H1 Screening Assessment - Devon Anaerobic Digestion (AD) Plant, Willand, Devon, EX15 2FP

On behalf of: Acorn Bioenergy Operations Ltd

ETL981/2026

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13 July 2026

Document Control	
Document Title:	**H1 Screening Assessment for Devon Anaerobic Digestion (AD) Plant, Willand, Devon, EX15 2FP**
Document Reference:	ETL981_DGPL_H1_V1.0
Prepared For:	Acorn Bioenergy Operations Limited
Project Reference:	ETL981/2026
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Version Control

Version	Date	Author	Technical reviewer	Approved by
Version 1.0	13 Jul 2026	Dr C McHugh	M Fuhrmann	A Becvar

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Abbreviations

AAD	Ambient Air Directive
ABL	Acorn Bioenergy Operations Limited
APIS	Air Pollution Information System
AQMA	Air Quality Management Area
AQIA	Air Quality Impact Assessment
AQS	Air Quality Standards
CH_4	Methane
CO_2	Carbon dioxide
DCC	Devon County Council
Defra	Department for the Environment, Food and Rural Affairs
EA	Environment Agency
EAL	Environmental Assessment Level
ELV	Emission Limit Value
ETL	Earthcare Technical Ltd
H1	H1 Assessment
H_2S	Hydrogen sulphide
MDDC	Mid Devon District Council
NO	Nitrous oxide
PC	Process Contribution
PEC	Predicted environmental concentration
PVRV	Pressure and vacuum relief valve
SAC	Special Area of Conservation
SPA	Special Protection Area
SSSI	Site of Special Scientific Interest
TVOC	Total gaseous and vaporous organic substances, expressed as total organic carbon
VOC	Volatile organic compounds

Executive Summary

Earthcare Technical Ltd (ETL) was commissioned to undertake an H1 Screening Assessment (H1) on behalf of Acorn Bioenergy Operations Limited (ABL), in respect of an application for a bespoke environmental permit for Devon Anaerobic Digestion (AD) Plant on land at Hide Market Road, Willand, Devon, EX15 2FP. The Plant will be operated by ABL.

An H1 risk assessment using the H1 tool, which is a conservative tool, was used to screen out the pollutants from the proposed emission sources that do not require further assessment. The evaluation included the following point source emissions to air: 2No. CHPs, Emergency Flare, Emergency Boiler, Odour Control System stack for the Manure Reception Building and extracted process emissions, and the Liquid Digestate Off-take point.

The process contribution of emissions to air and background concentrations have been compared with relevant environmental standards for the protection of health and ecosystems and Environment Agency significance criteria.

Emission rates of pollutants were based on Medium Combustion Plant (MCP) Emission Limit Values, Best Available Techniques (BAT) Associated Emissions Levels (AELs), the manufacturers' stated emission limits and relevant guidance.

The H1 assessment has determined that the pollutant- Environmental Assessment Levels (EALs) which require further assessment are as follows.

EALs for human health:

- Nitrogen dioxide (annual and 1-hour mean)
- Ammonia (annual and 1-hour mean)
- Carbon monoxide (8-hour mean)
- Benzene (annual and 24-hour mean)
- Sulphur dioxide (15 min mean)
- Sulphur dioxide (24 hr mean)

EALs for potential impacts on the local and nationally designated ecological sites:

- Nitrogen dioxide (ecological - daily mean)
- Sulphur dioxide (ecological-other vegetation)
- Sulphur dioxide (ecological -lichens and bryophytes)
- Ammonia (ecological-other vegetation)
- Ammonia (ecological -lichens and bryophytes, lower critical level of 1µg/m^3)

Pollutants that do not screen out need to be considered in an Air Quality Impact Assessment (AQIA) which would use detailed dispersion modelling. An AQIA, specifically an Air Quality and Odour Impact Assessment, was prepared as part of this permit application.

1 Introduction

1.1 Background

Earthcare Technical Ltd (ETL) has been commissioned to undertake an H1 Screening Assessment (H1) on behalf of Acorn Bioenergy Operations Limited (ABL), in respect of an application for a bespoke environmental permit for Devon Anaerobic Digestion (AD) Plant on land at Hide Market Road, Willand, Devon, EX15 2FP. The Plant will be operated by ABL.

An H1 risk assessment using the H1 tool,[1] which is a conservative tool, is used to screen out the pollutants from the proposed emission sources that do not require further assessment. Pollutants that do not screen out need to be considered in an Air Quality Impact Assessment (AQIA) which would use detailed dispersion modelling. An AQIA, specifically an Air Quality and Odour Impact Assessment, was prepared as part of this permit application.[2] The AQIA contains detailed information on the process description, background (ambient) concentrations of pollutants and technical specifications for the combustion plant which are not repeated here.

The emissions to air to be considered are listed in Section 2. H1 is set up to model point sources only, not distributed or fugitive sources often referred to as "area" or "volume" sources. In addition, odour is not listed in H1 as a default pollutant.

1.2 Site description

Figure 1 shows the Site Location and proposed green line boundary. The area enclosed by the permit boundary is referred to herein as 'the Site.'

The Site is in the administrative areas of Devon County Council (DCC) and Mid Devon District Council (MDDC). It is not located in an Air Quality Management Area (AQMA); the closest AQMA is the Cullompton AQMA, 2.4km to the south of the Site.

The Site lies approximately 400m northwest of the M5 motorway. To the south of the Site lies the 2 Sisters Food Group (an abattoir), to the west the land is in agricultural use, and to the north lies a Wastewater Treatment Works used by 2 Sisters Food Group. Both adjacent industrial land uses have the potential to generate odour. Other businesses in the industrial area are involved in vehicle storage.

The town of Willand lies mostly to the south of the M5, over 400m from the Site. The closest residential receptors lie approximately 100m southeast and southwest of the green line boundary.

There are no internationally or nationally designated sites: Special Areas of Conservation (SACs), Special Areas of Protection (SPAs) or Ramsar sites within 10km of the Site and no Sites of Special Scientific Interest (SSSIs) within 2km. There are two Local Wildlife Sites within 2km: Woody Park

[1]Atmospheric Dispersion Modelling Liaison Committee, H1 Risk Assessment Tool, Available at: https://admlc.com/h1-tool/ [Accessed 06 July 2026]

[2]ETL (2026) Air Quality & Odour Impact Assessment - Devon Anaerobic Digestion (AD) Plant, Willand, Devon, EX15 2FP, ETL981_DGPL_AQIA_V1.1_ Jul26, July 2026

Plantation on Ancient Woodland Site lies 1.6km to the southeast and Grand Western Canal Country Park Local Nature Reserve 1.915km to the north. There are no other sites of Ancient Woodland or National Nature Reserves within 2km.

1.3 Scope of report

This report describes: the sources of emissions to air to be considered (Section 2); the H1 tool and assessment criteria (Section 3); the assessment methodology and source data (Section 4); the results of the impact assessment (Section 5); and concludes in Section 6. Appendix A shows the H1 input and output tables.

2 Description of emissions to air

This section provides a summary of the processes on site in order to identify the emissions to air to be modelled. Figure 2 shows the Site Layout, Figure 3 the Site Emissions Plan and Figure 4 the Process flow diagram for the Site. A full process description is given in the accompanying AQIA.[2]

The facility will treat 80,780 tonnes per annum (TPA) of solid feedstock comprising: livestock waste (poultry litter); energy crops (wholecrop, maize and grass silage, oat pellets and cereal grain) and crop residues (straw). Liquid feedstocks will comprise dairy and pig slurry and non-hazardous liquid wastes such as washdown waters may be accepted to help meet the AD Plant Site's process water demand.

It will also produce heat and power using biogas produced by the process. Most of the biogas will be upgraded to biomethane for injection to the National Gas Grid, with the CO_2 captured, liquified and exported offsite.

In addition, it will produce 39,631 TPA of solid (fibre) digestate and 80,038 TPA of liquid digestate (liquor), of which 54,488 TPA will be exported from Site, to be used as a biofertiliser on local farms, the remaining liquor will be recirculated and used within the process. Table 1 shows the emission points to air, numbered A1-A22, taken from Figure 3, the Site Emissions Plan. Table 2 lists the sources of emissions to air at the AD Plant that have been considered in this H1 assessment. The emissions modelled as "volume" sources in the AQIA due to their distributed nature, the Working face of the Clamp and the Feed hoppers, have not been included in H1; they are sources of odour only.

Table 1 Description of emission points to air, A1-A22

Emission Point Reference	Source
A1	Combined heat and power (CHP) engine stack 1 (10m stack height, TEDOM Quanto 1200, 1.2MWe, natural gas-fired (NG)): CHP1 (NG)
A2	CHP stack 2, CHP2 (10m stack height, TEDOM Flexi 530, 499kWe, dual fuel, modelled as biogas-fired (BG)): CHP2 (BG)
A3	Emergency Flare Stack (10.51m stack height, Himmel MTU-3000, 15,000kWth, 2,500Nm^3/h biogas, 1,300Nm^3/h biomethane)
A4	Emergency Boiler Stack (7m height stack, Weismann Vitoplex 200, 599kWthi, dual fuel, modelled as biogas; with Riello Forced draught gas and biogas burner)
A5	Emergency Generator Stack (Scania DC 16 078A (02-43), 770 kVA Standby)
A6	Emissions abatement plant stack, Odour Control System (OCS) stack
A7	Biogas Upgrade Unit Pressure Relief Valve (PRV)
A8	Biogas Upgrade Unit CO_2 vent
A9	Carbon dioxide recovery plant unit CO_2 vent
A10	Carbon dioxide recovery plant PRV 1
A11	Carbon dioxide recovery plant PRV 2
A12	Pressure and Vacuum Relief Valve (PVRV) on Primary digester 1
A13	PVRV on Primary digester 2
A14	PVRV on Primary digester 3
A15	PVRV on Post digester 1
A16	PVRV on Post digester 2
A17	PVRV on Post digester 3
A18	PVRV on Separated Liquid Storage Tank
A19	Vent on Covered Process Water Lagoon (vent 0.1m diameter (assumed), lagoon capacity 1,150m^3)
A20	Grid Entry Unit PRV
A21	Vent for Process Water Tank
A22	Liquid Digestate Off-take point

Table 2 AD Plant sources of emissions to air to be assessed

Emission point reference	Source	Emissions	Modelled operational profile
Point Sources			
A1	CHP1 Stack (NG)	NOx, TVOC, CO	8,660 h/yr
A2	CHP2 Stack (BG)	NOx, SO_2, TVOC, CO	8,660 h/yr
A3	Emergency Flare Stack	NOx, TVOC, CO	Emergency back-up, conservatively modelled as up to 10% of the year

Emission point reference	Source	Emissions	Modelled operational profile
A5	Emergency Boiler Stack	NOx, SO_2	Emergency back-up, conservatively modelled as up to 15% of the year
A6	OCS Stack	NH_3, H_2S, odour	Continuous
A19	Covered Process Water Lagoon Vent	NH_3, odour	Continuous
A22	Liquid Digestate Off-take Point	NH_3, odour	Modelled as continuous during 40h/week

3 Assessment Methodology

3.1 H1 emissions screening assessment

The H1 screening evaluation has been undertaken following H1 methodology, set out in Environment Agency (EA) guidance[3] and using the EA H1 Assessment Tool spreadsheet (v9.2).[1]

3.2 Assessment criteria

3.2.1 Air Quality Standards and Critical Levels – Human Health

Table 3 sets out those Air Quality Strategy (AQS) objectives, Ambient Air Directive (AAD) Limit Values and Environmental Assessment Levels (EALs) for the protection of human health that are relevant to this assessment in determining receptor exposure. In the H1 Assessment Tool these are all referred to as EALs.

Table 3 Air Quality Standards and critical levels for human health

Substance	Emission period	Limit (average)	Standard	Exceedances[1]
Ammonia (NH_3)	Annual	180 µg/m^3	EAL	None
Ammonia (NH_3)	1 hour	2,500 µg/m^3	EAL	None
Carbon monoxide (CO)	8 hour running average across a 24-hour period	10,000 µg/m^3	AAD Limit Value	None
Hydrogen sulphide (H_2S)	Annual	140 µg/m^3	EAL	None
Hydrogen sulphide (H_2S)	24 hours	150 µg/m^3	EAL	None
Nitrogen dioxide (NO_2)	1 hour	200 µg/m^3	AAD Limit Value	Up to 18 1-hour periods
Nitrogen dioxide (NO_2)	Annual	40 µg/m^3	AAD Limit Value	None
Sulphur dioxide (SO_2)	15 minutes	266 µg/m^3	UK AQS Objective	Up to 35 15-minute periods

[3] Environment Agency and Department for Environment, Food & Rural Affairs, Air emissions risk assessment for your environmental permit, Available at: https://www.gov.uk/guidance/air-emissions-risk-assessment-for-your-environmental-permit [Accessed 06 July 2026]

Substance	Emission period	Limit (average)	Standard	Exceedances[1]
Sulphur dioxide (SO_2)	1 hour	350 µg/m^3	AAD Limit Value	Up to 24 1-hour periods
Sulphur dioxide (SO_2)	24 hours	125 µg/m^3	AAD Limit Value	Up to 3 24-hour periods
TVOC as benzene[2]	30 minutes	100 µg/m^3	EAL	None
TVOC as benzene[2]	Annual	5 µg/m^3	EAL	None
Notes: from https://www.gov.uk/guidance/air-emissions-risk-assessment-for-your-environmental-permit AQS: Air quality strategy; AAD: Ambient Air Directive; EAL: Environmental Assessment Level [1]number of times a year that the limit may be exceeded [2]Benzene is a TVOC				

3.2.2 Environmental standards for protected conservation areas

The AQS objectives and AAD Limit Values for the protection of vegetation and ecosystems applicable to this assessment are presented in Table 4. For 24-hour NOx there are two values of the EAL: 75µg/m^3 and 200µg/m^3. The latter, higher EAL applies where ozone is below the AOT40[4] critical level and sulphur dioxide is below the lower critical level of 10µg/m^3. H1 uses the lower critical level of 75µg/m^3 by default.

Table 4 Environmental Standards for protected conservation areas

Substance	Target	Emission period
Ammonia	1 µg/m^3 where lichens or bryophytes are integral for the habitat 3 µg/m^3 where they are not integral for the habitat	Annual
Nitrogen oxides (expressed as nitrogen dioxide)[1]	30 µg/m^3	Annual
Nitrogen oxides (expressed as nitrogen dioxide)	75 µg/m^3 200 µg/m^3 for detailed assessments where the ozone is below the AOT40 critical level[4] and sulphur dioxide is below the lower critical level of 10 µg/m^3	Daily
Nutrient nitrogen deposition	Depends on location, use www.apis.ac.uk[5]	Annual
Acidity deposition	Depends on location, use www.apis.ac.uk[5]	Annual
Notes: from https://www.gov.uk/guidance/air-emissions-risk-assessment-for-your-environmental-permit [1]30 µg/m^3 is an AAD Limit Value		

[4] The sum of difference between hourly ozone concentration and 40ppb for each hour when the concentration exceeds 40ppb during a relevant growing season (May to July) averaged over five years Available at: https://www.eea.europa.eu/help/glossary/eea-glossary/aot40 [Accessed: 12 August 2025]

[5] UK Air Pollution Information System (APIS) (http://www.apis.ac.uk/) [Accessed 06 July 2026]

4 Environment Agency Risk Assessment

The current evaluation is based on EA risk assessment guidance[3] to determine the significance of the predicted impact. The guidance provides screening criteria for quantifying the environmental impacts of emissions to air. The criteria include long and short-term Environmental Assessment Levels (EALs).

The guidance considers initial H1 screening and then detailed modelling. At the initial screening stage, **Test 1**, long-term and short-term concentrations due to the sources entered, referred to as the Process Contribution (PC) can be screened out from further assessment if:

- the short-term PC is less than 10% of the short-term environmental standard, and
- the long-term PC is less than 1% of the long-term environmental standard.

The second stage of screening, **Test 2**, considers the background concentration as well as the PC. The Background data used were the highest values at the human receptors, taken from the AQIA:

- NO_2 6.4µg/m^3
- NOx 8.1µg/m^3
- CO 1,653µg/m^3
- Benzene 0.25µg/m^3
- SO_2 1.43µg/m^3
- H_2S assumed to be 0µg/m^3
- NH_3 3.3µg/m^3

The Predicted Environmental Concentration (PEC) is the sum of the PC and background concentration. A further assessment is not needed if:

- for human receptors only, the short-term PC is less than 20% of the short-term environmental standards minus twice the long-term background concentration i.e., less than 20% of the 'Headroom', and
- the long-term PEC is less than 70% of the long-term environmental standards.

In accordance with the guidance, it is not necessary to calculate PEC for short-term targets. For an ecological receptor, if the short-term PC exceeds 10% of the EAL, detailed modelling is required.

If the PC cannot be screened out on that basis, the guidance outlines further steps, including detailed modelling, which may lead to a requirement to carry out a cost-benefit analysis.

4.1 H1 inputs – Process emissions

Table 5 details the source geometry, parameters, emission limit values (ELVs) and design emission limits for the combustion plant: CHP1 (A1), CHP2 (A2), Emergency flare (A3) and Emergency Boiler (A4); details of the ELVs for the combustion plant can be found in Section A.3. Technical specifications for the combustion plant are given in the AQIA.[2] The composition of the biogas consumed by the Emergency Flare has been assumed to be 52.4% methane (CH_4) and 47.6% CO_2.

Table 6 details the source geometry and emissions data for the OCS Stack (A5), Process Water Lagoon Vent (A19) and Liquid Digestate Offtake Point (A22). The Process Water Lagoon Vent (A19) is a source of odour emissions only so was not modelled by H1.

For the OCS, the manufacturer has provided exit concentrations as: < 1,000ou_E/m^3; < 1mg/m^3 NH_3; < 0.5mg/m^3 H_2S. These values have been used in the dispersion modelling except for NH_3, for which the upper BAT limit of 20mg/m^3 has been used as a conservative (pessimistic) assumption.

The Liquid Digestate Offtake Point emissions are due to air displaced from tankers during filling with liquid digestate. The emission concentration, just over 2,000ou_E/m^3, is twice the upper BAT level for abated emissions, however, this emission is unabated and would only occur during 40h/week i.e. less than 25% of the time.

Further details of assumptions made in calculating emissions are given in the AQIA.[2]

The effective stack height has been calculated for each point source in accordance with EA guidance.[3] All sources have been modelled with an effective stack height of 0m due to their proximity to the Manure Reception Building (MRB) and digestion tanks.

The input data entered in the H1 Assessment Tool is shown in Appendix A, Tables A.1 and A.2.

Table 5 CHP, flare and boiler emission parameters

Parameter	Units	CHP1 (NG) (A1)	CHP2 (BG) (A2)	Emergency flare (A3)	Emergency boiler (A4)
Location	Easting, Northing	303047, 111247	303054, 111255	302914, 111151	303059, 111242
Fuel	-	Natural gas	Natural gas/ Biogas[1]	Biogas/ Biomethane	Biogas
Electrical output	kWe	1,200	499	-	-
Thermal output	kWthi	n/a	n/a	-	599
Hours of operation	h/yr	8,660 (99%)	8,660 (99%)	876 (10% of hours)	1,314 (15% of hours)
Stack height	m	10.0	10.0	10.51	7.0
Effective stack height	m	0	0	0	0
Internal diameter at exit	m	0.4	0.2	2.1	0.2
Volume flow rate (dry)	Nm^3/h	5,891	2,655	14,624	1,006
Velocity	m/s	17.8	32.1	15.0	10.5
Temperature	°C	120	180	1,000	180
Exit concentration NOx	mg/Nm^3	250 (ELV, 5% O_2)	500 (ELV, 5% O_2)	150 (LFTGN 05, 3% O_2)	200 (ELV, 3% O_2)
Exit concentration SO_2	mg/Nm^3	n/a	107 (ELV, 5% O_2)	300 (LFTGN 05, 3% O_2)[4]	100 (ELV, 3% O_2)
Exit concentration CO	mg/Nm^3	1,100 (5% O_2)[2]	650 (5% O_2)[2]	50 (LFTGN 05, 3% O_2)	n/a
Exit concentration TVOC	mg/Nm^3	1,000 (LFTGN 08, 5% O_2)	1,000 (LFTGN 08, 5% O_2)	10 (LFTGN 05, 3% O_2)	n/a
Notes: Technical specifications for A1 to A4 can be found in Appendix C to Appendix F of the AQIA.					

Parameter	Units	CHP1 (NG) (A1)	CHP2 (BG) (A2)	Emergency flare (A3)	Emergency boiler (A4)
Details of the calculation of emissions and assumptions made are given in Appendix A, Section A.1 of the AQIA. n/a = not applicable [1]Modelled firing on biogas as a worst-case [2]Manufacturer's emission limit [4]Upper value provided by the supplier (Appendix E of the AQIA). SO_2 ELVs are not typically set in environmental permits for AD Plants.					

Table 6 Other point source emission parameters

Parameter	Units	OCS Stack[1] (A5)	Process Water Lagoon Vent (A19)	Liquid Digestate Off-take Point (A22)
Location	NGR (X,Y) m	303026, 111229	302802, 111217	302802, 111217
Stack height	m	16.1 (AOD 85.39)	1.0[2]	1.0[2]
Effective stack height	m	0	0	0
Hours of operation	-	Continuous (100%)	Continuous (100%)	40h/week (24%)
Internal diameter at stack exit	m	1.12	0.1	0.15[2]
Volume flow rate (wet)	Am^3/h	55,750	10	61.5
Velocity	m/s	15.7	0.35	0.97
Temperature	°C	22.5, Modelled as 'Ambient'	Modelled as 'Ambient'	Modelled as 'Ambient'
Exit concentration NH_3	mg/Nm^3	1 (manufacturer's value) 20 (Upper BAT limit – value used)	n/a	2.01[3]
Exit concentration H_2S	mg/Nm^3	0.5	n/a	n/a
Notes: Details of the calculation of emissions and assumptions made are given in Appendix A, Section A.1 of the AQIA. [1]Manufacturer's exit concentrations: $< 1{,}000ou_E/m^3$; $< 1mg/m^3$ NH_3 ; $< 0.5mg/m^3$ H_2S. [2]Assumed value [3]Concentrations and emission rates include consider of mitigations due to covering/containment and dilution; full details are in Section A.1 of the AQIA.				

5 Results of the Impact Assessment

Output tables from the H1 Assessment Tool are shown in Appendix A, Tables A.3 to A.7. Table A.3 shows the long-term and short-term PCs and EALs for each pollutant.

5.1 Air impact screening

Test 1 of the assessment compared the long-term and short-term PCs calculated by the H1 Assessment Tool with the relevant EALs.

Test 2 compared the long-term PECs are compared with the EALs and the short-term PCs with Headroom (EAL minus twice the long-term background concentration).

The results of Air Impact Screening Test 1 and Test 2 are summarised in Figure 7.

Table 7 Summary of Test 1 and Test 2 Screening results

Substance	Test 1	Test 2
Nitrogen dioxide	Fail	Fail
Nitrogen oxides (as NO2) (ecological)	Fail	Fail
Carbon monoxide	Fail	Fail
Benzene	Fail	Fail
Sulphur dioxide (15 min mean)	Fail	Fail
Sulphur dioxide (24 hr mean)	Fail	Fail
Sulphur dioxide (ecological-lichens and bryophytes)	Fail	Fail
Sulphur dioxide (ecological-other vegetation)	Fail	Fail
Hydrogen sulphide	Fail	**Pass**
Ammonia	Fail	Fail
Ammonia (ecological-lichens and bryophytes)	Fail	Fail
Ammonia (ecological-other vegetation)	Fail	Fail

The H1 assessment determined that emissions of all pollutants require further assessment by detailed modelling except H_2S.

5.2 Deposition to land

It is not possible to assess deposition to land from air using the current version of the H1 Risk Assessment Tool (version 9.2).1

6 Conclusion

This H1 Assessment has been produced on behalf of ABL in support of an application for a bespoke environmental permit for an AD Plant, Devon Anaerobic Digestion (AD) Plant, on land at Hide Market Road, Willand, Devon, EX15 2FP.

The H1 Assessment Tool spreadsheet v.9.2 has been used for emissions from point sources, excluding emissions of odour.

The H1 assessment determined that emissions of all pollutants except H_2S require further assessment by detailed dispersion modelling. The further assessment has been carried out and is reported in the accompanying AQIA.**Error! Bookmark not defined.**

Figures

Figure 1 Site Location Plan (ETL981_DGPL_SiteLocation_EPR01)

Figure 2 Site Layout & Permit plan

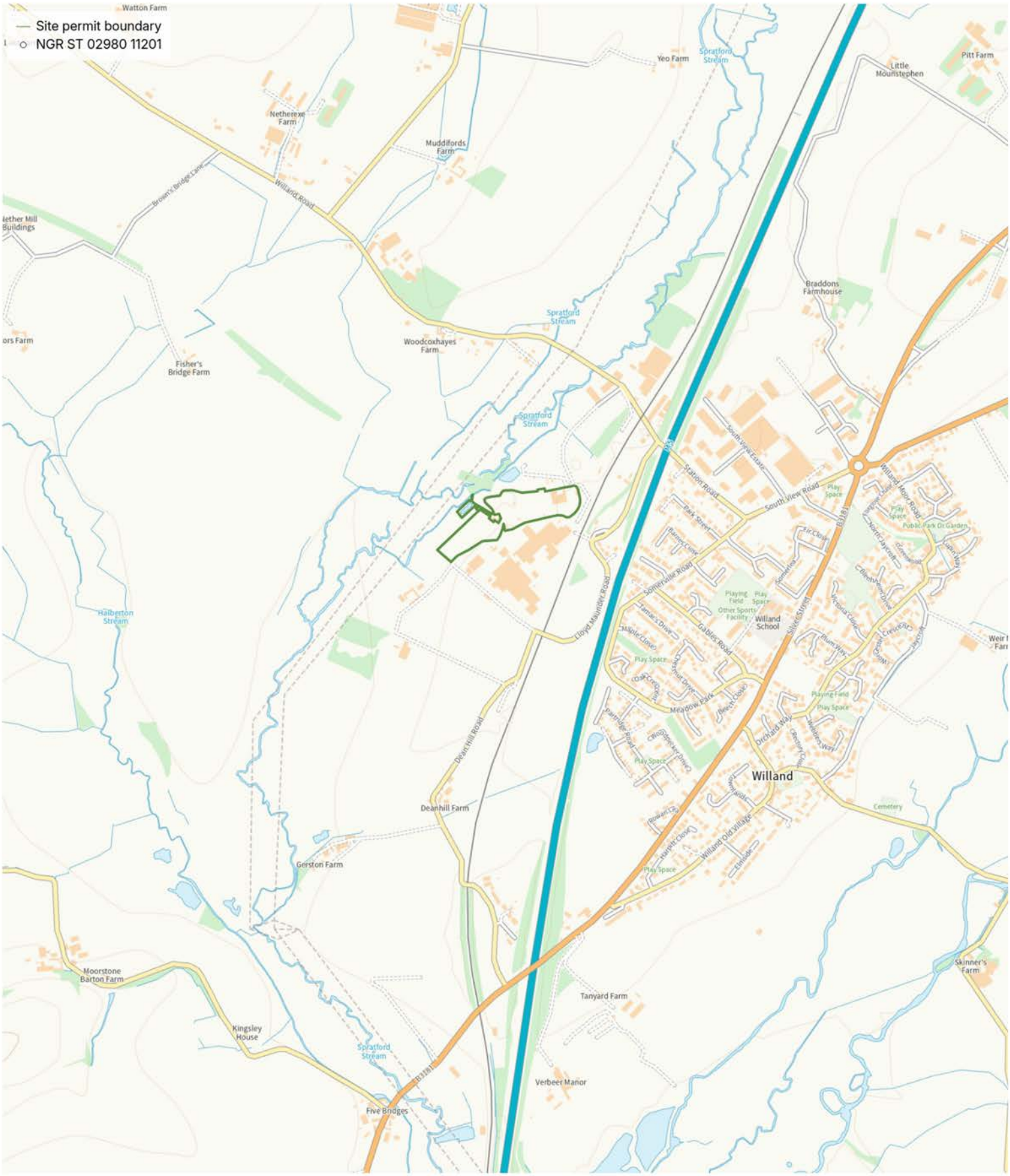
Figure 3 Site Emissions Plan

Figure 4 Process Flow Diagram

Figure 1 Site Location Plan (ETL981_DGPL_SiteLocation_EPR01)

Earthcare TECHNICAL

Site Location Plan
ETL981_DGPL_Site Location Plan_EPR01



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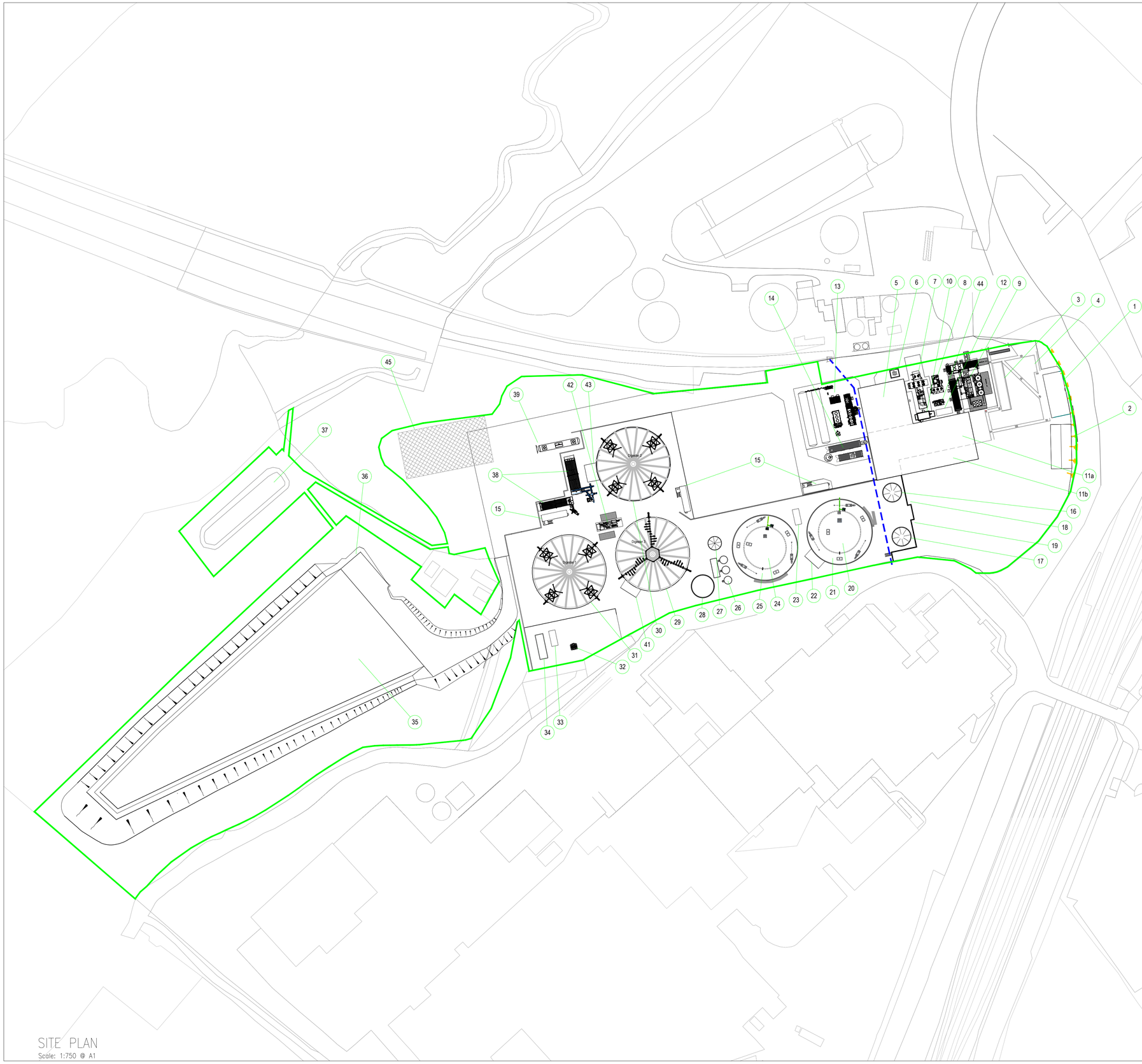
500 m
Scale 1:14000 (at A4)

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Figure 2 Site Layout & Permit Plan

© Acorn Bioenergy Operations Ltd Devon AD Plant Site Layout & Permit Plan DGP-ABE-LAY-112 Rev E Original size A1

AS NOTED ON A1 FRAME



Reference Table	
1	Site Office / Staff Welfare
2	Site Workshop
3	Weighbridge
4	Site Parking
5	Switchgear and site storage section of building
6	DNO Transformer Kiosk
7	CHP No1
8	CHP No2
9	Biogas Upgrade Unit
10	Emergency Generator
11	(a) Manure Reception Building with (b) Separation Hall
12	Emergency Boiler container
13	CO2 Recovery Unit and CO2 tanks
14	Odour Abatement
15	E-Comm containers
16	Liquid Feedstock Tank 1 - Volume 400m³
17	Liquid Feedstock Tank 2 - Volume 400m³
18	Liquid Feedstock Loading area
19	Digestate offtake area
20	Separated Liquid Storage Tank - Volume 1508m³
21	Post Digester 3 - Volume 2172m³
22	Pump Room
23	Pump Room
24	Post Digester 2 - Volume 1508m³
25	Post Digester 1 - Volume 2172m³
26	3 No. Pasteurisation tanks (25m³ each)
27	Process Water Tank - Volume 100m³
28	Existing tank Not in Use
29	Primary Digester 3 Tank - Volume 4455m³
30	Primary Digester 2 Tank - Volume 4618m³
31	Primary Digester 1 Tank - Volume 4618m³
32	Emergency Flare
33	Control Panel Kiosk
34	Grid Entry Unit Kiosk
35	Covered Storage Clamp - Volume 21,500m³
36	Silage Leachate catchment sump
37	Process Water Lagoon - Volume 1150m³
38	Feed Hoppers - 170m³ Volume and 115m³ Volume
39	Propane Tank - Volume 24tonne
40	Oxygen dosing Unit
41	Pump Room
42	Biogas Booster and Chiller
43	Pump Room
44	Gas Treatment System
45	Underground Cellular Storage Crates

SITE PLAN
Scale: 1:750 @ A1

NOT FOR CONSTRUCTION

NOTES:-

Permitted Area Boundary (3.34ha)

Two Sisters Food Group effluent discharge pipe

N

Rev	Date	Description	DR	CH
E	09/07/26	Issue for Permit	SJC	
D	26/06/26	Issue for Permit	SJC	
C	03/06/26	Revised Layout	SJC	
B	01/05/26	Revised Layout	HG	SJC
A	11/03/26	Preliminary Issue	SJC	–

acorn BIOENERGY

Job Title
AD Plant.
Devon AD Plant

Drawing Title
Devon AD Plant
Site Layout & Permit Plan

Status: Approval

Scale: As Shown | Date: Mar '26

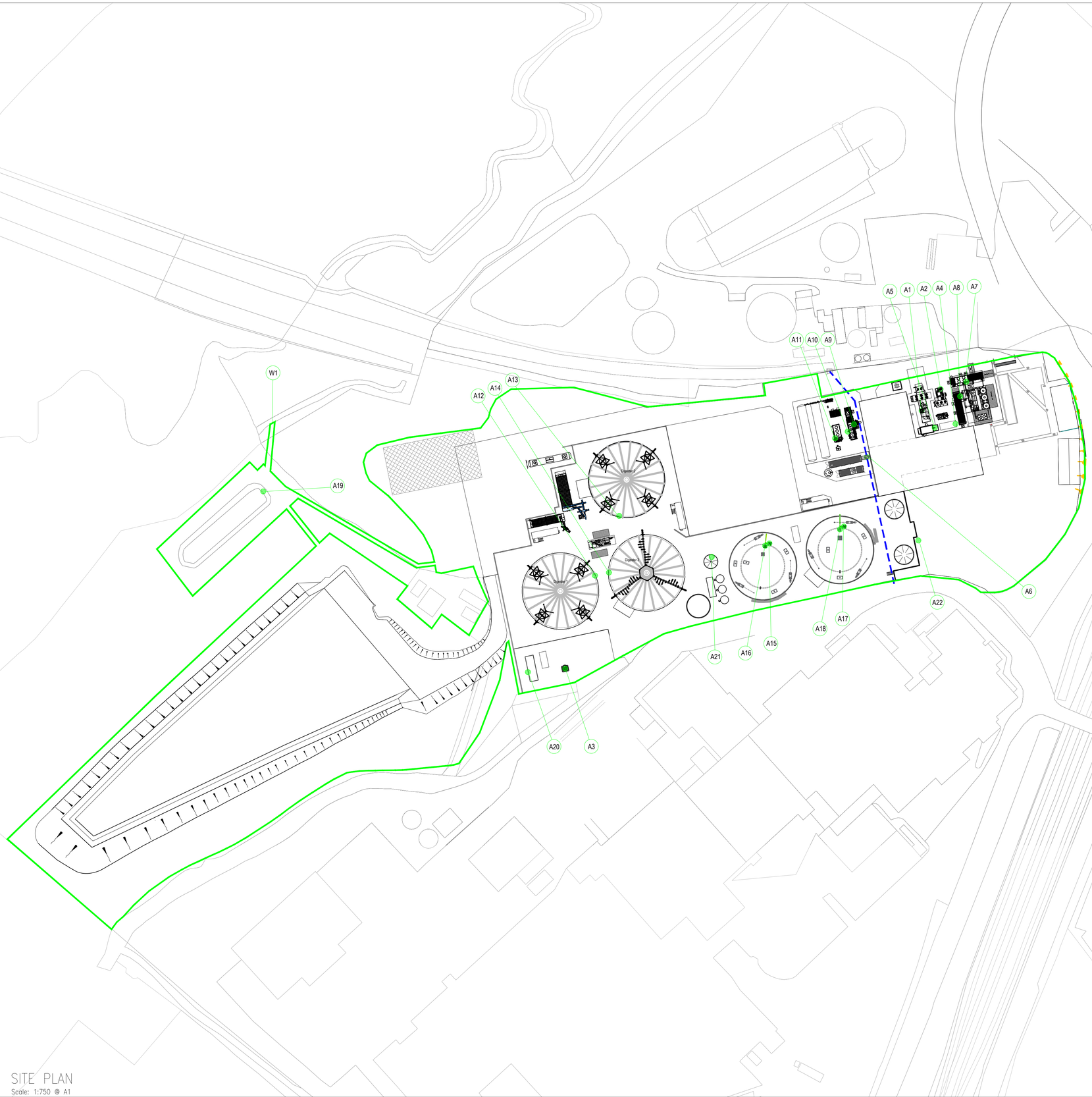
Drawn By: HG | Checked: SJC | Approved: –

Drg. No.: DGP-ABE-LAY-112 | Rev: E

Figure 3 Site Emissions Plan

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AS NOTED ON A1 FRAME



Reference Table	
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
A7	Biogas upgrade unit PRV
A8	Biogas upgrade unit CO_2 vent
A9	Carbon dioxide recovery plant unit CO_2 vent
A10	Carbon dioxide recovery plant PRV 1
A11	Carbon dioxide recovery plant PRV 2
A12	PVRV on Primary digster 1
A13	PVRV on Primary digester 2
A14	PVRV on Primary digester 3
A15	PVRV on Post digester 1
A16	PVRV on Post digester 2
A17	PVRV on Post digester 3
A18	PVRV on Separated liquid storage tank
A19	Vent on Covered Process Water lagoon
A20	Grid Entry Unit PRV
A21	Vent for Process Water tank
A22	Liquid Digestate Off-take point
W1	Clean surface water pumped discharge to the watercourse

SITE PLAN
Scale: 1:750 @ A1

NOT FOR CONSTRUCTION

NOTES:-

Permitted Area Boundary (3.34ha)

Emission Release Location

Two Sisters Food Group effluent discharge pipe

N

Rev	Date	Description	DR	CH
E	09/07/26	Issue for Permit	SJC	–
D	26/06/26	Issue for Permit	SJC	–
C	03/06/26	Revised Layout	SJC	–
B	01/05/26	Revised Layout	HG	SJC
A	11/03/26	Preliminary Issue	SJC	–

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Job Title
AD Plant.
Devon AD Plant

Drawing Title
Devon AD Plant
Site Emissions Plan

Status: Approval

Scale: As Shown | Date: Mar '26

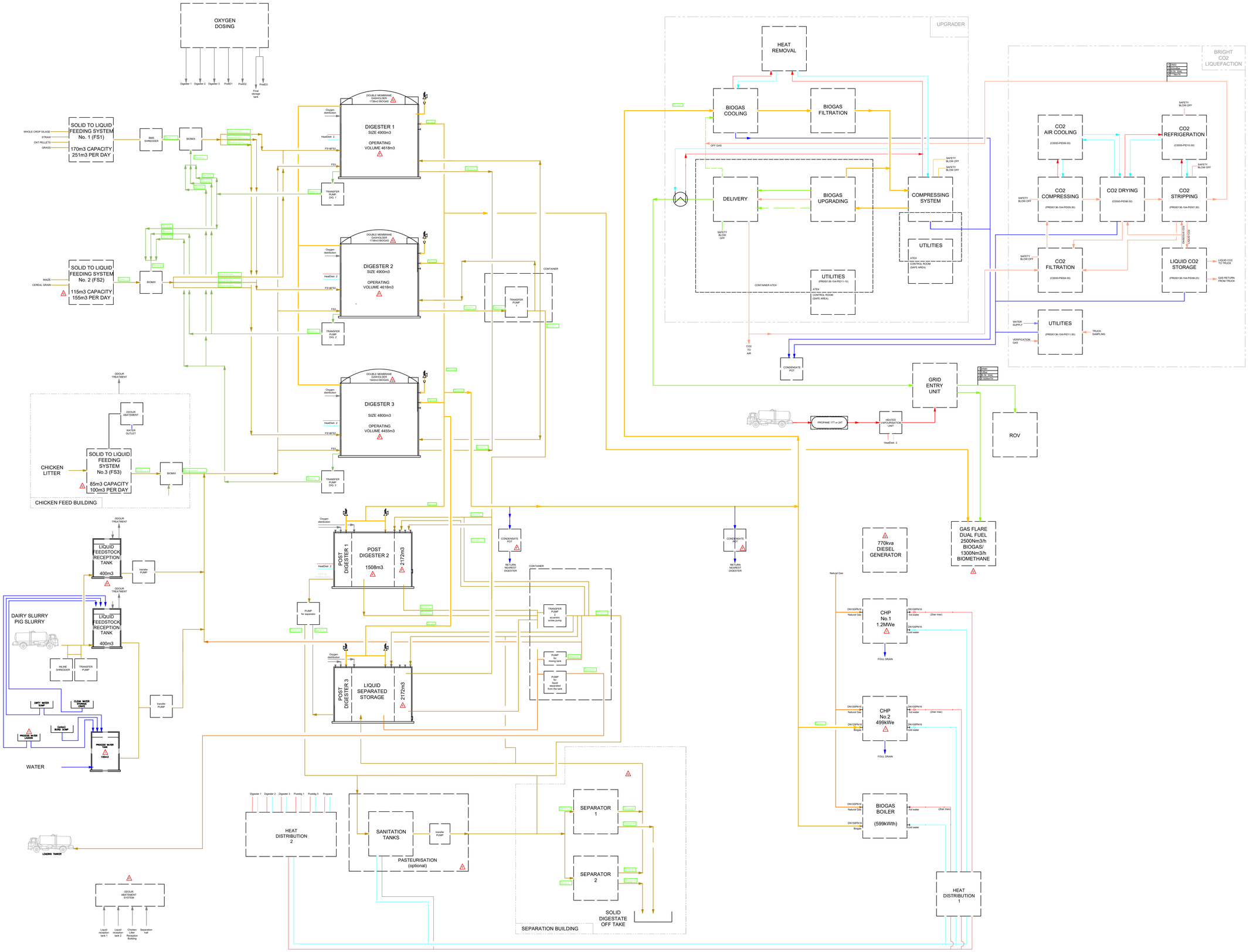
Drawn By: HGS | Checked: SJC | Approved: –

Drg. No.: DGP–ABE–LAY–111 | Rev: E

Figure 4 Process flow diagram

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AS NOTED ON A1 FRAME



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

1	PIPE SIZE
2	MATERIAL
3	DIN/BSEN
4	FLUID NAME

Rev	Date	Description
I	09/07/26	NOTES AMENDED
H	07/07/26	CHP KW AMENDED
G	04/06/26	OPTIONAL KIT REMOVED WITH UPDATES
F	21/05/26	TANK VOLUMES & GENERAL UPDATE
E	27/03/26	UPDATED FOLLOWING DESIGN REVIEW
D	20/01/26	UPDATED FOLLOWING GAIANOVA REVIEW
C	21/11/25	THIRD ISSUE
B	30/09/25	SECOND ISSUE
A	31/07/25	FIRST ISSUE

acorn BIOENERGY

Job Title

AD Plant.
DEVON AD PLANT

Drawing Title

PROCESS FLOW DIAGRAM

Status: PRELIMINARY

Scale: N.T.S.

Date: JuLY '24

Drawn By: NDJ

Checked: –

Drg. No.: DGPL–ABE–PFD–001 I

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Appendix A H1 Assessment Tool Input and Output

Table A. 1 Input: Air release points

Release point code	Location or grid reference	Activity/Activities	Effective height (metres)	Dispersion factor (Long term)	Dispersion factor (short term)	Dispersion factor (monthly)	Efflux velocity (m/s)	Total flow (m3/h)
CHP1 (A1)	303047, 111247	Combustion	0	148	3900	529	17.8	5891
CHP2 (A2)	303054, 111255	Combustion	0	148	3900	529	32.1	2655
Flare (A3)	302914, 111151	Combustion	0	148	3900	529	15	14624
Boiler (A4)	303059, 111242	Combustion	0	148	3900	529	10.5	1006
OCS Stack (A5)	303026, 111229	Odour abatement vent	0	148	3900	529	15.7	55750
Offtake (A22)	302802, 111217	Vent during filling of tankers	0	148	3900	529	0.97	61.5

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Table A. 2 Input: Emissions inventory

Release Point	Substance	Measurement method	Operating mode(%)	Long term conc (mg/m3)	Release rate g/s (long term)	Measurement basis (Long term)	Short term conc (mg/m3)	Release rate g/s (short term)	Measurement basis (short term)	Annual rate (t/yr)	Long term PC (ug/m3)	Short term PC (ug/m3)	Total Flow (m3/h)
CHP1 (A1)	Nitrogen dioxide	Estimated	99%	250	0.41	MCPD ELV	250	0.41	MCPD ELV	12.77	59.94	797.74	5891.00
CHP1 (A1)	Nitrogen oxides (as NO2) (ecological)	Estimated	99%	250	0.41	MCPD ELV	250	0.41	MCPD ELV	12.77	59.94	941.33	5891.00
CHP1 (A1)	Carbon monoxide	Estimated	99%	1100	1.80	Manufacturer	1100	1.80	Manufacturer	56.20	263.74	4914.08	5891.00
CHP1 (A1)	Benzene	Estimated	99%	1000	1.64	LFTGN 08	1000	1.64	LFTGN 08	51.09	239.76	3765.33	5891.00
CHP2 (A2)	Nitrogen dioxide	Estimated	99%	500	0.37	MCPD ELV	500	0.37	MCPD ELV	11.51	54.03	719.06	2655.00
CHP2 (A2)	Nitrogen oxides (as NO2) (ecological)	Estimated	99%	500	0.37	MCPD ELV	500	0.37	MCPD ELV	11.51	54.03	848.49	2655.00
CHP2 (A2)	Carbon monoxide	Estimated	99%	650	0.48	Manufacturer	650	0.48	Manufacturer	14.97	70.24	1308.69	2655.00
CHP2 (A2)	Benzene	Estimated	99%	1000	0.74	LFTGN 08	1000	0.74	LFTGN 08	23.03	108.06	1696.99	2655.00
CHP2 (A2)	Sulphur dioxide (15 min mean)	Estimated	99%	107	0.08	MCPD ELV	107	0.08	MCPD ELV	2.46	11.56	412.40	2655.00
CHP2 (A2)	Sulphur dioxide (24 hr mean)	Estimated	99%	107	0.08	MCPD ELV	107	0.08	MCPD ELV	2.46	11.56	181.58	2655.00
CHP2 (A2)	Sulphur dioxide (ecological-lichens and bryophytes)	Estimated	99%	107	0.08	MCPD ELV	107	0.08	MCPD ELV	2.46	11.56	307.76	2655.00
CHP2 (A2)	Sulphur dioxide (ecological-other vegetation)	Estimated	99%	107	0.08	MCPD ELV	107	0.08	MCPD ELV	2.46	11.56	307.76	2655.00
Flare (A3)	Nitrogen dioxide	Estimated	10%	150	0.61	LGTGN 05	150	0.61	LGTGN 05	1.92	9.02	1188.20	14624.00
Flare (A3)	Nitrogen oxides (as NO2) (ecological)	Estimated	10%	150	0.61	LGTGN 05	150	0.61	LGTGN 05	1.92	9.02	1402.08	14624.00
Flare (A3)	Benzene	Estimated	10%	50	0.20	LGTGN 05	50	0.20	LGTGN 05	0.64	3.01	467.36	14624.00
Flare (A3)	Carbon monoxide	Estimated	10%	10	0.04	LGTGN 05	10	0.04	LGTGN 05	0.13	0.60	110.90	14624.00
Flare (A3)	Sulphur dioxide (15 min mean)	Estimated	10%	300	1.22	Manufacturer	300	1.22	Manufacturer	3.84	18.04	6368.75	14624.00
Flare (A3)	Sulphur dioxide (24 hr mean)	Estimated	10%	300	1.22	Manufacturer	300	1.22	Manufacturer	3.84	18.04	2804.15	14624.00
Flare (A3)	Sulphur dioxide (ecological-lichens and bryophytes)	Estimated	10%	300	1.22	Manufacturer	300	1.22	Manufacturer	3.84	18.04	4752.80	14624.00
Flare (A3)	Sulphur dioxide (ecological-other vegetation)	Estimated	10%	300	1.22	Manufacturer	300	1.22	Manufacturer	3.84	18.04	4752.80	14624.00

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Release Point	Substance	Measurement method	Operating mode(%)	Long term conc (mg/m3)	Release rate g/s (long term)	Measurement basis (Long term)	Short term conc (mg/m3)	Release rate g/s (short term)	Measurement basis (short term)	Annual rate (t/yr)	Long term PC (ug/m3)	Short term PC (ug/m3)	Total Flow (m3/h)
Boiler (A4)	Nitrogen dioxide	Estimated	15%	200	0.06	MCPD ELV	200	0.06	MCPD ELV	0.26	1.24	108.98	1006.00
Boiler (A4)	Nitrogen oxides (as NO2) (ecological)	Estimated	15%	200	0.06	MCPD ELV	200	0.06	MCPD ELV	0.26	1.24	128.60	1006.00
Boiler (A4)	Sulphur dioxide (15 min mean)	Estimated	15%	100	0.03	MCPD ELV	100	0.03	MCPD ELV	0.13	0.62	146.04	1006.00
Boiler (A4)	Sulphur dioxide (24 hr mean)	Estimated	15%	100	0.03	MCPD ELV	100	0.03	MCPD ELV	0.13	0.62	64.30	1006.00
Boiler (A4)	Sulphur dioxide (ecological-lichens and bryophytes)	Estimated	15%	100	0.03	MCPD ELV	100	0.03	MCPD ELV	0.13	0.62	108.98	1006.00
Boiler (A4)	Sulphur dioxide (ecological-other vegetation)	Estimated	15%	100	0.03	MCPD ELV	100	0.03	MCPD ELV	0.13	0.62	108.98	1006.00
OCS Stack (A5)	Hydrogen sulphide	Estimated	100%	0.5	0.01	Manufacturer	0.5	0.01	Manufacturer	0.24	1.15	17.82	55750.00
OCS Stack (A5)	Ammonia	Estimated	100%	20	0.31	BAT upper threshold	20	0.31	BAT upper threshold	9.77	45.84	1207.92	55750.00
OCS Stack (A5)	Ammonia (ecological-lichens and bryophytes)	Estimated	100%	20	0.31	BAT upper threshold	20	0.31	BAT upper threshold	9.77	45.84	1207.92	55750.00
OCS Stack (A5)	Ammonia (ecological-other vegetation)	Estimated	100%	20	0.31	BAT upper threshold	20	0.31	BAT upper threshold	9.77	45.84	1207.92	55750.00
Offtake (A22)	Ammonia	Estimated	100%	2	0.00	Calculated by applicant	2	0.00	Calculated by applicant	0.00	0.01	0.13	61.50
Offtake (A22)	Ammonia (ecological-lichens and bryophytes)	Estimated	100%	2	0.00	Calculated by applicant	2	0.00	Calculated by applicant	0.00	0.01	0.13	61.50
Offtake (A22)	Ammonia (ecological-other vegetation)	Estimated	100%	2	0.00	Calculated by applicant	2	0.00	Calculated by applicant	0.00	0.01	0.13	61.50

Table A. 3 Output: Air impacts – pollutants

Number	Substance	Long term EAL (ug/m3)	Long term PC (ug/m3)	Long term modelled PC	Short term EAL (ug/m3)	Short term PC (ug/m3)	Short term modelled PC
1	Nitrogen dioxide	40	124.2290417		200	2813.985417	
2	Nitrogen oxides (as NO2) (ecological)	30	124.2290417		75	3320.502792	
3	Carbon monoxide	0	334.58		10000	6333.67	
4	Benzene	5	350.83		30	5929.68	
5	Sulphur dioxide (15 min mean)	0	30.22		266	6927.19	
6	Sulphur dioxide (24 hr mean)	0	30.22		125	3050.03	
7	Sulphur dioxide (ecological-lichens and bryophytes)	10	30.22		0	5169.54	
8	Sulphur dioxide (ecological-other vegetation)	20	30.22		0	5169.54	
9	Hydrogen sulphide	140	1.15		150	17.82	
10	Ammonia	180	45.84		2500	1208.05	
11	Ammonia (ecological-lichens and bryophytes)	1	45.84		0	1208.05	
12	Ammonia (ecological-other vegetation)	3	45.84		0	1208.05	

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Table A. 4 Output: Air impacts – Test 1

Number	Substance	Long term EAL (ug/m3)	Long term PC (ug/m3)	%PC of EAL (long term)	>1% of EAL? (long term)	Short term EAL (ug/m3)	Short term PC (ug/m3)	%PC of EAL (short term)	>10% of EAL? (short term)
1	Nitrogen dioxide	40	124.2290417	310.57%	fail	200	2813.985417	1406.99%	fail
2	Nitrogen oxides (as NO2) (ecological)	30	124.2290417	414.10%	fail	75	3320.502792	4427.34%	fail
3	Carbon monoxide	0	334.5793039			10000	6333.66825	63.34%	fail
4	Benzene	5	350.8282444	7016.56%	fail	30	5929.677	19765.59%	fail
5	Sulphur dioxide (15 min mean)	0	30.21889283			266	6927.186392	2604.21%	fail
6	Sulphur dioxide (24 hr mean)	0	30.21889283			125	3050.029829	2440.02%	fail
7	Sulphur dioxide (ecological-lichens and bryophytes)	10	30.21889283	302.19%	fail	0	5169.542083		
8	Sulphur dioxide (ecological-other vegetation)	20	30.21889283	151.09%	fail	0	5169.542083		
9	Hydrogen sulphide	140	1.145972222	0.82%	pass	150	17.81677083	11.88%	fail
10	Ammonia	180	45.84394556	25.47%	fail	2500	1208.049917	48.32%	fail
11	Ammonia (ecological-lichens and bryophytes)	1	45.84394556	4584.39%	fail	0	1208.049917		
12	Ammonia (ecological-other vegetation)	3	45.84394556	1528.13%	fail	0	1208.049917		

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Table A. 5 Output: Air impacts – Test 2

Number	Substance	Long term EAL (ug/m3)	Long term PC (ug/m3)	Air Background conc (ug/m3)	%PC of headroom (long term)	PEC Long term (ug/m3)	%PEC of EAL% (Long term)	%PEC of EAL>70%? (long	Short term EAL (ug/m3)	Short term PC (ug/m3)	%PC of the EAL-2*background	%PC of headroom >=20%? (short term)
1	Nitrogen dioxide	40	124.2290417	6.4	100%	130.63	326.57%	fail	200	2813.985417	1503.20%	fail
2	Nitrogen oxides (as NO2) (ecological)	30	124.2290417	8.1	100%	132.33	441.10%	fail	75	3320.502792	5647.11%	fail
3	Carbon monoxide	0	334.5793039	1653	100%	1987.58			10000	6333.66825	94.62%	fail
4	Benzene	5	350.8282444	0.25	100%	351.08	7021.56%	fail	30	5929.677	20100.60%	fail
5	Sulphur dioxide (15 min mean)	0	30.21889283	1.43	100%	31.65			266	6027.186392	2612.51%	fail
6	Sulphur dioxide (24 hr mean)	0	30.21889283	1.43	100%	31.65			125	3050.029829	2497.16%	fail
7	Sulphur dioxide (ecological-lichens and bryop	10	30.21889283	1.43	100%	31.65	316.49%	fail	0	5169.542083		
8	Sulphur dioxide (ecological-other vegetation)	20	30.21889283	1.43	100%	31.65	158.24%	fail	0	5169.542083		
9	Hydrogen sulphide	140	1.145972222	0	1%	1.15	0.82%	pass	150	17.81677083	11.88%	pass
10	Ammonia	180	45.84394556	3.3	26%	49.14	27.30%	pass	2500	1208.049917	48.45%	fail
11	Ammonia (ecological-lichens and bryophytes)	1	45.84394556	3.3	100%	49.14	4914.39%	fail	0	1208.049917		
12	Ammonia (ecological-other vegetation)	3	45.84394556	3.3	100%	49.14	1638.13%	fail	0	1208.049917		

Table A. 6 Results: Air Assessment

Report test results | Clear Output tables

Air

Option	Substance	Test 1	Test 2
1	Nitrogen dioxide	Fail	Fail
1	Nitrogen oxides (as NO2) (ecolog	Fail	Fail
1	Carbon monoxide	Fail	Fail
1	Benzene	Fail	Fail
1	Sulphur dioxide (15 min mean)	Fail	Fail
1	Sulphur dioxide (24 hr mean)	Fail	Fail
1	Sulphur dioxide (ecological-liche	Fail	Fail
1	Sulphur dioxide (ecological-othe	Fail	Fail
1	Hydrogen sulphide	Fail	Pass
1	Ammonia	Fail	Fail
1	Ammonia (ecological-lichens anc	Fail	Fail
1	Ammonia (ecological-other vege	Fail	Fail