HBP-OD-01
Environmental Management System Manual

Herriard Bio Power Ltd Anaerobic Digester

Bushywarren Lane, Herriard, Basingstoke, RG25 2NS

Produced in conjunction with Earthcare Technical Limited

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Abbreviations

AD	Anaerobic Digestion/er
ADQP	Anaerobic Digestate Quality Protocol
AMP	Accident Management Plan
AQMA	Air Quality Management Area
AW	Ancient woodland
BCS	Biofertiliser Certification Scheme
BUP	Biogas upgrading plant
CH_4	Methane
CHP	Combined heat and power
CMMS	Computerised Maintenance Management System
CO	Carbon monoxide
CO_2	Carbon dioxide
DAA	Directly Associated Activities
DSEAR	Dangerous Substances and Explosive Atmospheres Regulations 2002
EA	Environment Agency
EMS	Environmental Management System
EPR	Environmental Permitting Regulations
ERA	Environmental risk assessment
EWC	European Waste Catalogue
HAZOP	Hazard and operability study
HMI	Human machine interface
H_2S	Hydrogen Sulphide
kWthi	Kilowatts of thermal input
LDAR	Leak detection and repair
NOx	Oxides of nitrogen
OMP	Odour Management Plan
PHI	Priority Habitat Inventory
PM2.5	Particulate matter less than 2.5 micrometres in diameter
PM10	Particulate matter less than 10 micrometres in diameter
PVRV	Pressure and vacuum relief valve
RWBT	Raw Waste Buffer Tank
SCADA	Supervisory Control and Data Acquisition
SAC	Special Area of Conservation
SO_2	Sulphur dioxide
SOP	Standard Operating Procedure
SPA	Special Protection Area
SR	Standard Rules

SSSI	Site of Special Scientific Interest
TPA	Tonnes per annum
TVOCs	Total Volatile Organic Compounds
UV	Ultra violet

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1 Scope of the EMS

This Environmental Management System (EMS) is written to cover the scope of operations for Herriard Bio Power anaerobic digestion (AD) plant at Bushywarren Lane, Herriard, Basingstoke, RG25 2NS (the site) operated by Herriard Bio Power Limited 'the Operator'.

The EMS is written with consideration to the site Environmental Risk Assessment (Appendix A) which has been developed to:

- Assess the potential environmental risks from the operations;
- Determine if existing control measures are sufficient; and
- Propose additional control measures where appropriate.

The Environmental Risk Assessment (ERA) is based on the generic risk assessment for the equivalent Standard Rules (SR) environmental permit SR2021 No 6: anaerobic digestion facility, including use of the resultant biogas – installations. Additional hazards arising from the proximity of ecological receptors have been considered in full in the ERA (Appendix A), which also includes the current control measures that are employed, as well as additional control measures that are proposed to encompass the site upgrade works.

The EMS comprises of a series of 'live' documents to assist and inform daily site operations. This document, the EMS Manual, is an overarching document which links together all the EMS documents including the Accident Management Plan (AMP), Odour Management Plan (OMP), Standard Operating Procedures (SOPs), maintenance schedules and forms used for record keeping.

All the EMS documents are listed within the Master Document Control File **(HBP-OD-02)** which is used as a complete reference to all management system documents and includes version numbers and issue dates to ensure document control.

2 Environmental Policy

The environmental policy outlines the environmental commitments of the Operator with respect to its overall operations, activities, and environmental performance.

The Environmental Policy **(HBP-OD-03)** is a management system document.

3 Organisation & Site Profile

3.1 Planning

The original planning permission for the Herriard Bio Power AD plant was issued by Hampshire County Council on 9 October 2012 (Ref: BDB/76332) and permitted up to 16,700 tonnes per annum (tpa) of food waste and 12,500 tpa of crop material. On 23 March 2015 an amendment was approved to increase the maximum permitted annual tonnages of food waste to 40,000 tpa with the limit of 12,500 tpa still applying to crop feedstocks (Ref: 14/03351/CMA). On 13 August 2018 permission was granted for Installation of Biogas Upgrader, Gas Storage Container, Biomethane Off Take Vehicle Bays and Ancillary Equipment (Ref: 18/01659/CMA).

On 30 July 2021 planning permission was granted to implement tanks approved under 2012 permission for the original AD Plant along with similar works to those approved under the 2018 permission for the Installation of Biogas Upgrader, Gas Storage Container, Biomethane Off Take Vehicle Bays and Ancillary Equipment (including repositioning of two digester tanks approved under reference BDB/76332) and works, installation of a carbon dioxide recovery unit and subdivision and covering of existing lagoon for odour control and erection of office/welfare and classroom block (Ref: 21/00578/CMA). On 28 November 2023 Hampshire County Council issued a variation of condition 2 of 21/00578/CMA to allow weekend and further bank holiday deliveries of food waste.

3.2 Permitting

The bespoke waste operation permit for the site was issued on 20 January 2014 (Permit reference: EPR/AB3807KW) and is being updated to reflect the current and proposed infrastructure.

The activity is classified as an 'Installation' and therefore the requirements of the Industrial Emissions Directive apply, since the AD plant has a treatment capacity of more than 100 tonnes per day. The proposed Schedule 1 Listed Activity is S5.4 Part A(1)(b)(i)) *Recovery or a mix of recovery and disposal of non-hazardous waste with a capacity exceeding 75 tonnes per day (or 100 tonnes per day if the only waste treatment activity is anaerobic digestion involving biological treatment*.

The Directly Associated Activities (DAAs) which have been included in the current permit variation application are listed below. Once the application has been determined the permitted DAAs will be listed within Schedule 1 of the permit.

- Storage of waste pending recovery or disposal
- Physical treatment for the purpose of recycling
- Steam and electrical power supply
- Gas upgrading
- Emergency flare operation
- Gas storage
- Digestate storage
- Raw material storage
- Surface water collection and storage
- Dirty water collection and storage
- Air treatment

The operation does not meet the location criteria for the equivalent Standard Rules permit for food waste (SR2021 No6) as the site is within 50m of Ancient Woodland and Priority Habitat Inventory (PHI) sites namely Great Bushy Warren Copse to the south and an area adjacent to the permitted boundary at the site access to the east; these sites are classified as both Ancient Woodland and PHI deciduous woodland. Therefore, a bespoke installation permit is required for the operation. The environmental risks arising from the proximity to these receptors have been considered within the Air Quality and Odour Impact Assessment (AQOIA) which supports the 2023 permit variation application.

The substantial permit variation which this EMS Manual supports is to:

a) Reflect site upgrades, namely:
   - The addition of a raw waste buffer tank (452m^3) with mixing and gas storage and 2 No. Primary Digesters (2,440m^3 each) for food waste all within an extended secondary containment area.
   - The addition of a second combined heat and power engine (CHP). The existing CHP will become the 'standby' CHP and a new proposed CHP which will become the 'duty' CHP.
   - The installation of an emergency generator.
   - An upgrade to the Waste Reception Building including the installation of a new carbon filter odour abatement system to replace the UV system.
   - Installation of a new digestate pasteuriser (178m^3).
   - Remodelling of the existing uncovered digestate storage lagoon into 2 No. new covered digestate storage lagoons.
   - Addition of 2. No process water tanks (100m^3 each) within the secondary containment area for optimisation of use of dirty water on site.
   - Addition of a lined surface water storage lagoon (3,000m^3).
   - Addition of biogas upgrading plant (BUP) for the production of biomethane for transport off site via virtual gas pipeline and injection to the National Gas Grid and use of biomethane in an onsite vehicle refuelling facility.
   - Addition of carbon dioxide (CO_2) capture from the gas upgrade plant, storage and transport.
   - Replacement of the existing non-BAT compliant flare with a BAT compliant one and addition of a second flare to increase capacity to accommodate additional biogas generated from the site expansion.

b) Change the permit from a waste operation permit to an installation permit to reflect an increase in biological treatment capacity to over 100 tonnes per day.

c) Increase the maximum permitted quantity of treated waste from 36,500 to 40,000 tonnes per annum in line with the current planning permission.

d) Bring the permitted waste types in line with Appendix B of the Anaerobic Digestion Quality Protocol by removing six European Waste Catalogue (EWC) codes and adding one EWC code. Waste codes for wastes from wood processing and the production of panels and furniture (03 01 01 & 03 01 05) have not been requested although they are

included in Appendix B of the Anaerobic Digestate Quality Protocol (ADQP)[1] as the process is not designed to treat these waste types.

e) Amend emission points to include the addition of:
   - the outlet from the carbon filter odour abatement system.
   - pressure and vacuum relief valves (PVRVs) on the new raw waste buffer tank, the 2 No. new digesters and the pasteuriser;
   - a replacement to the existing flare;
   - a second flare;
   - the second combined heat and power engine (CHP) raising the aggregated net rated thermal input of onsite combustion plant to 5.7 MWth (excluding emergency generator). Calculations are carried out in accordance with the guidance[2] and are presented in Appendix B;
   - the emergency generator (363kW or 1,100kWthi);
   - a carbon dioxide vent on the biogas upgrading plant; and
   - a single vent from an impregnated carbon filter which serves the channelled emissions from the 2 No. new covered lagoons.

f) Change the registered address of Herriard Bio Power Limited.

3.3 Management Overview

The site is operated by HBP. There is a **Plant Manager**, who is responsible for the day-to-day operation of the AD plant and who acts as the **Technically Competent Manager**. They manage the **Plant Operatives, Plant Technicians, Maintenance Engineers** and **Weighbridge Operator** who assist in day-to-day operations and night shifts.

The **Plant Manager** is managed and supported by the **Managing Director**. Roles and responsibilities are summarised in the Staff Organogram **(HBP-OD-04)** and are detailed in Section 11.

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

3.4 Site Description

Address: Bushywarren Lane, Herriard, Basingstoke, RG25 2NS
National Grid Reference: SU 65490 46638
Local Authorities: Hampshire County Council & Basingstoke and Deane District Council

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

The site is 7.7 hectares (19.0 acres) in extent.

The site is situated approximately 6km south of the town Basingstoke, Hampshire and the M3 motorway which runs along the south side of the town. The site is accessed off Bushywarren Lane

[1] Anaerobic Digestate Quality Protocol, WRAP, Environment Agency, 2014

[2] Determination of thermal input power of an engine driven generator, Association of Manufacturers of Power generating Systems (AMPS) Technical Committee, 2016

which itself comes directly off the A339 between the villages of Winslade to the north and Herriard to the south.

To the west of the site is an agricultural field and beyond that a solar PV development. The immediate surrounding area is sparsely populated however, there is an open windrow composting facility accepting up to 100,000 tonnes of green waste a year, operated by Veolia, adjacent to the north easterly site boundary.

3.5 Infrastructure

The site infrastructure comprises:

- Access road
- Weighbridge
- 2 No. silage clamps (7,500m^3 capacity each)
- 1 No. external solids feeder (Crop / 57m^3 capacity)
- Waste Reception Building comprising:
    - Roller shutter doors
    - Mavitec depackaging line – paddle de-pack with hopper (4m^3 capacity) with 4 No. screens; 2 No. 25mm & 2 No. 12mm
    - Carbon filter odour abatement system
    - Quarantine bay
    - Disinfection area
    - Sealed drainage sump
    - 2.5m high concrete walls inside building structure
    - Liquid waste delivery point
- Secondary containment area including:
    - Raw waste buffer tank (452m^3) with mixing and biogas storage
    - 3 No. primary digesters (2,440m^3 each) with mixing, heating, and gas storage
    - 1 No. post digester (2,440m^3)
    - 1 No. single tank pasteuriser (178m^3)
- 2 No. FAN screw press separators, buffer tank (100m^3) and associated fibre storage bay
- 2 No. digestate storage lagoons (16,500m^3 each)
- Gas compressors
- 1 No. carbon filter prior to combined heat and power engine (CHP)
- 1 No. CHP (1,200kWe)
- 2 No. Emergency flares (500Nm^3/hour & 1,000Nm^3/hour)
- Emergency diesel generator (363 kW)
- Heat exchangers
- Control room / site office
- 40m^3 water tank
- 2 No. carbon filters in series serving biogas upgrading plant
- Biogas upgrading plant including vent to atmosphere.
- Biomethane compressors
- 2 No. Biomethane trailer bays
- Biomethane vehicle fuel dispensing pump

At the time of writing further infrastructure improvement is proposed:

- Addition of 2 No. 100m^3 process water tanks within the secondary containment system
- Addition of 1 No. CHP (1,200kWe)
- Covering of the 2 No. digestate storage lagoons with emissions treated by 2 No. carbon filters (one single emission point).
- Covering of the 2 No. separators and the fibre storage bay with a three sided tented structure
- Installation of a lined surface water storage lagoon (3,000m^3)

The site layout is shown on Figure 3 - Site Layout.

3.6 Hours of Operation

The site is staffed at all times.

The planning permission restricts delivery of waste to the site such that there can be up to 18 waste deliveries per day. Waste can only be delivered to the site between the hours of 07:00 and 18:00 Monday to Friday, between 07:00 and 12:00 on Saturday mornings and between 7:00 and 15:00 on Bank Holidays except Christmas Day and Easter Sunday.

3.7 Site Security

The site benefits from personnel on site at all times, perimeter fencing, a locked gate at entrance outside operating hours, locked valves and a CCTV system, which can be remotely monitored and with alarms in the office.

4 Site Sensitivities

4.1 Geology

The bedrock geology on which the Site is located is chalk namely, Seaford Chalk Formation. The superficial geology is Clay-with-flints Formation - Diamicton.[4]

4.2 Groundwater

The site is situated over an unproductive superficial aquifer and a principal bedrock aquifer. Groundwater vulnerability is classified as medium risk due to soluble rock risk. However, the site is not within a Groundwater Source Protection Zone nor is it within a Drinking Water Protected Area or Safeguard Zone.[3]

The site is within two Nitrate Vulnerable zones for groundwater namely, Hampshire Chalk NVZ (G143) and Kingsclere and Greywell NVZ (145).

There are no licensed groundwater abstractions within 2,000m.[4]

The site is within the Basingstoke Chalk Water Framework Directive groundwater body which was assigned an overall rating of Poor in 2019.[4]

4.3 Surface Water

The site is not within a Drinking Water (Surface Water) Protected Area or Drinking Water (Surface Water) Safeguard Zone.[3]

The site is within the Water Framework Directive of the Candover Brook which was classified as having a Moderate ecological rating and a chemical rating of Fail in 2019. The nearest Water Framework Directive surface water body is the Candover Brook 10,946m southwest of the site. There are no watercourses within the vicinity of the site.

There is an engineered reedbed system and leachate pond for the adjacent compost site over 25 m north of the site boundary.

The site is within the Hamble Estuary Eutrophic Nitrate Vulnerable Zones (NVZ) (TraC) for Eutrophic Water (ET3).

There are no licensed surface water abstractions within 2,000m.[4]

4.4 Flood Risk

The site is situated in a location which has a low probability of flooding (Flood Zone 1).[5] There is a negligible risk of surface water flooding on site.[4]

[3] https://magic.defra.gov.uk/MagicMap.aspx Accessed 18 September 2023

[4] Enviro+Geo Insight Report, GS-7RZ-5CU-15N-7H3, Groundsure, 19 September 2023

[5] https://flood-map-for-planning.service.gov.uk Accessed 18 September 2023

4.5 Ecological Receptors – Statutory Designated Sites

There are no Sites of Special Scientific Interest (SSSIs) within 2km of the Site; no Special Areas of Conservation (SACs), Special Protection Areas (SPAs) or Ramsar sites within 10km of the Site.[3]

4.6 Ecological Receptors – Priority Habitats & Species

There are 15 areas of Ancient Woodland (AW) within 2km of the Site including: Great Bushywarren Copse which lies to the south of the Site and partly within the Site boundary; Kingsmore, Allwood & Fryingdown Copses which lie approximately 60m away at the close point; Cowdray's Copse to the north; and Hen Wood to the northeast.

The nature and heritage conservation sites for consideration are identified in a screening report provided by the Environment Agency in October 2023 and are shown in Table 1 below.[6] The screening report with associated maps is in Appendix C. The impact of the proposed changes upon these receptors has been assessed through a Nature and Heritage Conservation Risk Assessment which forms Appendix D.

Table 1 Nature and Heritage Conservation sites within relevant screening distance

Site / Species name and type	Screening distance (m)	Distance from site boundary (m)	Direction from site
Sites of Special Scientific Interest (SSSi)	**2,000**		
Mapledurwell Fen		6km however the site is within 2000m of the nearest stretch of the Detailed River Network to the site location	Northeast
Local Wildlife Sites	**2,000**		
A339 Alton Road, Herriard		425	Northeast
Buckshorn Copse		1,102	North
C12 Bagmore Lane		1,718	South
Coombe Wood, Tunworth		1,535	North east
Ellisfield Road Verge		1,587	Southwest
Great Bushywarren Copse		Adjacent	South
Guy's Copse		1,046	Northeast
Kingsmore, Allwood & Fryingdown Copses		50	West

[6] Nature and Heritage Conservation Screening Report, EPR/AB3807KW/P002, Environment Agency, 31/10/2023

Site / Species name and type	Screening distance (m)	Distance from site boundary (m)	Direction from site
Kit Lane & Longfield Dells		1,788	Southwest
Herriard Common		1,815	South
Hen Wood		679	Northeast
Hook's Copse, Weston Corbett		1,701	Northeast
Honeyleaze Copse		1,427	East
Hummocks Clump		1,585	Northwest
Little Bushywarren Copse		Adjacent	East
Merritt's Copse		992	Southwest
Parkfield Copse Complex & Lower Common Pit		1,895	Southwest
Picked Craft Copse		2,039	Northwest
Platts Copse		1,079	Southwest
Smallhill Clump		2,000	Northeast
Tom's Copse		1,482	Northeast
Protected Species	**2,000**		
Bullhead		6,750	Northeast
Protected Habitats	**500**		
Chalk Rivers		4,635	Northeast
Coastal & Floodplain Grazing Marshes		4,635	Northeast

4.7 Air Quality Management Areas

The nearest Air Quality Management Area (AQMA) lies over 18km to the east, it is Waverley AQMA No.1 – Farnham in Waverley Borough Council area.[7]

[7] https://uk-air.defra.gov.uk/aqma/ Accessed 8 December 2023

4.8 Human Receptors

The next nearest residential receptors lie in the village of Herriard, the centre of which lies approximately 1km to the southeast of the Site.

Human receptors within proximity to the site are captured in Table 2 below and are shown in Figure 4 – Human Receptor Plan.

Table 2 Human receptor locations around 1km from the site

ID	Location	Type	NGR X	NGR Y	Distance from Site boundary (m)	Direction from Site
H1	Little Bushy Warren Composting Facility	Workplace	465779	146705	79	East
H2	Herriard Estates office	Workplace	466303	146137	714	Southeast
H3	Manor Court, Herriard	Workplace	466135	145922	744	Southeast
H4	Manor Farmhouse	Residential	466173	145962	745	Southeast
H5	Houses on Scratchface Lane	Residential	466303	146008	806	Southeast
H6	3, Parsonage Cottage	Residential	466430	145784	1,061	Southeast
H7	Winslade Cottages	Residential	465340	147794	952	North
H8	Widmoor bungalows	Residential	464454	145787	1,095	Southwest

5 Process Description

5.1 Overview

This section provides a summary of the treatment process which should be read in conjunction with the Process Flow Diagram (Appendix E) and Figure 3 – Site Layout.

The operation of the AD plant is fully automated from an on-site central control panel located in the Control Room which monitors information transmitted from field instrumentation around the AD plant. This is known as the Supervisory Control and Data Acquisition (SCADA) system. This information can be viewed both on site and remotely to ensure optimisation and safe operation of the anaerobic digestion and associated processes.

5.2 Feedstocks

Table 3 below provides an overview of the feedstocks for the AD plant.

Table 3: Feedstock description, source, form, storage location and approximate annual throughput

Feedstock description	Source(s) of feedstock	European Waste Catalogue (EWC) code	Form	Storage location	Approximate tonnages accepted / treated per year
Energy crops	Grown under farm contracts	Not applicable	Solid	Silage clamps	12,500
Prepared food soup	Permitted AD Plant	19 12 12	Liquid	Raw Waste Buffer Tank	2,000
Composting liquor	Adjacent composting facility	19 05 03	Liquid	RWBT	2,000
Liquid wastes	Various sources	EWC codes (all listed in Appendix B of the Anaerobic Digestate Quality Protocol)	Liquid	RWBT	2,000
Food waste	Various sources	EWC codes (all listed in Appendix B of the Anaerobic Digestate Quality Protocol)	Solid	Waste Reception Building	34,000
Maximum annual tonnage					**52,500**

The quantities of the solid and liquid feedstocks to be fed into the AD plant daily (the feed plan) is determined by the **Plant Manager** based on feedstock testing and process monitoring results.

5.3 Crop Feedstock Acceptance & Storage

Energy crops are grown under contract with local farms, ensiled within the silage clamps and covered with an impermeable cover. See Section 6.1 (Primary Containment) for details of silage clamp construction.

When crop feedstocks are brought onto site, they are checked in accordance with the Crop Acceptance & Rejection Procedure **(HBP-SOP-05**). The dry matter content of energy crops is tested to confirm they are suitable for ensiling. Crop feedstocks are also visually checked for the presence of stones or other physical contaminants. If found, they are either removed by hand or the load may be rejected if deemed too contaminated and unsuitable for treatment.

5.4 Waste Acceptance & Storage

All waste accepted on site is subject to pre-acceptance checks including waste sampling and verification where appropriate in accordance with the Waste Pre-Acceptance Procedure **(HBP-SOP-01)**. These checks are the responsibility of the **Plant Manager**.

The **Plant Manager** is responsible for booking feedstocks into site prior to receipt. Only waste that has passed pre-acceptance checks, and is booked in, is accepted on site.

When waste is delivered to site further checks are carried out in accordance with the Waste Acceptance and Rejection Procedure **(HBP-SOP-02)**. This includes paperwork checks by the Weighbridge Operator, visual checks by Site Operatives and verification waste sampling and analysis when required in accordance with the Sampling and Analysis Procedure (**HBP-SOP-13**).

Quarantined and rejected waste will be stored in the designated quarantine area in the Waste Reception Building and returned or removed to a suitably regulated facility within 5 days in accordance with the Waste Acceptance and Rejection Procedure **(HBP-SOP-02).**

Reception of prepared feedstock, composting liquor or other liquids waste is carried out in accordance with Liquid Waste Reception Procedure **(HBP-SOP-03).** Tankers may currently discharge liquid waste directly to the Raw Waste Buffer Tank (RWBT) within the secondary containment area but this discharge point is to be moved to within the Waste Reception Building which benefits from being fully enclosed with odour abatement.

See Section 6.1 (Primary Containment) for further detail on the Raw Waste Buffer Tank construction.

5.5 Waste Pre-treatment & Loading

Packaged food waste is loaded using the dedicated telehandler into the hopper of the depackaging plant in accordance with the Waste Loading Procedure **(HBP-SOP-04)** within the Waste Reception Building**.** The plant de-packages solid waste to separate packaging material from organic food wastes suitable for anaerobic digestion treatment. There are four screens on the Mavitech depackaging line; 2No. 25mm screens & 2 No. 20mm screens.

Water is used to wash the packaging material. From there de-packaged food waste mixed with wash water is fed directly into the RWBT.

The washed packaging material waste goes to the screw press compacter and is then discharged into a skip or container for removal off site to an energy from waste facility inside the Waste Reception Building.

Liquid waste is dispatched via a tanker connection point in the Waste Reception Building.

The waste in the RWBT is mixed (via hydraulic and gas mixing) and then pumped via a macerator and 12mm screen to the primary digesters, which operate in parallel.

The tonnages of waste entering the process are measured using weigh cells in the depackaging hopper and by flow meters between the RWBT and the primary digesters. All measurements are recorded within SCADA. In this way waste tonnages received and treated can be tracked and recorded on the waste tracking spreadsheet.

5.6 Crop Loading

Twice daily a front loader is used to load the energy crops from the silage clamp into the external solids feeder. This is carried out in accordance with the Crop Loading Procedure **(HBP-SOP-06).** There are weigh cells in the solids feeder which are used by the Operator to ensure that the correct tonnages of solid feedstocks are added. The tonnages of feedstocks loaded into the feeder is recorded on SCADA.

Prepared food waste from the RWBT is pumped to the feeding line and mixed with the crop feedstocks in mixing pumps in accordance with the daily feed plan and controlled via the SCADA control panel to make a pumpable mixture of the correct dry matter, which is then fed to Digester 1. The quantity of each feedstock is determined by the daily feed plan and controlled via SCADA.

5.7 Digesters

There are three primary digesters (D1, D2 & D3) which operate in parallel. D1 is a predominantly crop fed digester with some addition of food waste from the RWBT. D2 and D3 are food waste digesters only. All three primary digesters feed into a single post digester (PD). The construction type, mixing systems, gas storage and working capacities of the digesters are detailed in Table 4 below. See Section 6.1 (Primary Containment) for further details on the tank construction.

Table 4: Tank Details

Tank type	Reference	Construction type	Mixing type	Gas storage type	Gas storage capacity (m^3)	Average retention time (days)	Working capacity (m^3)
Raw Waste Buffer Tank	RWBT	Glass lined steel tank	Hydraulic mixing system and gas mixing system	Double membrane gas storage roof	340	2-3	452
Primary (Primarily crop)	D1	Pre-cast post tensioned concrete	3 No. submersible mixers	Double membrane gas storage roof	1,250	28	2,440
Primary (food)	D2 & D3	Pre-cast post tensioned concrete	Gas mixing & 1. No external pump mixer (each tank)	Double membrane gas storage roof	1,250 (each)	40 (in parallel)	2,440 (each)
Post	PD	Pre-cast post tensioned concrete	2 No. submersible mixers	Double membrane gas storage roof	1,250	13	2,440
				Total	**5,340**	**83-84**	**10,212**

The digesters have inspection windows which are checked once a day in accordance with Daily Checks **(HBP-RC-03)**.

The SCADA system ensures that the digesters operate in the mesophilic temperature range of 39-41 ^oC.

The digesters all have pressure and vacuum relief valves (PVRVs) which will release biogas or take in air in the event of an overpressure or under pressure biogas situation respectively.

The PVRVs are a necessary safety feature for an AD plant; but will only be used as a contingency to maintain structural integrity of the tank and dome structures. During normal operation the PVRVs will not operate.

The PVRVs on D1 and PD are water filled; glycol is added in winter months to prevent the water from freezing.

The seating of the PVRVs is checked daily in accordance with Daily Checks **(HBP-RC-03)**.

5.8 Gas Storage

The type of gas storage afforded by the digesters is detailed in Table 4 above.

The total variable volume of biogas in the vessels is 5,340m^3 which is approximately 5.3 hours of the daily volume of biogas produced and therefore provides short term storage of approximately 3 hours at full feeding which results in full gas production. This storage capacity allows for planned

routine CHP or biogas upgrading plant maintenance events when the gas storage levels will be reduced prior to shut down. This is detailed in Section 7.3 Control of Gas Pressures. The duty and standby CHP (once second CHP installed) provide ample capacity to burn all the biogas that may be generated on site in the event that the biogas upgrade plant is not operational.

5.9 Biogas Treatment

As previously described, biogas is stored within the double membrane gas storage domes above the digesters. The digesters tanks are equipped with desulphurisation nets and low-level oxygen injection to encourage microbial growth to reduce hydrogen sulphide (H_2S) levels and precipitate sulphur into the digestate below.

Ferric hydroxide powder is added directly to the packaging hopper in the Waste Reception Building to help control H_2S production levels, if process monitoring dictates that it is required.

The biogas from D1 passes from the gas storage dome through a condensate pit to remove any moisture, through a chiller to reduce the temperature, and then through a carbon filter to remove any excess hydrogen sulphide (H_2S) prior to being utilised in the CHP(s).

The biogas from D2, D3 and PD passes from the gas storage domes through a condensate pit to remove any moisture, through a chiller to reduce the temperature, and then through two carbon filters in series to remove trace gases prior to being utilised in the biogas upgrading plant (BUP).

The SCADA system manages the biogas treatment, gas distribution system and the flares if required.

5.10 CHP Engines

The existing CHP is a MWM TCG2020V12 with a rated power (electrical) of 1,200kWel. The thermal input power is 2.8 MWth. The CHP was put into operation before 20th December 2018 and is therefore classified as ‘existing’ with respect to the Medium Combustion Plant Directive (MCPD) and associated emission limit values.

The new proposed CHP is an updated version of the existing with a rated power (electrical) of 1,200kWel. The thermal input power is 2.8MWth. The CHP is ‘new’ with respect to the MCPD and associated emission limit values.

The existing CHP will become the ‘standby’ CHP and a new proposed CHP which will become the ‘duty’ CHP. The new CHP provides surety of electricity supply given that the existing CHP is over 10 years old and becoming less reliable, and also allows capacity to burn biogas should the BUP and export of biomethane be compromised. If this happens feeding will be markedly reduced or stopped to reduce gas production levels, but in the interim any biogas can be effectively used to generate electricity from both CHPs. Though only enough biogas will be produced to fuel both CHPs at 80% capacity due to the treatment/production capacity of the AD plant. The site has a capacity to export 2 MW of electricity to the grid. Each CHP can produce 1.2 MW of electricity. There is capacity to use 2.4 MW of electricity from both CHPs to supply the grid and the Pentair BUP, but it is preferable to run one CHP as the ‘duty’ CHP at 100% and use the second CHP as a standby. All heat produced from the CHPs can be used on site at certain times of the year dependent on ambient temperature at the time of production.

The CHP(s) burn approximately 30% of the treated biogas from the AD plant and converts the chemical energy of the gas into mechanical kinetic energy and heat energy. Mechanical energy is converted into electrical energy in the generator. The electricity produced is used to power the AD plant (parasitic load) and any excess electricity is exported to the National Electricity Grid.

Heat from the CHP engine is used to maintain the temperature of the digesters and provide heat to the pasteuriser. The CHP is sized such that one CHP is adequate to provide sufficient heat for the process.

There is a back-up generator (363kW) in place that can be used to power essential plant functions e.g. flare, dome fans in the case of a mains power outage.

5.11 Biogas Upgrading Plant

The treated biogas (Section 5.9) enters the BUP comprising of a membrane filtration system. The BUP separates the biogas to methane (CH_4) and carbon dioxide (CO_2). The CO_2 is vented and the biomethane is compressed and stored prior to dispatch from the site via gas tankers to a grid injection point, this is referred to as a virtual pipeline. There is also a vehicle refuelling station on site.

The BUP has its own monitoring and control HMI system.

5.12 Flares

There are 2 No. flares one serving the CHPs and one serving the BUP. Biogas is not routinely flared to atmosphere. The flares are only used during periods of abnormal operating conditions such as if the biogas storage became full. See Section 7.3 Control of Gas Pressures.

The flares are Uniflare High Temperature Enclosed Biogas Flares:

- UF-10-1000-BGF Build No. 1837 Jan 2022 (maximum flowrate 1,000m^3/h) principally serves the BUP system.
- UF-10 500-BGF Build No. 1836 Jan 2022 (maximum flowrate 500m^3/h) principally serves the CHP system.

Biogas levels can be balanced throughout the gas storage on site and therefore either or both flares may be used in the event of an emergency.

The flares both ignite automatically and burn at >1,000^{o}C for in excess of 0.3 seconds.

Both flares have stack heights of 7.67m.

Flare usage is recorded on SCADA in accordance with permit requirements.

5.13 Maceration & Pasteurisation

Digestate from the Post Digester is macerated and passed through a 12mm screen.

Screened digestate is then pasteurised in the single pasteuriser which has a capacity of 178m^3. Each batch is heated to over 70^{o}C for a minimum of one hour prior to being cooled via a heat exchanger and then being pumped to the separator buffer tank.

5.14 Digestate Separation & Storage

Whole pasteurised digestate from the separator buffer tank (100m^3) is passed through 2. No FAN screw press separators capable of separating up to 15m^3/hr of whole digestate each.

Separated fibre falls into a covered bay below the separators, and from there is removed to destination field heaps off-site.

At the time of writing, it is proposed to install a tented structure over the separators and around 3 sides of fibre storage bay to reduce diffuse emissions.

Separated liquor is pumped from the separator to the 2 No. digestate storage lagoons with working capacity of 16,500m^3 each. Based on the proposed feedstock tonnage of 52,500 tonnes per annum approximately 7,000 tonnes of solid fibre digestate and 40,000 tonnes of digestate liquor will be produced per year (assuming 1 tonne = 1 m^3). The digestate storage lagoons provides approximately 10 months storage capacity for digestate liquor.

The Operator is a registered producer under the Biofertiliser Certification Scheme (BCS) for PAS110:2014[8] certified digestate liquor achieving end of waste status under the Anaerobic Digestate Quality Protocol (ADQP)[9]; Process registration reference: BCS1214C59. At the time of writing the Operator is in the final stages of approval for the digestate fibre under the BCS scheme.

5.15 Digestate Use

The digestate is transferred via pipeline from the site to the Herriard Estate at a time when it may be spread to meet crop need effectively or to strategic offsite storage locations. The digestate liquor is a rich source of nitrogen, phosphorus, potassium, and trace elements which is stored and used to replace the use of manufactured fertiliser.

The digestate fibre is a very good source of organic matter as well as supplying valuable nutrients and is used as both a soil improver and manufactured fertiliser replacement material.

[8] PAS110:2014 Specification for whole digestate, separated liquor and separated fibre derived from the anaerobic digestion of source segregated biodegradable materials, British Standards Institution, July 2014

[9] Anaerobic digestate, Quality Protocol, End of waste criteria for the production and use of quality outputs from anaerobic digestion of source-segregated biodegradable waste, WRAP & Environment Agency, January 2014

6 Control of Emissions to Water & Land

6.1 Primary Containment

6.1.1 Silage Clamps & Leachate Tank

There are 2 No. silage clamps (7,500 m^3 capacity each). They have a concrete base and concrete walls running longitudinally. Silage effluent is collected in an underground tank (126m^3) made from a Composite Steel Reinforced (CSR) material. The leachate tank has a level switch and a submersible pump which pumps the leachate to the Mavitec Line for use in the AD process. It is proposed that once the process water tanks are in place they will be used to store leachate prior to it's use in the AD process.

The silage clamps are inspected annually when empty and repairs made as necessary, to be signed off by a qualified engineer.

6.1.2 Ancillary tanks

There are 2 No. process water tanks (100m^3 each) proposed which will be constructed of steel.

The Raw Waste Buffer Tank (RWBT) (452m^3) is an Aconsult pre-cast post tensioned tank. The roof is made from a double-membrane gas tight cover.

The pasteuriser is a glass lined stainless steel tank with a capacity of 178m^3.

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

All tanks are inspected during installation and by a competent qualified engineer every 5 years.

6.1.3 Digesters

The digesters are manufactured by Aconsult and are pre-cast post tensioned concrete. The roofs are made from a double-membrane gas tight cover*.*

All tanks will be inspected by a competent qualified engineer every 5 years as part of a scheduled degrit.

The digesters all benefit from level sensors linked to SCADA.

6.1.4 Digestate Storage

The two digestate storage lagoons are lined with leak detection, each have a storage capacity of 16,500m^3 excluding freeboard of 750mm. At the time of writing covers are to be installed. The installation of floating covers, with channelled emissions from both lagoons to a vent fitted with impregnated carbon filter is scheduled for 2025.

The volume of digestate entering the lagoon from the separator is measured via flow meters and recorded on a daily basis. The volume within the lagoon is restricted to 16,500m^3 per lagoon so as to maintain a 750mm freeboard at all times.

6.1.5 Storage of Oils and Chemicals

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

Diesel for the operation of the back-up generator is stored in a bunded integral tank with locked valves. Diesel for on-site vehicles is stored in a bunded store.

Ferric hydroxide powder for the control of hydrogen sulphide (H_2S production is stored within the Waste Reception Building / chemical store.

Any potentially polluting chemicals including glycol are stored within the chemical store.

An Inventory of Substances is maintained; Appendix B of the Accident Management Plan Manual **(HBP-OD-08)**.

6.2 Secondary Containment

The secondary containment system has undergone a construction quality assurance review by Plandescil Consulting Engineers which includes checking compliance with the relevant guidance (CIRIA C736).

The secondary containment infrastructure is inspected as part of the Daily Checks **(HBP-RC-03)**.

6.3 Drainage Description

The entire site drainage is managed as dirty with minimal clean and dirty water separation.

The drainage strategy is being redesigned by Plandescil Consulting Engineers who are experienced in the development of drainage systems for AD plants and will follow the guiding principles of BAT:

- Minimisation of underground structure and pipework where possible and suitable leak detection and containment to be provided.
- Segregation of clean and dirty areas and reuse of water where possible.
- Clean surface water collected from the digester roofs and designated clean areas of the site drains to a new proposed lined surface water storage lagoon (3,000m^3) for storage and use within the process.
- Use of an impermeable surface with a sealed drainage system for any areas where the runoff is potentially polluting i.e., silage clamps and apron, waste reception building, solids feeder, separator, and fibre bay.
- The secondary containment area will collect to a sump or sumps with a system for actively pumping out to dirty water or clean water storage as appropriate in accordance with the Secondary Containment Checking & Emptying Procedure **(HBP-SOP-07)**. Typically, water from the secondary containment bund will be treated as dirty and pumped to the Process Water Tanks 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 **(HBP-SOP-13),** and steps taken to resolve it.
- It will be ensured that the secondary containment system is designed in accordance with CIRIA 736 accounting for extreme rainfall events including climate change predictions. In the case of abnormal excess water levels due to extreme rainfall event clean water from the surface water lagoon may be released to the wider environment following pre-determined checks outlined within the Discharge of Flood Water Procedure **(HBP-SOP-23)** which is part of the Accident Management Plan **(HBP-OD-08).**

- If the visual and olfactory checks confirm that there have been no spillages, and laboratory analysis confirms that parameters for emissions to water are at acceptable levels, then the water will be pumped out to the surface water lagoon as clean water.

Following a full drainage survey, as-built drawings will be produced showing the route of all sub-surface drains.

A revised inspection, maintenance and repair schedule will be implemented in accordance with the recommendations provided by Plandescil Consulting Engineers. The Environmental Management System will be updated accordingly.

The majority of pipework is above ground however there are two stretches of underground pipework which are surveyed every 5 years:

- Pipe from crop feeder and associated mixing pump to Digester 1.
- Pipe between Digester 1 and the Post Digester.

6.4 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 **(HBP-OD-08)** including the procedure for the management of water following exceptional high rainfall events; Discharge of Flood Water Procedure **(HBP-SOP-23)** .

7 Control of Emissions to Air

7.1 Control of Emissions from Waste Reception Building

A new carbon filter odour abatement system has been installed to replace the Ultraviolet (UV) abatement system. It is used to treat air extracted from the waste reception building prior to discharge to atmosphere.

7.2 Biogas Treatment

Biogas treatment is carried out to reduce hydrogen sulphide (H_2S), VOCs and ammonia (NH_3) levels as described in the Process Description Section 5.9.

Reduction/removal of trace gases in the biogas reduces the potential emissions from burning biogas within the CHPs and flares. Biogas treatment also reduces potential emissions of trace gases from the vent on the BUP and ensures biomethane is suitable for transportation off site for injection to the national grid.

7.3 Control of Gas Pressures

Gas pressure is measured at 4 No. points within the raw biogas storage system; RWBT, D2, D3 and Pasteuriser. Gas holder levels are also measured in all the biogas storage domes.

SCADA uses gas level readings to dictate flare usage and also dictate the load of the BUP and CHP(s). The CHP operates from 50 to 100% gas level and the BUP operates from 20 to 100% gas level and gas pressure. The BUP will smoothly change the load automatically, while CHP requires manual intervention.

There are 2 No. flares; one principally serving the CHPs and one principally serving the biogas upgrading plant (BUP). Biogas is not routinely flared to atmosphere. There is a cross valve between the two gas storage systems such that biogas can move from an area of higher pressure to an area of lower pressure to reduce flaring events and duration.

The flares are only used during period of abnormal operating conditions should the biogas storage become full. If, due to equipment or system failure, excess biogas is produced the emergency flare(s) will automatically burn the biogas to ensure it is not released to the atmosphere.

The flares ignite automatically and are sized appropriately; the flare serving the CHP system can burn up to 500Nm3hr of biogas and the flare serving the BUP system can flare up to 1,000Nm3hr of biogas or biomethane.

The theoretical maximum production of biogas is 24,357m3 per day or 1,015m3 per hour. The appropriate flare capacity has been calculated considering these figures and worst-case scenarios for production of off-specification biomethane.

All of the tanks with gas storage and also the pasteuriser tank are fitted with a Pressure Vacuum Relief Valve (PVRV). The PVRVs are a necessary safety feature for an AD plant; but will only be used as a contingency to maintain structural integrity of the tank and dome structures. During normal operation the PVRVs will not operate.

The PVRVs on Digester 1 and the Post Digester are water filled; glycol is added in winter months to prevent the water from freezing. The seating of the PVRVs is checked daily in accordance with Daily Checks **(HBP-RC-03).**

7.4 Control of Fugitive Emissions of Biogas

There is a Leak Detection and Repair (LDAR) Plan **(HBP-OD-22)** in place which includes annual LDAR Inspections to measure levels of volatile organic compounds, including methane from a number of monitoring points around site in accordance with the DSEAR Risk Assessment **(HBP-OD-11)** and the Hazardous Area Classification Drawings **(HBP-OD-14)**.

The LDAR plan including tracking of required actions.

7.5 Control of Emissions from Digestate Storage

7.5.1 Lagoons

At the time of writing the 2 No. digestate storage lagoons are uncovered. The installation of floating covers, with emissions treatment is scheduled for 2025.

The floating covers on the lagoons will each have 6 No. vents which will join a system of pipework leading to a single two stage carbon filter treatment process; the first filter for NH_3 removal and the second stage for residual odour removal including volatile organic compounds and H_2S.The treated emissions will then vent to atmosphere.

7.5.2 Fibre bay

Fibre digestate falls into a bunker (4.5m x 5.3m x 1.85m high). The total fibre stored at any time is approximately 23t, 1 day's production of fibre digestate. The separator will be enclosed in a tented structure, open on one side to allow easy access for vehicles to remove fibre digester which will be removed from the Site to farm destination field heaps.

7.6 Control of Emissions to Air under Abnormal Operations

Control of emissions to air under abnormal operating conditions are detailed in the Accident Management Plan Manual **(HBP-OD-08)** and associated procedures.

8 Control of Amenity Impacts

8.1 Odour

The primary control of odour emissions is at source:

- Ensuring exposed silage clamp faces are kept tidy and to a minimum in accordance with the Crop Loading Procedure **(HBP-SOP-06).**
- Rejection of waste with a high odour potential in accordance with the Waste Acceptance and Rejection Procedure **(HBP-SOP-02)**.
- First-in / first out procedure for waste and minimisation of Waste Reception Building doors opening times in accordance with the Waste Loading & Management Procedure **(HBP-SOP-04)**.
- Process monitoring to ensure production of stable digestate with low odour potential in accordance with the Process Monitoring Procedure **(HBP-SOP-09)**.
- Regular inspection and maintenance of abatement systems including the waste reception building carbon filter and the lagoon gas abatement system (proposed) in accordance with the Computerised Maintenance Management System (CMMS).

Odour emissions are controlled and monitored in accordance with the Odour Management Plan **(HBP-OD-07).**

8.2 Noise

Noise emissions are minimised through planned preventative maintenance for all equipment including the CHPs, flares and the gas storage dome fans which are potential sources of noise emissions, in accordance with the Computerised Maintenance Management System (CMMS).

Planning applications for the site to date have not required a quantitative Noise Impact Assessment. The fact that there are no residential receptors within 750m have meant that a qualitative assessment was deemed to be sufficient. The Operator has confirmed that no noise complaints have been received.

If noise emissions are detected off-site then a Noise and Vibration Management Plan will be developed, submitted to the Environment Agency and implemented.

8.3 Pests

The presence of pests is minimised through daily checks for pests (Daily Checks **(HBP-RC-03)** and the use of an external pest control contractor for routine pest monitoring and control.

Pests are controlled in accordance with the Pest Management Plan **(HBP-OD-09).**

8.4 Dust

Dust is minimised through:

- Enforcing 10 miles per hour speed limit for vehicles;
- Silage is stored in covered silage clamps and kept with a tidy cutting face in accordance with the Crop Loading Procedure **(HBP-SOP-06)**.

- Digestate fibre falls from the separators into the bay. In line with current improvement work the separators and the fibre storage bay will be enclosed within a tented structure open on one side. Fibre is regularly removed from site to destination field heaps in accordance with the Digestate Handling Procedure **(HBP-SOP-08)**.

If there are emissions of dust observed as part of daily site inspections (Daily Checks **(HBP-RC-03)**) then dust suppression will be carried out with a water bowser (Dust Procedure **(HBP-SOP-11)**).

9 Control of Climate Change Impacts

Climate change impacts and mitigation controls are considered in a separate Climate Change Risk Assessment **(HBP-OD-19)**.

10 Roles & Responsibilities

10.1 Overview

This section of the Manual sets out the management structure of Herriard Bio Power Limited relevant to site operations along with the roles and responsibilities placed on operational staff. Specific responsibilities are also set out in the accompanying operational procedures.

All members of staff should be clear on their role, responsibilities, and position within the management structure to facilitate effective environmental management. All roles and responsibilities will be reviewed no less than annually by the **Managing Director**.

A Staff Organogram for Operational Staff is a management system document **(HBP-OD-04)**. .

10.2 Managing Director

The **Managing Director** is responsible for:

a) Overseeing the management of the site by the **Plant Manager** and providing the **Plant Manager** with such support and guidance as necessary to fulfil the requirements of the EMS within the organisation;
b) Providing extra resources / contingency arrangements due to staff shortages;
c) Approving and endorsing the EMS including any amendments;
d) Ensuring integration of the EMS within the business is achieved;
e) Engagement with external stakeholders regarding the EMS and Environmental Policy **(HBP-OD-03)**; and
f) Management of the Operations and Commercial Assistant and the Accounts and Admin Assistant and the Commercial Manager.

10.3 Plant Manager

The **Plant Manager** takes day to day responsibility for the operation of the site including:

a) Fulfilling the specific role requirements of individual procedures;
b) Ensuring the site processes and procedures are implemented and upheld across all areas of operation;
c) Implementing and overseeing emergency response procedures as required;
d) Overseeing the implementation of corrective actions where required;
e) Observing trends in process management data and discussing process management decisions with the **Managing Director** and / or Biologist;
f) Establishing and reviewing the daily feed recipe for the AD plants;
g) Responding to SCADA alarms or delegating this responsibility to a Nominated Competent Person;
h) Implementing the planned preventative maintenance plan with respect to the AD plant and associated infrastructure;
i) Retaining inspection and maintenance records;
j) Managing external contractors carrying out planned or ad hoc maintenance tasks;
k) Reporting site issues or incidents to the **Managing Director**;

l) Management of Plant Supervisor, Plant Operators, Plant Technicians, Maintenance Engineer and Weighbridge Operator; and
m) Carrying out waste pre-acceptance checks;

10.4 Technically Competent Manager

The role of the **Technically Competent Manager** is fulfilled by the **Plant Manager.** The **Technically Competent Manager** has the responsibility for:

a) Maintaining technical competence including Continuing Competence assessments;
b) Ensuring that operations at the site comply with all relevant environmental and health and safety legislation and where possible relevant guidance; and
c) Recording attendance hours on site.

10.5 Commercial Manager

The **Commercial Manager** has responsibility for:

a) Obtaining and maintaining the necessary the professional skills, training and/or experience to deal with all issues relevant for the management of the feedstocks in the facility.
b) Sourcing feedstocks for the AD Plant;
c) Ensuring that there is always a good supply of feedstocks but that the supply doesn't exceed the storage or treatment capacity of the plant;
d) Diverting feedstocks to other sites if required; and
e) Following up feedstock rejection with the feedstock supplier and preventing unsuitable material being sent to site.

10.6 Operations & Commercial Assistant

The Operations and Commercial Assistant is responsible for:

a) Checking that relevant training and competencies are maintained for operational staff;
b) Document control and record keeping in relation to the EMS including responsibility for editing, updating or superseding of documents;
c) Reviewing the EMS procedures and processes ensuring any changes to the EMS are planned and implemented; and
d) Ensuring that information regarding the EMS such as the environmental policy, EMS manual, management plans and Standard Operating Procedures (SOPs), including emergency response procedures, are readily available to all relevant employees and contractors.

10.7 Plant Operatives, Plant Technicians, Weighbridge Operator & Maintenance Engineer

The **Plant Operatives, Plant Technicians, Weighbridge Operator** and **Maintenance Engineer** are responsible for:

e) Being fully aware of the EMS to ensure that procedures and controls are upheld and understand and reduce environmental impact of the organisation's activities;
f) Obtaining and maintaining the necessary the professional skills, training and/or experience to deal with all issues relevant to their role in the facility; and
g) Fulfilling the specific role requirements of individual procedures and reporting to the **Plant Manager**.

11 Implementation & Operation

11.1 Overview

This section of the EMS Manual outlines the procedures and processes for identifying and delivering training requirements, communications, emergency preparedness and response, operation controls and documentation in relation to the EMS.

11.2 Document & Record Control

11.2.1 Overview

The Operator is committed to maintaining document and record controls to provide an audit trail of evidence in support of the company's activities.

11.2.2 Control of Documents

The EMS requires that all documents are clearly identifiable and traceable through their version history, and that only the current versions of documents are in circulation throughout the company. The Operator will ensure that documents are appropriately organised, stored and archived in a place (physical or electronic) that is easily accessible to staff who may need to consult or edit documents.

The **Operations & Commercial Assistant** is responsible for document management including responsibility editing, updating or superseding of documents.

The internally produced documentation associated with the EMS is presented in a consistent format including:

- Title of document
- Document reference in the format HBP-YYY-NN where:
    - YYY is:
        - OD denoting an Overarching Document for example a management plan
        - SOP is a Standard Operating Procedure
        - FT is a Standard form template used to in relation to the management system and associated procedures
    - NN is a unique number to identify the document.
- Document author / name of person who issued the document
- Version number
- Date of issue

To prevent the loss of documents the Operator uses cloud-based systems which are protected and backed up.

The process for creating and reviewing documents is detailed in the Document Control Procedure **(HBP-SOP-14**). The status of all management system documents is recorded within the Master Document Control File **(HBP-OD-02).**

11.2.3 Control of Records

Records are maintained to provide evidence of conformity with the requirements of the EMS (and wider management system). The records are listed on the Master Document Control File **(HBP-OD-02)** using the referencing system in the format HBP-RC-NN where NN is a unique number to identify the document. These are not controlled documents.

All records are:

a) legible;

b) made as soon as reasonably practicable;

c) if amended, amended in such a way that the original and any subsequent amendments remain legible, or are capable of retrieval;

d) retained for at least 6 years from the date when the records were made, or in the case of the following records until permit surrender:

- off-site environmental effects; and
- matters which affect the condition of the land and groundwater.

11.3 Competence, Training & Awareness

The Operator will ensure all persons performing tasks for the organisation or on its behalf, whose work may have a significant impact on the environment, are competent based on appropriate education, training and/or experience, and will retain associated records.

The Operator has established and implemented procedures to identify the training needs associated with the EMS, the operation of the site and the retention of staff competencies. Training requirements will be determined following the Training Procedure **(HBP-SOP-17).**

It is essential that all staff are fully aware of the EMS to ensure that procedures and controls are upheld. All new staff joining HBP will receive appropriate training using the environmental permit for the site and the EMS including documented procedures to understand and reduce environmental impact of the organisation's activities.

All formal training and Toolbox Talks received will be logged in the Training Matrix **(HBP-OD-10)**.

11.4 Communication

11.4.1 Internal & External Communications & Reporting

For internal communication, the **Operations & Commercial Assistant** ensures that information regarding the EMS such as the environmental policy, EMS manual, management plans and Standard Operating Procedures (SOPs), including emergency response procedures, are readily available to all relevant employees and contractors.

It is essential that all personnel are fully aware of the EMS to ensure that procedures and controls are upheld. All new employees and contractors receive appropriate training using the EMS documents and procedures to understand and reduce environmental impact of the organisation's activities.

For external communication, the Environmental Policy **(HBP-OD-03)** will be made available upon request. The Operator seeks to proactively communicate with its external stakeholders about its EMS.

11.4.2 Complaints

The Operator understands the importance of addressing both internal and external complaints in a prompt and comprehensive manner to resolve any issue as quickly as possible. All complaints are dealt with according to the Complaints Procedure **(HBP-SOP-15).**

Complaints including their investigation are recorded on:

- Complaints & Concerns Log (HBP-RC-16) – for anything other than odour
- Odour Complaint Form **(HBP-FT-05)** – for odour complaints

11.5 Operational Controls & Emergency Response

11.5.1 Operational Controls

The Operator has established and implemented operational controls relevant to the operational processes and the organisation's significant environmental risks.

The management system documents relevant to operational control are Overarching Documents (ODs), including the Environmental Policy and overarching management plans, Standard Operating Procedures (SOPs) and the forms associated with the SOPs (Form templates).

The operational controls will be adhered to, by all employees and personnel working for or on behalf of the organisation. The Operator therefore ensures that all relevant management system documents are communicated to the personnel to whom they apply.

Management system documents are reviewed at planned intervals as stated within with the Master Document Control File **(HBP-OD-02)** and revised when necessary.

Table 5 below lists management system documents relevant to operational control. Further Standard Operating Procedures are under development. The Master Document Control File **(HBP-OD-02)** serves as a complete list of management system documents at any one time:

Table 5: Management System Documents (Operational Controls)

Document Reference	Document Title
Overarching Documents	
HBP-OD-01	Environmental Management System Manual
HBP-OD-02	Master Document Control File
HBP-OD-03	Environmental Policy
HBP-OD-04	Staff Organogram
HBP-OD-05	Process Flow Diagram
HBP-OD-07	Odour Management Plan
HBP-OD-08	Accident Management Plan Manual
HBP-OD-09	Pest Management Plan

Document Reference	Document Title
HBP-OD-10	Training Matrix
HBP-OD-11	DSEAR Risk Assessment
HBP-OD-12	Residues Management Plan
HBP-OD-13	Site Decommissioning Plan
HBP-OD-14	Hazardous Area Classification Drawings
HBP-OD-15	Quality Management System Manual
HBP-OD-16	Hazard and Critical Control Point Plan
HBP-OD-17	Bioaerosol Risk Assessment
HBP-OD-19	Climate Change Risk Assessment
HBP-OD-20	HAZOP
HBP-OD-21	Lightning Risk Assessment
HBP-OD-22	Leak Detection and Repair Plan
HBP-OD-23	Fire Risk Assessment
HBP-OD-24	Site Condition Report
Standard Operating Procedures	
HBP-SOP-01	Waste Pre-acceptance Procedure
HBP-SOP-02	Waste Acceptance and Rejection Procedure
HBP-SOP-03	Liquid Waste Reception Procedure
HBP-SOP-04	Waste Loading & Management Procedure
HBP-SOP-05	Crop Acceptance and Rejection Procedure
HBP-SOP-06	Crop Loading Procedure
HBP-SOP-07	Secondary Containment Checking & Emptying Procedure
HBP-SOP-08	Digestate Handling Procedure
HBP-SOP-09	Process Monitoring Procedure
HBP-SOP-10	Odour Monitoring Procedure
HBP-SOP-11	Dust Procedure
HBP-SOP-12	Environmental Monitoring Procedure
HBP-SOP-13	Sampling & Analysis Procedure
HBP-SOP-14	Document Control Procedure
HBP-SOP-15	Complaints Procedure
HBP-SOP-16	Change Control Procedure
HBP-SOP-17	Training Procedure
HBP-SOP-18	Corrective Action Planning Procedure
HBP-SOP-19	Incident Reporting Procedure

Document Reference	Document Title
HBP-SOP-20	Spill Control Procedure
HBP-SOP-21	Control Panel Alarm Response
HBP-SOP-22	Fire & Explosion Response Procedure
HBP-SOP-23	Biogas Leak Response Procedure
HBP-SOP-24	Foam Response Procedure
HBP-SOP-25	Main Power Outage Response Procedure
HBP-SOP-26	Safe Shutdown Procedure
HBP-SOP-27	Mechanical Failure Procedure
HBP-SOP-28	Flood Response Procedure
HBP-SOP-29	Reduced Gas Grid Demand Contingency Plan
HBP-SOP-30	Discharge of Flood Water Procedure
HBP-SOP-31	Waste Contingency Procedure
Form Templates	
HBP-FT-01	Accident and Incident Report Form
HBP-FT-02	Waste Pre-acceptance Form
HBP-FT-03	Feedstock Rejection Form
HBP-FT-04	Change Control Form
HBP-FT-05	Odour Complaint Form
HBP-FT-06	Odour Monitoring Form

11.5.2 Emergency Preparedness & Response

The Operator has established and implemented emergency procedures relevant to the operational processes and the organisation's significant environmental risks.

Emergency response procedures will always be adhered to, by all employees and personnel working for and on behalf of the organisation. The Operator therefore ensures that all emergency response procedures are communicated to personnel to whom they apply. Emergency response procedures are reviewed at planned intervals as stated within with the Master Document Control File **(HBP-OD-02)** and revised when necessary.

Table 6 below lists the Management System documents relating to Emergency Response that have been implemented.

Table 6: Management System Documents (Emergency Response)

Document Reference	Document Title
Overarching Documents	
HBP-OD-05	Process Flow Diagram
HBP-OD-08	Accident Management Plan Manual
HBP-OD-11	**DSEAR Risk Assessment**
HBP-OD-14	Hazardous Area Classification Drawings
HBP-OD-23	**Fire Risk Assessment**
Standard Operating Procedures	
HBP-SOP-19	Incident Reporting Procedure
HBP-SOP-20	Spill Control Procedure
HBP-SOP-21	Control Panel Alarm Response
HBP-SOP-22	Fire & Explosion Response Procedure
HBP-SOP-23	Biogas Leak Response Procedure
HBP-SOP-24	Foam Response Procedure
HBP-SOP-25	Main Power Outage Response Procedure
HBP-SOP-26	Safe Shutdown Procedure
HBP-SOP-27	Mechanical Failure Procedure
HBP-SOP-28	Flood Response Procedure
HBP-SOP-29	Reduced Gas Grid Demand Contingency Plan
HBP-SOP-30	Discharge of Flood Water Procedure
Form Templates	
HBP-FT-01	Accident and Incident Report Form

11.6 Non-conformance & Corrective Actions

The Operator has established a system for ensuring that non-conformance is recorded, and actions are tracked to ensure that the relevant corrective actions are completed.

The management system documents relevant to non-conformance are the Corrective Action Planning Procedure **(HBP-SOP-18)** and the Non-conformance and Corrective Action Log **(HBP-RC-18).**

The Non-conformance and Corrective Action Log **(HBP-RC-18)** will be used for issues identified internally e.g. through internal audit and management review and externally identified issues such as complaints or non-compliance scores from the regulator.

12 Monitoring

12.1 Environmental Monitoring

The Operator monitors on an ongoing basis the environmental performance of the site through environmental monitoring as required to determine environmental performance and control environmental risks, as determined through the Environmental Risk Assessment (Appendix A).

Environmental monitoring procedures will always be adhered to, by all employees working for or on behalf of the organisation. The Operator therefore ensures that all environmental monitoring procedures are communicated to personnel to whom they apply. Environmental monitoring schedules and procedures will be reviewed at planned intervals as stated within with the Master Document Control File **(HBP-OD-02)** and revised when necessary.

Table 7 below lists the environmental monitoring procedures and check lists that will be implemented.

Table 7: Management System Documents (Environmental Monitoring)

Document Reference	Document Title
Overarching Documents	
HBP-OD-01	Environmental Management System Manual
HBP-OD-12	Residues Management Plan
HBP-OD-16	Hazard and Critical Control Point Plan
Standard Operating Procedures	
HBP-SOP-09	Process Monitoring Procedure
HBP-SOP-10	Odour Monitoring Procedure
HBP-SOP-12	Environmental Monitoring Procedure
HBP-SOP-13	Sampling & Analysis Procedure
HBP-SOP-18	**Corrective Action Planning Procedure**
Management System Records	
HBP-RC-01	Plant Control Log (Process Monitoring)
HBP-RC-02	**Daily Site Data (Spreadsheet)**
HBP-RC-03	**Daily Checks (Paper)**
HBP-RC-04	**Input Materials record**
Form Templates	
HBP-FT-01	Odour Monitoring Form

12.2 Process Monitoring

Process monitoring is key to ensure a stable anaerobic digestion process, to minimise the risk of abnormal events which may lead to emissions. Process monitoring also enables the Operator to maximise the efficiency of the process in terms of biogas yield and resulting heat, electricity, biomethane, carbon dioxide and digestate production.

Process monitoring is carried out in accordance with the Process Monitoring Procedure **(HBP-SOP-09)**.

Process monitoring can be sub-divided into:

- Feedstock analysis
- Visual checks
- Automated monitoring via SCADA
- On site testing
- Offsite testing at an external laboratory.

Relevant process management actions have been detailed here for ease of reference.

12.2.1 Feedstock Analysis

Crop feedstocks are tested for dry matter content as they come in during harvest. Crop feedstocks are also seasonally tested for biochemical methane potential (BMP) to inform the feed regime. This is in accordance with the Crop Acceptance and Rejection Procedure **(HBP-SOP-05)**.

Waste feedstocks undergo pre-acceptance and acceptance checks including sampling and testing in accordance with the Waste Pre-Acceptance Procedure **(HBP-SOP-01)** and the Feedstock Acceptance and Rejection Procedure **(HBP-SOP-02).**

In addition, there is an on-site laboratory which is used for dry matter testing of feedstock.

Test results are used to inform the feed plan for the AD plants which is determined by the **Plant Manager**.

12.2.2 Visual checks

Every day a visual inspection is carried out through the inspection windows on all the digesters and recorded on Daily Checks **(HBP-RC-03)**. Observations are made on the apparent mixing speed and the presence of crusting or foam as these are important indications of the health of the AD process.

12.2.3 Automated monitoring via SCADA

SCADA is a software application program which collects and records data in real time from remote locations to control equipment and conditions within an anaerobic digestion plant. The monitoring data is fed back to the SCADA system which is visible to site operatives.

The SCADA system detects any faults or approach to limits via a graphical interface and can be operated remotely.

12.2.3.1 Gas production

Gas production is measured through monitoring the quantity of gas consumed by the CHP engine(s) and the BUP and by the volume of biogas in storage across all tanks.

The daily biogas production is an important parameter because it shows immediately if there are changes in the biological process. As soon as the production drops in relation to the organic loading rate, then it indicates either reduced organic loading rate in the fermenter or potential inhibition within the digestion process.

If gas production drops in relation to organic loading rate, then the appropriate corrective action may be to increase the organic loading rate and / or investigate if there is inhibition of the process via sample analysis.

12.2.3.2 Gas Pressure & Gas Volume

Gas pressure is measured at 4 No. points within the gas storage system. Gas holder levels are also measured in all the biogas storage domes.

SCADA will alarm if:

- either flare is in operation
- either CHP engine trips
- the biogas upgrading plant trips

The **Plant Manager** or Nominated Competent Person is responsible for evaluating the root cause of the alarm and acting accordingly to resolve the problem. This may require re-setting of equipment. This is carried out in accordance with the Control Panel Alarm Response **(HBP-SOP-21)**.

12.2.3.3 Gas Quality

Gas quality is a key parameter for process monitoring and may give a quick indication of potential issues with the anaerobic digestion process.

Gas quality is continuously via in-line analysers. The following parameters are measured:

- Methane (CH_4)
- Hydrogen sulphide (H_2S)
- Carbon dioxide (CO_2)

Gas quality is checked daily or more frequently if an issue is suspected using a hand-held gas monitor; Daily Site Data **(HBP-RC-02)**. The hand-held gas monitor is calibrated annually or sooner if there is a significant difference between the in-line and handheld device readings.

A decreasing methane or increasing carbon dioxide trend may suggest that the feed rate needs to be reduced or that there is some level of inhibition in the process.

An increasing hydrogen sulphide trend may suggest that there is a change in the feedstock make-up which should be checked by further analysis and rectified with use of ferric hydroxide powder addition.

12.2.3.4 Temperature

Temperature control is required to keep the temperature in the digesters as stable as possible.

The temperature probe in the process tanks continuously monitor temperature and the SCADA system keeps the temperature within mesophilic limits 40^{o}C -43^{o}C.

12.2.4 On site testing

A sample is taken from each digester daily and tested for pH, dry matter, and FOS/TAC in accordance with the Process Monitoring Procedure **(HBP-SOP-09)**. The data is logged, and trends observed over time to inform process management.

The FOS TAC ratio and additional analyses are indicators for assessing fermentation processes. The FOS TAC ratio measures Volatile Organic Acids (FOS) in relation to Total Alkaline Carbonate (TAC); the TAC value is an estimation of the buffer capacity of the sample.

12.2.5 Offsite testing at an external laboratory

On a monthly basis a sample is taken from each of the digesters in accordance with the Sampling and Analysis Procedure **(HBP-SOP-13)** and send off site for analysis at a UKAS Accredited laboratory for a minimum of:

- pH
- FOS/TAC
- Dry matter
- Volatile fatty acids
- Trace elements

This data is used by the **Plant Manager** to inform process decisions including the feed plan, mixing regime and the addition of trace elements.

12.3 Process Management

Process monitoring determines appropriate process management. Process monitoring results are reviewed to identify data trends to inform decisions about managing the process. By reviewing trends in the data rather than individual results, changes in the balance of the whole system are more easily identified. A typical range of results, that could be expected, are shown in the Table 8 below:

Table 8: Parameters of a stable biogas process fed with energy crops (source: Bioreact)

Parameter	Range
pH	7.4 - 8
Electrical conductivity	20 – 25 mS/cm
Ammonium	< 5 g/L
Dry Matter	6 - 12%
Volatile Fatty Acids (VFA)	< 5 g/L
Acetic / Propionic Acid	3:1
Propionic Acid	< 0.8 g/L
Iso - acids	< 0.05 g/L
FOS /TAC	0.1 – 0.3 g/L
Methane	> 50%

Further process monitoring may be required to confirm findings. The expertise of a biologist is used as necessary to help inform process management decisions made by the **Plant Manager**.

It is the responsibility of the **Plant Manager** to look at process monitoring data and make process management decisions in consultation with the Managing Director and the Biologist to record decisions on the Site Diary **(HBP-MP-04)** and readily share with team members on WhatsApp. Major decisions will also be recorded in weekly operations meetings.

12.4 Digestate Quality Monitoring

The separated fibre and liquor are sampled and analysed to determine their characteristics, in accordance with BSI PAS110:2014 requirements at a suitably accredited laboratory. Results are provided to the end user and their agronomist such that a nutrient management plan may be made prior to the digestate being used.

The samples are taken and dispatched to the laboratory in accordance with the Sampling and Analysis Procedure **(HBP-SOP-13)** which includes a recommended sampling frequency schedule.

Digestate quality is covered under the Quality Management System which includes the Quality Management System Manual **(HBP-OD-15)** and associated management system documents and procedures.

12.5 Inspection & Maintenance of Equipment

The Operator will ensure that all process plant and equipment is commissioned, operated, and maintained in accordance with the manufacturers recommendations and is documented and recorded.

The Operator will ensure that all monitoring and measuring equipment is fit for purpose, maintained, and calibrated to appropriate standards (UKAS approved where applicable) and that a suitably qualified person undertakes all maintenance and calibration work.

Plant and equipment are inspected on a daily basis in accordance with the Management System records in Table 9 below:

Table 9: Inspection & Maintenance Records

Document Reference	Document Title
Management System Records	
HBP-RC-02	Daily Site Data (Spreadsheet)
HBP-RC-03	Daily Checks (Paper)
HBP-RC-07	Plant Vehicle Check Log
HBP-RC-17	Maintenance Schedule Limble Computerised Maintenance Management System (CMMS)
HBP-RC-19	Critical Spares List AD process
HBP-RC-20	Critical Spares List BUP

Maintenance is managed in accordance with a Limble Computerised Maintenance Management System (CMMS). The BUP, CHP(s), gas boosters, flares and biomethane compressors are managed by third party contractors.

Critical spares for the BUP and wider AD plant are kept on site and recorded:

- Critical Spares List AD process **(HBP-RC-19)**
- Critical Spares List BUP **(HBP-RC-20)**

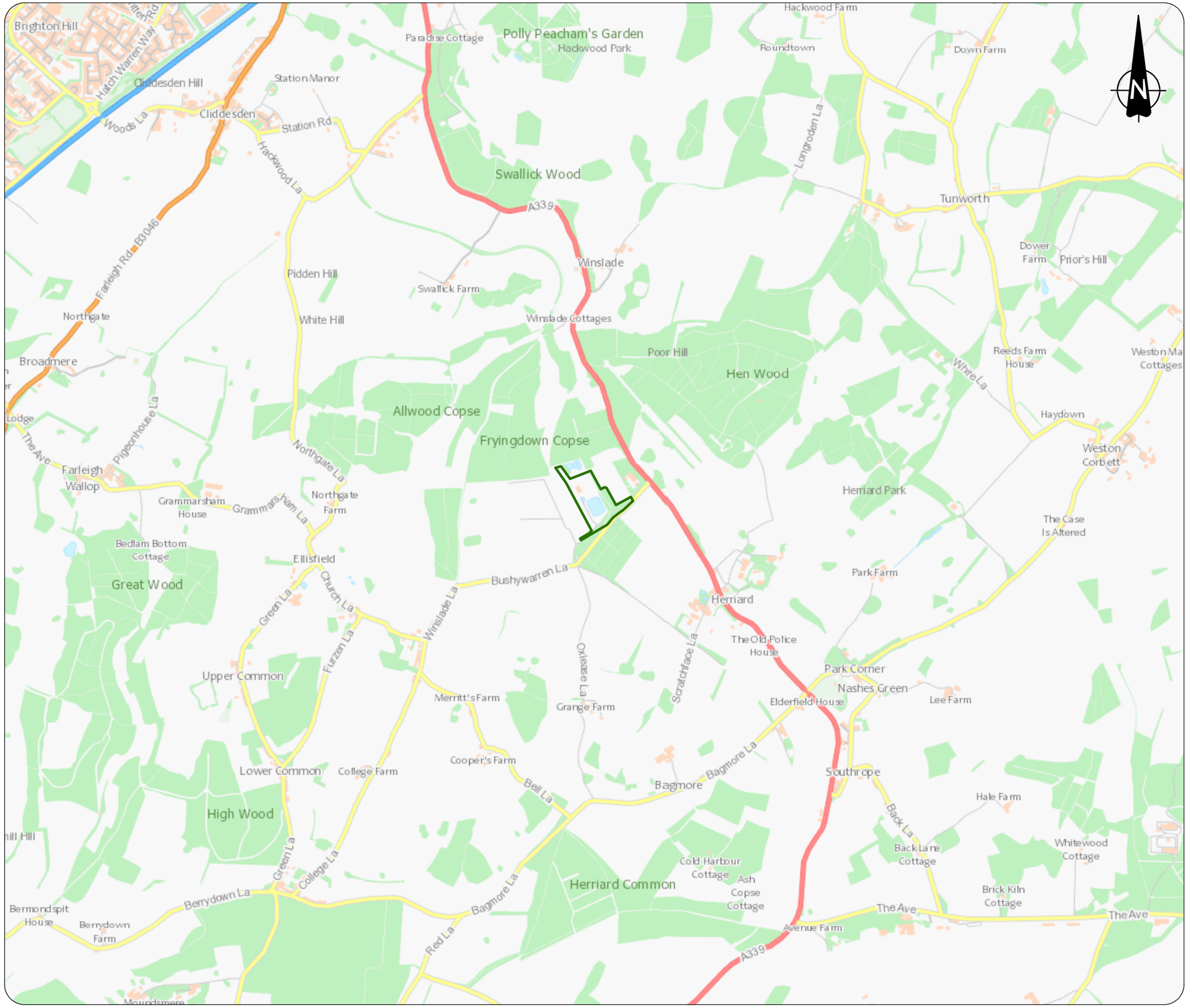
Figures

Figure 1: Site Location Plan, Earthcare Technical Limited (ETL813/EPR01/V1.0)

Figure 2: Existing Site Emission & Permit Boundary Plan, PDC Engineering (29407 - 005 Rev A)

Figure 3: Existing Site Layout, PDC Engineering (29407 - 004 Rev D)

Figure 4: Human Receptor Plan, Earthcare Technical Limited (ETL813/EPR03/V1.0)



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REVISIONS

REV	DATE	DESCRIPTION	DWN	CHK	APP
-	12/12 2023	First Issue	JJ	EP	MF

LEGEND

Permit Boundary

0 250 500 750 1,000 m

Scale at A3: 1:25,000

Client
Herriard Bio Power Limited

Project
Substantial Permit Variation

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	EP	MF	
Date		**Scale**	**Sheet Size**
December 2023		1:25,000	A3
Drawing Number			**File Reference**
ETL813/HBP/EPR01			ETL813.mxd

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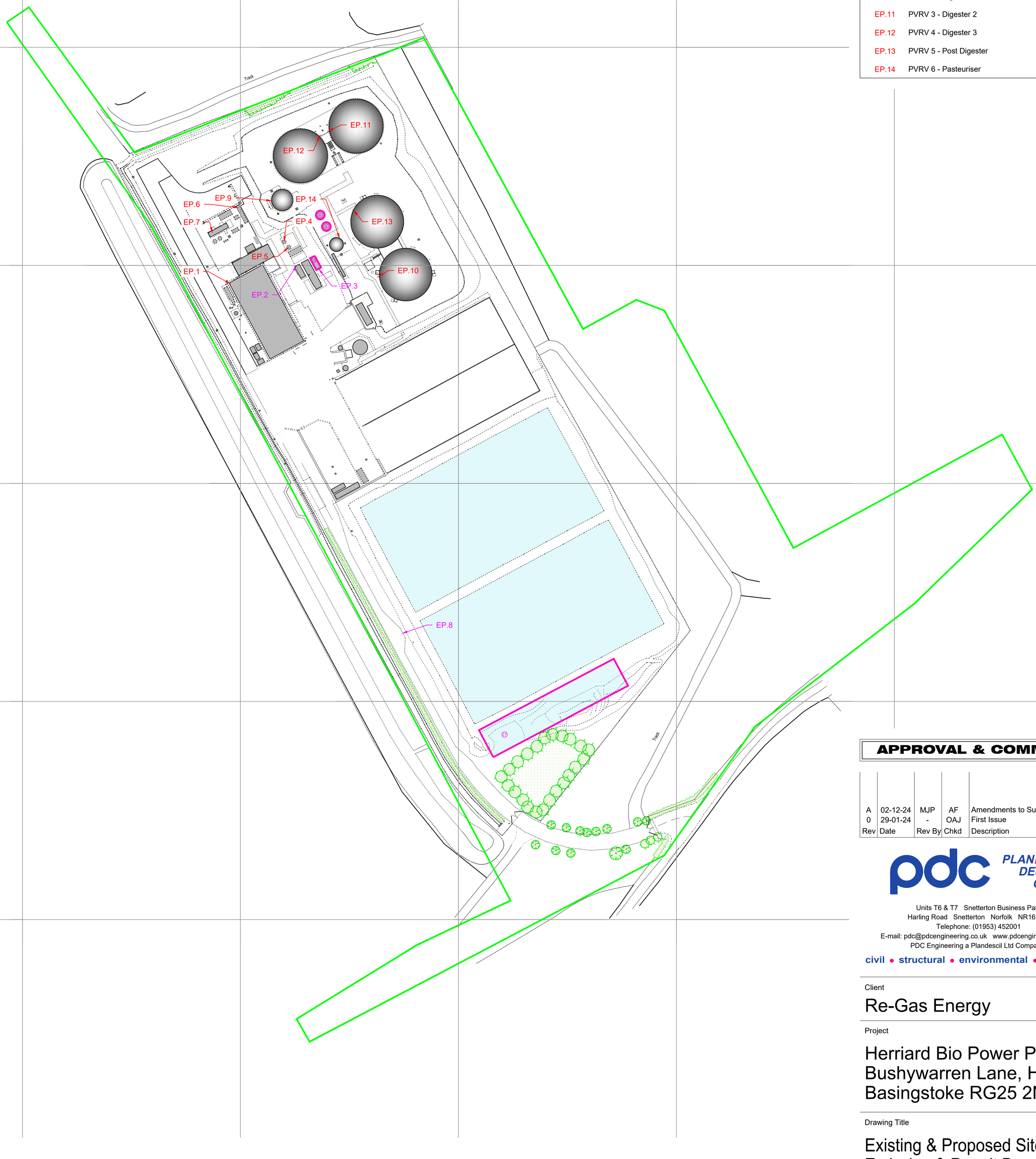
   PDC Engineering drawings.
   - '29407/004 - Existing Site Layout'
   - '29407/006 - Proposed Site Plan'

LEGEND:

EP.XX	Existing Emission Point
EP.XX	Proposed Emission Point
	Permit Boundary (Area - 72,606.80m²/7.2607ha)
	Proposed Plant

EMISSION POINT KEY:

EP.1	Odour Abatement Plant Outlet
EP.2	CHP Engine Stack 1 (Standby)
EP.3	CHP Engine Stack 2 (Duty)
EP.4	Flare Stack 1 (1,000m³/h)
EP.5	Flare Stack 2 (500m³/h)
EP.6	Emergency Diesel Generator Stack
EP.7	Carbon Dioxide Vent on Biogas Upgrader
EP.8	Combined Lagoon Gas Carbon Filter Vent
EP.9	PVRV 1 - Raw Waste Buffer Tank
EP.10	PVRV 2 - Digester 1
EP.11	PVRV 3 - Digester 2
EP.12	PVRV 4 - Digester 3
EP.13	PVRV 5 - Post Digester
EP.14	PVRV 6 - Pasteuriser



APPROVAL & COMMENT

Rev	Date	Rev By	Chkd	Description
A	02-12-24	MJP	AF	Amendments to Suit Comments
0	29-01-24	-	OAJ	First Issue

PLANNING DESIGN CIVIL

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PDC Engineering a Plandescil Ltd Company

civil • structural • environmental • surveying

Client

Re-Gas Energy

Project

Herriard Bio Power Plant
Bushywarren Lane, Herriard,
Basingstoke RG25 2NS

Drawing Title

Existing & Proposed Site Emission & Permit Boundary Plan

Scale U.N.O.	Date	Drawn By
1:1000 (A1)	January 2024	JWD

Drawing No.	Rev
29407/005	A

1:1000 - DRAWING SCALE REFERENCE (m)

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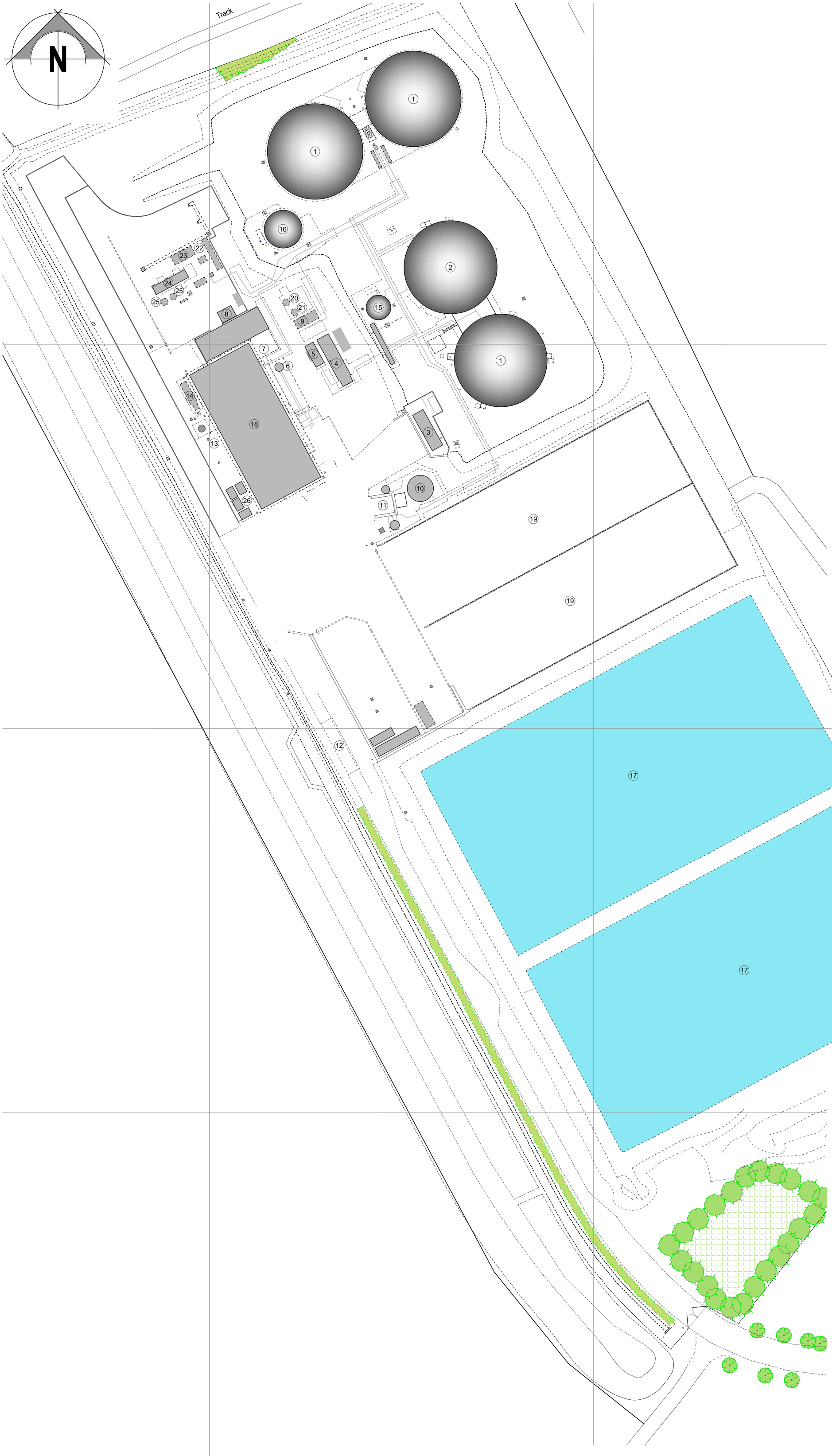

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   PDC Engineering drawings.
   - '29407/005 - Existing Site Emission & Permit Boundary Plan'
   - '29407/006 - Proposed Site Plan'

EXISTING PLANT KEY:

1	Primary Digester (3No.)
2	Secondary Digester
3	Solid Feed Hopper
4	Heat Distribution
5	CHP Engine
6	Liquid Tank
7	Mixing Tank
8	Step Down Transformer
9	Water Storage Tank
10	Separator Buffer Tank
11	Separator & Fibre Storage Bay (2No.)
12	Weighbridge
13	Sour drainage Pump & Sump
14	Odour Management Filter
15	Pasturisation Tank
16	Raw Waste Buffer Tank (452m³)
17	Digestate Lagoon (2No.)
18	Food Waste Reception Building
19	Silage Clamp (2No.)
20	Flare 1 (500m³/h)
21	Flare 2 (1,000m³/h)
22	Standby Generator
23	CNG Compressor
24	Biogas Upgrading Plant
25	Carbon Filters (2No.)
26	Site Office, Weighbridge Office & Welfare Facilities

1:500 - DRAWING SCALE REFERENCE (m)

20 10 5 0 10 20 30 40 50

APPROVAL & COMMENT

Rev	Date	Rev By	Chkd	Description
D	03-12-24	JWD	AF	Amendments to Suit Comments
C	02-12-24	MJP	AF	Amendments to Suit Comments
B	06-02-24	JWD	OAJ	Amendments to Suit Client Comments
A	29-01-24	JWD	OAJ	Amendments to Suit Client Comments
0	25-01-24	-	OAJ	First Issue

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PDC Engineering a Plandescil Ltd Company

civil • structural • environmental • surveying

Client

Re-Gas Energy

Project

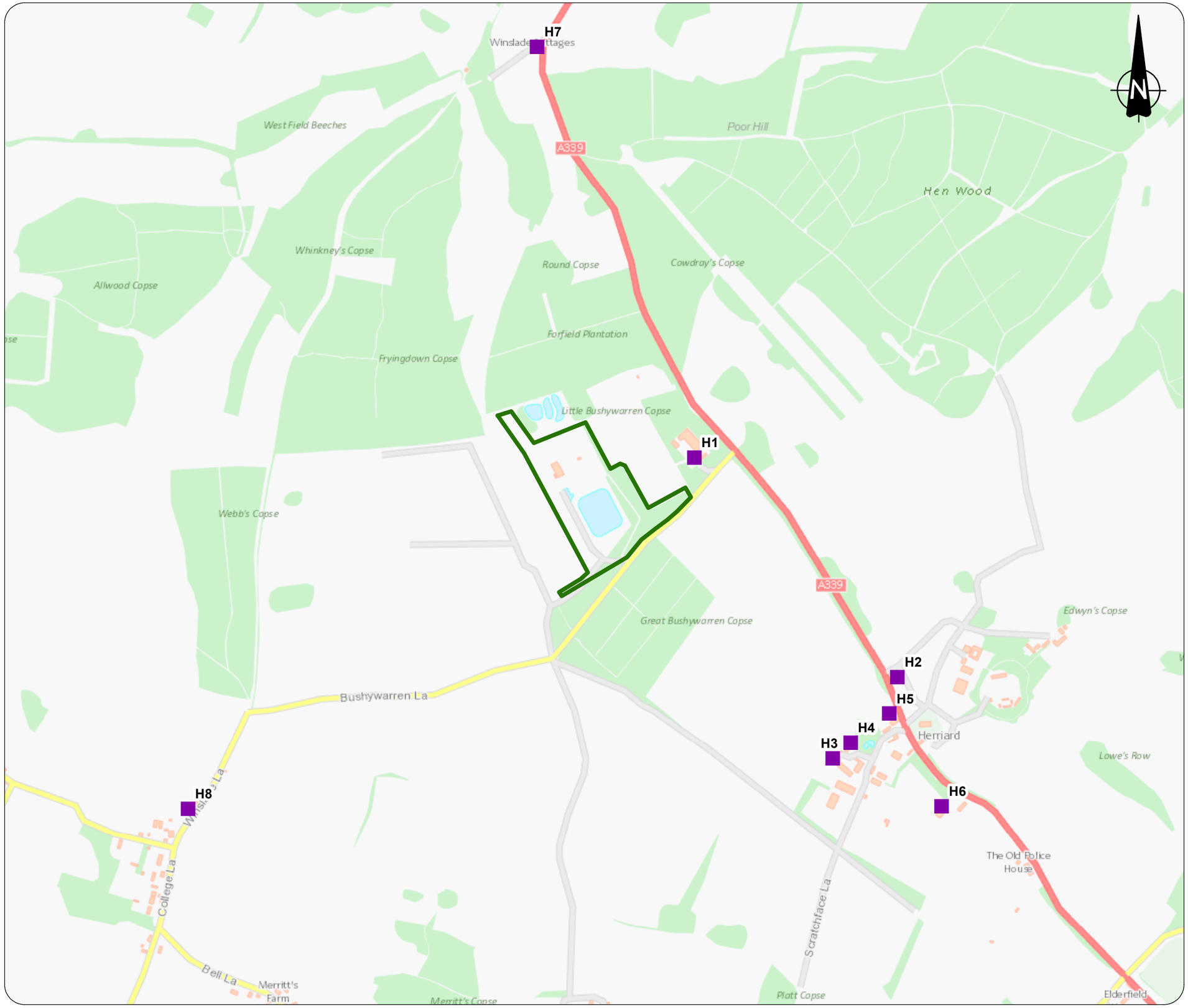
Herriard Bio Power Plant
Bushywarren Lane, Herriard,
Basingstoke RG25 2NS

Drawing Title

Existing Site Layout

Scale U.N.O.	Date	Drawn By
1:500 (A1)	January 2024	JWD

Drawing No.	Rev
29407/004	D



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REVISIONS

REV	DATE	DESCRIPTION	DWN	CHK	APP
-	12/12 2023	First Issue	JJ	EP	MF

LEGEND

- Permit Boundary
- Human Receptor

0 100 200 300 400 m

Scale at A3: 1:10,000

Client
Herriard Bio Power Limited

Project
Substantial Permit Variation

Title
Human Receptors Plan

Earthcare TECHNICAL
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Drawn	Checked	Approved	Revision
JJ	EP	MF	

Date	Scale	Sheet Size
December 2023	1:10,000	A3

Drawing Number	File Reference
ETL813/HBP/EPR03	ETL813.mxd

Appendix A – Environmental Risk Assessment

Receptor	Source	Harm	Pathway	Probability of exposure	Consequence	Magnitude of risk	Justification for magnitude	Risk management	Residual risk
What is at risk? What do I wish to protect?	What is the agent or process with potential to cause harm?	What are the harmful consequences if things go wrong?	How might the receptor come into contact with the source?	How likely is this contact?	How severe will the consequences be if this occurs?	What is the overall magnitude of the risk?	On what did I base my judgement?	How can I best manage the risk to reduce the magnitude?	What is the magnitude of the risk after management?
1.1 Local human population.	Releases of NOx, SOx, NH_3, H_2S, CO and TVOCs, PM10 and PM2.5	Harm to human health - respiratory irritation and illness.	Air transport then inhalation.	Medium	Medium	**Medium**	There is potential for exposure to anyone living close to the site and to members of the public at locations to which they could be regularly exposed. The nearest sensitive receptor is Little Bushy Warren Composting Facility site office 79 metres to the east of the	Activities are managed and operated in accordance with a written management system which includes: The inspection and maintenance of equipment, including engine management systems, the odour abatement plant, the lagoon gas emission treatment system (proposed) in	**Low**

Receptor	Source	Harm	Pathway	Probability of exposure	Consequence	Magnitude of risk	Justification for magnitude	Risk management	Residual risk
							site. The closest residential receptor is Manor Farmhouse 745m to the south east. The nearest Air Quality Management Area (AQMA) lies over 18km to the east. The potential for Air quality impacts from the operation on human receptors have been predicted through an Air Quality and Odour Impact	accordance with the Maintenance Schedule (CMMS). Emissions monitoring is carried out as per permit requirements. Emissions to air from the CHPs are monitored annually by a MCERTS contractor in accordance with the permit. All monitoring required by the permit will be reported as per the permit requirements. Leak detection and repair (LDAR)	

Receptor	Source	Harm	Pathway	Probability of exposure	Consequence	Magnitude of risk	Justification for magnitude	Risk management	Residual risk
							Assessment[10] which concluded that the long-term and short-term impacts at all receptors can be screened out as not significant and there is no need for further assessment. Solid wastes are stored within a dedicated Waste Reception Building fitted with air handling and abatement. Digestate liquor is stored in 2 No. lagoons which are due to be covered in 2025.	Plan **(HBP-OD-22)** is in place to mitigate and prevent fugitive emissions of biogas. Gas pressure and gas volume are continuously monitored by SCADA system and process controlled to minimise emissions from pressure and vacuum relief valves (PVRVs) and use of the flare. All PVRVs are inspected and calibrated as per	

[10] [10] ETL813/AQOIA/Final/V1.0 December 2023

Receptor	Source	Harm	Pathway	Probability of exposure	Consequence	Magnitude of risk	Justification for magnitude	Risk management	Residual risk
							The floating covers will each have 6 No. vents which will join a system of pipework leading to a single two stage carbon filter treatment process; the first filter for NH_3 removal and the second stage for residual odour removal including VOCs and H_2S. The separators and fibre storage bay are due to be covered by a tented structure open on one side. There is no digestate liquor	manufacturers recommendations. This is included within the Daily Checks **(HBP-RC-03)** & Maintenance Schedule (CMMS).	

Receptor	Source	Harm	Pathway	Probability of exposure	Consequence	Magnitude of risk	Justification for magnitude	Risk management	Residual risk
							offtake point as digestate is taken off site via a pipeline.		
1.2 Local human population.	Release of microorganisms (bio-aerosols).	Harm to human health - respiratory irritation and illness.	Air transport then inhalation.	Low	Low	**Low**	The nearest sensitive receptor is Little Bushy Warren Composting Facility site office 79 metres to the east of the site. The closest residential receptor is Manor Farmhouse 745m to the south east. There is the potential for bioaerosol release: • From the handling of	Activities are managed and operated in accordance with a written management system which includes: The abatement system for the Waste Reception Building is inspected and maintained in accordance with manufacturers instruction and emissions monitoring will be carried out as per permit requirements.	**Low**

Receptor	Source	Harm	Pathway	Probability of exposure	Consequence	Magnitude of risk	Justification for magnitude	Risk management	Residual risk
							crop feedstock; • From fibre digestate handling and movement. See above re storage of digestate liquor and fibre. There is no composting of digestate fibre.	Silage is managed in accordance with the Crop Loading Procedure **(HBP-SOP-04).** Process monitoring to ensure the production of a stable digestate with low residual biogas in accordance with the Process Monitoring Procedure **(HBP-SOP-09)** Management systems to ensure that digestate fibre doesn't accumulate on site; Digestate Handling	

Receptor	Source	Harm	Pathway	Probability of exposure	Consequence	Magnitude of risk	Justification for magnitude	Risk management	Residual risk
								Procedure **(HBP-SOP-08**).	
1.3 Local human population	Odour	Nuisance, loss of amenity	Air transport then inhalation.	Medium	Medium	**Medium**	The nearest sensitive receptor is Little Bushy Warren Composting Facility site office 79 metres to the east of the site. The closest residential receptor is Manor Farmhouse 745m to the south east. Local residents often sensitive to odour. However, the site has not historically received any	An Odour Management Plan **(HBP-OD-07)** is in place. Crops are ensiled on site and remain covered with the open face of the clamp minimised in accordance with the Crop Loading Procedure **(HBP-SOP-06)**. The residence time of waste feedstocks is minimised as far is possible, with older waste being fed prior to newer. Waste acceptance	**Low**

Receptor	Source	Harm	Pathway	Probability of exposure	Consequence	Magnitude of risk	Justification for magnitude	Risk management	Residual risk
							noise complaints. Odour can result from: • a wide range of waste, particularly when the site receives it. • the release of biogas • digestate Channelled emissions to air from the Waste Reception Building is fitted with carbon filter odour abatement to mitigate channelled emissions. All storage tanks and digester are	and loading is undertaken in accordance with the Waste Acceptance and Rejection Procedure **(HBP-SOP-02)** and the Waste Management & Loading Procedure **(HBP-SOP-04),** the latter specifies that the roller shutter doors are only open to allow vehicles to enter and leave the building. The maintenance of the abatement systems is incorporated into the site's Maintenance	

Receptor	Source	Harm	Pathway	Probability of exposure	Consequence	Magnitude of risk	Justification for magnitude	Risk management	Residual risk
							covered. The 2 No. digestate storage lagoons are being covered in 2025; the floating covers will benefit from emissions treatment system prior to release. The Air Quality and Odour Impact Assessment concluded that the Site operation is not likely to be an odour nuisance at human receptors.[10]	Schedule (CMMS). Minimisation of biogas loss as per 1.1 above. Control of emissions from digestate storage as per 1.2 above. In order to reduce emissions to air and to improve the overall environmental performance (BAT 38), process monitoring is undertaken and digestate samples are analysed periodically to verify that process controls have been effective in producing stable	

Receptor	Source	Harm	Pathway	Probability of exposure	Consequence	Magnitude of risk	Justification for magnitude	Risk management	Residual risk
								digestates; Process Monitoring Procedure **(HBP-SOP-09)**	
1.4 Local human population.	Noise and vibration.	Nuisance, loss of amenity, loss of sleep.	Noise through the air and vibration through the ground.	Medium	Medium	**Medium**	The nearest sensitive receptor is Little Bushy Warren Composting Facility site office 79 metres to the east of the site. The closest residential receptor is Manor Farmhouse 745m to the south east. Local residents can be sensitive to noise and vibration. However, there is low potential	Noise and vibration shall be minimised so as not cause nuisance. The maintenance of all critical plant and equipment (including fans, extraction equipment and condensate pots) are captured on the site's Maintenance Schedule (CMMS), to ensure it is suitably maintained and reduce the	**Low**

Receptor	Source	Harm	Pathway	Probability of exposure	Consequence	Magnitude of risk	Justification for magnitude	Risk management	Residual risk
							for exposure. The site has not historically received any noise complaints. Although the AD system operates continuously, the planning permission restricts deliveries of waste to the site to between the hours of 0700 and 1800 Monday to Friday and not at all at weekends, recognised Public Holidays or Bank Holidays with the exception of the two Bank	likelihood of noise from improper upkeep. Flare usage is minimised with operating hours recorded on SCADA. A noise and vibration management plan will be produced in the event that noise complaints are attributed to the operation of the AD Plant.	

Receptor	Source	Harm	Pathway	Probability of exposure	Consequence	Magnitude of risk	Justification for magnitude	Risk management	Residual risk
							Holidays immediately following Christmas Day and Easter Sunday.		
2.1 Local human population, livestock and wildlife after gaining unauthorised access to the installation.	Gaining unauthorised access to the installation.	There is a risk of direct physical contact with all on-site hazards such as wastes, machinery and vehicles. There is a risk of causing injury to humans or livestock.	Direct physical contact.	Low	Low	**Low**	Direct physical contact is minimised by the activity being carried out within enclosed tanks, pipework and digesters, so a low magnitude risk is estimated.	Activities are managed and operated in accordance with a management system which includes site security measures (Section 3.7, EMS Manual **(HBP-OD-01)** to prevent unauthorised access. The site benefits from personnel on site at all times, perimeter fencing, a locked gate at entrance outside operating hours,	**Low**

Receptor	Source	Harm	Pathway	Probability of exposure	Consequence	Magnitude of risk	Justification for magnitude	Risk management	Residual risk
								locked valves and a CCTV system, which can be remotely monitored and with alarms in the office. Any security breaches will be reported to Management. The site specific DSEAR Risk Assessment **(HBP-OD-11)** covers unauthorised access to site. Maintenance workers and contractors will only be permitted on site if suitably qualified for planned tasks and	

Receptor	Source	Harm	Pathway	Probability of exposure	Consequence	Magnitude of risk	Justification for magnitude	Risk management	Residual risk
								in accordance with Permit to Work requirements if applicable.	
3.1 Local human population and local environment.	Arson and / or vandalism causing the release of polluting materials to air (smoke or fumes), water or land.	Respiratory irritation, illness and nuisance to local population. Injury to staff, fire fighters or arsonists/ vandals. Pollution of water or land.	Air transport of smoke. Spillages and contaminated firewater by direct run-off from site and via surface water drains and ditches.	Medium	Medium	**Medium**	Although biogas is flammable, risk of direct physical contact is reduced by activity being carried out within enclosed systems. The consequences of an incident may be serious, affecting both human health and the environment, through loss of containment.	As above. An Accident Management Plan Manual **(HBP-OD-08)** forms part of management system and links to emergency procedures which include fire, biogas release and spillages. The DSEAR Risk Assessment **(HBP-OD-11)** identifies all areas of risk. A Fire Risk Assessment **(HBP-OD-23**) has been carried out.	**Low**

Receptor	Source	Harm	Pathway	Probability of exposure	Consequence	Magnitude of risk	Justification for magnitude	Risk management	Residual risk
							The tanks containing polluting substances are either within the site secondary containment system or benefit from separate bunding and control.	A HAZOP **(HBP-OD-20)** has been carried out, which informs the schedule of planned maintenance (CMMS). Warning signs including ATEX zone signage are clearly displayed and operatives are fully trained in gas alarm procedures. All visitors are accompanied by trained staff. LDAR Plan **(HBP-OD-22)** is in place to mitigate and to prevent fugitive emissions of biogas.	

Receptor	Source	Harm	Pathway	Probability of exposure	Consequence	Magnitude of risk	Justification for magnitude	Risk management	Residual risk
								Contingency measures will be considered in the event of loss of plant and are detailed in the Accident Management Plan Manual **(HBP-OD-08)**. Follow Waste Contingency Procedure **(HBP-SOP-31)** as required.	
3.2 Local human population and local environment.	Accidental explosion of biogas risks causing fire and smoke to travel through the air.	Respiratory irritation, illness and nuisance to local population. Injury to staff, fire fighters or arsonists/ vandals. Pollution of water or land.	Air transport. Spillages and digestate direct run-off from site and via surface water drains and ditches.	Low	Medium	**Medium**	The risk of occurrence is reduced by effective management systems. However, biogas is flammable, and the consequences	Risks are managed as per 2.1 and 3.1. The management system includes the risk management measures specified in the HAZOP **(HBP-**	**Low**

Receptor	Source	Harm	Pathway	Probability of exposure	Consequence	Magnitude of risk	Justification for magnitude	Risk management	Residual risk
							are likely to be serious, including risk to: • safety and wellbeing of those working or in close proximity to the site. • loss of containment may be detrimental to the environment.	**OD-20)** and DSEAR Risk Assessment **(HBP-OD-11)** including planned maintenance in the Maintenance Schedule (CMMS). An Accident Management Plan Manual **(HBP-OD-08)** forms part of management system and links to emergency procedures including those for fire, biogas release and spillages. A Training procedure **(HBP-SOP-17)** and overarching Training Matrix	

Receptor	Source	Harm	Pathway	Probability of exposure	Consequence	Magnitude of risk	Justification for magnitude	Risk management	Residual risk
								(HBP-OD-10) form part of the EMS and include training for emergency situations and incident preparedness, at prescribed training intervals. Details of the site's secondary containment, including tank bunding design is included within section 6.2 of the EMS Manual **(HBP-OD-01).**	
3.3 Local human population and local environment.	Accidental fire causing the release of polluting materials to air (smoke or	Respiratory irritation, illness and nuisance to local population. Injury to staff or fire fighters. Pollution of water or land.	As above.	Low	Medium	**Medium**	The risk is reduced by an effective management system.	This risk is managed in the same way as risks 2.1, 3.1 and 3.2. A Lightning Risk Assessment	**Low**

Receptor	Source	Harm	Pathway	Probability of exposure	Consequence	Magnitude of risk	Justification for magnitude	Risk management	Residual risk
	fumes), water or land.							**(HBP-OD-21)** has been undertaken to determine the requirement of any lightning conduction equipment. Equipment identified as necessary by the risk assessment has been installed. Activated charcoal and other combustible materials will be stored safely and in accordance with any manufacturers' recommendations.	
4. Risk of land bank contamination	Plastic in digestate and chemicals of concern	Risk of long term impact on soil and crop quality.	Direct application to soils through landspreading,	Low	Low	**Low**	There is a risk of impact on soil and crop quality.	Appropriate waste acceptance controls are in place to mitigate	**Low**

Receptor	Source	Harm	Pathway	Probability of exposure	Consequence	Magnitude of risk	Justification for magnitude	Risk management	Residual risk
	contaminating the land bank Operators landspreading contaminated digestate.		uptake of contaminants from crops.				Waste feedstocks will contain contaminants such as plastics.	the risk of introducing contamination; Waste Acceptance and Rejection Procedure **(HBP-SOP-02)**. Digestate liquor and fibre is routinely tested (Sampling & Analysis Procedure **(HBP-SOP-13)**) to ensure it is suitable for application to land and it is applied at an appropriate rate. There is a Quality Management System in place for digestate in	

Receptor	Source	Harm	Pathway	Probability of exposure	Consequence	Magnitude of risk	Justification for magnitude	Risk management	Residual risk
								accordance with PAS110:2014.[8] Quarterly waste returns will include the details of any recovered outputs.	
5.1 All surface waters close to and downstream of site.	Spillage of liquids, including oil and digestate.	Acute effects: fish kill. Water supply pollution	Direct run-off from site across ground surface, via surface water drains, ditches etc.	Medium	Medium	**Medium**	There is the potential for spillage from digestion tanks and digestate and other polluting substances such as oil from storage vessels on site. There are no watercourses within the vicinity of the site. There is a sealed drainage system in place.	Construction Quality Assurance validation has been undertaken on all anaerobic digestion tanks and ancillary tanks where appropriate and reports will be retained. During abnormal rainfall events, clean water from the containment bunds may need to be discharged to maintain	**Medium**

Receptor	Source	Harm	Pathway	Probability of exposure	Consequence	Magnitude of risk	Justification for magnitude	Risk management	Residual risk
							Run-off from areas designated as 'dirty' as well as condensate is recirculated back through the AD process. Condensate traps are checked daily **(HBP-RC-03)**. There will be a documented drainage plan for the site. Solid wastes are stored on concrete surfacing within the Waste Reception Building with sealed drainage back to the process.	capacity within the bund for a catastrophic tank failure. Any water would be subject to analysis prior to discharge and would need to meet BAT-associated emission levels (BAT-AELs) for direct discharges to a receiving water body. Procedures for discharging flood water are detailed in Discharge of Flood Water Procedure **(HBP-SOP-30)**. All staff will be trained and conversant with the site's Accident	

Receptor	Source	Harm	Pathway	Probability of exposure	Consequence	Magnitude of risk	Justification for magnitude	Risk management	Residual risk
							Run-off is restricted to clean surface water and under normal operating conditions, there will be no point source emissions. Digestate liquor is stored in 2 No. lagoons which are maintained with a freeboard of 750mm. Oil storage tanks are provided with the CHP Engines and are bunded within the container. Diesel and chemical storage are bunded.	Management Plan Manual **(HBP-OD-08)** and associated procedures.	

Receptor	Source	Harm	Pathway	Probability of exposure	Consequence	Magnitude of risk	Justification for magnitude	Risk management	Residual risk
							Secondary containment is designed in line with CIRIA 736 and industry standards.		
5.2 All surface waters close to and downstream of site.	As above	Chronic effects: deterioration of water quality.	As above. Indirect run-off via the soil layer.	Medium	Medium	**Medium**	As above	As above. All storage areas and containment are designed and constructed to the relevant industry standard (SSAFO for silage clamps & CIRIA 736 for primary and secondary containment). An inspection, maintenance and repair schedule of the facility's critical infrastructure, including the	**Medium**

Receptor	Source	Harm	Pathway	Probability of exposure	Consequence	Magnitude of risk	Justification for magnitude	Risk management	Residual risk
								impermeable surfacing and drainage system will be implemented; Daily Checks **(HBP-RC-03)** & Maintenance Schedule (CMMS). The digestate storage lagoons are inspected daily and a freeboard of 750mm maintained at all times; Daily Checks **(HBP-RC-03)**. The transfer of digestate is supervised and undertaken in accordance with the Digestate	

Receptor	Source	Harm	Pathway	Probability of exposure	Consequence	Magnitude of risk	Justification for magnitude	Risk management	Residual risk
								Handling Procedure **(HBP-SOP-08)**.	
6. Abstraction from watercourse downstream of facility (for agricultural or potable use).	As above	Acute effects, closure of abstraction intakes.	Direct run-off from site across ground surface, via surface water drains, ditches etc. then abstraction.	Medium	Medium	**Medium**	As above	This risk is managed in the same way as risks 5.1 and 5.2 above. Impermeable surfacing is in place to prevent potential pathways for any pollution; spills for example, to groundwater. Visual integrity checks of all primary containment are undertaken daily in line with the site Daily Checks **(HBP-RC-03)** and	**Medium**

Receptor	Source	Harm	Pathway	Probability of exposure	Consequence	Magnitude of risk	Justification for magnitude	Risk management	Residual risk
								the digesters are subject to integrity testing every 5 years, which is captured on the Maintenance Schedule **(**CMMS)	
7. Groundwater	As above	Chronic effects: contamination of groundwater, requiring treatment of water or closure of borehole.	Transport through soil/groundwater then extraction at borehole.	Medium	Medium	Medium	As above The site is not located within a Groundwater Source Protection Zone, or within 50 metres of any well, spring or borehole used for the supply of water for human consumption.	Risk management is as set out in 5.1, 5.2 and 6.1. The leakage detection pots of the digesters are checked daily; Daily Checks **(HBP-RC-03)**. Process parameters, such as volumes within tanks and digestate stores is monitored daily by plant operatives and recorded;	Low

Receptor	Source	Harm	Pathway	Probability of exposure	Consequence	Magnitude of risk	Justification for magnitude	Risk management	Residual risk
								Daily Checks **(HBP-RC-03).** The majority of pipework is above ground however there are two stretches of underground pipework which are surveyed every 5 years: Pipe from crop feeder and associated mixing pump to Digester 1. Pipe between Digester 1 and the Post Digester.	
8. Risk of diffuse emissions from polluting and greenhouse	Fugitive releases of volatile organic compounds such as methane from	Acute effects and long term effects on air quality, longer term effects of volatile organic compound	Airborne fugitive emissions from site	**Medium**	Medium	Medium	Biogas contains high levels of methane and carbon dioxide.	There are controls in place to mitigate the risk of diffuse emissions from	**Low**

Receptor	Source	Harm	Pathway	Probability of exposure	Consequence	Magnitude of risk	Justification for magnitude	Risk management	Residual risk
gases such as methane and ammonia	storage of gas bags, lagoons, tanks, vents and pipe work.	releases and adding to global climate change					Digestate and digestate storage may release ammonia which can impact air quality. All storage tanks and digester are covered. The 2 No. digestate storage lagoons are being covered in 2024; the floating covers will benefit from a gas treatment system prior to release. Burning biogas and biomethane can produce harmful pollutants.	the site which include: Venting to air from digester tanks will be minimised by the correct fitting and configuration of PVRVs including Daily Checks **(HBP-RC-03)**. Process monitoring of the AD plant will minimise excess biogas production and the likelihood of an overpressure event – Process Monitoring Procedure **(HBP-SOP-09)**. The emergency flares have set	

Receptor	Source	Harm	Pathway	Probability of exposure	Consequence	Magnitude of risk	Justification for magnitude	Risk management	Residual risk
								points lower than that of the PVRVs minimising emissions of unburnt biogas. The operation of the PVRVs will be recorded as an abnormal event. Gas pressure and gas volumes are continually measured and monitored within SCADA. LDAR Plan **(HBP-OD-22)** is in place to mitigate and prevent fugitive emissions. Gas holders are maintained as per manufacturer's recommendations and will be	

Receptor	Source	Harm	Pathway	Probability of exposure	Consequence	Magnitude of risk	Justification for magnitude	Risk management	Residual risk
								included on the sites Maintenance Schedule (CMMS)	
9. Protected Sites, including National Parks and Areas of Outstanding Natural Beauty, Marine Conservation Zones, Sites of Special Scientific Interest, Special Areas of Conservation,	Any, but principally NOx and NH_3.	Harm to protected site: • toxic contamination • nutrient enrichment • leachate contaminated surface water run-off • smothering • disturbance • predation from pests and vermin	Any	Low	Low	**Low**	Anaerobic digestion operations may cause harm to and deterioration of nature conservation sites. There are no Sites of Special Scientific Interest (SSSIs) within 2km of the Site; no Special Areas of Conservation (SACs), Special Protection Areas (SPAs) or Ramsar sites	Control measures as detailed under 1.1, 3.1, 3.2, 3.3, 5.1, 5.2, 6 and 8 above. Planned preventative maintenance schedule in place for all abatement measures; Maintenance Schedule **(**CMMS) An ammonia reduction plan will be implemented if necessary. A fugitive emission plan will	**Low**

Receptor	Source	Harm	Pathway	Probability of exposure	Consequence	Magnitude of risk	Justification for magnitude	Risk management	Residual risk
Special Protection Areas & Ramsar wetland sites							within 10km of the Site. There are several areas of Priority Habitat Inventory Deciduous Woodland and Ancient Woodland within close proximity to the site. There is no composting of digestate fibre on site. Emission limits for stack gases are specified within the permit. Solid waste is handled in a dedicated building with air	be implemented where necessary.	

Receptor	Source	Harm	Pathway	Probability of exposure	Consequence	Magnitude of risk	Justification for magnitude	Risk management	Residual risk
							handling and abatement. All tanks are covered and digestate liquor is stored in 2 No. storage lagoons which will be fitted with floating covers and a treatment system for residual biogas to remove NH_3, Installation of tented structure over separators and around 3 sides of fibre storage bay is proposed. Digestate fibre is regularly moved off -site to destination field heaps.		

Receptor	Source	Harm	Pathway	Probability of exposure	Consequence	Magnitude of risk	Justification for magnitude	Risk management	Residual risk
							The potential for air quality impacts from the operation on ecological receptors have been predicted through an Air Quality Odour Impact Assessment[10] which concluded that all predicted impacts can therefore be screened out as not significant and there is no need for further assessment.		

Magnitude of Risk	Consequence		
Probability of Exposure	**Low**	**Medium**	**High**
Low	**Very Low**	**Low**	**Medium**
Medium	**Low**	**Medium**	**Medium**
High	**Medium**	**Medium**	**High**

Appendix B – Combustion Plant Net Rated Thermal Input Calculations

The thermal input of the CHPs (existing and proposed) and the emergency generator have been calculated in accordance with Annex B of the AMPS Technical Committee document – Determination of the thermal input power of an engine driven generator.[11]

$P_{th} = P_{(r)} * 100/n_e$

Where:

P_{th} = thermal input power

$P_{(r)}$ = rated power (mechanical or electrical, whichever is available)

n_e = effective efficiency (relevant for mechanical or electrical power)

Table 5 Thermal input calculation

Combustion plant / Generator	**Rated power (electrical) kW**	**Effective efficiency (electrical) (%)**	**Thermal input power kWthi**
CHP (existing)	1,200	42.1 (at full load)	2,850
CHP (proposed)	1,200	42.1 (at full load)	2,850
Emergency generator	363	33*	1,100
Aggregated thermal input			**6,800**

* Used suggested efficiency from AMPS guidance for a <1MW compression ignition generator using liquid fuel.

[11] Determination of thermal input power of an engine driven generator, Association of Manufacturers of Power generating Systems (AMPS) Technical Committee, 2016

Appendix C - Nature and Heritage Conservation Sites Screening Report

Nature and Heritage Conservation

Screening Report: Bespoke installation

Reference	**EPR/AB3807KW/P002**
NGR	**SU6545146699**
Buffer (m)	**170**
Date report produced	**31/10/2023**
Number of maps enclosed	**3**

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
Local Wildlife Sites (LWS) (see map below)	2	Appropriate Local Record Centre (LRC)
A339 Alton Road, Herriard		Appropriate Wildlife Trust
Buckshorn Copse		
C12 Bagmore Lane		
Coombe Wood, Tunworth		

Ellisfield Road Verge

Great Bushywarren Copse

Guy's Copse

Kingsmore, Allwood & Fryingdown Copses

Kit Lane & Longfield Dells

Herriard Common

Hen Wood

Hook's Copse, Weston Corbett

Hummocks Clump

Little Bushywarren Copse

Merritt's Copse

Parkfield Copse Complex & Lower Common Pit

Picked Craft Copse

Platts Copse

Smallhill Clump

Tom's Copse

Sites of Special Scientific Interest (SSSI)	2	Natural England and Magic map
Mapledurwell Fen		

Protected Species within screening distance	Screening distance (km)	Further Information
Bullhead	up to 2	Natural England Appropriate Local Record Centre (LRC)

National Biological Network (NBN)

Environment Agency. Dial 03708 506 506 for your local Fisheries and Biodiversity team

Protected Habitats within screening distance	Screening distance (km)	Further Information
Chalk Rivers	up to 2	Natural England
Coastal and Floodplain Grazing Marsh		

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.

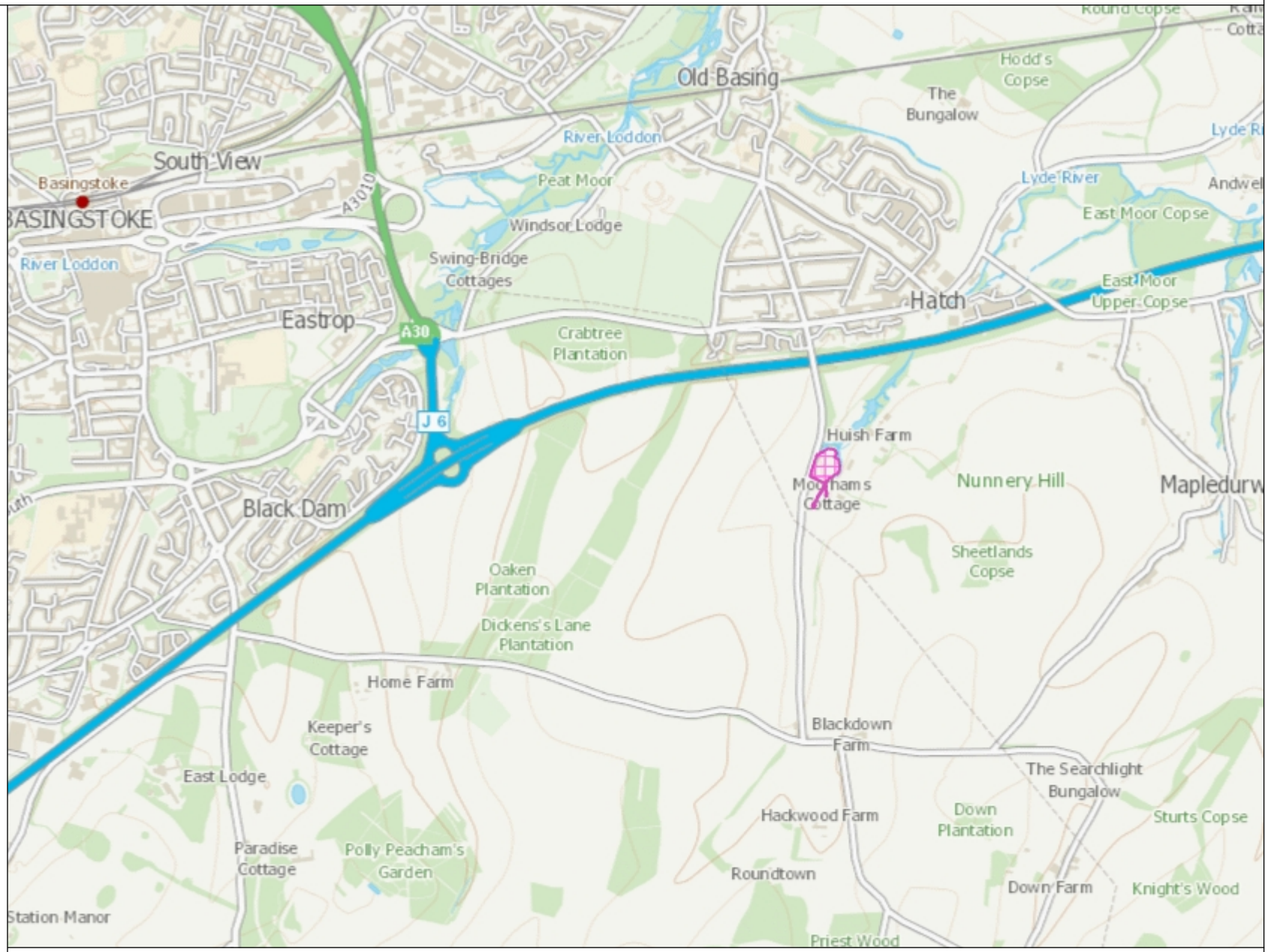
The nature and heritage screening we have conducted as part of this report is subject to change as it is based on data we hold at the time it is generated. We cannot guarantee there will be no changes to our screening data between the date of this report and the submission of the permit application,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

Protected Habitats

Environment Agency

Legend

Protected Habitats screened for Env Permits



1: 25,000

0 625

Metres

N W E S

Protected Species

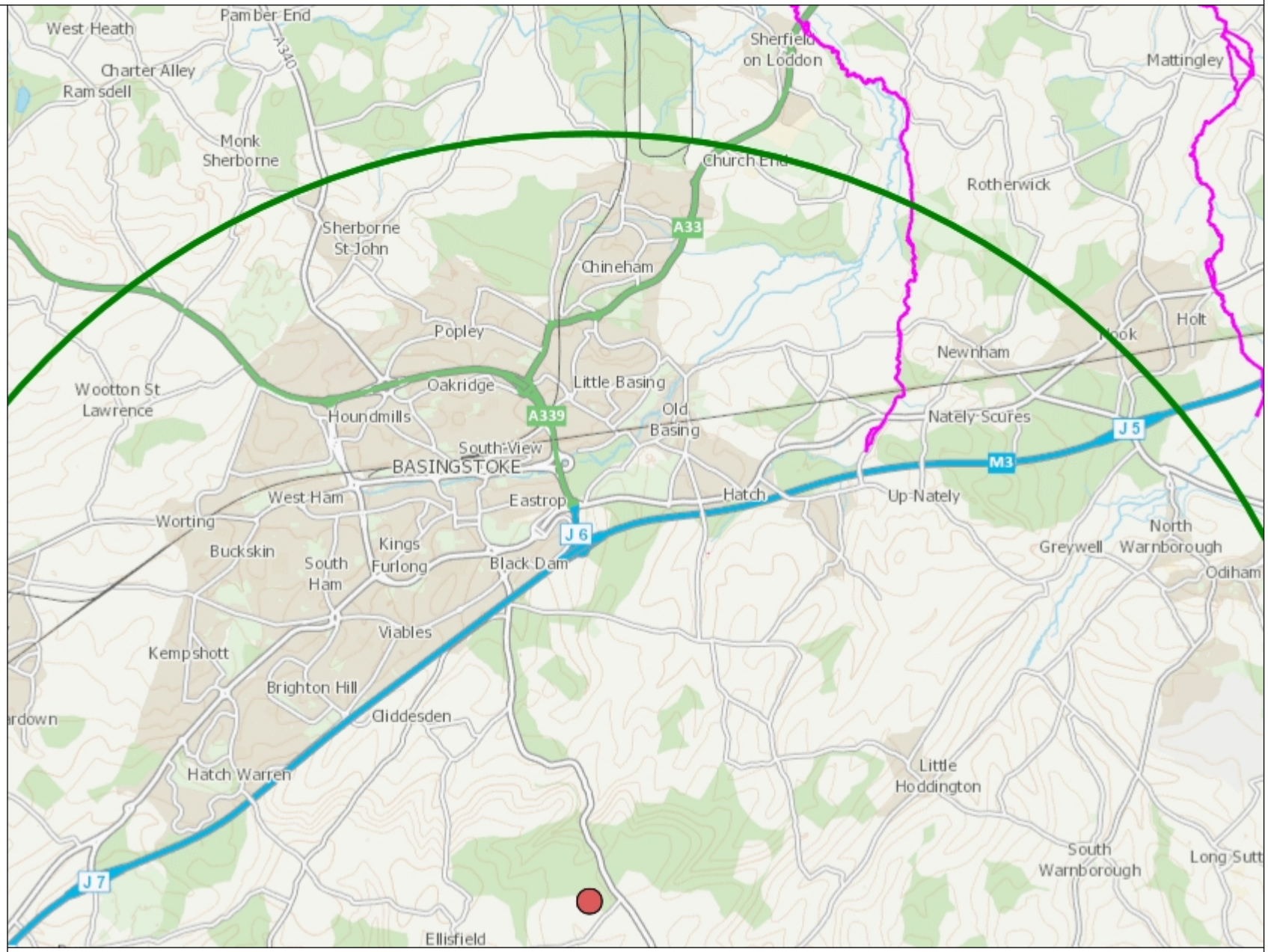
Environment Agency

Legend

Protected species screened for Env Permits - complete set

- Protected species, non fish
- Protected fish
- Protected fish migratory route

Fish migratory routes screened for Environmental Permits



1: 75,000

0 1,875

Metres

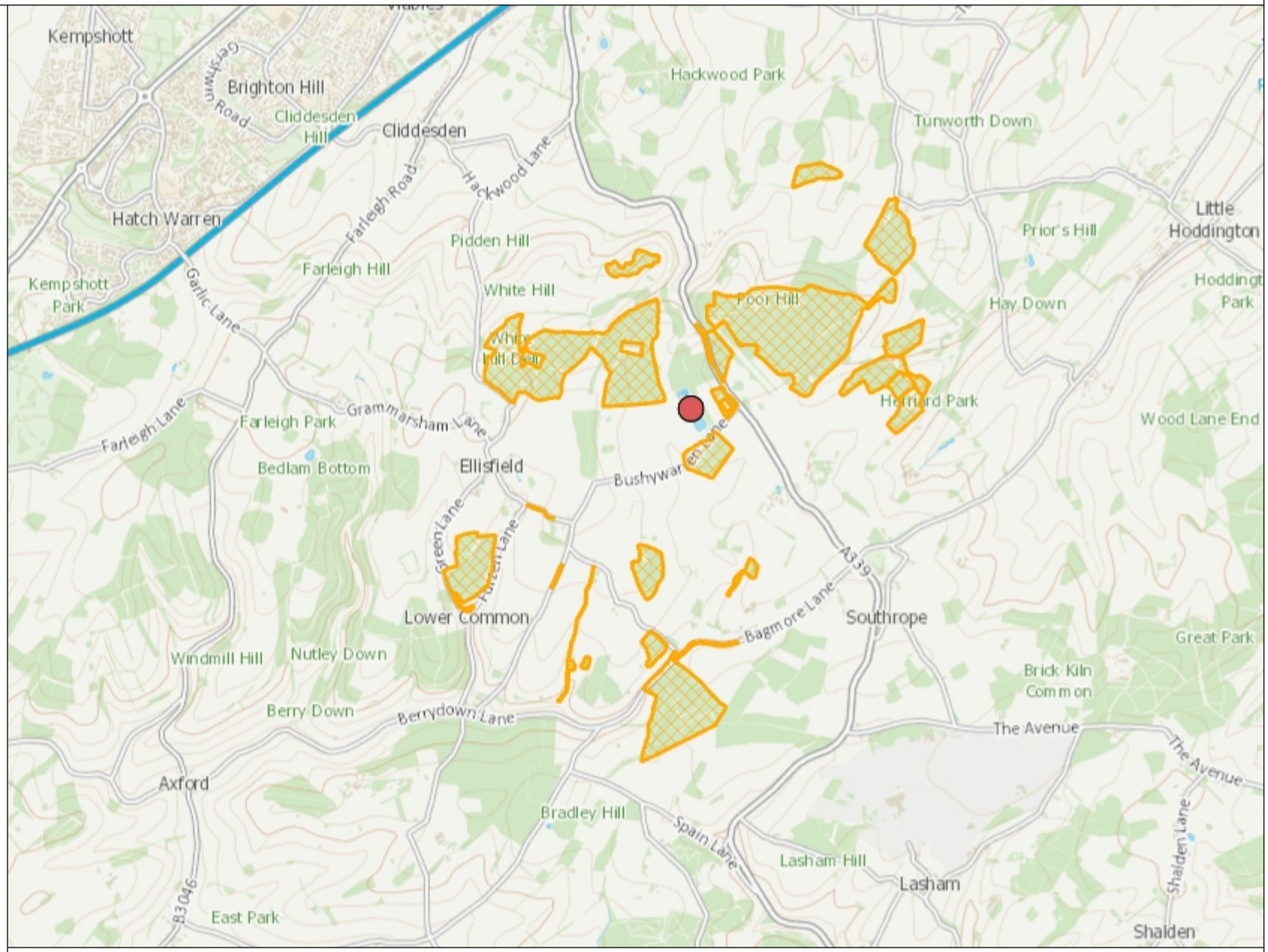
N W E S

Local Wildlife Sites

Environment Agency

Legend

Local Wildlife Sites



1: 50,000

0 1,250

Metres

N W E S

Appendix D – Nature and Heritage Conservation Sites Risk Assessment

Site / Species name and type	Screening distance (m)	Distance from site boundary (m)	Direction from site	Assessment of risk upon protected site from proposed changes
Sites of Special Scientific Interest (SSSi)	**2,000**			
Mapledurwell Fen		6km however the site is within 2000m of the nearest stretch of the Detailed River Network to the site location	North east	Water quality impact - None. The site is in a different waterbody catchment to the protected habitat. Air quality impacts – None. The site has not been considered in the Air Quality and Odour Impact Assessment that supports this permit variation application as it is outside the relevant screening distance (2km).
Local Wildlife Sites (LWS)	**2,000**			
A339 Alton Road, Herriard		425	North east	The Air Quality and Odour Impact Assessment[Error! Bookmark not defined.] s upporting this permit variation application has considered the predicted impacts upon ecological receptors including LWS Sites and they have been screened out as not significant.
Buckshorn Copse		1,102	North	As above
C12 Bagmore Lane		1,718	South	As above
Coombe Wood, Tunworth		1,535	North east	As above

Site / Species name and type	Screening distance (m)	Distance from site boundary (m)	Direction from site	Assessment of risk upon protected site from proposed changes
Ellisfield Road Verge		1,587	South west	As above
Great Bushywarren Copse		Adjacent	South	As above
Guy's Copse		1,046	North east	As above
Kingsmore, Allwood & Fryingdown Copses		50	West	As above
Kit Lane & Longfield Dells		1,788	South west	As above
Herriard Common		1,815	South	As above
Hen Wood		679	North east	As above
Hook's Copse, Weston Corbett		1,701	North east	As above
Honeyleaze Copse		1,427	East	As above
Hummocks Clump		1,585	North west	As above
Little Bushywarren Copse		Adjacent	East	As above
Merritt's Copse		992	South west	As above
Parkfield Copse Complex & Lower Common Pit		1,895	South west	As above

Site / Species name and type	Screening distance (m)	Distance from site boundary (m)	Direction from site	Assessment of risk upon protected site from proposed changes
Picked Craft Copse		2,039	North west	As above
Platts Copse		1,079	South west	As above
Smallhill Clump		2,000	North east	As above
Tom's Copse		1,482	North east	As above
Protected Species	**2,000**			
Bullhead		6,750	North east	None. There are no emissions to water under normal operating conditions. The site is in a different waterbody catchment to the protected habitat.
Protected Habitats	**500**			
Chalk Rivers		4,635	North east	None. There are no emissions to water under normal operating conditions. The site is in a different waterbody catchment to the protected habitat.
Coastal & Floodplain Grazing Marshes		4,635	North east	None. There are no emissions to water under normal operating conditions. The site is in a different waterbody catchment to the protected habitat.

Appendix E - Process Flow Diagram

Herriard Bio Power Process Flow Diagram, November 2024, V3.0