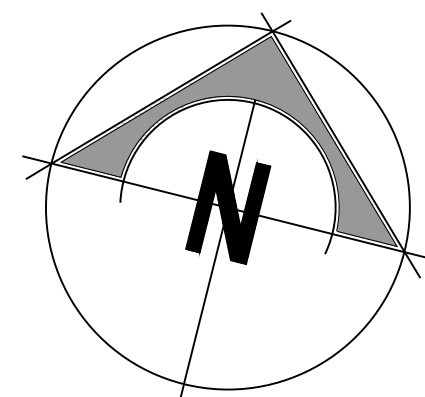








- Note:
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  - Plandescil Ltd. to be immediately notified of any suspected omissions or discrepancies.
  - This drawing is to be read in conjunction with all other relevant documents relating to the project.
  - Refer to Plandescil Ltd Dwg 24727 - 001 Rev 0 - Topographical Survey undertaken in April 2021.
  - Proposed Site Layout received from BioConstruct. Refer to EXPORT pipe system\_Attleborough\_JAS\_210825.dwg



- EXISTING PLANT KEY:
- 1 Digester (2No.) (23mØ)
  - 2 Fermenter (19mØ)
  - 3 Silage Clamp (2No.) (30m x 95m)
  - 4 Covered Lagoon
  - 5 Feedhopper (2No.) - To Be Repositioned
  - 6 Substation
  - 7 Transformer
  - 8 CHP Engine - To Be Repositioned
  - 9 Storage Container - To Be Replaced and Repositioned
  - 10 Chiller & Oil Container
  - 11 Technical Container
  - 12 Boiler
  - 13 Dirty Water Holding Lagoon - To Be Regraded/Reinforced Separator
  - 14 Flare - To Be Retained (EVE)
  - 15 Welfare Facility / Site Office - To Be Repositioned

- PROPOSED PLANT KEY:
- 1 BioConstruct Fermenter (3No. @ 26.00mØ)
  - 2 BioConstruct Post-Fermenter (26.00mØ)
  - 3 Ferric Chloride Tank
  - 4 Technical Building
  - 5 Pre-Storage Tank (10.00mØ)
  - 6 Pre-Storage Tank (3No. @ 3.50mØ)
  - 7 Pasteurisation Tank (3No.)
  - 8 Oxygen Generator
  - 9 Switchboard Room
  - 10 Site Office
  - 11 Weighbridge
  - 12 VSAT
  - 13 Grid Entry Unit
  - 14 Propane Tanks
  - 15 Gas Upgrading Unit
  - 16 Boiler, Heating Buffer Tank
  - 17 Switchboard Container
  - 18 Gas Processing Unit
  - 19 Active Carbon Tanks (2No.)
  - 20 Reception Building (30.20m x 45.20m)
  - 21 Odour Control Filter (1No.)
  - 22 Flare - BioConstruct (10.00m Exclusion Zone)
  - 23 Digestate Storage Lagoon (10,000m³ Storage)
  - 24 Containment Sump - Size Varies
  - 25 Bund Gate (1No.)
  - 26 LV Switchboard
  - 27 Emergency Generator
  - 28 Condensate Pit
  - 29 Dirty Water Holding Lagoon (175m³ Storage)
  - 30 Surface Water Attenuation Lagoon (936m³ Storage)
  - 31 Leachate Tank (20m³ Storage)
  - 32 Borehole
  - 33 Stair Access (4No.)
  - 34 BioConstruct Container
  - 35 Digestate Pump
  - 36 Leachate and Clean Water Pumps (2No.)
  - 37 Digestate Removal Station

#### APPROVAL & COMMENT

Rev	Date	Rev By	Chkd	Description
0	01-12-21		OAI	First Issue

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civil / structural / environmental / surveying

Client  
**Attleborough AD Plant Limited**

Project  
**Attleborough AD Plant,  
Attleborough, Norfolk,  
NR17 1AE**

Drawing Title  
**Proposed Site Levels Layout**

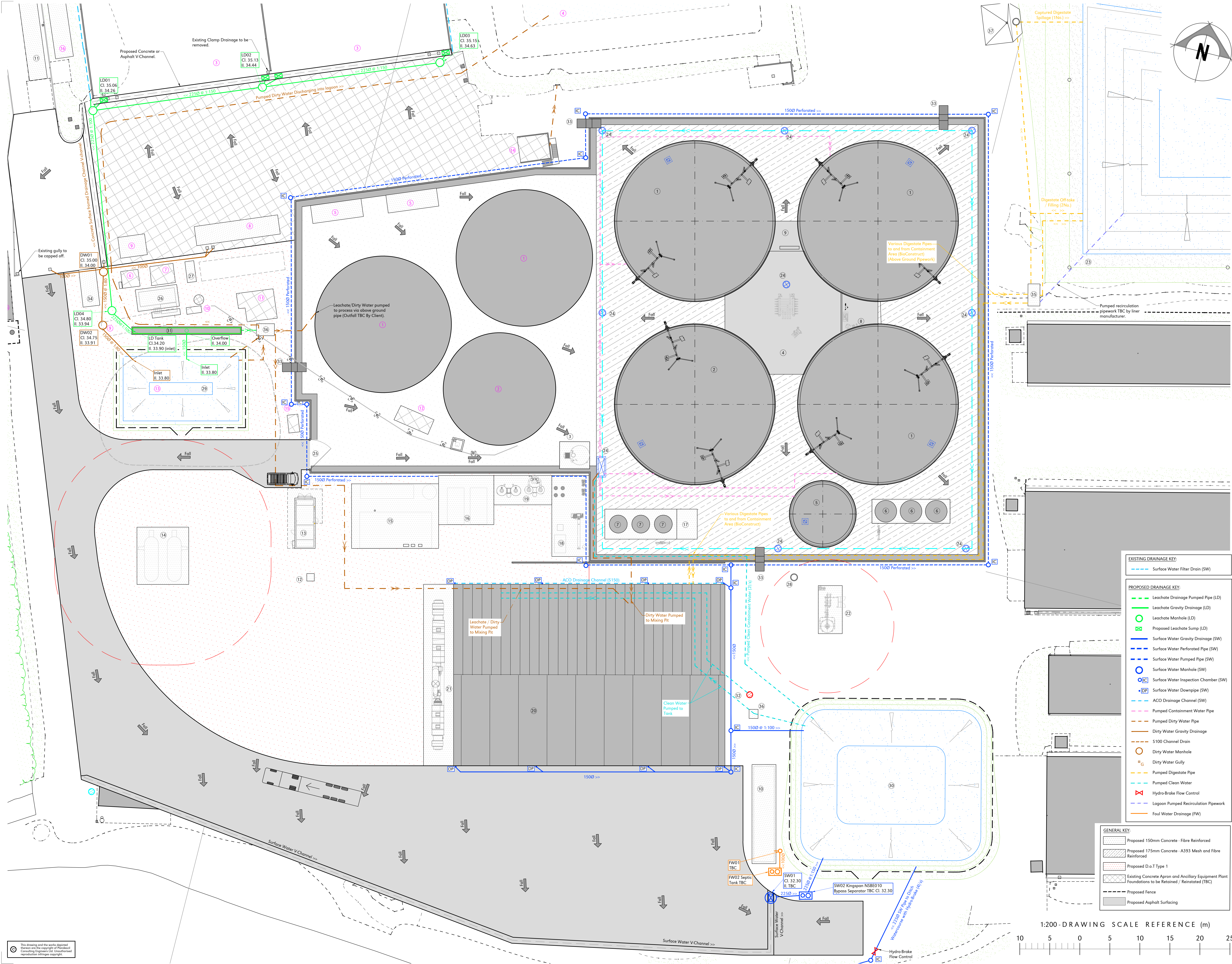
Scale	U.N.O.	Date	Drawn By
1:200 (A0)		November 2021	TOH
Drawing No.	Rev	0	0
24727/551			

LEVEL KEY:	Proposed Site Levels
34.40	Surface Fall
34.40	
GENERAL KEY:	
34.40	Proposed 150mm Concrete - Fibre Reinforced
34.40	Proposed 175mm Concrete - A393 Mesh and Fibre Reinforced
34.40	Proposed D.o.T Type 1
34.40	Existing Concrete Apron and Ancillary Equipment Plant Foundations to be Retained / Reinstated (TBC)
34.40	Proposed Fence
34.40	Proposed Asphalt Surfacing

1:200 - DRAWING SCALE REFERENCE (m)







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#### APPROVAL & COMMENT

Rev	Date	Rev By	Chkd	Description
0	01-12-21		OAI	First Issue

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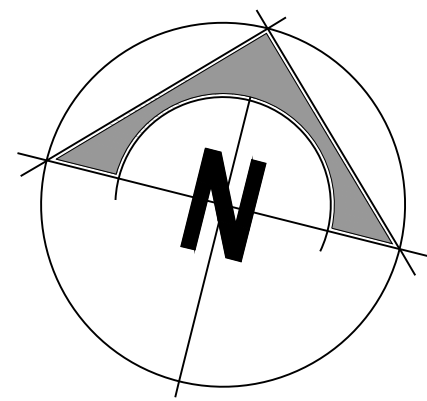
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**Attleborough AD Plant Limited**

Project:  
**Attleborough AD Plant,  
Attleborough, Norfolk,  
NR17 1AE**

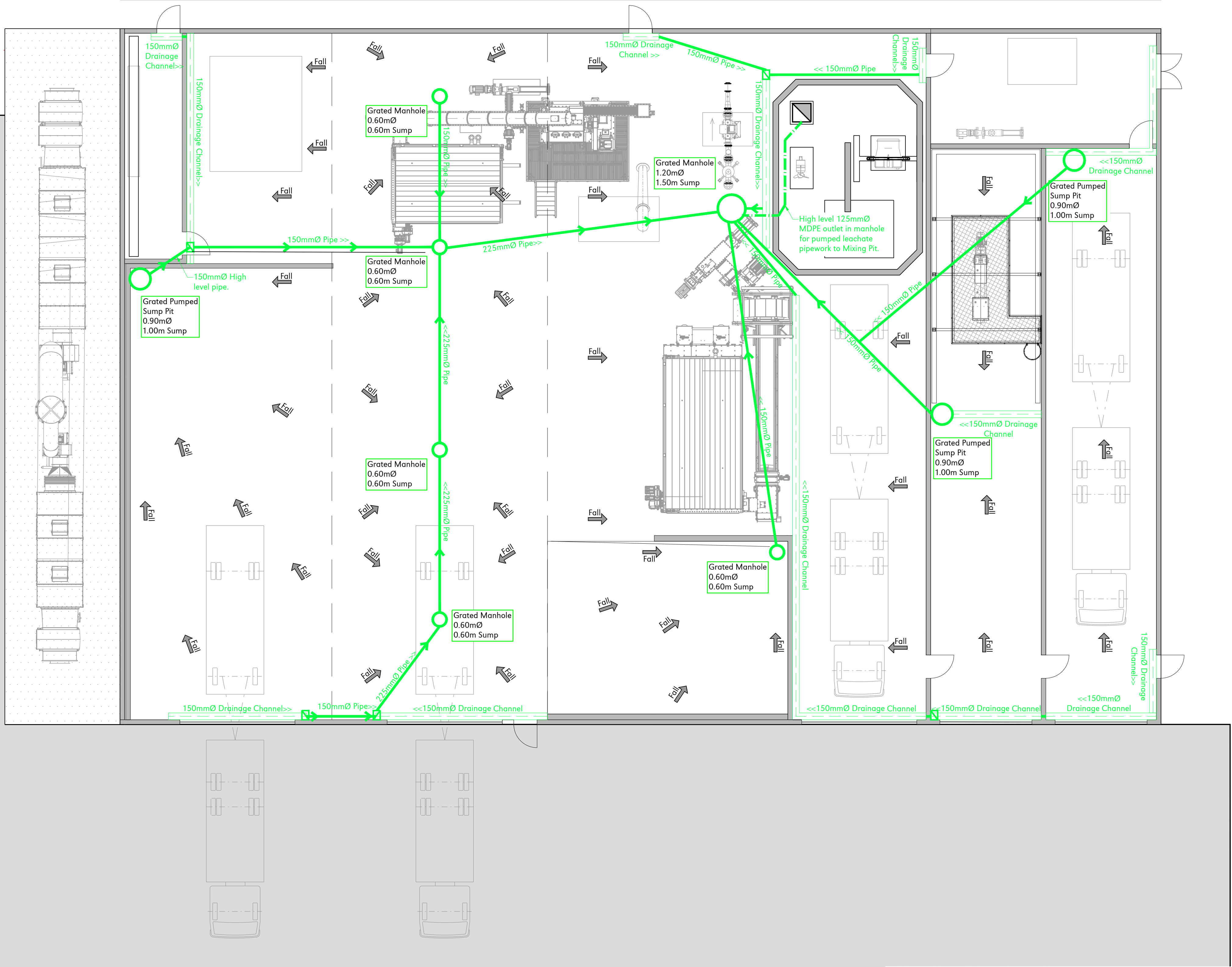
Drawing Title:  
**Proposed Drainage Layout**







Scale	U.N.O.	Date	Drawn By
1:200 (A0)		November 2021	TOH
Drawing No.	Rev		
24727/552	0		





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  5. This drawing is to be read in conjunction with all other relevant documents relating to the project.
  6. Layout based on drawing received from BioConstruct. Refer to B202103 / A19: reception hall\_Attleborough\_IAS\_210630.dwg
  7. Drainage layout by Process Provider and Civil Engineering Contractor. Plandescil Ltd. accept no liability for the internal building drainage design.



PROPOSED INTERNAL DRAINAGE KEY:	
	Leachate Pipe (Gravity)
	Leachate Pipe (Pumped)
	Leachate Manhole (LD)
	F900 Drainage Channel (150mm)
	Surface Fall
	Proposed Drainage Channel Sump

APPROVAL & COMMENT				
B	13-10-20	DAD	OAJ	Minor Amendments
A	06-10-20	DAD	OAJ	Minor Amendments
O	23-09-20	-	OAJ	First Issue
Rev	Date	Rev By	Chkd	Description

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Client  
Attleborough AD Plant Limited

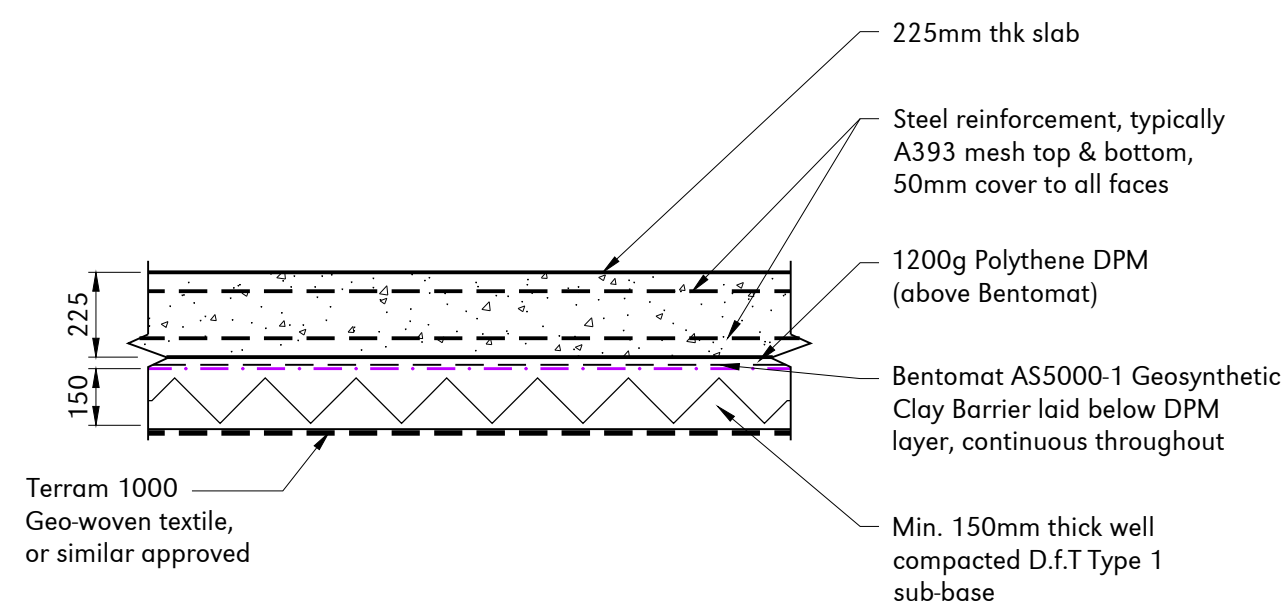
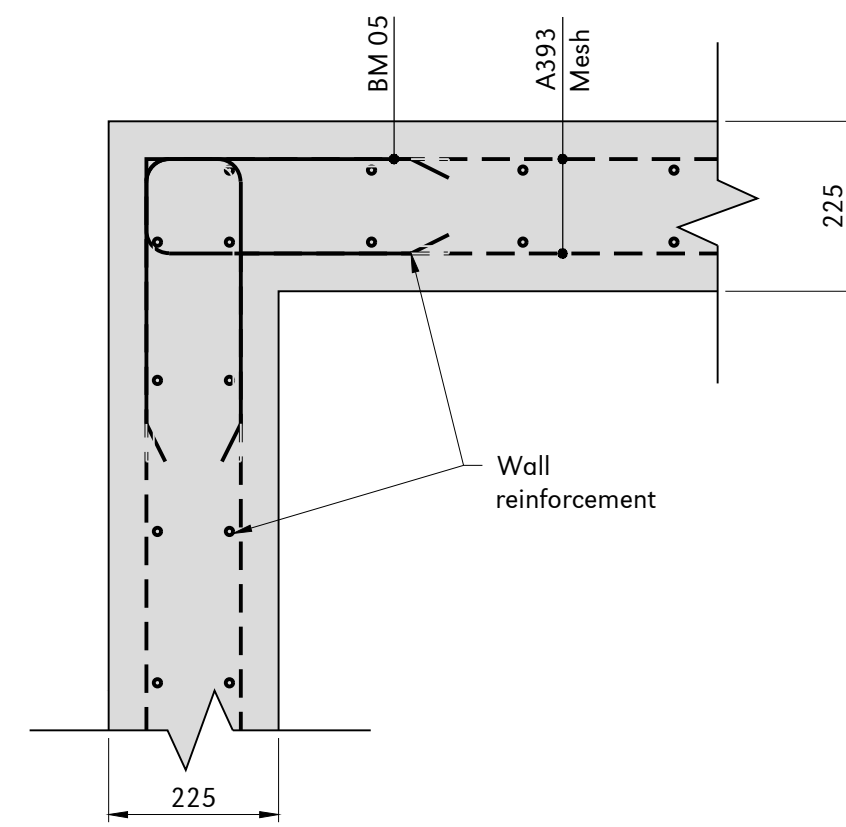
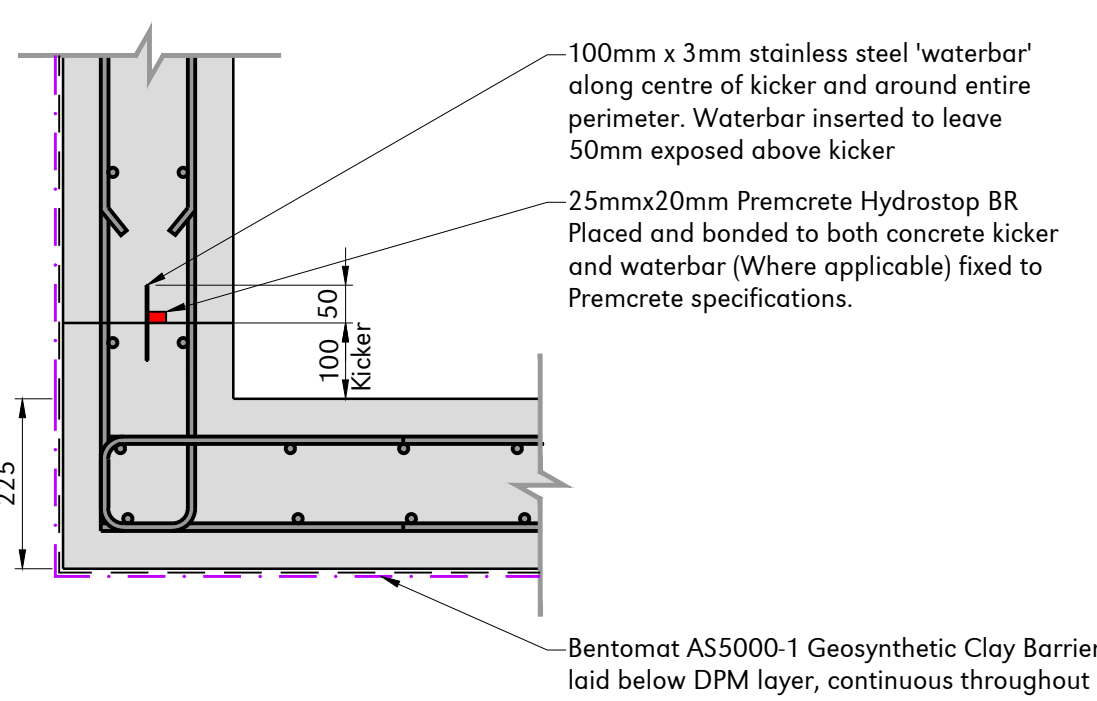
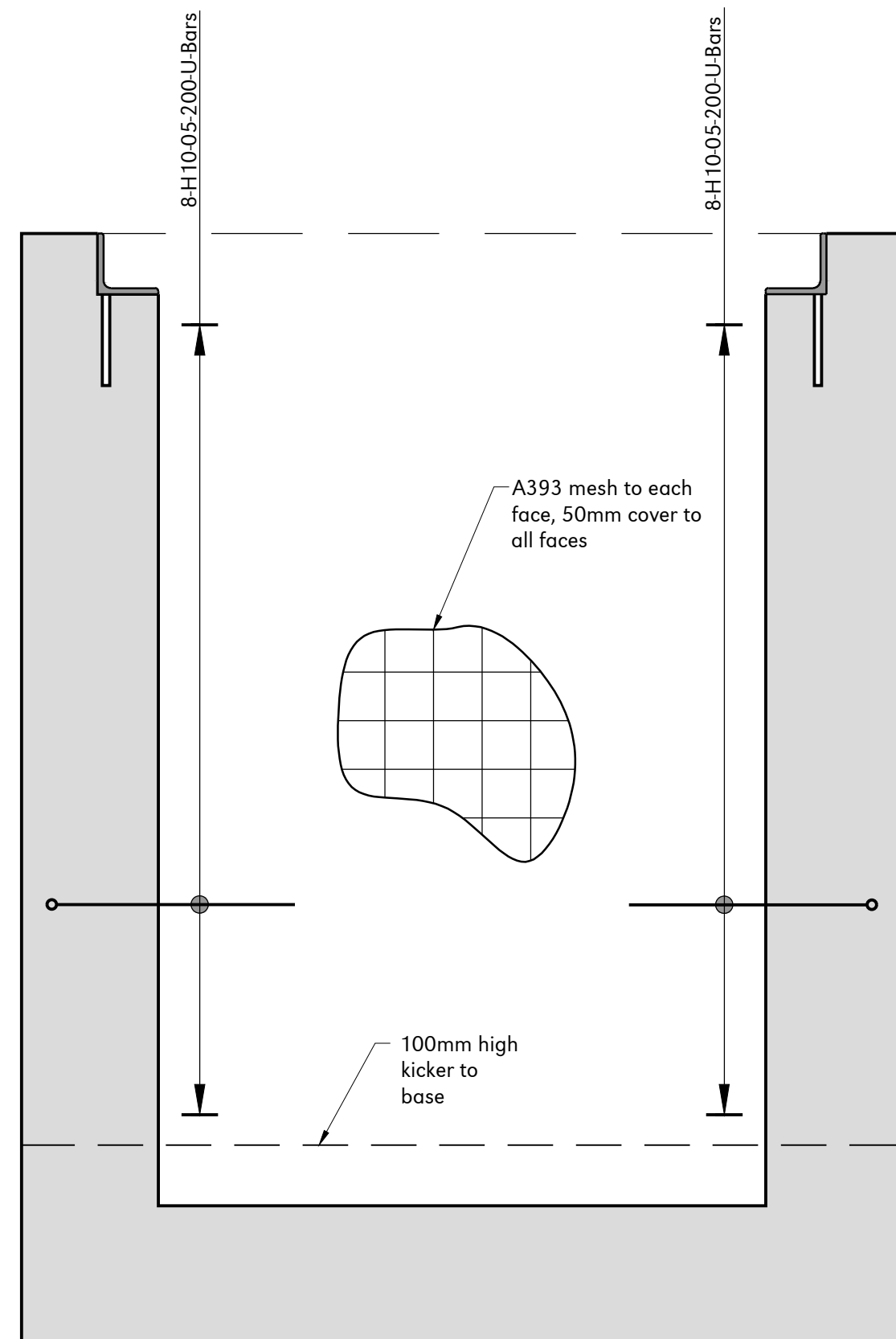
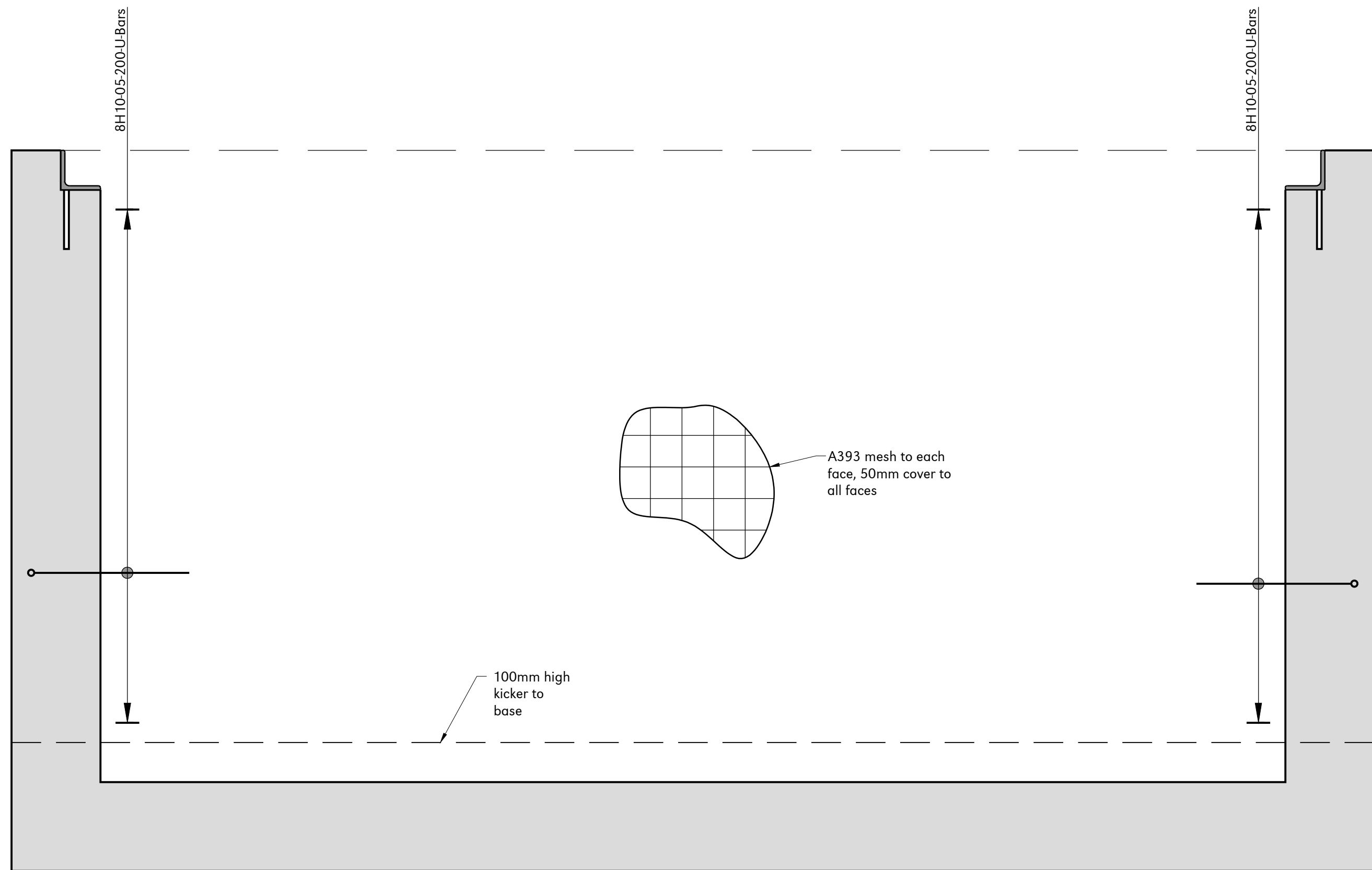
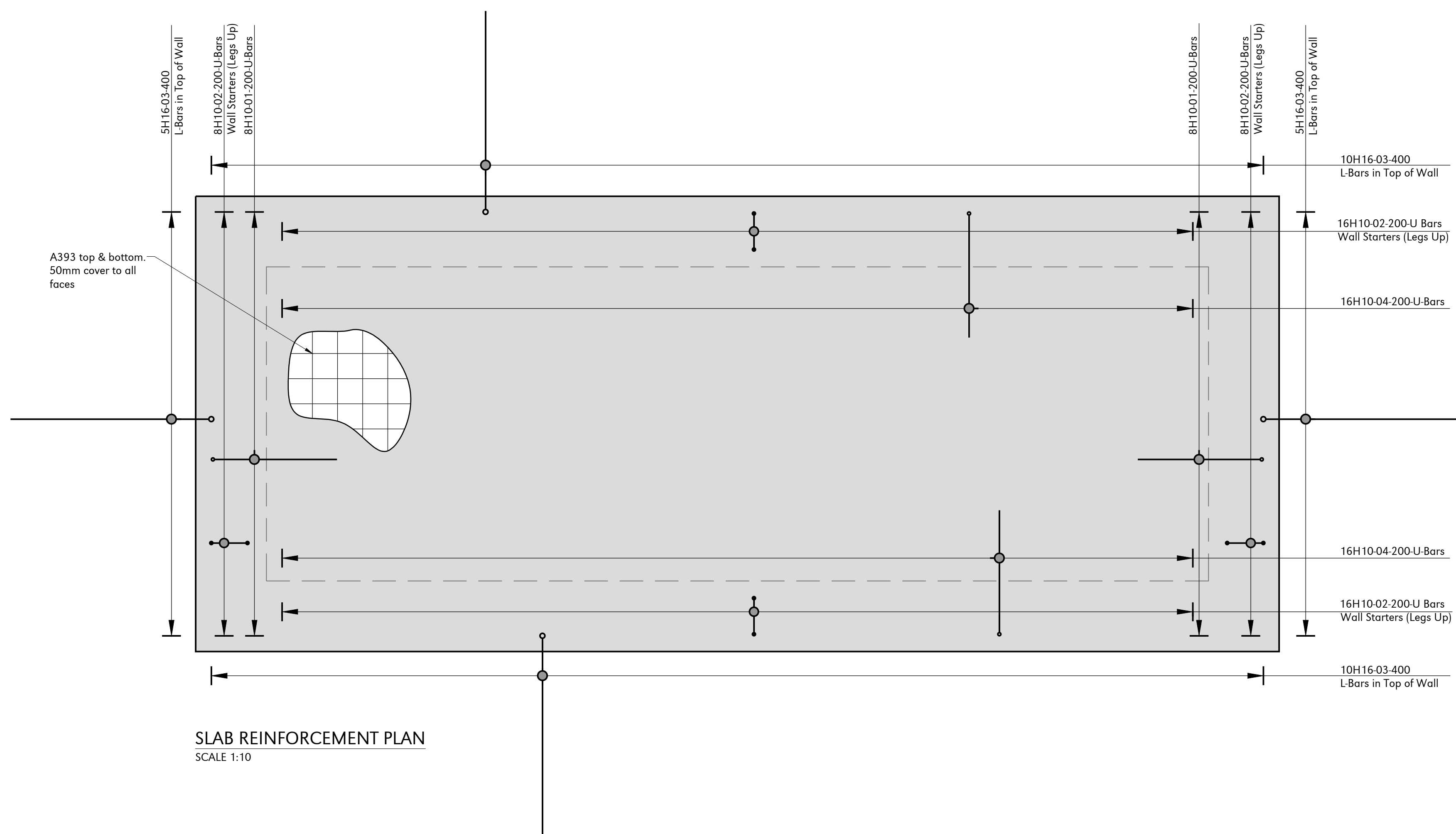
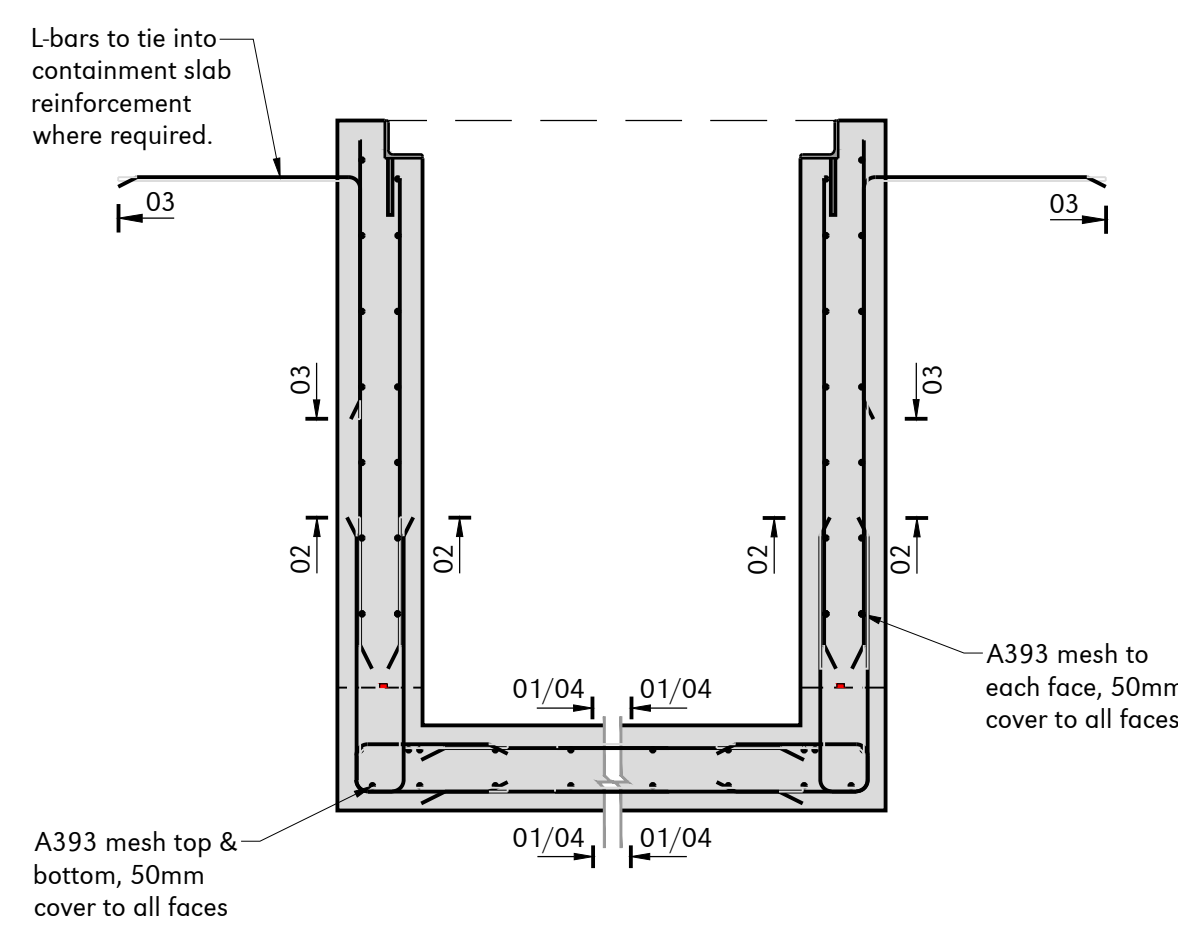
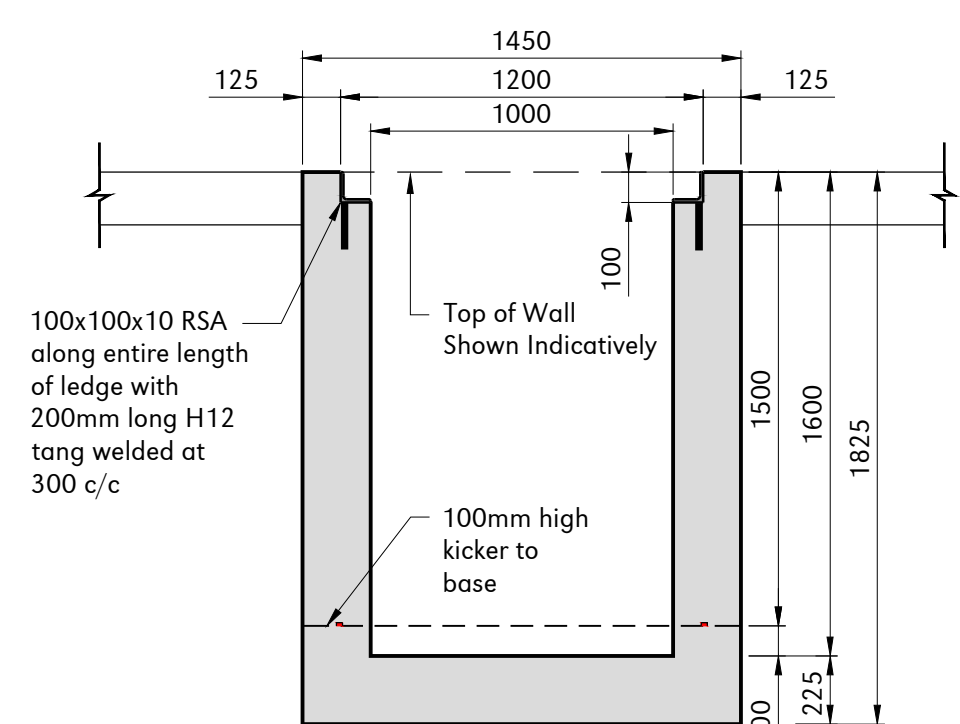
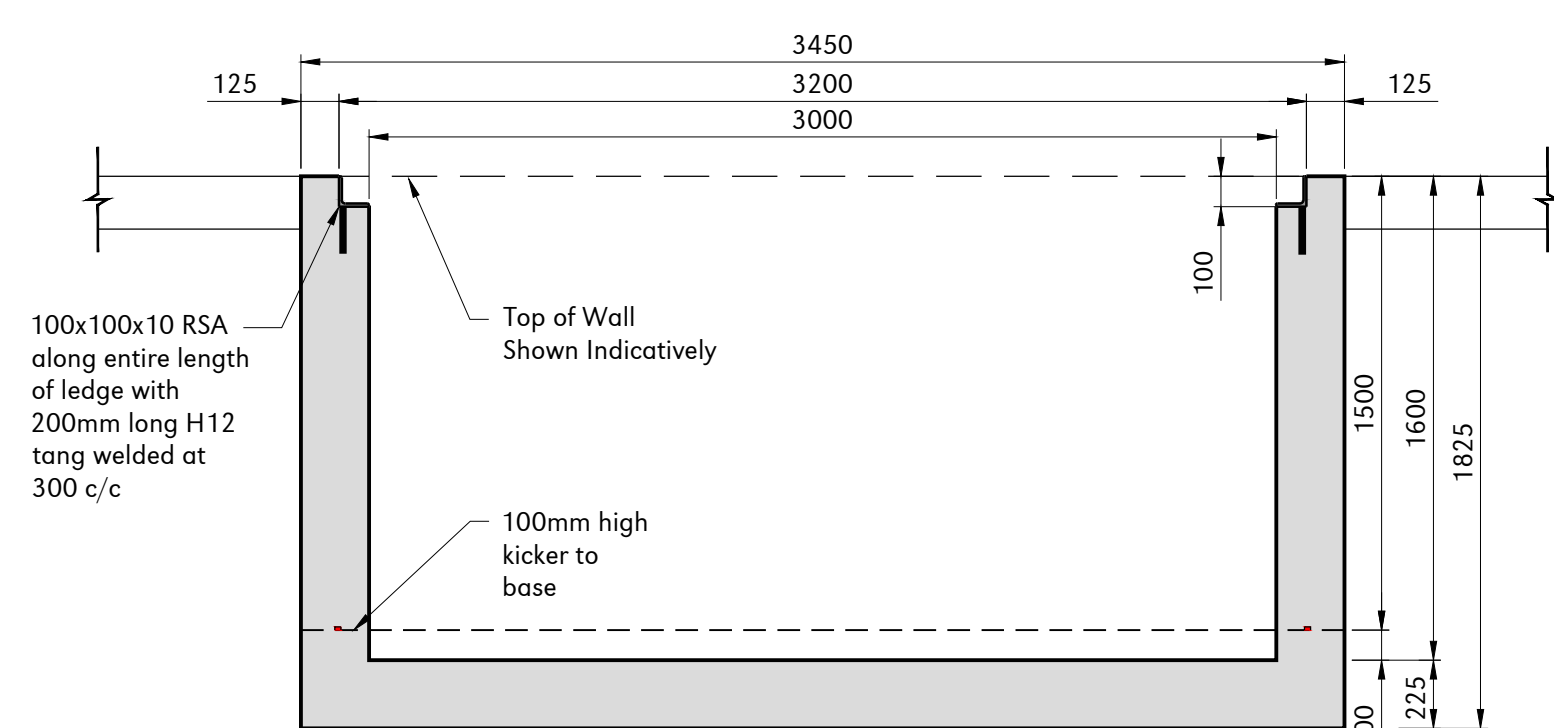
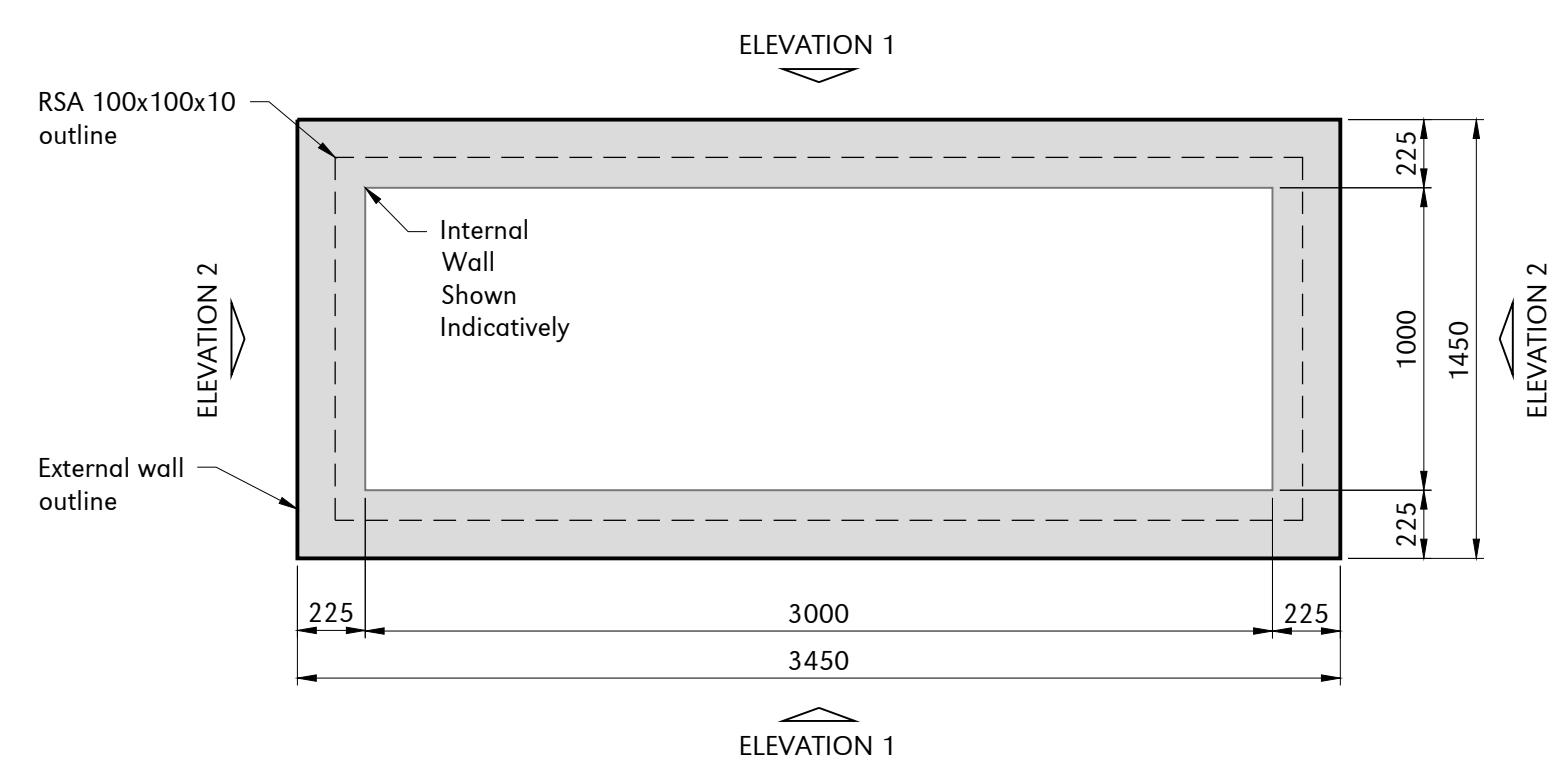
Project  
Attleborough AD Plant,  
Attleborough, Norfolk,  
NR17 1AE

Drawing Title  
Proposed Reception Building  
Internal Drainage Layout

Scale	U.N.O.	Date	Drawn By
1:200 (A1)		September 2021	TOH
Drawing No.	24727/011	Rev	B

1:200 - DRAWING SCALE REFERENCE (m)





- NOTES:
1. All dimensions noted are in millimetres unless stated otherwise.
  2. All levels to be above Ordnance Survey Datum defined levels.
  3. (A.O.D) unless noted otherwise.
  4. On scale drawings, dimensions are given in millimetres unless otherwise stated. All dimensions are clear and unambiguous.
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  6. Planspec Ltd to be immediately notified of any suspected omissions or discrepancies.
  7. This drawing is to be read in conjunction with all other relevant documents relating to the project.
  8. All fittings are to be coordinated by the Contractor and to be checked online prior to construction.
  9. To be read in conjunction with the following Planspec Drawings, schedules and documents:  
24727/005 - Proposed Site Layout  
24727/082/01 B5 - Bar Bending Schedule
  10. Contractor to design, Planspec Ltd conforming to Contractor preferred practices.

- REINFORCED CONCRETE:**
- Instru Concrete to be RC40/50 with max w/c ratio 0.45, 360kg/m<sup>3</sup> cement, combination class (III/A), with 20mm max. aggregate, chlorite content class 0/4 and minimum slump of class 35 (90mm) Slump).
  - Instru Concrete to be in accordance with BS 8110 and BS 8500-1.
  - Reinforcement to be Grade H 500N/mm<sup>2</sup> High Yield, Deformed and Barbed and installed in accordance with BS 4449 and BS 8666.
  - Walls nominal 225mm thick, 50mm cover to bottom, sides and top.
  - Slab nominal 225mm thick, 50mm cover to bottom, sides and top.
  - Floor Classification to meet FMS1 standard for Flatness and Level  $\pm 5$ mm. Construction tolerance to be in accordance with the NCS for Building Structures.
  - Slabs to have brushed finish to exposed surface and fair face to be smooth finish to sides.
  - Walls to have fair face shuttered finish to sides and top.

- ## CONCRETE JOINT NOTES

18. All joint dowel/reinforcement shall be set level and perpendicular to the joint face prior to casting. Damage or bent dowels are to be re-aligned or replaced prior to casting.
19. All formed joints are to be cleaned of concrete overruns to ensure accidental restraint is not created
20. All joints are to be sufficiently cured and cleaned of all contaminations prior to sealing.
21. All sealants are to be installed as per manufacturers specification and must be suitable for the joint type.

- FOUNDATION NOTES:**
22. Assumed GBP value of 225kN/m<sup>2</sup> has been used. Value provided by O'Brien Moran Ltd, following an initial ground treatment review. Confirmation of minimum GBP of 225kN/m<sup>2</sup> required prior to construction.
  23. Any soft spots or deleterious material is to be removed & taken down to virgin ground level & replaced with compact D.f.T Type 1 or suitable hogging material.
  24. Overdig to be made up in compacted D.f.T. Type 1 or lean mix concrete.

#### APPROVAL & COMMENT

B	27-10-21	OAJ	Minor Amendments
A	13-01-20	OAJ	Client Name Amended
0	10-01-20	OAJ	First Issue
Rev	Date	Chkd	Description

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civil / structural / environmental / surveying

Client

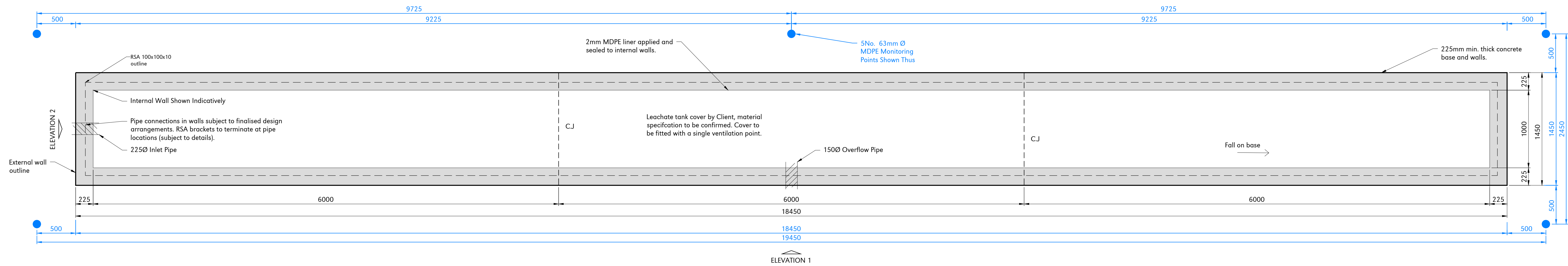
Project

Drawing Title

Scale U.N.O. Date Drawn By

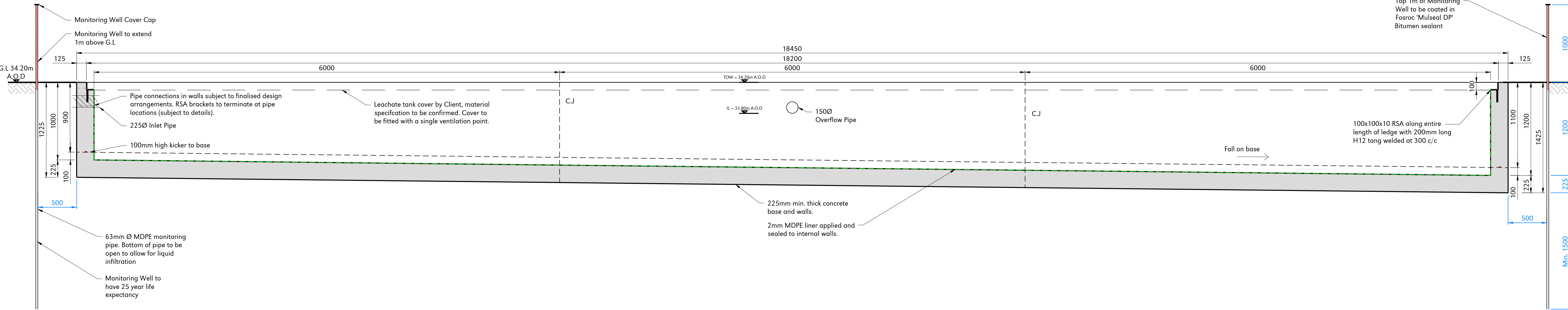
Drawing No.	3-505-1000	Rev.	1
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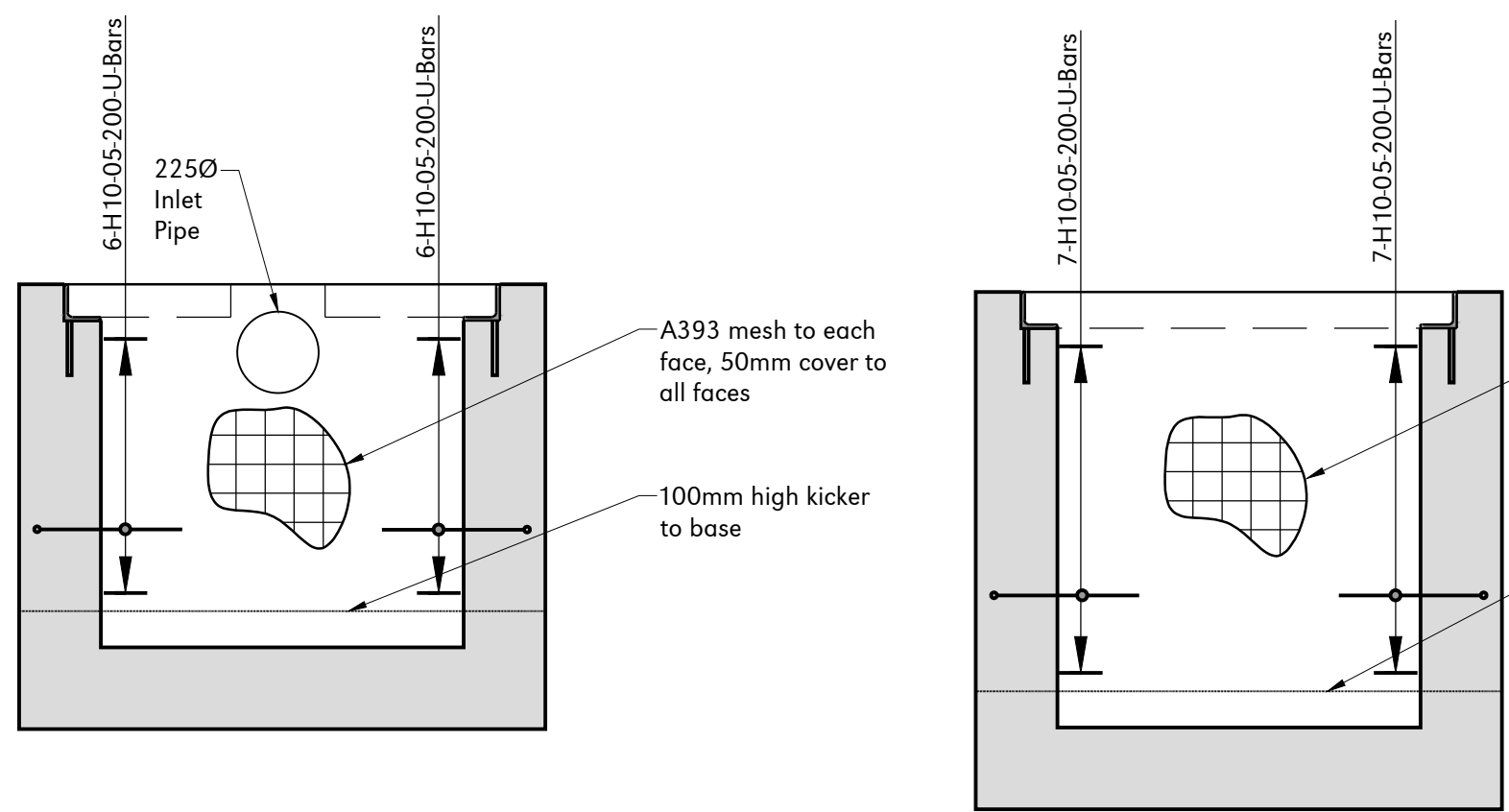
SUMP PIT BASE SLAB GA

SCALE 1:25



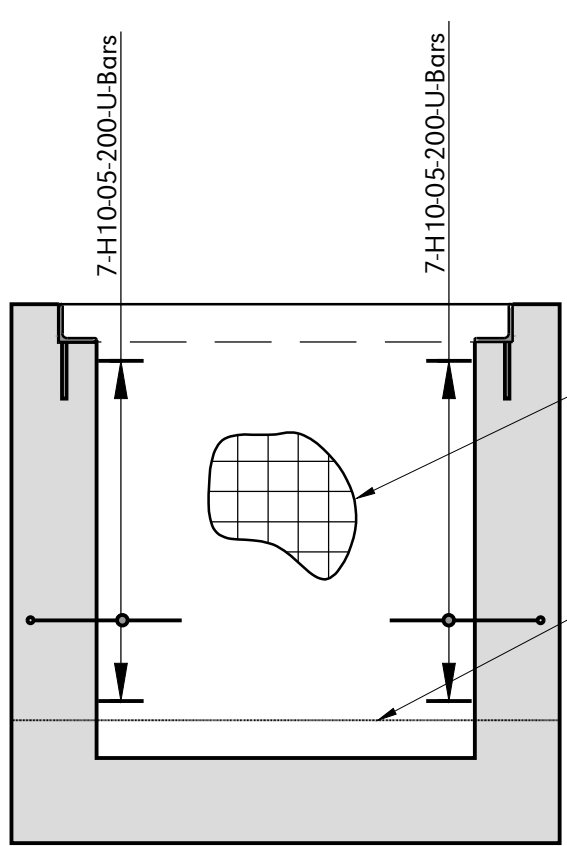
SUMP PIT RETAINING WALL GA (ELEVATION 1, 2No. THUS)

SCALE 1:25



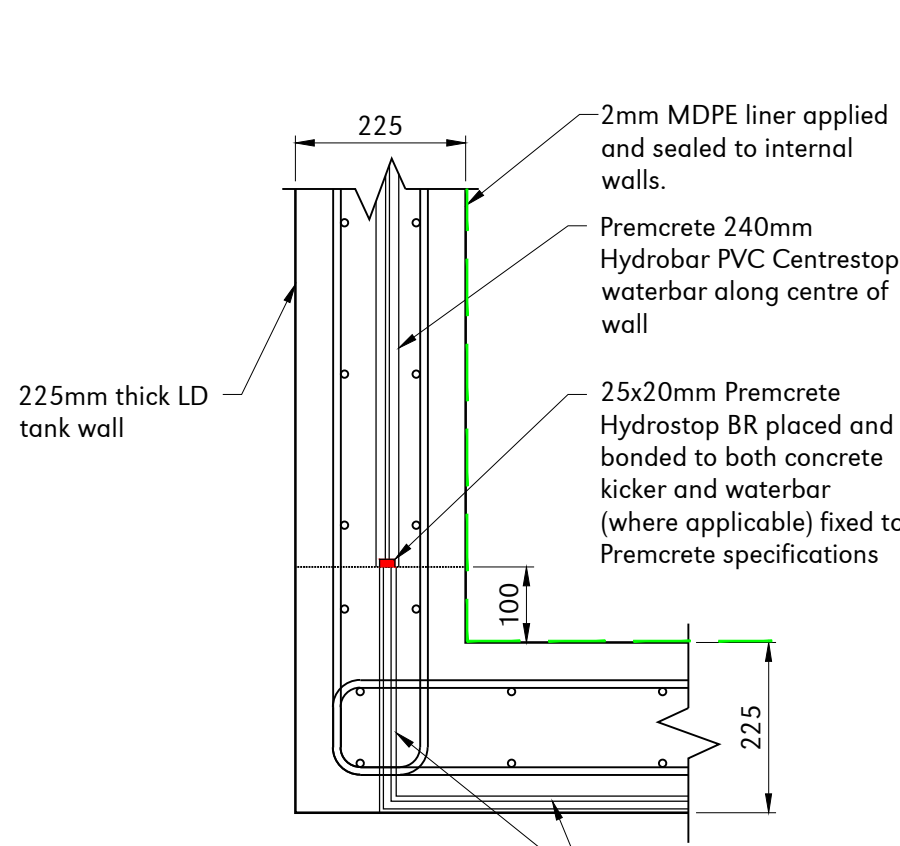
ELEVATION 2 RC (1No. THUS)

SCALE 1:10



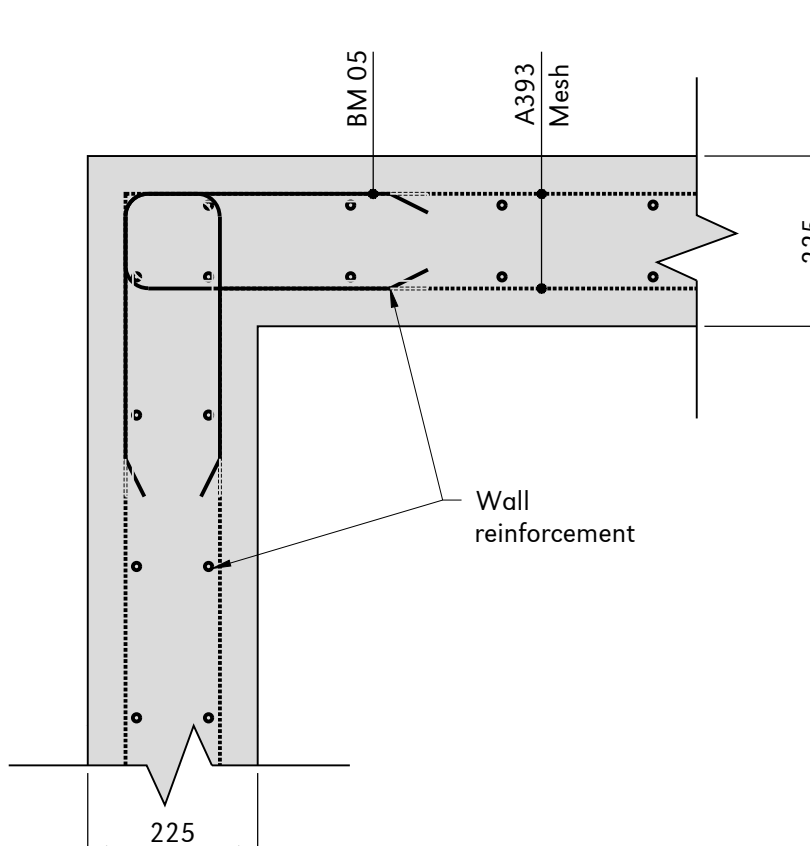
ELEVATION 3 RC (1No. THUS)

SCALE 1:10



TYPICAL SECTION OF WALL WATERPROOFING DETAIL

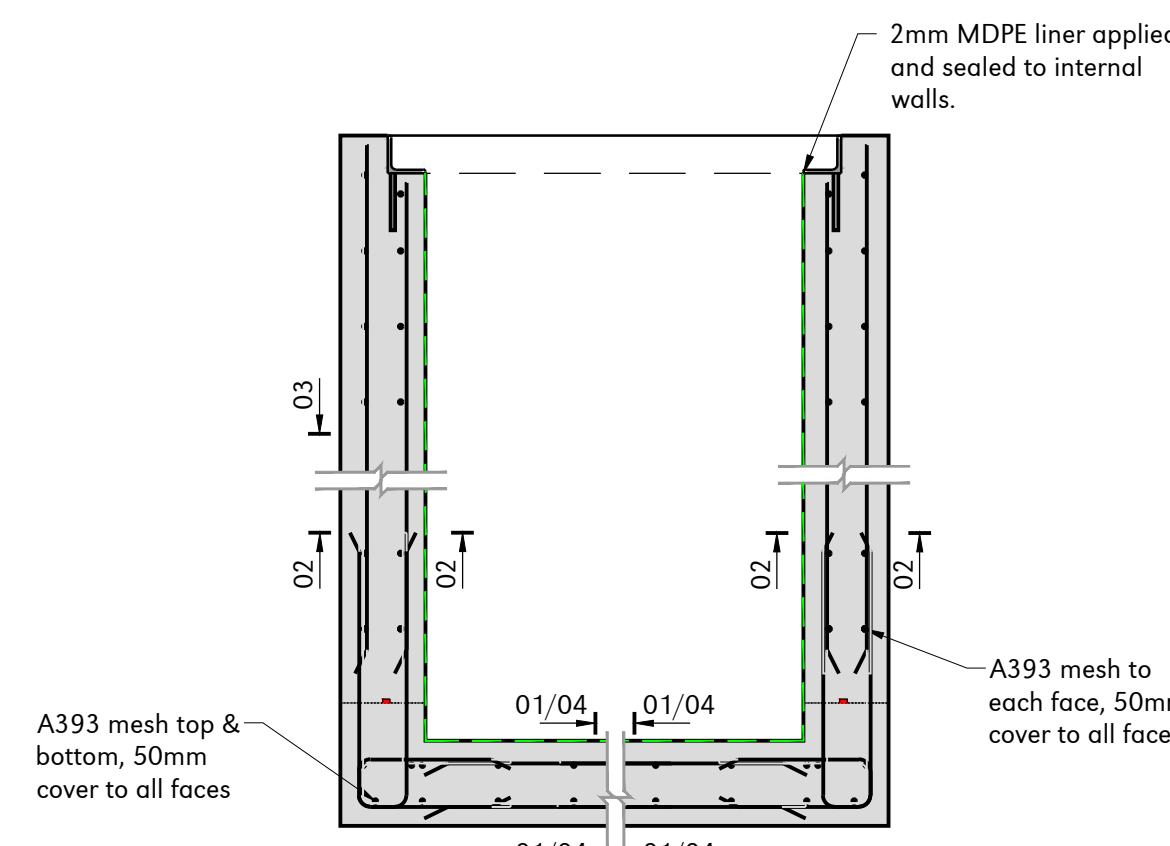
Scale 1:10



TYPICAL WALL CORNER REINFORCEMENT DETAIL PLAN (4No. THUS)

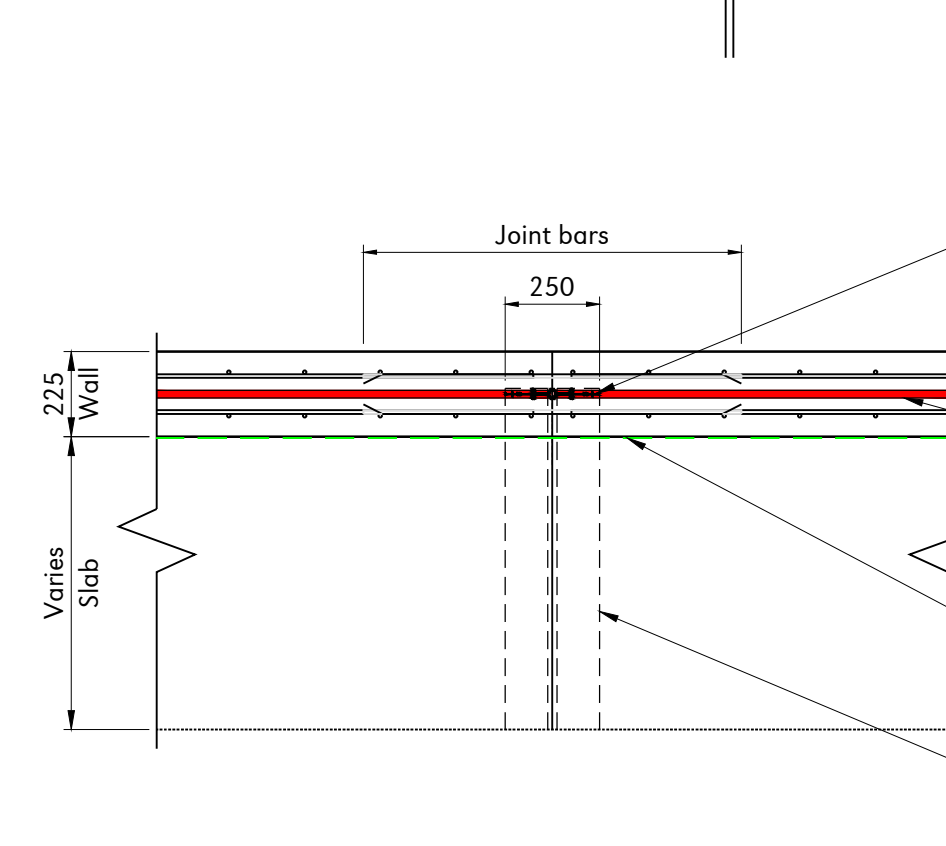
SCALE 1:10

Note: Base Reinforcement to be cut to suit at corner location



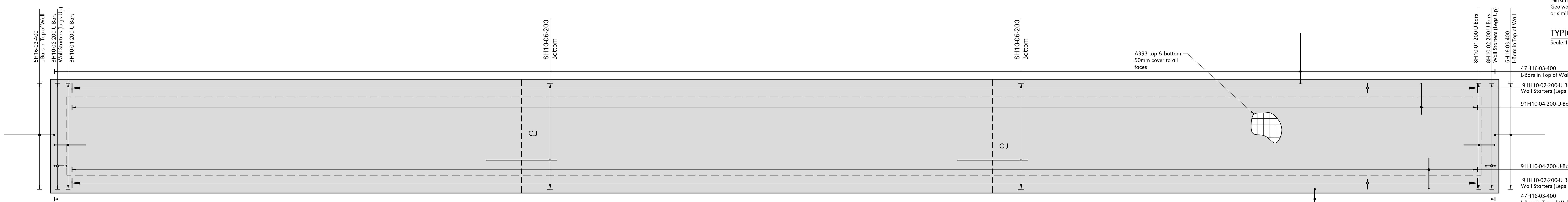
TYPICAL PIT SECTION

SCALE 1:20



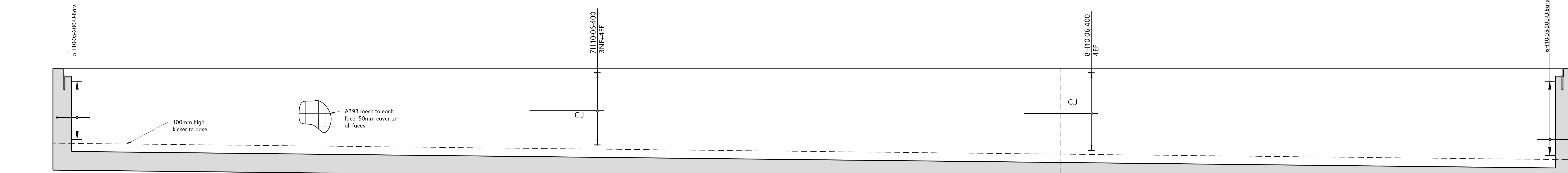
TYPICAL PLAN OF WALL WATERPROOFING THROUGH CONTRACTION JOINT (C.J.)

Scale 1:20



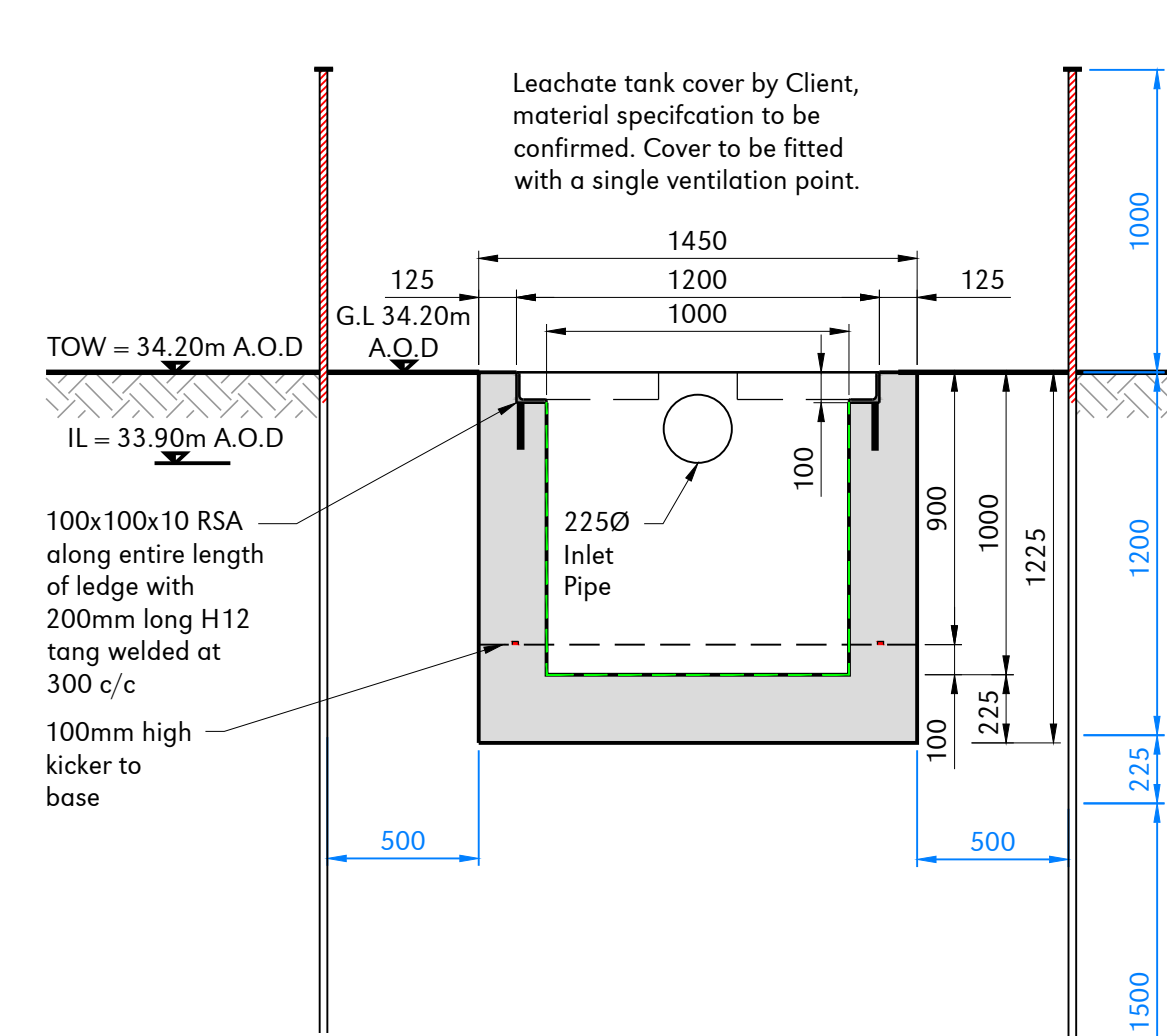
SLAB REINFORCEMENT PLAN

SCALE 1:20



ELEVATION 1 RC (2No. THUS)

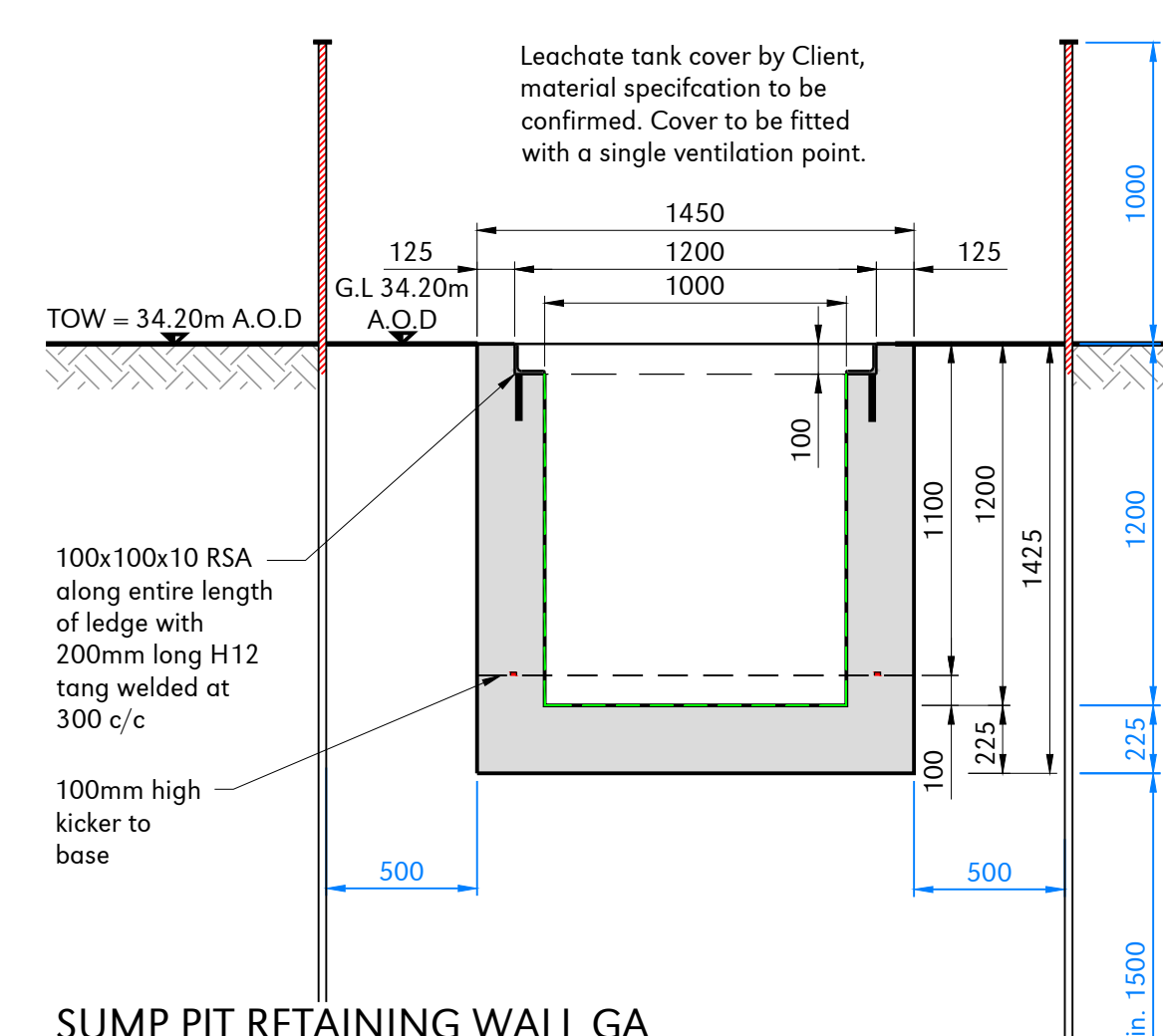
SCALE 1:20



SUMP PIT RETAINING WALL GA (ELEVATION 2, 1No. THUS)

SCALE 1:25

Note: Pipe connections in walls subject to finalised design arrangements



SUMP PIT RETAINING WALL GA (ELEVATION 2, 1No. THUS)

SCALE 1:25

- NOTES:
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  - All levels to be above Ordnance Survey Datum defined levels (A.O.Dm) unless noted otherwise.
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  - Plandescil Ltd. to be immediately notified of any suspected omissions or discrepancies.
  - This drawing is to be read in conjunction with all other relevant documents relating to the project.
  - All setting out to be coordinated by the Contractor and to be checked on-site prior to construction.
  - To be read in conjunction with the following Plandescil Drawings, schedules and documents:  
24727/100-01 BS: Bar Bending Schedule
  - Pipe connections in walls subject to finalised design arrangements.

REINFORCED CONCRETE:

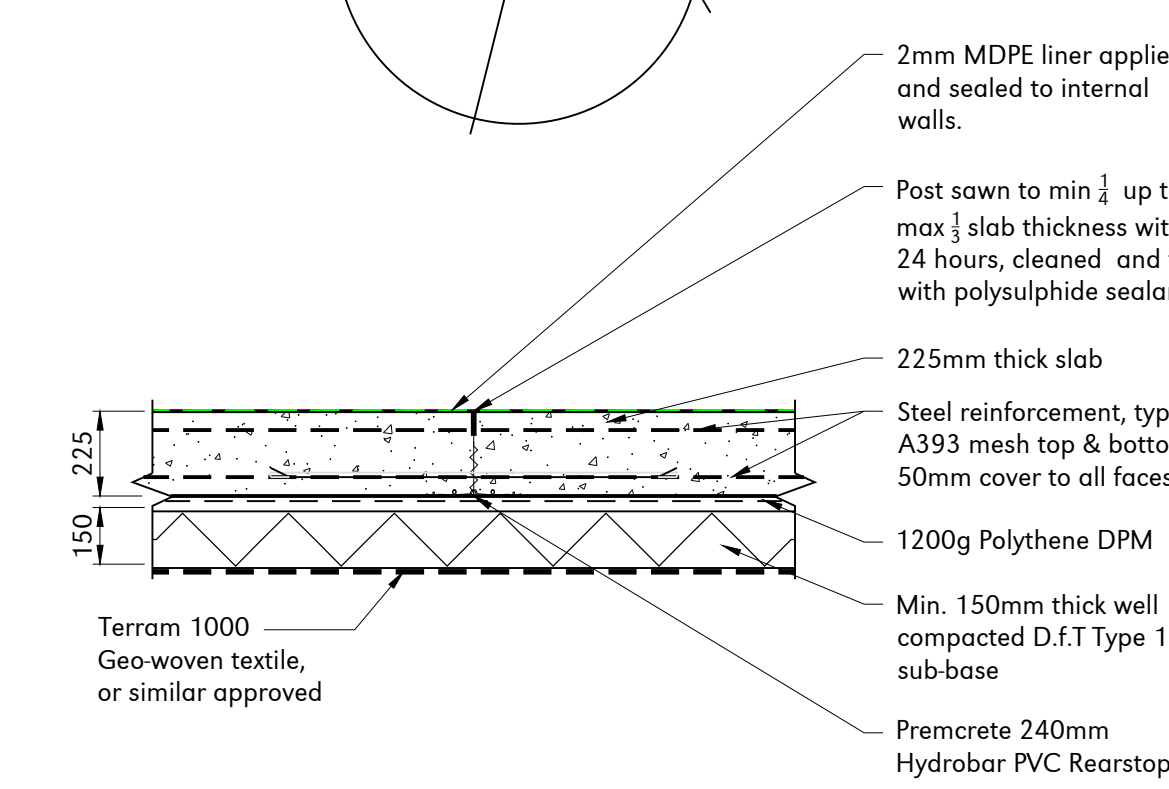
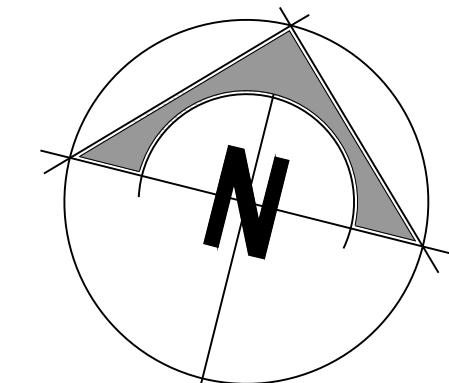
- Insta Concrete to be RC40/50 with max w/c ratio 0.45, 360kg/m<sup>3</sup> cement combination content (III/A), with 10mm max. aggregate, chloride content class 0.4cl and minimum slump of class S3 (90mm Slump).
- Insta Concrete to be in accordance with BS 8110 & BS 8500-1.
- Reinforcement to be Grade H 500N/mm<sup>2</sup> High Yield, Deformed Type 2 Bar detailed in accordance with BS 4449 and BS 8666.
- Walls nominal 225mm thick, 50mm cover to bottom, sides and top.
- Slab nominal 225mm thick, 50mm cover to bottom, sides and top.
- Floor Classification to meet FM3 standard for Flatness and Level ±5mm. Construction tolerance to be in accordance with the NSCS for Building Structures.
- Slab to have brushed finish to exposed surface and fair face shutter finish to sides.
- Walls to have fair faced shuttered finish to sides and top.

CONCRETE JOINT NOTES:

- All joint dowel/reinforcement shall be set level and perpendicular to the joint face prior to casting. Damage or bent dowels are to be re-aligned or replaced prior to casting.
- All formed joints are to be cleaned of concrete overruns to ensure accidental restraint is not created.
- All joints are to be sufficiently cured and cleaned of all contaminants prior to sealing.
- All sealants are to be installed as per manufacturers specification and must be suitable for the joint type.

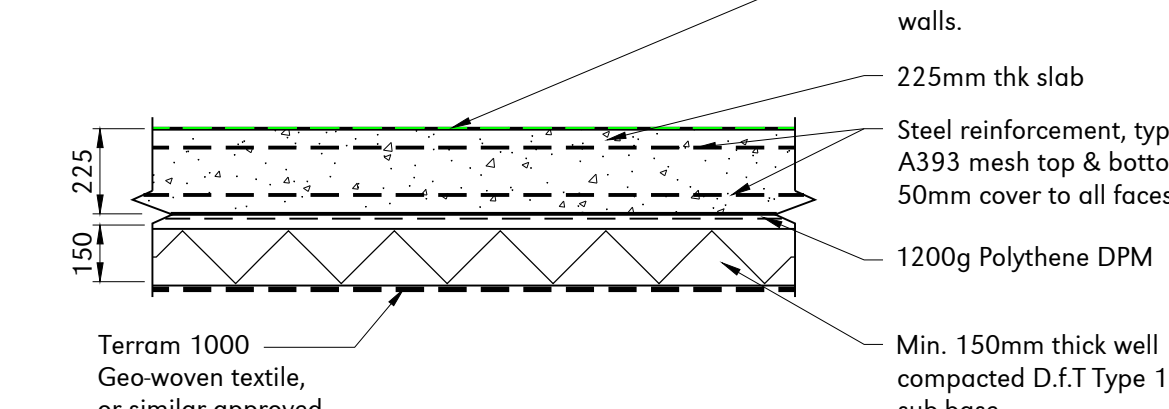
FOUNDATION NOTES:

- Assumed GBP value of 225kN/m<sup>2</sup> has been used. Value provided by O'Brien Moran Ltd. following an initial ground treatment Confirmation of minimum GBP of 225kN/m<sup>2</sup> required prior to construction.
- Any soft spots or deleterious material is to be removed & taken down to virgin ground level & replaced with compact D.F.T Type 1 or suitable haggling material.
- Overdig to be made up in compacted D.F.T. Type 1 or lean mix concrete.



TYPICAL SLAB CONTRACTION JOINT DETAIL (C.J.)

Scale 1:20



TYPICAL SLAB CONSTRUCTION

Scale 1:20

Reinforcement specification subject to final detailing. Bars only shown for provisional purposes.

APPROVAL & COMMENT

PROVISIONAL

Rev	Date	Chkd	Description
C	01-12-21	OAJ	Tank Design Amended
B	27-10-21	OAJ	Tank Design Amended
A	13-01-20	OAJ	Client Name Amended
0	10-01-20	OAJ	First Issue

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civil / structural / environmental / surveying

Client

Attleborough AD Plant Limited

Project

Attleborough AD Plant,  
Attleborough, Norfolk,  
NR17 1AE

Drawing Title

Leachate Tank  
GA & RC Details

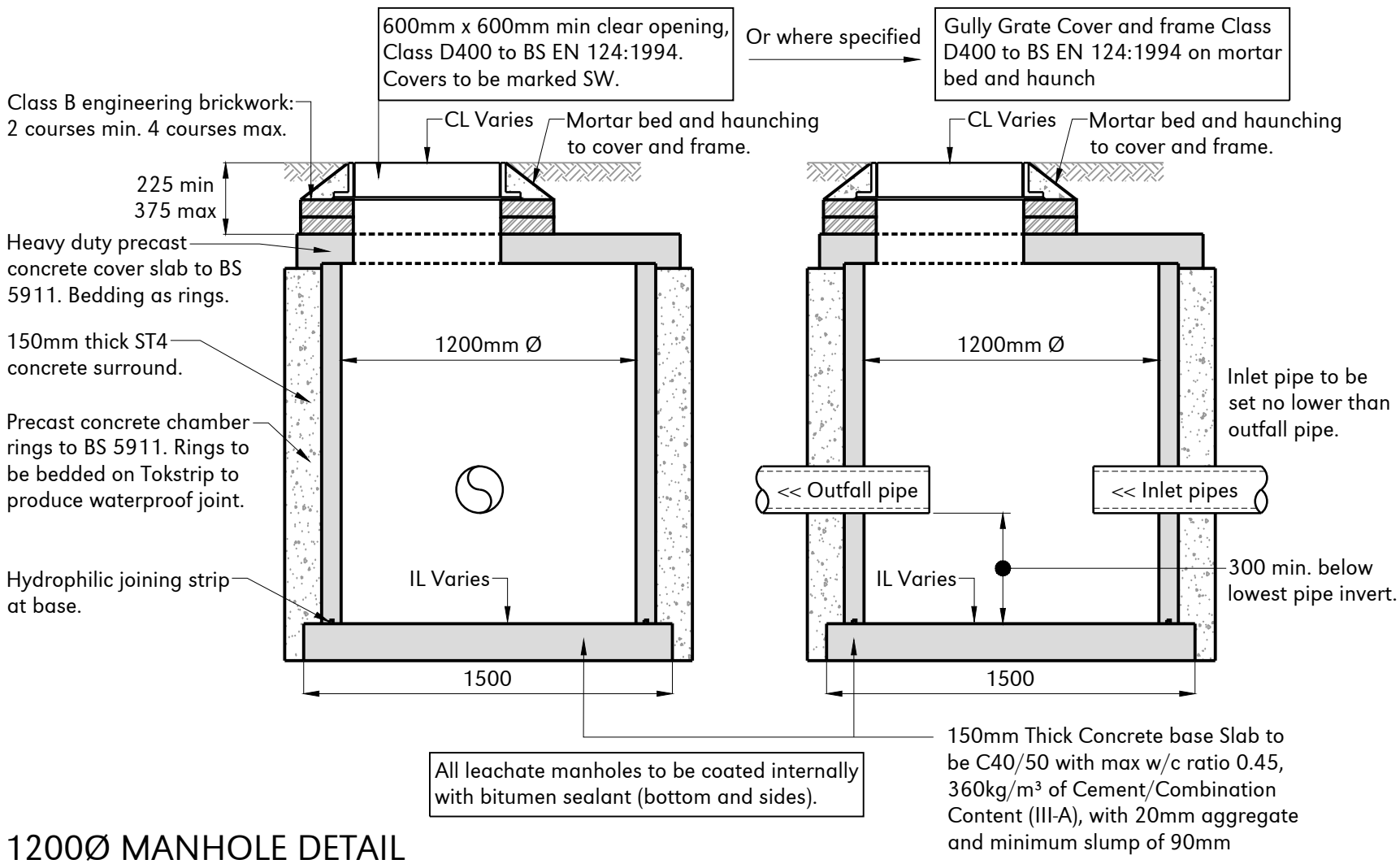
Scale U.N.O. Date

As Noted (AO) January 2020

Drawing No. 24727/100

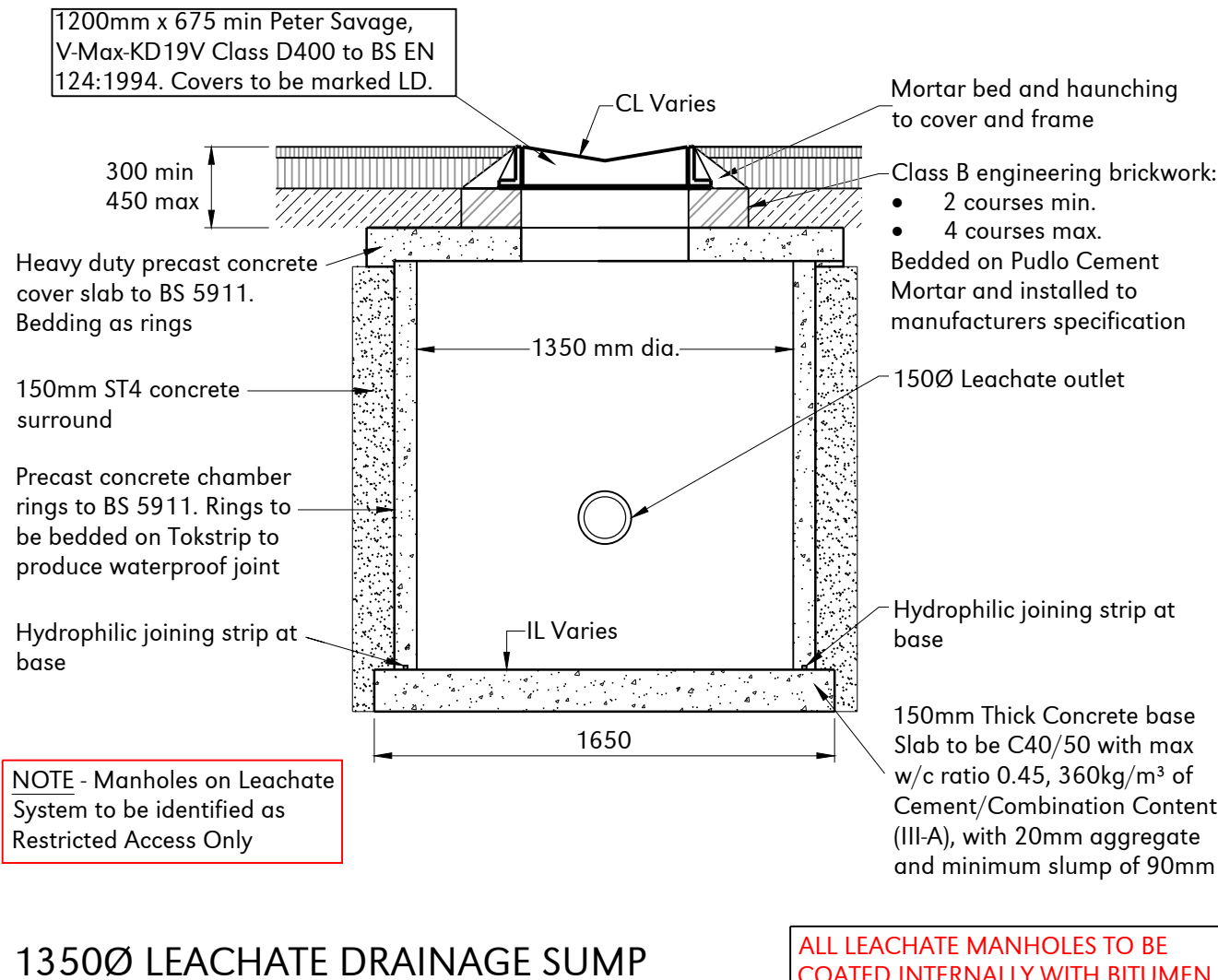
Rev C





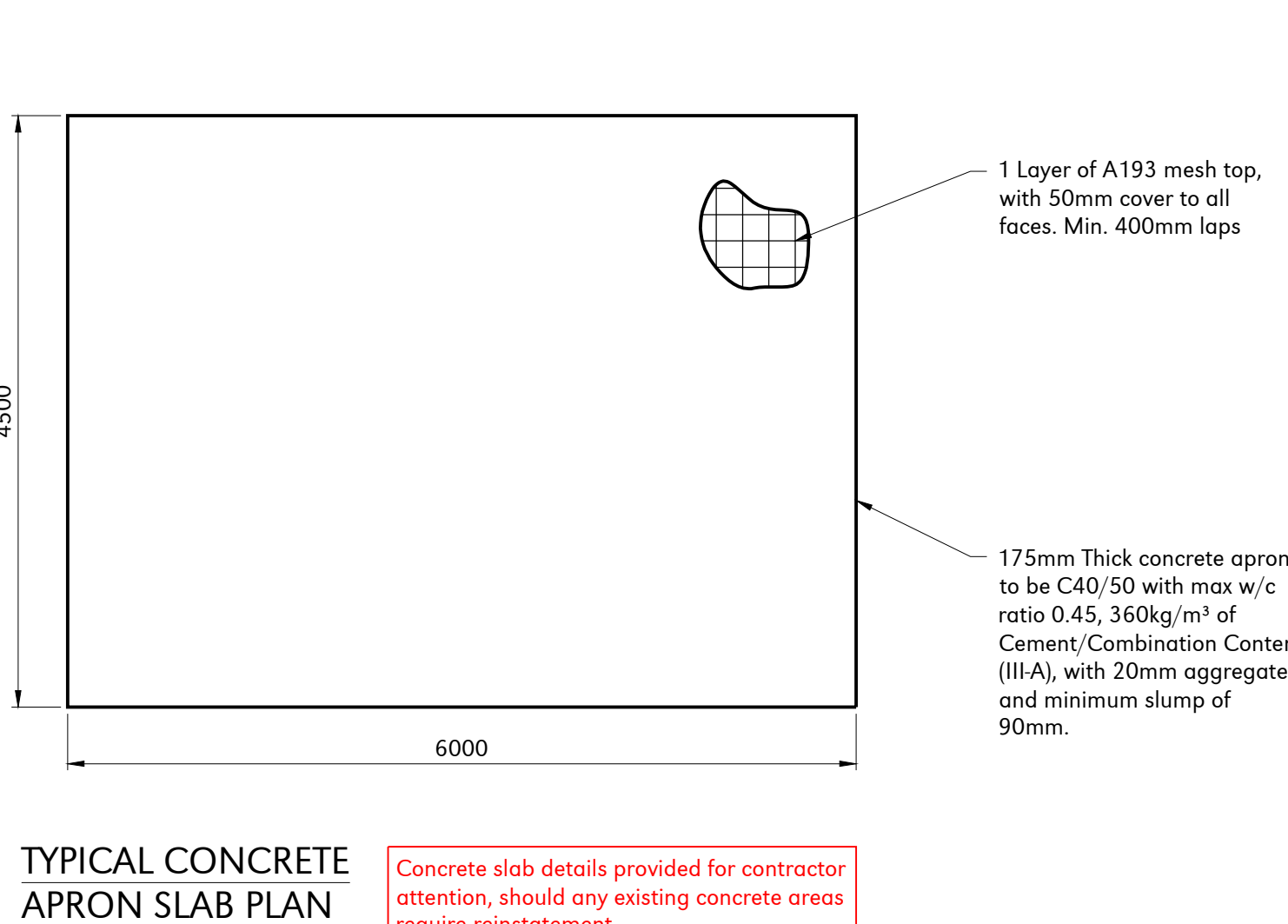
1200Ø MANHOLE DETAIL

Scale 1:25



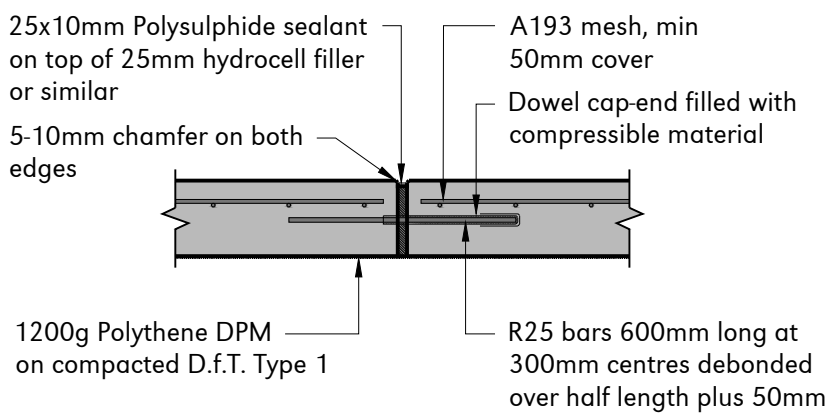
1350Ø LEACHATE DRAINAGE SUMP

Scale 1:25



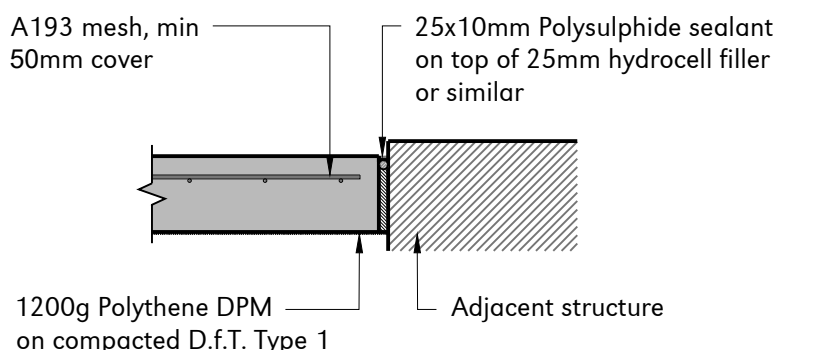
TYPICAL CONCRETE APRON SLAB PLAN

Scale 1:50



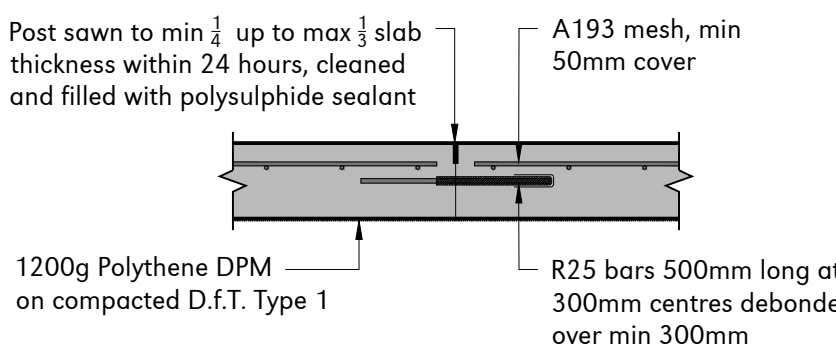
TYPICAL EXPANSION JOINT (E.J.)

Scale 1:20



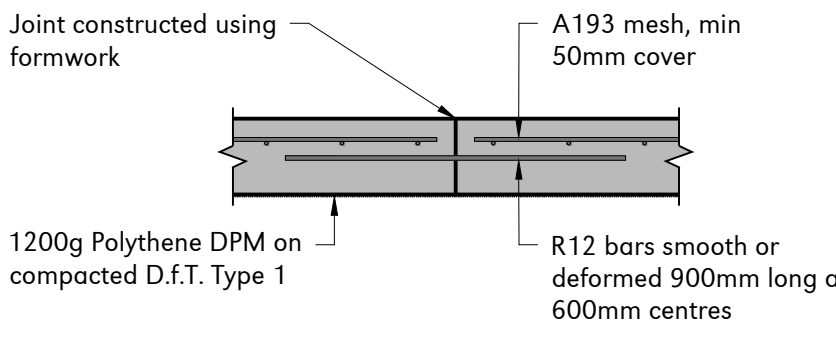
TYPICAL ISOLATION JOINT (I.J.)

Scale 1:20



TYPICAL SAWN FREE-MOVEMENT CONTRACTION JOINT (C.J.)

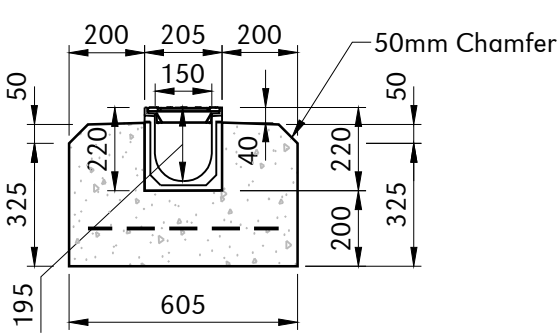
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TYPICAL FORMED RESTRAINED-MOVEMENT LONGITUDINAL JOINT (L.J.)

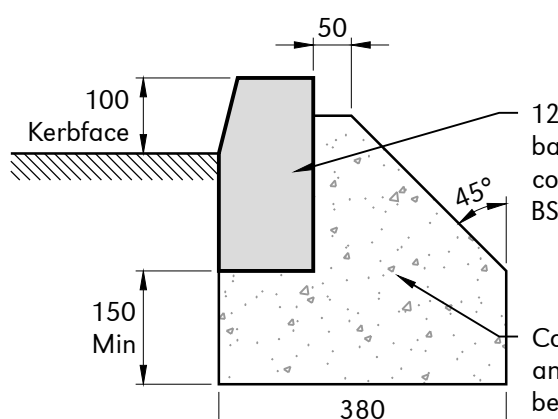
Scale 1:20

Note:  
• Drainage to be installed as per ACO 'S Range' manufacturer details, U.N.O.  
• 2No. sumps, 1No. at each end of channel.  
• Top of ACO Grating to be 3mm below finished level of road surfacing.



ACO S150 CHANNEL HAUNCH DETAIL

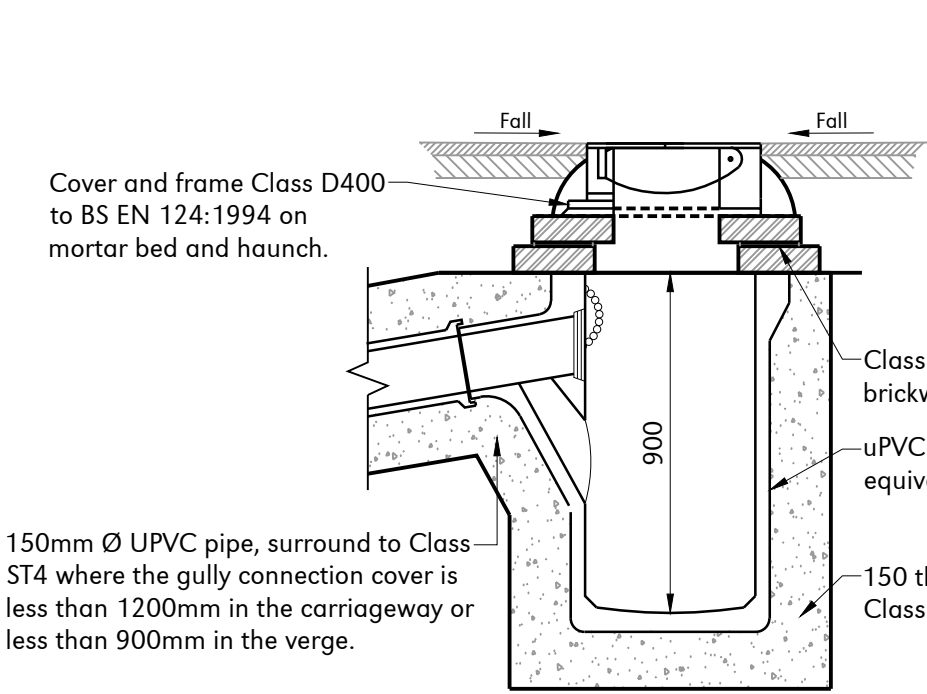
Scale 1:20



HALF BATTERED KERB (HB2)

Scale 1:10

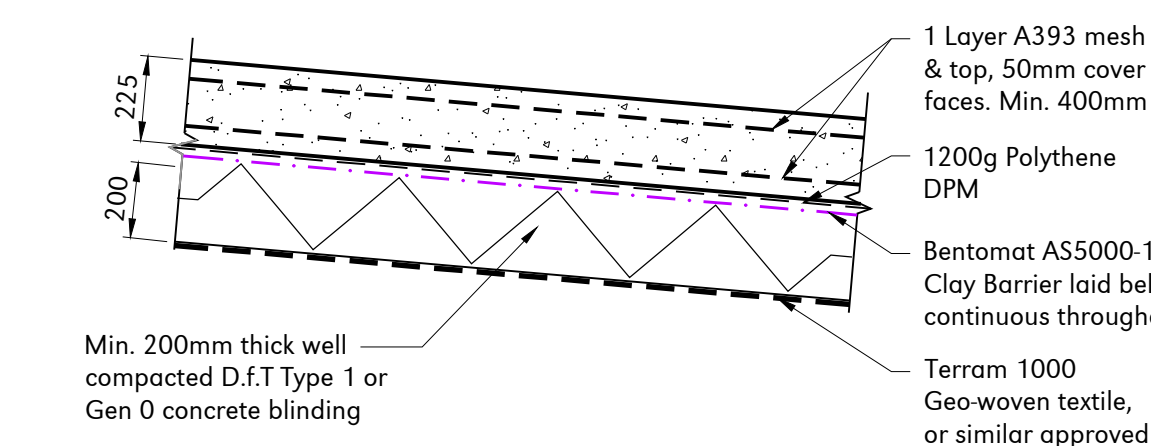
Notes For Alternative Details  
• Kerb face can be increased to 125mm



TYPICAL SURFACE WATER GULLY DETAIL

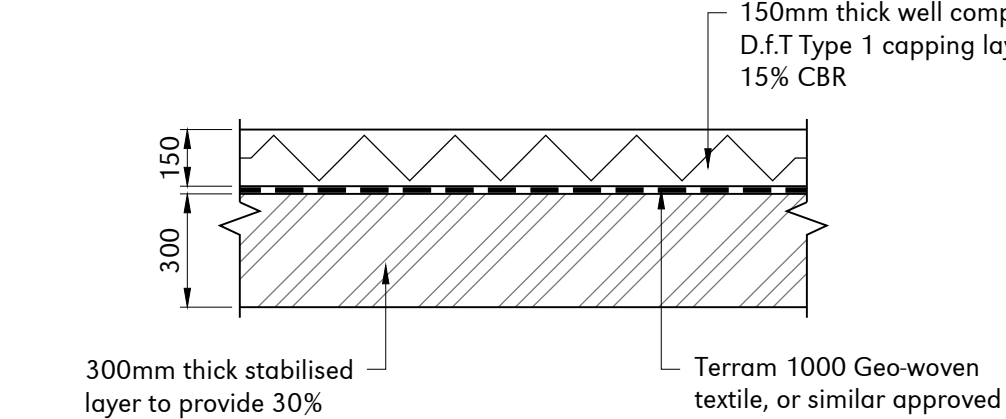
Scale 1:20

RC32/40 with max w/c ratio 0.45, 300kg/m³ cement/combination content (III/A), with 20mm max. aggregate (non-limestone). Fibre dosage of 3.0kg/m³ ConCrib Durus EasyFib, in accordance with Manufacturer specification and design calculations. Ramp details TBC.



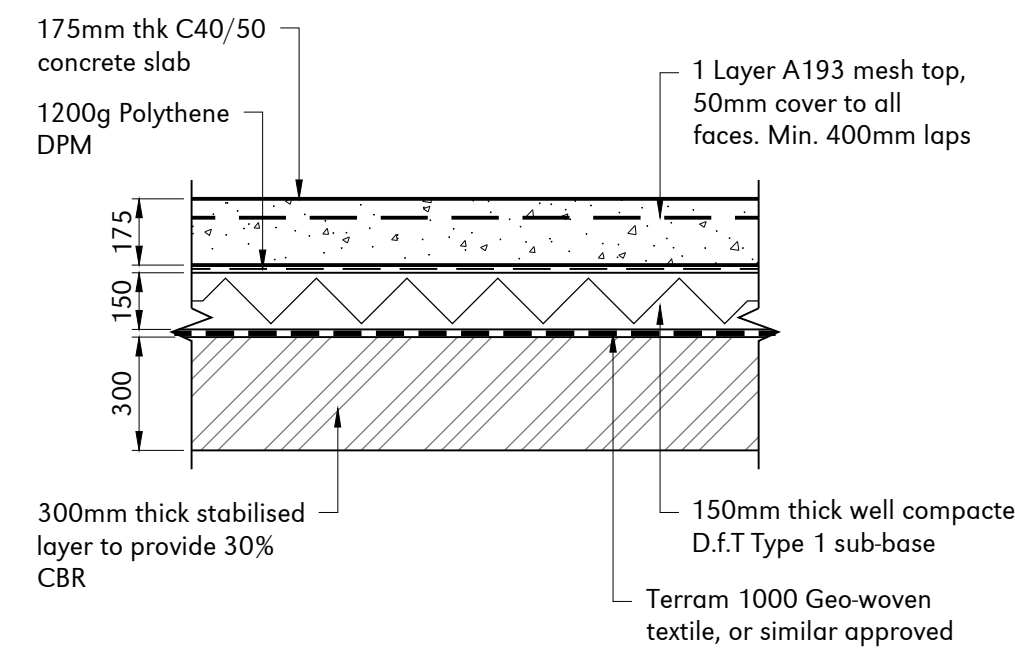
CONTAINMENT BUND RAMP TYPICAL CONSTRUCTION

Scale 1:20



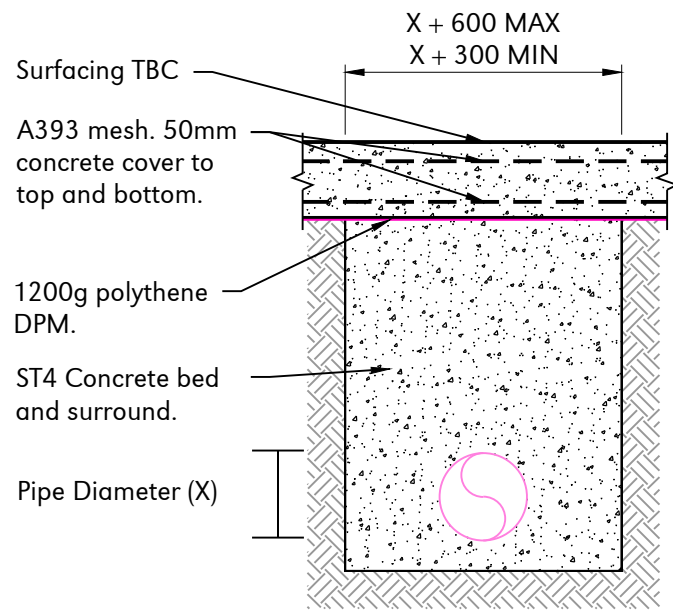
TYPICAL TYPE 1 CONSTRUCTION

Scale 1:20



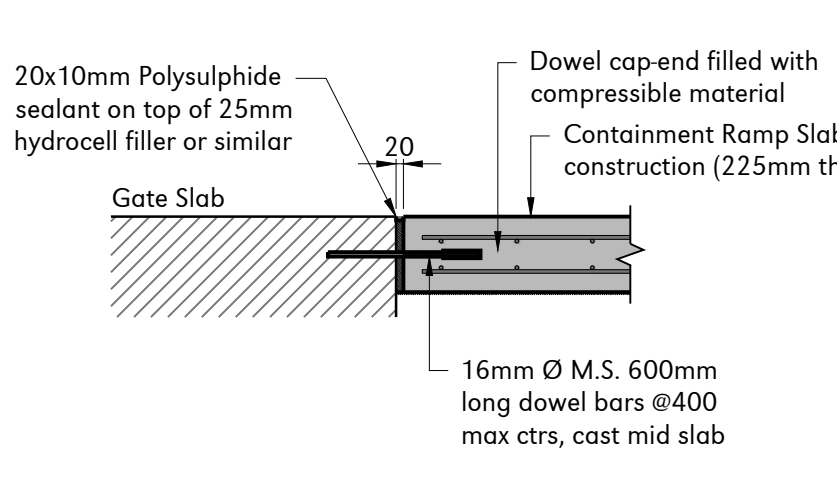
TYPICAL CONCRETE APRON SLAB CONSTRUCTION

Scale 1:20



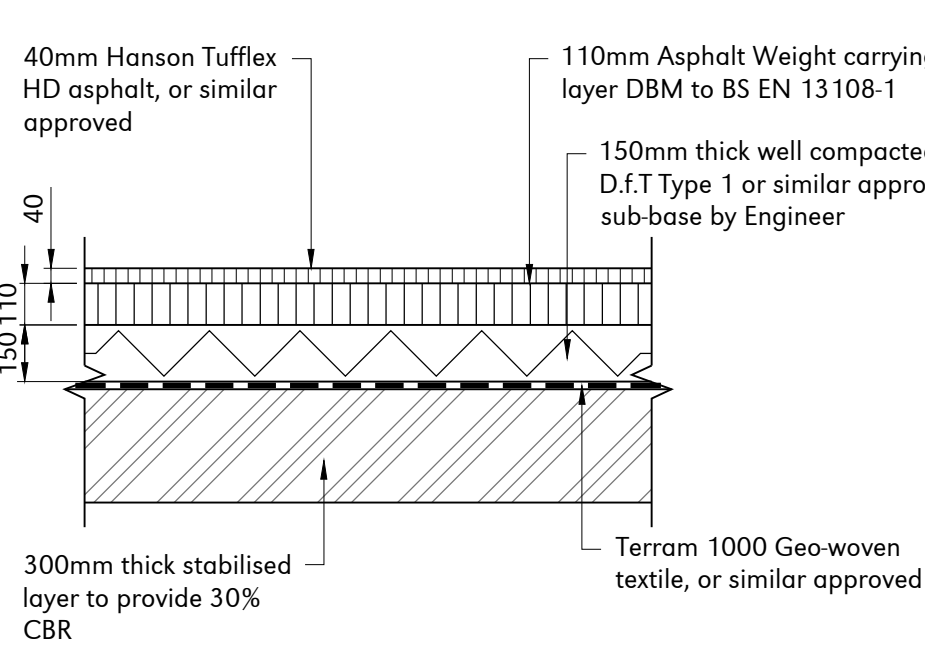
PIPE BEDDING DETAIL FOR DRAINS WHERE DEPTH TO SOFFIT LESS THAN 0.5M

Scale 1:20



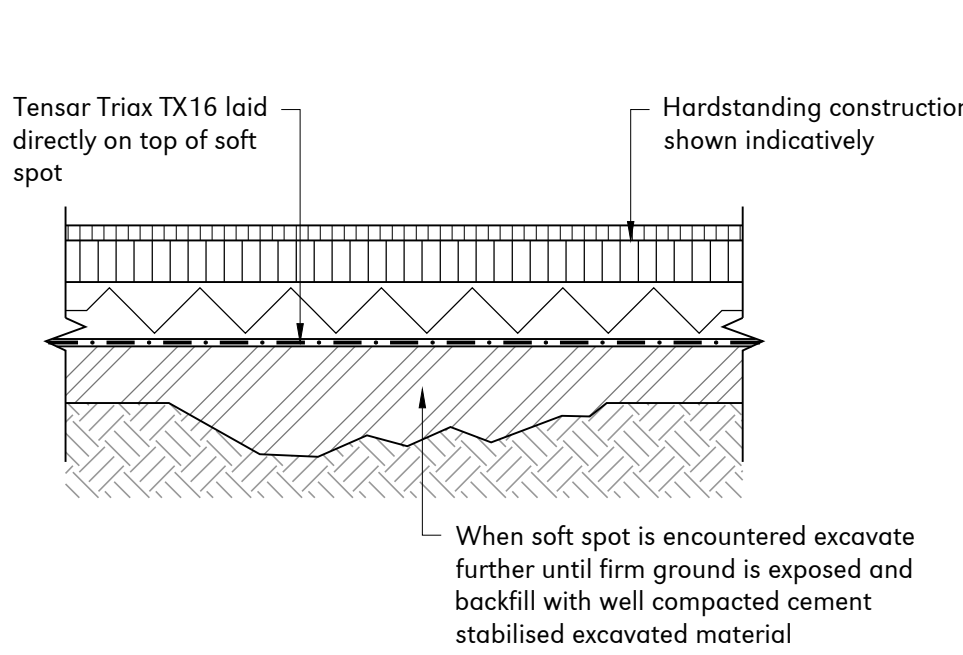
TYPICAL CONTAINMENT RAMP EXPANSION JOINT DETAIL (E.J.)

Scale 1:20



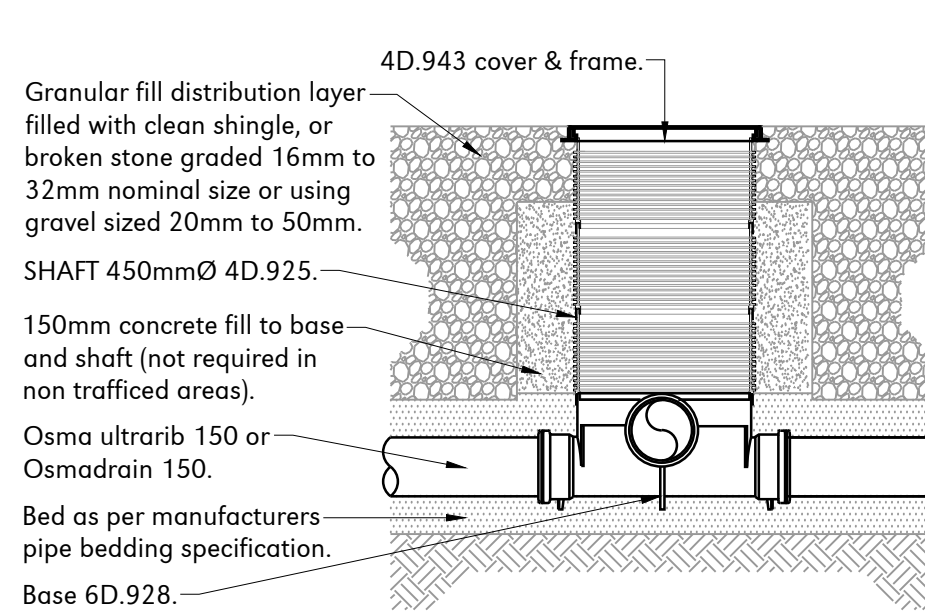
TYPICAL ASPHALT SURFACE CONSTRUCTION

Scale 1:20



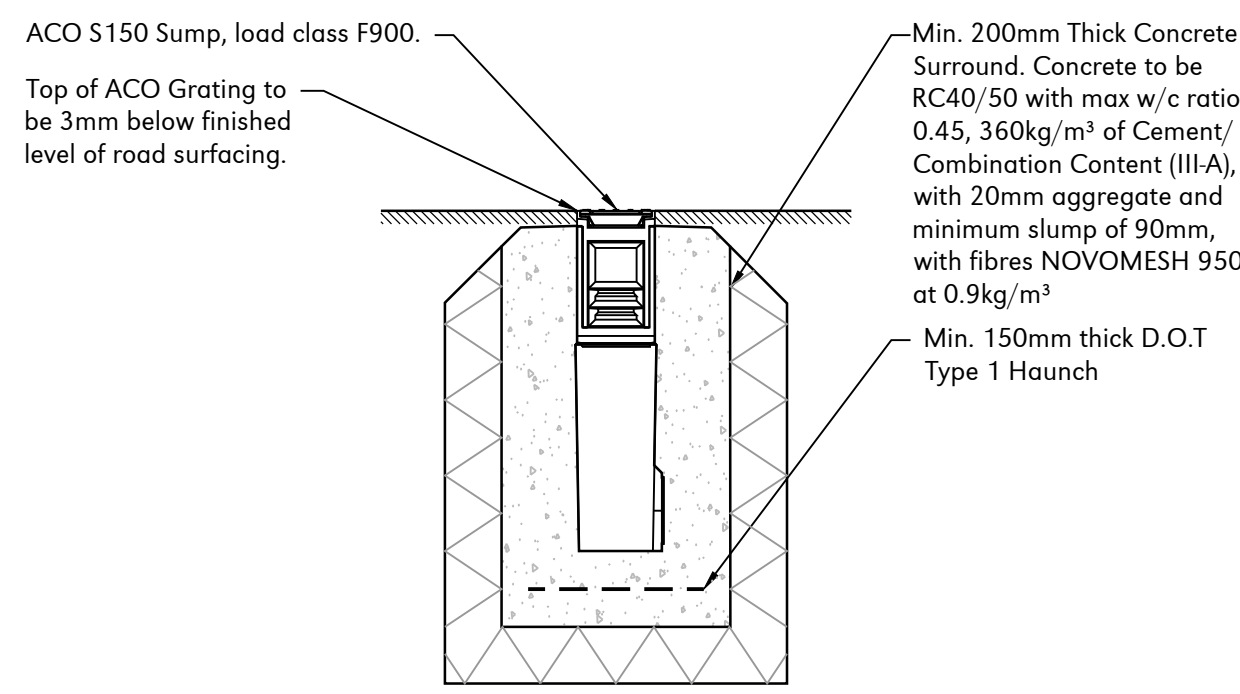
TYPICAL SOFT SPOT REMEDIAL DETAIL

Scale 1:20



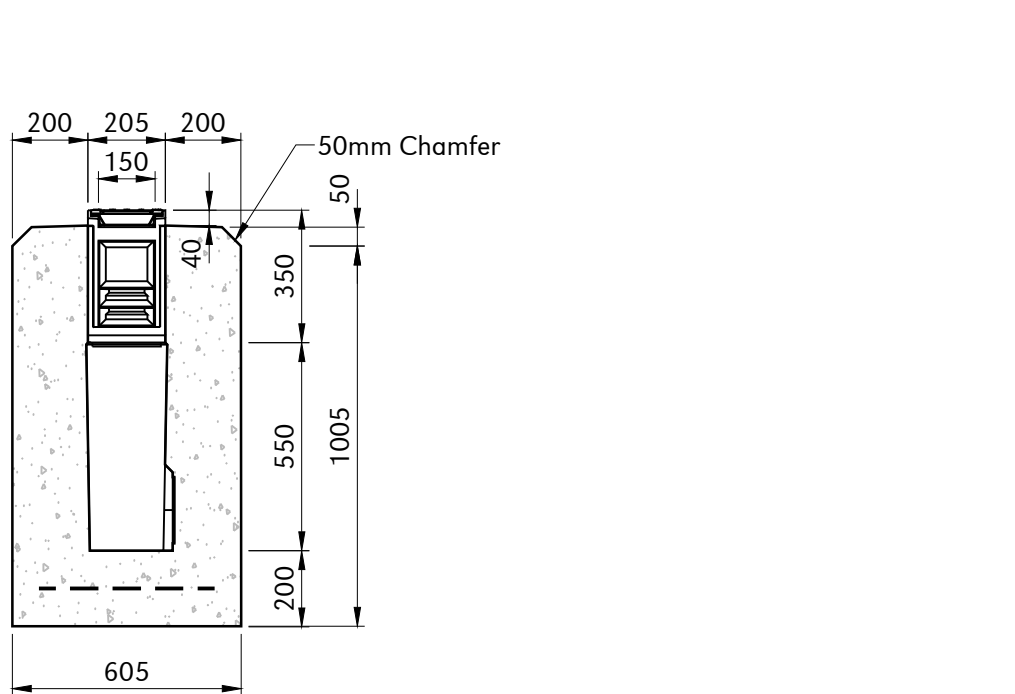
4500Ø INSPECTION CHAMBER DETAIL

Scale 1:20



ACO S150 SUMP TYPICAL SECTION

Scale 1:20

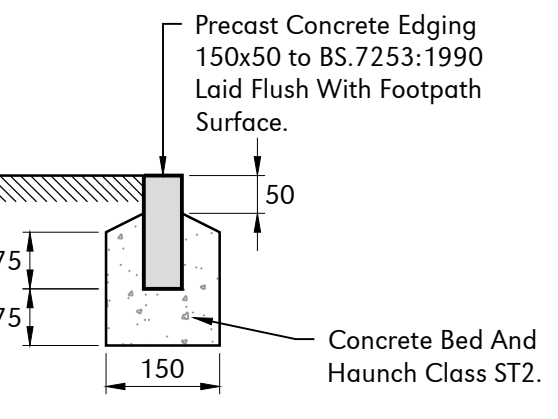


ACO S150 SUMP HAUNCH DETAIL

Scale 1:20

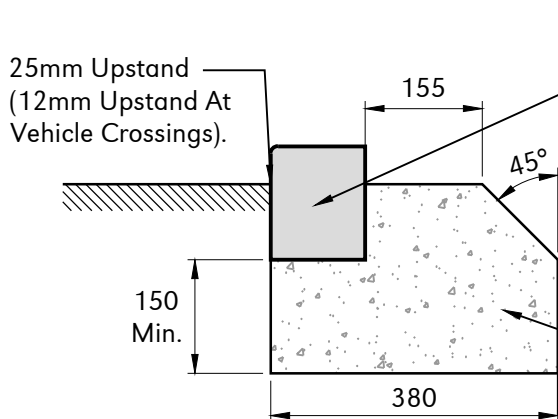
ACO S150 CHANNEL TYPICAL SECTION

Scale 1:20



FOOTPATH EDGING (EF)

Scale 1:10



DROP KERB (BN)

Scale 1:10

Notes For Alternative Details  
• Upstand can be varied  
• For Pram Crossing See Detail K7

- NOTES:
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  - All levels to be above Ordnance Survey Datum defined levels (A.O.D.M) unless noted otherwise.
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  - Plandescil Ltd. to be immediately notified of any suspected omissions or discrepancies.
  - This drawing is to be read in conjunction with all other relevant documents relating to the project.
  - All setting out to be coordinated by the Contractor and to be checked onsite prior to construction.
  - To be read in conjunction with the following Plandescil Drawings, schedules and documents:  
24727/103 - Containment Bund Slab & Joint Details  
24727/005 - Proposed Site Layout  
24727/103 - Containment Bund Slab & Joint Details
  - Asphalt hard standing layout and specifications as requested by others, not by Plandescil Ltd. Reinforced concrete aprons preferred by Plandescil Ltd.

ASPHALT HARD STANDINGS:

- Asphalt surface specification, 40mm Hanson Tuffex HD asphalt, 110mm Asphalt Weight carrying DPM, 150mm D.F.T. Type 1 sub-base, 300mm thick stabilised layer.

MATERIAL NOTES:

- All D.F.T. Type 1 must NOT contain limestone.
- All Asphalt to be made with Granite or other acid resistant aggregate (No Limestone filler allowed).

FOUNDATION NOTES:

- Assumed GBP value of 150kN/m² has been used. Value provided within O'Brien Moran Ltd 'Geotechnical Design Report (Final)' - 10/07/2021. Confirmation of minimum GBP of 150kN/m² required prior to construction.
- Any soft spots or deleterious material is to be removed & taken down to virgin ground level & replaced with compact D.F.T. Type 1 or suitable hogging material.
- Overdig to be made up in compacted D.F.T. Type 1 or lean mix concrete.

DRAINAGE NOTES:

- All drainage pipes to be laid invert to invert.
- All levels are indicative only.
- All proprietary materials to be fixed strictly in accordance with manufacturer's recommendations using materials approved by the manufacturer.
- All levels and dimensions should be checked on site by contractors and relevant sub-contractors.
- Existing public utility services and private apparatus are not necessarily shown on the drawings. The contractor shall liaise with the utility provider to determine precise location of existing services. Existing services to be marked out on site prior to any excavation works. All utility company guidelines & health and safety procedures must be strictly followed.
- Where surface water drains to ground, the existing ground should be broken up prior to laying the subgrade to aid infiltration.
- All leachate manholes to be coated internally with bitumen sealant (bottom and sides).

MATERIAL NOTE:

- Materials must NOT contain limestone, including D.F.T. Type 1 and concrete aggregate.
- All Asphalt to be made with Granite or other acid resistant aggregate (No Limestone filler allowed).
- All leachate water pipes to be uPVC (Foul Pipe), NOT concrete or Twin Wall.
- All surface water pipes to be uPVC Twin Wall, NOT concrete.

APPROVAL & COMMENT

Rev	Date	Chkd	Description
C	16-11-21	OAJ	Minor Amendments
B	27-10-21	OAJ	Minor Amendments
A	13-01-20	OAJ	Client Name Amended
0	10-01-20	OAJ	First Issue

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Client  
Attleborough AD Plant Limited

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Attleborough, Norfolk,  
NR17 1AE

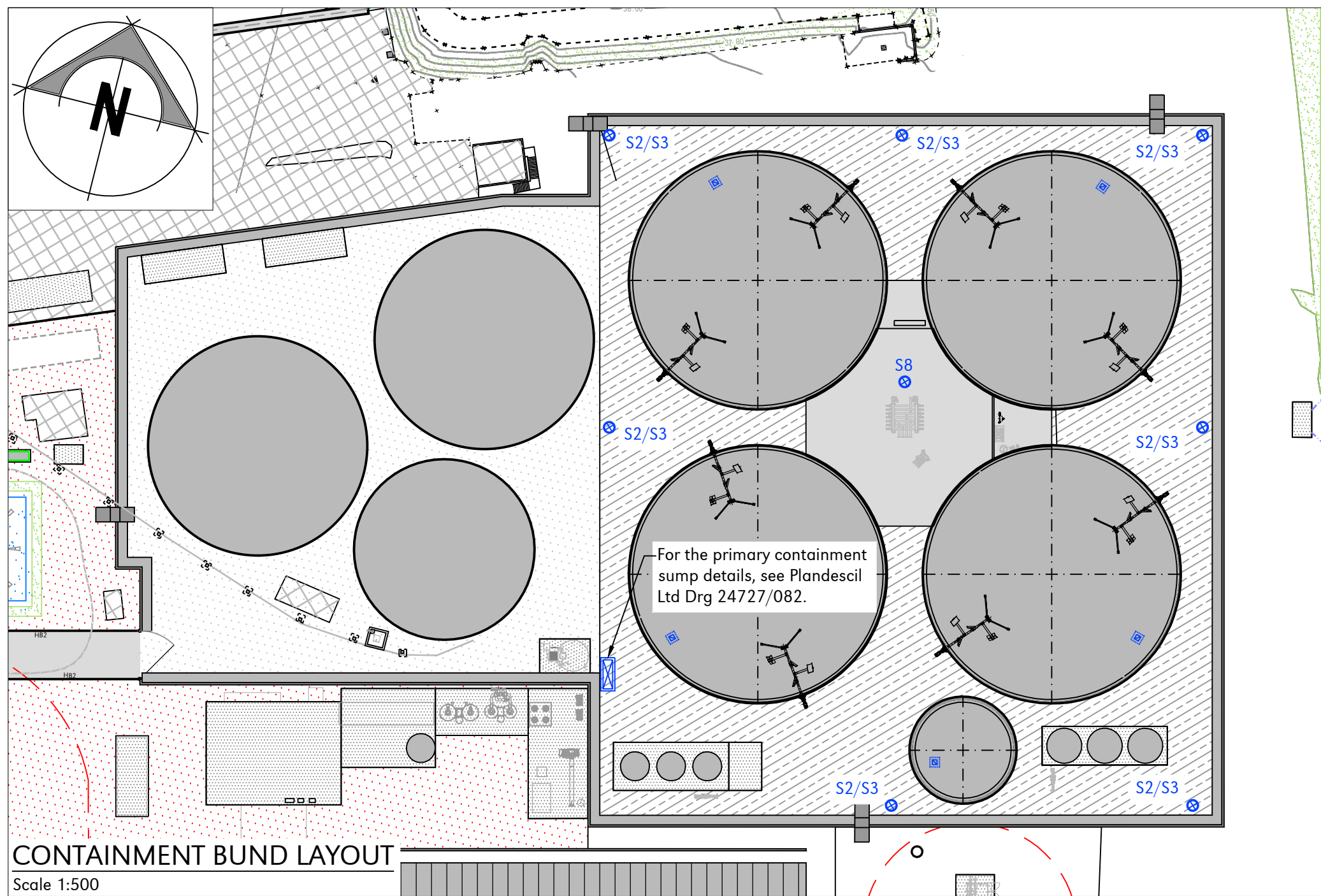
Drawing Title

Typical Hardstanding &  
Drainage Details

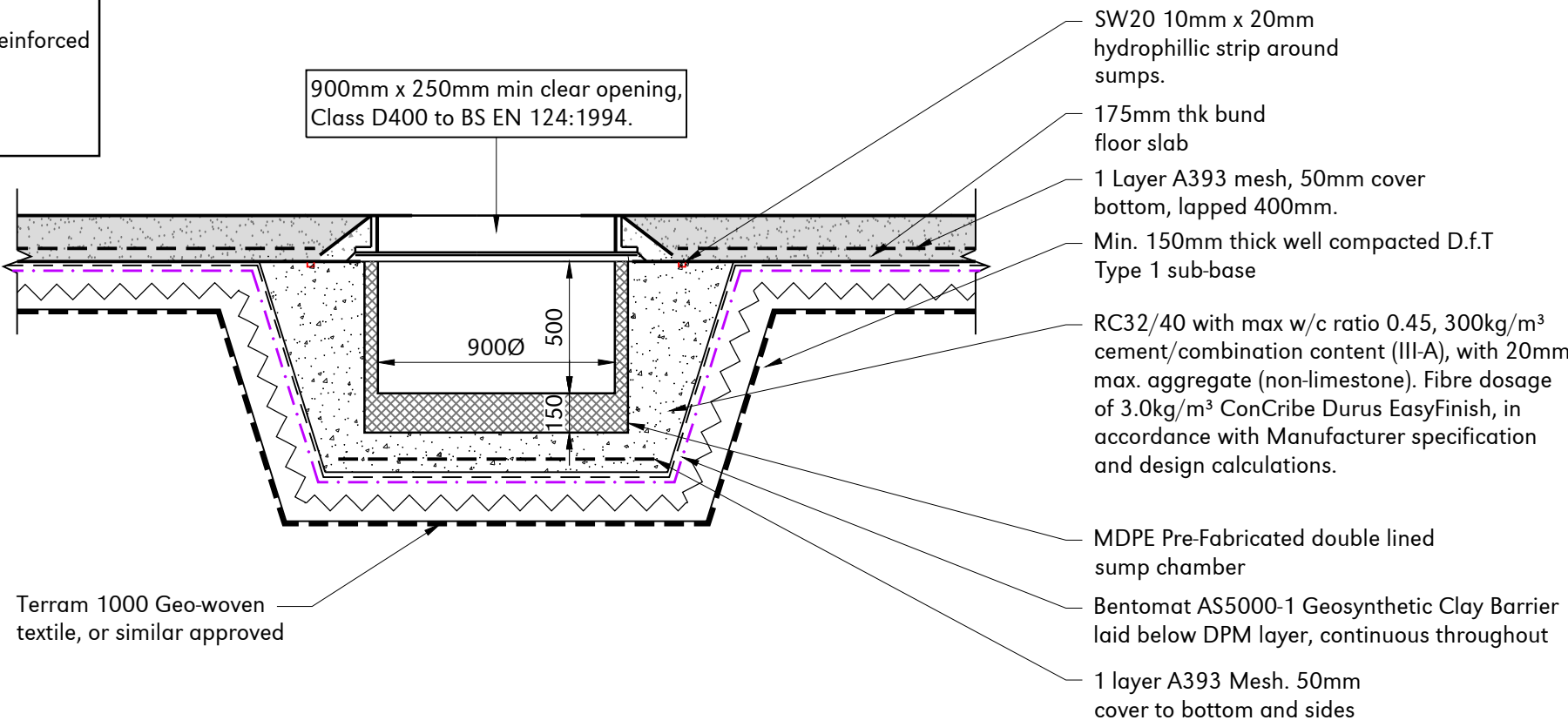
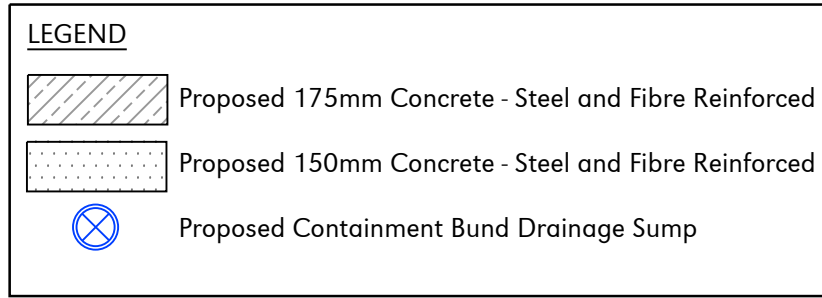
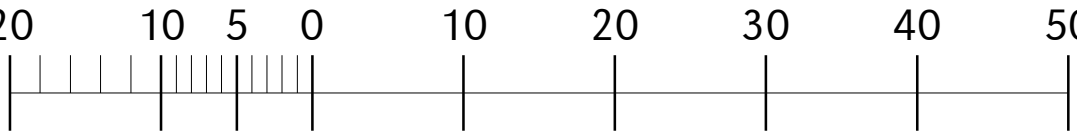
Scale: U.N.O. Date: January 2020 Drawn By: JHB

Drawing No. 24727/101 Rev C



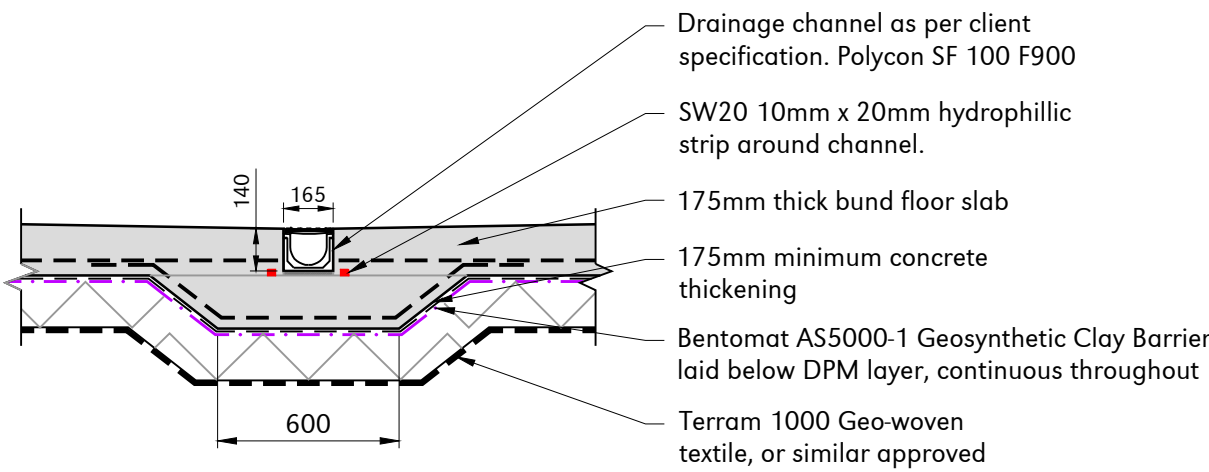


1:500 - DRAWING SCALE REFERENCE (m)



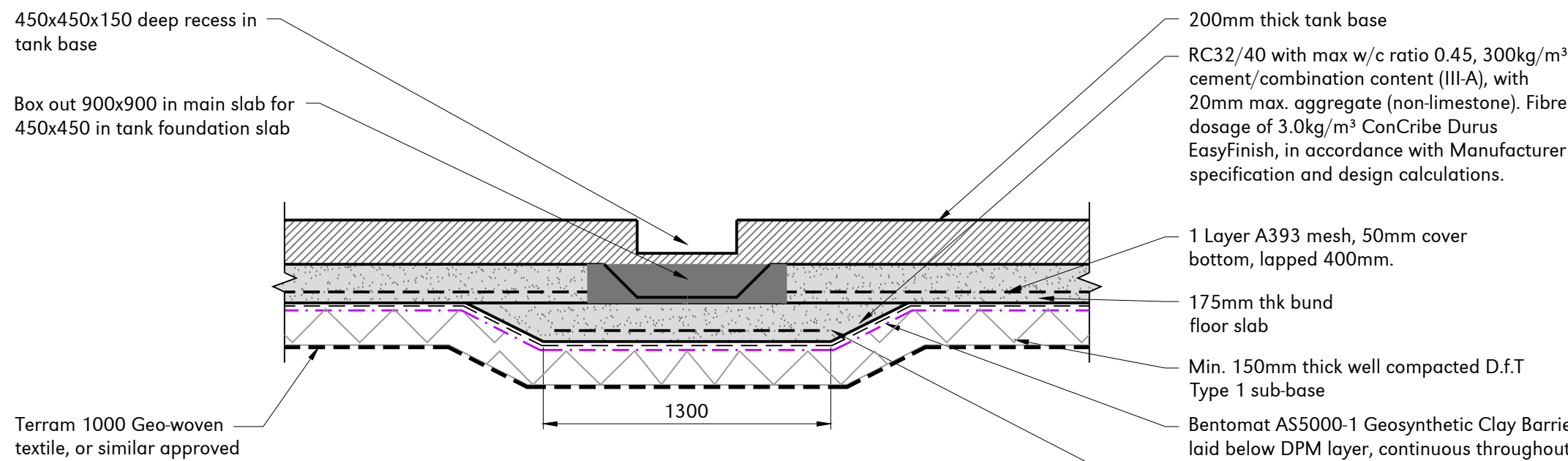
#### CONTAINMENT BUND DRAINAGE SUMP - S2

Scale 1:25



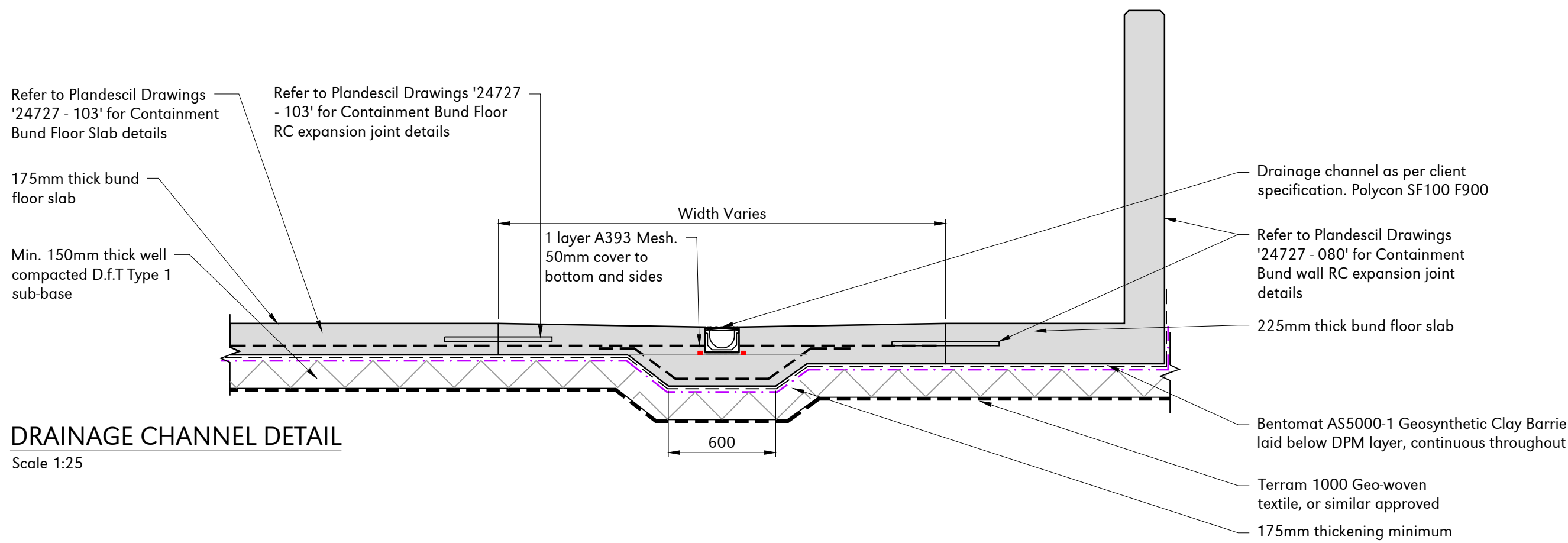
#### TYPICAL DRAINAGE CHANNEL DETAIL

Scale 1:25



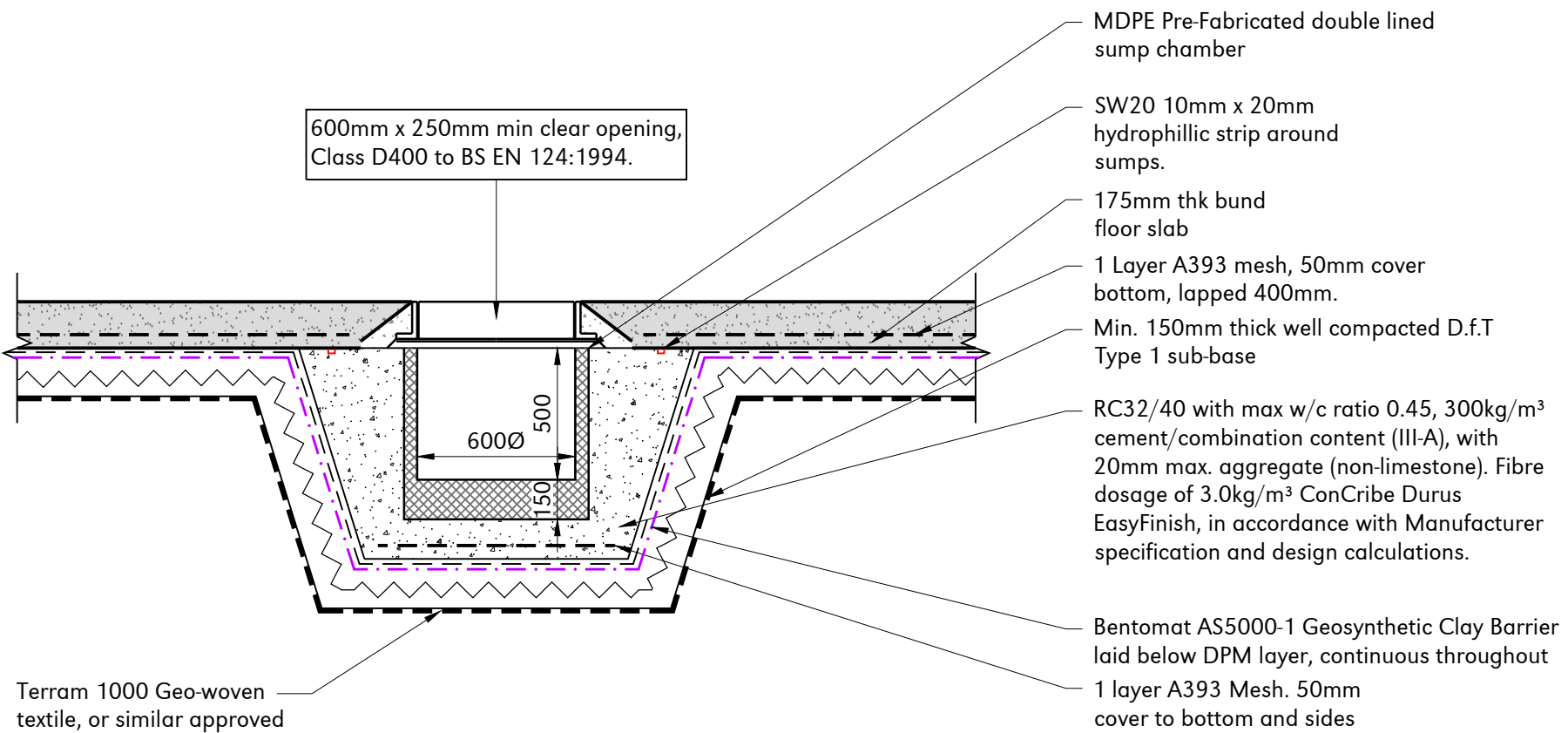
#### DRAINAGE SUMP UNDER TANK

Scale 1:25



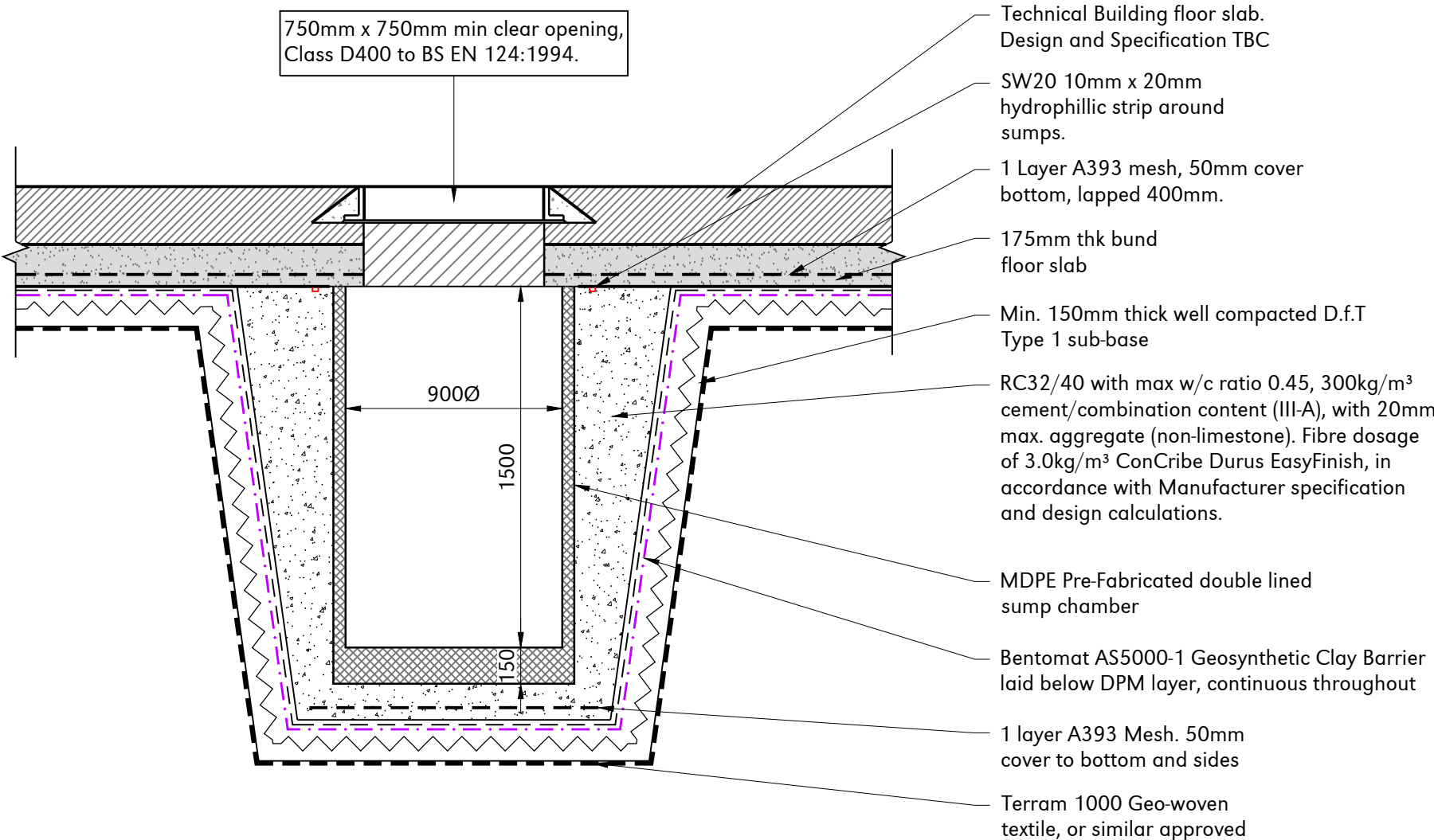
#### DRAINAGE CHANNEL DETAIL

Scale 1:25



#### CONTAINMENT BUND DRAINAGE SUMP - S3

Scale 1:25



#### TECHNICAL BUILDING DRAINAGE SUMP - S8

Scale 1:25

#### NOTES:

- All dimensions noted are in millimetres unless stated otherwise.
- All levels to be above Ordnance Survey Datum defined levels (A.O.Dm) unless noted otherwise.
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- Plandescil Ltd. to be immediately notified of any suspected omissions or discrepancies.
- This drawing is to be read in conjunction with all other relevant documents relating to the project.
- All setting out to be coordinated by the Contractor and to be checked onsite prior to construction.
- To be read in conjunction with the following Plandescil Drawings, schedules and documents:  
24727/005 - Proposed Site Layout  
24727/080 - 1.75m Containment Bund Wall R.C. Details  
24727/082 - Proposed Containment Sump GA & RC Details
- Contractor led design, Plandescil Ltd conforming to Contractor preferred practices.

#### REINFORCED CONCRETE:

- 150mm Containment Slab Concrete to be RC32/40 with max w/c ratio 0.45, 300kg/m³ cement/combination content (III-A), with 20mm max. aggregate (non-limestone).
  - Fibre dosage of 3.0kg/m³ ConCribе Durus EasyFinish, in accordance with Manufacturer specification and design calculations.
  - Slab nominal 150mm thick, 50mm cover to bottom and sides.
- 175mm Containment slab Concrete to be RCRC32/40 with max w/c ratio 0.45, 300kg/m³ cement/combination content (III-A), with 20mm max. aggregate (non-limestone).
  - Fibre dosage of 4.0kg/m³ ConCribе Durus EasyFinish, in accordance with Manufacturer specification and design calculations.
  - Slab nominal 175mm thick, 50mm cover to bottom and sides.
  - Above mix to be used in addition to A393 mesh reinforcement in the bottom with 50mm cover to all faces.
- Insitu Concrete to be in accordance with BS 8110 & BS 8500-1.
- Reinforcement to be Grade H 500N/mm² High Yield, Deformed Type 2 Bar detailed in accordance with BS 4449 and BS 8666.

#### CONCRETE JOINT NOTES:

- All joint dowel/reinforcement shall be set level and perpendicular to the joint face prior to casting. Damage or bent dowels are to be re-aligned or replaced prior to casting.
- All formed joints are to be cleaned of concrete overruns to ensure accidental restraint is not created
- All joints are to be sufficiently cured and cleaned of all contaminations prior to sealing.
- All sealants are to be installed as per manufacturers specification and must be suitable for the joint type.
- Joints subject to confirmation by Fibres used in mix design supplies. Fibre Supplier/Designer to check and approve joints.

#### FOUNDATION NOTES:

- Assumed GBP value of 225kN/m² has been used. Value provided by O'Brien Moran Ltd, following an initial ground treatment review. Confirmation of minimum GBP of 225kN/m² required prior to construction.
- Any soft spots or deleterious material is to be removed & taken down to virgin ground level & replaced with compact D.f.T Type 1 or suitable hogging material.
- Overdig to be made up in compacted D.f.T. Type 1 or lean mix concrete.

ALL PROPRIETARY MATERIALS TO BE FIXED STRICTLY IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS USING MATERIALS APPROVED BY THE MANUFACTURER.

#### APPROVAL & COMMENT

Rev	Date	Rev By	Chkd	Description
0	27-10-21	-	OAJ	First Issue

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Client

Attleborough AD Plant Limited

Project

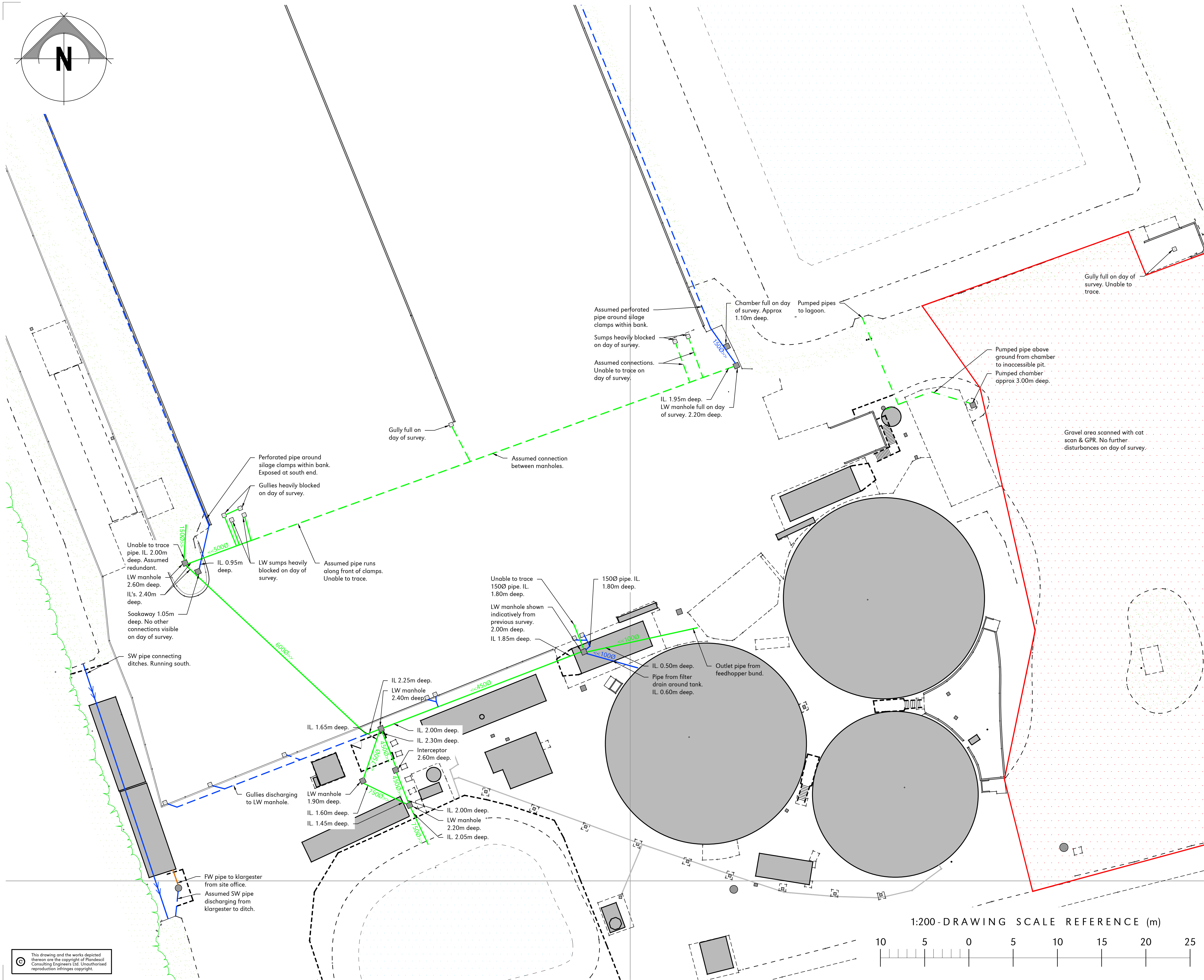
Attleborough AD Plant,  
Attleborough, Norfolk,  
NR17 1AE

Drawing Title

Typical Containment Bund  
Drainage Details

Scale	U.N.O.	Date	Drawn By
As Noted (A1)		October 2021	TOH
Drawing No.	24727/104	Rev	0





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  4. Plandescil Ltd to be immediately notified of any suspected omissions or discrepancies.
  5. This drawing is to be read in conjunction with all other relevant documents relating to the project.
  6. Topographical survey not undertaken from Plandescil. Unknown whether topographical survey is to correct co-ordinates or to scale.

- Surveying Notes
7. A drainage survey was conducted at Attleborough AD Plant, Crows Hall Farm, Attleborough. The objective was to determine all drainage below and above the surface. Survey undertaken week commencing 29.03.21. Survey updated 07.05.21.
  8. Contractor is to take all necessary precautions to confirm location of services prior and during excavation works.
  9. Plandescil Ltd take no responsibility for service strikes. It is the contractors duty to carry out excavations safely with due care and attention.

LEGEND	
	Foul Water Drainage (FW)
	Assumed Foul Water Drainage (FW)
	Redundant Pumped Foul Water Drainage (FW)
	Surface Water Drainage (SW)
	Assumed Surface Water Drainage (SW)
	Leachate Water Drainage (LW)
	Assumed Leachate Water Drainage (LW)
	Pumped Leachate Water Drainage (LW)
	Scanned GPR Area

### ISSUED FOR CLIENT REVIEW

Rev	Date	Chkd	Description
C	11.05.21	OAJ	Amendments Following Site Visit
B	29.04.21	OAJ	Amendments Following Site Visit
A	13.01.20	OAJ	Client Name Amended
0	03.06.19	OAJ	First Issue

**plandescil**  
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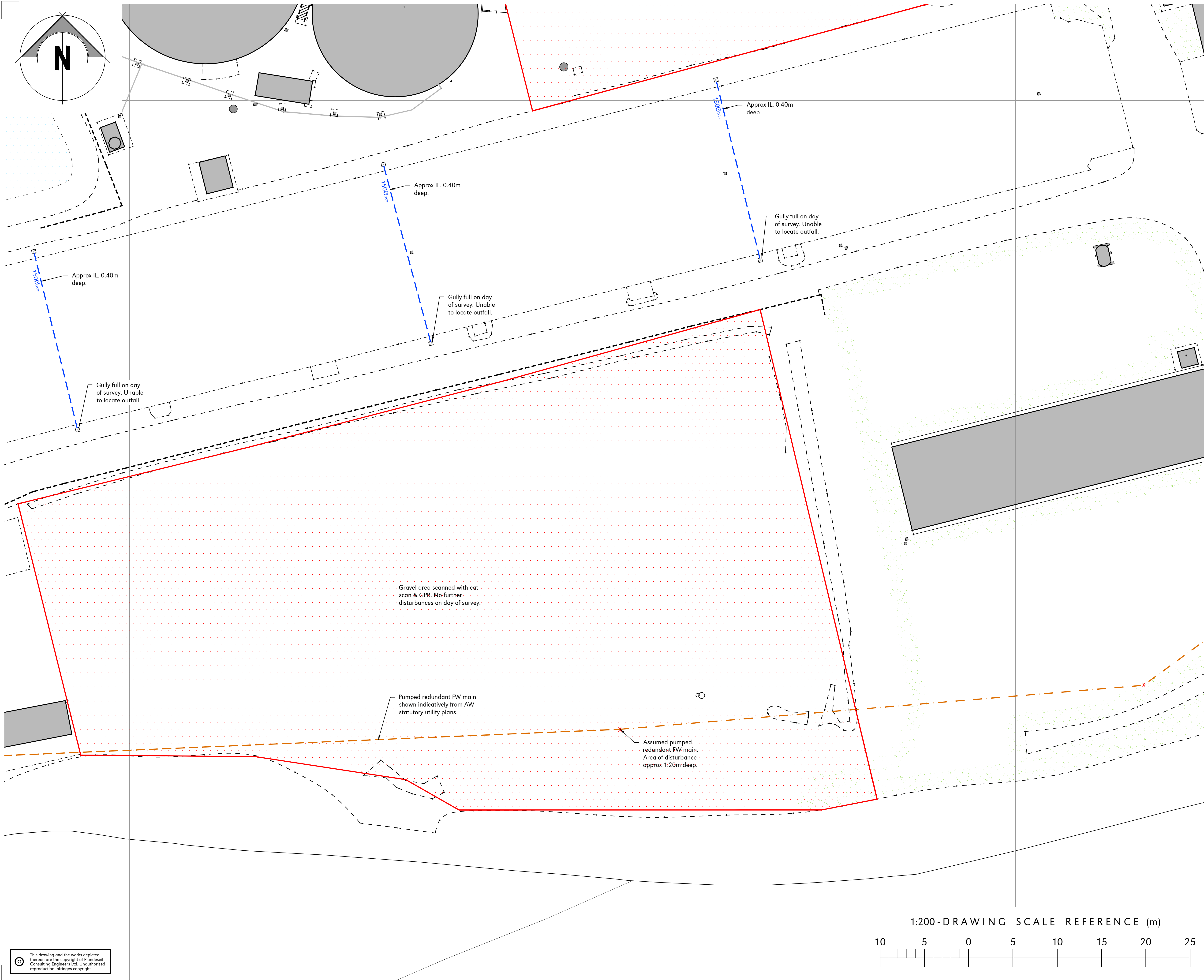
Client  
**Attleborough AD Plant Limited**

Project  
**Attleborough AD Plant,  
Attleborough, Norfolk  
NR17 1AE**

Drawing Title  
**Drainage Survey  
Sheet 1 of 2**

Scale	U.N.O.	Date	Drawn By
1:200 (A1)		June 2019	LJS
Drawing No.	24727/300		Rev
			C





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7. A drainage survey was conducted at Attleborough AD Plant, Crows Hall Farmt, Attleborough. The objective was to determine all drainage below and above the surface. Survey undertaken week commencing 29.03.21. Survey updated 07.05.21.
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LEGEND	
	Foul Water Drainage (FW)
	Assumed Foul Water Drainage (FW)
	Redundant Pumped Foul Water Drainage (FW)
	Surface Water Drainage (SW)
	Assumed Surface Water Drainage (SW)
	Leachate Water Drainage (LW)
	Assumed Leachate Water Drainage (LW)
	Pumped Leachate Water Drainage (LW)
	Scanned GPR Area

ISSUED FOR CLIENT REVIEW

0	11.05.21	OAJ	First Issue
Rev	Date	Chkd	Description

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civil / structural / environmental / surveying

Client  
**Attleborough AD Plant Limited**

Project  
**Attleborough AD Plant,  
Attleborough, Norfolk  
NR17 1AE**

Drawing Title  
**Drainage Survey  
Sheet 2 of 2**

Scale	U.N.O.	Date	Drawn By
1:200 (A1)		June 2019	LJS
Drawing No.	24727/301	Rev	0

Job No : 24727 Schedule No : 01 Rev : A  
Dwg No : 24727/082/B Status : A Sheet No : 1/1  
Project : Containment Sump  
Attleborough AD Plant, Attleborough, Norfolk,  
NR17 1AE  
Date Revised : 27-Oct-21 By : JHB Check : AF  
Date Prepared : 10-Jan-20 By : JHB Check : AF


Member	Bar Mark	Type & Size	No. of mbrs	No. in each	Total No.	Length of each bar †	Shape code	<i>A</i> *	<i>B</i> *	<i>C</i> *	<i>D</i> *	<i>E/R</i> *	Rev
						mm		mm	mm	mm	mm		
Base Slab	01	H 10	1	16	16	900	21	400	125	400			
	02	H 10	1	48	48	1550	21	725	125	725			
	03	H 16	1	30	30	1250	11	640	640				
	04	H 10	1	32	32	850	13	400	100	400			
	Approx. 4.55m <sup>2</sup> A393 mesh per layer (not including laps, min. 400mm). Total 9.1m <sup>2</sup> required												
Elevation 1	05	H 10	2	16	32	850	13	400	100	400			
	Approx. 9.1m <sup>2</sup> A393 mesh per elevation (not including laps, min. 400mm). Total 18.2m <sup>2</sup> required (2no. Elevations)												
Elevation 2	05	H 10	2	16	32	850	13	400	100	400			
	Approx. 3.7m <sup>2</sup> A393 mesh per elevation (not including laps, min. 400mm). Total 7.4m <sup>2</sup> required (2no. Elevations)												



## Surface Water Maintenance Schedule

Feature	Schedule	Required action	Frequency	Responsibility
Drainage	Regular	Inspect flow control manhole and check for blockages to grates and outlets.	Monthly and after large storm events.	Attleborough AD Plant Limited
	Occasional	Remove silt and leaf build up from manholes, gutters etc.	Annually (or as required).	
		Removal of sediment, oil, grease and floatables	Annually (or as required).	
	Remedial	Replacement of malfunctioning parts.	As required.	
	Monitoring	Inspect inlets and pre-treatment systems for silt accumulation. Establish appropriate silt removal frequencies.	Half yearly.	
		Check outlet for blockages to ditch outlet	Three monthly	
		Check Flow control for blockages	Three monthly	
		Check manholes, gutters etc. for silt and leaf build up.	Annually.	
Lined Attenuation Pond	Regular	Litter, debris and trash removal.	Monthly.	Land Owner (expected actions to be carried out by land owner as part of general industrial site development procedures)
		Grass cutting – for landscaped areas and access routes.	Monthly (during growing season), or as required.	
		Inspect marginal and bankside vegetation and remove nuisance plants (for first 3 years)	Monthly ( at start, then as required)	
		Inspect inlets, outlets, banksides, structures, pipework etc for evidence of blockage and/or physical damage	Monthly	
		Inspect water body for signs of poor water quality	Monthly (May - October)	
		Inspect silt accumulation rates in any forebay and in main body of the pond and establish appropriate removal frequencies; undertake contamination testing once some build-up has occurred, to inform management and disposal options	Half Yearly	
		Check any mechanical devices, eg penstocks	Half Yearly	
		Hand cut submerged and emergent aquatic plants (at minimum of 0.1m above pond base; include max 25% of pond surface)	Annually	
		Remove 25% of bank vegetation from water's edge to a minimum of 1m above water level	Annually	
		Tidy all dead growth (scrub clearance) before start of growing season (Note: tree maintenance is usually part of overall landscape management contract)	Annually	
		Remove sediment from any forebay	Every 1 - 5 years, or as required	
		Remove sediment and planting from one quadrant of the main body of ponds without sediment forebays	Every 5 years, or as required	
	Occasional	Re-seed areas of poor vegetation growth.	Annually, or as required.	
		Remove sediment from pre-treatment system when 50% full.	As required	
		Remove sediment from the main body of big ponds when pool volume is reduced by 20%	With effective pre-treatment, this will only be required rarely, eg every 25 - 50 years	
	Remedial	Repair of erosion or other damage by re-seeding or re-turfing.	As required	
		Repair/rehabilitation of inlets	As required	
		Rehabilitate infiltration surface using scarifying and spiking techniques if performance deteriorates.	As required	
		Patch repair liner if required by rewelding new liner by specialists	As required	
		Re-level uneven surfaces and reinstate design levels.	As required	
	Monitoring	Inspect inlets and clear if required.	Monthly	
		Inspect banksides, liners, structures, pipework, etc for evidence of physical damage.	Monthly	
		Inspect lined surfaces for rips, tears, broken joints, broken welds or pest ingress.	Annually	
		Inspect concrete and banks to establish appropriate silt removal frequencies.	Half yearly	
		Inspect attenuation surfaces for compaction and ponding.	Annually	


Filter Drains / Leak Detection Bund Drains	Regular Maintenance	Remove litter (including leaf litter) and debris from filter drain surfaces, access chambers and pre-treatment devices.	Monthly (or as required)	Attleborough AD Plant Limited
		Inspect filter drain surface, inlet-outlet pipework and control systems for blockages, clogging, standing water and structural damage.	Monthly	
		Inspect pre-treatment systems, inlets and perforated pipework for silt accumulation, and establish appropriate silt removal frequencies.	Six Monthly	
		Remove sediment from pre-treatment devices.	Six Monthly, or as required	
	Occasional Maintenance	Remove or control tree roots where they are encroaching the sides of the filter drain, using recommended methods (eg NJUG, 2007 or BS 3998:2010).	As Required.	
		At locations with high pollution loads, remove surface geotextile and replace, and wash or replace overlying filter medium.	Five yearly, or as required	
		Clear perforated pipework of blockages.	As Required.	

Plandescil Limited		Page 1
42-44 Connaught Road Attleborough Norfolk NR17 2BW	24272	
Date 25/06/2021 11:32 File 24727 Roof and Aspahlt Pump...	Designed by MJH Checked by MJH	
Innovyze	Source Control 2020.1	

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

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m <sup>3</sup> )	Status
15 min Summer	0.488	0.488	2.0	192.9	O K
30 min Summer	0.628	0.628	2.0	248.3	O K
60 min Summer	0.768	0.768	2.0	303.8	O K
120 min Summer	0.922	0.922	2.0	364.6	O K
180 min Summer	1.030	1.030	2.0	407.3	O K
240 min Summer	1.114	1.114	2.0	440.3	O K
360 min Summer	1.236	1.236	2.0	488.8	O K
480 min Summer	1.318	1.318	2.0	520.9	O K
600 min Summer	1.373	1.373	2.0	542.8	O K
720 min Summer	1.412	1.412	2.0	558.0	O K
960 min Summer	1.455	1.455	2.0	575.3	O K
1440 min Summer	1.475	1.475	2.0	583.2	O K
2160 min Summer	1.434	1.434	2.0	566.8	O K
2880 min Summer	1.385	1.385	2.0	547.6	O K
4320 min Summer	1.298	1.298	2.0	513.0	O K
5760 min Summer	1.220	1.220	2.0	482.4	O K
7200 min Summer	1.155	1.155	2.0	456.5	O K
8640 min Summer	1.096	1.096	2.0	433.2	O K
10080 min Summer	1.042	1.042	2.0	411.8	O K
15 min Winter	0.547	0.547	2.0	216.1	O K
30 min Winter	0.704	0.704	2.0	278.3	O K
60 min Winter	0.862	0.862	2.0	340.6	O K
120 min Winter	1.035	1.035	2.0	409.2	O K
180 min Winter	1.157	1.157	2.0	457.5	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m <sup>3</sup> )	Discharge Volume (m <sup>3</sup> )	Time-Peak (mins)
15 min Summer	159.233	0.0	112.7	19
30 min Summer	102.797	0.0	141.9	34
60 min Summer	63.250	0.0	247.2	64
120 min Summer	38.352	0.0	287.7	124
180 min Summer	28.820	0.0	310.5	184
240 min Summer	23.563	0.0	323.4	244
360 min Summer	17.709	0.0	331.0	362
480 min Summer	14.367	0.0	327.1	482
600 min Summer	12.153	0.0	323.0	602
720 min Summer	10.565	0.0	319.0	722
960 min Summer	8.409	0.0	310.8	962
1440 min Summer	6.025	0.0	294.4	1440
2160 min Summer	4.270	0.0	605.8	2052
2880 min Summer	3.336	0.0	589.1	2336
4320 min Summer	2.355	0.0	535.4	3068
5760 min Summer	1.845	0.0	848.2	3864
7200 min Summer	1.537	0.0	874.3	4680
8640 min Summer	1.328	0.0	892.5	5456
10080 min Summer	1.177	0.0	899.3	6256
15 min Winter	159.233	0.0	125.8	19
30 min Winter	102.797	0.0	154.1	34
60 min Winter	63.250	0.0	271.7	64
120 min Winter	38.352	0.0	310.8	122
180 min Winter	28.820	0.0	329.1	182


Plandescil Limited		Page 2
42-44 Connaught Road Attleborough Norfolk NR17 2BW	24272	
Date 25/06/2021 11:32 File 24727 Roof and Aspahlt Pump...	Designed by MJH Checked by MJH	
Innovyze	Source Control 2020.1	

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

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m <sup>3</sup> )	Status
240 min Winter	1.252	1.252	2.0	494.9	O K
360 min Winter	1.391	1.391	2.0	550.0	O K
480 min Winter	1.485	1.485	2.0	586.9	O K
600 min Winter	1.549	1.549	2.0	612.4	O K
720 min Winter	1.595	1.595	2.0	630.4	O K
960 min Winter	1.649	1.649	2.0	651.8	O K
1440 min Winter	1.682	1.682	2.0	665.1	O K
2160 min Winter	1.653	1.653	2.0	653.4	O K
2880 min Winter	1.592	1.592	2.0	629.3	O K
4320 min Winter	1.472	1.472	2.0	582.0	O K
5760 min Winter	1.365	1.365	2.0	539.7	O K
7200 min Winter	1.269	1.269	2.0	501.7	O K
8640 min Winter	1.179	1.179	2.0	466.2	O K
10080 min Winter	1.096	1.096	2.0	433.2	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m <sup>3</sup> )	Discharge Volume (m <sup>3</sup> )	Time-Peak (mins)
240 min Winter	23.563	0.0	335.5	240
360 min Winter	17.709	0.0	332.6	358
480 min Winter	14.367	0.0	328.8	476
600 min Winter	12.153	0.0	325.1	594
720 min Winter	10.565	0.0	321.5	712
960 min Winter	8.409	0.0	314.2	944
1440 min Winter	6.025	0.0	299.5	1400
2160 min Winter	4.270	0.0	622.8	2072
2880 min Winter	3.336	0.0	599.8	2684
4320 min Winter	2.355	0.0	552.2	3328
5760 min Winter	1.845	0.0	944.2	4208
7200 min Winter	1.537	0.0	970.3	5112
8640 min Winter	1.328	0.0	986.1	5968
10080 min Winter	1.177	0.0	987.8	6768



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42-44 Connaught Road Attleborough Norfolk NR17 2BW	24272	
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File 24727 Roof and Aspahlt Pump...	Checked by MJH	
Innovyze	Source Control 2020.1	

#### Rainfall Details

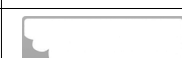
Rainfall Model	FEH
Return Period (years)	100
FEH Rainfall Version	2013
Site Location	GB 603300 295601 TM 03300 95601
Data Type	Point
Summer Storms	Yes
Winter Storms	Yes
Cv (Summer)	0.750
Cv (Winter)	0.840
Shortest Storm (mins)	15
Longest Storm (mins)	10080
Climate Change %	+40

#### Time Area Diagram

Total Area (ha) 0.650

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

0	4	0.650
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42-44 Connaught Road Attleborough Norfolk NR17 2BW	24272	
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File 24727 Roof and Aspahlt Pump...	Checked by MJH	
Innovyze	Source Control 2020.1	

#### Model Details

Storage is Online Cover Level (m) 2.000

#### Tank or Pond Structure


Invert Level (m) 0.000

Depth (m)	Area (m <sup>2</sup> )	Depth (m)	Area (m <sup>2</sup> )
0.000	395.3	2.000	395.3

#### Pump Outflow Control

Invert Level (m) 0.000

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.500	2.0000	1.000	2.0000	1.500	2.0000	2.000	2.0000

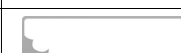
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Date 25/06/2021 11:30 File 24727 Roof and Asphalt Pump...	Designed by MJH Checked by MJH	
Innovyze	Source Control 2020.1	

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

Critical storm may not be identified, please run longer storm durations.

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
15 min Summer	0.491	0.491	0.0	194.1	O K
30 min Summer	0.634	0.634	0.0	250.6	O K
60 min Summer	0.780	0.780	0.0	308.3	O K
120 min Summer	0.946	0.946	0.0	373.9	O K
180 min Summer	1.066	1.066	0.0	421.5	O K
240 min Summer	1.162	1.162	0.0	459.5	O K
360 min Summer	1.310	1.310	0.0	518.0	O K
480 min Summer	1.417	1.417	0.0	560.3	O K
600 min Summer	1.499	1.499	0.0	592.5	O K
720 min Summer	1.563	1.563	0.0	618.0	O K
960 min Summer	1.659	1.659	0.0	655.9	O K
1440 min Summer	1.783	1.783	0.0	705.0	O K
15 min Winter	0.550	0.550	0.0	217.4	O K
30 min Winter	0.710	0.710	0.0	280.6	O K
60 min Winter	0.874	0.874	0.0	345.3	O K
120 min Winter	1.059	1.059	0.0	418.8	O K
180 min Winter	1.194	1.194	0.0	472.1	O K
240 min Winter	1.302	1.302	0.0	514.6	O K
360 min Winter	1.468	1.468	0.0	580.2	O K
480 min Winter	1.588	1.588	0.0	627.5	O K
600 min Winter	1.679	1.679	0.0	663.6	O K
720 min Winter	1.751	1.751	0.0	692.2	O K
960 min Winter	1.858	1.858	0.0	734.6	O K

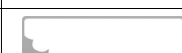
Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	159.233	0.0	0.0	19
30 min Summer	102.797	0.0	0.0	34
60 min Summer	63.250	0.0	0.0	64
120 min Summer	38.352	0.0	0.0	124
180 min Summer	28.820	0.0	0.0	184
240 min Summer	23.563	0.0	0.0	244
360 min Summer	17.709	0.0	0.0	364
480 min Summer	14.367	0.0	0.0	484
600 min Summer	12.153	0.0	0.0	604
720 min Summer	10.565	0.0	0.0	724
960 min Summer	8.409	0.0	0.0	964
1440 min Summer	6.025	0.0	0.0	1444
15 min Winter	159.233	0.0	0.0	19
30 min Winter	102.797	0.0	0.0	34
60 min Winter	63.250	0.0	0.0	64
120 min Winter	38.352	0.0	0.0	124
180 min Winter	28.820	0.0	0.0	184
240 min Winter	23.563	0.0	0.0	244
360 min Winter	17.709	0.0	0.0	364
480 min Winter	14.367	0.0	0.0	484
600 min Winter	12.153	0.0	0.0	604
720 min Winter	10.565	0.0	0.0	724
960 min Winter	8.409	0.0	0.0	964

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Innovyze	Source Control 2020.1	

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

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m <sup>3</sup> )	Status
1440 min Winter	1.997	1.997	0.0	789.6	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m <sup>3</sup> )	Discharge Volume (m <sup>3</sup> )	Time-Peak (mins)
1440 min Winter	6.025	0.0	0.0	1444

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#### Rainfall Details


Rainfall Model	FEH
Return Period (years)	100
FEH Rainfall Version	2013
Site Location	GB 603300 295601 TM 03300 95601
Data Type	Point
Summer Storms	Yes
Winter Storms	Yes
Cv (Summer)	0.750
Cv (Winter)	0.840
Shortest Storm (mins)	15
Longest Storm (mins)	1440
Climate Change %	+40

#### Time Area Diagram

Total Area (ha) 0.650

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

0	4 0.650
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Model Details

Storage is Online Cover Level (m) 2.000

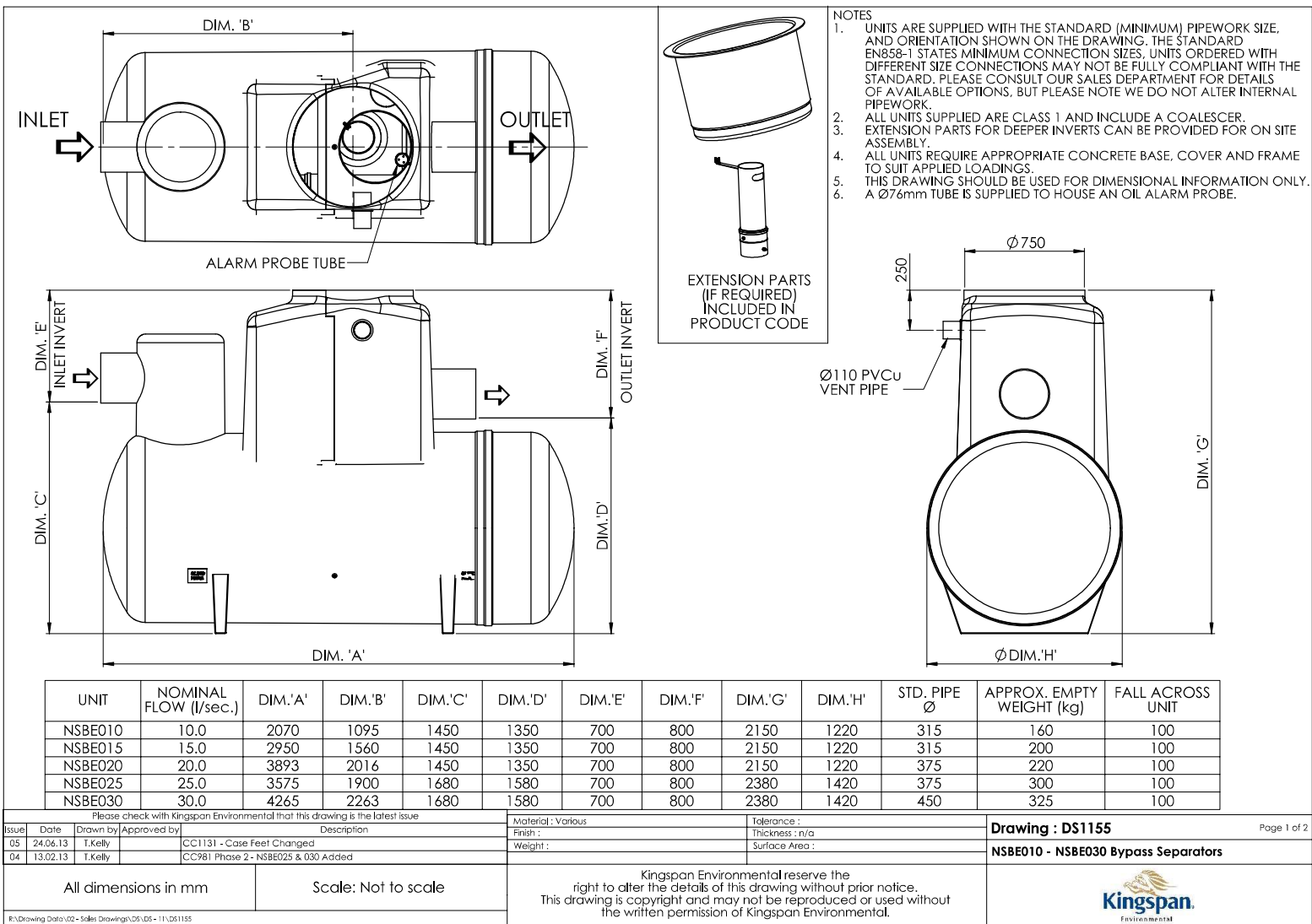
Tank or Pond Structure

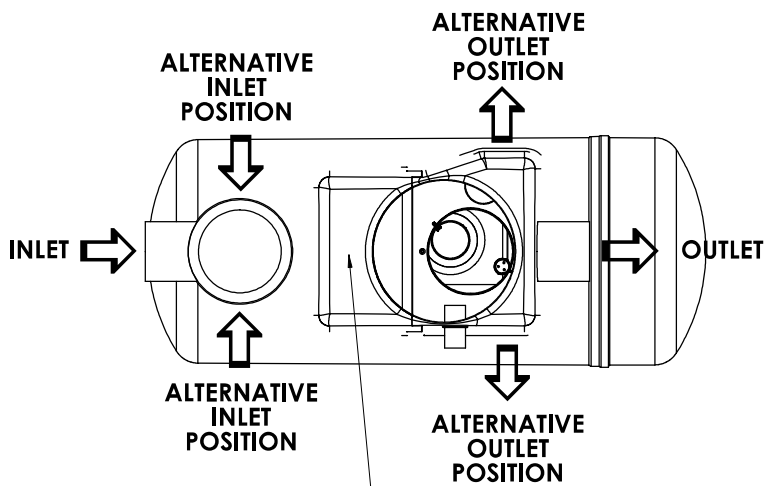
Invert Level (m) 0.000

Depth (m)	Area (m <sup>2</sup> )	Depth (m)	Area (m <sup>2</sup> )
0.000	395.3	2.000	395.3

Pump Outflow Control


Invert Level (m) 0.000





**Please Note:-**  
Due to the physically small size of the NSBE010, the inlet pipe, all orientation options, is fitted directly into this turret.

Pipe Orientation Options		
OPTION A 	OPTION B 	OPTION C 
OPTION D 	OPTION E 	OPTION F 
OPTION G 	OPTION H 	OPTION K 

Material : Various	Tolerance (unless stated) :	<b>Drawing : DS1155</b>	Page 2 of 2
Finish :	Thickness : n/a		
Weight : 229.91 Kg	Surface Area : m²		
Modelled By :			
Kingspan Environmental reserve the right to alter the details of this drawing without prior notice. This drawing is copyright and may not be reproduced or used without the written permission of Kingspan Environmental		NSBE010 - 030 BYPASS SEPARATORS	
			

R:\Drawing Data\02 - Sales Drawings\DS\DS - 11\DS1155



## civil engineering and building



- Industrial, Commercial, Agricultural and Domestic building design
- Foundation Design and ground improvements
- Highway Engineering including PDS/Civil 3D
- Retaining walls
- Sheet Piling
- Infrastructure planning and design
- Design of sustainable drainage system (SUDS)
- Soakaway design
- Architectural design of industrial buildings
- Planning and building regulation applications
- 3D conceptual models
- Renewable Energy Civil Engineering design and project management
- Anaerobic Digestion and Waste to Energy Project design and detail

## environmental engineering



- Contaminated Land investigations (intrusive & non-intrusive)
- Land remediation verification
- Environmental impact assessments (EIA)
- Flood Risk Assessments
- Water supply, treatment, storage and distribution
- Foul and surface water & effluent/leachate drainage design
- Drainage network modelling
- 1D & 2D flood modelling
- Hydraulic river modelling
- Flood Alleviation
- Breach & overtopping analysis
- Reservoir flood inundation modelling
- Consent to discharge applications
- Landscaping design
- Tree surveys
- Environmental Permits

## structural engineering



- Structural calculations for Commercial, Agricultural and Domestic building design
- Structural design using steel, stainless & carbon steel, concrete, timber, alloys and masonry
- Maritime and Hydraulic structures
- Structural surveys and structural suitability surveys
- Structural failure studies
- Subsidence claims
- Temporary works design
- 3D Finite Element Analysis
- Structural monitoring
- Structural enhancement/remedial work
- Historic building advice
- 3D Revit & Level 2 BIM structural design & modelling

## surveying land and buildings



- Geomatic / topographical site surveys
- Building, Road, and Earthworks Setting out
- Engineering Setting out
- Establish precise site survey control
- 3D digital terrain modelling
- Volumetric analysis
- Site area computations
- Flood risk surveys using GPS active network
- Measured building floor plans and elevation surveys
- Land transfer plans to Land Registry requirements
- Drainage network surveys
- Assistance/Expert witness in land boundary disputes
- Deterioration monitoring
- Preparation of asset plans
- As built record surveys

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