Non-Technical Summary for a new Bespoke Installation Permit application – Horse Close AD Plant, Courteenhall, Northamptonshire, NN7 2QF

On behalf of:

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ETL747/2024

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V1.0 Issue 0	19/02/2025	First Issue	A Trelawny	A Becvar
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CONTENTS

Abbreviations

AD	Anaerobic Digestion/er
AQMA	Air Quality Management Area
AQIA	Air Quality Impact Assessment
AW	Ancient woodland
BAT	Best Available Techniques
BUU	Biogas upgrading unit
CHP	Combined heat and power engine
CO_2	Carbon dioxide
COMAH	Control of Major Accident Hazards
CQA	Construction Quality Assurance
EA	Environment Agency
ELV	Emission limit value
EMS	Environmental Management System
EP	Emission Point
ETL	Earthcare Technical Limited
EWC	European Waste Catalogue
EVCS	Electric Vehicle Charging Station
GSM	Grams per square metre
H_2S	Hydrogen sulphide
HDPE	High density polyethylene
HRA	Hot rolled asphalt
HSE	Health and Safety Executive
kWthi	Kilowatts of thermal input
LDPE	Low-density polyethylene
LWS	Local Wildlife Site
MCP	Medium Combustion Plant
MCPD	Medium Combustion Plant Directive
n/a	Not applicable
NGR	National Grid Reference
NMP	Noise Management Plan
NTS	Non-technical Summary
NVZ	Nitrate Vulnerable Zone
PHI	Priority Habitat Inventory
PVRV	Pressure and vacuum relief valve
PRV	Pressure relief valve
PVC	Polyvinyl chloride

SAC	Special Area of Conservation
SSAFO	The Water Resources (Control of Pollution) (Silage, Slurry and Agricultural Fuel Oil) (England) Regulations 2010
SCADA	Supervisory Control and Data Acquisition
SCR	Site Condition Report
SPA	Special Protection Area
SPZ	Source Protection Zone (for groundwater)
SR	Standard Rules
SSSI	Site of Special Scientific Interest
TPA	Tonnes per annum

1 Introduction

This Non-Technical Summary (NTS) has been prepared by Earthcare Technical Ltd (ETL) on behalf of Acorn Bioenergy Operations Limited 'ABL' in support of an application for a new bespoke Installation Environmental Permit for an anaerobic digestion (AD) plant including the use of resultant biogas for Horse Close AD Plant, located on agricultural land at Courteenhall, Northamptonshire, NN7 2QF (the site), centred on National Grid Reference (NGR): SP 77438 52588 , herein termed 'the Site'. The plant will be operated by Acorn Bioenergy Operations Limited, herein termed 'the Operator'.

This NTS highlights the key control measures that are proposed to minimise any potential environmental impacts from the site operations and signposts the reader to the key supporting documents for the permit application, which contain further detail.

The bespoke permit application has been compared to criteria within *SR2021 No.6: anaerobic digestion facility, including use of the resultant biogas – installations*[1] (SR2021 No6) since although feedstock materials are principally agricultural in nature additional non-hazardous waste codes to be used as feedstock materials are requested.

2 Site Description

The facility will treat around 94,900 tonnes per annum (TPA) of feedstocks comprising energy crops primarily maize and wholecrop silage, straw and animal manures, supplied by local farms; and as well as dirty water and non-hazardous liquid wastes to supplement process water use. The 6.2ha of site area was previously arable land and is adjacent to a poultry unit, the manures from which will be treated within the AD Plant.

The feedstocks for the AD plant are energy crops primarily maize and wholecrop silage, straw and animal manures, supplied by local farms

The site will produce 20,286,323 Nm^3/y of biogas which will be used on site to generate heat and power and upgraded to biomethane for injection to the National Gas Grid via virtual pipeline and carbon dioxide captured for use or sequestration. In addition, around 26,182 TPA of solid fibre digestate and 67, 454 TPA of liquid digestate will be produced to be used as a biofertiliser on local farms.

3 Planning

Planning permission for the site was approved by West Northamptonshire Council on the 18 January 2024 (ref: WNS/2022/2402/EIA). The site has a continuous history of being open agricultural fields. The surrounding area has remained agricultural with generally only minor changes except for construction of the M1 motorway 200m east in the 1950s-1960s and a newly constructed poultry farm on the adjacent property around 2019.

[1] https://www.gov.uk/government/publications/sr2021-no-6-anaerobic-digestion-facility-including-use-of-the-resultant-biogas-installations/sr2021-no-6-anaerobic-digestion-facility-including-use-of-the-resultant-biogas-installations, Accessed 21 August 2021

4 Permitting

The operation requires an Installation permit as the proposed AD plant will have a treatment capacity of over 100 tonnes per day which constitutes a listed activity under Part 2 to Schedule 1 of the Environmental Permitting Regulations 2016.

The operation cannot benefit from the appropriate Standard Rules (SR) permit SR2021 No.6 given:

- The location criteria under permit condition 2.2.4 cannot be met, namely there are areas of Priority Habitat Inventory (PHI) deciduous woodland adjacent to the southwest corner of the AD site area and west of the Lagoon and a further PHI woodland area around 34m to the northwest of the site boundary.
- Under Activity 3 of SR2021 No.6 (gas combustion to produce heat and power) the total aggregated rated thermal input for appliances must be less than 5 megawatts. This threshold will be exceeded. The net rated thermal input figures of the proposed plant are shown in Appendix A.
- It is proposed that the Combined Heat and Power Engines (CHPs) are fitted with heat exchangers which reduce the exit temperature of the exhaust gas. The Standard Rules Installation permits stipulate that the "*(ii) the gas exit temperature shall be no less than 200°C*". The heat exchangers may introduce a non-compliance to the Standard Rules permit.

Carbon dioxide (CO_2) capture, treatment and storage from biogas, are to be carried out on site, currently covered under RPS 255 but to be included as a permitted activity in future.[2] For all these reasons a new bespoke installation permit is required.

Pre-application advice was initially sought from the Environment Agency (EA) with respect to this permit application in December 2022 (Reference: EPR/ KP3440QR/A001). In order to ensure that all relevant nature and conservation sites have been considered a further basic pre-application request was made in March 2024 (Reference EPR/ RP3426SN/P001). The Nature and Heritage Conservation Screening Reports are included as Appendix B.

The potential environmental impacts relevant to the bespoke installation permit application have been fully considered in supporting documents to this permit application, and specifically within:

- The Air Quality Impact Assessment (AQIA)[3]; and
- The site-specific Environmental Risk Assessment (Appendix A of the Environmental Management System (EMS) Manual **(HRCL-ETL-EMS-MAN-P1**), which also includes the control measures that will be employed.

[2] https://www.gov.uk/government/publications/treating-storing-and-using-carbon-dioxide-from-anaerobic-digestion-rps-255/treating-storing-and-using-carbon-dioxide-from-anaerobic-digestion-rps-255

[3] Earthcare Technical Ltd (June 2025) Horse Close AD Plant Air Quality Impact Assessment (Doc ref: ETL747_HRCL_AQIA_V1.1)

Details in relation to the proposed Medium Combustion Plant (MCP) are shown in Appendix A. The calculations for net rated thermal input of plant are detailed in Appendix B of the EMS Manual **(HRCL-ETL-EMS-MAN-P1).**

5 Site Details

5.1 Location

Site Address: Horse Close AD Plant, Courteenhall, Northamptonshire, NN7 2QF

National Grid Reference (approx. centre of Site): SP 77438 52588

Local Authorities: West Northamptonshire Council

The Site Location is shown in Figure 1 - Site Location Plan.

The total site permitted area is 6.2 hectares (15.3 acres) in extent. The site is located on the Courteenhall Estate which is an arable operation producing cereals, oilseeds, and pulses. The proposed site sits within the South Northamptonshire area of West Northamptonshire Council. The large town of Northampton lies 3.3km north of the proposed site and the City of Milton Keynes 12.5km to the south. Both Northampton and Milton Keynes are easily accessible from the M1 motorway which runs from the northwest to southeast. The M1 is approximately 190m, as the crow flies, from the proposed site with access at J15 around 3km north of the site.

The proposed site will be accessible to vehicles from the southwest corner of the site boundary via a network of local roads.

The proposed site is an agricultural field which has been in arable production for at least 10 years and was under a Countryside Stewardship Agreement. An online pond which forms part of the River Nene basin is situated approximately 30m from the northern edge of the site boundary.

5.2 Environmental Sensitivities

Environmental sensitivities have been assessed through a Groundsure Enviro+Geo Insight Report[4] obtained 11 March 2024 and verified via publicly available data sources accessed 04 February 2025.

5.2.1 Geology

Site soils are classified as lime-rich loamy and clayey soils with slightly impeded drainage[5] over superficial geology of Oadby Member, Diamicton of Low to moderate permeability. Underlying bedrock geology is Blisworth Limestone Formation of Bathonian age. Bedrock permeability is very high[6]. The

[4] Groundsure Enviro+Geo Insight Report, obtained 11 March 2024

[5] Soilscape Viewer https://www.landis.org.uk/soilscapes, accessed 04 February 2025

[6] British Geological Viewer, https://geologyviewer.bgs.ac.uk/ accessed 04 February 2025

site has an Agricultural Land Classification of Grade 3[7]. Good to moderate quality agricultural land. Land with moderate limitations which affect the choice of crops, timing and type of cultivation, harvesting or the level of yield.

5.2.2 Hydrogeology

The Site is over a Principal Aquifer, but risk is mitigated due to significant thickness of low permeable superficial deposits overlying the bedrock and is therefore designated as a secondary superficial aquifer of Medium Vulnerability. The site is over Productive Bedrock Aquifer and Productive Superficial Aquifer.

The closest Abstraction is a groundwater abstraction for general farming and domestic use at Qinton Green (Licence No. 5/32/04/*G/0013). This is located 1067m north east of the site.

There is a historical surface water abstraction at Lower Farm 1867m north of the site which is not actively used.

There are two investigative borehole records on the farm itself. Additional borehole records relate to widening works to the M1 road junction nearby.

5.2.3 Groundwater

There is low to moderate risk to groundwater given that the deep low permeability superficial deposits are above the underlying limestone bedrock aquifer.

The site overlies the Northampton Sands Groundwater body but is not within a Groundwater Source Protection Zone or Drinking Water Safeguard Zone (Groundwater) (England).

The site is within the River Nene Nitrate Vulnerable Zone (NVZ), designated for surface water sensitivity and the Thrapston lake Eutrophic NVZ.

[7] https://magic.defra.gov.uk/MagicMap.aspx, accessed 04 February 2025

5.2.4 Surface Water

The site is within the Nene Catchment and there is a watercourse 28m northwest of the site boundary which feeds into a small inline pond (approximately 50m2 in area) and then into a tributary of the Wootton Brook (2.9km north of the site), which was classified as having a 'Poor' overall rating in terms of water quality under the Water Framework Directive. The site is also within a Drinking Water Safeguard Zone for Surface Water (Anglian_SWSGZ1006,1007,1008,1009,1010_River Nene)

There is a new pond, a biodiversity enhancement feature, to be built and landscaped to the northeastern corner of the site.

5.2.5 Flood Risk

The proposed site is situated within a Flood Risk Zone 1, which means it has low probability of flooding from rivers and the sea.[8] There is a negligible risk of flooding on site from surface or groundwaters.

5.2.6 Human Receptors

Human receptors within 1 km of the site are captured in Table 2 below and are shown in Figure 6 – Human Receptor Plan. The village of Littleton lies over 1km from the proposed site.

Table 1 Human receptors within 1km of the site

ID	Receptor Name	Type of receptor	NGR X	NGR Y	Distance from site boundary (m)	Direction from site
R1	Courteenhall East Lodge	Residential and commercial units including building supplies and physiotherapists	477260	252901	211	N
R2	Quinton Green	Residential and commercial units including children's day care	478151	253020	634	NE
R3	Courteenhall, West Northamptonshire, England, NN7 2QE, United Kingdom	Residential	476718	253031	645	NW
R4	Bluebell Rise, Grange Park, West Northamptonshire, England, NN4 5DF, United Kingdom	Residential	476832	254278	1643	NW
R5	Village Spinney	Residential	476679	252985	660	NW

[8] https://flood-map-for-planning.service.gov.uk accessed 9th December 2024

ID	Receptor Name	Type of receptor	NGR X	NGR Y	Distance from site boundary (m)	Direction from site
R6	St Peter and St Pauls Church	Place of worship	476460	252929	836	NW
R7	Quinton, West Northamptonshire, England, NN7 2EG, United Kingdom	Residential	478276	253263	857	NE
R8	Courteenhall Farm	Residential, public house and gardens, commercial units	476103	252952	1190	WNW
R9	Quinton, West Northamptonshire, England, NN7 2EA, United Kingdom	Residential	477839	253970	1239	NNE
R10	Quinton, West Northamptonshire, England, NN7 2EG, United Kingdom	Residential	478394	253701	1248	NE
R11	Quinton, West Northamptonshire, England, NN7 2EG, United Kingdom	Residential	478849	252302	1268	SE
R12	14, Fox Covert Drive, Roade, West Northamptonshire, England, NN7 2LL, United Kingdom	Residential	476603	251440	1268	SW
R13	M1, Quinton, West Northamptonshire, England, NN7 2HD, United Kingdom	Residential	478350	251531	1280	SE
R14	Ashton, Roade, West Northamptonshire, England, NN7 2JT, United Kingdom	Commercial	477038	251137	1336	SSW
R15	Manor Close, Roade, West Northamptonshire, England, NN7 2PE, United Kingdom	Residential	476080	251805	1451	SW
R16	Northampton Road, Roade, West Northamptonshire, England, NN7 2PF, United Kingdom	Residential	475612	252158	1702	WSW

Note: a permitted poultry Installation is located 10 m to the north east of the Site boundary. Following a review of Site personnel attendance hours, the poultry unit has been dismissed as a potential sensitive receptor; the Site works to a 7 week cleanout cycle with employees typically present on Site for short periods (<6 hours at a time) with the exception of approximately 2 days out of every 7 weeks when the units are cleaned out.

5.2.7 Ecological Receptors

Details on nearby ecological receptors are provided below.

5.2.7.1 Statutory Designated Sites

There are no statutory designated sites within 2 km of the proposed permitted boundary. SSSI Sites within 5km are:

- Roade Cutting SSSI 2.04km west which can be excluded as an ecological receptor as it is designated for geological features only; and
- Salcey Forest SSSI 2.95km south west, (which is also classified as an Ancient Woodland and contains areas of Local Wildlife site).

The Upper Nene Valley Gravel Pits SSSI, Special Protection Area (SPA) and Ramsar is 6.9km northeast of the site.

These are shown on plans within the Nature and Heritage Conservation Screening Report Appendix B.

5.2.7.2 Priority Habitats & Species

There is an area designated as Priority Habitat (PHI) deciduous woodland adjacent to the southwest corner of the AD site area and west of the lagoon and a further PHI woodland area around 34m to the northwest of the site boundary. There are no Local or National Nature Reserves within 5km of the site.

There are two records of Ancient Woodland within 2km of the site, both are components of the Salcey Forest and Rowley Wood, the closest of which are:

- Stoneway Copse 1.32km east of the site, part of Salcey Forest.
- Rowley Wood 1.64km south east of the site

The following Local Wildlife Sites are present within 2km of the site:

- Roade Disused Railway East 0.48km south
- Salcey Forest the closest area being 1.32km east, Stoneway Copse
- Rowley Wood 1.64km south east
- Preston Wood 2.0km north east

These are shown on plans within the Nature and Heritage Conservation Screening Report Appendix B.

Northamptonshire Biodiversity Records Centre note the presence of a Potential Wildlife Site (PWS), adjacent to the NW site corner which has not been considered as such as this is unverified but has been considered as designated PHI Habitat.

The nearest area identified for the presence of Great Crested Newts (GCN) is situated in Roade 1.7km southwest of the proposed site. A recent survey of the ponds within 500m of the site carried out by SLR consulting found no evidence of GCNs.

5.2.8 Scheduled Monuments

There are no Scheduled Monuments within 1km of the Site boundary.

5.2.9 Air Quality Management Areas

The site is not within an Air Quality Management Area (AQMA). The nearest AQMA is 2.8km northwest of the site starting at Junction 15 of the M1 motorway running northwest away from the proposed site.[9]

5.3 Process Summary

The process description is fully detailed within Section 5 of the EMS Manual **(HRCL-ETL-EMS-MAN-P1)** and depicted as a Process Flow Diagram (Appendix C). A Site Layout Plan is also provided (Figure 3).

The feedstocks for the AD plant are energy crops primarily maize and wholecrop silage, straw and animal manures, supplied by local farms. The AD plant will treat around 94,900 tonnes per year of feedstock. The proposed feedstocks in accordance with the Permitted Activities document[10] which supports this permit application includes a number of non-hazardous liquid wastes which are requested to future proof the operation in terms of liquid process water supply. These waste streams are not part of the current mass balance however, this would be adjusted in accordance with feedstock testing if these waste types were available.

The solid manures are stored in a dedicated Manure reception building fitted with bespoke emissions abatement plant. The solid waste feedstocks are macerated and mixed with recirculated digestate liquor and process water. The liquid manures are stored in a Liquid feedstock tank (402m^3).

Crops are ensiled on site in three silage clamps. Crop feedstocks are fed into the process via two external feed hoppers (dry feed system), through a Hammermill pre-treatment process into Primary digesters via an auger.

The straw is treated in a Straw treatment building; the process involves wetting and chopping the straw to break up the bales and reduce dry matter prior to passing the processed straw through an extruder, which opens up the lignin in the straw. The extruded straw is mixed with digestate within an enclosed Pre-mix Liquid Feeding System which connects the Feed hopper to the 2 No. PowerRing Digesters.

The digesters operate in the mesophilic temperature range at 38-45°C. The Digester Tanks utilise PowerRing concept technology. Each of the 2 No. PowerRing Digesters consists of two digesters (one inside the other); a Primary Digester and a Secondary Digester. The 2 No. Primary Digesters (PD1 & PD2) operate in parallel and feed into the two Secondary Digesters (SD1 & SD2) via an overflow. Both Secondary Digesters feed into a single Tertiary Digester (TD1). The Primary digesters each have an operational capacity of 9,000m^3, the Secondary digesters each have an operational capacity of 4,512m^3 and the Tertiary digester each have an operational capacity of 7,444m^3.

Whole digestate from the Tertiary digester is then pasteurised in one of three 25m^3 batch pasteurising tanks. Each batch is heated to over 70°C for a minimum of one hour prior to being cooled via a heat exchanger and then being pumped to the Hygienized Digestate Tank (80 m^3). Whole digestate from the Hygienized Digestate Tank is pumped to the 2 No. RC75 Börger type mechanical separators capable of separating up to 75m^3/hr of whole digestate equivalent to 1800 m^3/tonnes per day. housed within the

[9] https://uk-air.defra.gov.uk/aqma/maps/ accessed 6th December 2024

[10] Earthcare Technical Limited, Permitted Activities, (Doc ref: ETL747_HRCL _Permitted_Activities_V1.0)

Separator covered bunker. . The expected daily process requirement is to separate approximately 448 m^3/tonnes per day.

Separated liquor is pumped from the separator to:

- the digestate storage lagoon with working capacity of 12,350 m^3.
- the Digestate Buffer Tank (402 m^3) which feeds the premix systems for the manure and straw feeding systems.

The fibre collects in the Separator covered bunker below the separators.

Both the separated liquor and fibre digestate are to be used as a biofertiliser on nearby farms. Digestate will be removed from site either to on farm storage locations or delivered to be spread directly to land for agricultural benefit to meet crop need.

The biogas will be upgraded into biomethane which will be transported offsite for injection at a central gas to grid injection point. In addition, carbon dioxide (CO_2) from the biogas will be captured and upgraded to 99.9% purity. The treated CO_2 is suitable for almost all industrial and commercial applications in the UK. Upgraded CO_2 will be liquefied and transported by road to end users.

There are 2 No. 1.2 MW CHPs; one of which will burn biogas and the other natural gas to produce heat and electricity. Heat from the CHPs is used to maintain the temperature of the digesters and to provide heat to the pasteurisers.

There is also a dual fuel emergency boiler (500kW for biogas, 560 kW for natural gas) which can burn biogas or biomethane (or natural gas) to provide heat for the AD process, if one or more of the CHPs is non-operational.

5.4 Infrastructure list

The site infrastructure is listed in Table 3 below.

Table 2 List of site infrastructure

Item.	Working capacity
3 No. Silage clamps	Clamp 1: 11,760 m^3
	Clamp 2: 17,000 m^3
	Clamp 3: 19,900 m^3
	Total: 48,660 m^3
1 No. Silage effluent Tank	54 m^3
1 No. Manure reception building	
Centriair abatement plant to manure building	
1 No. Straw processing building	
1 No. Straw set down bay	
2 No. Silage feed hoppers	120 m^3 each
2 No. Pre-treatment Hammer Mills	75 kW each
1 No. Solid Manure Feed System	65 m^3
1 No. Straw Feed System	65 m^3
1 No. Liquid Feedstock Tank	402 m^3
2 No. Water Tanks (Dirty)	402 m^3
Primary Digester-I	9000 m^3
Secondary Digester-I	4512 m^3
Primary Digester-II	9000 m^3
Secondary Digester-II	4512 m^3
Tertiary Digester	7444 m^3
1 No. Gas Dome above tertiary digester	3,800 m^3
2 No. Desulphurisation plant with oxygen injection	
Supervisory Control and Data Acquisition (SCADA) System	
3 No. Pasteurisation Tanks	25 m^3 each
1 No. Hygienized Digestate Tank	80m^3
1 No. Digestate separation fully enclosed bunker	
2 No. Borger RC75	Up to 75m^3/hr
1 No. Digestate Buffer Tank	402 m^3
1 No. Fire Water Tank	250 m^3
1 No. Digestate Lagoon (750mm freeboard)	12,350 m^3
2 No. Digestate offtake points	5.1m^3 (sump for secondary off-take point located outside of bund)
1 No. Clean Water lagoon (300m freeboard)	511.57 m^3

1 No. Dirty Water Lagoon (750mm freeboard)	510 m^3
2 No. Gas Valve/ Condensate Chambers (Condensate sump 1 & 2)	
Gas Booster and carbon filter	
2 No. Quanto Dual fuel CHPs with heat exchangers	2 No. 1200 kW each
1 No. Emergency boiler	560 kW
1 No. Emergency Flare	50-2,600 Nm^3/hr
1 No. Emergency Generator (Back up)	616 kW (770 KVA)
Biogas upgrade unit (BUU)	Capacity: 2,200 Nm^3/hr
Chiller(s) on BUU	
Biogas booster skid	
Compressors	
3 No. CO_2 recovery unit and CO_2 tanks	CO_2 tanks: 50 m^3
4 No. Biomethane (CNG) trailer bays /CO_2 off-take bays	
Secondary containment bund	
Parking area	
Access road	
Pump containers	
Site boundary fence	
2 No. Weighbridges	
Site office, Welfare (including Wastewater package treatment plant (Klargester)) and Workshop	
Technical Building, including site laboratory (within containment bund)	
Clean water break tank	10 m^3
2 No. Clean water tanks	30 m^3 each
Additional booster pumps	

5.5 Requested feedstock material waste codes

A list of proposed permitted waste codes to be treated is provided in Table 4 below.

Table 3 Proposed permitted waste types for anaerobic digestion

Waste code	Description
02	**Wastes from agriculture, horticulture, aquaculture, forestry, hunting and fishing, food preparation and processing**
02 01	**Wastes from agriculture, horticulture, aquaculture, forestry, hunting and fishing**
02 01 01	Sludges from washing and cleaning – vegetables, fruit and other crops
02 01 03	Plant tissue waste
02 01 06	Animal faeces, urine and manure (including spoiled fully biodegradable animal bedding)
02 01 99	Wastes not otherwise specified – spent mushroom compost from commercial mushroom growing only
02 03	**Wastes from fruit, vegetables, cereals, edible oils, cocoa, coffee, tea and tobacco preparation and processing; conserve production; yeast and yeast extract production, molasses preparation and fermentation**
02 03 01	Sludges from washing, cleaning peeling, centrifuging and separation (including sludge from production of edible fats and oils, seasoning residues, molasses residues, residues from production of potato, corn or rice starch only)
02 03 04	Materials unsuitable for consumption or processing (including waste from production of edible fats and oils, seasoning residues, molasses residues, residues from production of potato, corn or rice starch only)
02 03 05	Sludges from on-site effluent treatment (including sludge from production of edible fats and oils, seasoning residues, molasses residues, residues from production of potato, corn or rice starch only)
02 04	**Wastes from sugar processing**
02 04 03	Sludges from on-site effluent treatment – sludges from the processing of sugar
02 05	**Wastes from the dairy products industry**
02 05 01	Materials unsuitable for consumption or processing – biodegradable wastes derived from the processing of dairy products only
02 05 02	Sludges from on-site effluent treatment
02 06	**Wastes from the baking and confectionery industry**
02 06 01	Materials unsuitable for consumption or processing – biodegradable wastes from the processing of materials used in bakery and confectionery

02 06 02	Wastes from preserving agents
02 07	**Wastes from the production of alcoholic and non-alcoholic beverages (except coffee, tea and cocoa)**
02 07 01	Wastes from washing, cleaning and mechanical reduction of raw materials – biodegradable wastes from the processing of the raw materials used in the production of such beverages only (wastes from the production of alcoholic and non-alcoholic beverages (except coffee, tea and cocoa))
02 07 02	Wastes from spirits distillation – spent grains, hops and whisky filter sheets and cloths, yeast and yeast like residues, sludge from production process, or malt husks, malt sprouts, yeasts and yeast-like residues only
02 07 04	Materials unsuitable for consumption or processing – biodegradable wastes from the processing of the raw materials used in the production of such beverages only (wastes from the production of alcoholic and non-alcoholic beverages (except coffee, tea and cocoa))
02 07 05	Sludges from on-site effluent treatment – sludges from the production of alcoholic and non- alcoholic beverages (except coffee, tea and cocoa)
16 10	**Wastes not otherwise specified in the list, Aqueous liquid waste destined for off-site treatment**
16 10 02	Untreated wash waters from cleaning fruit and vegetables on farm only
16 10 02	Sludges from washing and cleaning fruit and vegetables on farm only
16 10 02	Milk and dairy waste milk from agricultural premises only
16 10 02	Liquor or leachate from a composting or anaerobic process that accepts waste input types listed in these standard rules or composting and anaerobic digestion standard rules only, and in compliance with Animal By-Products Regulations
19 06	**Wastes from waste management facilities, off-site wastewater treatment plants and preparation of water intended for human consumption/industrial use, Waste from the anaerobic treatment of waste**
19 06 03	Liquor from anaerobic treatment of municipal waste (from a process that accepts wastes listed in these standard rules or anaerobic digestion standard rules only) and made up of previously pasteurised
19 06 05	Digestate from anaerobic treatment of source segregated biodegradable waste (from a process that treats wastes which are listed in these standard rules only and pasteurised)

6 Management

The site is operated by ABL, who are in the process of developing several AD plants nationwide. The AD plants will be managed by ABL, supported by the management team. There will be a Site Manager, who will be responsible for the day-to-day operation of the AD plant and who will act as the Technically Competent Manager (TCM). The Site Manager will manage Site Operatives to assist in day-to-day operations. The Head of Permitting is a TCM who will also provide cover until a Site Manager with the relevant qualifications is in place.

The Site Manager will be managed and supported by the wider ABL management team. Roles and responsibilities are summarised in the Staff Organogram (Appendix D of the EMS Manual **(HRCL-ETL-EMS-MAN-P1)** and are detailed in Section 10 of the EMS Manual **(HRCL-ETL-EMS-MAN-P1)** and associated Standard Operating Procedures (SOPs).

Contracts will be in place for the supply of feedstocks and off-take of all digestate produced to be applied to land for agricultural benefit.

7 Control of Emissions to Land and Water

7.1 Overview

There are no emissions to land.

Dirty water from the silage clamps, digestate offtake points and areas designated as 'dirty' within the containment bund including; the feeder loading area, separator bunker and manure reception building is collected and reused in the process. Water collecting within the remainder of the secondary containment system is used within the AD process under normal operating conditions.

Clean rainwater from the designated clean areas of the site including vehicle access and movement areas (via a full retention separator) and roofs may be discharged the Clean Water Lagoon (511 m^3) before out falling to an existing watercourse to the north west corner via a hydro brake to allow for flow control or being directed to the Dirty Water Tanks for reuse within the process. The discharge of clean water to the watercourse is not an emission to water per se as this is clean rainwater only. However, it has been given an emission point reference of W1 - Clean surface water from lagoon storage. See Figure 2: Site Emissions Plan.

7.2 Primary Containment

7.2.1 Silage Clamps

The 3 No. silage clamps, which will store and contain ensiled crop, have a hot rolled asphalt (HRA) base and three back-filled concrete walls each in a U shape. The clamp dimensions are:

Clamp 1 – 58.75 m (l) x 42.5 m (w) x 3.52 m (wall height) (11,760 m^3capacity)
Clamp 2 – 73.75 m (l) x 42.5 m (w) x 3.52 m (wall height) (17,000 m^3)
Clamp 3 – 97.80 m (l) x 42.5 m (w) x 3.52 m (wall height) (19,900 m^3)

The clamps are an Ark Agriculture backfilled design, a patented sloping walled silage clamp system. The design incorporates the following features:

- A fall along the axis of the clamps to enable drainage of leachate off the clamp surface to the leachate collection system in front of the clamps.
- A leak detection system in the backfilled walls in accordance with The Water Resources (Control of Pollution) (Silage, Slurry and Agricultural Fuel Oil) (England) Regulations 2010 (SSAFO).

The leak detection drain of the clamps is inspected daily in accordance with Daily Checks **(HRCL-QUAL-DAILY CHECKS-AQD 24-P1)**. The silage clamps are inspected annually when empty, and repairs will be made as necessary, to be signed off by a suitably qualified engineer.

7.2.2 Silage Effluent Tank

Silage effluent arising from the silage clamps flows into a Silage Effluent Tank (54 m^3). In preference to storage of all leachate below ground, the tank contains level switches and submersible pumps to pump

the leachate to 2 No. Dirty Water Tanks (402m^3 each) above ground within the secondary containment area.

The capacity calculations in relation to SSAFO are detailed in Section 6.1.2 of the EMS Manual **(HRCL-ETL-EMS-MAN-P1)**.

The Silage Effluent Tank is constructed of polyethylene and has a secondary liner under the full extent of the tank, carried up to the surface and sealed. A leak detection point is provided between the tank and the liner which will be inspected daily in accordance with Daily Checks **(HRCL-QUAL-DAILY CHECKS-AQD 24-P1).**

The Silage Effluent Tank benefits from a level sensor linked to SCADA.

7.2.3 Ancillary Tanks

There are 5 No. above ground ancillary tanks namely:

1 No. Liquid Feedstock Tank (402 m^3)
2 No. Dirty Water Tanks (402 m^3 each)
1 No. Hygienized Digestate Tank (80 m^3)
1 No. Digestate Buffer Tank (402 m^3)

These tanks are for the storage of slurry, non-hazardous liquid wastes, leachate, separated liquor or water for the process and are constructed of concrete and sited within the secondary containment system.

The 3 No. Pasteurisation Tanks (25 m^3 each) are made from stainless steel and are also within the secondary containment system.

All tanks will be inspected during installation and by a suitably qualified engineer every 5 years thereafter.

The ancillary tanks all benefit from level sensors linked to SCADA.

7.2.4 Digesters

The 2 No PowerRing digesters are each constructed of concrete base, walls and flat roofs, manufactured and cast in situ by Wolf. The Tertiary digester is constructed of concrete base and walls and has a double-membrane gas tight cover roof. The inner and outer membranes of the covers are PVC coated, and the outer membrane is resistant to UV.

Following construction, all digester tanks will be hydrostatically tested, and Construction quality assurance (CQA) validated by a suitably qualified engineer to ensure they are fit for use.

All tanks will be inspected by a suitably qualified engineer every 5 years as part of a scheduled tank inspection and de-grit programme.

The digesters all benefit from level sensors and overfilling / foaming prevention sensors linked to SCADA.

7.2.5 Digestate Storage Lagoon

The Digestate storage lagoon has a storage capacity of 12,350 m^3 excluding freeboard and is constructed of the following layers starting from the base:

- Sub-grade material with a smooth surface.
- Proprietary drainage medium.
- 200 grams per square metre (GSM) non-woven geotextile membrane to separate and protect secondary liner from sub-grade materials.
- Secondary 1.0mm low density polyethylene (LDPE) liner.
- Intermediate drainage medium laid in 750mm wide strips at 2.5m centres gravitating to an inspection/monitoring chamber on the outside of the fence.
- Primary 2.0mm High density polyethylene (HDPE) liner.
- 2.0mm LDPE floating gas collection cover

The liners will be continuously welded and anchored in trench around the top of lagoon and graded down to the draw-off sump.

The Leak detection and sampling point will allow the use of a sampling jar on a retractable rod to recover samples from the ground water collection chamber beside the draw-off sump for monitoring purposes.

The recirculation pipework will sit within a lined trench with leak detection.

The working capacity of the Digestate storage lagoon volume is 12,350 m^3 as 750 mm freeboard will be maintained at all times and the level will be checked on a daily basis in accordance with Daily Checks **(HRCL-QUAL-DAILY CHECKS-AQD 24-P1)**.

7.2.6 Storage of Oils & Chemicals

Fresh oil and waste oil associated with the operation of the CHPs are stored in bunded tanks.

Diesel and Ad-Blue are stored in bunded tanks. The emergency generator has an integral bunded diesel tank (200 m^3).

Ferric hydroxide powder is kept undercover in the integrally bunded chemical store.

Glycol, sulphuric acid (for Manure reception building emissions abatement plant) and anti-foam are kept in a bunded area in the chemical store.

An Inventory of Substances stored on site will be maintained in Appendix A of the Accident Management Plan Manual **(HRCL-ETL-AMP-RPT-P1)**.[11]

[11] Accident Management Plan Manual, Horse Close AD, HRCL-ETL-AMP-RPT-P1, V1.0

7.3 Secondary Containment

7.3.1 Secondary Containment System for Tanks

The secondary containment system for the AD plant is designed in accordance with CIRIA C736 and is fully detailed within the Primary & Secondary Containment Report With Bund Capacity Calculations Report produced by the GGP Consult, who designed the system.[12]

The secondary containment system comprises a concrete slab underlain with an HDPE layer. The bund walls are comprised of sections of earthwork bunds (lined with a protective HDPE liner) and concrete wall around the slab, providing available containment volume equal to 17,010 m^3,based on the proposed minimum wall level of 121.800 m AOD and earth bund level of 122.800 m AOD. A surge allowance of 750 mm for the earth bunds and 250 mm for the concrete bund has been used within the construction design wall levels in accordance with the CIRIA guidance.

The containment capacity is designed in accordance with CIRIA C736, with the calculations in the report demonstrating 110% of the largest tank volume to be a greater volume than 25% of the combined tank volume. Pipework will not penetrate the containment walls or floor. The primary and secondary containment infrastructure is checked on a daily basis in accordance with Daily Checks (**HRCL-QUAL-DAILY CHECKS-AQD 24-P1**).

The secondary containment sump is inspected daily in accordance with the Secondary Containment Checking & Emptying Procedure (**HRCL-QUAL-SECONDARY CONTAINMENT CHECKS AND EMPTYING-WI12-P1**).

7.3.2 Leak Detection for Concrete Slab

There is an HDPE layer underlying the whole concrete slab within the secondary containment area, which facilitates leak detection as well as containment, to provide further reassurance as to containment integrity. The inspection of this leak detection system via 1 No. leak detection pot is carried out daily in accordance with Daily Checks **(HRCL-QUAL-DAILY CHECKS-AQD 24-P1).**

7.3.3 Leak Detection for Silage Effluent Tank

The Silage Effluent Tank has a secondary liner under the full extent of the tank, carried up to the surface and sealed. A leak detection point is provided between the tank and the liner which is inspected daily in accordance with Daily Checks **(HRCL-QUAL-DAILY CHECKS-AQD 24-P1).**

7.3.4 Leak Detection for Digesters

The digesters will sit slightly below the main containment slab to allow the drainage of the slab base to fall towards the secondary containment system sump to the south of the site. Given the tanks are located below the bund slab, but above the HDPE liner, a leak detection system has been incorporated by Wolf to allow for leak detection of each tank. This system is sealed to prevent leaks escaping into the lower HDPE membrane and or liquid flowing into the system from above.

[12] Primary & Secondary Containment Report With Bund Capacity Calculations, Horse Close AD, GGP-29384-CON-03, GGP Consult, February 2025

The 3 No. Digester leak detection pots to be inspected daily in accordance with Daily Checks **(HRCL-QUAL-DAILY CHECKS-AQD 24-P1)**.

Further detail is provided within the Primary & Secondary Containment Report with Bund Capacity Calculations Report by GGP Consult.[11]

7.4 Drainage description

7.4.1 Overview

The drainage system is designed by GGP Consult and described in their Drainage Impact Assessment report.[13]

This section provides a summary of the drainage which should be read in conjunction with the Drainage Impact Assessment, the Drainage Process Flow Diagram (Appendix D), Figure 4: Drainage Layout and Figure 5: Drainage Catchment Plan.

The entire impermeable surfacing and drainage system is subject to an inspection, maintenance, and repair schedule.

7.4.2 Dirty Areas

Leachate and dirty water from the silage clamps is collected through channel drains running along the front of the clamps falling to 1 No. Silage Effluent Tank (54 m^3 each). The tank has a level switch and submersible pump which pumps leachate to the 2 No. Dirty Water Tanks (402 m^3 each) for use within the AD process.

The dirty area around the feeders, Manure Reception Building and the digestate separators drains through a series of drainage channels, pipes and chambers and stored within the process water tanks; the 2 No. Dirty Water Tanks for use in the AD process.

The principal digestate off-take point is located within the containment bund. The secondary off-take point benefits from a concrete apron and 5.1 m^3 spill collection sump.

7.4.3 Condensate

Condensate from gas cooling is collected separately in 2 No. condensate sumps and then recirculated for treatment within the digesters.

7.4.4 Clean Areas

In accordance with the drainage strategy, surface water from hardstanding areas is discharged into a Klargester Full Retention Separator to ensure oil, chemicals and solids are removed. The outflow from the separator along with clean water from building roofs is stored within the Clean Water Lagoon (511 m^3) before out falling to an existing watercourse to the north west corner via a hydro brake to allow for flow control or diversion to the Dirty Water Tanks for reuse within the process.

[13] Drainage Impact Assessment, Horse Close AD, GGP-29348-CD-DIA-08, GGP Consult, February 2025

The system has been sized to accommodate up to a 1:100-year storm event with a 40% allowance for climate change. The Drainage Impact Assessment should be referred to for full calculations provided as a supporting document to this application.[13]

Penstocks are in place for the clean water drainage system, including at the following locations, such that any spillages can be contained on site if required:

- Before the full retention interceptor;
- Downstream of the full retention interceptor; and
- On the Hydro-Brake.

The Penstocks also allow for diversion of clean water into process water capture at periods of low rainfall.

7.4.5 Secondary Containment Drainage

Water collecting within the secondary containment area is quality assessed daily in accordance with the Secondary Containment Checking & Emptying Procedure **(HRCL-QUAL-SECONDARY CONTAINMENT CHECKS AND EMPTYING-WI12-P1)**.

Within the containment bund, areas at high risk of producing dirty water runoff (the area around the Feeders and Digestate Separators) are segregated and managed separately as described in Section 7.4.2 as Dirty Areas. Typically, water from the remainder of the secondary containment bund is also treated as dirty and pumped to the Liquid Feedstock Tank for treatment in the AD process. If visibly contaminated the source of the contamination will be immediately investigated in accordance with the Spill Control Procedure **(HRCL-QUAL-SPILL CONTROL/USE OF SPILL KITS-WI24-P1)**, and steps taken to resolve it.

The secondary containment system is designed in accordance with CIRIA 736. The required additional capacity for rainfall accumulation has been calculated using a worst-case scenario for a 12-hour period of the site being unmanned (12 hour 1:100 storm event with a 40% allowance for climate change).

In the case of abnormal excess water levels due to an extreme rainfall event clean water from the secondary containment system may be released to the wider environment following pre-determined checks detailed within the Discharge of Flood Water Procedure **(HRCL-QUAL-DRAINING MANAGEMENT AND CONTROL-WI23-P1)**. In these circumstances, if the visual and olfactory checks confirm that there have been no spillages, and onsite testing confirms that required parameters are at acceptable levels, then the water will be pumped out to the Clean Water Lagoon as clean water.

7.4.6 Pipework

Above ground substrate pipework is stainless steel, designed for longevity and visible for daily inspection in accordance with Daily Checks **(HRCL-QUAL-DAILY CHECKS-AQD 24-P1)**.

Underground pipework has been avoided where possible and except for drainage pipework is limited to a small stretch of HDPE pipework beneath the farm track, transferring separated liquor digestate to the Digestate Lagoon. The lagoon pipework benefits from secondary containment and leak detection. Drainage pipework will be made of suitable material e.g., Poly Vinyl Chloride (PVCu) and sealed, and pressure tested (water & air) prior to completion. All drainage within the containment system is located above the 1.0 mm HDPE membrane, with pipes, channels & chambers to have minimum 175 mm concrete surround.

7.5 Control of Emissions to Land & Water under Abnormal Operations

Control of emissions to water and land under abnormal operating conditions are detailed in the Accident Management Plan Manual **(HRCL-ETL-AMP-RPT-P1)** and associated procedures including the Discharge of Flood Water Procedure **(HRCL-QUAL-DRAINING MANAGEMENT AND CONTROL-WI23-P1)**.

8 Control of Emissions to Air

8.1 Overview

The emission points to air A1 to A23 inclusive are shown on Figure 2 – Site Emissions Plan and are shown in Table 4 below:

Table 4: Emission Points to Air

Emission Point Reference	Source
A1	Combined heat and power engine stack 1
A2	Combined heat and power engine stack 2
A3	Emergency flare stack
A4	Emergency boiler stack
A5	Emergency generator stack
A6	Emissions abatement plant stack (Manure reception building)
A7	Biogas upgrade unit PRV
A8	Biogas upgrade unit Carbon dioxide vent
A9	Carbon dioxide recovery plant PRV1
A10	Carbon dioxide recovery plant PRV2
A11	Compressor PRV1
A12	Compressor PRV2
A13	Underground leachate tank vent
A14	PVRV on Primary digester 1
A15	PVRV on Secondary digester 2
A16	PVRV on Primary digester 2
A17	PVRV on Secondary digester 2
A18	PVRV on Tertiary digester
A19	Covered digestate storage lagoon carbon filter outlet
A20	Liquid feedstock tank carbon filter outlet
A21	Liquid Digestate off-take point carbon outlet
A22	PVRV on Liquid digestate storage lagoon
A23	Carbon dioxide recovery plant unit Carbon dioxide vent
A24	Liquid Digestate off-take point carbon filter outlet (principal loading point)

8.2 Control of Emissions from the Manure Reception Building and Pasteurisers

Air from the Manure reception building is treated via a bespoke emissions abatement plant supplied by CentriAir which comprises the following steps:

- Sulphuric acid scrubber removes ammonia.
- High intensity ultraviolet (UV) light treatment termed 'ColdOx UV' which provides two wavelengths of UV light to both breakdown complex compounds and to produce ozone, which is used to oxidise Volatile Organic Compounds (VOCs);
- Double layer carbon filter as a final polishing step; and
- Release of treated air via a 15.5m stack (A6).

The system design will ensure that negative pressure is maintained within the building and an appropriate rate of airflow is maintained for effective treatment in the emissions abatement plant.

8.3 Control of Displaced Air from the Pasteurisers

Displaced air from the 3 No. Pasteurisers is passed through the Sulphuric acid scrubber (part of the emissions abatement plant serving the Manure Reception Building) before release to mitigate ammonia emissions.

Air from the Hygienized Digestate Tank and the Digestate Buffer Tank will be captured.

8.4 Control of Emissions from the Liquid Feedstock Tank

Displaced air from the Liquid feedstock tank is directed through an impregnated carbon filter to reduce emissions to air. The carbon filter will be replaced in line with manufacturers/ suppliers' recommendations.

8.5 Control of Emissions of Raw Biogas

Biogas pressure is measured by gas pressure sensors within the gas storage infrastructure, and is controlled by SCADA, to ensure process parameters are optimised such that gas production meets demand, and storage capacity is not exceeded (see EMS Manual **(HRCL-ETL-EMS-MAN-P1)**, Section 12.2 Process Monitoring), preventing a release to atmosphere via PVRVs.

If, due to equipment or system failure, excess biogas is produced the emergency flare will automatically and immediately ignite to burn the biogas to ensure it is not released to the atmosphere.

The emergency flare is a ground enclosed BAT compliant flare which is sized appropriately; it can burn between 500 to 2,600 Nm^3hr (variable) of biogas.

The predicted maximum production of biogas is 2,315 Nm^3/hr. Given that the CHP plant will also consume biogas, the expected maximum production of biomethane from the BUU is around 1,301 Nm^3/hr. Any reject Biomethane will be blended back together with the associated CO_2, which will also

be out of specification and this pure biogas stream will be returned to the gas storage dome above the Tertiary Digester.

The appropriate flare capacity has been calculated considering these figures and worst-case scenarios for production of off-specification biomethane.

The SCADA settings will dictate that the emergency flare will automatically start before the PVRVs will release gas, meaning that they are only in place for unforeseen emergency use.

8.6 Control of Fugitive Emissions of Biogas

There will be a Leak Detection and Repair (LDAR) Programme in place for the operational site which will be used to measure levels of VOCs, including methane from a number of monitoring points around the site as identified through the DSEAR risk assessment (**HRCL-ABL-DSEAR RISK ASSESSMENT-H&S-P1**) and LDAR programme.

LDAR inspections will be carried out by a third party annually, as a minimum. LDAR reports including tracking of required actions will be retained onsite.

8.7 Control of Combustion Emissions

Biogas treatment is carried out to reduce H_2S, VOCs and NH_3 levels within the biogas as described in the Process Description Section 5 of the EMS Manual **(HRCL-ETL-EMS-MAN-P1).** The removal of these trace gases reduces the potential for emissions when the biogas is combusted.

Emissions from combustion plant; CHPs (A1 & A2), emergency flare (A3), emergency boiler (A4), and emergency generator (A5) are controlled through a planned preventative inspection and maintenance regime.

The use of the emergency flare is minimised through the control of gas pressures and volumes through process monitoring.

8.8 Control of Emissions from the Biogas Upgrade Unit (BUU)

Under normal operating conditions there will be no emissions from the BUU. There is a PRV on the BUU (A7) which will only operate under abnormal operating conditions. If the CO_2 recovery plant is not operating, then CO_2 is released from the CO_2 stack on the BUU (A8) as is normal operation when CO_2 capture equipment is not installed.

8.9 Control of Emissions from the CO_2 Recovery Unit

Under normal operating conditions there will be no emissions from the CO_2 recovery unit. The 2 No. CO_2 recovery plant PRVs (A9 and A10) may release under abnormal operating conditions as a preventative safety measure.

8.10 Control of Emissions from Digestate Storage & Off-take

The digestate Separators and fibre digestate storage is within a covered bunker with a door which is closed when not in use.

The Digestate Storage Lagoon is fitted with gas capture to allow the venting of residual emissions which would reduce the digestate storage capacity. The captured gas is directed through an impregnated carbon filter to abate ammonia (A19).

The primary control for the release of biogas from the Digestate Storage Lagoon is production of stable digestate through process monitoring and management of the AD process (see EMS Manual **(HRCL-ETL-EMS-MAN-P1**) Section 12.2 & 12.3 on Process Monitoring & Management respectively). The three-stage digestion process reduces by-pass and thus residual biogas potential.

There are carbon filters at both digestate offtake points, located on the vents for displaced air during off-take of digestate liquor (A21 & A24). Carbon filters will be replaced when required in line with manufacturers / suppliers' recommendations.

8.11 Control of Emissions to Air under Abnormal Operations

Control of emissions to air under abnormal operating conditions are further detailed in the Accident Management Plan Manual **(HRCL-ETL-AMP-RPT-P1)** and associated procedures.

9 Control of Amenity Impacts

9.1 Odour

Odour emissions will be minimised through:

- Ensuring exposed silage clamp faces are kept tidy and to a minimum, when using energy crops, in accordance with the Feedstock Management & Loading Procedure **(HRCL-QUAL-FEEDSTOCK MANAGEMENT-WI13-P1).**
- Minimisation of Manure reception building fast acting roller shutter door opening times in accordance with the Feedstock Management & Loading Procedure **(HRCL-QUAL-FEEDSTOCK MANAGEMENT-WI13-P1)**.
- Digestate separation and fibre storage being within an enclosed bunker with roller shutter door, openings controlled in accordance with the Digestate Handling Procedure **(HRCL-QUAL-DIGESTATE HANDLING (SOLID AND LIQUID)-WI25-P1).**
- Process monitoring to ensure production of stable digestate with low odour potential in accordance with the Process Monitoring Procedure **(HRCL-QUAL-PROCESS MONITORING-WI16-P1)**.
- Regular inspection and maintenance of abatement measures including those associated with the odour control unit (OCU) for the Manure Reception Building, the Liquid Feedstock Tank and the Digestate Storage Lagoon and digestate offtake points in accordance with manufacturers recommendations and the Maintenance Planner **(HRCL-QUAL-MAINTENANCE PLANNER-AQD 27-P1).**

The maximum odour impact at a receptor location is below the relevant benchmark of 3.0ouE/m^3 for "moderately offensive" odours. Therefore, the site operation is unlikely to cause an odour impact at human receptors. Odour emissions will be controlled in accordance with the Odour Management Plan **(HRCL-ETL-OMP-RPT-P1).**

9.2 Noise

Noise emissions will be minimised through planned preventative maintenance for all equipment including the CHP(s), emergency flare and the gas storage dome fans which are potential sources of noise emissions, in accordance with the Maintenance Planner **(HRCL-QUAL-MAINTENANCE PLANNER-AQD 27-P1)**. The Environment Agency's Qualitative Noise Screening Assessment Tool (QNST) has been completed for the Site and is included with the permit application. The QNST concludes that neither a Noise Impact Assessment nor a Noise Management Plan are required for the permit application.

If noise emissions are detected off-site then corrective actions will be taken as soon as possible and a Noise Management Plan (NMP) will be developed, submitted to the EA and implemented.

A Noise Impact Assessment was carried out as part of the planning permission application for the site.[14] The findings verified those of the report concluded:

' It is concluded that noise should not present reasonable grounds for planning refusal. The likely acoustic effects have been established about the NOAEL and LOAEL thresholds of the NPSE, such that noise is not expected to cause any change in behaviour or attitude. Following local Council guidance and policy interpretation, the impact has been described about the 'NOEL - No Observed Effect Level' where the rating level is below the background sound level.'

9.3 Pests

The presence of pests will be minimised through:

- Routine pest monitoring and control;
- Use of approved products for pest control products only;
- Development and implementation of a Pests Management Plan, if required by the EA.

9.4 Dust

Dust will be minimised through:

- Straw treatment being carried out within a dedicated Straw treatment building and the use of water within the preparation process.
- Enforcing the 10 miles per hour (mph) site speed limit for all vehicles on site.
- Daily clean down procedures in accordance with a Housekeeping Procedure (**HRCL-QUAL-HOUSEKEEPING-WI03-P1**).

If Daily Checks (**HRCL-QUAL-DAILY CHECKS-AQD 24-P1**) identify that dust may be blowing off site, then the Dust Procedure **(HRCL-ENV-DUST CONTROL-WI17-P1)** will be followed.

[14] Noise Impact Assessment, Ref: 404.11923.00004_0015, SLR Consulting, Version No: Final, November 2022

9.5 Bioaerosols

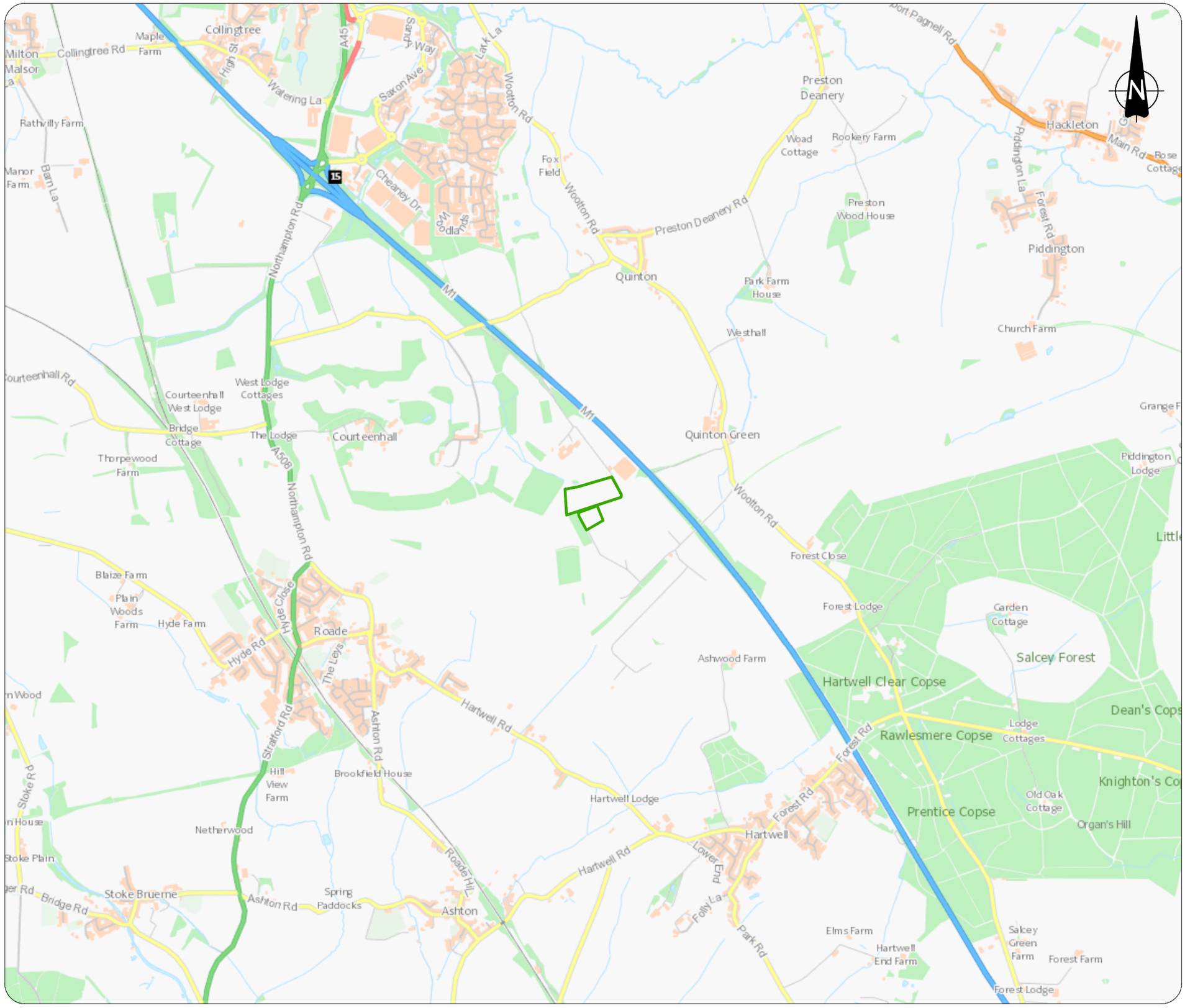
A site specific bioaerosol risk assessment[15] has been carried out, which is included with the application. It concluded "*'The results of the assessment indicate that the residual risk from all sources associated with the plant is low or very low. As such, it is concluded that no further control measures, other than those detailed in the assessment, are required in order to reduce the potential for impacts at sensitive locations in the vicinity of the site*."

10 Control of Climate Change Impacts

Climate change impacts and mitigation controls are considered in a separate site-specific Climate Change Adaptation Risk Assessment (**HRCL-ETL-CCARA-H&S-P1**).

[15] Bioaerosol Risk Assessment Horse Close Anaerobic Digestion Plant, 8876 r1, Redmore Environmental, February 2025

Figures



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REVISIONS

REV	DATE	DESCRIPTION	DWN	CHK	APP
-	04/02 2025	First Issue	JJ	MF	MF

LEGEND

Permitted Boundary

0 250 500 750 1,000 1,250 1,500 m

Scale at A3: 1:25,000

Client: Acorn Bioenergy Operations Limited

Project: Permit Application

Title: Site Location Plan

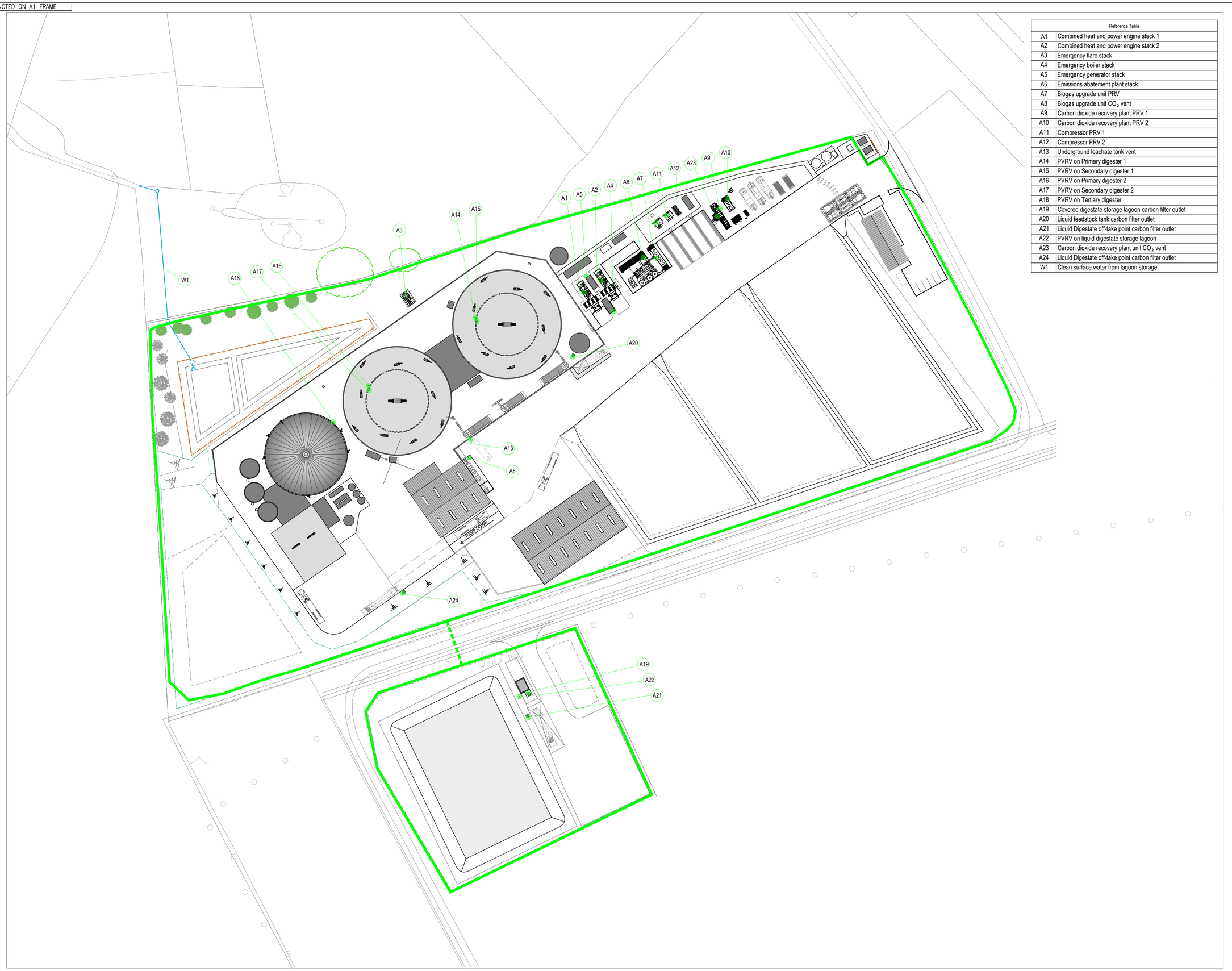
Earthcare TECHNICAL
Manor Farm
Chalton
Waterlooville
Hants PO8 0BG
Tel: 02392 290488
enquiries@earthcaretechnical.co.uk
www.earthcaretechnical.co.uk

Drawn	Checked	Approved	Revision
JJ	MF	MF	

Date	Scale	Sheet Size
February 2025	1:25,000	A3

Drawing Number	File Reference
ETL747_/HRCL/SiteLocation/EPR01	ETL747.mxd

AS NOTED ON A1 FRAME



Reference Table	
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A5	Emergency generator stack
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A9	Carbon dioxide recovery plant PRV 1
A10	Carbon dioxide recovery plant PRV 2
A11	Compressor PRV 1
A12	Compressor PRV 2
A13	Underground leachate tank vent
A14	PVRV on Primary digester 1
A15	PVRV on Secondary digester 1
A16	PVRV on Primary digester 2
A17	PVRV on Secondary digester 2
A18	PVRV on Tertiary digester
A19	Covered digestate storage lagoon carbon filter outlet
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A21	Liquid Digestate off-take point carbon filter outlet
A22	PVRV on liquid digestate storage lagoon
A23	Carbon dioxide recovery plant unit CO_2 vent
A24	Liquid Digestate off-take point carbon filter outlet
W1	Clean surface water from lagoon storage

SITE PLAN
Scale: 1:750 @ A1

NOT FOR CONSTRUCTION

NOTES:-

Permitted Area Boundary (5.89ha)

Emission Release Location

Underground pipe conduit with leak detection

Rev	Date	Description	DR	CH
C	15/05/25	Issued For Approval	SJC	-
B	27/01/25	Issued For Approval	SJC	-
A	21/11/24	Issued For Approval	SJC	-

acorn BIOENERGY

Job Title
AD Plant.
Horse Close

Drawing Title
Site Emissions Plan.

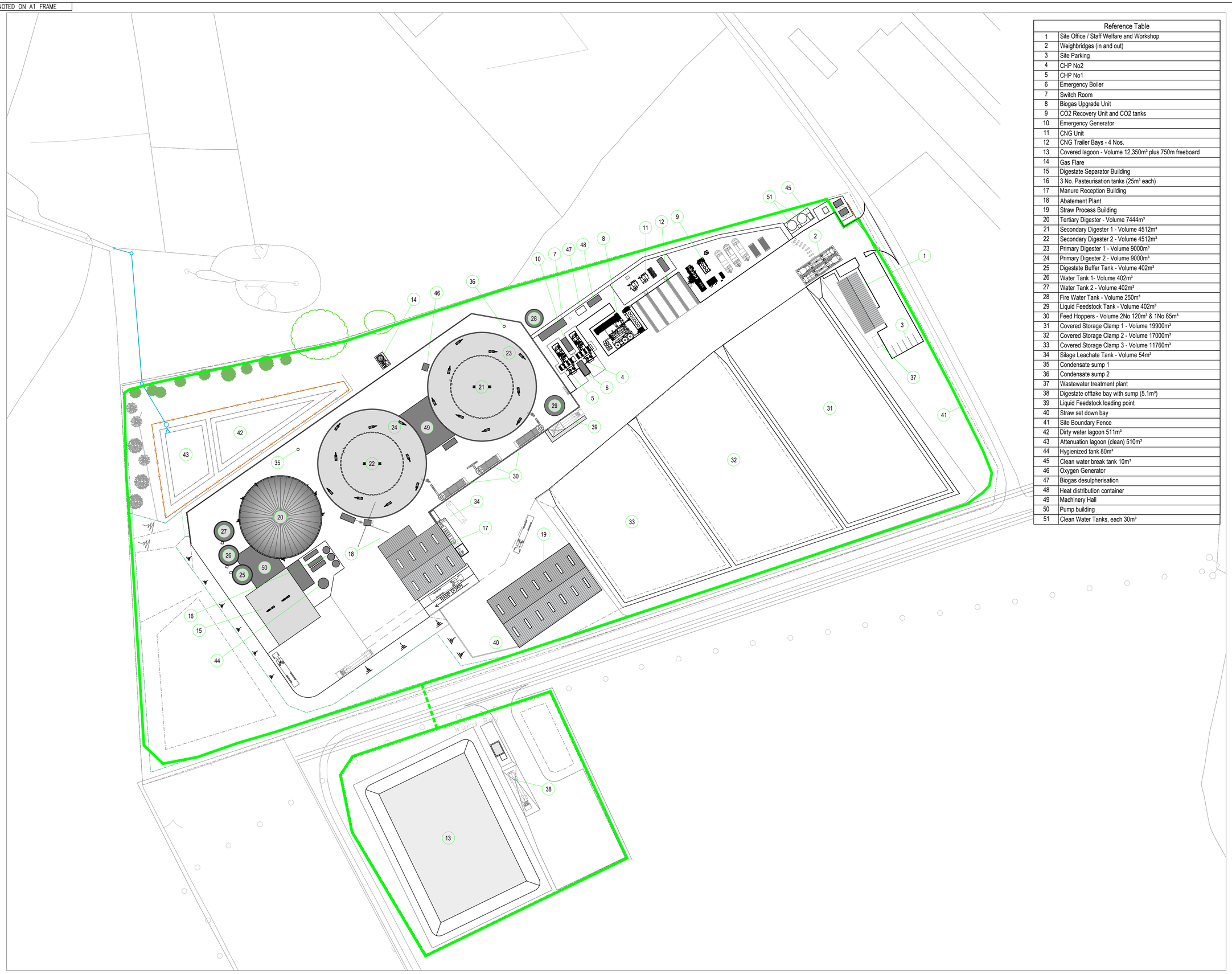
Status
Approval

Scale	Date
As Shown	Nov '24

Drawn By	Checked	Approved
SJC	–	–

Drg. No.	Rev
HRCL-LAY-ABE-010	C

AS NOTED ON A1 FRAME



Reference Table	
1	Site Office / Staff Welfare and Workshop
2	Weighbridges (in and out)
3	Site Parking
4	CHP No2
5	CHP No1
6	Emergency Boiler
7	Switch Room
8	Biogas Upgrade Unit
9	CO2 Recovery Unit and CO2 tanks
10	Emergency Generator
11	CNG Unit
12	CNG Trailer Bays - 4 Nos.
13	Covered lagoon - Volume 12,350m³ 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 511m³
43	Attenuation lagoon (clean) 510m³
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
51	Clean Water Tanks, each 30m³

NOTES:-

Permitted Area Boundary (5.89ha)

Underground pipe conduit with leakage detection

Rev	Date	Description	DR	CH
C	15/05/25	Issued For Approval	SJC	-
B	25/02/25	Issued For Approval	SJC	-
A	21/11/24	Issued For Approval	SJC	-

acorn BIOENERGY

Job Title
AD Plant.
Horse Close

Drawing Title
Site Layout & Permit Plan

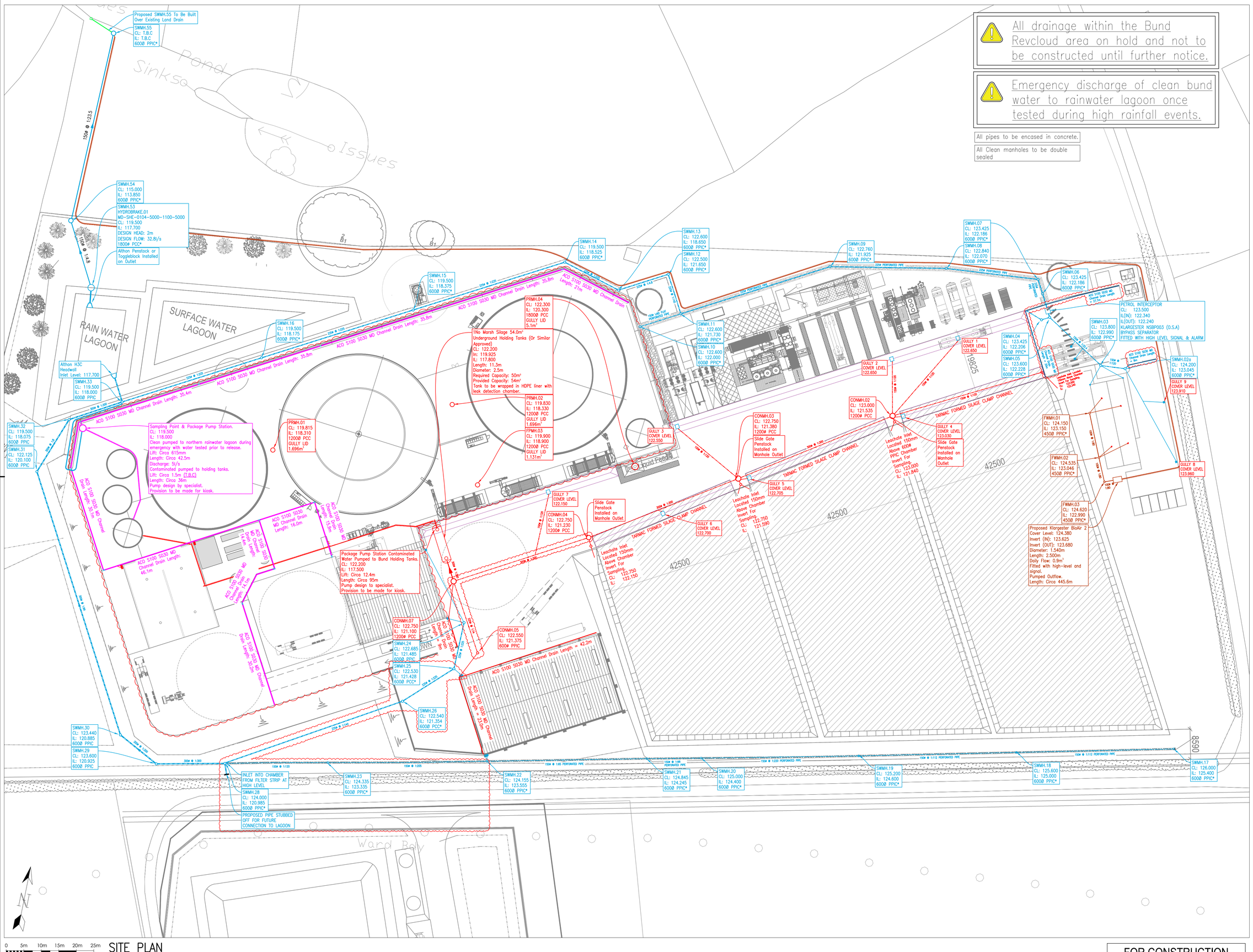
Status
Approval

Scale	Date
As Shown	Nov '24

Drawn By	Checked	Approved
SJC	–	–

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

PERMIT PLAN
Scale: 1:750 @ A1



0 5m 10m 15m 20m 25m
Scale 1:500 @ A1

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
C18	09/01/25	Issued For Construction	JT	JHC
C17	18/12/24	Issued For Construction	JT	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

Constructionline · intertek · Achilles UVDB SILVER PLUS · UKAS · Audited RISQS

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Client: acorn

Job Title
AD Plant
Horse Close Green Power

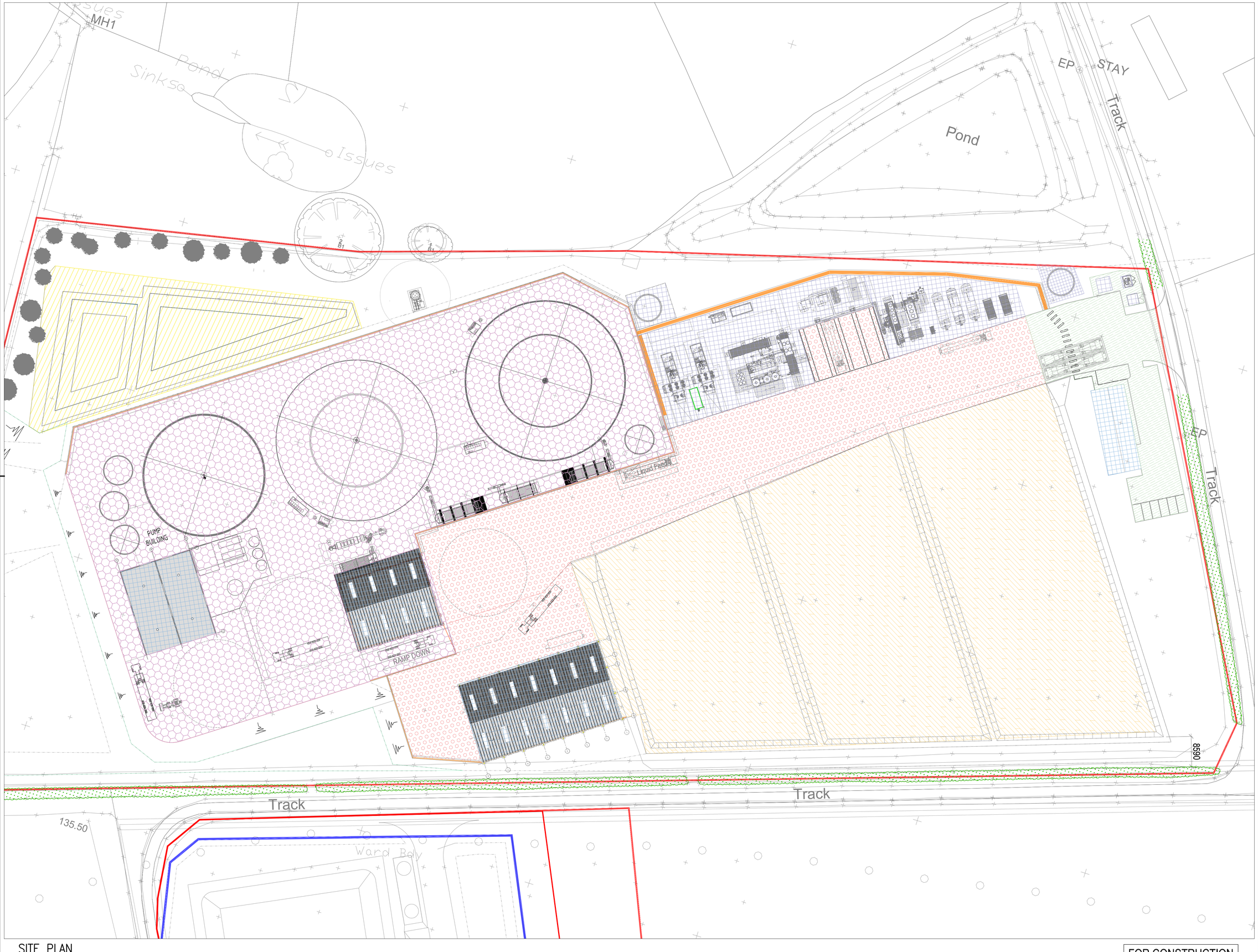
Drawing Title
Proposed Drainage Layout

Status: CONSTRUCTION

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

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

Drg. No.: 29384/C1/105 | Rev: C18



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

Denotes Clean Surface Water Swale Area – 2,548m²

Denotes Clean w/Petrochemicals Hardstanding Runoff Area – 1,304m²

Denotes Clean Equipment Runoff Area – 2,450m²

Denotes Clean/Contaminated Bund Runoff Area – 11,664m²

Denotes Dirty Silage Clamp Runoff Area – 11,714m²

Denotes Contaminated Hardstanding Runoff Area – 5,630m²

Denotes Clean Roof Runoff Area – 2,258m²

Rev	Date	Description	DR	CH
C06	09/01/24	Layout amended	JT	JHC
C05	18/12/24	Layout amended	KW	JHC
C04	12/11/24	Layout amended	MK	JHC
C03	10/09/24	Issued For Construction	WD	JHC
C02	21/08/24	Issued For Final Approval	WD	JHC
C01	16/08/24	Issued For Final Approval	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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Email info@ggpconsult.co.uk

Client: acorn

Job Title: AD Plant
Horse Close Green Power

Drawing Title: Proposed Catchment Plan

Status: FINAL CONSTRUCTION

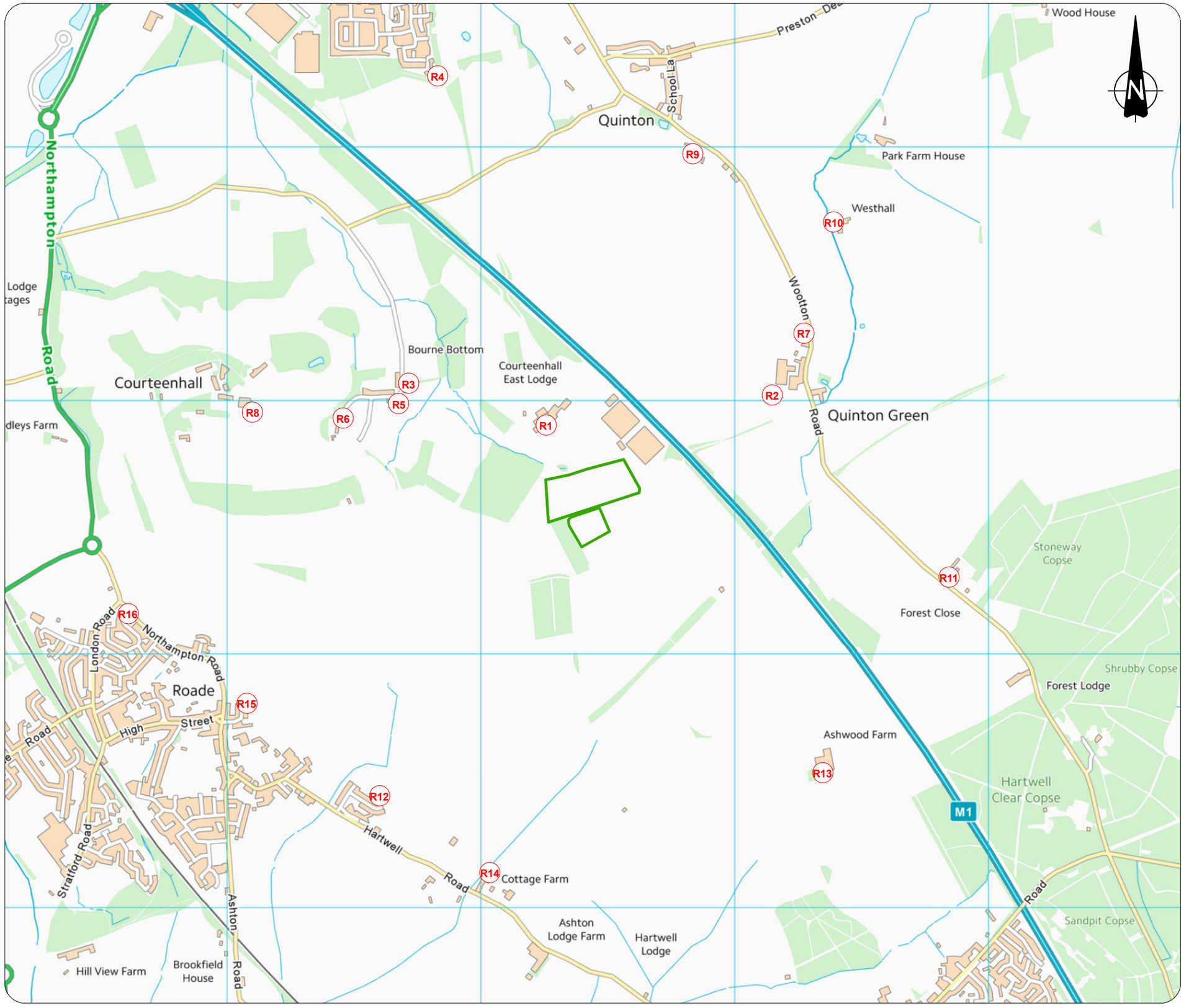
Scale: As Noted @ A1 | Date: JUN' 2024

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

Drg. No.: 29384/C1/103 | Rev: C06

SITE PLAN
Scale: 1:500 @ A1

FOR CONSTRUCTION



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REVISIONS

REV	DATE	DESCRIPTION	DWN	CHK	APP
-	05/02 2025	First Issue	JJ	MF	MF

LEGEND

Permitted Boundary

(H) Receptor location

0 250 500 750 m

Scale at A3: 1:15,000

Client
Acorn Bioenergy Operations Limited

Project
Permit Application

Title
Human Receptor Plan

Earthcare TECHNICAL

Manor Farm
Chalton
Waterlooville
Hants PO8 0BG

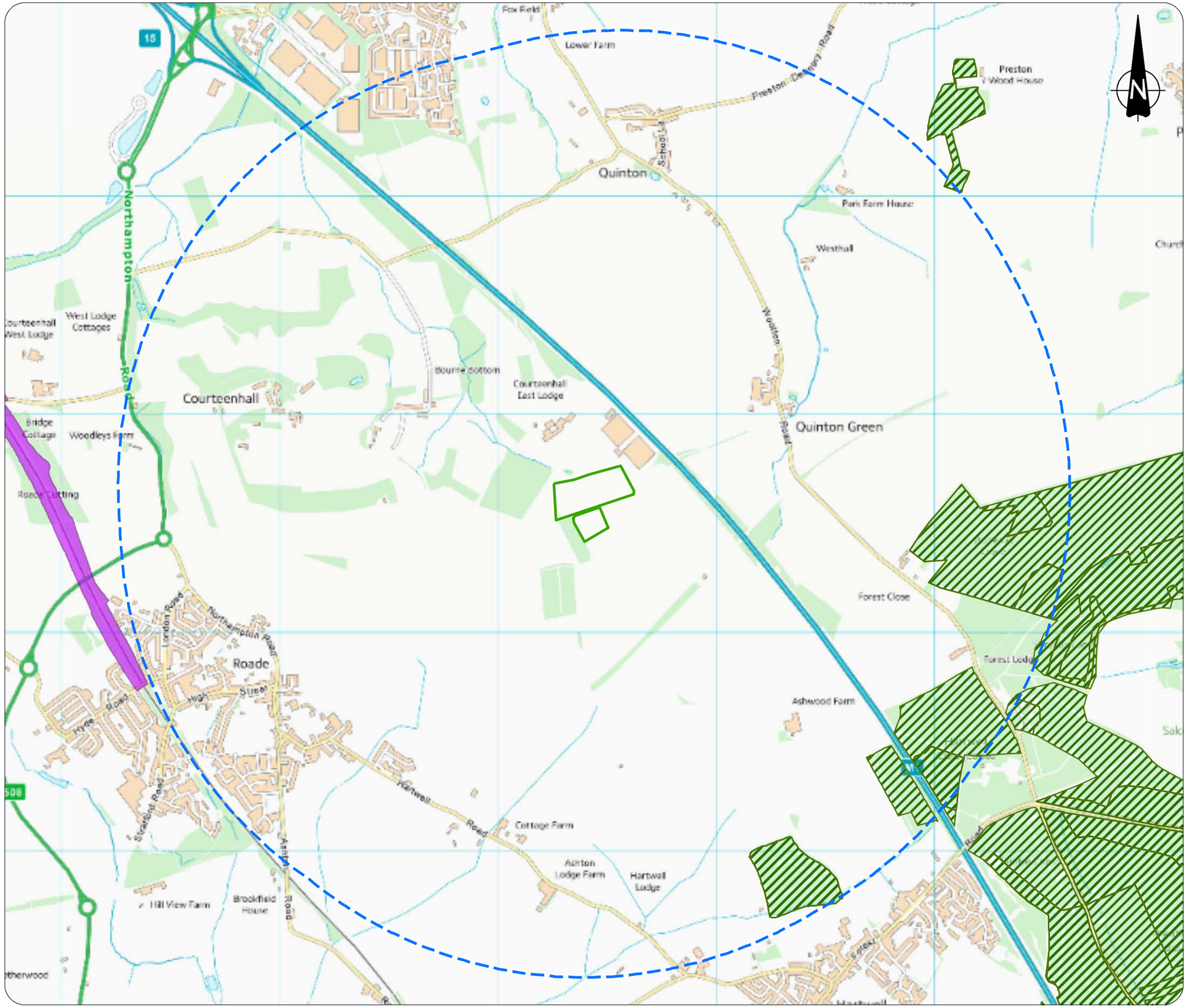
Tel: 02392 290488

enquiries@earthcaretechnical.co.uk
www.earthcaretechnical.co.uk

Drawn	Checked	Approved	Revision
JJ	MF	MF	

Date	Scale	Sheet Size
February 2025	1:15,000	A3

Drawing Number	File Reference
ETL747_HRCL_HumanReceptors /EPR02	ETL747.mxd



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REVISIONS

REV	DATE	DESCRIPTION	DWN	CHK	APP
-	05/02 2025	First Issue	JJ	MF	MF

LEGEND

- Permitted Boundary
- 2km buffer
- Ancient Woodland
- Site of Special Scientific Interest (SSSI)

0 250 500 750 m

Scale at A3: 1:17,500

Client: Acorn Bioenergy Operations Limited

Project: Permit Application

Title: Ecological Receptor Plan (2km)

Earthcare TECHNICAL
Manor Farm
Chalton
Waterlooville
Hants PO8 0BG
Tel: 02392 290488
enquiries@earthcaretechnical.co.uk
www.earthcaretechnical.co.uk

Drawn	Checked	Approved	Revision
JJ	MF	MF	

Date	Scale	Sheet Size
February 2025	1:17,500	A3

Drawing Number	File Reference
ETL747_HRCL_Eco Receptors /2km/EPR03	ETL747.mxd

REVISIONS

REV	DATE	DESCRIPTION	DWN	CHK	APP
-	05/02 2025	First Issue	JJ	MF	MF

LEGEND

Permitted Boundary

10km buffer

Ancient Woodland

Ramsar

Special Protection Areas

Site of Special Scientific Inter

est 4,000m

0 1,000 2,000 3,000

Scale at A3: 1:85,000

Client: Acorn Bioenergy Operations Limited

Project: Permit Application

Title: Ecological Receptor Plan (10km)

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Drawn	Checked	Approved	Revision
JJ	MF	MF	

Date	Scale	Sheet Size
February 2025	1:85,000	A3

Drawing Number: ETL747_HRCL_Eco Receptors /10km/EPR04

File Reference: ETL747.mxd

Appendix A – Medium Combustion Plant Information

Item of plant	MCP specific identifier (serial number)	12-digit grid reference	Size (KWth) (rated thermal input)	Type of MCP (technology such as diesel engine, gas turbine, other engine or other MCP)	Type of fuel used	Date first put into operation	Nomenclature of Economic Activities (NACE) code	Expected operating hours
CHP1	**To be confirmed**	477444, 252701	2,830	Other MCP	Biogas	Not yet commissioned	35.21 Manufacture of gas	8,760
CHP2	**To be confirmed**	477451, 252706	2,857	Other MCP	Natural gas	Not yet commissioned	35.21 Manufacture of gas	7,500
Emergency boiler	**To be confirmed**	477456, 252693	659*	Other MCP	Natural gas & biogas	Not yet commissioned	35.21 Manufacture of gas	1,314
Emergency generator	**To be confirmed**	477445, 252708	1,867	Diesel engine	Diesel	Not yet commissioned	35.21 Manufacture of gas	Emergency use only

* when burning natural gas at 85% efficiency

Appendix B - Nature and Heritage Conservation Screening Report & Maps

Nature and Heritage Conservation

Screening Report: Bespoke installation

Reference	**EPR/RP3426SN/P001**
NGR	**SP 77433 52673**
Buffer (m)	**190**
Date report produced	**15/03/24**
Number of maps enclosed	**1**

This nature and heritage conservation report

The nature and heritage conservation sites, protected species and habitats, and other features identified in the table below **must be considered in your application**.

In the further information column, there are links which give more information about the site or feature type and indicate where you are able to self-serve to get the most accurate site boundaries or feature locations.

Most designated site boundaries are available on Magic map. Using Magic map allows you to zoom in and see the site boundary or feature location in detail, Magic map also allows you to measure the distance from these sites and features to your proposed boundary. Help videos are available on Magic map to guide you through.

Where information is not publicly available, or is only available to those with GIS access, we have provided a map at the end of this report.

Sites and Features within screening distance	Screening distance (km)	Further Information
Special Protection Area (pSPA or SPA) **Upper Nene Valley Gravel Pits**	10	Joint Nature Conservation Committee and Magic map
Ramsar **Upper Nene Valley Gravel Pits**	10	Joint Nature Conservation Committee and Magic map

Local Wildlife Sites (LWS) (see map below) **Roade Disused Railway East, Salcey Forest, Rowley Wood, Preston Wood**	2	Appropriate Local Record Centre (LRC)
Ancient Woodland **Salcey Forest, Rowley Wood**	2	Woodland Trust Forestry Commission Natural England and Magic map

Where protected species are present, a licence may be required from Natural England to handle the species or undertake the proposed works.

The relevant Local Records Centre must be contacted for information on the features within local wildlife sites. A small administration charge may also be incurred for this service.

The following nature and heritage conservation sites, protected species and habitats, and other features have been checked for, where they are relevant for the permit type requested, but have not been found within screening distance of your site unless included in the list above.

Special Areas of Conservation (cSAC or SAC), Special Protection Area (pSPA or SPA), Marine Conservation Zone (MCZ), Ramsar, Sites of Special Scientific Interest (SSSI), National Nature Reserve (NNR), Local Nature Reserve (LNR), Local Wildlife Sites (LWS), Ancient Woodland, relevant species and habitats.

Please note we have screened this application for features for which we have information. It is however your responsibility to comply with all environmental and planning legislation, this information does not imply that no other checks or permissions will be required.

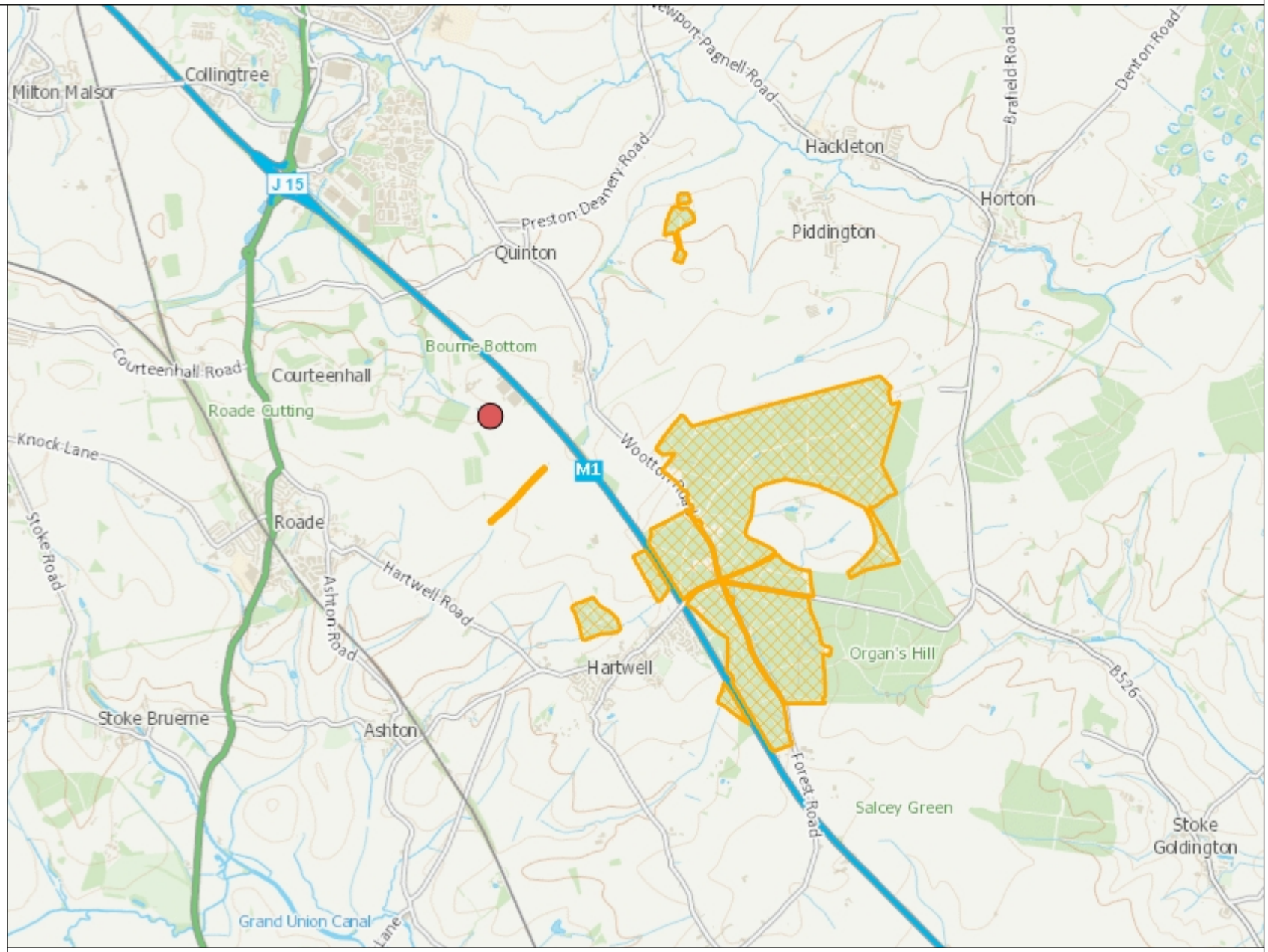
The nature and heritage screening we have conducted as part of this report is subject to change as it is based on data we hold at the time it is generated. We cannot guarantee there will be no changes to our screening data between the date of this report and the submission of the permit application, which could result in the return of an application or requesting further information

Local Wildlife Sites

Environment Agency

Legend

Local Wildlife Sites



1: 50,000

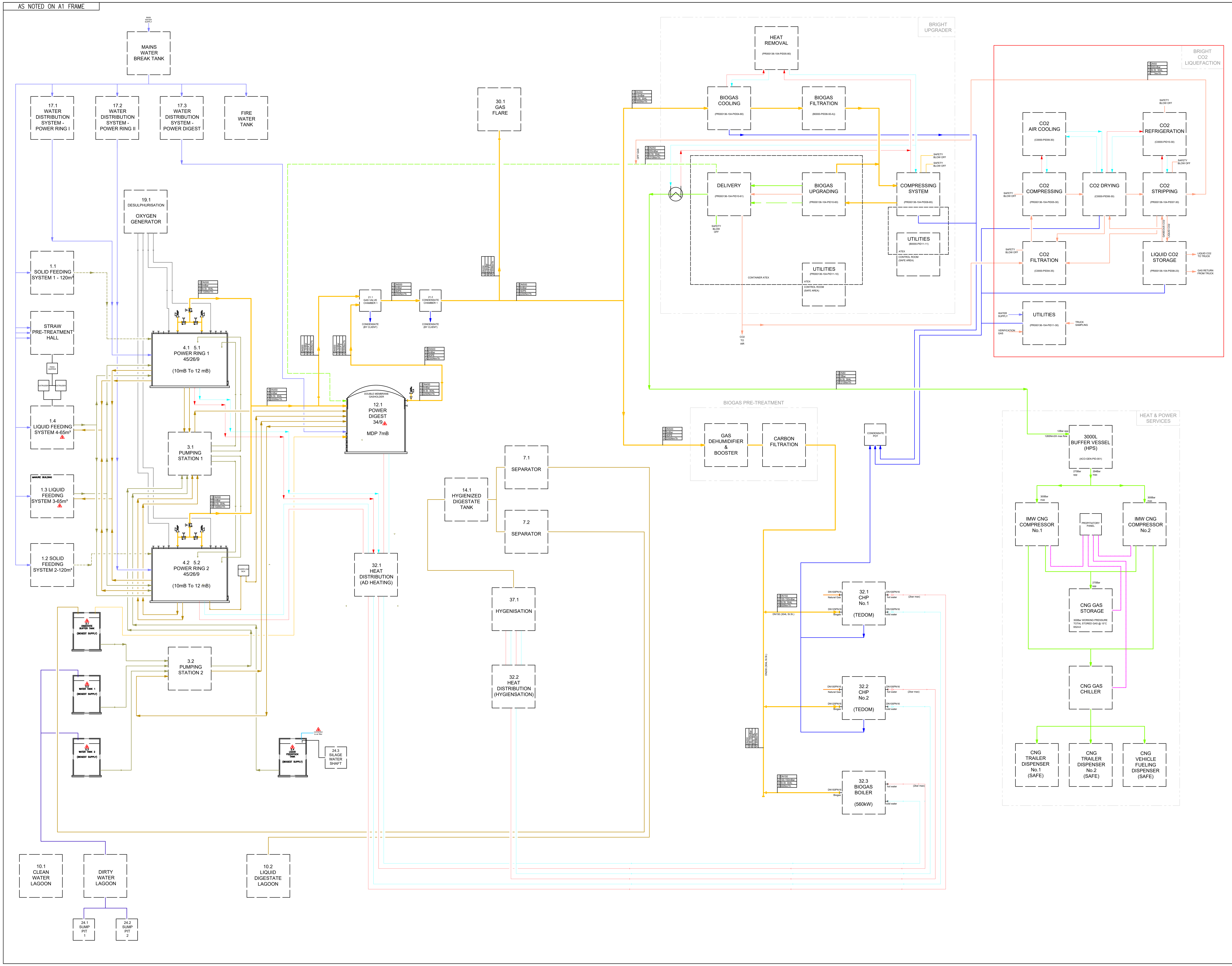
0 1,250

Metres

N W E S

Appendix C - Process Flow Diagram

AS NOTED ON A1 FRAME



MAINS WATER BREAK TANK
17.1 WATER DISTRIBUTION SYSTEM - POWER RING I
17.2 WATER DISTRIBUTION SYSTEM - POWER RING II
17.3 WATER DISTRIBUTION SYSTEM - POWER DIGEST
FIRE WATER TANK
30.1 GAS FLARE
19.1 DESULPHURISATION
OXYGEN GENERATOR
1.1 SOLID FEEDING SYSTEM 1 - 120m³
STRAW PRE-TREATMENT HALL
1.4 LIQUID FEEDING SYSTEM 4-65m³
1.3 LIQUID FEEDING SYSTEM 3-65m³
1.2 SOLID FEEDING SYSTEM 2-120m³
4.1 5.1 POWER RING 1 45/26/9
(10mB To 12 mB)
3.1 PUMPING STATION 1
4.2 5.2 POWER RING 2 45/26/9
(10mB To 12 mB)
3.2 PUMPING STATION 2
21.1 GAS VALVE CHAMBER 1
21.2 CONDENSATE CHAMBER 1
DOUBLE MEMBRANE GASHOLDER
12.1 POWER DIGEST 34/9
MDP 7mB
7.1 SEPARATOR
7.2 SEPARATOR
14.1 HYGIENIZED DIGESTATE TANK
32.1 HEAT DISTRIBUTION (AD HEATING)
37.1 HYGENISATION
32.2 HEAT DISTRIBUTION (HYGIENSATION)
24.3 SILAGE WATER SHAFT
10.1 CLEAN WATER LAGOON
DIRTY WATER LAGOON
10.2 LIQUID DIGESTATE LAGOON
24.1 SUMP PIT 1
24.2 SUMP PIT 2
BRIGHT UPGRADER
HEAT REMOVAL
BIOGAS COOLING
BIOGAS FILTRATION
DELIVERY
BIOGAS UPGRADING
COMPRESSING SYSTEM
UTILITIES
CONTAINER ATEX
BRIGHT CO2 LIQUEFACTION
CO2 AIR COOLING
CO2 REFRIGERATION
CO2 COMPRESSING
CO2 DRYING
CO2 STRIPPING
CO2 FILTRATION
LIQUID CO2 STORAGE
LIQUID CO2 TO TRUCK
GAS RETURN FROM TRUCK
UTILITIES
WATER SUPPLY
TRUCK SAMPLING
BIOGAS PRE-TREATMENT
GAS DEHUMIDIFIER & BOOSTER
CARBON FILTRATION
CONDENSATE POT
32.1 CHP No.1 (TEDOM)
32.2 CHP No.2 (TEDOM)
32.3 BIOGAS BOILER (560kW)
HEAT & POWER SERVICES
3000L BUFFER VESSEL (HPS)
IMW CNG COMPRESSOR No.1
PROPRIETARY PANEL
IMW CNG COMPRESSOR No.2
CNG GAS STORAGE
CNG GAS CHILLER
CNG TRAILER DISPENSER No.1 (SAFE)
CNG TRAILER DISPENSER No.2 (SAFE)
CNG VEHICLE FUELING DISPENSER (SAFE)

NOTES:-

KEY

- BIOGAS
- BIOMETHANE
- BIOMETHANE REJECT
- NATURAL GAS
- CARBON DIOXIDE
- CONDENSATE
- OXYGEN
- HOT WATER
- COLD WATER
- DIGESTATE
- LIQUID WASTE/SUBSTRATE
- FRESH WATER
- WASTE WATER
- SIGNAL CABLE

PIPE IDENTIFICATION

Rev	Date	Description
B	12/12/24	UPDATED
A	17/06/24	FIRST ISSUE

PRELIMARY

acorn BIOENERGY

Job Title
AD Plant.
HORSE CLOSE

Drawing Title
PROCESS FLOW DIAGRAM
HORSE CLOSE

Status
PRELIMINARY

Scale	Date
N.T.S.	Jun '24

Drawn By	Checked
NDJ	– –

Drg. No.
HRCL-ABE-PFD-001 B

Appendix D - Drainage Process Flow Diagram

HRCL-ETL-Drainage Process-PFD-P1 Horse Close AD, Drainage Process Flow Diagram V1.0, February 2025