Spring Grove Green Energy

Statement on the Protection of Environment and Human Health In The Design of the Site

Table of Contents

Introduction

All facilities managed owned and operated by Acorn Bioenergy must be operated in a manner that is compliant with the relevant Environmental Protection Regulations for England and Wales and must be operated in a way that does not cause environmental nuisance to local residents.

The primary environmental regulatory requirements that Spring Grove Green Energy must comply with are listed below:

- Environmental Protection Act
- Environmental Permitting Regulations (England and Wales) (2016)
- Industrial Emissions Directive (2010)
- Medium Combustion Plant Directive (2015)
- Best Available Techniques Reference Document (BREF) for Waste Treatment (2018)
- Biological waste treatment: appropriate measures for permitted facilities
- Silage, slurry and Agricultural Fuel Oil (SSAFO) Regulations
- CIRIA 736P
- The Anaerobic Digestion Quality Protocol
- BSI PAS 110

To ensure compliance with the above requirements, the site will be required to hold an Environmental Permit to operate. This is regulated in England by the Environment Agency. Based on the site specific requirements of the Environment Agency, Spring Grove Green Energy will require a Bespoke Environmental Permit.

The site is then required to operate in accordance with an Environmental Management System that ensures operational compliance with the requirements of the permit at all levels of the business.

Additionally, the site will be required to be designed, operated and maintained in a way that is compliant with a range of health and safety regulations, and where appropriate carry out regular inspections as required. These include:

- The Health and Safety at Work etc Act 1974
- The Management of Health and Safety at Work Regulations 1999
- Construction (Design and Management) Regulations 2015
- Provision and Use of Work Equipment Regulations 1998
- Lifting Operations and Lifting Equipment Regulations 1998 (LOLER)
- Pressure Systems Safety Regulations (2000)
- Dangerous Substances and Explosive Atmospheres Regulations 2002 with appropriate ATEX Zoning and compliance.
- Lightning Risk Assessment and Protection in compliance with BS EN 62305
- The Electricity at Work Regulations 1989
- Hazardous Substances Consent
- Control of Major Accident Hazards (COMAH)

Site Context

Location

The site is located within the Local Authority areas of West Suffolk (District) and Suffolk County Council (Unitary Authority). The site is centred at NGR TL 64174 46918 and is approximately 9.5 ha in extent. The land is currently in agricultural use.

The proposed AD plant will be located on land to the North of Spring Grove Farm. The surrounding land to the North, South and West is predominantly agricultural land with occasional associated farm complexes.

The site is near the village of Withersfield, the centre of which lies approximately 1800 m to the Northeast at the closest point. The town of Haverhill lies just over 2 km to the Southeast and the village of Cardinal's Green lies 2 km to the Southwest of the site. The city of Cambridge is located 15 miles to the Northwest.

The A1307 is located immediately to the South and West of the site. A number of additional A roads run to the South of the site, through the town of Haverhill. A Google image of the site is provided in Figure 1, and the site location in Figure 2.

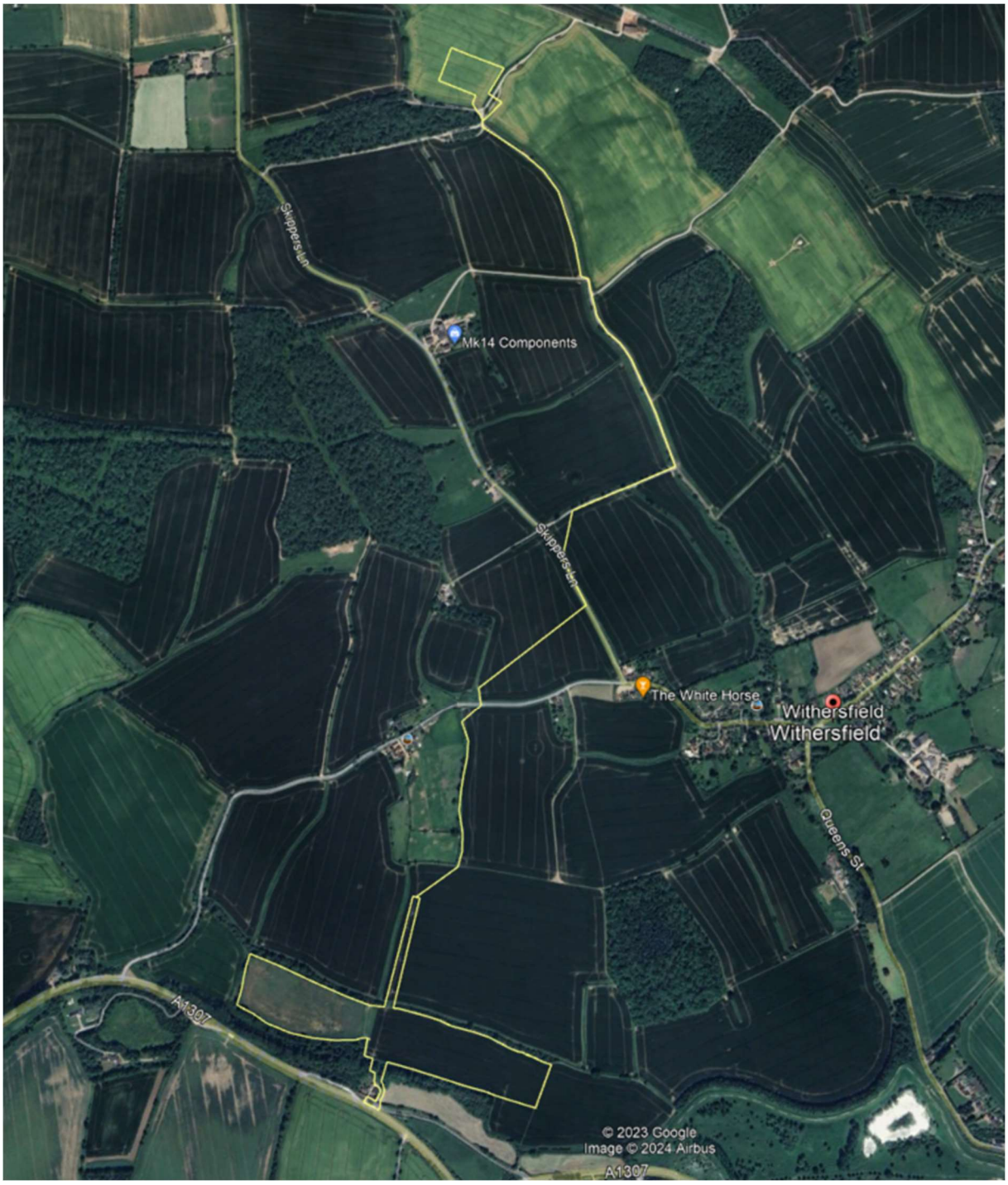

Figure 1 – Google Earth Plan of Site

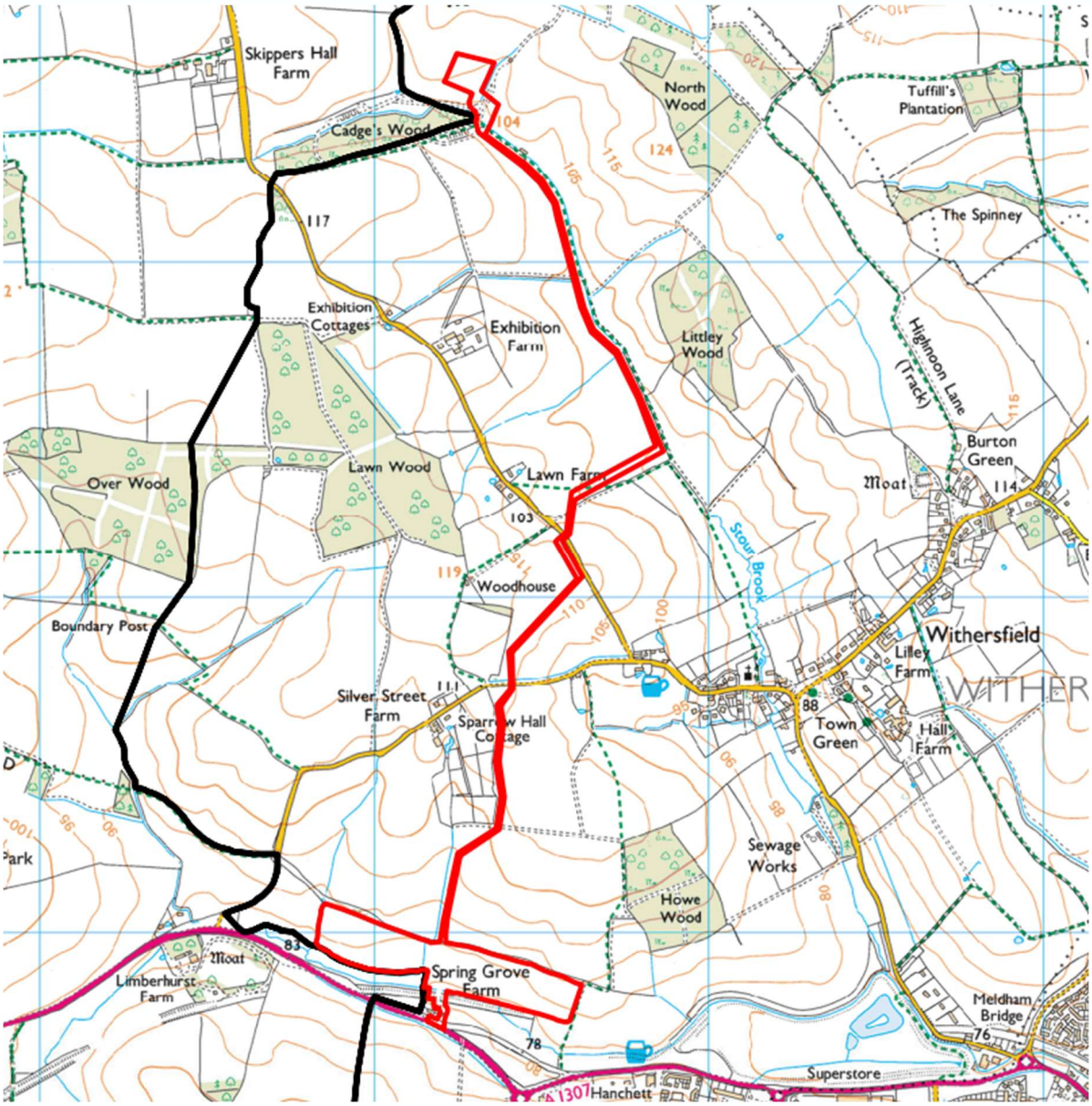

Figure 2 – Site Location Plan

Geology

The soils are classified as a combination of freely draining, slightly acidic loamy soils and lime-rich loamy and clays soils with impeded drainage, upon a bedrock geology of Lewes Nodular Chalk Formation and Seaford Chalk Formation.

Hydrogeology

Both the site and the proposed lagoon are located on a principal bedrock aquifer as well as a secondary (undifferentiated) superficial aquifer. Groundwater vulnerability is classified as medium overall due to soluble rock risk. See Figure 3 Groundwater Vulnerability.

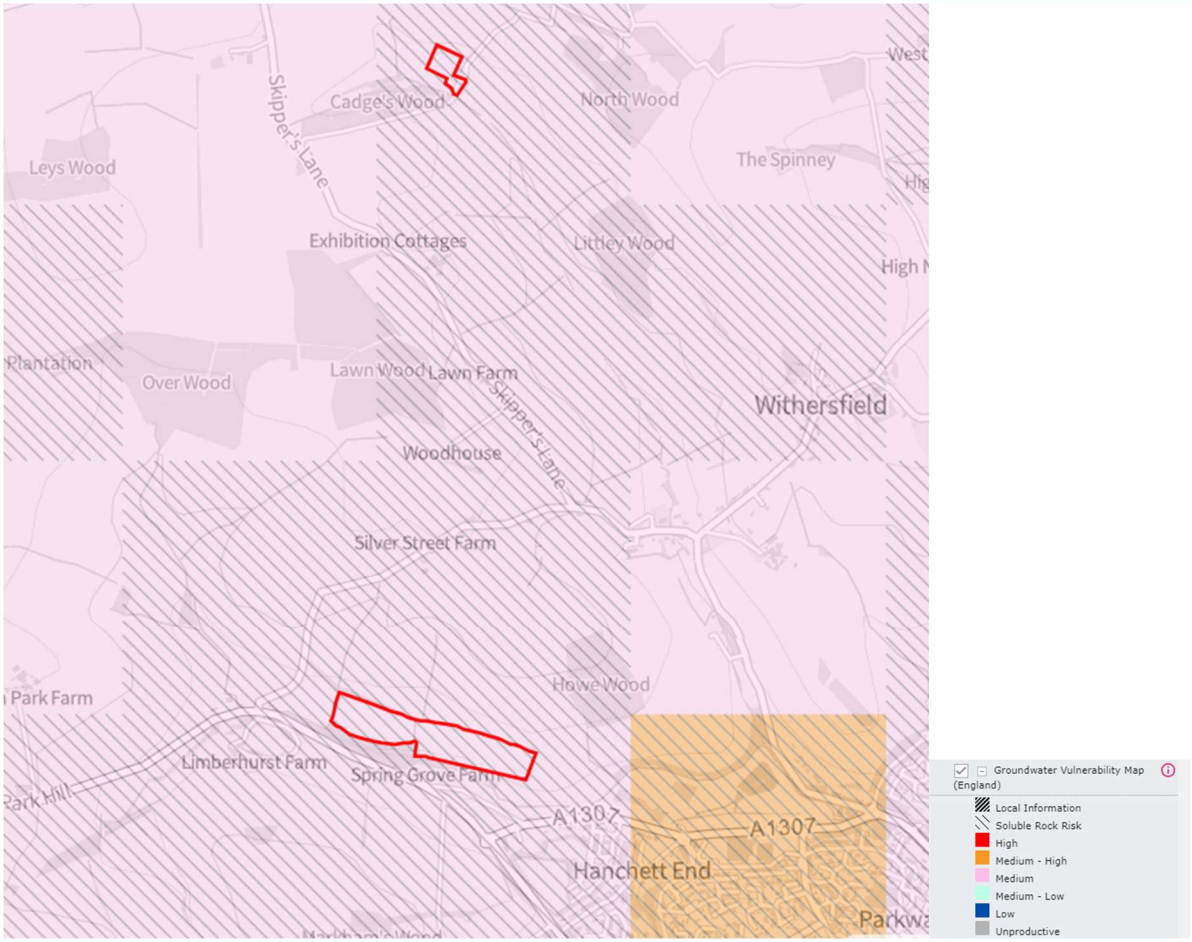

Figure 3 – Groundwater Vulnerability (Source: https://magic.defra.gov.uk)

The site is not within a Drinking Water Safeguard Zones for Groundwater. The site and lagoon however are located within a groundwater Source Protection Zone 3.

The site is located within a groundwater Nitrate Vulnerable Zone (NVZ) designated to protect water quality within the Sandlings and Chelmsford NVZ.

The secondary containment system and sealed drainage system will be designed to mitigate risk of groundwater pollution.

Surface Water

A tributary of the Stour Brook lies <30 m to the South of the site, spanning the entire width of the site, running West to East in direction before joining the Stour Brook approximately 1085 m to the East of site boundary. An unnamed drain runs vertically at the Western boundary of the site and joins a drainage ditch that runs along the southern boundary before entering the tributary of the Stour Brook to the South of the site. Another drain runs vertically through the centre of the site, but it is unclear from the available maps as to whether this connects with the aforementioned tributary, although it is likely that it does.

Unnamed ditches are present immediately to the east and south of the proposed lagoon site and within <100 m to the west.

The site is not within a Drinking Water Protected Area (Surface Water). However, both the site and proposed lagoon site lie within Drinking Water Safeguard Zones for Surface Water for parameters including nitrite and a number of pesticides.

The site and lagoon are located within a Nitrate Vulnerable Zone designated to protect water quality within the Lower River Stour catchment.

The secondary containment system and sealed drainage system for the site will be designed to mitigate risk of surface water pollution.

Flood Risk

The majority of the site is in an area which is at very low risk of surface water flooding from surface waters, rivers, or sea. The Southern border of the site however is located within a flood zone 3 and as such has a high probability of flooding, as shown in Figure 4. The only actual construction element of the site within this zone is an improved access way into the site, which follows the route of the existing farm access bridge. No element of the AD process itself is within the flood risk zone.

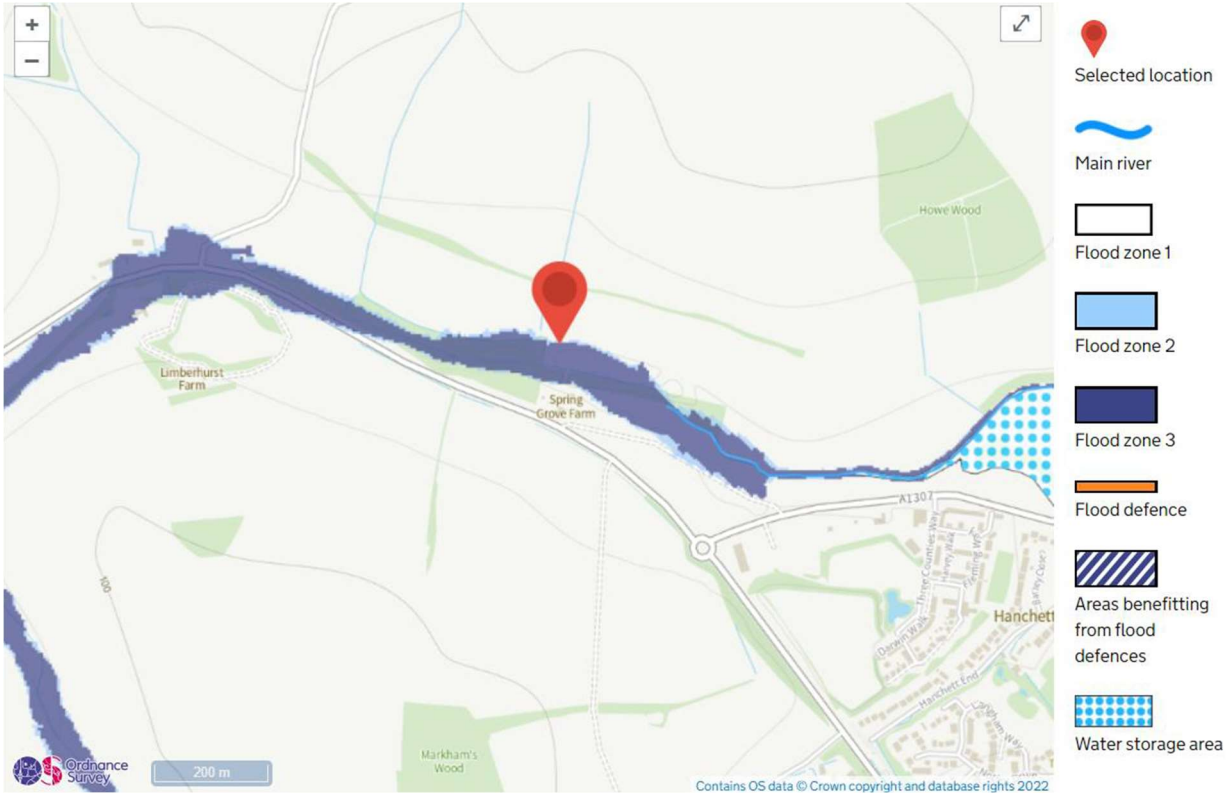

Figure 4 Flood Zone Map (source: flood-map-for-planning.service.gov.uk)

The lagoon area is in Flood Zone 1 which means it is not at risk of flooding at all.

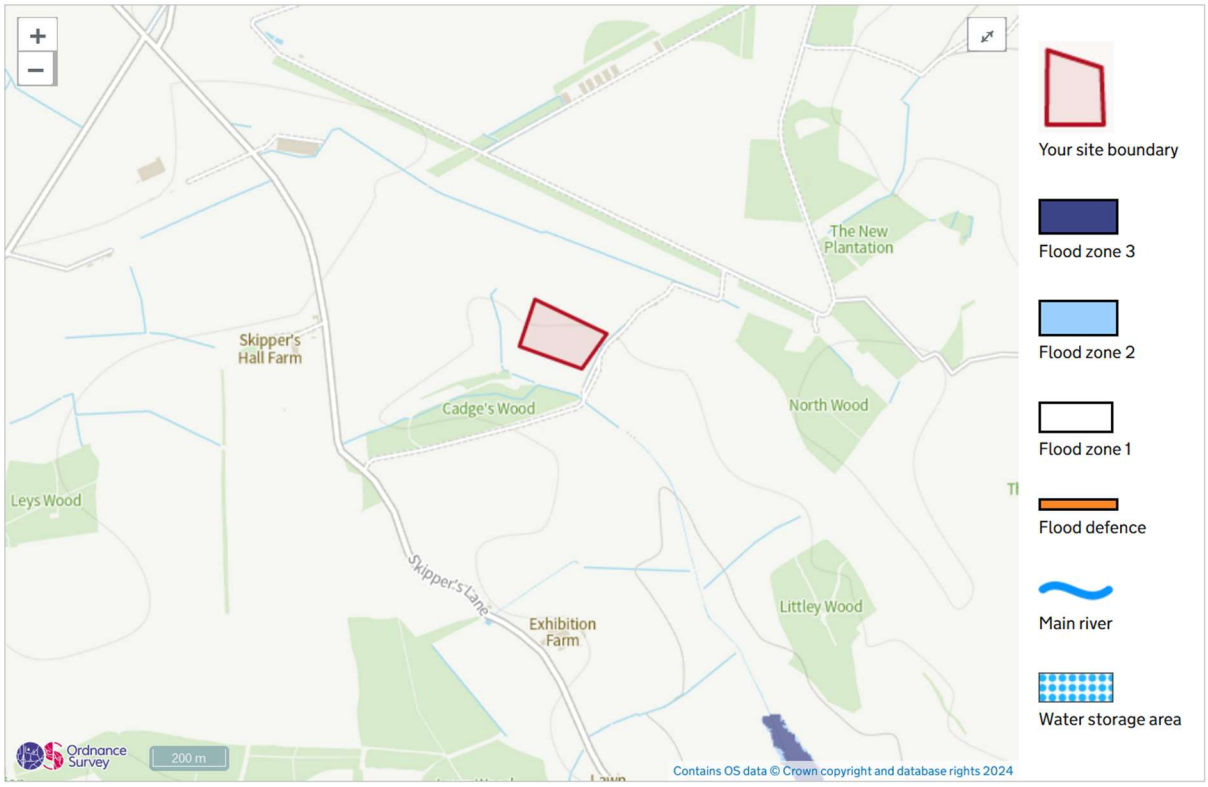

Figure 5 Flood Zone Map of Lagoon Area (red line for illustrative purpose only) (source: flood-map-for-planning.service.gov.uk)

Human Receptors

Human receptors are considered separately for the core AD site, and for the digestate storage lagoons. It is important that each is evaluated separately as the potential causes of emissions are different for each element of the site, and they must be considered separately and thoroughly. The evaluation of this must consider both residential property and places of work.

For the purposes of this report, receptors within 1km of the boundary of each site are considered. Potential receptors at a greater distance are considered in the wider planning application and will be considered in the resultant application for an Environmental Permit to the Environment Agency.

Distance to the pipeline is not considered as that is a contained and monitored system, which does not have emissions to air.

Human receptors within 1km of the core AD Site are shown in Figure 6 and Table 1 below.

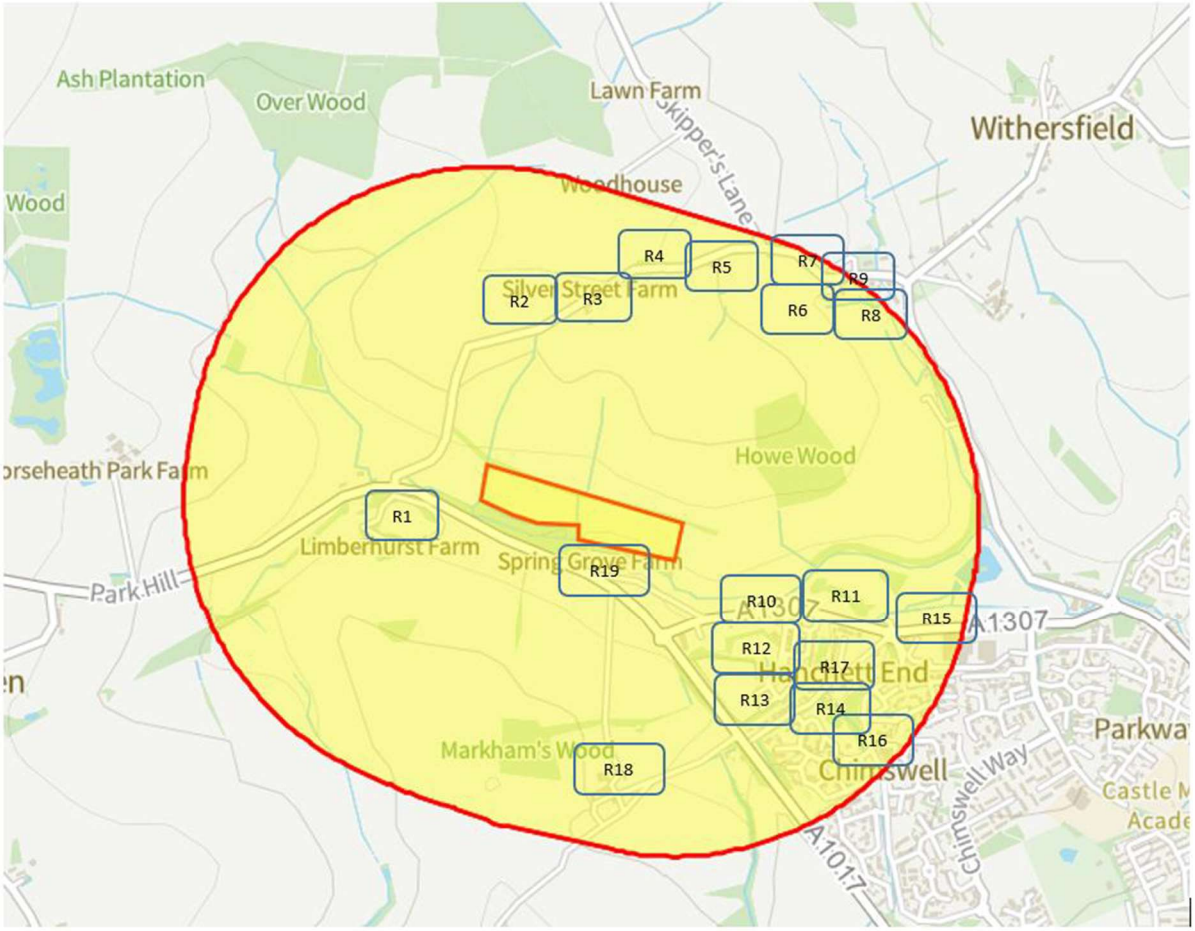

Figure 6 Plan of human receptors within 1 km of the approximated site boundary shown

Receptor ID	Receptor Name	Type of Receptor	Distance from site boundary (m)	Direction from site boundary
R1	Limberhurst Farm	Residential / Workplace	150	Southwest
R2	Properties on Silver Street	Residential	620	North
R3	Silver Street Farm	Residential / Workplace	680	North
R4	Properties on Horseheath Rd	Residential	878	North
R5	The White Horse	Amenity / Workplace	945	Northeast
R6	CRB Automotive	Workplace	954	Northeast
R7	JFK Services (electrician)	Workplace	980	Northeast
R8	Properties on Homestall Crescent	Residential	950	Northeast
R9	Properties on Church Street	Residential	976	Northeast
R10	Flying Shuttle	Workplace / Amenity	407	Southeast
R11	Colourbox Montessori Nursery	School	509	Southeast
R12	Prestimage (video production)	Workplace	453	Southeast

R13	Haverhill Research Park	Residential / Workplace	490	Southeast
R14	Spine Align -Veterinary Chiropractic care	Residential	551	Southeast
R15	Sainsburys	Residential	968	Southeast
R16	The Meadows Care home	Residential / Workplace	935	Southeast
R17	Properties in Hanchet End	Residential	455	Southeast
R18	Hanchett Hall Boarding Kennels & Cattery	Workplace	773	South
R19	Spring Grove Farm	Residential / Workplace	25	South

Table 1: List of Human Receptors with 1 km of the approximate site boundary

Human receptors within approximately 1km of the lagoon site are shown in Figure 7 and Table 2 below.

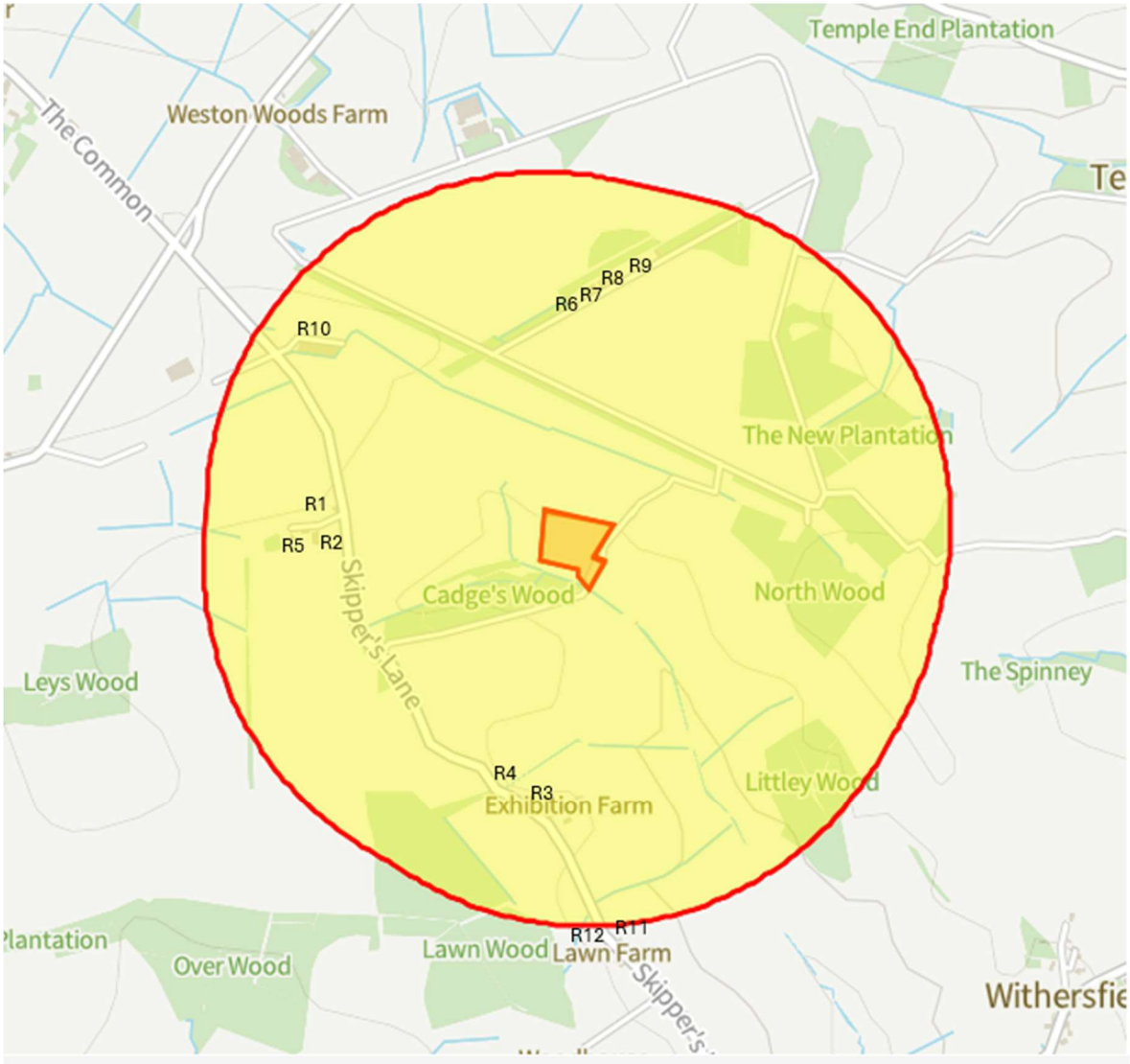

Figure 7 Plan of human receptors within 1 km of the approximated lagoon boundary shown

Receptor ID	Receptor Name	Type of Receptor	Distance from site boundary (m)	Direction from site boundary
R1	Skippers Lodge	Residential	590	west
R2	Skippers Hall Storage (self storage facility)	Commercial / Workplace	596	west
R3	Commercial units at Skippers Lane (incl. Automotive Sporting Heritage, Mk14 Components & PJW Services)	Commercial / Workplace	613	South
R4	Nos. 1 & 2 Skippers Lane	Residential	631	South west
R5	Commercial units at Skippers Hall Farm (incl. welding services & Skippers Hall Equestrian)	Commercial / Amenity	640	west
R6	Agricultural TEFL (machinery storage and temporary grain)	Commercial / Workplace	617	North
R7	Industrial storage unit (kitchens)	Commercial / Workplace	653	North
R8	Motor vehicle repair service	Workplace	662	North
R9	Compost and landscape materials (processing and bagging)	Workplace	712	North
R10	Jellycat Warehouse	Workplace	761	North west
R11	Residential Property on Skippers Lane	Residential	1050	South
R12	Lawn Farm	Residential & Agricultural	1070	South

Table 2: List of Human Receptors with approximately 1 km of the approximate site boundary

Ecological Receptors

Designated Sites

As with Human Receptors it is important to consider the core anaerobic digestion site and the lagoon site separately, as potential for emissions form the sites is different and the pathways to those ecological sites must be evaluated separately.

The designated ecological sites within 10km of the core anaerobic digestion site are shown within the Figure 8 and Table 3 below.

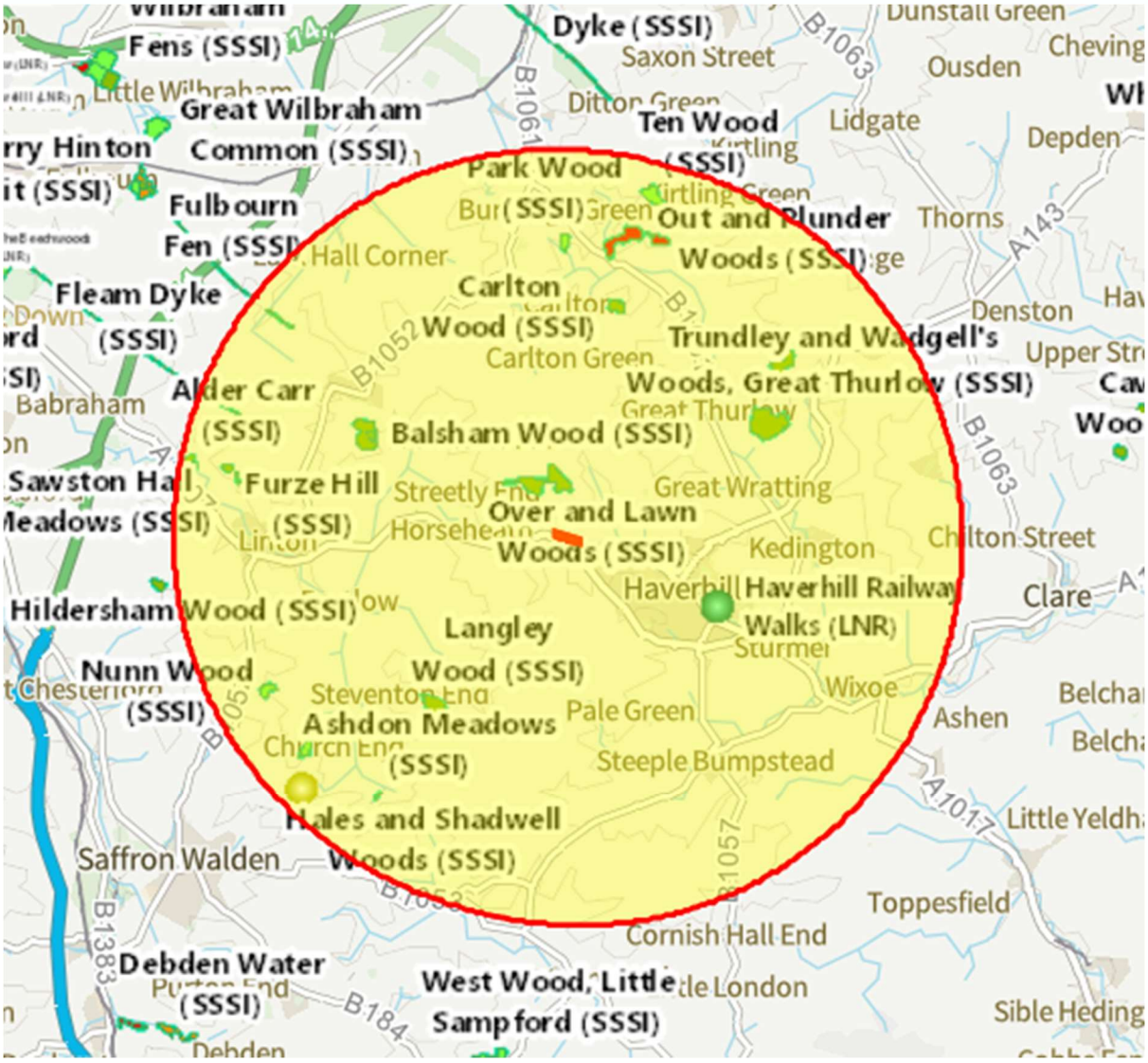

Figure 8 Designated Sites Including Sites of Special Scientific Interest (England) Within 10km of AD Site (Source: magic.defra.gov.uk)

Receptor Name	Ecological Designation	Distance from site boundary (m)	Direction from site boundary
Over and Lawn Woods	SSSi	1,028	North
Haverhill Railway Walks	Local Nature Reserve	1,703	East
Langley Wood	SSSi	5,234	South west
Ashdon Meadows	SSSi	8,168	South west
Hales and Shadwell Woods	SSSi	8,337	South west
Hales Wood	National Nature Reserve	9,238	South west
Nunn Wood	SSSi	8,330	South west
Balsham Wood	SSSi	5,230	North west
Furze Hill	SSSi	8,426	West

Carlton Wood	SSSi	5,957	North east
Park Wood	SSSi	7,319	North
Out and Plunder Wood	SSSi	7,276	North
Ten Wood	SSSi	8,871	North east
Trundley and Wadgell's Woods, Great Thurlow	SSSi	5,253	North east
Alder Carr	SSSi	9,581	West
Fleam Dyke	SSSi	8,724	North west
Roman Road	SSSi	8,248	North west

Table 3: List of statutory designated sites with approximately 10 km of the approximate AD Site boundary

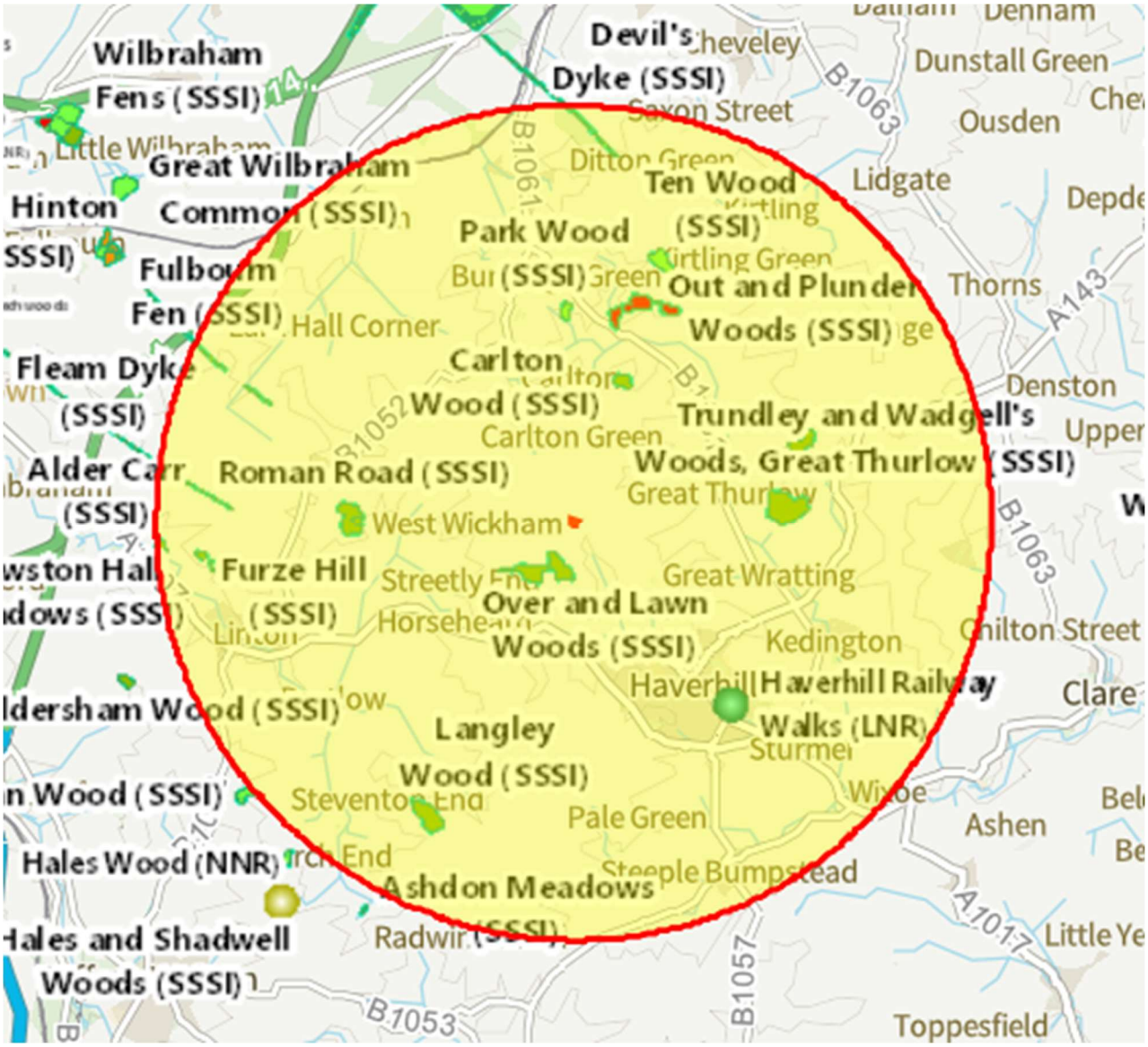

Figure 9 Designated Sites Including Sites of Special Scientific Interest (England) Within 10km of AD Site (Source: magic.defra.gov.uk)

Receptor Name	Ecological Designation	Distance from site boundary (m)	Direction from site boundary
Over and Lawn Woods	SSSi	794	South west
Haverhill Railway Walks	Local Nature Reserve	3,420	south east
Langley Wood	SSSi	7,598	South west
Ashdon Meadows	SSSi	10,044	South west
Hales and Shadwell Woods	SSSi	10,404	South west
Hales Wood	National Nature Reserve	11,346	South west
Nunn Wood	SSSi	10,042	South west
Balsham Wood	SSSi	4,997	West
Furze Hill	SSSi	8,692	West
Carlton Wood	SSSi	3,417	North east
Park Wood	SSSi	4,778	North
Out and Plunder Wood	SSSi	4,693	North
Ten Wood	SSSi	6,328	North east
Trundley and Wadgell's Woods, Great Thurlow	SSSi	4,575	East
Alder Carr	SSSi	9,745	West
Fleam Dyke	SSSi	7,735	North west
Roman Road	SSSi	8,124	West
Devil's Dyke	SSSi	8,806	North

Table 4: List of statutory designated sites with approximately 10 km of the approximate Lagoon boundary

Priority Habitats & Species

Priority Habitats local to both the Core Anaerobic Digestion site and the lagoon area are shown in Figure 10 below.

Both the site and the proposed lagoon location are bordered to the south by a priority habitat, namely deciduous woodland. In both cases the location of the woodland is <50m from the boundary.

The 'good quality semi-improved grassland' to the east of the site and additional areas of deciduous woodland to the north and east of the site are greater than 100m from the potential permit boundary.

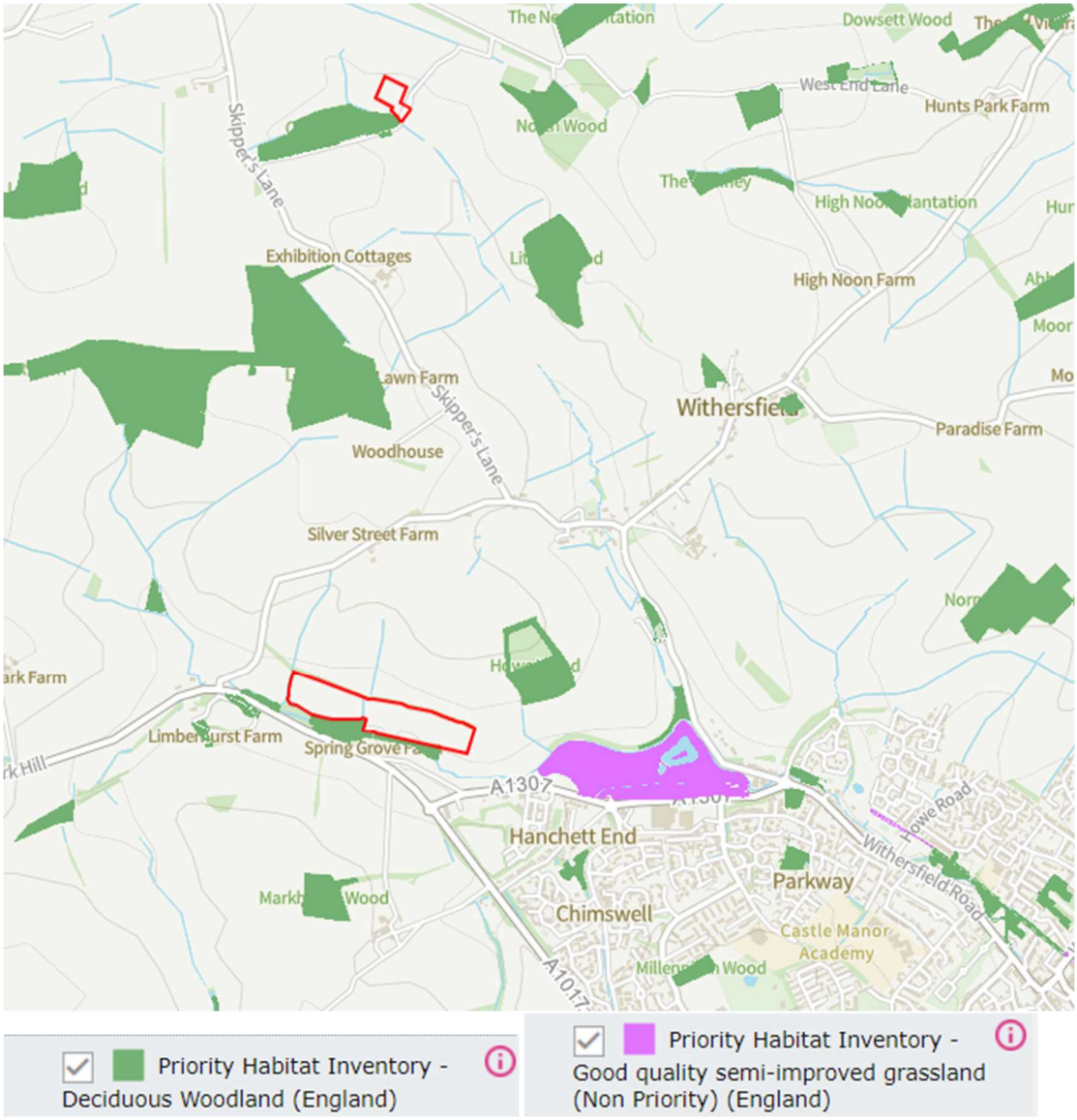

Figure 10 Priority Habitats (Source: magic.defra.gov.uk)

Site Design for Prevention of Pollution to Ground and Surface Water

Site Drainage

In order to prevent the release of potentially contaminating liquids such as silage effluent into the local environment, the site is designed in full accordance with SSAFO Regulations and CIRIA 736 to ensure that all dirty water run-off is captured with in the sealed drainage systems. These will be designed to be completely separate to the management of clean rain water run off to prevent any contamination of clean water.

This dirty water run-off will be consumed within the process to balance dry matter within the feedstock on a daily basis.

The only element that is buried is the underground silage effluent tank, which will be installed with leakage detection.

All aspects of the drainage system will be regularly inspected to ensure their continued function and operation. Records will be kept of any maintenance work required, and this will be inspected by the Environment Agency.

Tank and Bund Design

In order to protect the local environment, the Anaerobic Digestion Tanks will sit within secondary containment bund. In the event of a tank failure, as per CIRIA 736 guidance, the bund will be designed to contain a minimum 25% of the total volume of substrate contained within the digestors. This will include a consideration of all objects such as planting feeding infrastructure that housed within that bunded area, to ensure the minimum containment is achieved.

This containment bund will be designed with leakage detection and inspection chambers both for the individual tanks and for the full containment bund.

Lagoon Design

The covered digestate storage lagoons will all be constructed within an earthen bund. These will be designed to CIRIA 736 standards and will include a secondary containment layer with a monitored leakage detection system and inspection system, for each separate lagoon.

The design for each lagoon will include a minimum 110% containment within the earth structure and the operator will ensure they always observe a minimum free board of 75cm. This ensures that he earthen bund will keep the stored digestate contained even if there is a fault with the liner.

The quantity of digestate material stored in each lagoon will be monitored via the use of flow meters and will be corroborated by daily visual inspection.

The Environment Agency require a minimum of six months storage, which can be on or off site. With over 50,000m³ of storage capacity at the two lagoon locations (onsite and offsite, to the north) the site has greatly exceeded this requirement.

The sealed cover design will prevent rain ingress into the lagoons. This ensures that the plant nutrient qualities of the digestate are kept consistent for agricultural use, and that heavy rain cannot cause overflow of digestate.

The northern lagoon site will also be monitored via CCTV as will the core AD site.

Digestate Pipe

The pipe line and route has been designed by an appropriately qualified specialist.

At all points it will be installed well below the plough level of agricultural land, with the top of the external pipe sitting at a minimum depth of 1100mm.

Where the pipe needs to cross obstacles such as the public highway, the aviation fuel line and tree lines, these sections will be installed with Horizontal Directional Drilling rig.

It will be installed as a sheathed or double walled pipe meaning the pipe will effectively sit within a second pipe to prevent any leaks contaminating ground water. Were a leak to happen in the primary pipe it would travel down the secondary pipe to the leakage detection.

The trench around the duct will be back filled with a fine protective backfill and up to 100mm both below and above the pipe with a layer of warning marker tap rolled out over the backfill prior to the refilling of the trench with the excavated earth.

The route will be installed with inspection points along the route to enable checking of contamination within the secondary piping and also cleaning of any blockages within the core pipe.

Flow meters will be installed both at both ends of the pipe, which enable to the operator to check the quantity of material that is being pumped across to the off-site digestate lagoons on the farm. Should there be a difference the system will automatically go into

The pipeline will be pressure tested prior to being used, and will be fully inspected and tested annually.

Site Design for Prevention of Pollution to Air

Full details of the site's approach the prevention of Airbourne Pollution and Fugitive Emissions are contained with the Air Quality Impact Assessment and an operational Odour Management Plan will be required as part of the assessment for the Bespoke Environmental Permit.

Anaerobic Digestion Process

Anaerobic Digestion is a fully contained process, designed to capture the Biogas produced by the digestion process.

The Environmental Permit will include a requirement for regular inspection of the site as part of a Leakage Detection and Repair Programme (LDAR), designed to ensure the plant is well maintained and that any gas leaks are quickly indemnified and repaired.

Gas monitors will be in place around the site and all personnel will carry a personal gas monitoring device.

Combustion Emissions

The CHP engines will be fully compliant with the Medium Combustion Directive, the emissions requirements this implies.

The Environmental Permit for the site will include an operational requirement for annual inspection of the exhaust emissions by an appropriately qualified and MCERTS accredited technical specialist, who will be competent to comply with EA guidance for monitoring stack emissions of Medium Combustion Plant, to ensure continued compliance with those emissions limits.

Manure Storage

Manure will be stored in a building that will be kept under negative pressure with fast shutting roller shutter doors to prevent emissions.

The air from the building will be treated for Ammonia and odour to prevent fugitive emissions and pollution.

Site Design for Prevention of Accidents

General Design Principles

The plant is designed and all relevant processes are managed in full accordance with Construction Design Management (CDM) regulations. This requires:

- The use of competent suppliers of all aspects of construction and supply,
- The use of competent specialists to complete design risk assessments,
- The use of methodologies such as significant release modelling for asphyxiation, fire and explosion and HAZOP and LOPA analysis process design and safety.

The purpose of this is to ensure subsequent construction, commissioning and operation of the plant will be safe so far as is reasonably practicable.

Fire Risk

During the design phase of the project, fire and explosion modelling will be used to define the measures that will prevent, control and mitigate the risks of fire and explosion. This will be reviewed throughout the construction and commissioning process to ensure all elements of the plant are incorporated.

This will lead to the production of a Fire Improvement Plan, which will specify the requirements for fire detection and suppression systems around the site, as well as the placement of fire extinguishers around the site.

Firefighting water supplies will be provided as building Standards regulations and the requirements of the local firefighting service.

Familiarisation visits will be provided for local firefighting teams and Acorn Bioenergy will ensure the Fire Brigade are provided with all the information they need regarding the design and operation of the site and will fully co-operate with any further requirements of the emergency services.

Risk of Explosion

Detailed hazard analysis and risk assessments will be carried out on all aspects of the plant during its design phase, to ensure all risks are reduced and managed to a level that is consistent with the principle of 'As Low As Reasonably Practicable' (ALARP) and safe level. This will involve all those involved in the engineering design of the plant and its systems including the core equipment suppliers.

An appropriately qualified technical specialist will carry out a DSEAR Assessment for the plant and all its components. This will then designate ATEX zones around the site. Access to these areas will be restricted, and only ATEX rated electrical and mechanical equipment can be used in these zones. The purpose of the ATEX Zoning is to prevent gas coming into contact with a potential source of ignition.

A separate application will be submitted for Hazardous Substances Consent, and Acorn Bioenergy Limited is discussing this with the relevant team at the Health and Safety Executive. The site will be operated in full compliance with any relevant aspect of lower tier COMAH regulations.

Gas Pressure

Gas pressure will be constantly monitored across the site with interlocks in the feed system designed to prevent build-up of pressure, at points when gas consumers are not able to use the gas.

A BAT compliant Emergency Flare will be installed which can will be designed to burn excess gas production, and the use of this will be closely monitored by the Environment Agency. This will ensure that in situations where there is excess gas pressure, the gas pressure can be managed safely, without risk of release to atmosphere.

Addition Pressure Relief valves will be fitted to all the digestion tanks. They will be monitored and any use of the PRVs must be reported to the Environment Agency as part of the Environmental Permit.

Lightning Protection

A full lightning risk assessment will be carried out on the site, by an appropriately qualified specialist, in compliance with compliance with BS EN 62305 and the recommended lightning protection measures will be installed in full.

Operational Site Management

Working Practices

All tasks on the site must be carried out by people with the appropriate levels of training and competency to carry out that specific task. This will include both the management of the on-site staff team, and all also the selection of technical contractors for the provision of specific services for the plant.

Risk assessments and Work Instructions will be produced, and all Contractors will be asked to submit Risk Assessments and Method Statements, which will require approval before they can work on site.

Lock Out / Tag and Isolation Systems will be presents across the site, to prevent accidents while work is being carried out.

As appropriate, all items of equipment, machinery, plant and vehicles will be inspected and tested according to the relevant legislative and regulatory guidance for that specific item, with detailed records kept of the inspection programmes.

SCADA Control Systems

The operation of the AD plant will be fully automated from an on-site central control panel located in the Control Room which monitors information transmitted from instrumentation around the AD plant. This is known as a Supervisory Control and Data Acquisition (SCADA) system.

This information system provides process data on all operational aspects of the plant and provides the practical operational control interface which includes the ability to programme and control all aspects

of the process. It can be viewed both on site, on the site computer and remotely through a remote control system.

As part of the process monitoring software, the SCADA system sends out a range of process alarms and error messages when required to alert the operational team that something requires their attention. These are coded to different priority response levels. These are designed to ensure issues are spotted early and manged properly.

The SCADA system will be remotely monitored at all times and outside of operational hours a duty operator will always be on standby to respond to process alarms and to attend site outside of hours, where process alarms require a site visit.

The system will store plant management data and enable trend monitoring to enable the identification of problems.

Inspection Regimes

The Environmental Management System will require the site operations team to carry out regular daily inspections and checks around the plant and for records to be kept. Notes are required in order to ensure that corrective actions are undertaken. Checks required include:

1. Daily odour checks
2. Completion of maintenance schedules and checks
3. Daily AD process checks and on-site lab tests

Additionally, the regulatory compliance will require technical specialists to carry checks out across the site. These are designed to ensure that the site is kept safe and properly maintained, thereby protecting both human health and the environment. This list of inspection regimes includes:

1. Pressure Systems and safety
2. Lifting systems
3. Electrical testing
4. Drainage inspection
5. Concrete testing
6. MCERTS Accredited emissions testing
7. Leakage Detection and Repair Programme
8. Safety Instrumented Systems

Records will be kept of all tests and inspections, including details of any corrective actions required and their successful completion.

Conclusions

The design of the site has been carefully assessed in the context of sensitive receptors in the local area.

The principal control measure for prevention of harm to human health or causing pollution in the local environment is to physically design the site in a way that prevents the risk of harm wherever possible, or in such a way that potential impact is reduced to acceptably small levels.

The site is then managed in such a way as to ensure it is well maintained, and the various permitting, compliance and inspection regimes will all link into the Environment Management System to ensure the site is operated safely.