PRIMARY & SECONDARY CONTAINMENT REPORT WITH BUND CAPACITY CALCULATIONS

FOR

PROPOSED ANAEROBIC DIGESTION PLANT

AT

HORSE CLOSE,

ON BEHALF OF

Project ref:	**GGP/29384/Horseclose/Bund Calcs**
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APPENDICES

Appropriately Qualified Person Statement:
This report has been prepared and written by Jeremy Collins BSc (Hons) MCIWEM, Civil Engineer. Who has Over 18 year's industry experience across reinforced concrete, water retaining structures, building & structures, SuDS & Highway design and detailing. In addition, Jeremy has designed and detailed over 30 Anaerobic Digestion plants been fully compliant to CIRIA C736 & EA (BAT) Guidance.

Document Revision Box			
Revision	Date	Description	Author
01	09.07.2024	First Issue	JHC
02	06.12.2024	Construction Issue	JHC
03	16.01.2025	Construction Issue	JHC

1.0 Brief

GGP Consult has been requested by Acorn Bioenergy Ltd Limited to prepare containment calculations for the proposed Anaerobic Digestion Plant for Horse Close (Courteenhall).

The calculations demonstrate the philosophy behind the bunding of the site and how a tank failure event would be contained within the site boundary.

2.0 Description

The proposed bund will contain 3 main digester tanks of similar sizes, and a few smaller “tanks”.

A drawing has been provided showing the proposed site layout with tank sizes indicated.

This can be seen in Appendix I.

3.0 Design Philosophy

The AD plant shall be bunded with a reinforced concrete wall, a full internal concrete slab and underlay with a HDPE membrane.

The report design approach will be determining if the proposed designed wall height of 121.800m AOD (Concrete Bunds) & 122.800m AOD (Earth Bunds) will provide sufficient containment volume in line with thew requirements set out in CIRIA C736.

All tanks shall operate with a “high” alarm and max fill overflow pipes. Therefore, it is technically impossible for these tanks to be overfilled. These levels can therefore be adopted in accordance with *CIRA C736, Section 4.3.2. “However, where the tank is fitted with a physical overflow, the capacity at which the tank would overflow may be taken.”*

Max fill capacity levels will be taken for all tank and not operational levels. This will be referred to as “fill level” within this report.

Further design points are the 10% margin has been interpreted by industry and regulators to cover a range of factors including,

- Prevention of overtopping of the bund in the event of a surge of liquid caused by catastrophic failure of the primary tank.
- Prevention of overtopping, which may be caused by wind-induced wave action during the time that the bund is full, following a failure of a primary tank.
- An allowance for firefighting agents, including a foam blanket on the surface or firefighting water.
- Protection against overfilling.
- An allowance for rain that might collect in the bund and reduce its net capacity, or for rain that might fall in coincident with, or immediately following, the failure of the primary containment.

Based on the above, providing the bund can contain the 110%, no further action is required to justify an increase wall height of any of the above points.

However, for the purpose of this report a quantitative assessment of these assumptions will be provided in section 9.0.

As part of the quantitative assessment, the 100% volume will always be taken and compared against.

Design Standards:

The bund capacity will be calculated in line with *CIRA C736, Section 4.2.1*

“Where two or more tanks are installed within the same bund, the recommended capacity of the bund is the greater of:”

1. 110% of the capacity of the largest tank within the bund.

2. 25% of the total capacity of all the tanks within the bund, except where tanks are hydraulically linked in which case they should be treated as if they were a single tank.

4.0 Bund Capacity

4.1 110% of the largest Tank Capacity

The largest proposed tank is one of the digester tanks at 45m Diameter with a wall height of 9.0m. The tank will have an available fill height of 8.5m.

Inner Tank Volume (26m DIA x 8.5m High) = = 4,512m³

Outer Tank Volume (45m DIA x 8.5m High) – (Inner + Wall) **= 9,000m³**

Total Volumes

Inner Ring	= 4,512m³
Outer Ring	= 9,000.00m³
Tank Volume	**= 13,512.00m³**
110% Volume	**= 14,863.20m³**

4.2 25% of Total Tank Capacity

For all tank capacities see appendix 1.

Digester 1 Inner	= 4,512.00m³	x 1No.	= 4,512.00m³
Digester 1 Outer	= 9,000.00m³	x 1No.	= 9,000.00m³
Digester 2 Inner	= 4,512.00m³	x 1No.	= 4,512.00m³
Digester 2 Outer	= 9,000.00m³	x 1No.	= 9,900.00m³
Tertiary Digester	= 7,444.00m³	x 1No.	= 7,444.00m³
Pasteurisation Tank	= 25.00m³	x 3No.	= 75.00.00m³
Dirty Water Tank 1 - 2	= 402.00m³	x 2No.	= 804.00m³
Digestate Buffer Tank	= 402.00m³	x 1No.	= 402.00m³
Liquid Feed Tank 1	= 402.00m³	x 1No.	= 402.00m³
Total tank Volume			= 36,151.00m³
25% Volume			**= 9,037.75m³ < 110%**

THEREFORE 110% CAPACITY WILL BE USED FOR THE BUND VOLUME

5.0 Available Bund Volume – Design Stage

A detail assessment of the bund proposed levels has been undertaken. A 2D/3D model has been generated to provide an accurate available volume within the bund. See appendix II.

The model has taken the proposed internal bund levels and excluded all tanks / equipment within the bund up to the design retaining wall level.

From the model an available liquid volume within the bund has been calculates to be 17,010.00m³.

The proposed bund capacity requirements have confirmed that the 110% volumes shall be taken as concluded in section 4.0.

The final available liquid volume within the bund for the 110% scenario will be 17,010.00m³

It has therefore been demonstrated that the available bund volume based on a top of wall height no less than 121.800m AOD provides more than sufficient volume to contain the 110% volume.

6.0 Quantitative Assessment for the 10% Arbitrary Allowance

In accordance with the *CIRA C736,* guidance, the following section shall review the 10% increase.

The largest tank capacity based on max fill level equates to.

14,863.20m³

Based on the detailed assessment undertaken using a 2D model, an available volume equates to

17,010.00m³

Rainfall shall now be considered.

6.1 Rainfall Allowance

At the time of a failure, it can be assumed that the drainage system will be empty providing an allowance is made for rainfall equal to a 1:10 year return period 24hr duration before & 8 days' duration after a failure event (*CIRA C736, Section 4.3.3, page 43 & 44).*

For a first estimate fig 4.2 average rainfall depths (from HR Wallingford, 1986) shall be used.

Based on the below table (see following page), a total rainfall depth of 97mm (32mm + 64mm) should be accounted for.

32mm of rainfall occurred across the site dirty water area 24hr before a failure event, equating to 418.00m³ (13,057x0.032=418.00).

Based on the above the bund will have sufficient capacity to contain the first 41mm.

14,863.20m³ + 418m³ = 15,281.20m³ < 17,010.00m³ - **PASS**

Now to consider 8 days of rainfall be 64mm.

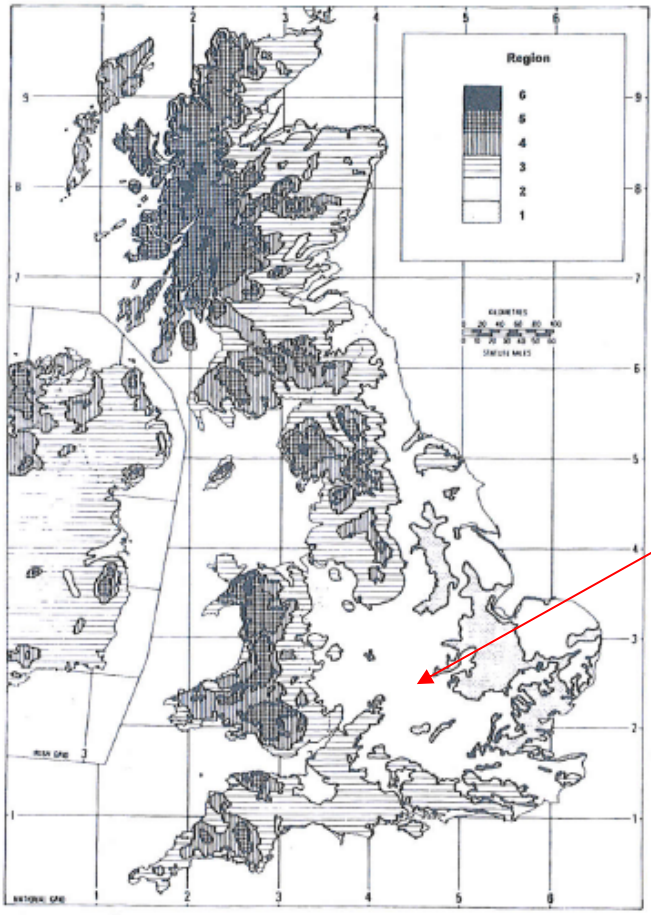
64mm of rainfall occurred across the site dirty water area 8 days after a failure event, equating to 836m³ (13,057x0.064=836).

Based on the above the containment will have sufficient capacity to contain the first 32mm plus the additional 64mm.

14,863.20m³ + 418m³ + 836m³ = 16,117.20m³ < 17,010m³ - **PASS**

It can now be concluded that the bund will have sufficient capacity to contain a failure event including rainfall.

Freeboard & dynamic effects shall now be considered.



Region	Standard annual average rainfall (mm)	Rainfall depth (mm) 10-year return period	
		24-hr duration	8-day duration
1	<600	29	54
2	600–800	32	65
3	800–1200	41	95
4	1200–1600	52	120
5	1600–3200	88	231
6	3200	106	288

Notes

It should be stressed that Figure 4.2 should only be used to derive a first estimate for considering containment volumes. This is for two reasons:

1 The figure is based on *Flood studies report* (Institute of Hydrology, 1975) data produced up to 1986.

2 Climate change effects since the publication of HR Wallingford (1986) will have resulted in different annual rainfall figures.

Detailed design should therefore be based on the output of the FEH rainfall.

Figure 4.2 Average rainfall depths (from HR Wallingford, 1986)

Based on the above table at total rainfall depth of 97mm (65mm + 32mm) should be added to the bund wall height.

6.2 Freeboard & Dynamic Effects

An allowance for freeboard in bund and dynamic effects should be added to the final bund height required for the worse case failure i.e. 110%.

Freeboard / Firefighting Foam

The tank contents are not of a flammable nature and therefore the allowance for firefighting foam is not considered necessary for this development.

Surge

CIRA C736, Section 4.4, page 53 & 54. fig 4.7.

Table 4.7 Surge allowance (in the absence of detailed analysis)

Type of structure (see Part 3)	Allowance
In situ reinforced concrete and blockwork bunds	250 mm
Secondary containment tanks	250 mm
Earthwork bunds	750 mm

Based on the above table at total surge allowance of 250mm should be added to the reinforced concrete bund wall height along the north, east, south containment elevations.

To the west are part of the south containment, the walls are made up of earth retaining, which shall adopt the higher surge requirements of 750mm.

As the lowest containment level is located within the reinforced concrete section 250mm will be considered.

Surge shall be considered at the time of failure.

The available bund volume at time of failure will be 17,010.00m³.

100% volume = 13,512m³.

13,512.00 LESS 17,010 = 3,498m³.

Wall available surge height = 3,498 / area (13,057) = 0.267m

Therefore, based on the above and the proposed wall height of 121.800m AOD will comply with the surge allowance required set out in table 4.7 above.

7.0 Jetting Failure

The failure of a storage tank through a rupture or corrosion of the side wall, could result in the escape of a jet of liquid. This is referred to as jetting.

The risk of jetting cannot be designed out, however maintenance of the tank through internal inspections can assess the condition of the tank. However, this is not always practical or feasible.

Additional protection measures have been included by all tanks being covered in insulation & cladding. The cladding system will add a secondary protection measure to jetting failures, with the likely event forcing AD material to run down the internal face of the cladding panels.

This is considered as an acceptable protection measure.

8.0 Design Summary

- 110% of the largest tank volume has demonstrated to be the worst-case design option when compared against 25% of the all the tanks.

- Analysis of the proposed structural slab levels has demonstrated an available volume equal to 17,010m³ based on the proposed minimum wall level of 121.800m AOD & earth bund level of 122.800m AOD

- Surge allowance of 250mm has been incorporated within the as- built minimum wall level in accordance with the CIRIA guidance.

- The design level of 121.800m AOD (Concrete Bund) & 122.800m AOD (Earth Bund) has been demonstrated to provide additional capacity to the requirement containment volume. The wall height shall be review and refined during the detail design phase of the project.

9.0 Site Classification

The following section shall follow the risk assessment methodology set out within CIRIA C736.

This will be done as a three-tier risk-based classification system for secondary and tertiary containment.

The outcome of this will provide a standard of construction, or level of performance in accordance with each of the three levels of risk.

The following diagrams set out the methodology of the risk assessment to determining the Classification.

Figure 2.2 Source–pathway–receptor model

The concept of the source–pathway–receptor model is illustrated in Figure 2.3.

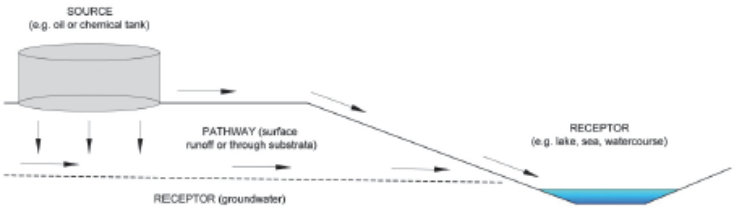


Figure 2.3 Concept of the source–pathway–receptor model

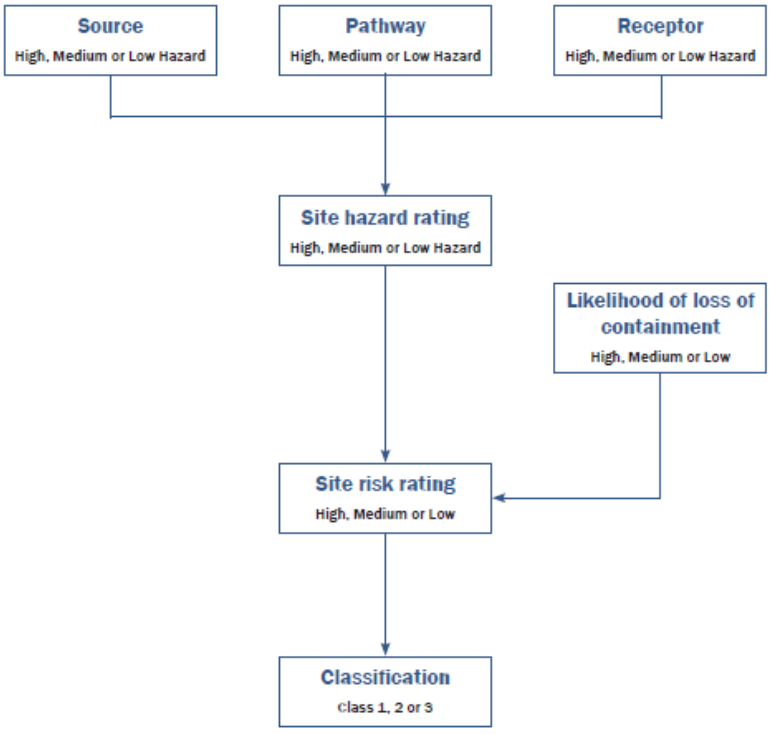


Figure 2.5 Risk assessment framework

9.1 Source

The source material is energy crops and digestate. This is an organic rich material.

The material is classified as non-hazardous.

Given the above, it has been deemed the material shall be classified with a **LOW** environmental hazard rating.

9.2 Pathway

The following pathways shall be considered, as part of these pathways the main receptors location in relation to the site shall also be considered.

1. Overland flows.
2. Existing sewers.
3. Ground Conditions
4. Below Ground Pipework
5. Watercourse

9.2.1 Overland Flows

The tank farm benefits from a perimeter bund, made of reinforced concrete walls, which shall been construction in accordance with CIRIA C736.

The internal area has a mixed surface finish of hard and gravel soft finishes. The bund has a full HDPE membrane located under the internal surface lapped into the external bund, providing a full water retaining containment cell.

Overground flow will therefore be contained within the confines for the perimeter bund.

Surge has been considered as part of the bund calculations with compliance with the requirements set out in the CIRIA guidance.

The risk from overland flows is therefore considered LOW

9.2.2 Existing Sewers

The site has no existing sewer connection.

No local sewers are present on the site or the surrounding area.

The risk from sewers is therefore considered LOW

9.2.3 Ground Conditions

Infiltration test have been carried out at formation of the earthworks package demonstrating no infiltration within the clayey strata.

Ground improvement layers has then been placed above the strata with a minimum thickness of 0.6m up to 2.0m. This improvement ground has been stabilised using cement providing an impermeable manmade strata above the existing impermeable clay.

Both strata will provide an adequate protection to any potential ground pathway.

It shall be considered, the risk to the ground water shall be taken as Low.

Therefore, the risk of ground contamination is considered LOW.

9.2.4 Below Ground Pipework

The existing strata along with the ground improvement strata shall provided to layers of impermeable strata with the additional of a HDPE membrane.

Any below ground pipework within the containment area shall be placed above the HDPE membrane.

All process pipework shall be placed above ground with only drainage pipes below ground. These shall be CCTV's before use and air tested.

Therefore, the risk of ground contamination is considered LOW

9.2.5 Watercourse

The site is bond by a watercourse to the North, with the site been elevated means a potential overground flow pathway to the watercourse.

The site shall have primary and secondary containment systems designed to be compliant with CIRIA C736, taking into account rainfall, surge and freeboard.

Secondary containment shall consist of reinforced concrete wall to the perimeter of the tanks, constructed to water retaining standards. During the construction phase a Construction Quality Control procedures shall be carried out by the contractor and a Civil Engineer to ensure the construction works follow and comply with the design drawings.

Failure of the primary & secondary containment is not considered likely.

Therefore, the risk to the watercourse is considered LOW / MEDIUM.

9.2.6 Pathway Risk Consideration

From the above the pathways is deemed to be Medium risk. these do however relay on the integrity of the perimeter bund & hardstanding.

9.3 Receptor

The receptors are;

1. Watercourse

The watercourse is environmentally sensitive and located downhill in a flow path of containment bund.

The site shall be constructed with a concrete hardstanding, reinforced concrete bunding all compliant to CIRICA C736, this secondary containment system will from a second line of defence.

Based on an unlikely failure event the risk shall be considered as High, however in normal operation the site is considered to be low risk to the receptors.

It can therefore be concluded for this particular event, the risk to the receptor shall be considered medium taking a conservative approach between the two events.

In the event of an unlikely failure event the tank & the bunding. The watercourse would become engulfed with contaminated material.

Given its unlikely event, it is not recommended that further actions are taken to help / protect against such events. However, it is noted that an HDPE membrane has been included under the full containment bund plan area which will offer a third level of containment. Would normally be considered for this reason.

It is therefore essential that the bund integrity forms a vital part of the plant maintenance and inspection schedule, with all reported defects responded to as a matter of the highest importance.

Therefore, after reviewing all the receptors, an overall risk has been concluded as HIGH.

9.4 Site Hazard Rating

The site hazard rating shall be assessed using the below table from CIRIA C736, with the following ratings, derived as above.

1. **Source - Low**
2. **Pathway - High**
3. **Receptor - High**

Box 2.1 Suggested combinations of hazard ratings to give overall site hazard rating

Environmental hazard ratings

H = High rating

M = Moderate rating

L = Low rating

Source (hazard rating)	**Pathway** (transport potential)	**Receptor** (damage potential)	**Suggested consequent overall site hazard rating:**
May be H, M or L	May be H, M or L	May be H, M or L	
Possible combination of ratings:			
HHH or HHM or HMM			**HIGH**
HHL or MMM or HML			**MODERATE**
MML or HLL or MILL or LLL			**LOW**

Therefore, an overall site hazard rating has been considered and concluded as MODERATE.

9.5 Site Risk Rating

The site risk rating considers the site hazard rating and the risk of loss of containment.

The site hazard rating has been deemed moderate.

The risk of loss of containment shall now be considered and this is done by using the below table.

Table 2.3 Frequency of loss of containment

Risk of loss of containment	Annual probability of loss of containment per site
High	Greater than 1% (1 in 100)
Medium	Between 1% (1 in 100) and 0.001% (1 in 1 million)
Low	Less than 0.001% (1 in 1 million)

The following simple table has been formulated considering events and their probability in relation to the above table from CIRIA C736

	High	Medium	Low
Small Spills	X		
Pump failure	X		
Pipe Failure		X	
Localised Flooding		X	

Site-wide Fires			X
Whole vessel failure			X
Major flooding			X
Vandalism			X
Subsidence			X
Terrorism			X
Plane Crash			X
Earthquake			X

From the above table it has been concluded a likely risk of loss of containment shall be taken as medium to be conservative.

These two risks shall now be put into the following table to conclude a Site Risk Rating.

Box 2.2 *Overall site risk rating as defined by combining ratings of site hazard and probability of containment failure*

Site hazard ratings

May be high (H), moderate (M) or low (L) (see Box 2.1)

Frequency of loss of containment

May be high (H), moderate (M) or low (L)

Possible combination of ratings:	**Suggested consequent overall site hazard rating:**
HH or HM or MH	**HIGH**
MM or HL or LH	**MODERATE**
LL or ML or LM	**LOW**

Therefore, an overall site risk rating has been considered and concluded as MODERATE.

9.6 Classification Conclusion

The CIRIA guidance sets out that there is no direct quantifiable link between the site hazard or site risk and the design of the containment system. The following simple relationship is considered appropriate in most circumstances:

- low overall site risk containment type **class 1**, ie base level of integrity
- moderate overall site risk containment type **class 2**, ie intermediate degree of integrity
- high overall site risk containment type **class 3**, ie highest degree of integrity.

Therefore, an overall site classification has been considered and found to be moderate, with an overall site risk containment type requirement of class 2, i.e. providing an intermediate degree of integrity.

9.7 Key Performance Recommendation by Class

The site risk assessment has concluded an overall site hazard rating as being MODERATE. Class 2 containment would be required.

Therefore, the following Table 6.5, will be used to assess the as-built containment.

Table 6.5 Summary of key performance recommendations by class

Recommendation		Containment class		
		Class 2	*Class 2*	*Class 3*
a	Provide not less than 750 mm clearance between primary tank and bund walls for maintenance access.	Desirable	Recommended	Recommended
b	System to detect leakage from primary tank in situations where not practicable to provide clearance between base of tank and bund.	Desirable	Desirable	Recommended
c	No structure within bund to be closer than its own height to the bund wall.	Not necessary	Desirable	Recommended
d	Pumps*, valves, couplings, delivery nozzles and other items associated with the operation of a primary container to be located inside the bund or within a separately bunded area.	Desirable	Recommended	Recommended
e	Penetrations of the bund wall to be avoided.	Desirable	Recommended	Recommended
f	No provision for rainwater draw-off via a valved outlet in bund wall.	Desirable	Recommended	Recommended
g	Take account of possible jetting failure.	Desirable	Recommended	Recommended
h	Take account of surge effects.	Desirable	Desirable	Recommended

a. A minimum 750mm clearance has been provided between all tanks and the bund wall for maintenance. **– Achieved**

b. The main tanks do not have any leak detection system where the tank bases are below the bund. **– All tank are above the containment system or a HDPE membrane has been placed below the tank.**

c. Not all the tanks are beyond their own height to the bund wall. One of the three digester tanks is located 1.5m away from the bund wall, with the tank heights been 9.0m. This requirement is a desirable recommendation which has been complied with in three directions. Bund wall heights have achieved the required surge effects. Therefore, the design has considered this requirement. **- Achieved**

d. Below ground transfer pipes between the primary container are located below the bund slab. These are construction in MDPE. **– Achieved, all pipework shall be placed above ground**

e. There are no penetrations of the bund walls. **- Achieved**

f. No rainwater draw-off point has been provided. **- Achieved**

g. Jetting has been considered, with the tank insulation and cladding system offering a line of defence against jetting affect. The maintenance and operation team will be able to monitor loss of volume via the SCADA system. It is also recommended that visual site walkovers are undertaken to look out for wall pooling at the bottom of the tank cladding. - **Achieved**

h. Surge effects have been considered and applied in line with the recommendation set out in the CIRIA guidance in absence of detailed analysis. **– Achieved**

10.0 Bund Construction Design

The following section shall provide a descriptive description of the proposed construction containment system, covering the perimeter, secondary, leak detection and any form of additional containment.

Primary Containment

The bund shall contain 5 main tanks which are to be constructed by Wolf with insitu concrete wall and a cast insitu slab.

The tanks shall sit slightly below the main containment slab due to the floor falls to aid in drainage to the south / collection pit. Given the tank is located below the bund slab a leak detection system with has been incorporated by Wolf to allow for leak detection of each tank. This system shall be sealed to prevent leaks escaping into the lower HDPE membrane and or liquid flowing into the system from above (rainfall)

See Appendix IV for Wolf details.

Secondary Containment

Perimeter Walls

The containment bund walls have all been designed in accordance with CIRIA C736 at the Environment Agency's Best Available Technic (BAT).

The wall height has been determined based on the provided tank numbers and volumes as outlined within section 4.0 – 8.0.

All vertical & horizontal joints within the bund wall shall have a waterbar cast to the middle of the wall at and both faces to have sealant applied to the full height.

Expansion joints shall be placed at maximum spacing of 18m. A waterbar shall be placed vertically in the wall joint and base.

The Contractor shall construct in accordance with the supplier construction drawing and GGP Consult shall perform a CQA role during the construction phase to ensure compliance.

See Appendix V for GGP Consult details.

Bund Floor Slab

The floor slab shall be constructed from a 175mm fibre reinforced concrete slab with a layer of A252 mesh. A specialist fibre contractor has provided a design mix for the fibres which can be see within Appendix V.

The final mix design shall be submitted for review and approval by GGP Consult before accepting any concrete on site.

The bund slab shall form a fully sealed water retaining structure, with all joints between the bund slab, walls & tank bases sealed with a Fosroc or similar approved by GGP Consult.

All joints within the bund slab and intersection with the perimeter retaining wall shall have a waterbar at the bottom and sealant to the top surface.

Additional Containment

A 1.0mm HDPE membrane shall be placed below the full bund slab area, with all joints lapped, welded and certified to form a fully sealed liner. This shall provide an enhanced composite secondary containment slab and the ability to perform leak detection on the secondary containment with any failures of the bund slab been trapped between the slab and HDPE membrane allowing for sampling.

See Appendix V for GGP Consult details.

Drainage

All drainage within the containment system shall be located above the 1.0mm HDPE membrane, with pipes, channels & chambers to have minimum 175mm concrete surround.

Where the intersection between pours and the bund slab, a Adcor waterstop shall be provided to the liner perimeter.

Drainage channel shall be BSI certified with loading rate of E600, installation shall be strictly in accordance with the manufactures details. All joints shall be sealed through the system.

All manholes shall be BSI kitemarked, D400 lids and double sealed.

Precast concrete chambers shall have a minimum internal diameter of 1200mm and be constructed in accordance with the standard details provided.

Where Precast concrete chambers are used within the defined dirty water system, all chambers are to be internally sealed / lined to ensure sealed rings and prevent deterioration of the concrete.

Plastic chambers shall hold a BSI kitemark certification and shall have a minimum internal diameter of 450mm.

All pipes shall be PVC-U or similar material approved by GGP Consult and all drainage pipes should be sealed, and pressure tested (water & air) prior to completion.

All below ground tanks shall have up & downstream penstock valves fitting to allow isolation of the tank.

The below ground effluent tank shall have a secondary liner under the full extent of the tank, carried up to the surface and sealed. A leak detection point shall be provided between the tank and the liner.

See Appendix VI for GGP Consult details.

11.0 Summary and Compliance Statement

It has been demonstrated within the report that the sites containment system has been designed in compliance with the recommendation and guidance set out within CIRIA C736.

The site hazard rating has been concluded as moderate with a minimum requirement of Class 2 containment system required.

The constructed containment system is in compliance with a class 2.

The proposed design bund wall level of 121.800m AOD (Concrete Walls) & 122.800m AOD (Earth Bunds) will contain the 110% volume.

The containment system shall be inspection via a CQA role performed by GGP Consult with a written compliance report confirming the As-Built containment has complied with the design.

The operator shall conform to the proposed maintenance schedule and undertake work immediately.

From GGP CONSULT

Report Checked by:-

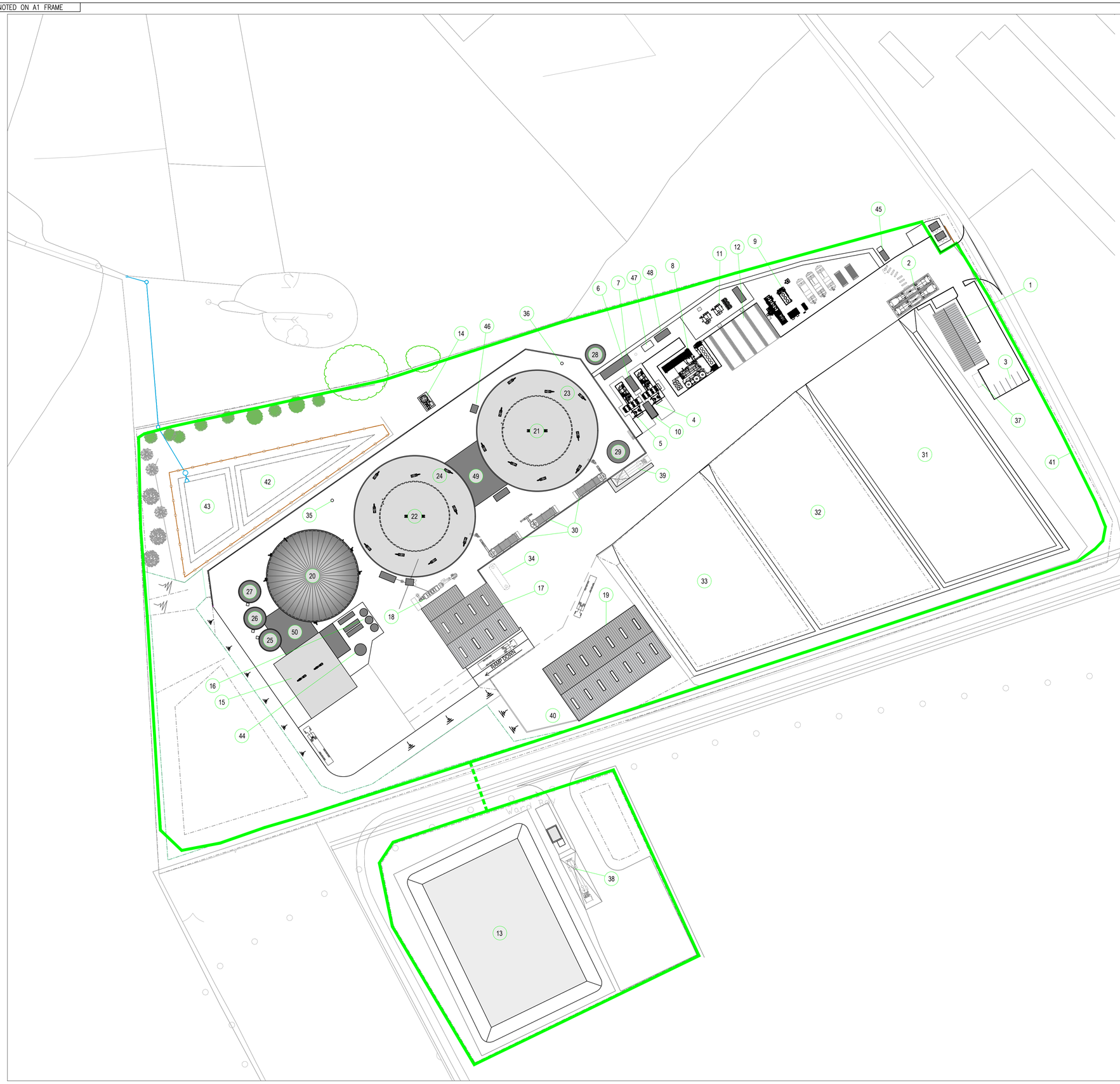
J. H. Collins BSc. (Hons), MCIWEM

Director - Drainage & Infrastructure

APPENDIX I

Layout Showing Tank Sizes

AS NOTED ON A1 FRAME



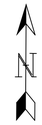
Reference Table	
1	Site Office / Staff Welfare and Workshop
2	Weighbridges (in and out)
3	Site Parking
4	CHP No1
5	CHP No2
6	Emergency Generator
7	Switch Room
8	Biogas Upgrade Unit
9	CO2 Recovery Unit and CO2 tanks
10	Emergency Boiler
11	CNG Unit
12	CNG Trailer Bays - 4 Nos.
13	Covered lagoon - Volume 12,163m³ plus 750m freeboard
14	Gas Flare
15	Digestate Separator Building
16	3 No. Pasteurisation tanks (25m³ each)
17	Manure Reception Building
18	Abatement Plant
19	Straw Process Building
20	Tertiary Digester - Volume 7444m³
21	Secondary Digester 1 - Volume 4512m³
22	Secondary Digester 2 - Volume 4512m³
23	Primary Digester 1 - Volume 9000m³
24	Primary Digester 2 - Volume 9000m³
25	Digestate Buffer Tank - Volume 402m³
26	Water Tank 1- Volume 402m³
27	Water Tank 2 - Volume 402m³
28	Fire Water Tank - Volume 250m³
29	Liquid Feedstock Tank - Volume 402m³
30	Feed Hoppers - Volume 2No 120m³ & 1No 65m³
31	Covered Storage Clamp 1 - Volume 19900m³
32	Covered Storage Clamp 2 - Volume 17000m³
33	Covered Storage Clamp 3 - Volume 11760m³
34	Silage Leachate Tank - Volume 54m³
35	Condensate sump 1
36	Condensate sump 2
37	Wastewater treatment plant
38	Digestate offtake bay with sump (5.1m³)
39	Liquid Feedstock loading point
40	Straw set down bay
41	Site Boundary Fence
42	Dirty water lagoon 510m³
43	Attenuation lagoon (clean) 800m³
44	Hygienized tank 80m³
45	Clean water break tank 10m³
46	Oxygen Generator
47	Biogas desulpherisation
48	Heat distribution container
49	Machinery Hall
50	Pump building

PERMIT PLAN
Scale: 1:750 @ A1

NOTES:-

Permitted Area Boundary (5.89ha)

Underground pipe conduit with leakage detection



Rev	Date	Description	DR	CH
A	21/11/24	Issued For Approval	SJC	

acorn BIOENERGY

Job Title
AD Plant.
Horse Close

Drawing Title
Site Layout & Permit Plan

Status
Approval

Scale	Date	
As Shown	Nov '24	

Drawn By	Checked	Approved
SJC	–	–

Drg. No.	Rev
HRCL-LAY-ABE-011	A

APPENDIX II

2D Volume Visualisation

TANK BUND LAYOUT (LIQUID UPTO LEVEL +121.550m)

Scale: N.T.S.

SURFACE LEVEL DATA				
NUMBER	MINIMUM LEVEL	MAXIMUM LEVEL	COLOUR	AREA
1	0.00	0.50		235.354m2
2	0.50	1.00		235.821m2
3	1.00	1.50		1165.241m2
4	1.50	2.00		7129.935m2
5	2.00	2.50		423.964m2

Total Volume = 14700 m³

TANK BUND LAYOUT (LIQUID UPTO LEVEL +121.800m)

Scale: N.T.S.

SURFACE LEVEL DATA				
NUMBER	MINIMUM LEVEL	MAXIMUM LEVEL	COLOUR	AREA
1	0.00	0.50		237.010m2
2	0.50	1.00		237.259m2
3	1.00	1.50		245.195m2
4	1.50	2.00		6694.009m2
5	2.00	2.50		1897.907m2

Total Volume = 17010 m³

FOR CONSTRUCTION

NOTES:-

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2. The Contractor shall make a survey of the site and shall be responsible for obtaining all dimensions and levels necessary for the proper fabrication of the structure as indicated.
3. All levels shown on this drawing are relative to Agreed Topographic survey
4. This drawing is to be read in conjunction with 29384/100 Series Drawings.
5. All existing invert levels are to be confirmed by contractor prior to construction. Connection subject to approval.
6. Refer to drawing no. GGP-29384-C1-108 for Proposed Site Levels

Denotes Site Boundary

Rev	Date	Description	DR	CH
C05	16/01/25	Liquid top levels updated	MK	JHC
C04	07/12/24	Layout amended	MK	JHC
C03	03/10/24	Issued For Construction	MK	JHC
C02	23/08/24	Issued For Construction	MK	JHC
C01	15/07/24	Issued For Construction	MK	JHC

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Fax (+44) 01482 641736
Email info@ggpconsult.co.uk

Client: acorn

Job Title: AD Plant
Horse Close Green Power

Drawing Title: Volume Calculation for Bund Area

Status: Construction

Scale: As Noted @ A1

Date: JULY 2024

Drawn By: MK

Checked: JHC

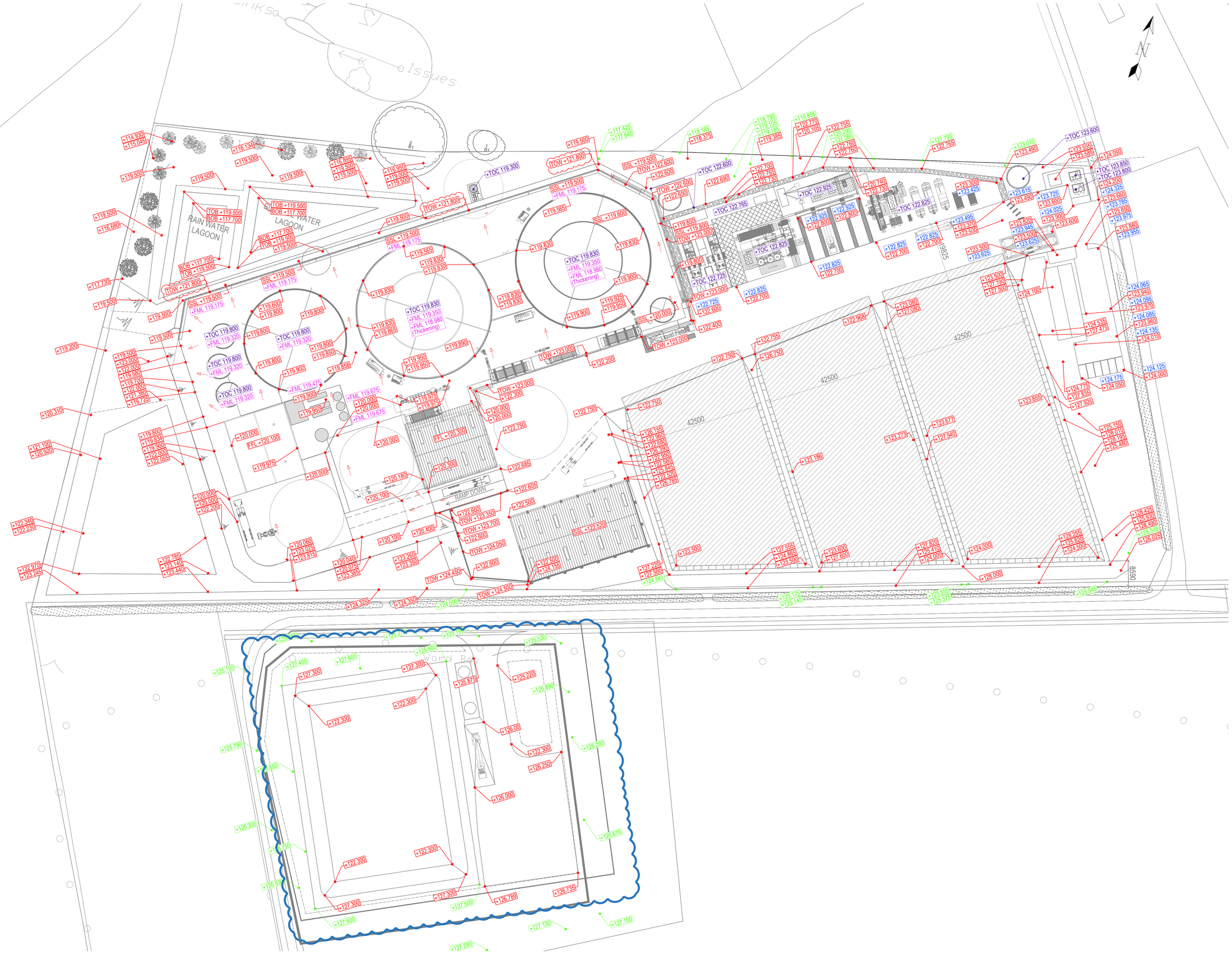
Approved: JHC

Drg. No.: 29384/C1/2024

Rev: C05

APPENDIX III

Proposed Site Levels



NOTES:-

1. All dimensions must be checked on site and not scaled from this drawing.
2. The Contractor shall make a survey of the site and shall be responsible for obtaining all dimensions and levels necessary for the proper fabrication of the structure as indicated.
3. All levels shown on this drawing are relative to Agreed Topographic survey
4. This drawing is to be read in conjunction with 29384/100 Series Drawings.
5. All existing invert levels are to be confirmed by contractor prior to construction. Connection subject to approval.

Denotes Site Boundary

T.O.C. : Denotes Top Of Concrete

T.O.W. : Denotes Top Of Wall

F.F.L. : Denotes Finished Level

+xx.xxx Denotes top of kerb level

+xx.xxx Denotes finished ground level

+xx.xxx Denotes top of concrete levels

+xx.xxx Denotes existing levels

+xx.xxx Denotes Proposed Formation levels

Denotes Updated Levels

Denotes Levels TBC for consrtuction

Rev	Date	Description	DR	CH
C16	09/01/24	Layout Amended	JT	JHC
C15	23/12/24	Updated Bund Wall Levels	MK	JHC
C14	19/12/24	Layout amended	KW	JHC
C13	28/11/24	Layout amended	JT	JHC
C12	11/11/24	Layout amended	MK	JHC
C11	08/10/24	Updated Bund Wall Levels	LD	JHC
C10	11/09/24	Issued For Construction	LD	WD
C09	10/09/24	Updated Tank Levels	LD	WD
C08	29/08/24	Updated Trailer Bay Levels	WD	WD
C07	27/08/24	Updated Bund Levels	LD	JHC
C06	15/08/24	Updated Levels	WD	LD
C05	05/08/24	Updated Flare Level	LD	LD
C04	02/08/24	Updated w/ Lagoon Levels	LD	JHC
C03	15/07/24	Updated Bund Level	LD	JHC
C02	12/07/24	Updated Ramp Level	LD	JHC
C01	11/07/24	Issued For Construction	WD	JHC
C1	07/06/24	Issued For Contract	MK	JHC
T2	05/03/24	Layout amended	MK	JHC
T1	03/02/24	Issued For Tender	MK	JHC

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Fax (+44) 01482 641736
Email info@ggpconsult.co.uk

Client: acorn

Job Title: AD Plant
Horse Close Green Power

Drawing Title: Proposed Site Levels

Status: Construction

Scale: As Noted @ A1

Date: JUN' 2024

Drawn By: MK

Checked: JHC

Approved: JHC

Drg. No.: 29384/C1/108

Rev: C16

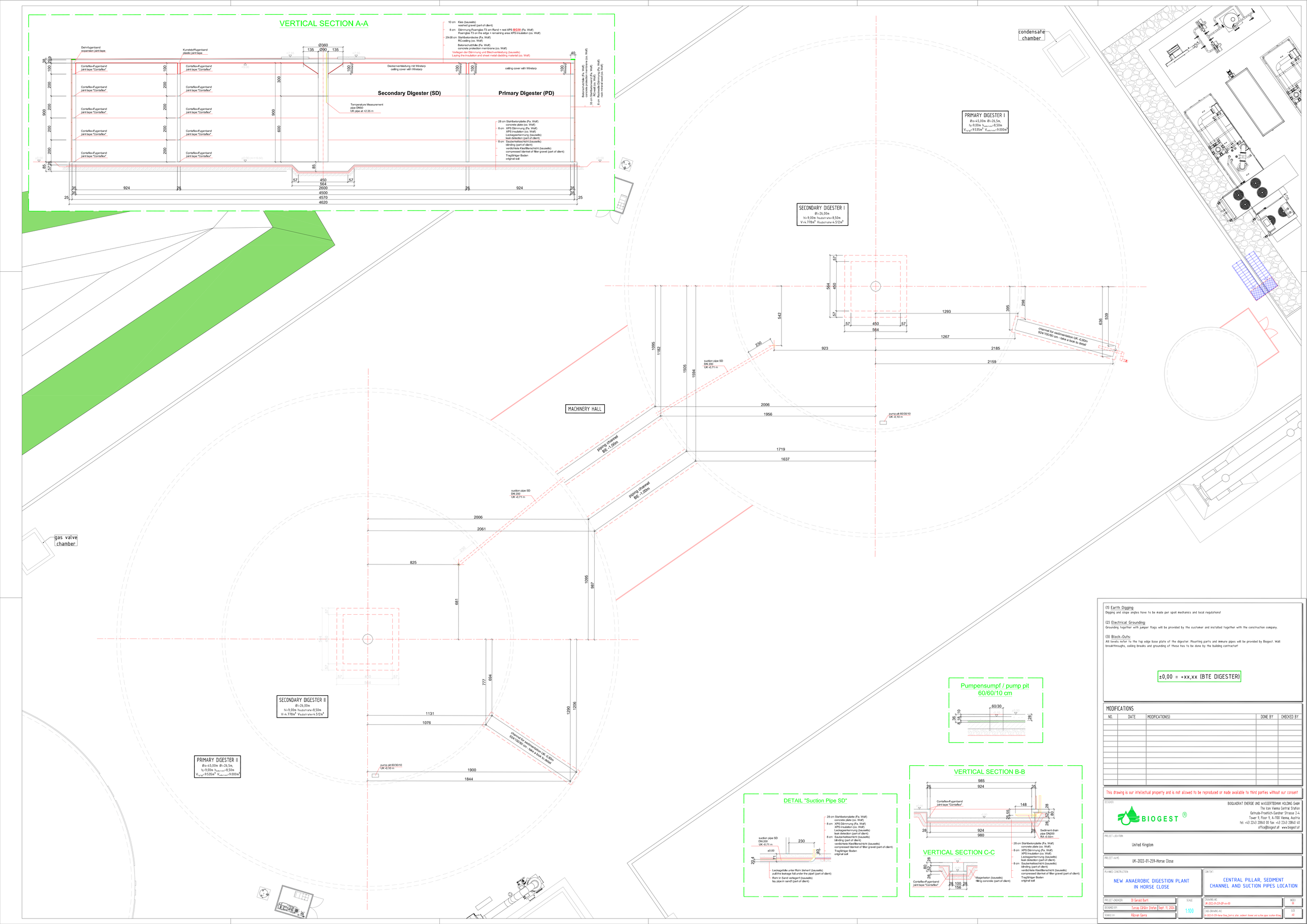
SITE PLAN
Scale: 1:600 @ A1

FOR CONSTRUCTION

APPENDIX IV

Primary Containment – Wolf Tanks

VERTICAL SECTION A-A



Pumpensumpf / pump pit 60/60/10 cm

DETAIL "Suction Pipe SD"

VERTICAL SECTION B-B

VERTICAL SECTION C-C

(1) Earth Digging:
Digging and slope angles have to be made per spoil mechanics and local regulations!

(2) Electrical Grounding:
Grounding together with jumper flags will be provided by the customer and installed together with the construction company.

(3) Block-Outs:
All levels refer to the top edge base plate of the digester. Mounting parts and immune pipes will be provided by Biogest. Wall breakthroughs, ceiling breaks and grounding of these has to be done by the building contractor!

±0,00 = +xx,xx (BTE DIGESTER)

MODIFICATIONS

NO.	DATE	MODIFICATION(S)	DONE BY	CHECKED BY

DESIGNED:
BIOGEST ®
BIOQUADRAT ENERGIE UND WASSERTECHNIK HOLDING GmbH
The Icon Vienna Central Station
Gertrude-Froehlich-Sandner Strasse 3-4
Tower 9, Floor 9, A-1100 Vienna, Austria
Tel: +43 2243 20840 00 fax: +43 2243 20840 40
office@biogest.at www.biogest.at

PROJECT-LOCATION:
United Kingdom

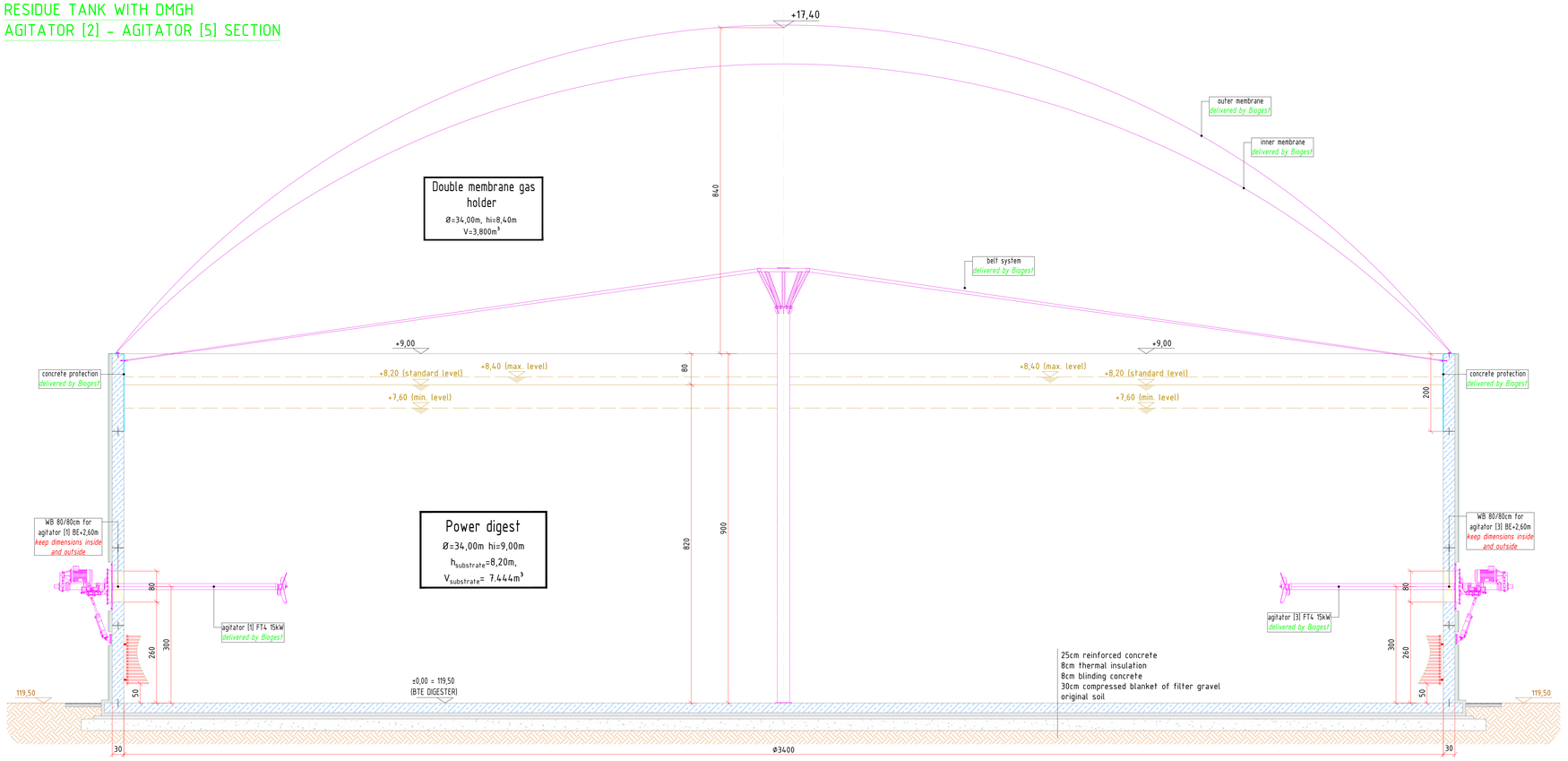
PROJECT-NAME:
UK-2022-01-259-Horse Close

PLANNED CONSTRUCTION:
NEW ANAEROBIC DIGESTION PLANT IN HORSE CLOSE

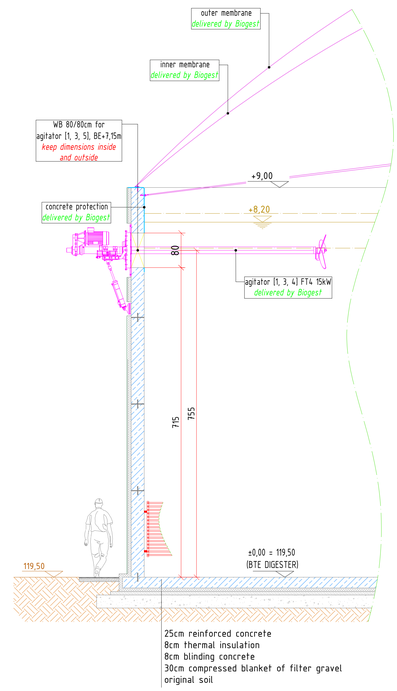
CONTENT:
CENTRAL PILLAR, SEDIMENT CHANNEL AND SUCTION PIPES LOCATION

PROJECT-OWNER: DI Gerald Bartl	SCALE: 1:100	DRAWING-NR.: UK-2022-01-259-DP-xx-00	INDEX: 00
DESIGNED BY: Turcaş Cătălin Ştefan Sept. 11, 2024			
VIEWED BY: Răzvan Şpera		CAD-DRAWING-NO.: UK-2022-01-259-Horse Close_Central pillar, sediment channel and suction pipes location-00.dwg	SIZE: A3

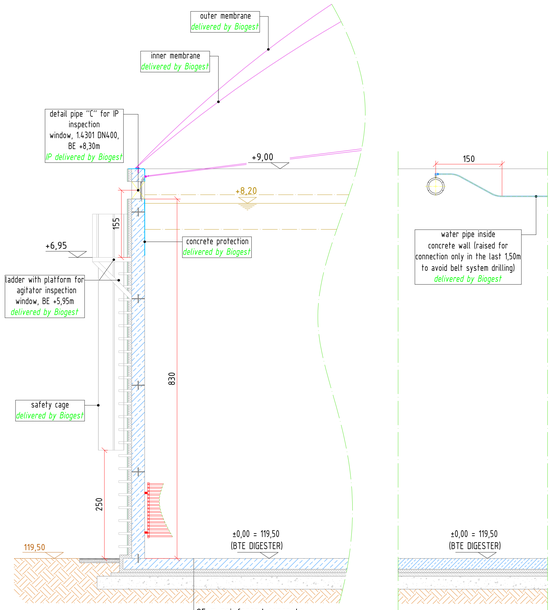
RESIDUE TANK WITH DMGH
AGITATOR [2] - AGITATOR [5] SECTION



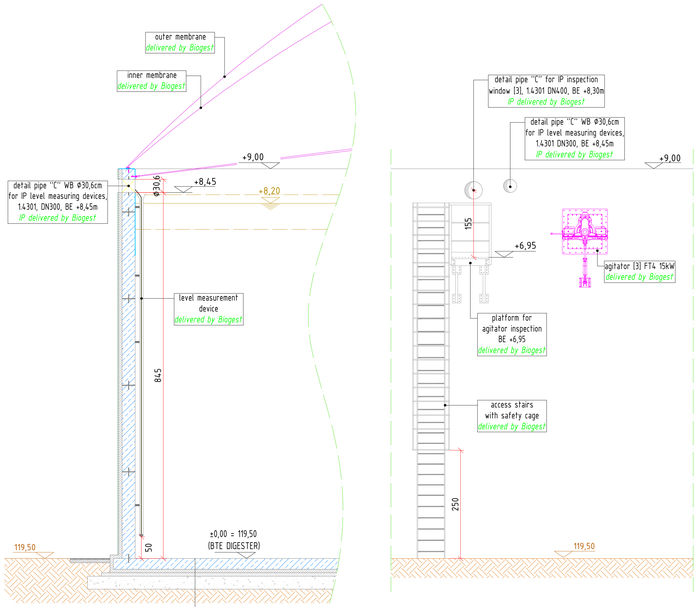
RESIDUE TANK WITH DMGH
AGITATOR [1, 3, 4] SECTION



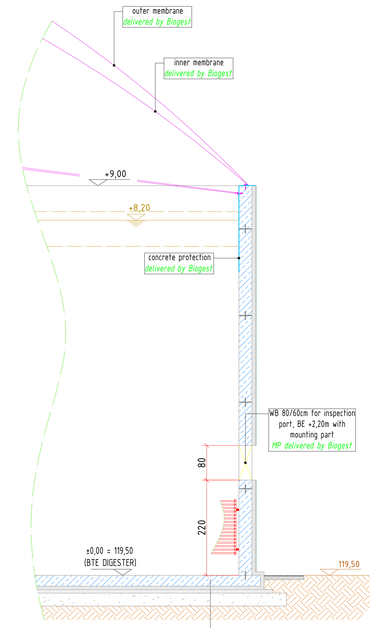
INSPECTION WINDOWS
WATER SUPPLY SECTION



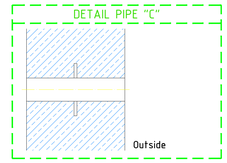
LEVEL MEASURING DEVICES SECTION
(heating lines not shown)



INSPECTION PORT SECTION



DETAIL PIPE "C"



Concrete protection on the last upper 2m of the walls!

Concrete protection has to be cut in front of the openings!

Wall, top and ground slab thickness are based on our experience. Consult the structural engineer's plans for the final dimensions.

Central pillar load on foundation is xx kN. The size of the foundation has to be determined according static calculation.

(1) Earth Digging:
Digging and slope angles have to be made per UK-Norm respectively per industrial safety regulations!

(2) Electrical Grounding:
Grounding together with jumper flags will be provided by Biogest and installed together with the construction company.

(3) Block-Outs:
All levels refer to the top edge base plate of the digester. Mounting parts and immure pipes will be provided by Biogest. Wall breakthroughs, ceiling breaks and grounding of these has to be done by the building contractor!

±0,00 = 119,50 (BTE DIGESTER)

Tolerances: +/- 1 cm for construction
+/- 1 mm for steel works
All pipes and welds DIN EN ISO 1127:1996-05

SHORTCUTS	
BTE	BASE PLATE TOP EDGE
CB	CEILING BREAK THROUGH
PD	PRIMARY DIGESTER
SD	SECONDARY DIGESTER
WB	WALL BREAK THROUGH
BE	BOTTOM EDGE
WI	WALL INSIDE
WO	WALL OUTSIDE
GL	GROUND LEVEL
IP	IMMERE PIPE
MP	MOUNTING PART

MODIFICATIONS

NO.	DATE	MODIFICATION(S)	DONE BY	CHECKED BY
01	06.06.2024	General update	TuS	GaR
02	02.07.2024	General update according new site plan	TuS	GaR

DESIGNER:
BIOGEST ®
BIOQUADRAT ENERGIE UND WASSERTECHNIK HOLDING GmbH
The Icon Vienna Central Station
Getrude-Froehlich-Sandner Strasse 2-4
Tower 9, Floor 9, A-1100 Vienna, Austria
tel: +43 2243 20840 00 fax: +43 2243 20840 40
office@biogest.at www.biogest.at

PROJECT-LOCATION:
United Kingdom

PROJECT-NAME:
UK-2022-01-259-Horse Close

PLANNED CONSTRUCTION:
NEW ANAEROBIC DIGESTION PLANT IN HORSE CLOSE

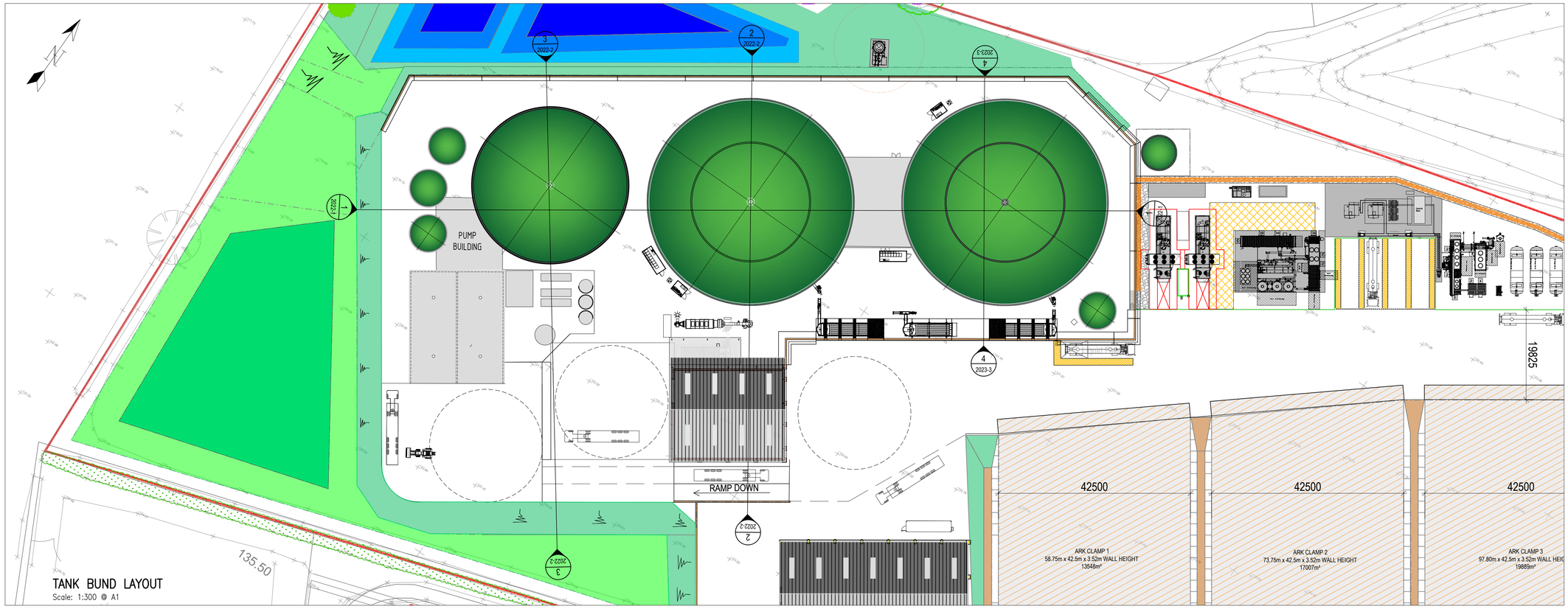
CONTENT:
POWER DIGEST SECTIONS PART I

PROJECT-ENGINEER:	DI. Gerald Barth	SCALE: 1:50	DRAWING-NO: UK-2022-01-259-GP-SB-3 Li-02 — INDEX: 02
DESIGNED BY:	Turcas Cătălin Stefan Apr 23, 2024		
VERIFIED BY:	Răzvan Gavra		CAD-DRAWING-NO: UK-2022-01-259-Horse Close_SB-Power digest-02.dwg — SIZE: A0

APPENDIX V

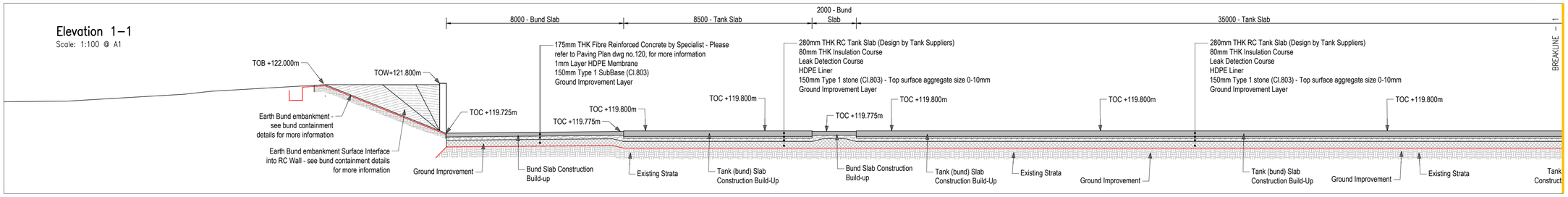
Secondary Containment Details

AS NOTED ON A1 FRAME

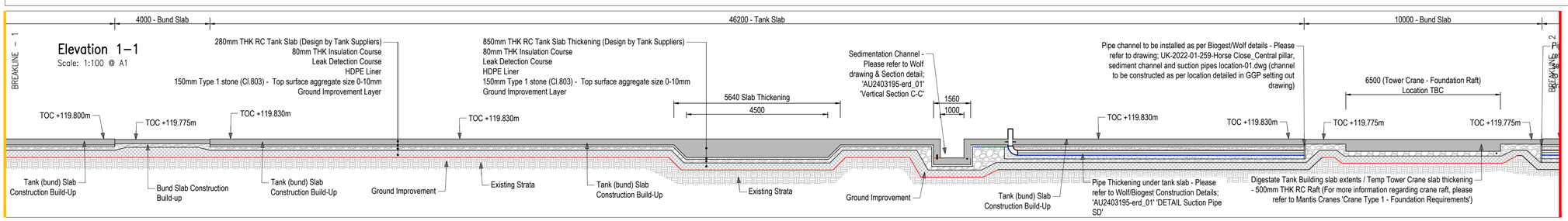


TANK BUND LAYOUT
Scale: 1:300 @ A1

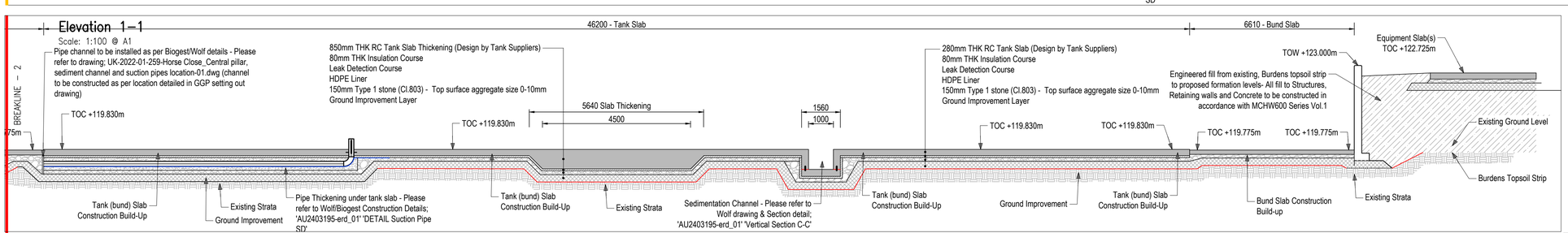
Elevation 1–1
Scale: 1:100 @ A1



Elevation 1–1
Scale: 1:100 @ A1



Elevation 1–1
Scale: 1:100 @ A1



FOR CONSTRUCTION

NOTES:-

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3. All levels shown on this drawing are relative to Agreed Topographic survey
4. This drawing is to be read in conjunction with 29384/100 Series Drawings.
5. All existing invert levels are to be confirmed by contractor prior to construction. Connection subject to approval.
6. Digestate tank details and slab thickenings are to be read in conjunction with Wolf drawing; 'AU2403195-erd_01'

Site Red Line Boundary

Rev	Date	Description	DR	CH
C05	17/01/25	Issued For Construction	LD	JHC
C04	13/09/24	Issued For Construction	LD	JHC
C03	11/09/24	Updated Trough&Thickening	LD	JHC
C02	10/09/24	Updated Slab Thickening	LD	JHC
C01	27/08/24	Issued For Construction	LD	JHC
C1	10/06/24	Issued For Contract	MK	JHC
T1	06/02/24	Issued For Tender	MK	JHC

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2 Hallam Road
Priory Park East
HULL HU4 7DY
United Kingdom
Telephone (+44) 01482 627963
Fax (+44) 01482 641736
Email info@ggpconsult.co.uk

Client: acorn

Job Title
AD Plant.
Horse Close Green Power

Drawing Title
Bund Details
Sheet 1 of 3

Status: For Construction

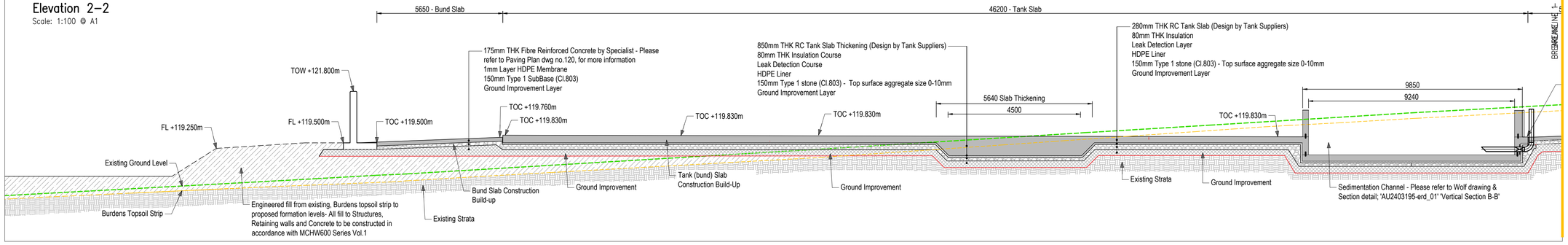
Scale: As Shown @ A1
Date: AUG' 2024

Drawn By: LB
Checked: LB
Approved: JHC

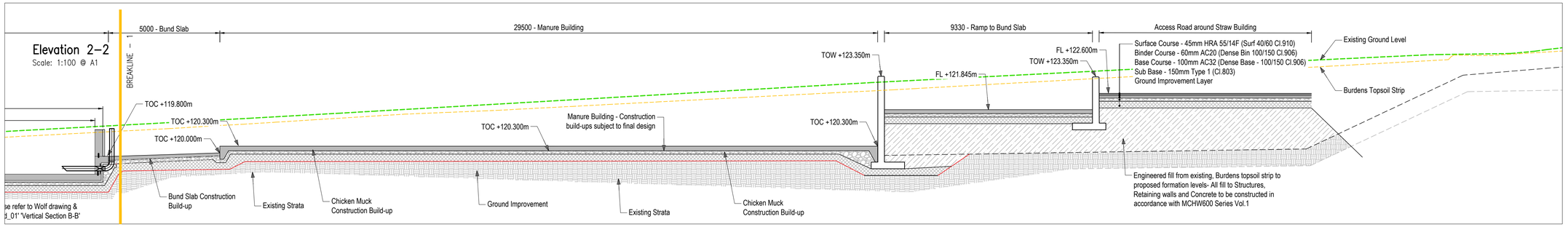
Drg. No.: 29384/C1/2021
Rev: C05

AS NOTED ON A1 FRAME

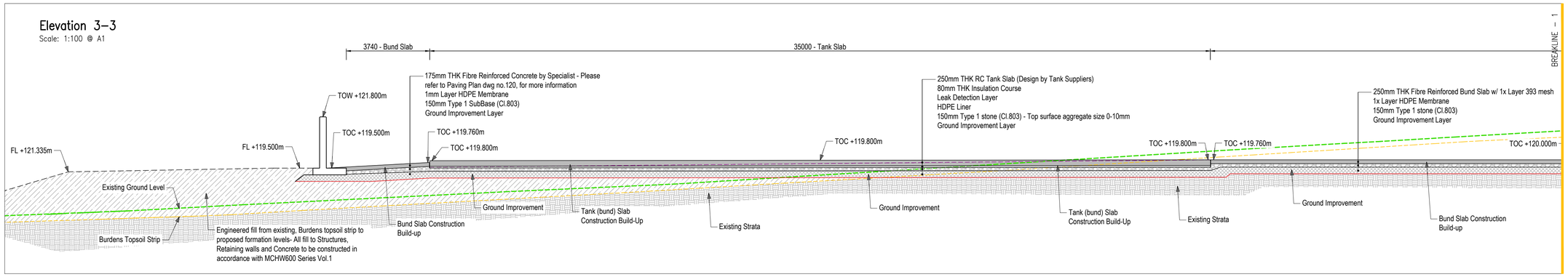
Elevation 2–2
Scale: 1:100 @ A1



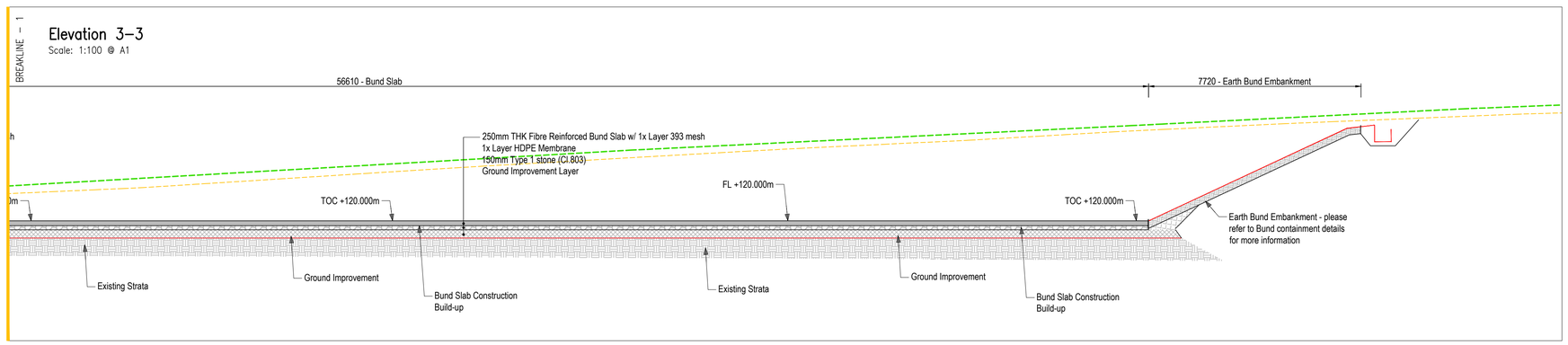
Elevation 2–2
Scale: 1:100 @ A1



Elevation 3–3
Scale: 1:100 @ A1



Elevation 3–3
Scale: 1:100 @ A1



FOR CONSTRUCTION

NOTES:-

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2. The Contractor shall make a survey of the site and shall be responsible for obtaining all dimensions and levels necessary for the proper fabrication of the structure as indicated.
3. All levels shown on this drawing are relative to Agreed Topographic survey
4. This drawing is to be read in conjunction with 29384/100 Series Drawings.
5. All existing invert levels are to be confirmed by contractor prior to construction. Connection subject to approval.
6. Digestate tank details and slab thickenings are to be read in conjunction with Wolf drawing; 'AU2403195-erd_01'

Site Red Line Boundary

Rev	Date	Description	DR	CH
C05	17/01/25	Issued For Construction	LD	JHC
C04	13/09/24	Issued For Construction	LD	JHC
C03	11/09/24	Updated Trough&Thickening	LD	JHC
C02	10/09/24	Updated Slab Thickening	LD	JHC
C01	27/08/24	Issued For Construction	LD	JHC
C1	10/06/24	Issued For Contract	RW	JHC
T1	06/02/24	Issued For Tender	MK	JHC

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HULL HU4 7DY
United Kingdom
Telephone (+44) 01482 627963
Fax (+44) 01482 641736
Email info@ggpconsult.co.uk

Client: acorn

Job Title
AD Plant.
Horse Close Green Power

Drawing Title
Bund Details
Sheet 2 of 3

Status: For Construction

Scale: AS SHOWN @ A1 | Date: AUG' 2024

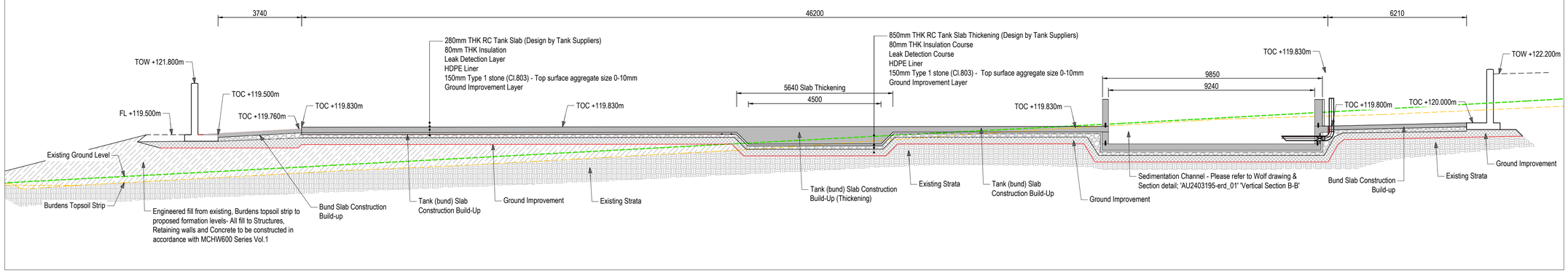
Drawn By: LB | Checked: LB | Approved: JHC

Drg. No.: 29384/C1/2022 | Rev: C05

AS NOTED ON A1 FRAME

Elevation 4–4

Scale: 1:100 @ A1



FOR CONSTRUCTION

NOTES:-

1. All dimensions must be checked on site and not scaled from this drawing.
2. The Contractor shall make a survey of the site and shall be responsible for obtaining all dimensions and levels necessary for the proper fabrication of the structure as indicated.
3. All levels shown on this drawing are relative to Agreed Topographic survey
4. This drawing is to be read in conjunction with 29384/100 Series Drawings.
5. All existing invert levels are to be confirmed by contractor prior to construction. Connection subject to approval.
6. Digestate tank details and slab thickenings are to be read in conjunction with Wolf drawing; 'AU2403195-erd_01'

Site Red Line Boundary

Rev	Date	Description	DR	CH
C05	17/01/25	Issued For Construction	LD	JHC
C04	13/09/24	Issued For Construction	LD	JHC
C03	11/09/24	Updated Trough&Thickening	LD	JHC
C02	10/09/24	Updated Slab Thickening	LD	JHC
C01	27/08/24	Issued For Construction	LD	JHC
C1	10/06/24	Issued For Contract	MK	JHC
T1	06/02/24	Issued For Tender	MK	JHC

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CONSULTING ENGINEERS
PROJECT MANAGEMENT
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Priory Park East
HULL HU4 7DY
United Kingdom
Telephone (+44) 01482 627963
Fax (+44) 01482 641736
Email info@ggpconsult.co.uk

Client: acorn

Job Title: AD Plant.
Horse Close Green Power

Drawing Title: Bund Details
Sheet 3 of 3

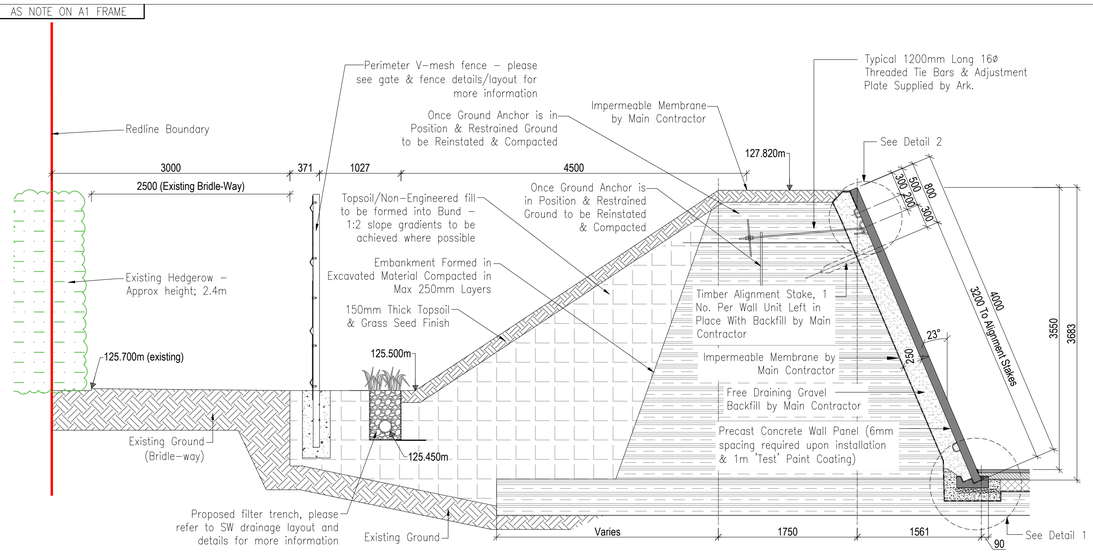
Status: For Construction

Scale: AS SHOWN @ A1
Date: AUG' 2024

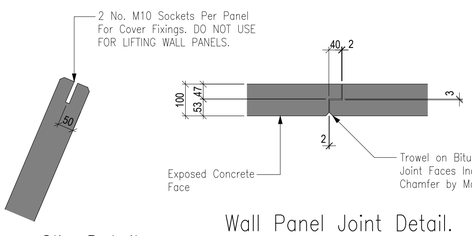
Drawn By: LB
Checked: LB
Approved: JHC

Drg. No.: 29384/C1/2023
Rev: C05

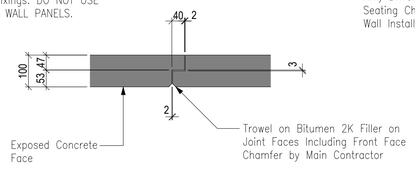
AS NOTE ON A1 FRAME



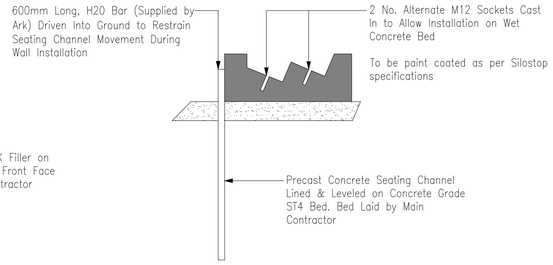
Section E–E
Scale: 1:40 @ A1



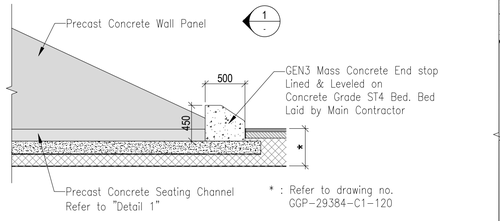
Cover Clip Detail.
Scale: 1:10 @ A1



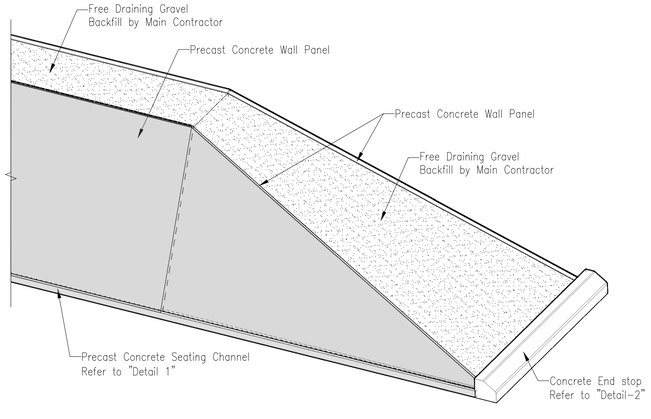
Wall Panel Joint Detail.
Scale: 1:10 @ A1



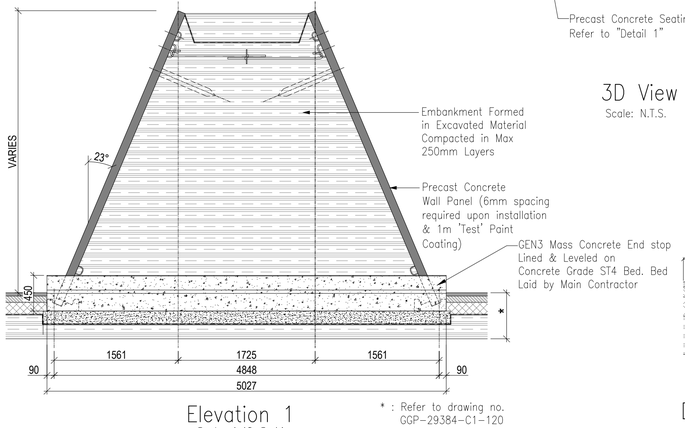
Seating Plinth Installation Detail.
Scale: 1:10 @ A1



Detail 2
Scale: 1:40 @ A1

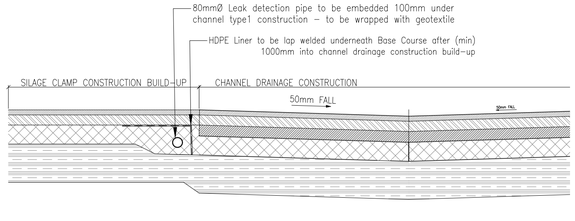


3D View – Concrete End Stop
Scale: N.T.S.

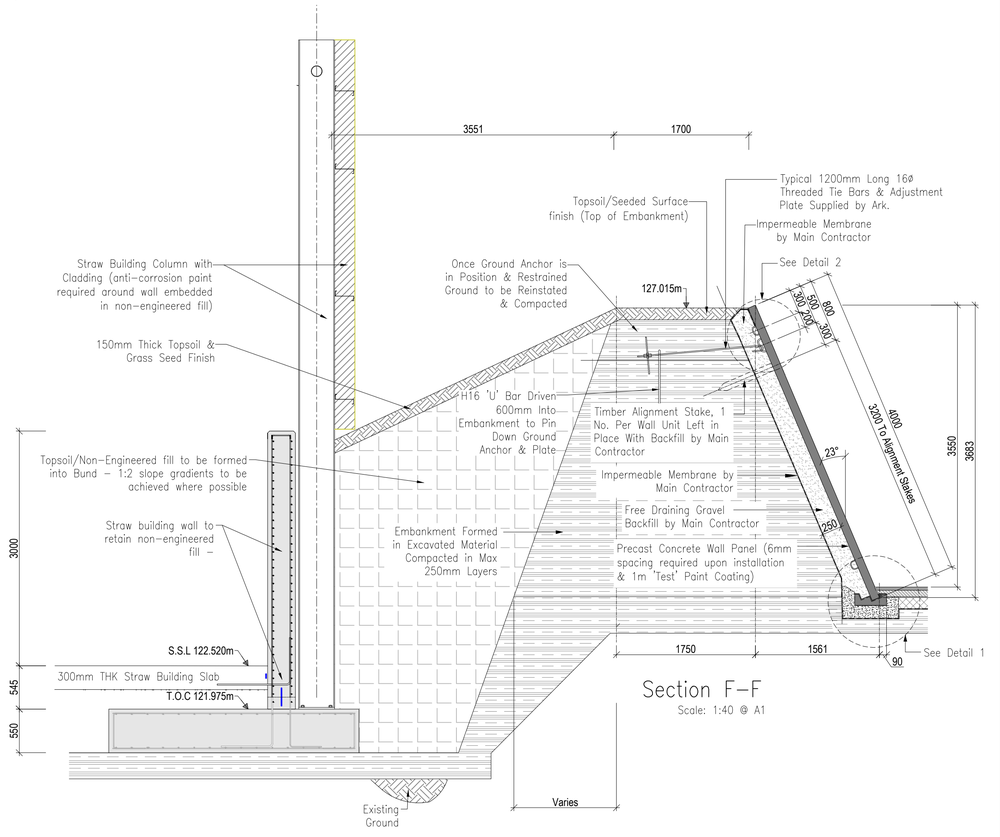


Elevation 1
Scale: 1:40 @ A1

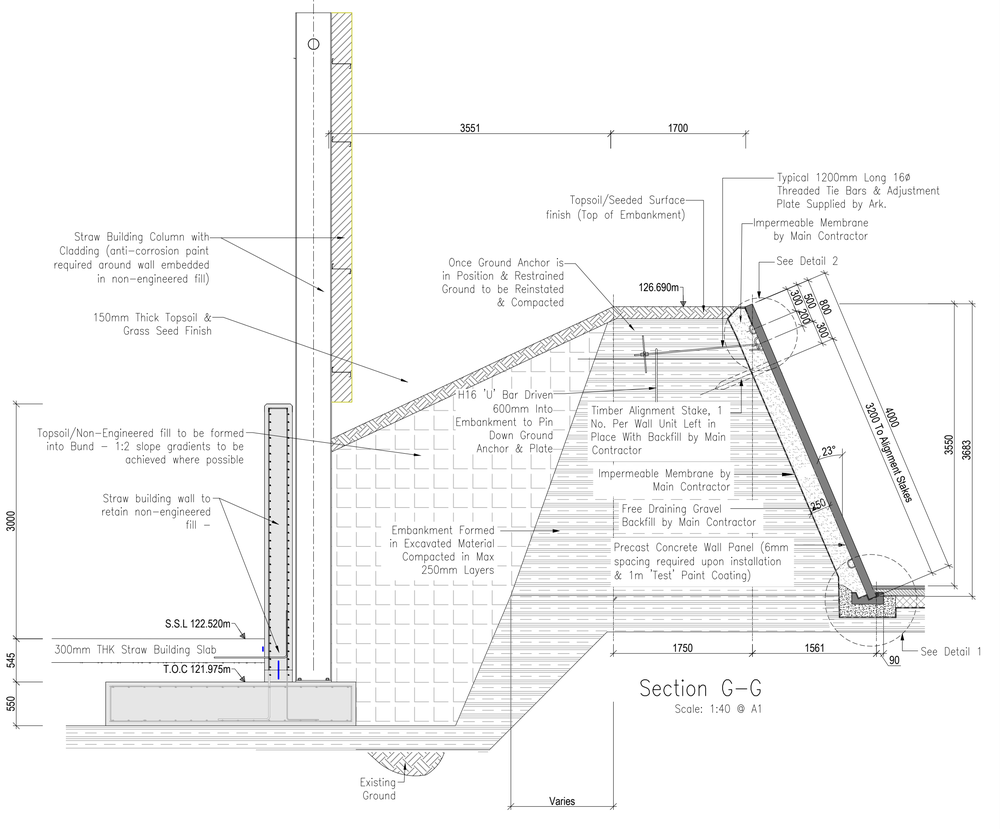
* : Refer to drawing no. GGP-29384-C1-120



Drainage Channel – Liner Construction
Scale: 1:50 @ A1



Section F–F
Scale: 1:40 @ A1



Section G–G
Scale: 1:40 @ A1

FOR CONSTRUCTION

NOTES:-

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3. All levels shown on this drawing are relative to Agreed Topographic survey
4. This drawing is to be read in conjunction with 29384/100 Series Drawings.
5. All existing invert levels are to be confirmed by contractor prior to construction. Connection subject to approval.

ALL DETAILS AND SECTIONS SHOWN ARE BASED ON 'ARK AGRICULTURE' DETAILS AND ARE TO BE USED ALONG SIDE THEIR 'GENERAL CONSTRUCTION NOTES FOR PATENTED ARK AGRICULTURE SILAGE CLAMP SYSTEM' DOCUMENT.

DETAILS SHALL NOT BE SHARED WITH THIRD PARTIES WITHOUT 'ARK AGRICULTURE' WRITTEN APPROVAL.

ALL CONSTRUCTION DETAILS & SECTIONS TO BE READ IN CONJUNCTION WITH SILOSTOP DRAWINGS & DETAILS

Please refer to the following drawings for more information; 'W167799-01' / 'W167799-02' / 'W167799-03' / 'W167799-04'

Rev	Date	Description	DR	CH
C08	16/11/24	Updated drainage channel	LB	JHC
C07	22/10/24	Updated Channel Drain HDPE	LB	JHC
C06	22/10/24	Updated Channel Drain HDPE	LB	JHC
C05	25/09/24	Platform Drainage Removed	LB	JHC
C04	24/09/24	Updated Panel Spacing	LB	JHC
C03	18/09/24	Issued For Construction	LB	JHC
C02	28/08/24	Issued For Construction	LB	JHC
C01	16/08/24	Issued For Final Comment	LB	JHC

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United Kingdom
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Fax (+44) 01482 641736
Email info@ggpconsult.co.uk

Client: acorn

Job Title: AD Plant.
Horse Close Green Power

Drawing Title: Silage Clamp Sections & Details – Sheet 2 of 2

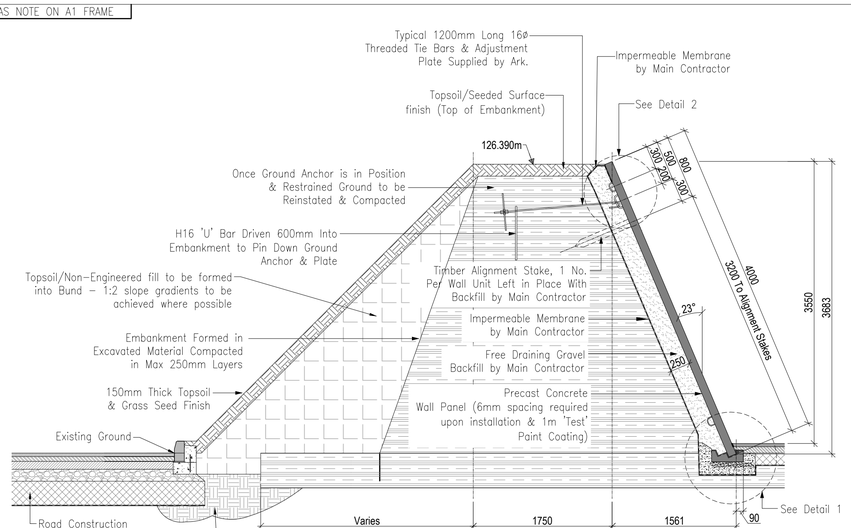
Status: Construction

Scale: AS SHOWN @ A1 | Date: AUG' 2024

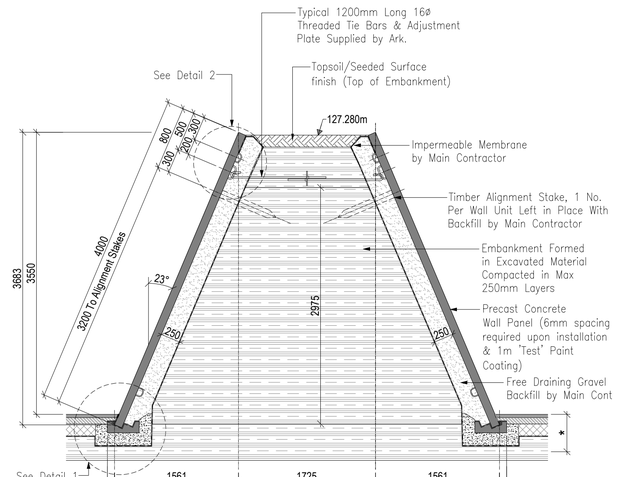
Drawn By: LB | Checked: JHC | Approved: JHC

Drg. No.: 29384/C1/2021 | Rev: C08

AS NOTE ON A1 FRAME

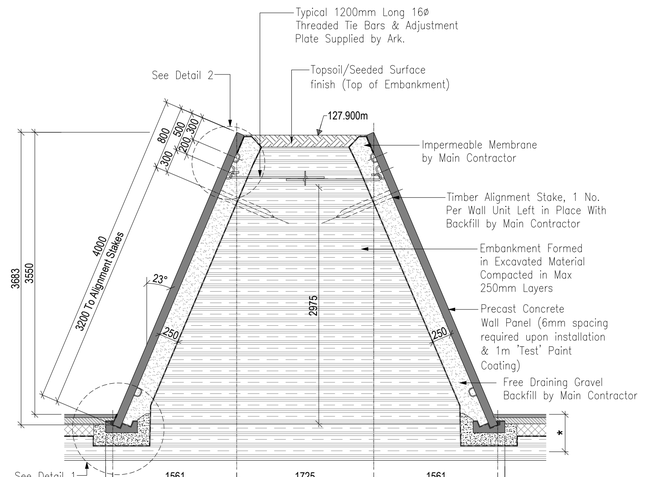


Section A–A
Scale: 1:40 @ A1



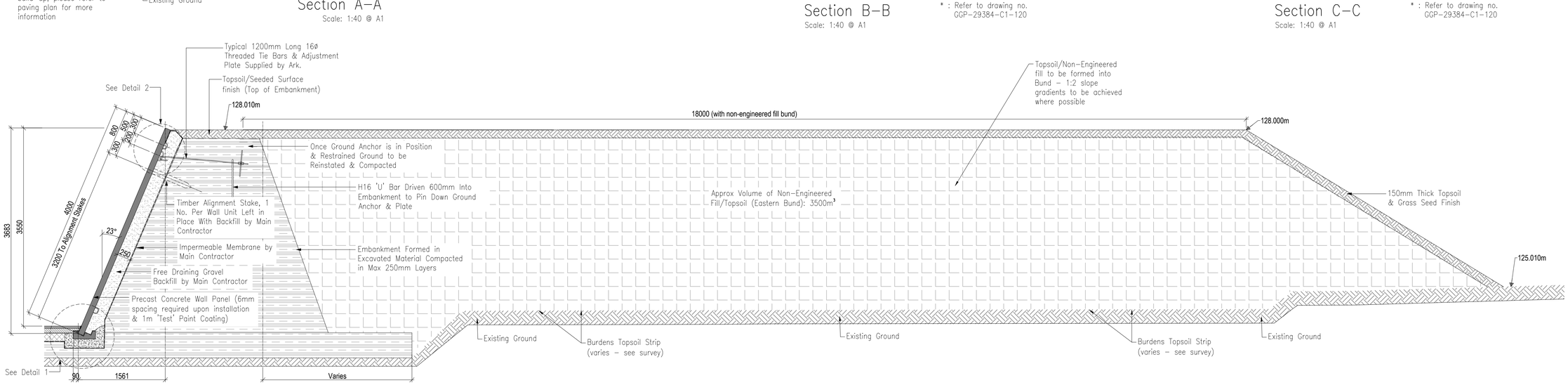
Section B–B
Scale: 1:40 @ A1

* : Refer to drawing no. GGP-29384-C1-120



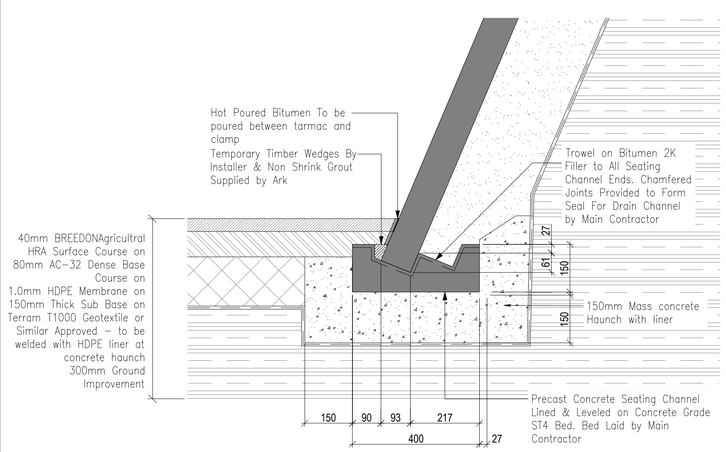
Section C–C
Scale: 1:40 @ A1

* : Refer to drawing no. GGP-29384-C1-120

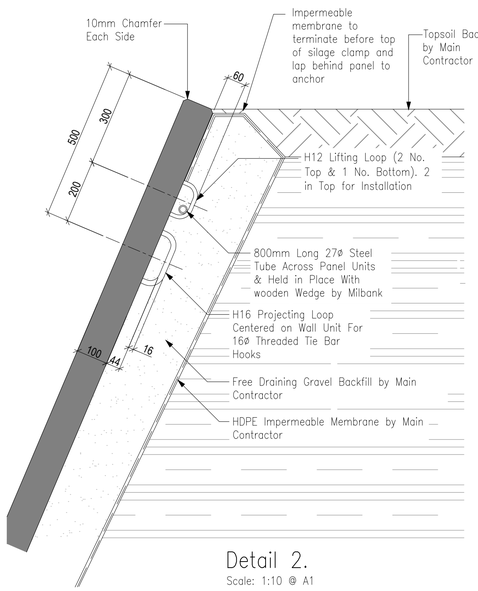


Section D–D
Scale: 1:40 @ A1

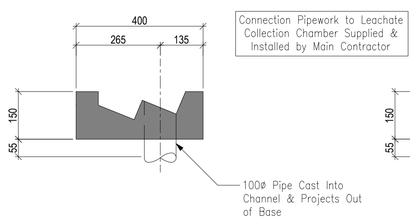
GGP DETAIL 1 & 2 TO TAKE PRECEDENCE FOR CONSTRUCTION



Detail 1.
Scale: 1:10 @ A1

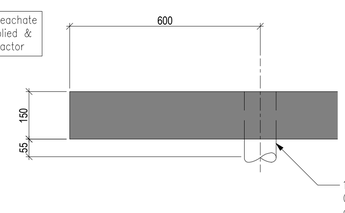


Detail 2.
Scale: 1:10 @ A1



End Elevation on Channel Outlet Pipe.
Scale: 1:10 @ A1

Connection Pipework to Leachate Collection Chamber Supplied & Installed by Main Contractor



Side Elevation on Channel Outlet Pipe.
Scale: 1:10 @ A1

FOR CONSTRUCTION

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2. The Contractor shall make a survey of the site and shall be responsible for obtaining all dimensions and levels necessary for the proper fabrication of the structure as indicated.
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4. This drawing is to be read in conjunction with 29384/100 Series Drawings.
5. All existing invert levels are to be confirmed by contractor prior to construction. Connection subject to approval.

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DETAILS SHALL NOT BE SHARED WITH THIRD PARTIES WITHOUT 'ARK AGRICULTURE' WRITTEN APPROVAL.

ALL CONSTRUCTION DETAILS & SECTIONS TO BE READ IN CONJUNCTION WITH SILOSTOP DRAWINGS & DETAILS

Please refer to the following drawings for more information; 'W167799-01' / 'W167799-02' / 'W167799-03' / 'W167799-04'

Rev	Date	Description	DR	CH
C08	16/12/24	Issued For Construction	LD	JHC
C07	22/10/24	Issued For Construction	LD	JHC
C06	25/09/24	Platform Drainage Removed	LD	JHC
C05	24/09/24	Updated Panel Spacing	LD	JHC
C04	18/09/24	Issued For Construction	LD	JHC
C03	28/08/24	Issued For Construction	LD	JHC
C02	16/08/24	Issued For Final Comment	LD	JHC
C01	23/07/24	Issued For Construction	JT	JHC
C1	10/06/24	Issued For Contract	KW	JHC
T1	05/02/24	Issued For Tender	MK	JHC

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Email info@ggpconsult.co.uk

Client: acorn

Job Title: AD Plant.
Horse Close Green Power

Drawing Title: Silage Clamp Sections & Details - Sheet 1 of 2

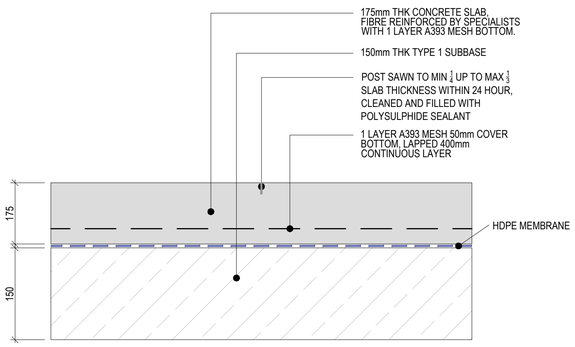
Status: Construction

Scale: AS SHOWN @ A1
Date: JUN' 2024

Drawn By: MK
Checked: JHC
Approved: JHC

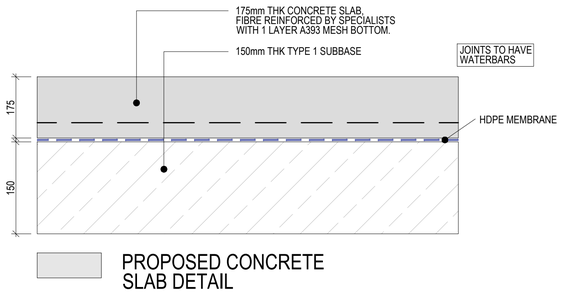
Drg. No.: 29384/C1/2020
Rev: C08

AS NOTED ON A1 FRAME



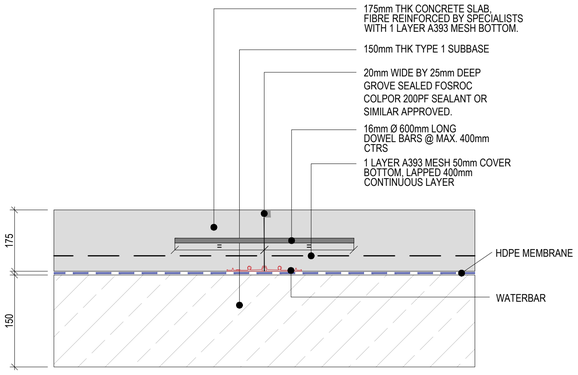
TYPICAL FIBRE SLAB CONTRACTION JOINT (C.J.)

SCALE: 1:10 @ A1



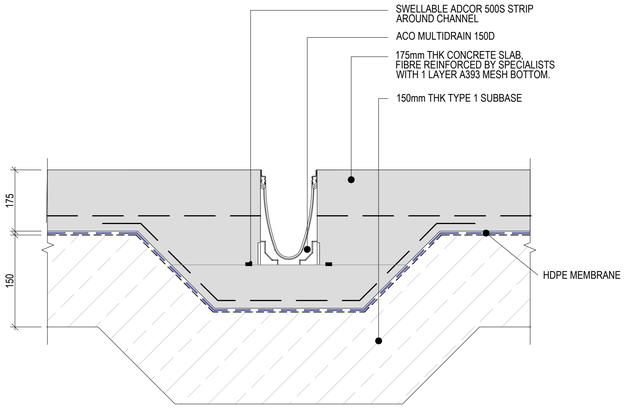
PROPOSED CONCRETE SLAB DETAIL

SCALE: 1:10 @ A1



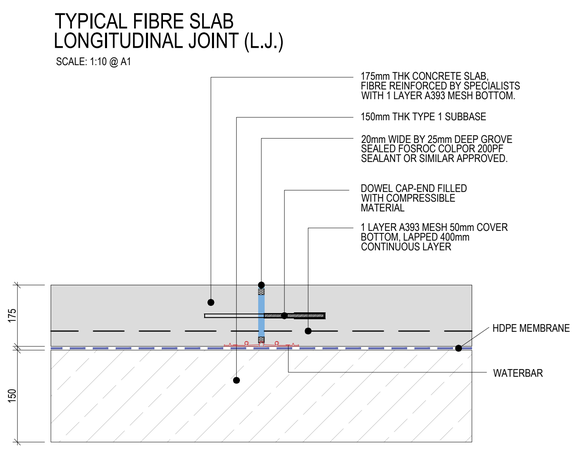
TYPICAL FIBRE SLAB LONGITUDINAL JOINT (L.J.)

SCALE: 1:10 @ A1



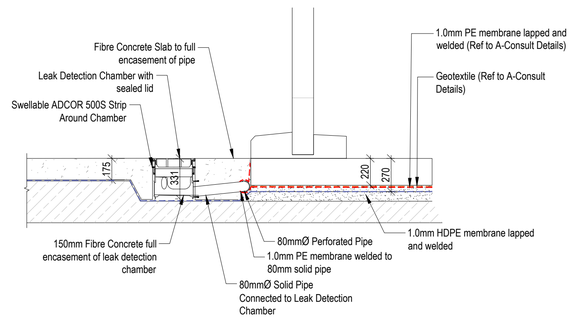
TYPICAL DRAINAGE CHANNEL DETAIL

SCALE: 1:10 @ A1



TYPICAL FIBRE SLAB EXPANSION JOINT (E.J.)

SCALE: 1:10 @ A1



LEAK DETECTION CHAMBER TYPICAL DETAIL

SCALE: 1:25 @ A1

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3. All levels shown on this drawing are relative to Agreed Topographic survey
4. All existing invert levels are to be confirmed by contractor prior to construction. Connection subject to approval.
5. When The Distance Between The Top Of Bund Wall & External Concrete/Ground Levels is Less Than 1.1m Provide Medium Duty Galvanised Steel Handrailing Fixed to The Top of the Wall. Height of Handrailing Varies to Suit Change in Concrete/Ground Levels.
6. Provide Movement Joints at 10m Centres Along Length of Wall in Accordance With Typical Contraction Joint Detail.
7. 25x25 Chamfer to all Exposed Edges

T.O.C. : Denotes Top Of Concrete
T.O.W. : Denotes Top Of Wall
F.F.L. : Denotes Finished Level
M.J. : Denotes Movement Joint

Rev	Date	Description	DR	CH
C1	09/12/24	ISSUED FOR CONSTRUCTION	MK	JHC

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Fax (+44) 01482 641736
Email info@ggpconsult.co.uk

Client: acorn

Job Title: AD Plant. Horse Close

Drawing Title: Bund Containment Typical Details

Status: Construction

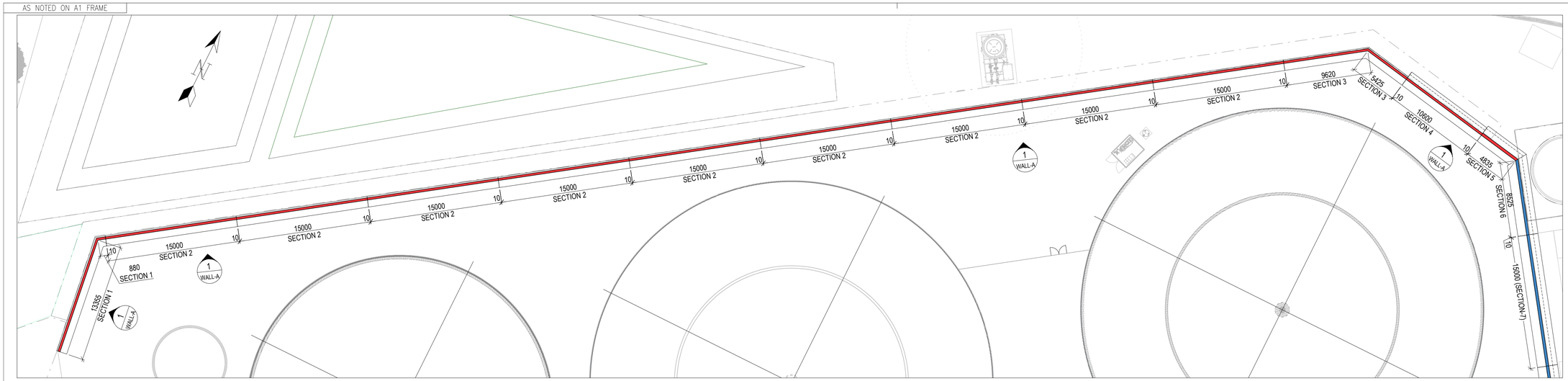
Scale: As shown @ A1 | Date: DEC' '24

Drawn By: MK | Checked: JHC | Approved: JHC

Drg. No.: 29384/C1/2026 | Rev: C01

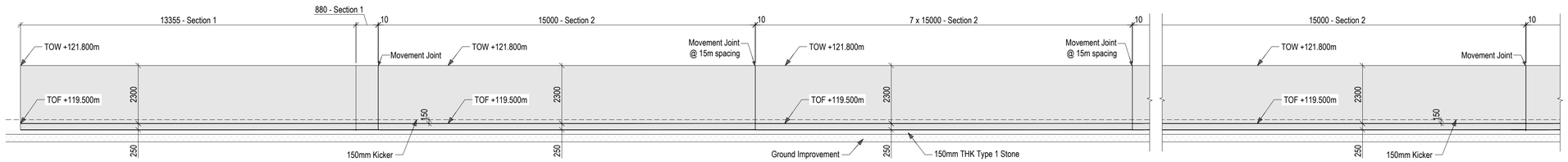
FOR CONSTRUCTION

AS NOTED ON A1 FRAME



BUND WALL LAYOUT (WALL-A)

Scale: 1:250 @ A1

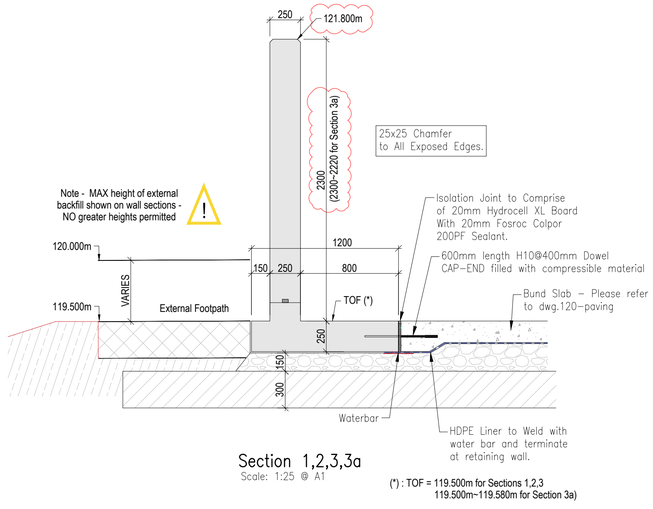


ELEVATION-1 (WALL-A)

Scale: 1:100 @ A1

ELEVATION-1 (WALL-A)

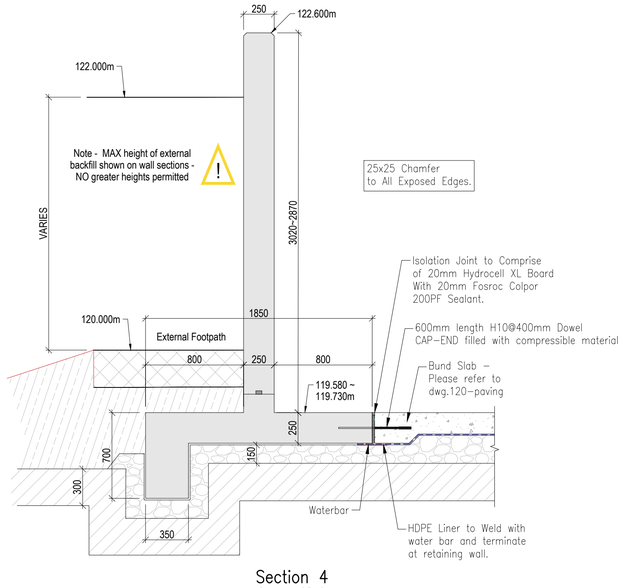
Scale: 1:100 @ A1



Section 1,2,3,3a

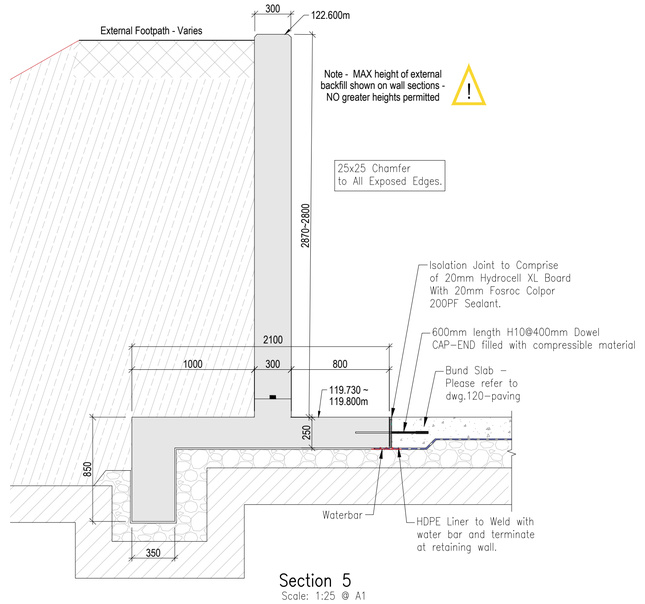
Scale: 1:25 @ A1

(*) : TOF = 119.500m for Sections 1,2,3
119.500m-119.580m for Section 3a)



Section 4

Scale: 1:25 @ A1



Section 5

Scale: 1:25 @ A1

FOR CONSTRUCTION

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   Height of Handrailing Varies to Suit Change in Concrete/Ground Levels.
6. Provide Movement Joints at 18m Centres Along Length of Wall in Accordance With Typical Contraction Joint Detail.
7. 25x25 Chamfer to all Exposed Edges
8. Concrete cover to reinforcement = 50mm U.N.O

Site Red Line Boundary

T.O.W. : Denotes Top Of Wall
T.O.F. : Denotes Top Of Foundation
T.O.C. : Denotes Top Of Concrete
F.F.L. : Denotes Finished Level
G.L. : Denotes Ground Level
I.F. : Denotes Inner Face
O.F. : Denotes Outer Face
T : Denotes Top
B : Denotes Bottom

+xx.xxx Denotes finished ground level
Denotes Proposed Backfill Profile

Rev	Date	Description	DR	CH
C04	18/12/24	Top of wall levels updated	MK	JHC
C03	21/11/24	Dowels notes added	MK	JHC
C02	15/11/24	ISSUED FOR CONSTRUCTION	MK	JHC
C01	08/10/24	ISSUED FOR CONSTRUCTION	LB	JHC

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Fax (+44) 01482 641736
Email info@ggpconsult.co.uk

Client: acorn

Job Title
AD Plant.
Horse Close

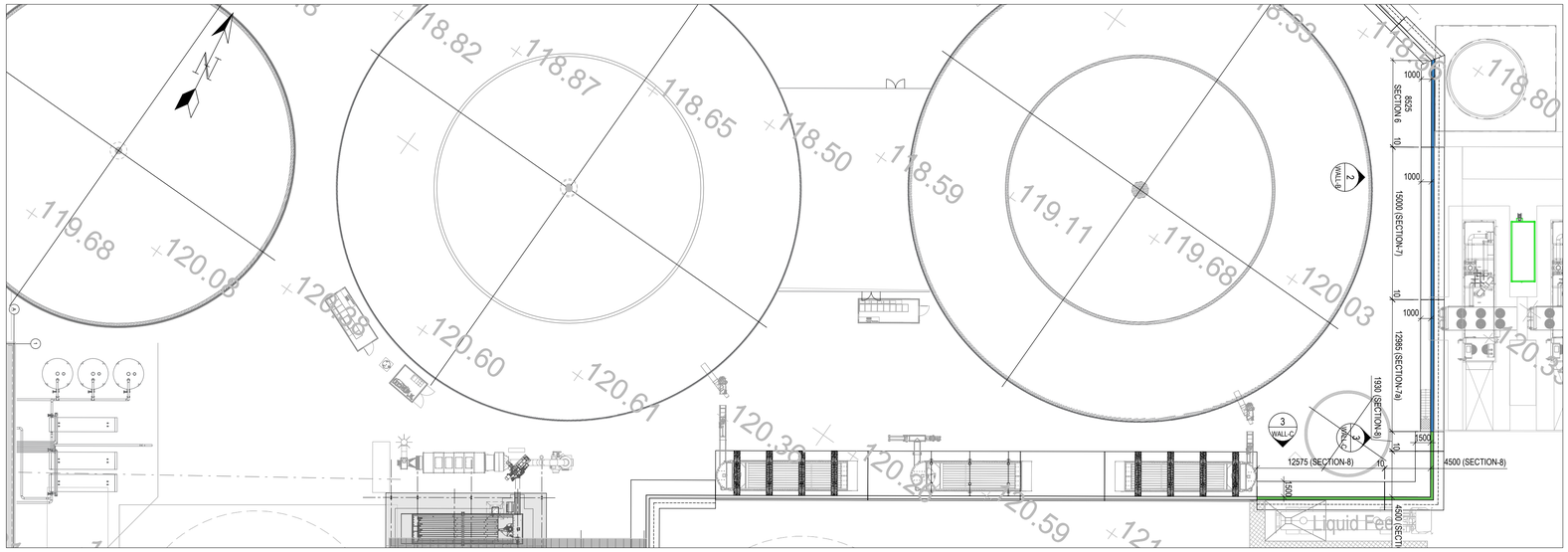
Drawing Title
Bund Details
Wall A
Sheet-1

Status: Construction

Scale	Date	Drawn By	Checked	Approved
AS NOTED @ A1	AUG '24	LB	JHC	JHC

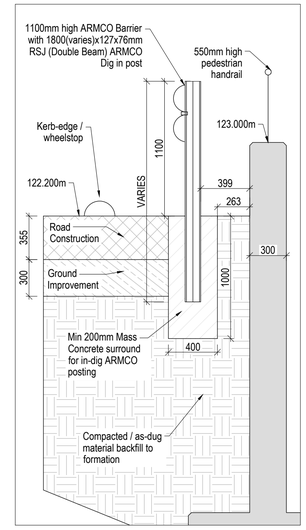
Drg. No.	Rev
29348/C/2038	C04

AS NOTED ON A1 FRAME



BUND WALL LAYOUT (WALL–B & C)

Scale: 1:300 @ A1



ARMCO SECTION (WALL–C)

Scale: 1:25 @ A1

NOTES:-

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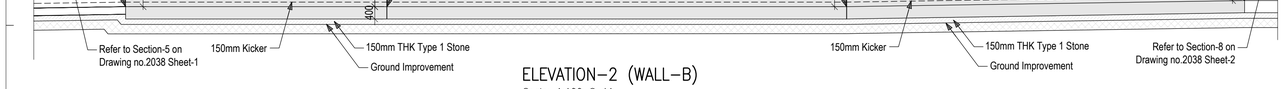
7. 25x25 Chamfer to all Exposed Edges
8. Concrete cover to reinforcement = 50mm U.N.O

Site Red Line Boundary

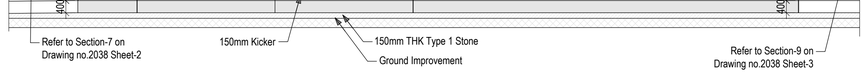
T.O.W. : Denotes Top Of Wall
T.O.F. : Denotes Top Of Foundation
T.O.C. : Denotes Top Of Concrete
F.F.L. : Denotes Finished Level
G.L. : Denotes Ground Level
I.F. : Denotes Inner Face
O.F. : Denotes Outer Face
T : Denotes Top
B : Denotes Bottom

+xx.xxx Denotes finished ground level



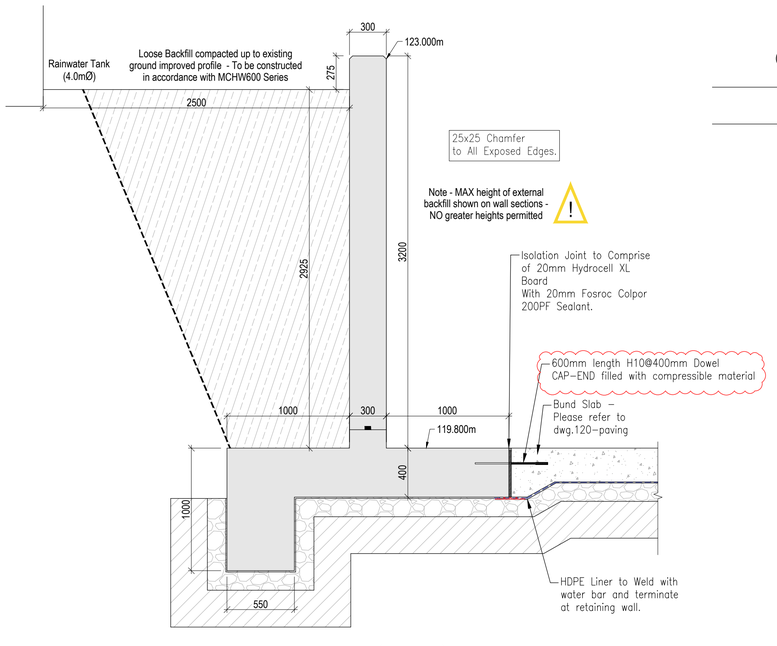
ELEVATION–2 (WALL–B)

Scale: 1:100 @ A1



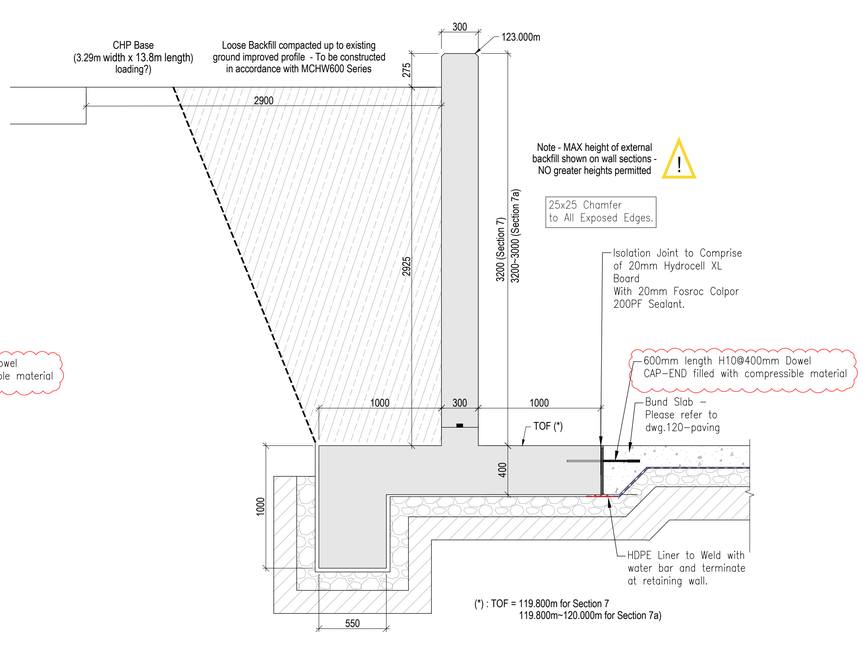
ELEVATION–3 (WALL–C)

Scale: 1:100 @ A1



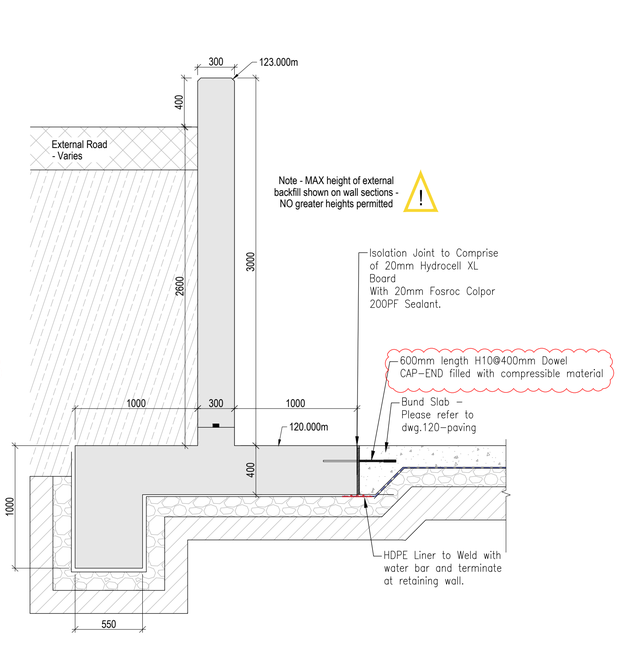
SECTION–6 (WALL–B)

Scale: 1:25 @ A1



SECTION–7,7a (WALL–B)

Scale: 1:25 @ A1



SECTION–8 (WALL–C)

Scale: 1:25 @ A1

FOR CONSTRUCTION

Rev	Date	Description	DR	CH
C03	21/11/24	Dowels notes added	MK	JMC
C02	15/11/24	ISSUED FOR CONSTRUCTION	MK	JMC
C01	08/10/24	ISSUED FOR CONSTRUCTION	LB	JMC

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Priory Park East
HULL HU4 7DY
United Kingdom
Telephone (+44) 01482 627963
Fax (+44) 01482 641736
Email info@ggpconsult.co.uk

Client: acorn

Job Title: AD Plant. Horse Close

Drawing Title: Bund Details Wall B – C Sheet–2

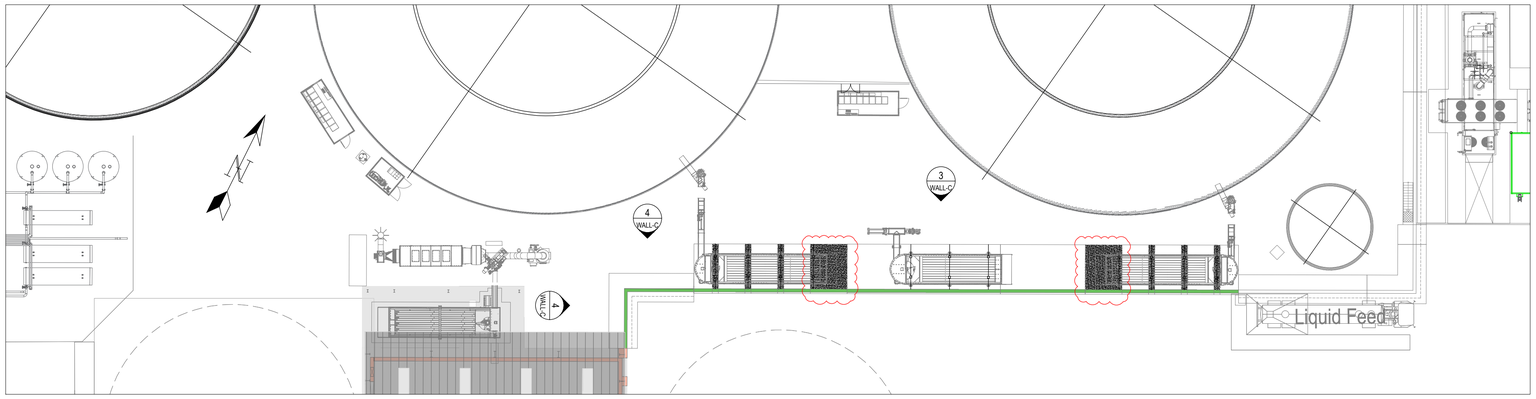
Status: Construction

Scale: AS NOTED @ A1 | Date: AUG '24

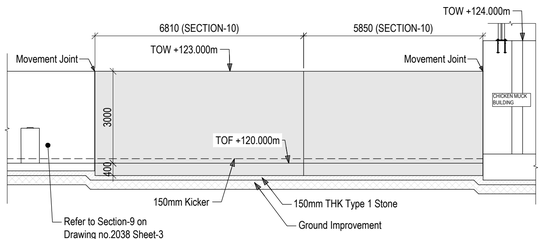
Drawn By: LB | Checked: JHC | Approved: JHC

Drg. No.: 29348/C/2038 | Rev: C03

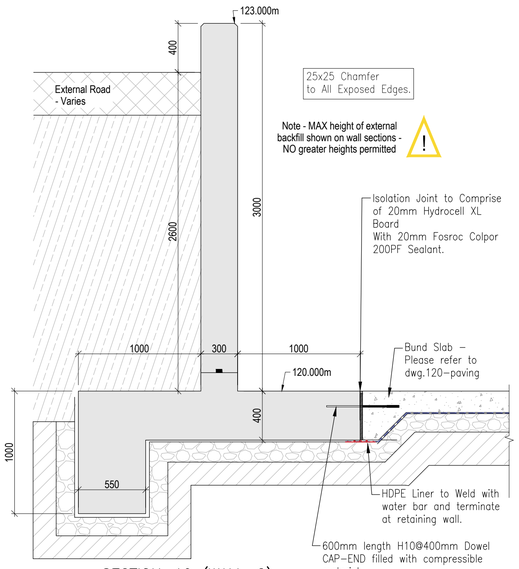
AS NOTED ON A1 FRAME



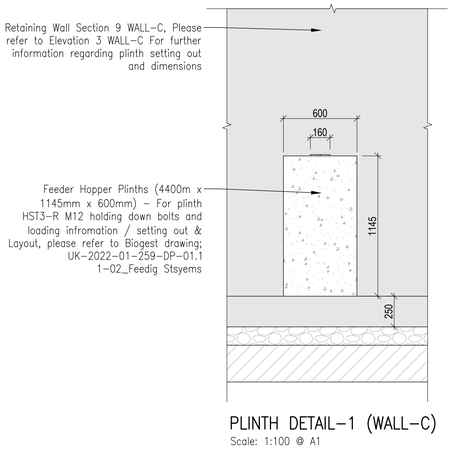
BUND WALL LAYOUT (WALL-C)
Scale: 1:300 @ A1



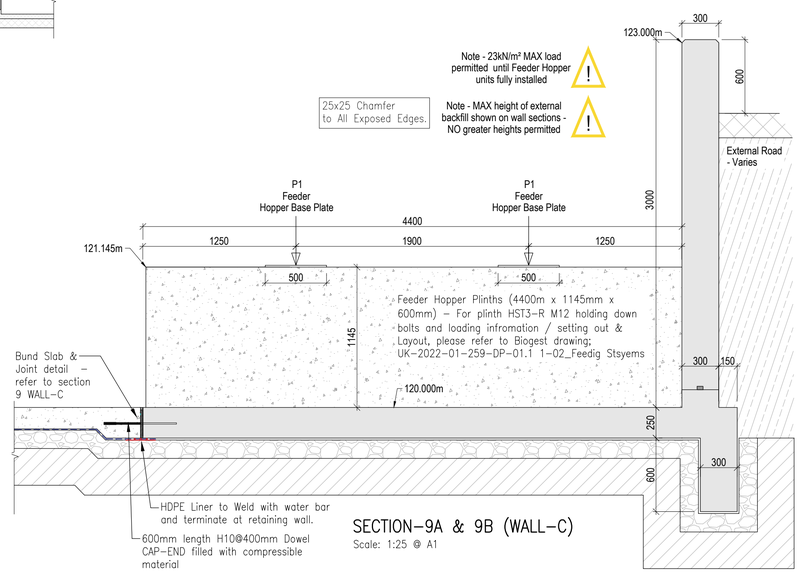
ELEVATION-4 (WALL-C)
Scale: 1:100 @ A1



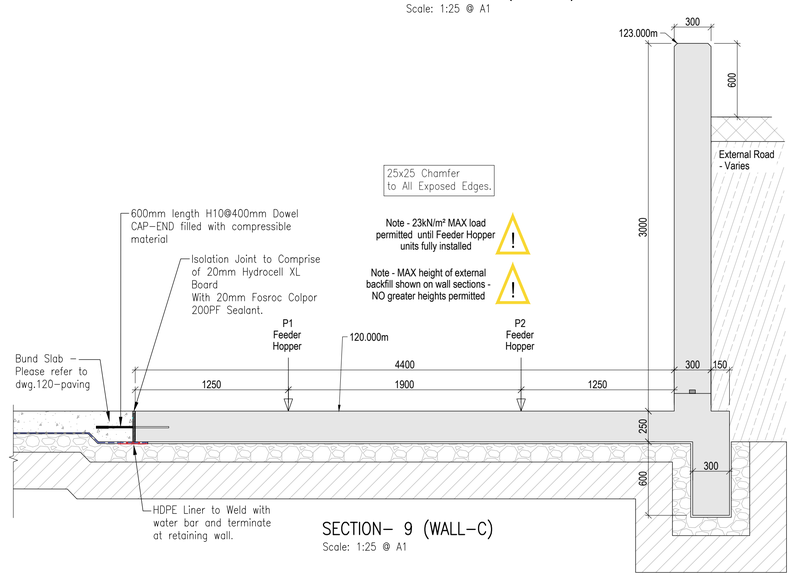
SECTION-10 (WALL-C)
Scale: 1:25 @ A1



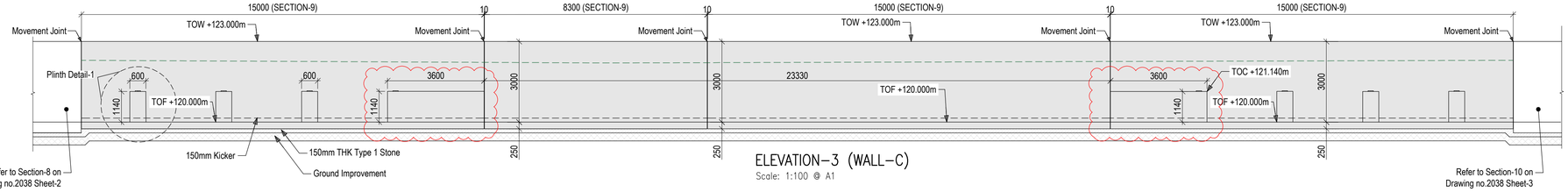
PLINTH DETAIL-1 (WALL-C)
Scale: 1:100 @ A1



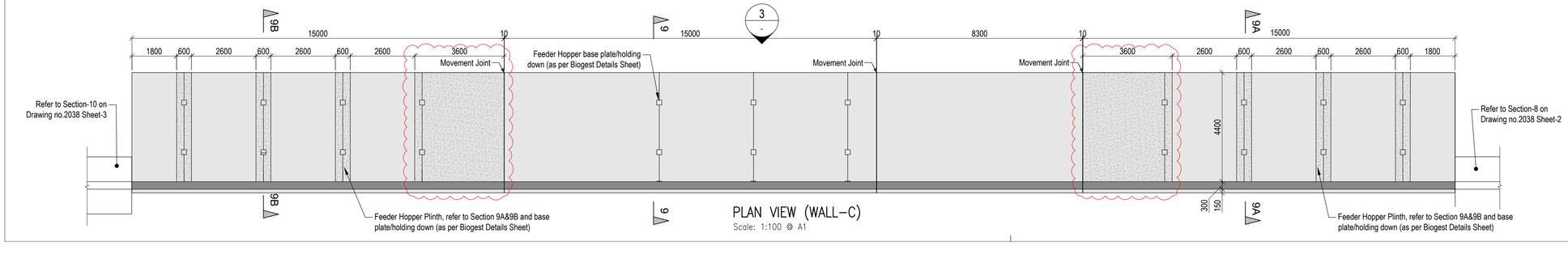
SECTION-9A & 9B (WALL-C)
Scale: 1:25 @ A1



SECTION- 9 (WALL-C)
Scale: 1:25 @ A1



ELEVATION-3 (WALL-C)
Scale: 1:100 @ A1



PLAN VIEW (WALL-C)
Scale: 1:100 @ A1

FOR CONSTRUCTION

NOTES:-

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2. The Contractor shall make a survey of the site and shall be responsible for obtaining all dimensions and levels necessary for the proper fabrication of the structure as indicated.
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4. All existing invert levels are to be confirmed by contractor prior to construction. Connection subject to approval.
5. When The Distance Between The Top Of Bund Wall & External Concrete/Ground Levels is Less Than 1.1m Provide Medium Duty Galvanised Steel Handrailing Fixed to The Top of the Wall. Height of Handrailing Varies to Suit Change in Concrete/Ground Levels.
6. Provide Movement Joints at 18m Centres Along Length of Wall in Accordance With Typical Contraction Joint Detail.
7. 25x25 Chamfer to all Exposed Edges
8. Concrete cover to reinforcement = 50mm U.N.O

Site Red Line Boundary

T.O.W. : Denotes Top Of Wall
T.O.F. : Denotes Top Of Foundation
T.O.C. : Denotes Top Of Concrete
F.F.L. : Denotes Finished Level
G.L. : Denotes Ground Level
I.F. : Denotes Inner Face
O.F. : Denotes Outer Face
T : Denotes Top
B : Denotes Bottom

+xx.xxx Denotes finished ground level
Denotes Proposed Backfill Profile

Rev	Date	Description	DR	CH
C06	04/12/24	Plinths amended	MK	JHC
C05	21/11/24	Dowels notes added	MK	JHC
C04	18/11/24	Dimensions for plinth locations	MK	JHC
C03	18/11/24	ISSUED FOR CONSTRUCTION	MK	JHC
C02	15/10/24	ISSUED FOR CONSTRUCTION	LB	JHC
C01	08/10/24	ISSUED FOR CONSTRUCTION	LB	JHC

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HULL HU4 7DY
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Email info@ggpconsult.co.uk

Client: acorn

Job Title
AD Plant.
Horse Close

Drawing Title
Bund Details
Wall B - C
Sheet-3

Status: Construction

Scale: AS NOTED @ A1
Date: AUG '24

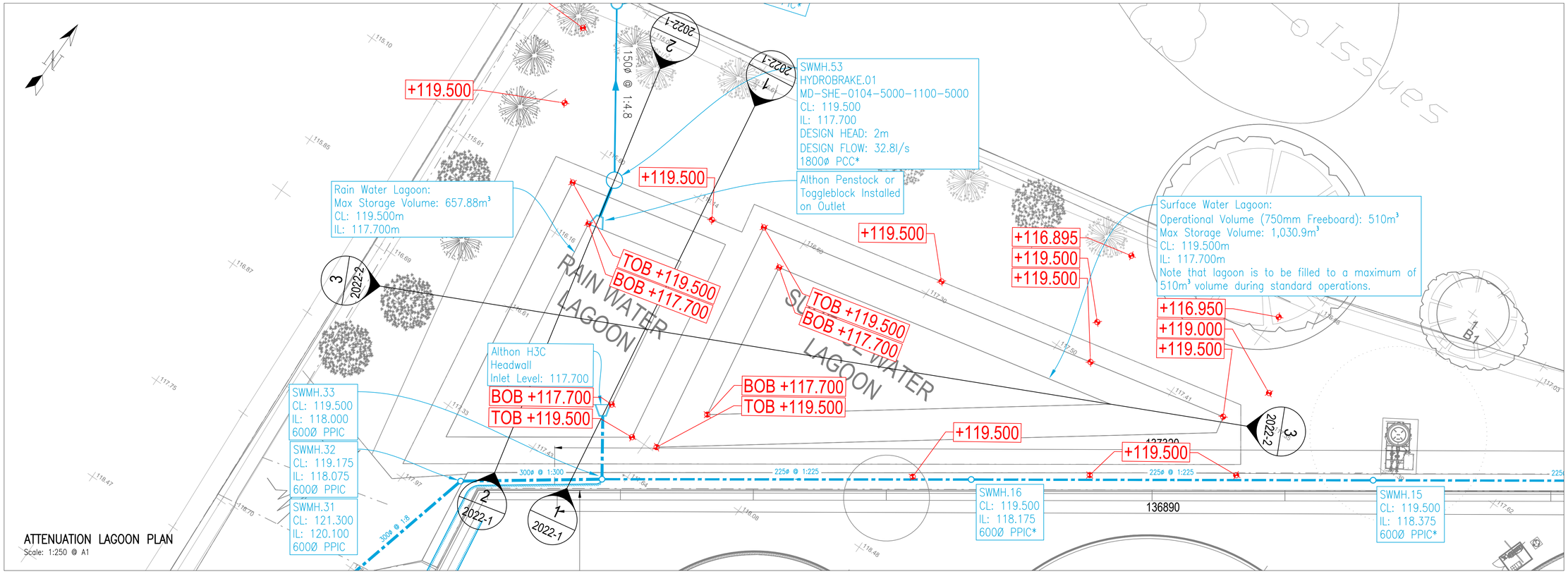
Drawn By: LB
Checked: JHC
Approved: JHC

Drg. No.: 29348/C/2038
Rev: C06

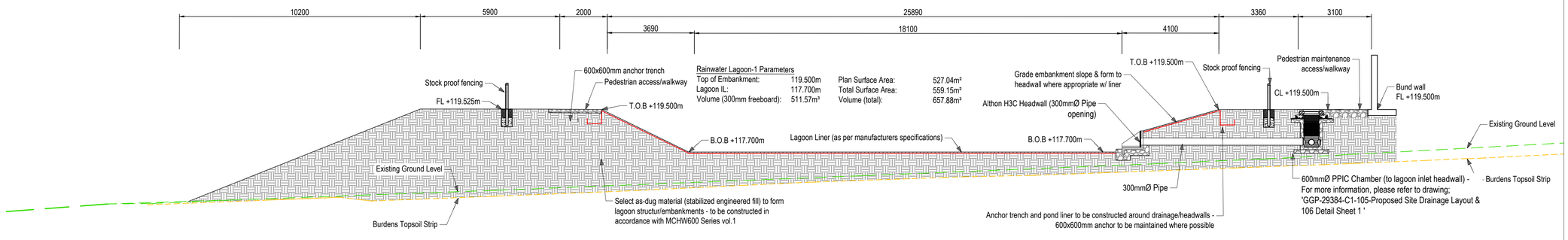
APPENDIX VI

Drainage Details

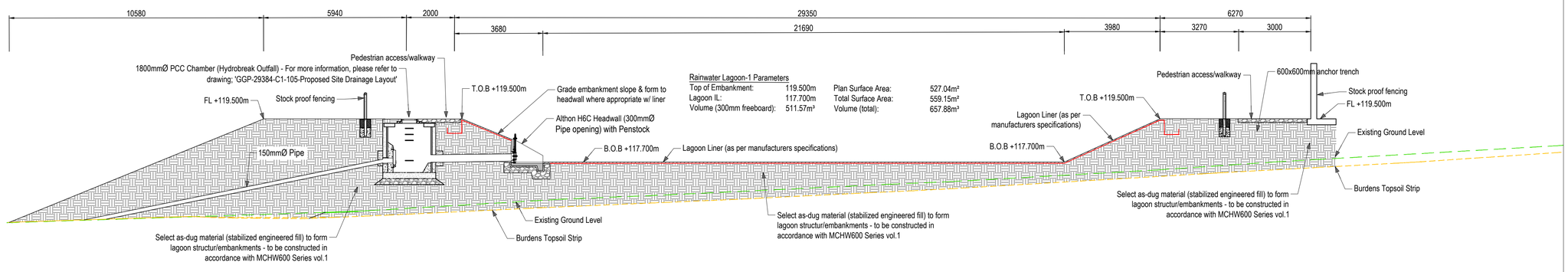
AS NOTED ON A1 FRAME



ATTENUATION LAGOON PLAN
Scale: 1:250 @ A1



Section 1
Scale: 1:100 @ A1



Section 2
Scale: 1:100 @ A1

FOR CONSTRUCTION

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5. All existing invert levels are to be confirmed by contractor prior to construction. Connection subject to approval.

Site Red Line Boundary

Rev	Date	Description	DR	CH
C05	03/02/25	Updated For Construction	JH	JHC
C04	18/12/24	Updated For Construction	LD	JHC
C03	28/11/24	Updated For Construction	JH	JHC
C02	26/09/24	Updated Headwall Specs	LD	JHC
C01	16/08/24	Issued For Final Comment	LD	JHC

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HULL HU4 7DY
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Fax (+44) 01482 641736
Email info@ggpconsult.co.uk

Client: acorn

Job Title
AD Plant.
Horse Close Green Power

Drawing Title
Attenuation Lagoon Sections and Headwall Details Sheet 1

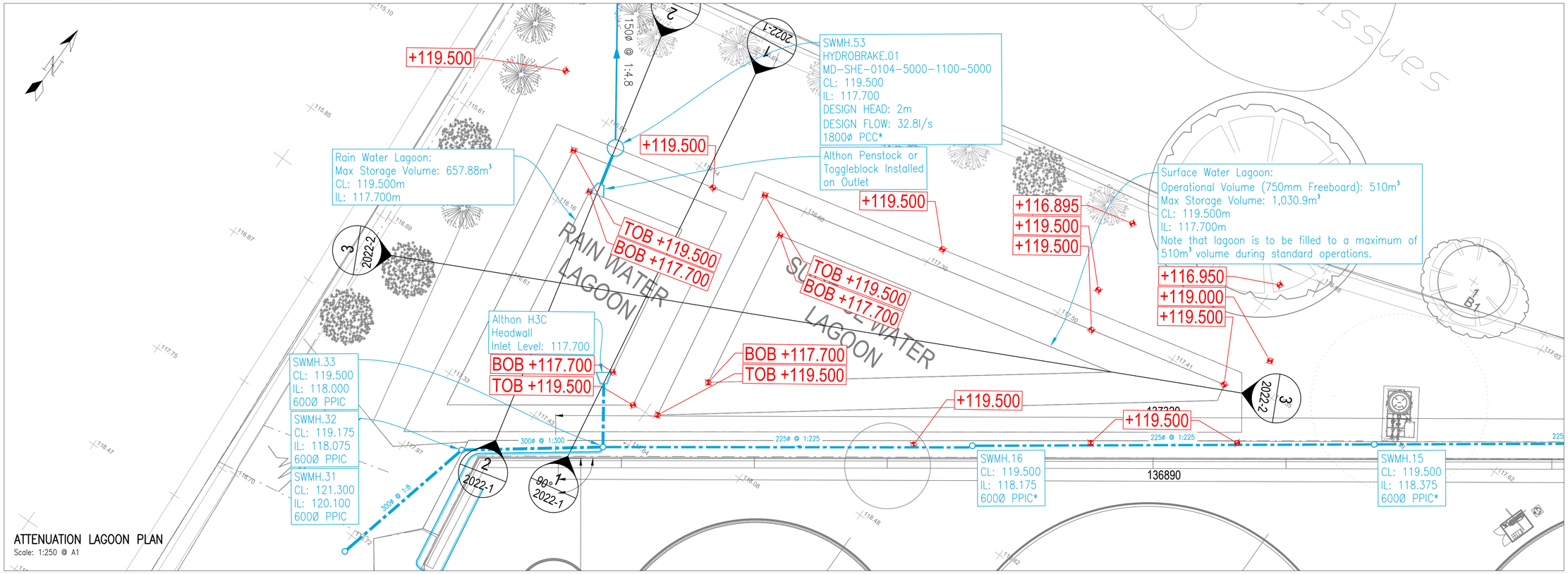
Status: Construction

Scale: As Shown @ A1
Date: JUN' 2024

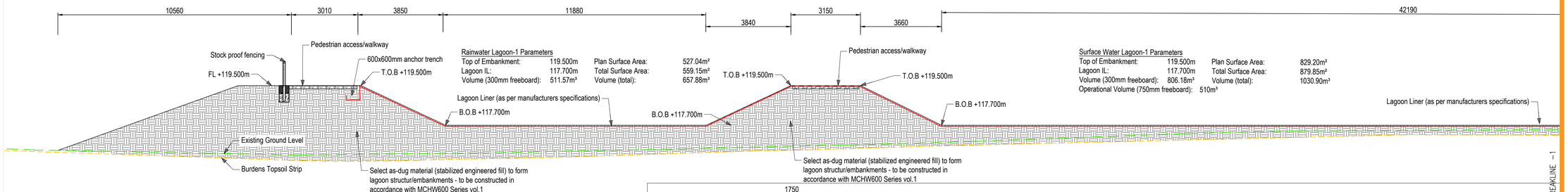
Drawn By: LB
Checked: JHC
Approved: JHC

Drg. No. 29384/C1/2031
Rev C05

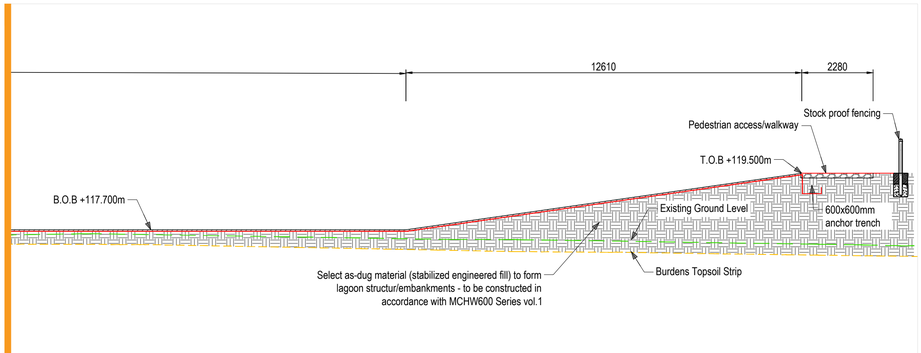
AS NOTED ON A1 FRAME



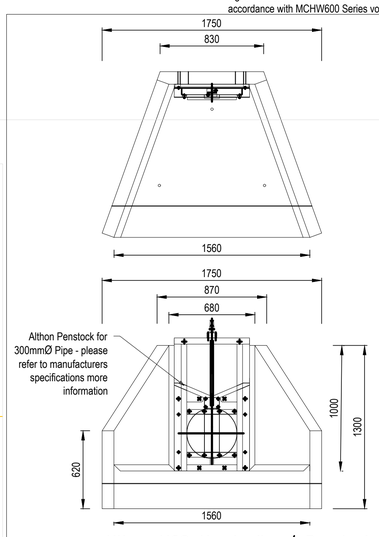
ATTENUATION LAGOON PLAN
Scale: 1:250 @ A1



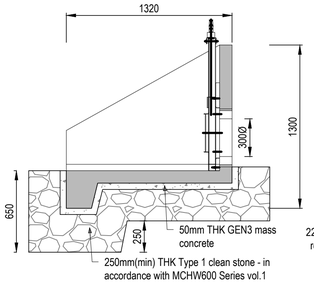
Section 3
Scale: 1:100 @ A1

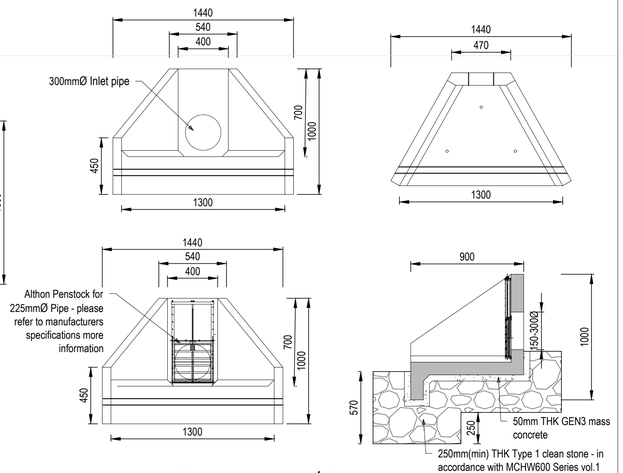


Section 3
Scale: 1:100 @ A1



Althon H6C Headwall w/ Penstock Sections
Scale: 1:25 @ A1





Althon H3C Headwall & w/ Penstock Sections
Scale: 1:25 @ A1

FOR CONSTRUCTION

NOTES:-

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4. This drawing is to be read in conjunction with 29384/100 Series Drawings.
5. All existing invert levels are to be confirmed by contractor prior to construction. Connection subject to approval.

Site Red Line Boundary

Rev	Date	Description	DR	CH
C05	03/02/25	Updated For Construction	JT	JHC
C04	18/12/24	Updated For Construction	LD	JHC
C03	28/11/24	Updated For Construction	JT	JHC
C02	26/09/24	Updated Headwall Specs	LD	JHC
C01	16/08/24	Issued For Final Comment	LD	JHC

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Email info@ggpconsult.co.uk

Client: acorn

Job Title: AD Plant. Horse Close Green Power

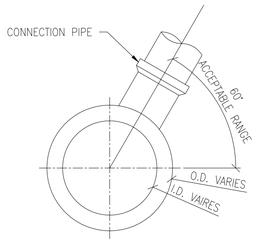
Drawing Title: Attenuation Lagoon Sections and Headwall Details Sheet 2

Status: Construction

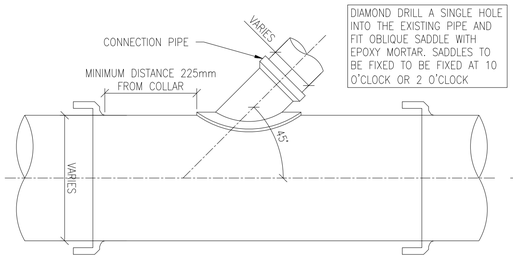
Scale: As Shown @ A1 | Date: JUN' 2024

Drawn By: LB | Checked: JHC | Approved: JHC

Drg. No.: 29384/C1/2032 | Rev: C05



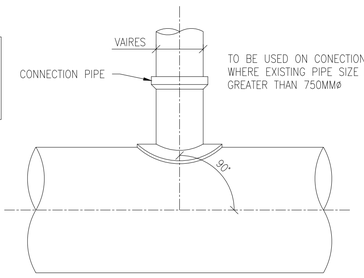
CROSS-SECTION VIEW OF SADDLE CONNECTION
SCALE 1:10



DIAMOND DRILL A SINGLE HOLE INTO THE EXISTING PIPE AND FIT OBLIQUE SADDLE WITH EPOXY MORTAR. SADDLES TO BE FIXED TO BE FIXED AT 10 O'CLOCK OR 2 O'CLOCK

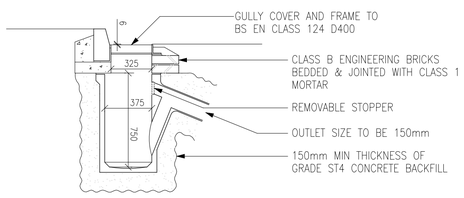
SIDE VIEW OF 45° SADDLE CONNECTION
SCALE 1:10

SIZE OF CONNECTION MUST BE AT LEAST THREE INCREMENTS LESS THAN THE SEWER SIZE (EG. 375mm SEWER MAX SIZE CONNECTION 150mm) THE HOLE IN THE SEWEER MUST BE APPROVED BY SEVERN TRENT WATER BEFORE THE SADDLE IS FIXED

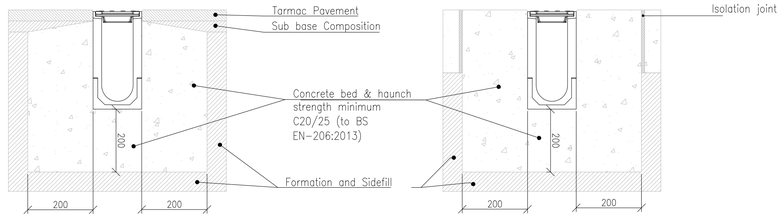


TO BE USED ON CONECTIONS WHERE EXISTING PIPE SIZE IS GREATER THAN 750MMø

SIDE VIEW OF 90° SADDLE CONNECTION
SCALE 1:10



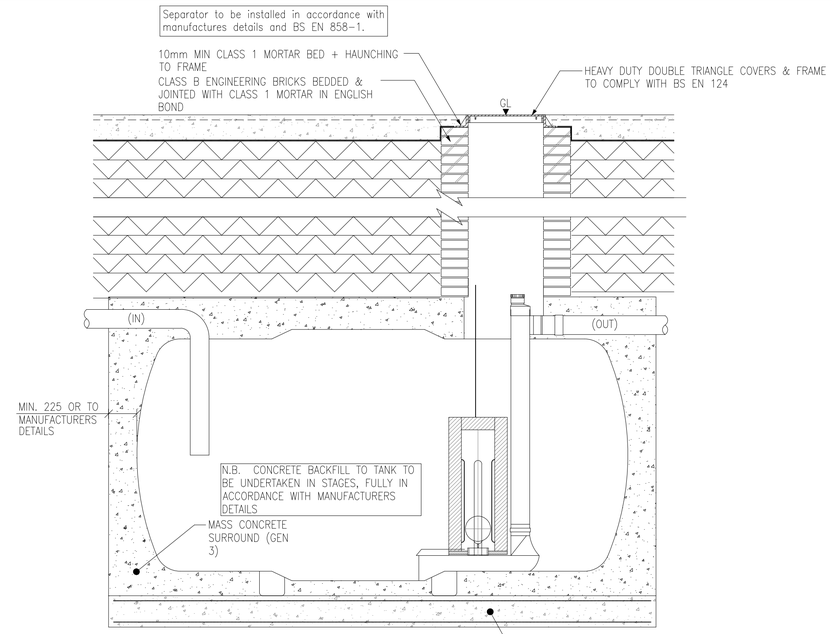
TYPICAL ROAD GULLY DETAIL
SCALE: 1:25 @ A1



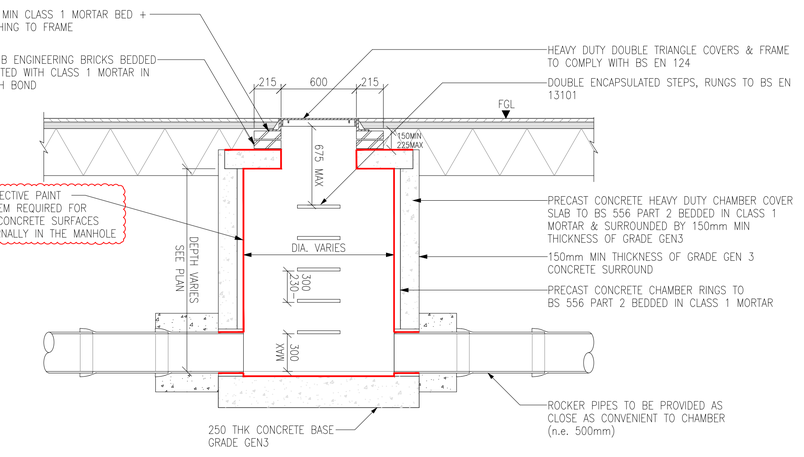
ACO S Range Tarmac Pavement
Scale 1:10

ACO S Range Concrete Pavement
Scale 1:10

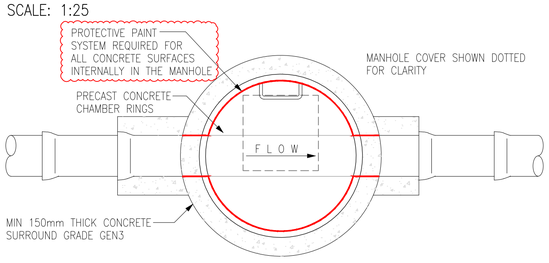
Separator to be installed in accordance with manufactures details and BS EN 858-1.



TYPICAL SECTION THROUGH SEPARATOR (SEPARATOR SHOWN INDICATIVE ONLY)
SCALE: 1:25 @ A1

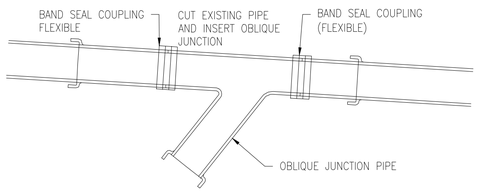


TYPICAL SECTION THROUGH EXTERNAL PCC MANHOLE CHAMBER
SCALE: 1:25

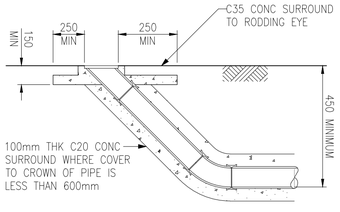


PLAN OF MANHOLE CHAMBER
SCALE: 1:25

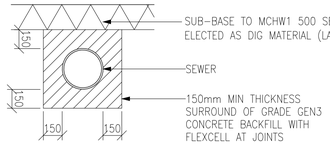
ALL CONCRETE TO BE SULPHATE RESISTANT



OBLIQUE JUNCTION / BAND SEAL COUPLING
SCALE 1:25

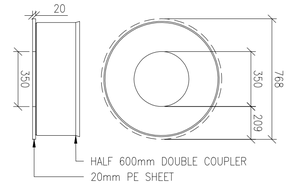


TYPICAL RODDING EYE (RE)
SCALE 1:25 @ A1

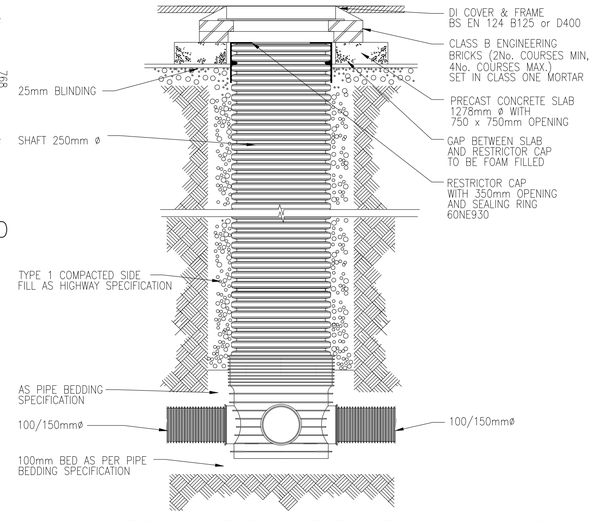


TYPICAL SEWER TRENCH DETAIL
SCALE: 1:25 @ A1

PIPE MATERIAL	PIPE SIZE	TRENCH WIDTH
VC/PVC-U	100ø	550
VC/PVC-U	150ø	650
VC/PVC-U	225ø	750
VC/PVC-U	300ø	850

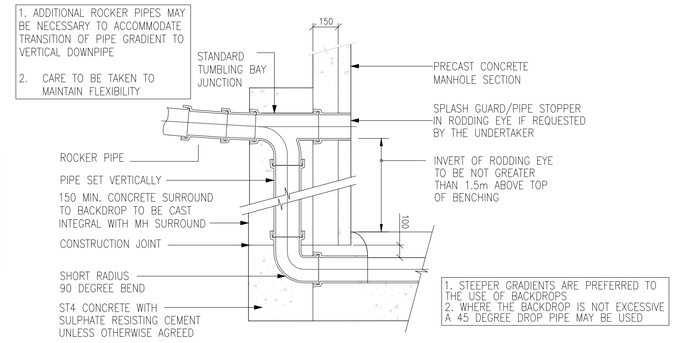


600mm – 350mm REDUCED ACCESS CAP DETAIL
SCALE: 1:20 @ A1



TYPICAL SECTION OF RANGE 600 MANHOLE
SCALE 1:20

1. ADDITIONAL ROCKER PIPES MAY BE NECESSARY TO ACCOMMODATE TRANSITION OF PIPE GRADIENT TO VERTICAL DOWNPIPE
2. CARE TO BE TAKEN TO MAINTAIN FLEXIBILITY



1. STEEPER GRADIENTS ARE PREFERRED TO THE USE OF BACKDROPS
2. WHERE THE BACKDROP IS NOT EXCESSIVE A 45 DEGREE DROP PIPE MAY BE USED

TYPICAL VERTICAL BACKDROP DETAIL
SCALE: 1:25 @ A1

FOR CONSTRUCTION

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Reducer Caps to be Installed on PPIC's Deeper than 1m deep.

Rev	Date	Description	DR	CH
C03	20/09/24	ISSUED FOR CONSTRUCTION	WP	JHC
C02	10/09/24	ISSUED FOR CONSTRUCTION	WP	JHC
C01	15/08/24	ISSUED FOR FINAL APPROVAL	WP	JHC

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Email info@ggpconsult.co.uk

Client: acorn

Job Title
AD Plant.
Horse Close Green Power.

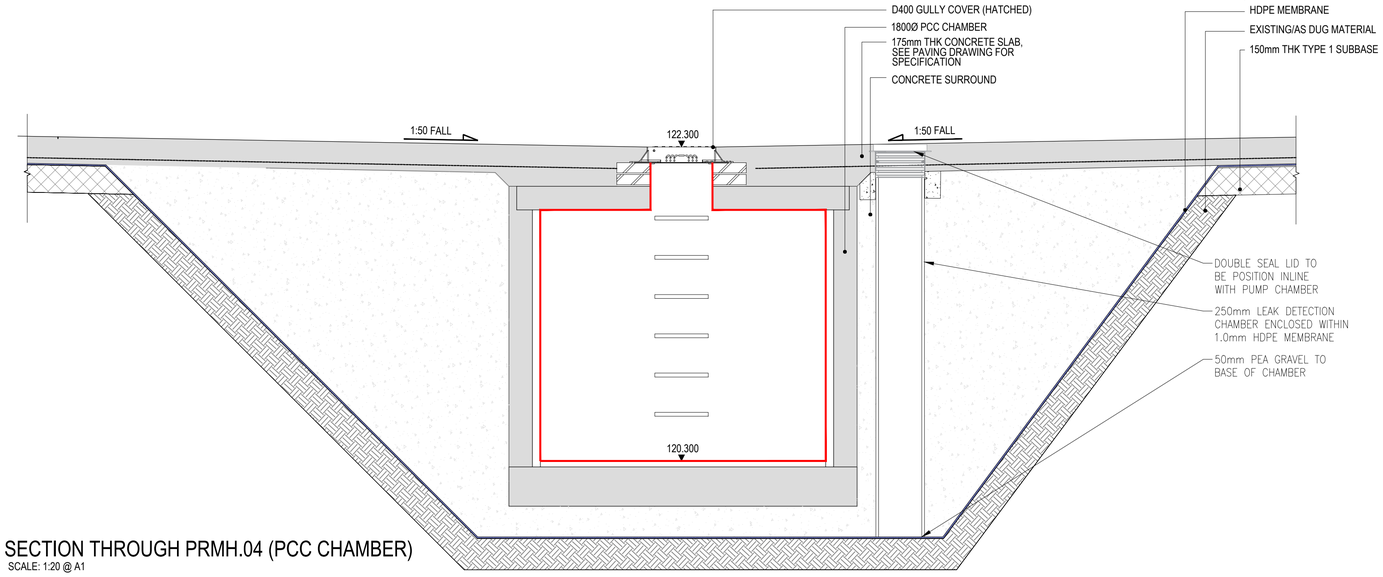
Drawing Title
Drainage Details Sheet 1
Clean Water Details

Status: FOR CONSTRUCTION

Scale: AS NOTED @ A1 | Date: AUG' 24

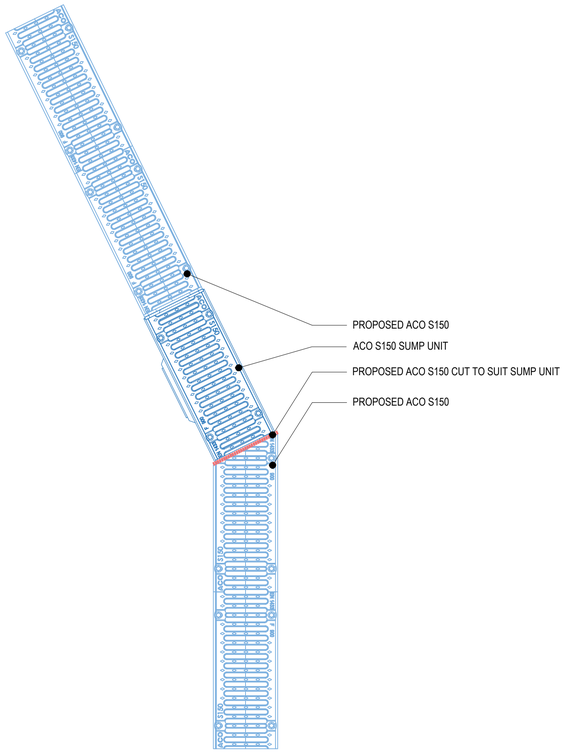
Drawn By: WB | Checked: JHC | Approved: JHC

Drg. No.: 29384/C1/106 | Rev: C03



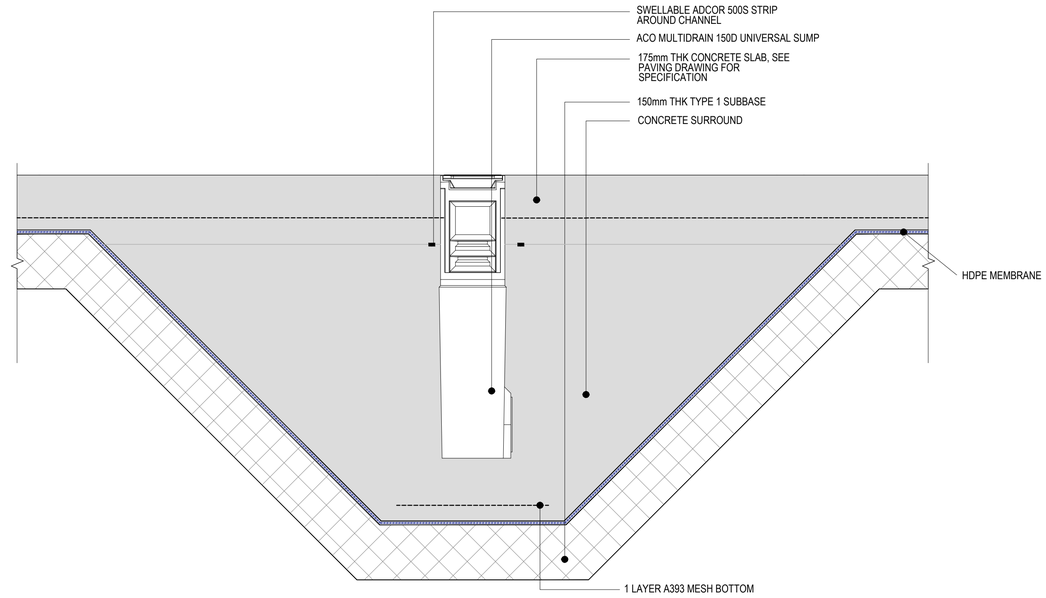
SECTION THROUGH PRMH.04 (PCC CHAMBER)

SCALE: 1:20 @ A1



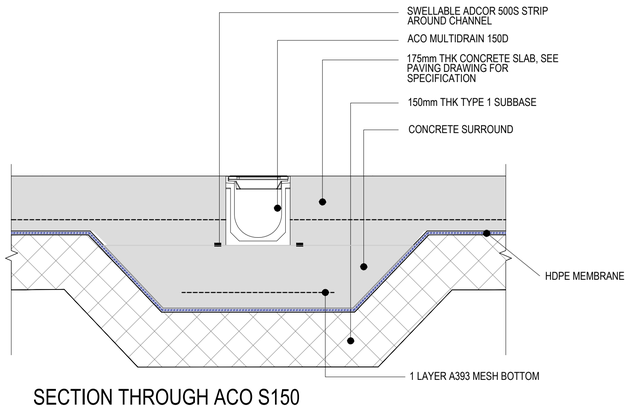
TYPICAL ACO CUT FROM SUMP

SCALE: 1:10 @ A1



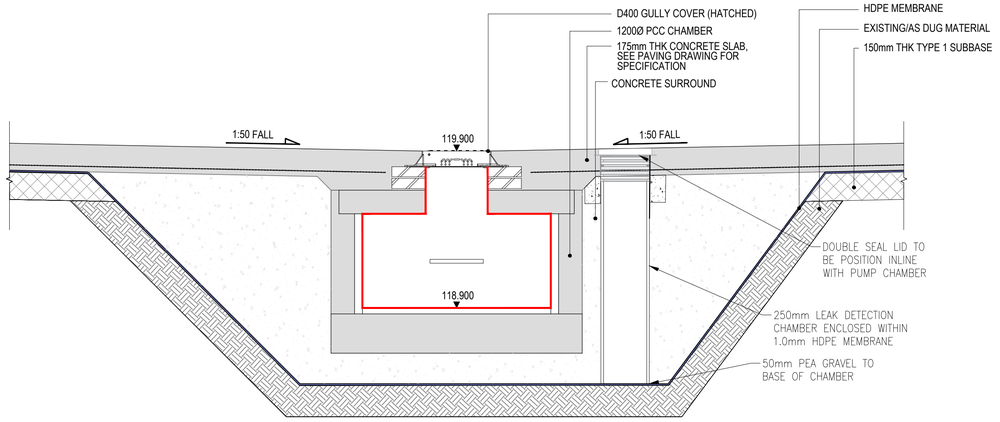
SECTION THROUGH ACO S150 SUMP UNIT

SCALE: 1:10 @ A1



SECTION THROUGH ACO S150

SCALE: 1:10 @ A1



SECTION THROUGH FPMH.03 (PCC CHAMBER)

SCALE: 1:20 @ A1

NOTES:-

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Rev	Date	Description	DR	CH
C03	20/09/24	ISSUED FOR CONSTRUCTION	WP	JHC
C02	10/09/24	ISSUED FOR CONSTRUCTION	WP	JHC
C01	15/08/24	ISSUED FOR FINAL APPROVAL	WP	JHC

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Fax (+44) 01482 641736
Email info@ggpconsult.co.uk

Client: acorn

Job Title: AD Plant.
Horse Close Green Power

Drawing Title: Drainage Details Sheet 2

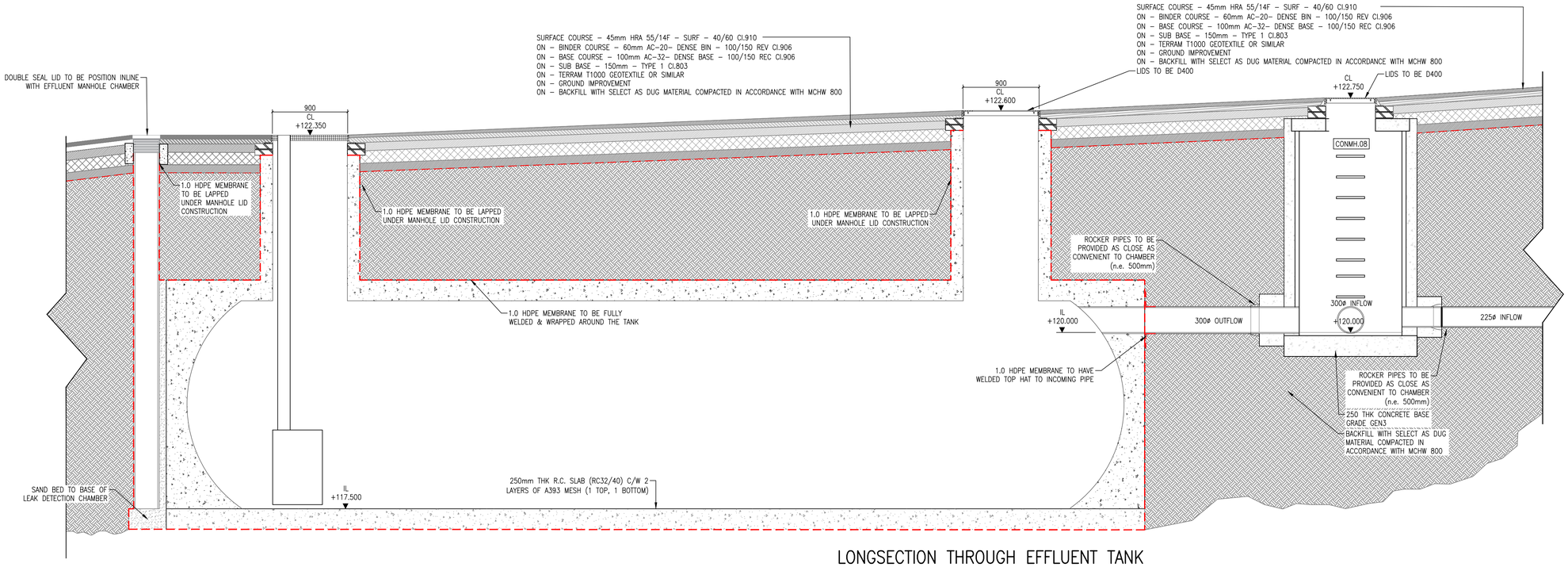
Status: FOR CONSTRUCTION

Scale: AS NOTED @ A1 | Date: AUG' 24

Drawn By: WB | Checked: JHC | Approved: JHC

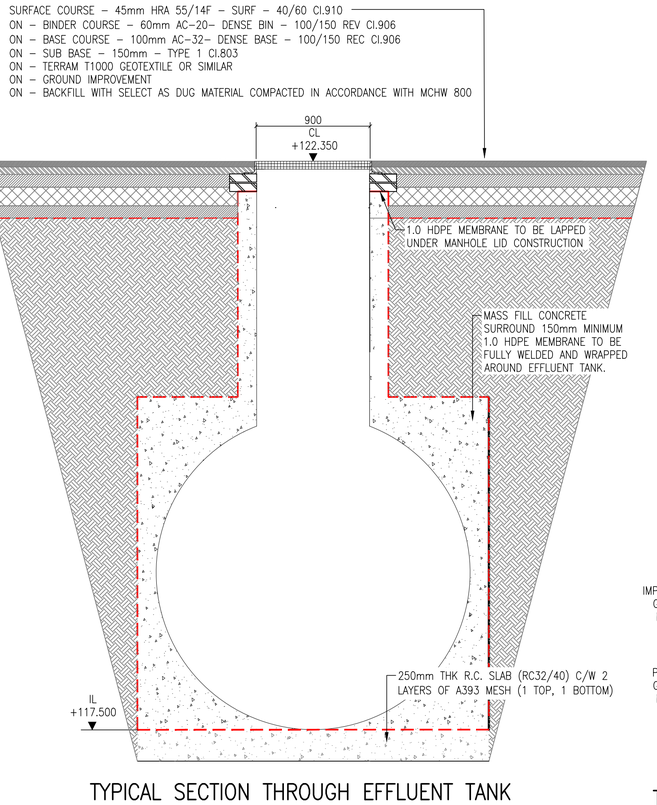
Drg. No.: 29384/C1/110 | Rev: C03

FOR CONSTRUCTION



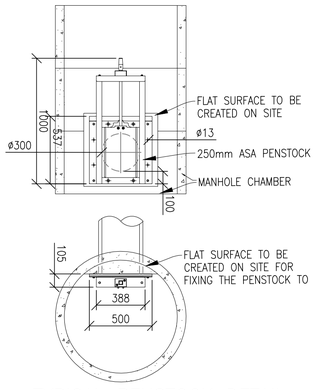
LONGSECTION THROUGH EFFLUENT TANK

SCALE: 1:30 @ A1



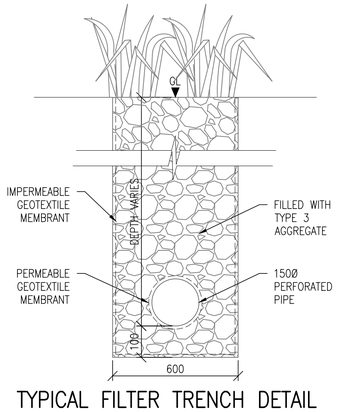
TYPICAL SECTION THROUGH EFFLUENT TANK

SCALE: 1:25 @ A1



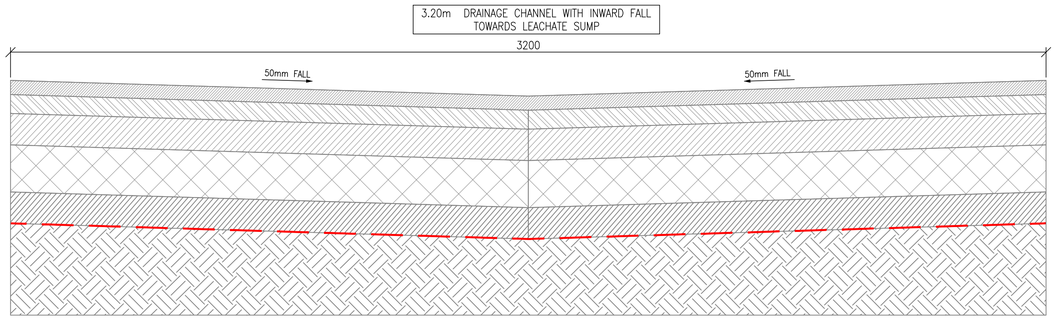
TYPICAL PENSTOCK DETAIL

SCALE: 1:25 @ A1



TYPICAL FILTER TRENCH DETAIL

SCALE: 1:10 @ A1



FORMED CHANNEL IN TARMAC FOR SILAGE LEACHATE

Scale: 1:10 @ A1

NOTES:-

1. All dimensions must be checked on site and not scaled from this drawing.
2. The Contractor shall make a survey of the site and shall be responsible for obtaining all dimensions and levels necessary for the proper fabrication of the structure as indicated.
3. All levels shown on this drawing are relative to Agreed Topographic survey
4. This drawing is to be read in conjunction with 29348/100 Series Drawings.
5. All existing invert levels are to be confirmed by contractor prior to construction. Connection subject to approval.

Rev	Date	Description	DR	CH
C03	10/09/24	ISSUED FORCONSTRUCTION	WP	JHC
C02	03/09/24	ISSUED FOR FINAL APPROVAL	WP	JHC
C01	15/08/24	ISSUED FOR FINAL APPROVAL	WP	JHC

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Client: acorn

Job Title: AD Plant.
Horse Close Green Power

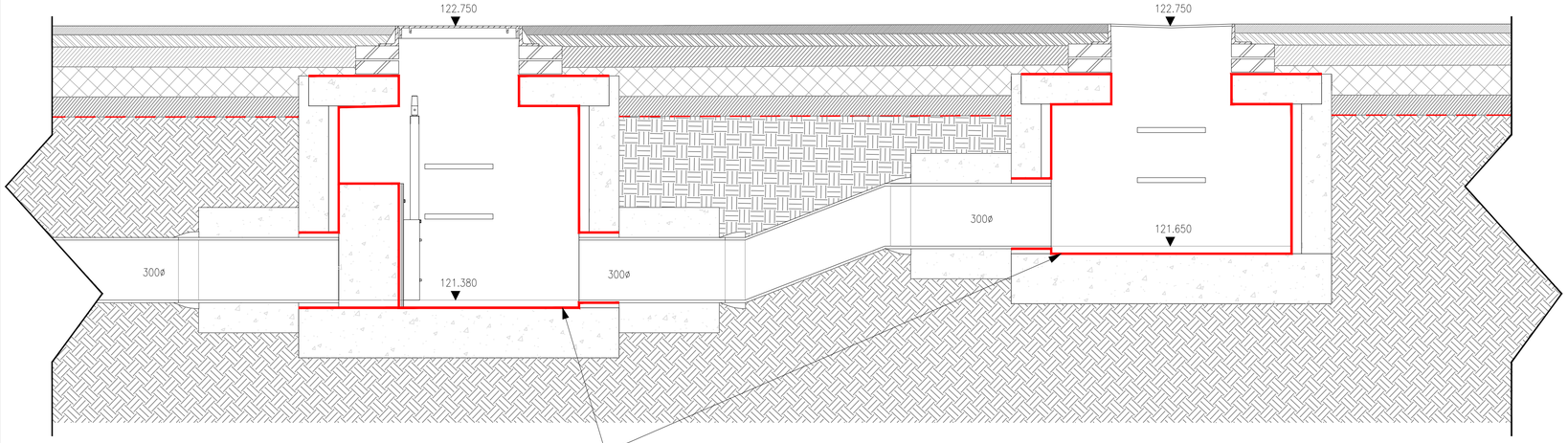
Drawing Title: Drainage Details Sheet 3

Status: FOR CONSTRUCTION

Scale	Date	Drawn By	Checked	Approved
AS NOTED @ A1	SEP' '23	MK	JHC	JHC

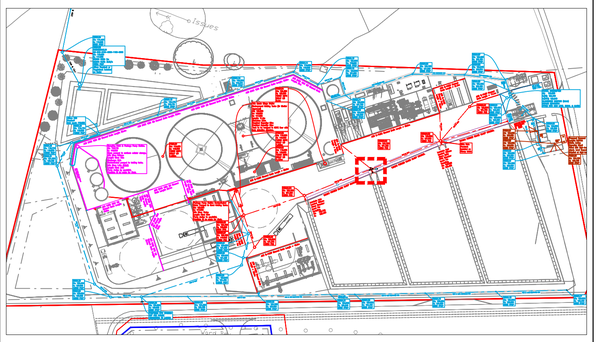
Drg. No.	Rev
29348/C1/111	C03

FOR CONSTRUCTION

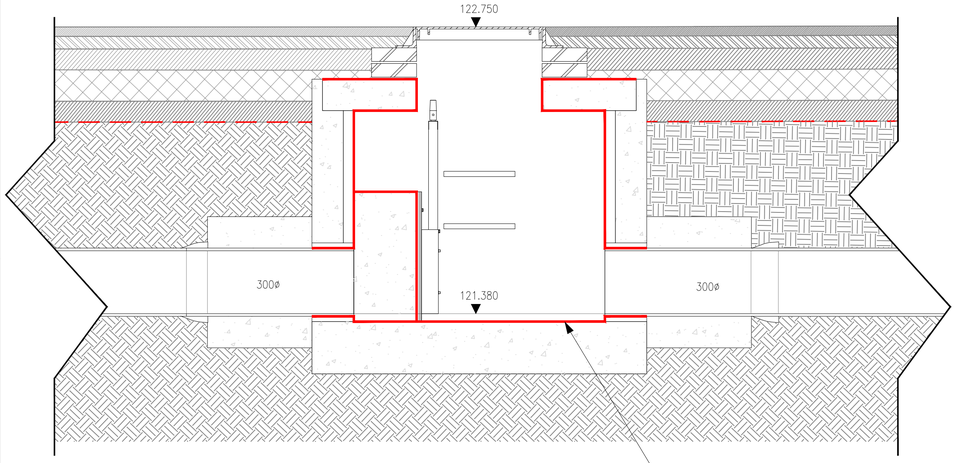


PROTECTIVE PAINT SYSTEM REQUIRED FOR ALL CONCRETE SURFACES INTERNALLY IN THE MANHOLE

PROPOSED SECTION A–A
SCALE: 1:15 @ A1

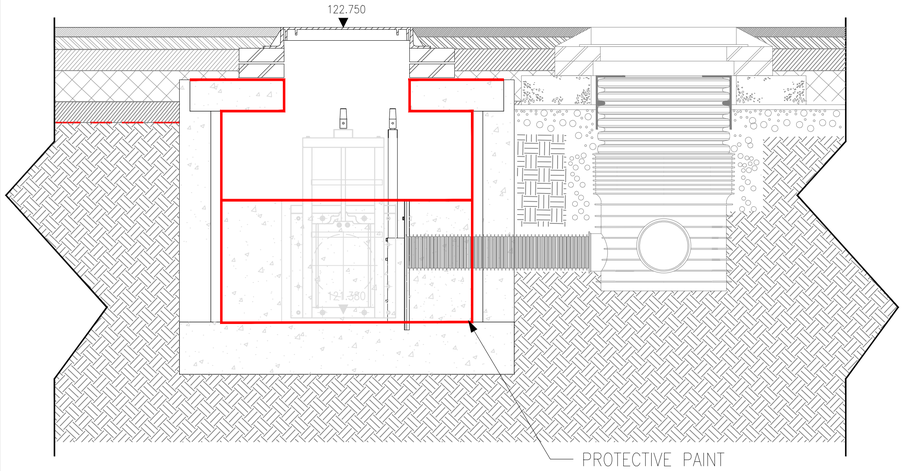


PROPOSED SITE PLAN
SCALE: 1:2000 @ A1



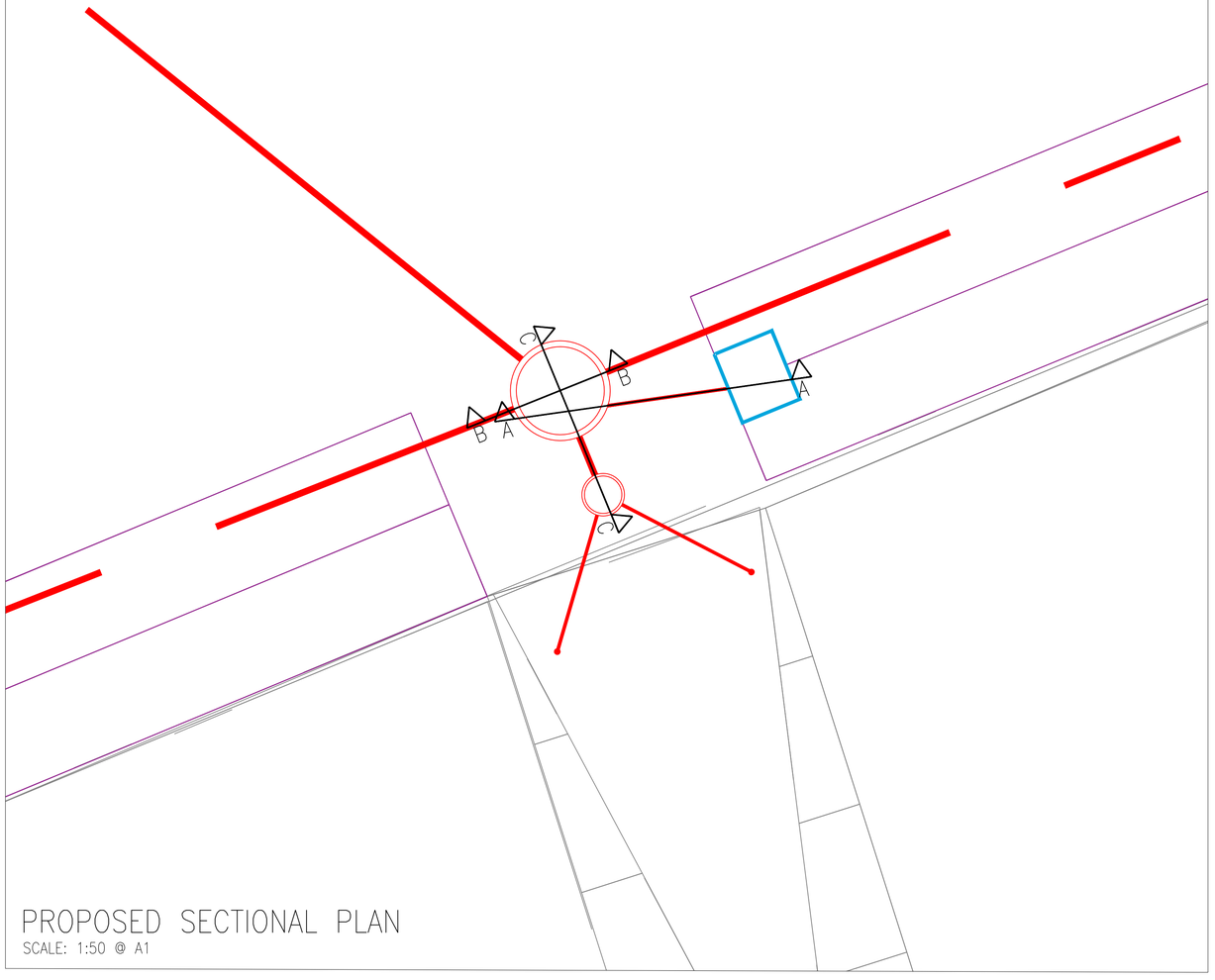
PROTECTIVE PAINT SYSTEM REQUIRED FOR ALL CONCRETE SURFACES INTERNALLY IN THE MANHOLE

PROPOSED SECTION B–B
SCALE: 1:15 @ A1



PROTECTIVE PAINT SYSTEM REQUIRED FOR ALL CONCRETE SURFACES INTERNALLY IN THE MANHOLE

PROPOSED SECTION C–C
SCALE: 1:15 @ A1



PROPOSED SECTIONAL PLAN
SCALE: 1:50 @ A1

FOR CONSTRUCTION

NOTES:-

1. All dimensions must be checked on site and not scaled from this drawing.
2. The Contractor shall make a survey of the site and shall be responsible for obtaining all dimensions and levels necessary for the proper fabrication of the structure as indicated.
3. All levels shown on this drawing are relative to Agreed Topographic survey
4. This drawing is to be read in conjunction with 29348/100 Series Drawings.
5. All existing invert levels are to be confirmed by contractor prior to construction. Connection subject to approval.

Rev	Date	Description	DR	CH
C03	20/09/24	ISSUED FOR CONSTRUCTION	WB	JHC
C02	10/09/24	ISSUED FOR CONSTRUCTION	WB	JHC
C01	03/09/24	ISSUED FOR FINAL APPROVAL	WB	JHC

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Client: acorn

Job Title: AD Plant.
Horse Close Green Power

Drawing Title: Drainage Details Sheet 4

Status: FINAL APPROVAL

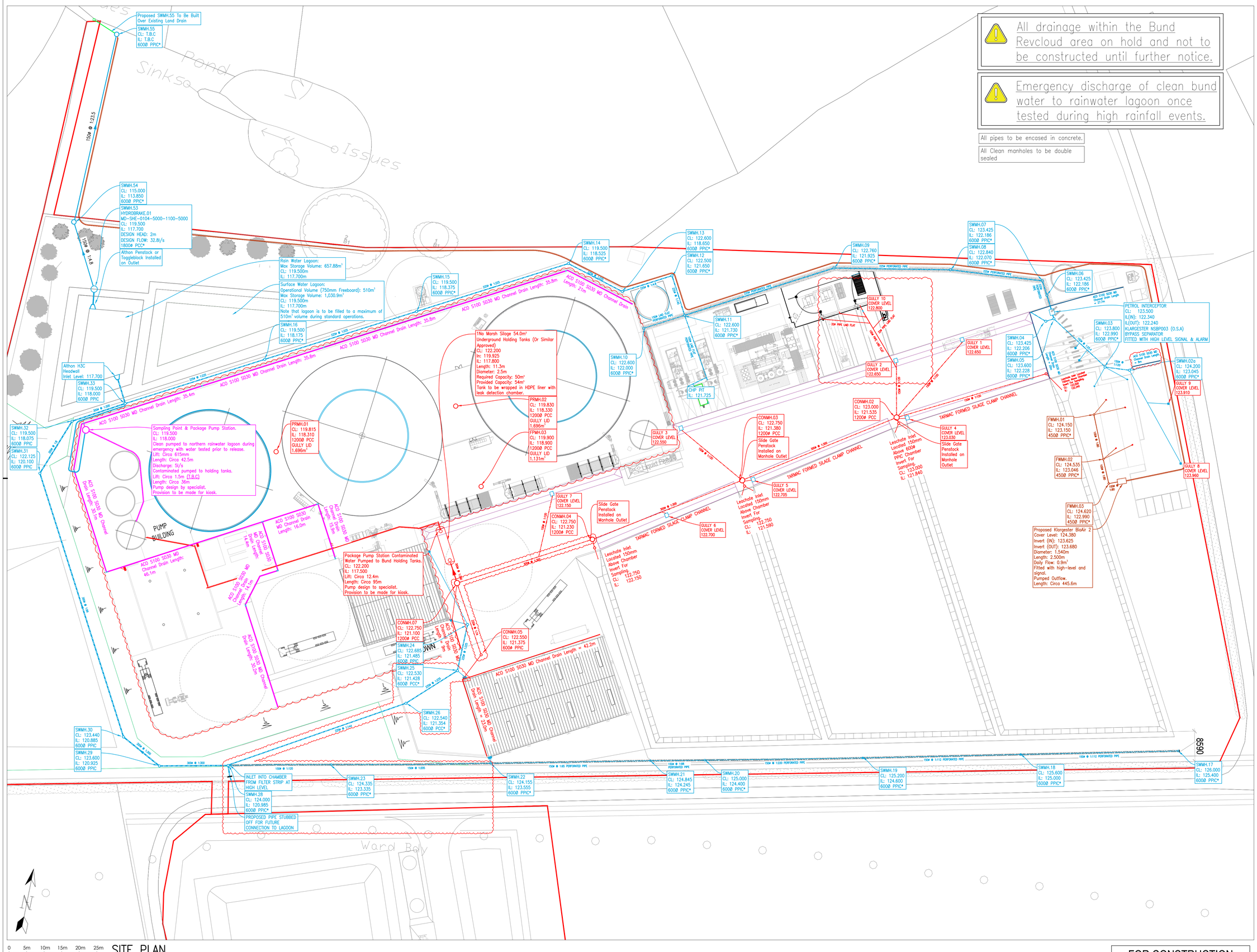
Scale	Date
AS NOTED @ A1	SEP' '23

Drawn By	Checked	Approved
WB	JHC	JHC

Drg. No.	Rev
29348/C1/112	C03

APPENDIX VII

Drainage Schematic Plan



SITE PLAN
Scale: 1:500 @ A1

FOR CONSTRUCTION

NOTES:-

1. All dimensions must be checked on site and not scaled from this drawing.
2. The Contractor shall make a survey of the site and shall be responsible for obtaining all dimensions and levels necessary for the proper fabrication of the structure as indicated.
3. All levels shown on this drawing are relative to Agreed Topographic survey
4. This drawing is to be read in conjunction with 29384/100 Series Drawings.
5. All existing invert levels are to be confirmed by contractor prior to construction. Connection subject to approval.

Site Red Line Boundary
Clean Surface Water Sewer
Clean Surface Water Chamber
Clean Surface Water Headwall
Clean Surface Water Drainage Channel
Clean Surface Water Rainwater Pipe
Clean Surface Water Rising Main
Contaminated Surface Water Sewer
Contaminated Surface Water Chamber
Contaminated Surface Water Drainage Channel
Contaminated Surface Water Rising Main
Bund Surface Water Sewer
Bund Surface Water Chamber
Bund Surface Water Channel Drain
Foul Water Sewer
Foul Water Chamber
Foul Water Rising Main
Soil Vent Pipe
Leak Detection Chamber

Rev	Date	Description	DR	CH
C20	03/02/25	Issued For Construction	JH	JHC
C19	31/01/25	Issued For Construction	JH	JHC
C18	09/01/25	Issued For Construction	JH	JHC
C17	18/12/24	Issued For Construction	JH	JHC
C16	05/12/24	Issued For Construction	WD	JHC
C15	14/11/24	Issued For Construction	WD	JHC
C14	11/11/24	Issued For Construction	WD	JHC
C13	25/10/24	Issued For Construction	WD	JHC
C12	15/10/24	Issued For Construction	WD	JHC
C11	20/09/24	Issued For Construction	WD	JHC
C10	11/09/24	Issued For Construction	WD	JHC
C9	09/09/24	Issued For Construction	WD	JHC
C8	06/09/24	Issued For Final Approval	WD	JHC
C7	03/09/24	Issued For Final Approval	WD	JHC
C6	29/08/24	Issued For Final Approval	WD	JHC
C5	28/08/24	Issued For Final Approval	WD	JHC
C4	21/08/24	Issued For Final Approval	WD	JHC
C3	16/08/24	Issued For Final Approval	WD	JHC
C2	15/08/24	Issued For Final Approval	WD	JHC

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Email info@ggpconsult.co.uk

Client: acorn

Job Title
AD Plant
Horse Close Green Power

Drawing Title
Proposed Drainage Layout

Status: CONSTRUCTION

Scale: As Noted @ A1
Date: JUN' 2024

Drawn By: MK
Checked: JHC
Approved: JHC

Drg. No.: 29384/C1/105
Rev: C20