



STATEMENT ON SECONDARY  
CONTAINMENT

AT  
CHARLTON PARK FARM  
WILTSHIRE

ON BEHALF OF  
CHARLTON PARK BIOGAS LTD



ARP GEOTECHNICAL LTD

CHARTERED CONSULTING ENGINEERS

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CLIENT: CHARLTON PARK BIOGAS LTD  
 JOB NUMBER: PJT/01  
 PROJECT: CHARLTON PARK FARM, WILTSHIRE  
 REPORT TYPE: STATEMENT SECONDARY CONTAINMENT  
 REPORT REFERENCE: PJT/01ssc

	Name	Signature
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ISSUE	DATE	STATUS
1	April/May 2021	V1 FINAL

## 1.0 Introduction

- 1.1 A Anaerobic Digestion Facility is under construction at Charlton Park Farm in Wiltshire. To comply with the design guidelines, and the Environment Agency Regulations, it was considered appropriate to carry out a design for the secondary containment system for the site. Plans showing the location of the site, and the design of the Anaerobic Digestion system, are enclosed for reference.
- 1.2 This report is based on the information obtained from various sources:
- Charlton Park Farm, Malmesbury Geo-environmental Report 2018, Report by Enzygo Geoenvironmental Ltd.
  - Drawing: mm4440-tek01 Melf layout (unofficial), 2021, Host Bio-energy Installations.
  - Ciria 736 - Containment systems for the prevention of pollution, 2014.
  - Various publicly available plans, maps and data sets for general reference.
- 1.3 This report includes what is considered to be a reasonable realistic interpolation of the ground conditions. It should be noted that there is a possibility of variation in the ground conditions across the site. Discussions have been had with ground workers during preparatory elements of this site design to confirm, as best as possible, that the ground conditions interpolated are factual. No liability is accepted for any variance of actual ground conditions from those interpolated.
- 1.4 An amendment to this document was made in May 2021 to include for the most up to date drawing details. No other variations were made.
- 1.5 This document has been prepared to provide information for the Client and other interested parties, such as the Regulatory Authorities, outlining how secondary containment measures for the Anaerobic Digestion Facility will be implemented and the installation verified as satisfactory. The document should be agreed, prior to implementation, with the relevant Regulatory Authorities, usually the local Planning Authority and Environment Agency or other building control provider.

## 2.0 Background

- 2.1 Prior to development, the site was occupied by agricultural fields. The site slopes gently to the northeast. Primary access was off Quobwell Farm in the south. The surrounding land use is predominantly agricultural fields, with some residential dwellings in the north and Quobwell Farm in the south.
- 2.2 Ground conditions observed during the 2018 geo-environmental investigation were Topsoil and Made Ground to 0.30mbgl, over firm (locally soft) clay and medium dense (locally loose) clayey gravelly sands and clayey sands, underlain by firm to stiff clays interpreted in the report as weathered Kellaway Mudstone formation. Shallow groundwater was recorded at depths ranging from 0.80mbgl to 1.60mbgl.
- 2.3 The geo-environmental report highlights that the site is located within an inner Source Protection Zone associated with a confined aquifer within the Cornbrash Formation. This is confined by the Kellaways Mudstone formation. It also notes that there is expected to be low permeability within the Kellaways Mudstone, due to the fine nature of the unit.
- 2.4 No radon protective measures are stated to be necessary for developments on the site, and the site is within a “**lower probability radon area**”. No other proximal sources of hazardous ground gases were identified.
- 2.5 Pertinent environmental factors from the geo-environmental investigation are included below:
- No significant mining activities (coal or other) have been identified within 1,000m of the site.
  - A limestone quarry is located 494m to the north of the site. This was deemed to be not at risk from, or not a risk to, the site.
  - The closest open watercourse is a Tertiary River 105m south of the site, which flows south into the River Avon. This was deemed to not be at risk from the site due to its distance.
  - There are no surface water abstractions within 1,000m of the site.
  - There are no licensed groundwater abstractions within 500m of the site.
  - There are no oil or gas pipelines within 500m of the site. There are no fuel station entries within 250m of the site.

### 3.0 Environmental Sensitivity

3.1 The environmental sensitivity of the site is considered for the purpose of assigning a risk category to the site. The risk profile used is from CIRIA 736 - Containment Systems for the Prevention of Pollution.

3.2 The three risk categories that can be assigned to a site storing waste materials are summarised in box 2 in CIRIA 736. This box is included here for reference.

Box 2: Chapter 2.5 CIRIA 736

<b>Site hazard ratings</b> May be high (H), moderate (M) or low (L) (see Box 2.1)	
<b>Frequency of loss of containment</b> May be high (H), moderate (M) or low (L)	
<b>Possible combination of ratings:</b>	<b>Suggested consequent overall site hazard rating:</b>
HH or HM or MH	<b>HIGH</b>
MM or HL or LH	<b>MODERATE</b>
LL or ML or LM	<b>LOW</b>

This is categorised by an assessment of the site conditions, as undertaken in the ground investigation, and the risk of loss of containment. The risk of loss of containment is summarised in table 2.3 from CIRIA 736, included below for reference.

Table 2.3: Chapter 2.5 CIRIA 736

<b>Risk of loss of containment</b>	<b>Annual probability of loss of containment per site</b>
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 site hazard rating is established via the source-receptor-pathway assessment in the geo-environmental report. This indicated that the possibility of exposure was negligible or dismissed, due to the lack of contaminants present. This classified the site as low risk. An updated version of this has been included below, to specifically account for the introduction of potential contamination from the storage tanks and other facilities. To comply with recommendations, a Class 1 Containment system is required.

Viable Source - Pathway - Receptor Matrix (Finished Development)

Contamination Sources	Pathways	Receptors	Severity of Consequence	Probability of Event	Risk
Possible contamination from a leak, spill or deliberate discharge of material from digesters	<ul style="list-style-type: none"> <li>Inhalation, ingestion and dermal contact with soil and dust</li> </ul>	Humans:- <ul style="list-style-type: none"> <li>Maintenance workers</li> <li>Adjacent residents and general public</li> </ul>	Medium	Low Likelihood	Moderate/ Low
	<ul style="list-style-type: none"> <li>Fruit and vegetable intake, with soil (agricultural crops)</li> </ul>	Humans (as above)	Medium	Low Likelihood	Moderate/ Low
	<ul style="list-style-type: none"> <li>Vapour inhalation outdoor</li> </ul>	Humans (as above)	Medium	Unlikely	Low
	<ul style="list-style-type: none"> <li>Migration in surface water</li> </ul>	Surface water (nearest 105m to south. There are no abstractions within 1km.	Mild	Unlikely	Very Low
	<ul style="list-style-type: none"> <li>Migration in groundwater</li> </ul>	<ul style="list-style-type: none"> <li>Groundwater (Confined aquifer well beneath site, reduced permeability, no abstractions within 1km)</li> </ul>	Mild	Unlikely	Very Low
	<ul style="list-style-type: none"> <li>Root uptake</li> </ul>	Vegetation:- <ul style="list-style-type: none"> <li>Agricultural fields</li> </ul>	Medium	Low Likelihood	Moderate/ Low
	<ul style="list-style-type: none"> <li>Migration</li> </ul>	Services/Utilities:- <ul style="list-style-type: none"> <li>Potable water supply</li> </ul>	Mild	Unlikely	Very Low
Silage stores	<ul style="list-style-type: none"> <li>Explosive risk</li> </ul>	<ul style="list-style-type: none"> <li>Construction/de-molition workers</li> <li>Buildings</li> </ul>	Medium	Low Likelihood	Moderate/ Low

3.3 The site hazard rating assigned from a conservative assessment of the Viable Source - Pathway - Receptor Matrix (Finished Development) assigns a category of moderate to low. Conservatively, and in line with the CIRIA 736 Box 2, this classifies the site risk as M. The risk of spill from the plant is considered to be rated as L. This classifies the site as ML equating to a LOW risk. The silage stores do not have a ground contamination risk and as such are not considered here.

3.4 There are no point systems required for secondary containment design. However, CIRIA 736 chapter 2.6.1 recommends the application of the following simple guidelines:

Low site risk - containment type class 1, i.e. base level of integrity

Moderate site risk - containment type class 2, i.e. intermediate degree of integrity

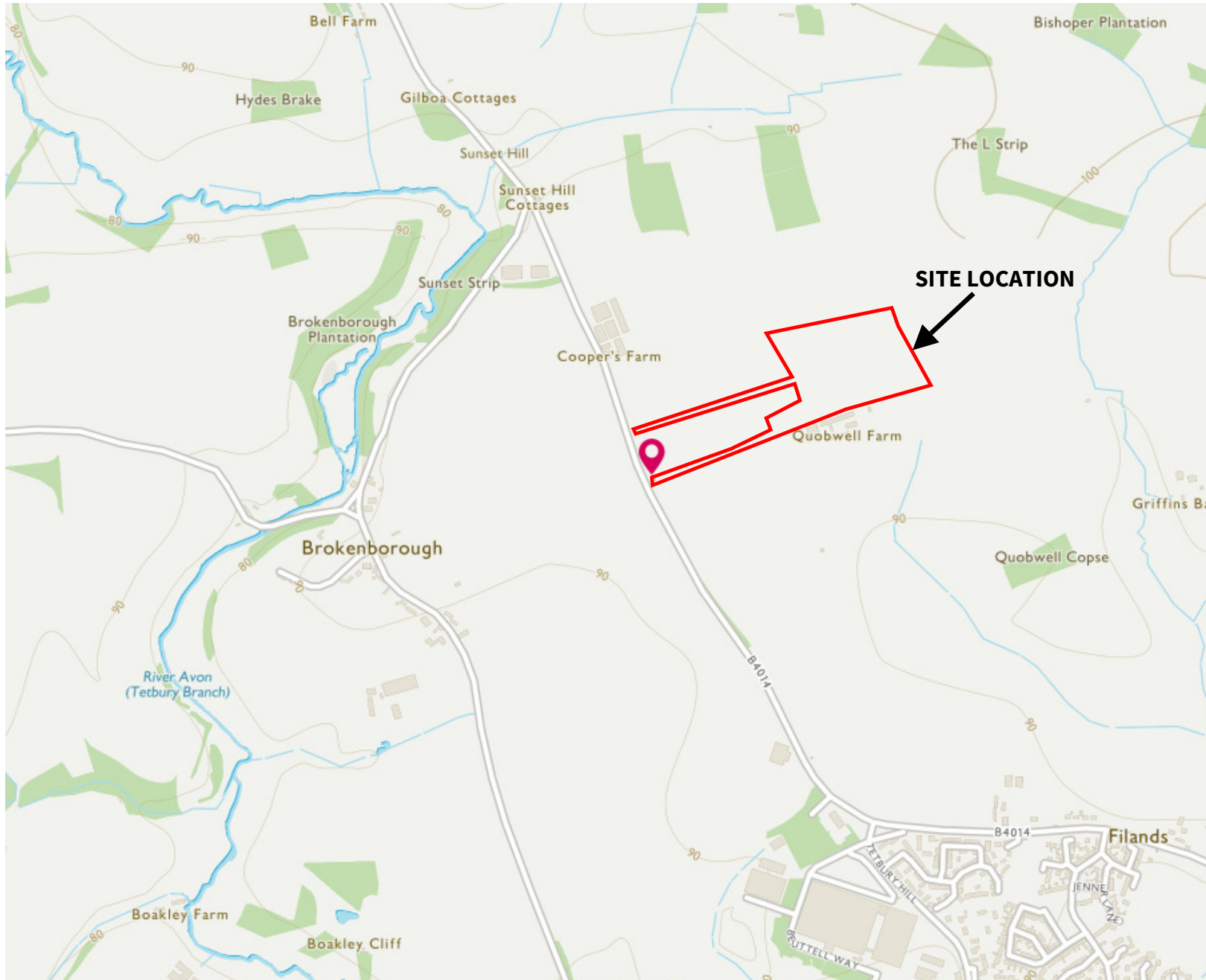
High site risk - containment type class 3, i.e. highest degree of integrity.

#### 4.0 Design Secondary Containment Measures

- 4.1 In accordance with CIRIA 736, to comply with the site classification as LOW risk, a secondary containment system that includes for a bund should be designed. This includes for an impervious ground barrier, which is discussed below.
- 4.2 As there are no appropriate soils on site to create a natural impermeable soil ground barrier, an artificial barrier is required. This barrier is to have specific imperviosity, to block leakage in the event of a hazard.
- 4.3 The barrier is to have a hydraulic conductivity of  $10^{-11}$  m/s and an index flux of  $10^{-9}$  (m<sup>3</sup>/m<sup>2</sup>)/s. The barrier is to be inert to the stored waste and ground conditions, and have a design life of at least 20 years. A product specification for such a liner is attached.
- 4.4 The placement of this layer is to be in accordance with the attached drawing 872-02-DR-S-2011. Specifications for lapping detail are also included in the attachments for this report.

- 5.0 Validation/Verification of Secondary Containment
- 5.1 CIRIA 736 provides some details on how the installation of the bentonite layer system will be independently verified. The manufacturer's details will also provide information on installation requirements.
- 5.2 Key to the validation is that the level of verification required will be determined by the qualifications and experience of the installer. Verification should always be carried out by an appropriate independent person such as an experienced and suitably trained consultant or independent third party qualified and experienced installer.
- 5.3 For a LOW risk site, where the installation is to be carried out by a general builder/groundworker, an independent inspection will be required for the placement of the bentonite, as well as the protective system. At a minimum, partial visual inspection of the earthworks prior to installation should also be undertaken.
- 5.4 **The barriers will need to be installed in accordance with the manufacturer's instructions,** with the appropriate laps and sealing as specified by the manufacturer.
- 5.5 The independent inspection will take place before any screed or insulation is placed, and will check for the items included on the Verification Proforma document. In basic terms, this will allow the following to be confirmed:
- That appropriate products are being used,
  - That all the required area is covered,
  - That all the laps are sufficient, and are appropriately sealed,
  - That any service entry is appropriately sealed,
  - That there are no visible punctures or tears in the membrane.
  - That any repairs are completed to the recommended standard.
- 5.6 Photographs will be taken of all elements for the area inspected, for inclusion within the Validation Report.
- 5.7 Any defects identified whilst on site will be reported to the Site Agent so that a repair may be made before the barrier is covered. The repair may be made whilst we are present on site, so that the validation can be completed. If a repair is not possible at that time, it will need to be confirmed by inspection at a later date and should, therefore, remain visible until after inspection.
- 5.8 Assuming the Engineer carrying out the inspections will be from ARP Geotechnical Ltd, the inspections will be carried out by an engineer in a relevant discipline who will have been trained in-house in the verification of barrier protection measures.
- 5.9 The results of an inspection will be reported in letter format shortly after the site visit, and this will contain all the observations made and have photographs attached.
- 5.10 On completion of the development, the discharge of any associated planning condition may be achieved by submission of the validation letter reports.





0m 400m

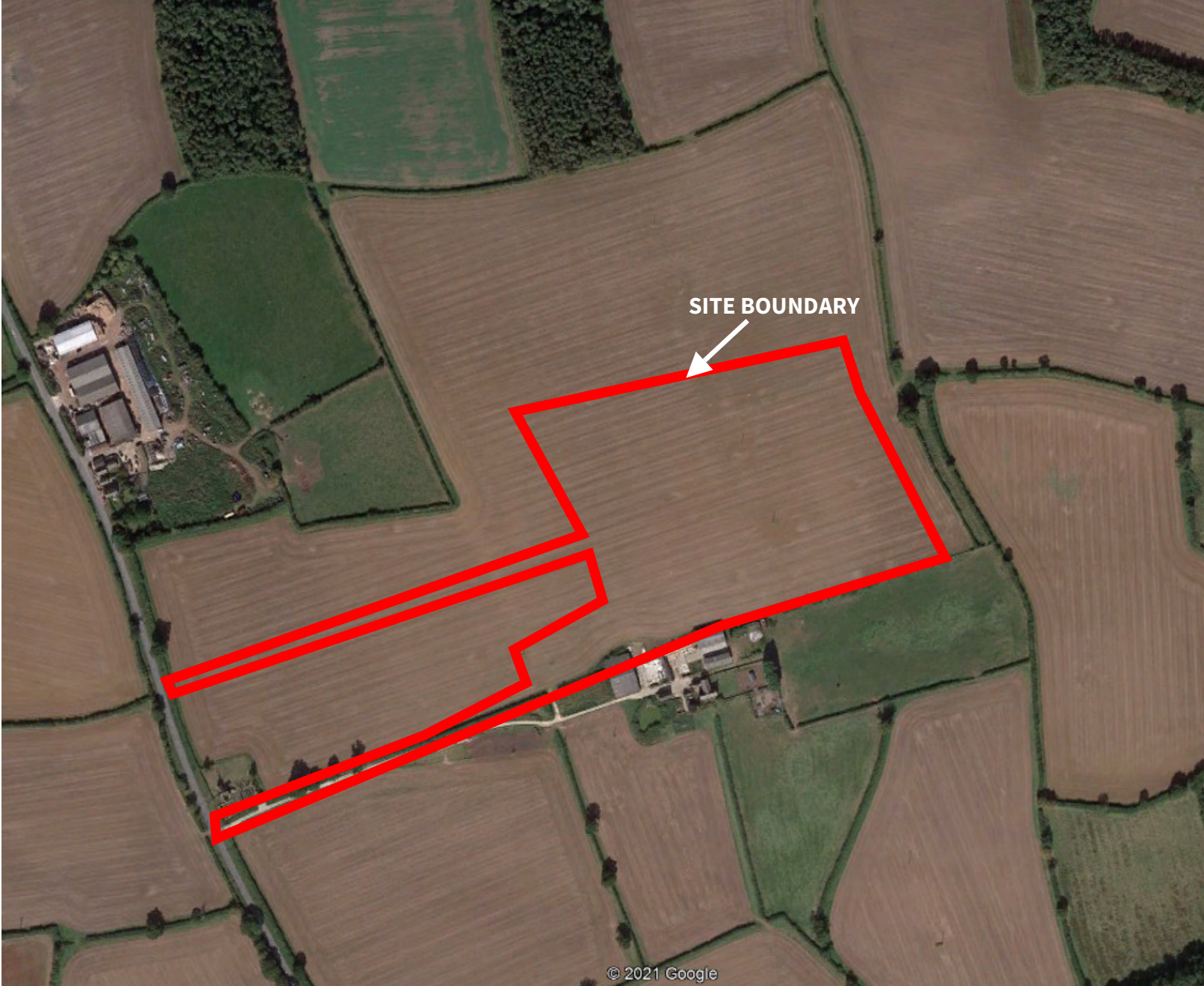
Approximate Scale



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Project		CHARLTON PARK	
Client		CHARLTON PARK BIOGAS LTD	
Title		SITE LOCATION PLAN	
Date		MAY 2021	
Drawn	Scale		
DMB	AS SHOWN		
Job No.		PJT/01	



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0m 175m

Approximate Scale



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Project

CHARLTON PARK

Client

CHARLTON PARK BIOGAS  
LTD

Title

AERIAL PHOTOGRAPH

Date

MAY 2021

Drawn

DMB

Scale

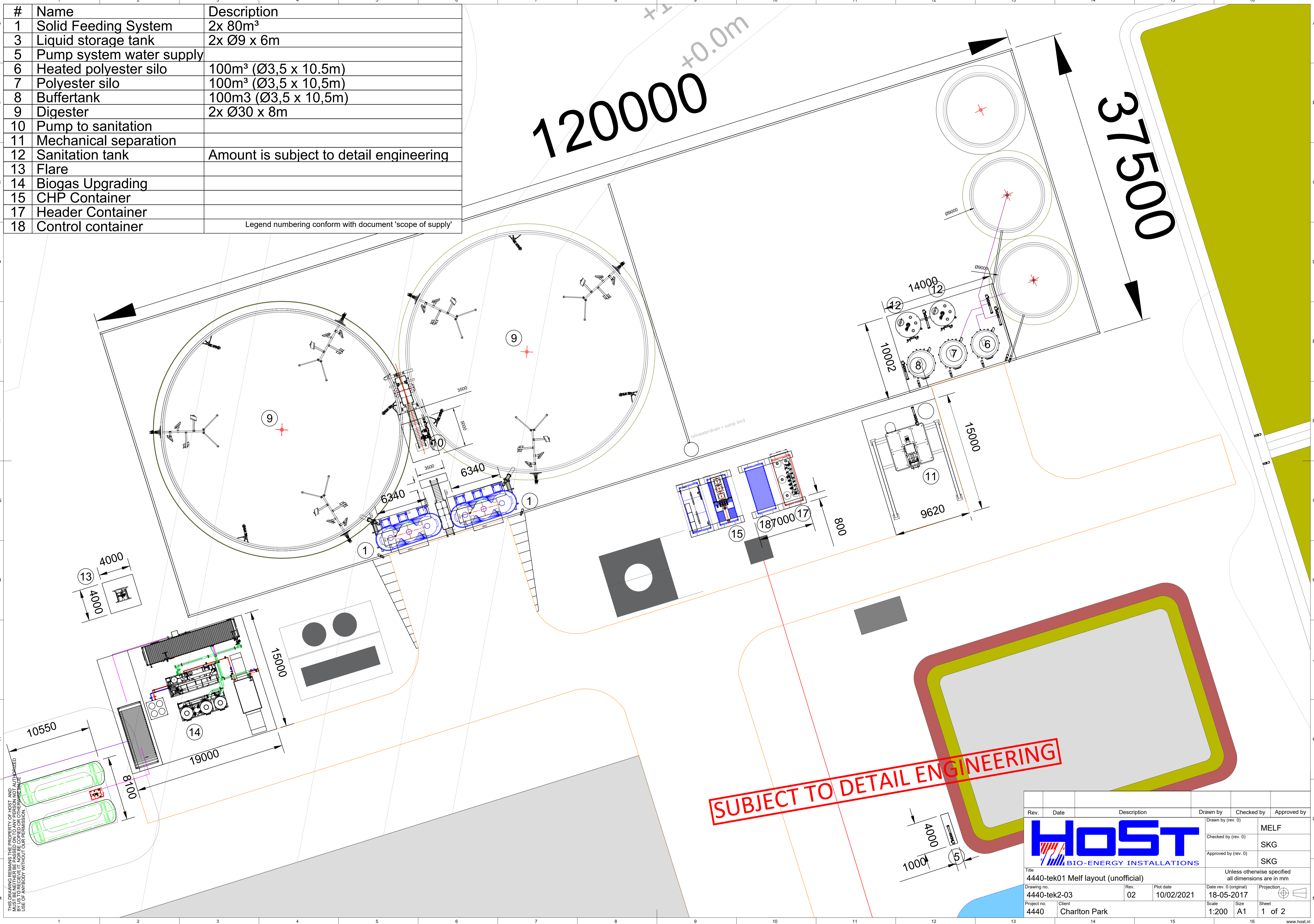
AS SHOWN

Job No.

**PJT/01**

#	Name	Description
1	Solid Feeding System	2x 80m <sup>3</sup>
3	Liquid storage tank	2x Ø9 x 6m
5	Pump system water supply	
6	Heated polyester silo	100m <sup>3</sup> (Ø3,5 x 10,5m)
7	Polyester silo	100m <sup>3</sup> (Ø3,5 x 10,5m)
8	Buffertank	100m <sup>3</sup> (Ø3,5 x 10,5m)
9	Digester	2x Ø30 x 8m
10	Pump to sanitation	
11	Mechanical separation	
12	Sanitation tank	Amount is subject to detail engineering
13	Flare	
14	Biogas Upgrading	
15	CHP Container	
17	Header Container	
18	Control container	

Legend numbering conform with document 'scope of supply'



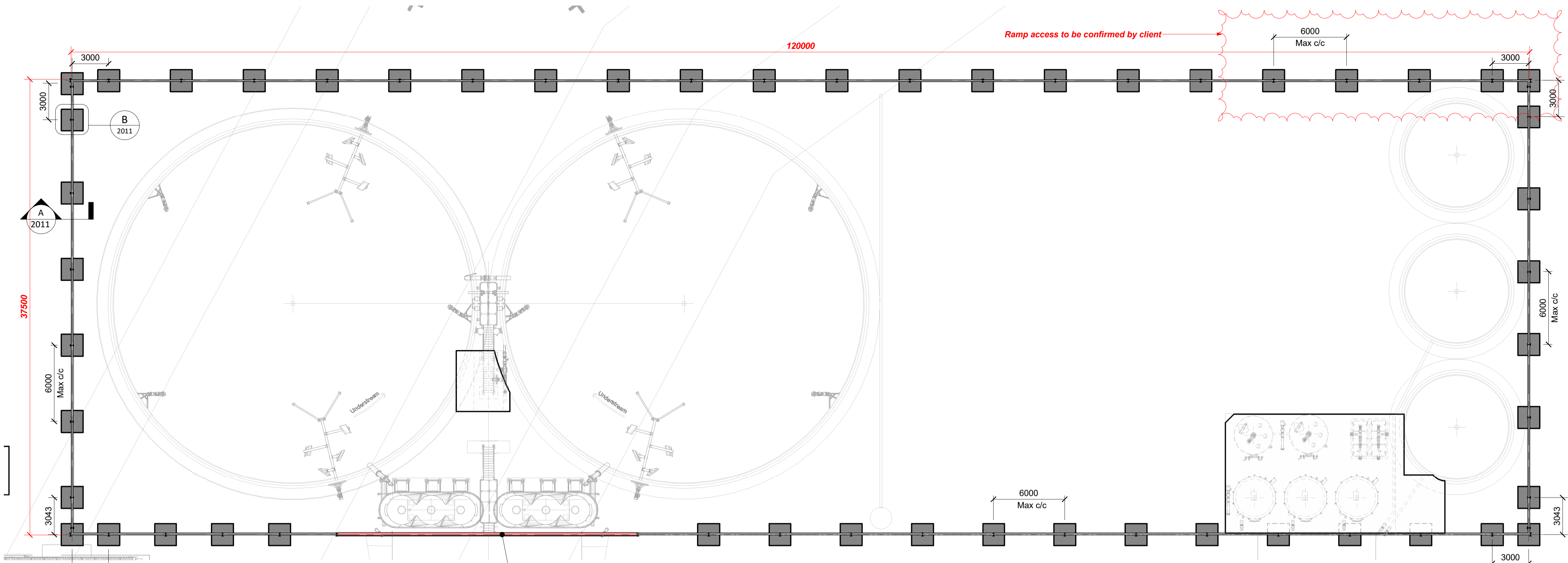
**SUBJECT TO DETAIL ENGINEERING**

Rev.	Date	Description	Drawn by	Checked by	Approved by
					Drawn by (rev. 0)
					MELF
					Checked by (rev. 0)
					SKG
					Approved by (rev. 0)
					SKG

Title: 4440-tek01 Melf layout (unofficial)  
 Drawing no.: 4440-tek2-03  
 Rev.: 02  
 Plot date: 10/02/2021  
 Date rev. 0 (original): 18-05-2017  
 Project no.: 4440  
 Client: Charlton Park  
 Scale: 1:200  
 Size: A1  
 Sheet: 1 of 2

Unless otherwise specified all dimensions are in mm

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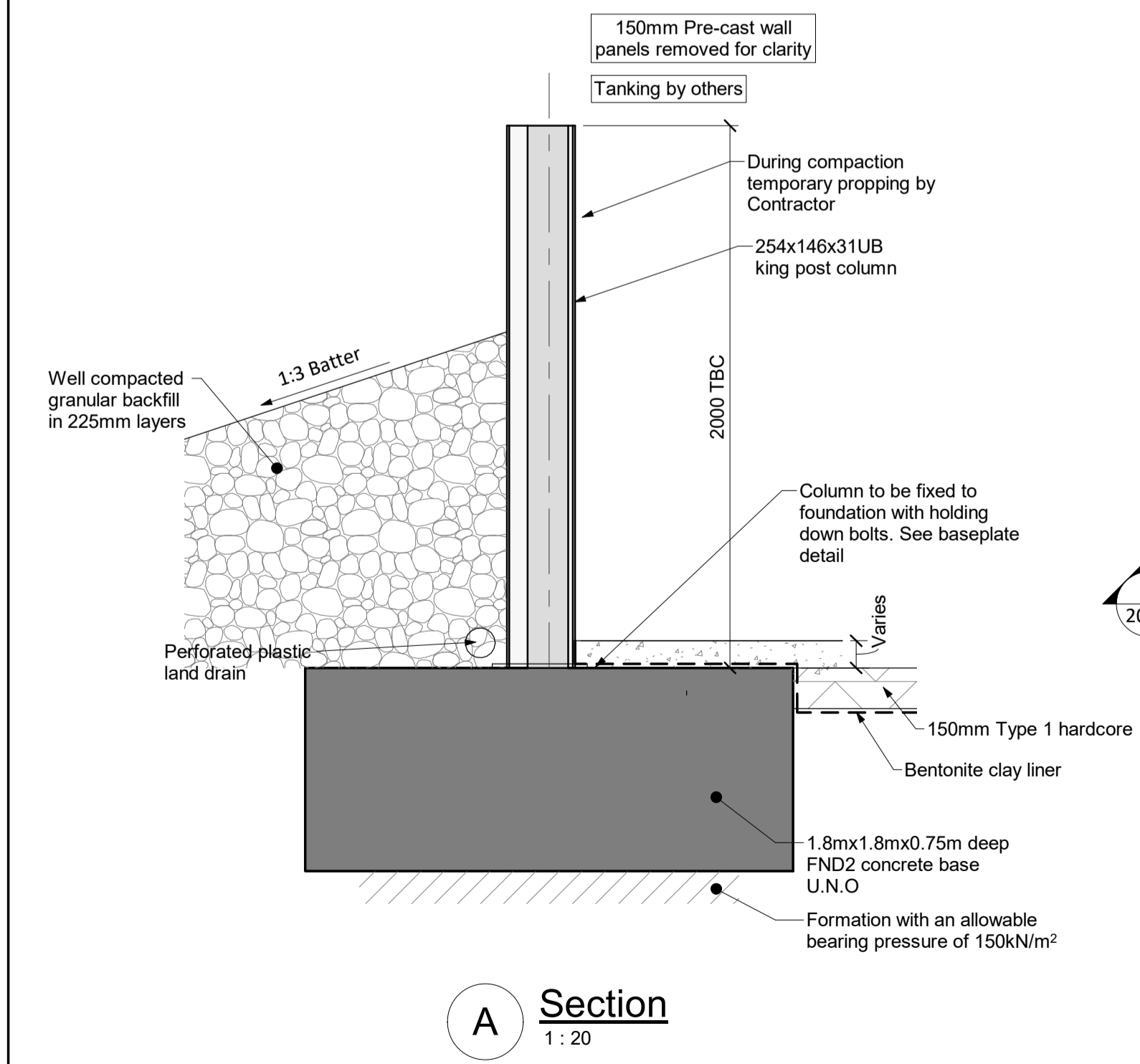
All steel to be galvanised

Setting out to be confirmed by others

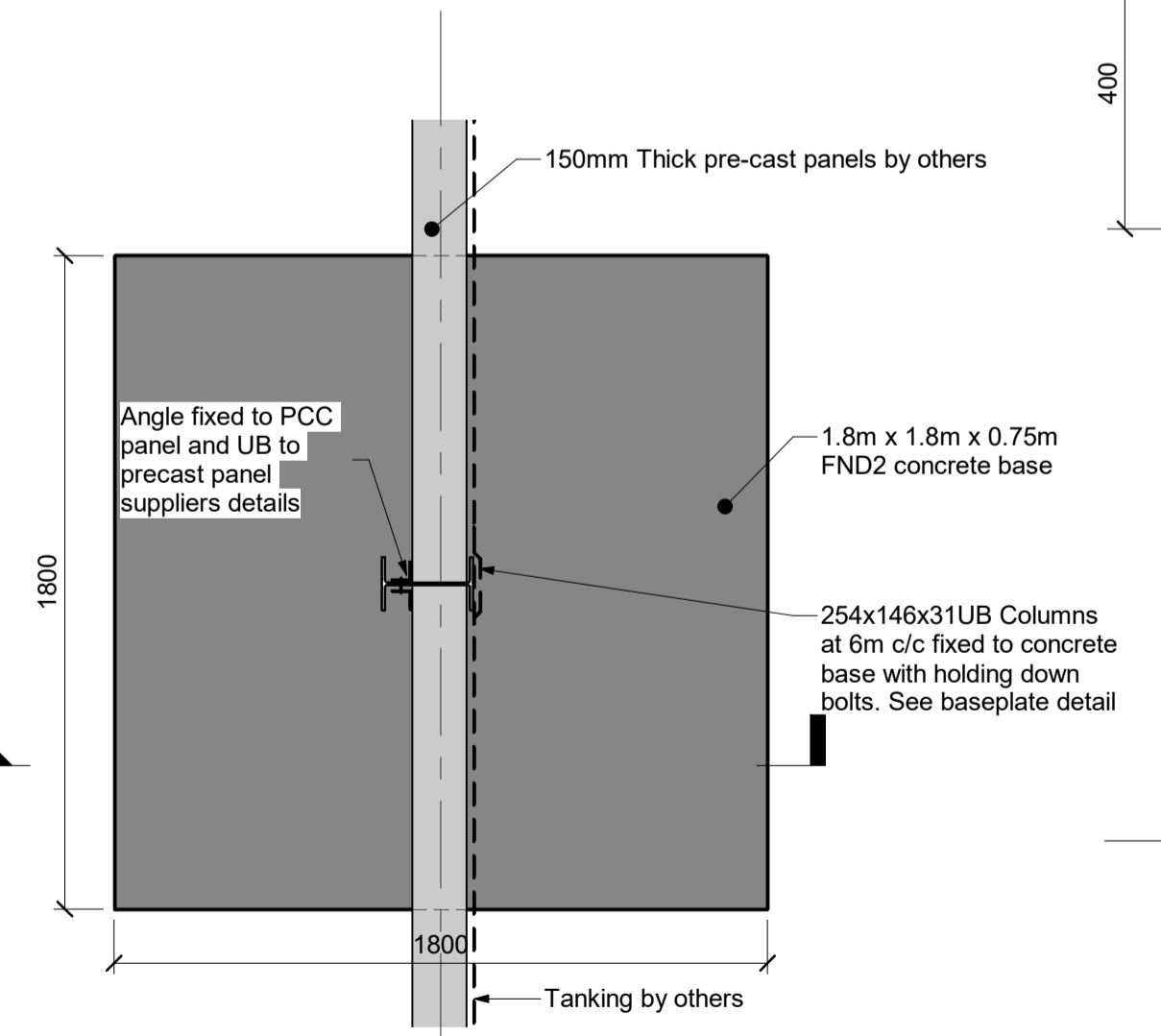
All slab fixings to be designed and detailed by others

Refer to ARP drawing 1872-02-2002 for retaining wall details & connection between pre-cast panels

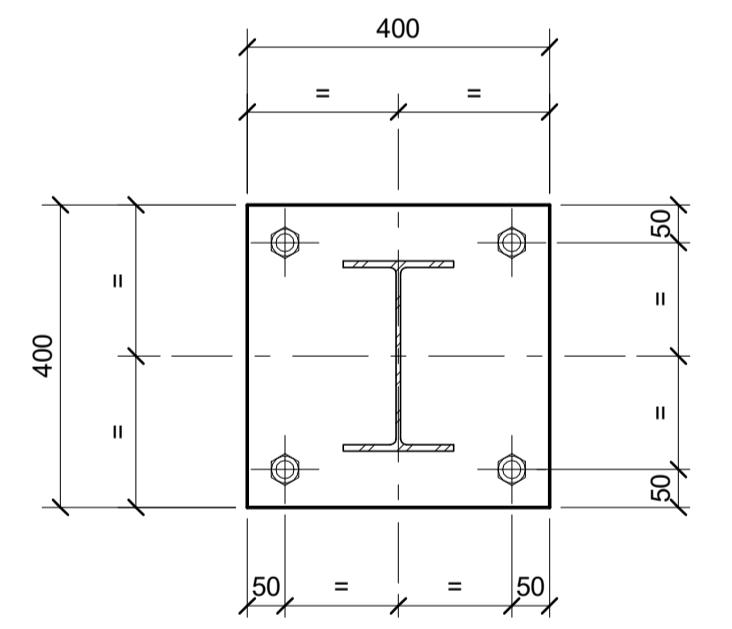
**Digester Bund Perimeter Wall Plan**  
1 : 200



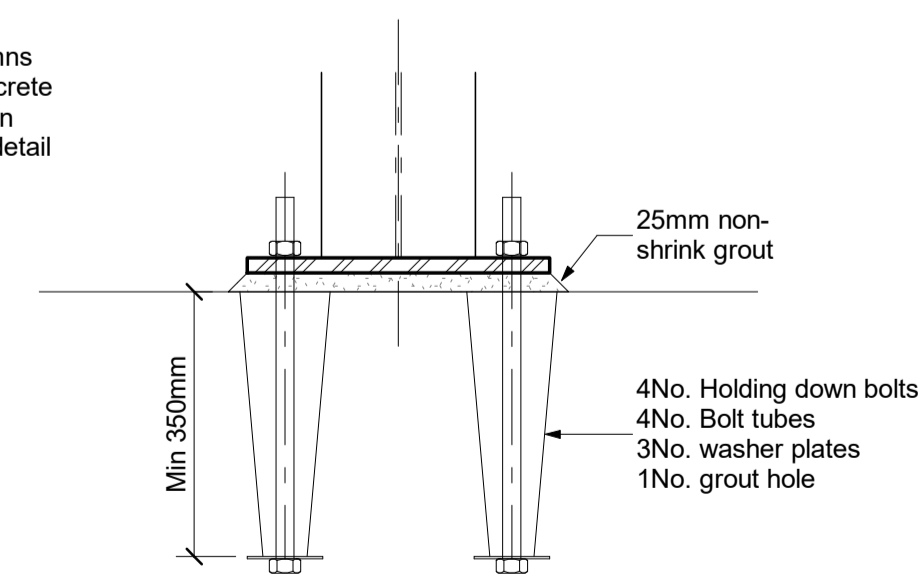
**A Section**  
1 : 20



**B Enlarged Detail**  
1 : 20



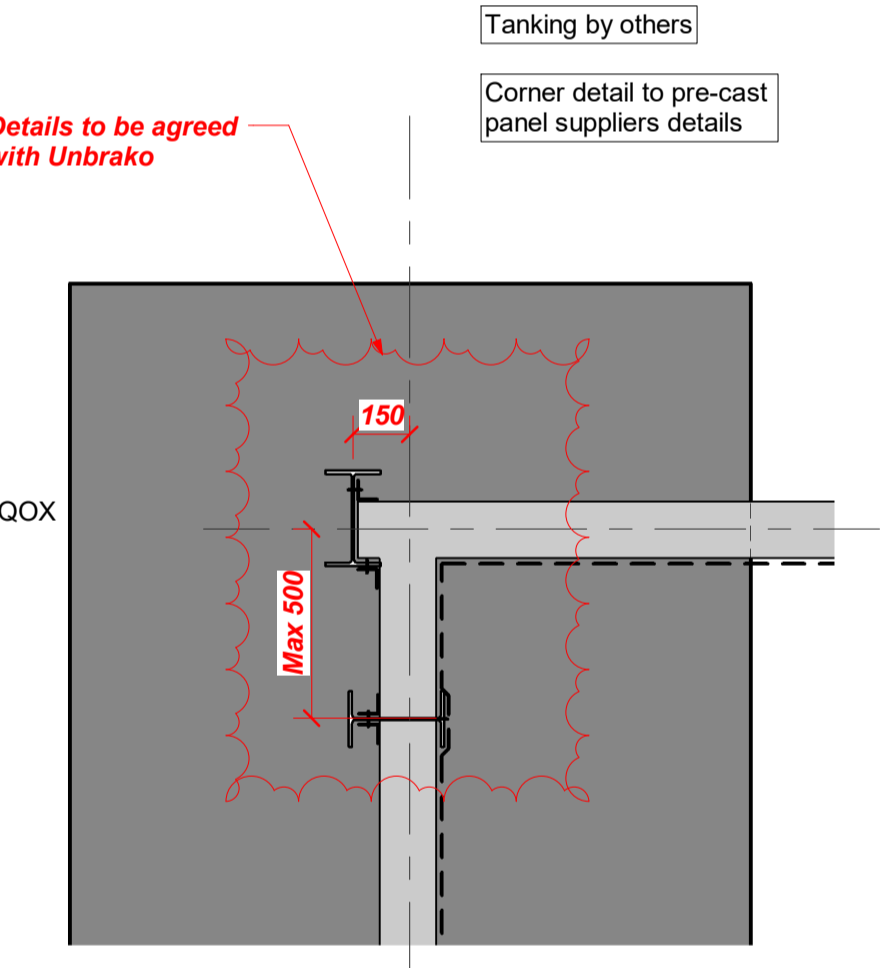
Plan



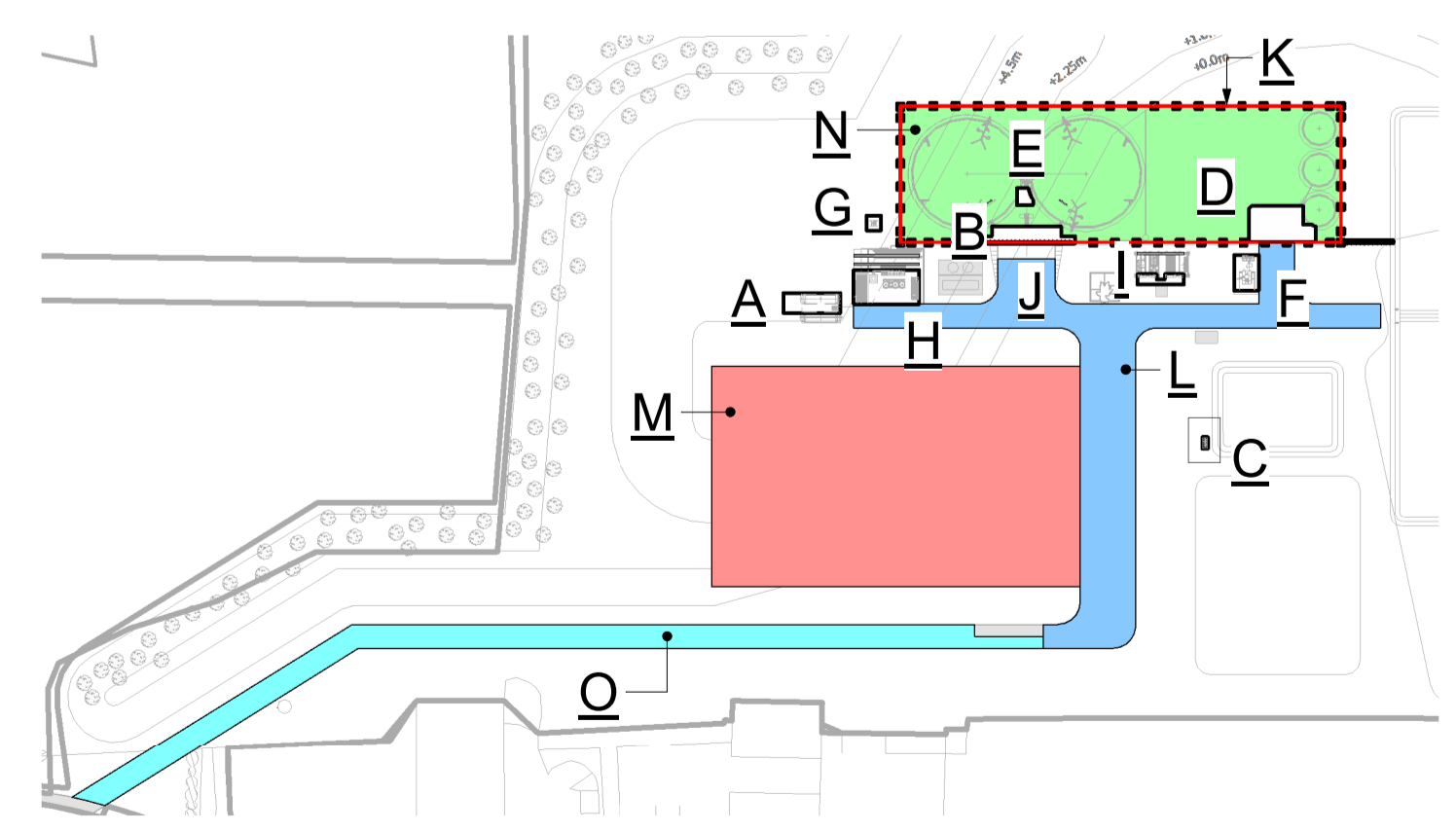
Section

**Typical Baseplate Detail**  
1 : 10

4No. M22 x 550mm long grade 8.8 holding down bolts SQSQOX  
Minimum 350mm Embedment  
Projection 125mm  
Non-Shrink Grout 25mm  
Washer plates 2No. per bolt type OFRW  
Washer plates 120x12 flat x 120mm long



**Typical Digester Bund Corner Wall Plan**  
1 : 20



**Key Plan**  
1 : 2000

**CONSTRUCTION**

C1	Construction Issue	EB	AH	29.04.21
P2	Revised Issue	EB	AH	28.04.21
P1	For Comments Only	EB	AH	12.04.21
REV	DESCRIPTION	BY	CHK	DATE

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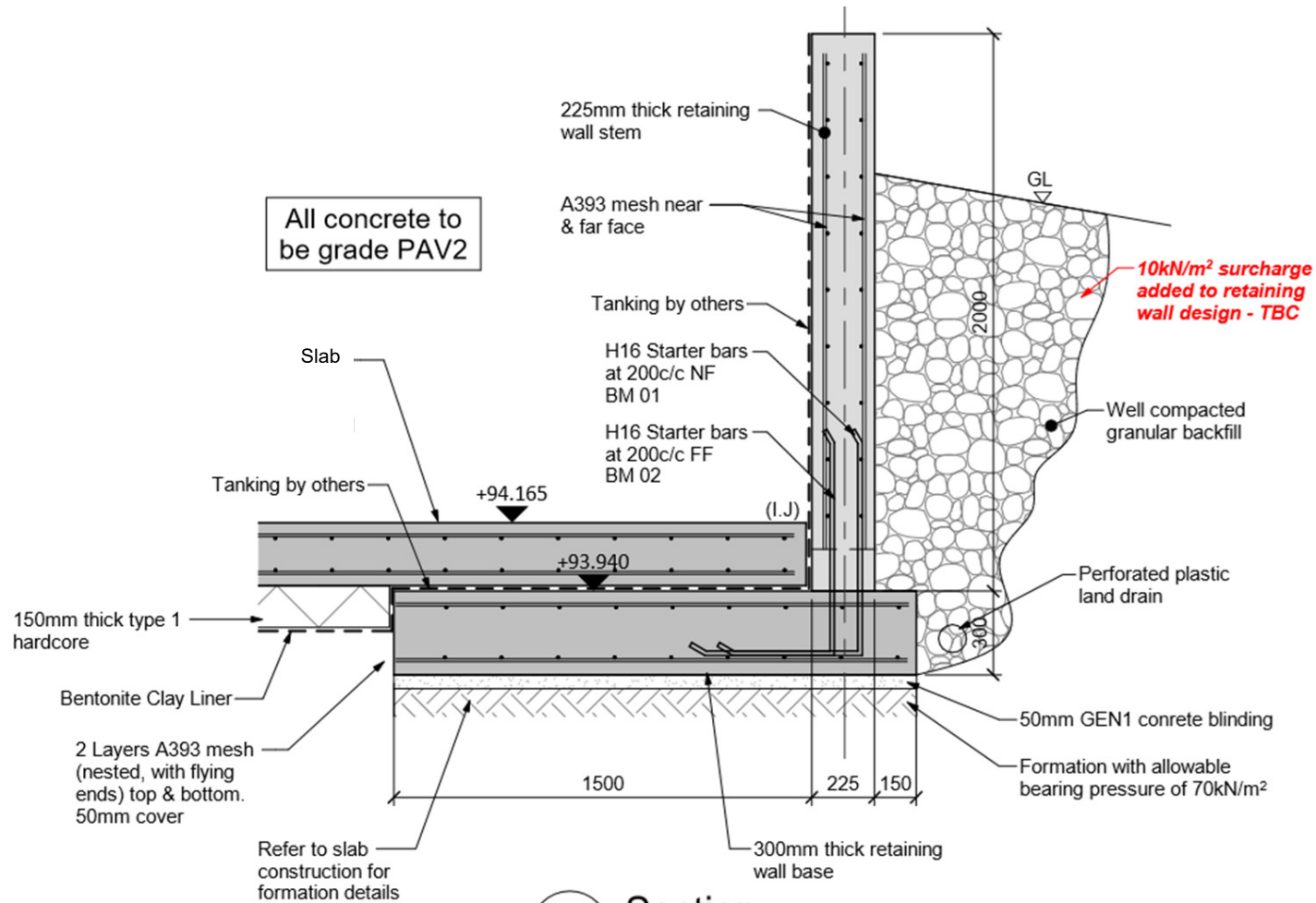
CLIENT  
**S9 Construction**

DRAWING TITLE:  
**K - Digester Bund Perimeter Wall - General Arrangement**

PROJECT:  
**Charlton Park, Wiltshire**

Scale @ A1 As Indicated	Drawn EB	Checked JB	Approved AH	Date 04/07/21
Drawing No. 1872-02-DR-S-2011				Revision C1

28/04/2021 4:15:56pm  
C:\Users\james\Documents\1872-02-DR-S-2011-Structural



**A** Section  
1:20

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Project	
CHARLTON PARK	
Client	
CHARLTON PARK BIOGAS LTD	
Title	
BENTONITE LAP OVER RETAINING WALL	
Date	
MAY 2021	
Drawn	Scale
DMB	AS SHOWN
Job No.	
PJT/01	