Environmental Statement

Erection of an anaerobic digestion plant and all associated works at Lower Leighton, Welshpool, Powys, SY21 8HH

Prepared for Farm Biomethane Limited

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Lower Leighton
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Farm Biomethane Limited

Erection of an anaerobic digestion plant and all associated works

Environmental Statement

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Planning Authority

Powys County Council
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CHAPTER 1 - INTRODUCTION

Foreword

This Environmental Statement (ES) has been prepared for Farm Biomethane Limited by Roger Parry & Partners LLP. It accompanies a planning application for a proposed anaerobic digestion plant at Lower Leighton, Welshpool.

The ES is the principal written output of the EIA process, and provides the required information on the predicted environmental impacts of the proposal. It has been prepared in accordance with the Town and Country Planning (Environmental Impact Assessment) Regulations 2017. The ES is intended to enable the recipients (such as the Local Planning Authority) to understand the nature of the proposed development and to evaluate the likely environmental impacts in the light of proposed mitigation measures. The ES therefore represents an essential component of the decision making process and presents information in a readily accessible form.

A Non-Technical Summary (NTS) and Technical Appendices accompany the ES and form part of the same document. Other documents making up the planning submissions include:

- Local Planning Authority Application Forms;
- Design and Access Statement
- Ownership Certificates and Notices;

Copies of the full documentation for this planning application have been placed on deposit at the following location, where they may be examined by members of the public during normal office hours: Roger Parry & Partners LLP, The Estates Office, 20 Salop Road, Oswestry, SY11 2NU.

The Environmental Statement, in the form of a CD, can be purchased at a cost of £10 from the above address. The Non-Technical Summary is available free of charge from the same address and can be found on Roger Parry & Partners website at: www.rogerparry.net/planning.

1. Introduction

This chapter summarises the nature of the proposed development and its location, introduces the basis for the planning application, explains the general basis and methods used for the Environmental Impact Assessment (EIA), sets out the structures of the Environmental Statement (ES) and introduces the authors of the ES.

1.1 Introduction to the Environmental Statement

As part of the process of making an application for an anaerobic digestion plant, Farm Biomethane Limited have employed Roger Parry & Partners to co-ordinate with the compilation of the associated planning application, including provision of an Environmental Impact Assessment (EIA) to be reported in an Environmental Statement (ES).

This chapter summarises the nature of the proposed development and sets out the purpose of the ES.

1.2 Summary of the Proposals

1.2.1 Background to the Proposed Development

Farm Biomethane Limited is applying for planning permission for the installation of an anaerobic digestion plant and all associated works at Lower Leighton, Welshpool, Powys, SY21 8HH.

When fully operational, the proposed development will utilise feedstock to generate biomethane for injection into the National Gas Grid.

The proposed development will provide up to 78GW on farm Anaerobic Digestion. The AD plant will use the slurry produced on site by the dairy enterprise at Lower Leighton to generate heat and power.

1.2.2 Project Team

The Environmental Statement has been prepared by Roger Parry & Partners LLP on behalf of Farm Biomethane Limited.

Specialist topic chapters have been prepared by the following sub-consultants:
Air Quality, Odour, Ammonia and Dust – Earthcare Technical

Noise – Matrix Acoustics

Archaeology – Trysor

Ecology and Biodiversity – Arbor Vitae

Water Resources and Flood Risk – Townsend Water Engineering

1.3 Requirement for an EIA: Legislative Background

The Town and Country Planning (Environmental Impact Assessment) Regulations 2017 set out the types of development which must always be subject to an EIA (Schedule 1 development) and other developments, which may require assessment where they give rise to significant environmental impacts (Schedule 2).

The proposed development is consistent with Schedule 2 of the Regulations. On this basis, no formal screening opinion was sought from the Planning Authority.

1.4 Objectives and Purpose of EIA

The objectives of EIA are as follows:

- To identify the potential environmental impacts of a proposed development, taking into account the characteristics of the development and the local environment, and the views of local authorities and statutory consultees with responsibilities for the environment;
- To interpret the nature of potential impacts;
- To identify measures to mitigate adverse impacts; and
- To report the results of the assessment in an ES for submission to the planning authority.

The purpose of an ES is to present the findings of the assessment into the likely significant environmental impacts of the proposed development. This document describes the assessment process, the results of the assessment of the impacts of the proposed development, assesses the significance of the impacts and describes mitigation measures proposed to reduce impacts to acceptable levels.

The ES is intended to enable stakeholders to understand the nature of the proposed development and to evaluate the likely significant environmental impacts. In the case of the local planning authority, they may use that knowledge in deciding whether to grant planning permission and, if so, what conditions might be appropriate. The ES therefore serves to aid the decision-making process and to present relevant information in a readily accessible form.

1.5 Method Statement and Assessment Criteria

The Town and Country Planning (Environmental Impact Assessment) (Wales) Regulations 2017, require (as set out in Part II of Schedule 4) that an ES should include, as a minimum, the following information:

- *"A description of the development comprising information on the site, design and size of the development;*
- *A description of the measures envisaged in order to avoid, reduce and, if possible, remedy significant adverse effects;*
- *The data required to identify and assess the main effects which the development is likely to have on the environment;*
- *An outline of the main alternatives studied by the applicant or appellant and an indication of the main reasons for its choice, taking into account the environmental effects;*
- *A non-technical summary of the information provided under paragraphs 1 to 4".*

Part I of Schedule 4 expands in detail on the contents of an ES that would comply fully with the spirit of the Regulations. This is provided in Appendix 3.0.

Good practice advises that EIA should be treated as an iterative process rather than as a one-off, post-design environmental appraisal, and that interested parties be consulted at an early stage to identify key impacts and design appropriate mitigation. In this way, the findings from the EIA have been fed into the design process, leading to a project which achieves a 'best fit' within the environment. This approach has been used throughout the EIA of the proposed development in particular the design was not fixed until specialist assessors had reported their recommendations following carrying out baseline assessments of the surrounding environment. Where likely significant adverse impacts have been predicted, or sensitive environments were identified, the results of the EIA have been used to influence the construction, location and design of the installation. In this way it has been possible to reduce or eliminate likely significant impacts through sensitive design and construction methods alone.

The EIA has been carried out taking due consideration of guidance such as that contained within the Institute of Environmental Management and Assessment's (IEMA) 'Guidelines for Environmental Impact Assessment' (2004), where appropriate, along with various guidance documents in relation to the assessment of individual issues (see individual assessment chapters).

In order to evaluate environmental impacts, it is important that assessment criteria are identified. Any impact is assessed by a combination of the degree of alteration from the baseline state (both positive and negative) which can be predicted (i.e. the magnitude of the effect) and the sensitivity of the receptor(s) (e.g. the rarity of a species/habitat, the quality of a view, the type of land use, the presence of people etc.).

Within this ES, thresholds of magnitude and sensitivity are used to make explicit the conclusion of the assessment process in terms of the significance of the impact. Significance is generally based on the structured evaluation of a number of primary criteria:

- the value of the resource (international, national, regional and local level importance);
- the magnitude of the impact;
- the duration of the impact (whether long-term or short-term, temporary or permanent);
- the reversibility of the impact;
- the number and sensitivity of receptors;
- the nature of the impact; and
- Whether the impact is direct or indirect.

For the purposes of undertaking an EIA, the significance of any impact (positive or negative) is generally considered in terms of:

- *No Significance / Negligible* - beneath the levels of perception, within normal bounds of variation or within the margin of forecasting error: a non-detectable change to a location, environment or species;
- *Minor Significance*: a detectable but non-material and non-noteworthy change to a location, environment or species at a local level, relevant quality standards not approached;
- *Moderate Significance*: a material and noteworthy but non-fundamental change to a location, environment or species of local or district importance, relevant quality standards may be approached;
- *Major Significance*: a fundamental change to a location, environment or species of district to regional importance, relevant quality standards exceeded;
- *Extreme Significance*: a fundamental change (e.g. loss) to a location, environment or species of national / international importance, relevant quality standards exceeded by a substantial margin on a regular basis.

This ES generally follows this theoretical approach. Full magnitude and significance criteria are provided in the individual topic assessment chapters as appropriate.

The assessment process considers residual impacts following the introduction of measures to reduce, remedy or avoid any significant adverse environmental impacts. Mitigation can be applied through the consideration of alternatives, physical design, provision of specific control equipment, project management or operation and other means. Mitigation generally incorporated into the design as standard and additional mitigation identified by the assessment process is set out within each technical impact assessment chapter of this ES.

1.6 Structure of the Environmental Statement

The key issues together with a clear description of the project and relevant planning policy form the main content of this ES.

This document is supplemented by a non-technical summary (NTS) of the findings of the EIA. The objective of the NTS is to provide an accurate and balanced statement of the key information presented in the ES.

The main body of the ES is set out as follows:

Introduction (Chapter 1) – setting out the background to, and location of, the development and the EIA process;

Scoping and Key Issues (Chapter 2) – summarising how the topics to be assessed and methods to be used were chosen via the initial application process;

Alternatives (Chapter 3) – describing the alternatives considered including the 'Do-Nothing Scenario' and alternative locations, in terms of their physical, operational, economic and environmental feasibility.

Development Description (Chapter 4) – describing the construction, use and physical nature of the proposed plant and its use, including delivery and access issues; and

Policy and Legislative Context (Chapter 5) – summarising the planning and legislative context of the proposals.

The Environmental Assessment Chapters – covering impacts associated with:

- Air Quality (Chapter 6);
- Landscape and Visual Impacts (Chapter 7);
- Traffic (Chapter 8)
- Odour (Chapter 9);
- Ecology (Chapter 10);
- Noise and Vibration (Chapter 11);
- Water Resources (Chapter 12);
- Soils (Chapter 13);
- Heritage (Chapter 14);

Each chapter sets out the types of impacts possible, summarises relevant legislation and policy (where appropriate), describes the existing background/baseline environment, the methodologies used to predict impacts and associated guidance (along with any limitations of the methodology or available data), magnitude and significance criteria, incorporated mitigation and the provision of additional mitigation, and the residual impact assessment. Where appropriate the assessment of individual sub-topics / sensitive receptors are assessed in discrete sections within each technical chapter. Also, combined impacts (e.g. one effect resulting in another effect, such as atmospheric emissions affecting habitats, is assessed in one chapter whilst cross referencing other relevant chapters as appropriate); and

Finally, **Summary and Conclusions** (Chapter 15) – provides an overview of the assessment.

Note that drawings are included within the chapters and technical appendices are provided as separate individual appendices.

A Design and Access Statement and other forms and certificates have been submitted separately.

1.7 Authors of the Environmental Statement

A number of organisations and specialist consultants have assisted with the preparation of this ES and provided input into the content of a number of individual technical chapters to a standard format (where possible) provided by Roger Parry & Partners LLP (who also collated the ES). The specific contributions with respect to the key chapters are listed in Table 1 below.

Table 1 - Contribution to the ES

Topic Area	Author
Introduction	Roger Parry & Partners
Scoping and Key Issues	Roger Parry & Partners
Alternatives	Roger Parry & Partners
Development Description	Roger Parry & Partners
Planning Policy Context	Roger Parry & Partners
Air Quality	Roger Parry & Partners, Earthcare Technical
Landscape	Roger Parry & Partners
Traffic	Roger Parry & Partners
Odour	Roger Parry & Partners, Earthcare Technical
Ecology	Roger Parry & Partners, Arbor Vitae
Noise & Vibration	Roger Parry & Partners, Matrix Acoustics
Water Resources	Roger Parry & Partners, Townsend Water Engineering
Soils	Roger Parry & Partners
Heritage	Roger Parry & Partners, Trysor
Summary & Conclusions	Roger Parry & Partners

CHAPTER 2 – SCOPING AND KEY ISSUES

2. Scoping and Key Issues

This chapter sets out the requirement for and process of scoping the Environmental Statement (ES), summarises the receiving environment in the vicinity, covers the scoping consultation process and indicates the results of the consultations, and provides the final scope for the ES. Finally it sets out other permitted/proposed developments with which the proposed development could potentially create cumulative impact.

2.1 The Scoping Process

Schedule 4 of the Town and Country Planning (Environmental Impact Assessment) (Wales) Regulations 2017 specifies the general information that should be included within an Environmental Statement (ES) as best practice. An ES should identify, describe and assess the likely significant impacts of the development on the environment with reference to:

- *"Population;*
- *Climate;*
- *Flora;*
- *Fauna;*
- *Landscape;*
- *Soil;*
- *Air;*
- *Water;*
- *Material assets (including architectural and archaeological heritage); and*
- *Any inter-relationships between the above"*

The EIA Regulations also require that an EIA should cover:

"Direct effects and any indirect, secondary, cumulative, short, medium and long-term, permanent and temporary, positive and negative effects of the development, resulting from:

a) the existence of the development;

b) the use of natural resources;

c) the emission of pollutants, the creation of nuisances and the elimination of waste."

Scoping (i.e. determining the amount of information on each of these principal subjects and effect types to be presented in an ES) is regarded as an important first step in the overall EIA process, although it is not necessarily a mandatory requirement of the EIA Regulations. The primary aim of EIA scoping is to facilitate the planning of a focused EIA that concentrates on the resolution of substantive potential importance and, where appropriate, excluding any non–issues from further consideration. It also allows primary concerns to be identified at an early stage and informs developers of aspects of concern that they may not have been aware of. Surveys and assessment methodologies can also be agreed between all interested parties such that it is less likely that additional information is required after submission of the application.

Regulation 10 of the EIA Regulations allows potential applicants to ask the planning authority to state, in writing, the information that should be set out in an ES.

Issues that have been scoped out of the ES are set out in Section 2.4.

2.2 Summary of the Receiving Environment

2.2.1 General

Aside from the hedges which border the site, the application site lies in an area of open, agricultural land. It is part of a lowland landscape of medium to large scale sub-regular shaped fields in mixed agricultural uses.

2.2.2 Air Quality

There are no Air Quality Management Areas within the vicinity of the site.

Local air quality is dominated by traffic sources including the B4381 and the B4388.

2.2.3 Highways

There are three access points to the proposed development – one off an existing access, an improved existing access and a new access point, as per the site and location plans.

2.2.4 Population / Socio-Economics

The site lies within the open countryside with limited isolated residential properties close by and small villages in the surrounding landscape. The site lies within the unitary authority area of Powys County Council and the Forden with Leighton & Trelystan Community Council.

2.2.5 Noise

The noise environment in the area is dominated by road traffic sources from the two surrounding highways. The surrounding community comprises of a mixture of scattered agricultural holdings with some residential dwellings within small settlements. Noise levels across the site are considered to be typical of a rural area.

2.2.6 Geology, Soils, Ground Stability and Contamination

The geology of the area surrounding the site consists of slowly permeable seasonally wet acid loamy and clayey soils.

2.2.7 Water Resources

The majority of the application area is not located within a Flood Zone. A small portion of the site to the North is within Flood Zone 2 and Flood Zone 3 for Rivers and Sea. With the development being greater than 1ha in area, a Flood Risk Assessment (FRA) is required.

2.2.8 Ecology

The main site consists of arable land.

Plans do not appear to have any impact upon protected species, as long as the measures suggested within the ecology report are adopted.

2.2.9 Cultural Heritage

The chosen site itself has no apparent cultural heritage or archaeological interest. Within 500 metres of the site there are no listed buildings.

2.3 Summary of the Scoping Exercise

2.3.1 The aspects of the Proposed Development Considered to Have the Potential to Give Rise to Significant Environmental Impacts

Following consideration of the existing environment the potential sources of environmental impacts have been preliminary identified in Table 2 below for construction, operation and decommissioning of the development respectively.

Table 2: Summary of key potential impacts

Potential receptors of impact		Activities & potential Impacts Construction Phase	Operation phase	Decommissioning Phase
WATER	Surface water hydrology and channel morphology	**Use of vehicles and machinery** - Increase in surface runoff from soil compaction **Works near watercourses** - Change in flow velocities - Increased flood risk **Earthworks** - Increased sedimentation of watercourses **Buildings and ancillary structures** - Changes to runoff characteristics and infiltration rates	**Use of vehicles and machinery** - Increase in surface runoff from soil compaction	
	Surface water quality	**Earthworks** - Pollution from suspended material **Materials management** - Pollution from spills or leaks of fuel, oil and construction materials	**Water and manure management** - Decrease in water quality from sudden releases (e.g. from tank failure or yard washing) or gradual seepage of contaminated water into nearby watercourses **Materials management** - Pollution from agricultural chemicals, spills or leaks of fuel and oil - Eutrophication of watercourses	
	Groundwater hydrology	**Earthworks and site drainage** - Reduction in water table - Changes to groundwater distribution and flow	**Use of borehole for water supply** - Lowering water table	**Termination of abstraction** - Rebound of water table
	Groundwater quality	**Materials management**	**Materials management**	

Potential receptors of impact		Activities & potential Impacts Construction Phase	Operation phase	Decommissioning Phase
		- Pollution from spills or leaks of fuel, oil and building materials	- Contamination from agricultural chemicals, spills or leaks of fuel and oil	
LAND	Landscape	**Excavation and earthworks** - Creation of a new landform - Change in character of landscape **Creation of housing** - Change in character of landscape	**Presence of AD unit** - Change in character of landscape **Presence of manure and digestate** - Change in character of landscape	
	Soils	**Use of vehicles and machinery** - Compaction **Earthworks** - Further erosion of exposed soil	**Spreading of manure/digestate** - Changes in soil nutrient levels and heavy metals **Use of vehicles and machinery** - Soil compaction - Soil erosion	
AIR	Local Air quality	**Use of vehicles and machinery** - Dust generation	**AD unit** - Ammonia emissions **Use of vehicles and machinery** - Exhaust emissions	
	Regional / global air quality	**Change in vegetation** - Changes in uptake of CO_2	**AD unit** - ammonia emissions - increase in domestic production leading to reduction in greenhouse gas emissions through transportation of overseas produce	
FLORA AND FAUNA	Aquatic ecology	**Drainage works and use of vehicles** - negative impact on flora and fauna from increased sediment loading of streams **Materials management**	**Surface runoff** - pollution of watercourses by contaminated runoff - sedimentation of watercourses **Site drainage**	**Post-closure land-use** - changes in habitat type - opportunity for increase in uncultivated areas

Potential receptors of impact		Activities & potential Impacts Construction Phase	Operation phase	Decommissioning Phase
		- harm to aquatic flora and fauna from oil, fuel or other substances entering watercourses	- indirect effect on aquatic flora and fauna from ongoing changes to stream hydrology and morphology **Materials management** - direct and indirect effects from agro-chemicals, oil, fuel or other substances entering the aquatic environment	
	Terrestrial ecology	**Earthworks and excavations** - habitat removal, fragmentation or severance - disturbance to, or loss of species	**AD unit** - deposition of ammonia onto vegetation **Physical presence of building and ancillary structures** - alteration or loss of terrestrial habitats - creation of new habitats	**Post-closure land-use** - changes in habitat type opportunity for increase in uncultivated areas
HUMAN ENVIRONMENT	Socio-economic		**Farming operation** - continued flux of people away from or towards the farm	**Closure of farm** - movement of people away from the farm
	Health & Safety	**Negative publicity** - adverse reaction to perceived health issues	**Waste disposal operations** - risk of nuisance or harm from manure storage (e.g. consumption of contaminated groundwater)	
	Amenity		**Presence of building, ancillary structures and field boundaries** - possible alteration of rights of way or reduction in access **Vehicle movements** - increase in number and frequency of vehicles	

Potential receptors of impact	Activities & potential Impacts		
	Construction Phase	Operation phase	Decommissioning Phase
		- noise and vibration from vehicle movements **Storage of feed** - increase in flies and vermin	

2.4 Consultations

The main points of the Scope of the Environmental Impact Assessment are set out below:

- **Introduction and Project Description** – The ES should include a description of the site and its surroundings and details of its planning history. It should also include descriptions of the extent and duration of the construction works and longer term day to day activities.
- **Planning Policy and Legislative Framework** – The ES should contain a section that considers the planning and legislative framework against which the proposals would be considered and assess whether the proposals accord with such policies and legislation.
- **Air Quality and Climate** – The impact of airborne emissions likely to affect designated nature conservation sites should be considered.
- **Noise and Vibration** – The assessment should cover the issues identified in the scoping exercise and include predicted noise levels from site operations and background noise monitoring at the nearest sensitive receptors including operation, construction plant and traffic noise and set out any proposed mitigation.
- **Highways and Traffic** – The ES assesses the effects on the local road network of the development and includes details of existing and proposed movements, their timing and routing.
- **Ecology and Conservation** – The ES should consider direct and indirect impacts on both statutory and non-statutory sites of biodiversity importance, determine the presence of protected species (bats and great crested newts) and include mitigation as necessary.
- **Flood Risk, Surface and Groundwater Protection (Hydrology)** – The ES will need to include a section dedicated to flood risk and include a sequential test and Flood Risk Assessment (FRA). The FRA must address drainage issues to ensure that there is no increase in runoff and should take a + 20% increase in precipitation to account for climate change.
- **Landscape and Visual Assessment** – The ES should consider the site and its surroundings and should assess the proposals in the context of the local landscape character. A Zone of Visual Influence (ZVI) exercise should show the views affected by the development. Plans of current site conditions and impacts on the quality of views as well as mitigation should be provided.
- **Historic Environment / Archaeology** – The ES should focus on indirect impacts on the settings of nearby listed buildings and include any mitigation proposals.
- **Soils**– The ES should include an assessment on the potential impacts on soils
- **Amenity, Material Assets, and Socio-Economics** - The ES should cover issues relating to odour flies and other potential nuisance issues caused by anaerobic digestion plants.
- The ES must be accompanied by a Non-Technical Summary.

2.5 Items not to be assessed

Issues scoped out from the assessment were as follows:

- Public Safety during the Construction, Operational and Decommissioning as the site will be secure

- Utilities / Services during the construction and decommissioning phase
- Landscape features during the construction, operational and decommissioning stage
- Night-time lighting during the construction and decommissioning stages
- Archaeological during the construction, operational and decommissioning phases
- Architectural interest during construction phase
- Blight during decommissioning
- Fugitive emissions during decommissioning
- Water use during decommissioning
- Archaeology during decommissioning

2.6 Cumulative Impacts

2.6.1 Rationale

A Cumulative Impact Assessment (CIA) looks at whether the impacts of multiple projects or activities create a cumulative impact greater than or different to that of each individual project. The CIA needs to be kept reasonable and in proportion to the nature and scale of the development. The CIA should consider potential for significant impacts rather than on covering every conceivable impact that might occur. CIA should be proportionate, focussing on key impacts and sensitive receptors to ensure a holistic assessment of the environmental risks and impacts.

There are no other AD units close to the development site.

2.6.2 Cumulative Impact Assessments:

When looking at the impacts arising from AD units, it is generally accepted that a 400-metre zone around the development is the threshold for nuisance complaints relating to airbourne emissions (with the exception of ammonia). This distance is set out in IPPC (Integrated Pollution Prevention & Control) for both noise management and odour management. There are no other AD units within 400 metres of the site with the potential to result in cumulative effects.

Where appropriate cumulative assessment is considered in the relevant chapters of this Statement.

With regard to ammonia, this has been covered in Chapter 6.

CHAPTER 3 – ALTERNATIVES

3. Alternatives

Schedule 4 of the EIA Regulations requires that an outline of the main alternatives to the proposed development, considered by the applicant, should be set out in the ES.

The planning applications seeks permission for the construction of an AD plant. The experience gained in developing waste management and biogas projects across the UK has meant that the applicant has appropriate knowledge when considering the best location for an installation of this type. As the applicant does not own any land in the UK, it has been necessary to approach private landowners of suitable sites.

It is also necessary only to deal with alternatives in "*outline*" such that detailed environmental assessment of all alternatives, or combinations of alternatives, is not required. In addition, factors other than the environment may be taken into account such as: costs; engineering constraints; safety issues; practicability; operational requirements etc.

In order to fully assess which of the available sites would be most suitable for the installation, an options appraisal was undertaken. There are a number of critical questions which were considered when examining appropriate sites for the development for a anaerobic digestion facility:

- The feedstock which is going to be processed and whether it can be sourced in appropriate quantities
- Whether the site is suitably located to avoid environmental impacts on sensitive local receptors;
- Whether the local highway network is suitable to manage the proposed number of traffic movements; and
- Whether there is a suitable point nearby to connect to the gas grid which could accept the proposed biomethane flows.

The options available to the applicant are as follows:

- Do nothing;
- Develop the proposed site; and
- Develop another site

Do Nothing

The 'do nothing' would be of no benefit to the applicant as their interests are only as the developer and operator of the proposed development. They are not the landowners nor are they the suppliers of the feedstock and as such there is no benefit for them in not progressing the project. With regards to the landowner, it is reasonable to assume that the proposed development area would continue to be farmed in a similar fashion as is currently the case. As for the suppliers of feedstock, it is also reasonable to assume that manures and silage continue to be used in the same way it is currently, without any of the climate change and sustainability benefits mentioned above. As such, in terms of the options available, the do-nothing approach could see an increase in environmental impacts associated with the development compared to other options.

The subject site was considered the only suitable location. This was due to the proximity of sensitive receptors close to other sites and distance to the main gas line and as such no alternatives have been considered for the development.

CHAPTER 4 – DEVELOPMENT DESCRIPTION

4. Development Description

4.1 Purpose of the Proposed Development

The proposal is to construct and operate an AD unit on land at Lower Leighton Farm. The proposed development would be part of a growing number of AD plants operational nationwide, producing low-carbon energy from crops and farm wastes.

When fully operational, the proposed development will utilise approximately 143,000 tonnes of feedstock to generate biomethane for injection into the National Gas Grid. The AD plant will enable the end substrate to be applied to land, reducing the use of artificial fertilisers and will be much less odours and potentially polluting than untreated manure and slurry.

4.2 Development Site

The site of the proposed development is located to the West of Lower Leighton Farm and measures approximately 5.9 hectares. The site is gently sloping to the south west and is bounded on its north, south, east and west by existing mature hedgerows.

Access to the site is from the county highway.

Due to the existing buildings and mature hedgerows surrounding the proposed development, long and short distance views towards the digester plant will not be adversely affected. The application site and surroundings are shown on the submitted plans.

Lower Leighton comprises of a number of modern portal framed buildings which have seen the farmyard complex extend in all directions. As such, the site has the character and appearance of a modern and substantive farm holding.

4.3 Development Setting

The landscape surrounding the site comprises predominately flat farmland with medium to large scale fields bounded by hedgerows with scattered blocks of woodland.

The site currently has the existing slurry towers for the dairy farm at Lower Leighton, which will be used as the digestate lagoons for the proposed development.

The site falls within the administrative boundary of Powys County Council and is approximately 1.3 miles from Welshpool.

Figure 1 Aerial photograph of development site and surrounding area

Directly adjacent to the development site is a dairy farm. It is proposed that manure and slurry from this farm would be used as feedstock for the proposed development.

4.4 Description of the Proposed Development

Anaerobic digestion is the conversion of biodegradable material to produce methane. It is already widely established in many countries in Europe to treat biodegradable organic wastes and the UK has already seen the construction of a significant number of AD plants for treating sewage sludge, agricultural slurry and other organic materials.

A 1.6MW combined heat and power (CHP) unit will also be installed to generate electricity and recover waste heat for on-site use.

The feedstock for the proposed AD unit will consist of the following:

Feedstock types	Tonnage	Transport route
Dairy Slurry	87,000	Pumped/ Public roads
Cattle manure	21,000	Public roads
Rye Silage	25,000	Public roads

The on-site feedstock amounts to 67,000 tonnes with 66,000 tonnes coming from off-site.

The dairy slurry is pumped to the existing slurry towers on site from Lower Leighton Farm to the East of the site.

The cattle manure will be removed from Lower Leighton Farm to the East of the site.

The rye silage will come from local farms.

There will be two outputs from the AD plant site as follows:

- Biomethane – the project will produce approximately 800m³/day of biomethane for injection into the Wales and West Utilities grid. The AD plant will generate 100% biogas which will be upgraded by removing 46% CO_2 and 54% biomethane.
- Digestate – this will be held in two adjacent lagoons and applied locally as a replacement for synthetic fertiliser.

4.5 Sustainability, Renewable Energy and Climate Change Assessment

Over the last 5 years, energy security and more latterly food security have moved up the UK Government's agenda becoming areas of significant concern. The UK is reliant on imports of both, with only 62% of energy and 60% of food being produced domestically, with the interruption of both of these, as demonstrated by the current war in Ukraine, having a direct impact on living standards and industry.

Farmbiomethane Ltd has identified that renewable low-carbon energy can be harvested from resources which are abundant in the UK in the form of biomethane. Furthermore, domestic food production can be protected through the domestic manufacture of fertilisers, which would displace the production of synthetic fertilisers which are responsible for a significant proportion of global carbon emissions.

4.5.1 Renewable Energy

Biomethane Grid Injection

The 5,800,000 N-m³ of biomethane per annum produced by the proposed development has the potential to have a substantial benefit in terms of renewable energy production with the associated reduction in fossil fuel use. For example, currently 74% of UK housing stock uses mains gas as its source for central heating with the residential sector responsible for 20% of UK greenhouse carbon emissions

in 2021. Although there is a slow shift away from gas as a heat source to more renewable sources, the rate of transition is slow. As such, biomethane has a valuable role to play in displacing the use of natural gas in our national gas grid, reducing carbon emissions and helping to UK meet its obligations under the Paris Agreement 2016 to limit global warming to 1.5°C by the end of this century.

Based on the average annual gas use, by dwelling in the UK, the biomethane annually produced by the proposed development has the potential to heat nearly 4,965 homes. This demonstrates that the proposed development has a significant potential to reduce carbon emissions associated with natural gas usage.

4.5.2 Use of Nutrients

Manures

The proposed development would provide a safe and scalable pathway to manage manure from livestock farms as they are generated. Manures would be brought to the site on a regular basis, being part of an enclosed/controlled environment as soon as they enter the reception hall. Managing manure in this way will avoid the use of temporary field heaps which release ammonia and odour to the atmosphere, and if poorly sited, allow run-off of slurry to surface and groundwaters.

Water

Once operational, the proposed development will not require any additional water to operate other than potable water for staff use. Water required for operation would be sourced from the recirculated liquid from the digestion process, water harvested from the drying process and water harvested from rainfall falling on the site.

4.6 Description of Buildings and Plant

The key elements of the proposed development are as follows:

- Silage clamps
- 1 manure reception pit
- Building for solid feedstock with air treatment and biofilter
- 1 weighbridge
- 2 solid feeding systems (one with crusher)
- 2 digesters
- 1 post-digester
- Membrane upgrading unit
- 1 CHP
- Biogas boiler
- Gas flare
- Pasteurisation unit
- 4 phase separation
- 1 building for solid fraction storage
- 3 lagoons
- Bunded area
- Grid entry unit
- 1 office building

4.7 Proposed Site Layout

The proposed site layout is shown on drawing 79211 / RR / 002. The site has been arranged with the office and reception building adjacent to the main site access road in order that all delivery vehicles and visitors have to report to the reception before they are allowed on site. The main car park has also been located adjacent to the site office to ensure that private vehicles do not use the internal access roads.

The feedstock buildings are located to the south of the site and north of the site office to enable manure, slurry and silage delivery vehicles not having to move across the site to unload. Immediately

north of the feedstock buildings is the AD plant within a bunded area. The AD plant is set out so that the feedstock runs through the site in a sequential manner, minimising the necessary pipework, ending at the post digesters to the north of the site.

The CHP building is located adjacent to the boiler and heat recovery containers.

To the north west of the site is the gas upgrade area from where biomethane is then pumped to the compression equipment and on to the Wales & West Utilities Network.

Figure 2 Proposed Site Layout

Site Access

The site has two existing accesses onto the B4388 to the east of the site. These accesses are to be improved to allow HGVs to enter and exit the site without the need to wait on the highway.

An additional access is proposed to the north west of the proposed site.

The site has a 6.5m wide access road which allows HGVs to drive around the site.

4.8 Dimensions of Various Site Elements

The dimensions and materials of the various plant elements can be found on the supporting plans submitted with the application.

4.9 Reception Building and Digestate Storage

This is where solid manures is deposited after being transported to the site. To the south of the building is a weighbridge, to weigh laden HGVs entering the site and the same empty vehicles when leaving, to monitor and thus control volumes of incoming feedstock. The vehicle entranceways into the building would have high-speed roller shutter doors to limit the emission of odours.

Internally, the reception building has been designed to allow HGVs to deposit the material and leave in a forward gear. The building has been made tall enough to allow tipping trailers to tip inside the building to ensure site operation is as flexible as possible. Feedstock material would be collected from the reception building using a front-end loader which would be used to transport feedstock to one of the digester tanks.

4.10 Silage Clamps

Silage will be brought into the site and weighed on the weighbridge at the entrance, with HGVs entering from the southern entrance. It will be unloaded by being tipped directly into the silage clamps. The feedstock material will then be collected and transported to one of the digester tanks.

4.11 AD Plant

The proposed AD plant can be subdivided into separate processes as follows:

- Pre-digestion processing
- Anaerobic digestion
- Digestate separation

4.11.1 AD Plant Description

The majority of the tanks will be massed poured steel reinforced concrete structures. They will be fabricated in sections off site, with final construction taking place on site. All of the tanks on site would be coloured to match the surrounding buildings. The tanks would be topped with gas PVC accumulators.

Adjacent to the tanks would be small technical buildings which would be used to house the numerous pumps and plant, which would be clad in the same colour as the tanks.

4.11.2 Bunded Area

The plant has been designed with adequate spacing between all elements to allow vehicular maintenance access to all equipment.

The whole of the AD plant site would be surrounded by a 1.9m high bund wall to provide secondary containment for the AD tank area.

4.12 Digestate Separation

The substrate, known more commonly as digestate, left after the biogas production process is a nutrient rich slurry. The digestate will be separated into solid and liquid fractions. The solid fraction can be applied to land. An estimated 24,465 tonnes of solid digestate will be produced annually. This volume is expected to generate approximately 979 additional road movements per year.

The liquid fraction will be stored and applied to land between March and September, subject to land conditions, moisture levels and chemical loading parameters. The plant will produce approximately 96,004 tonnes of liquid digestate annually. Storage will be provided both on and off-site, with a total of 10 months storage available. Of the total volume, 67,000 tonnes will offset existing road movements currently used to remove slurry and manure from Lower Leighton. The remaining 29,004 tonnes will result in an estimated 1,160 additional road movements per year.

The landowner at Lower Leighton Farm has confirmed 917 hectares of land is available for applying digestate, allowing for the spreading of approximately 27,549 tonnes. The remaining digestate will be managed by local agricultural contractors on land within the vicinity of the site.

4.13 Gas Upgrade Area

The gas upgrade area is located directly to the west of the bunded AD plant area.

Located to the north of the gas upgrade area is a flare which would only be used in an emergency situation to burn off gas from the plant if it could not be transferred to the gas grid or burnt in the on-site CHP engines.

4.14 Office Building

The office building has been constructed using similar materials to the other buildings on site. The office building would comprise the following elements:

- Site reception
- Offices and meeting rooms
- Toilets, shower/changing rooms and locker rooms
- Canteen, kitchen area and lounge area
- Laboratory

4.15 Miscellaneous Site Elements

In order to provide appropriate access to all areas of the site, new roadways, pathways, turning areas and HGV parking areas would be provided at various locations around the operational site.

4.16 Working Hours

The proposed development would operate 24 hours a day, 365 days a year. HGV feedstock delivery will operate 08:00 to 18:00 hours Monday to Saturday throughout the year.

Many of the site staff will work more typical 'office hours' between Monday to Friday between 08:00 and 18:00. There will be one member of staff on site at weekends for 4 hours (split into 2 shifts).

HGV drivers will work hours in accordance with the relevant legislation.

4.17 Construction

Phase 1 – Site Establishment, Security and Initial Excavations
During this phase contractors will move onto the site and erect a perimeter fence to ensure the site remains secure during the entire construction phase. The perimeter around the main site will follow that shown as the development red line on the location plan.

Site welfare and management buildings will be installed and connected to power, water and communications.

Site excavations to strip topsoil and subsoils for concrete pad foundations will take place. Crushed stone and suitable membranes will be laid to meet site requirements, roadways, entrance splays and building layouts.

Phase 2 – Excavations for Foundations and Site Services
Excavations for the foundations of structural steel, walls, tank bases and all major site components will be completed and concrete poured.

Phase 3 – Erection of Tanks and Structural Buildings
All buildings will be constructed using structural steel manufactured offsite. Some buildings will have reinforced concrete walls brought to site as pre-cast panels. All buildings will be cladded and sealed.

Scaffolding will be erected to facilitate the construction and mass pour of the reinforced concrete tanks.

Phase 4 – Installation of Components and M&E
Major components will arrive to the site in a planned manner. Some of these will arrive as single piece and some as multiple components. The mechanical and electrical installation will see the fit out of all interconnecting pipework, power sources and the communications networks around the site linking key processes together.

Phase 5 – Commissioning & Soft Installations
First all tank and process pipework needs testing for leaks using cold water. The same tests need to be completed using hot water. When completed and accepted, substrates can begin arriving to the site and the biological processes begin. Soft installations like camera systems, furniture, landscaping and site signage will be completed during this phase.

Mitigation of Construction Activities
All construction will take place in accordance with a Construction Environment Management Plan which will be agreed prior to the commencement of construction works at the site. This will be followed at all times, being updated as necessary through the construction period. Adherence to the CEMP will ensure that any offsite impacts during the construction period are mitigate as far as possible.

4.18 Decommissioning

Decommissioning of the Proposed Development in accordance with appropriate techniques, mitigation and disposal, will not result in any environmentally harmful effects or other hazards to nearby sensitive receptors.

Raw material residues and fermentation substrate are collected during final cleaning and, depending on the given quality, used in agriculture or properly disposed of (e.g. in an operating biogas plant). Equipment at the plant which is not contaminated by harmful substances would be recycled (metal scrap), whilst the constructional elements (concrete pads, containers, footings, etc.) can be broken up and re-cycled. Other materials which cannot be reused or recycled can be disposed of as building or commercial waste that is not subject to monitoring.

The pipeline would be decommissioned and sealed. All surface gas grid equipment would be removed.

Landscape and ecological mitigation would be retained, with the soils at the main AD plant site appropriately restored in accordance with Defra's Construction Code of Practice for the Sustainable Use of Soils on Construction Sites.

It has been assumed that all decommission operations would be conducted in accordance with appropriate guidance and best practice (as outlined in the Construction Environment Management Plan (CEMP)) which would ensure that impacts arising from these works on sensitive receptors would be appropriately mitigated. As such, the effects associated with the future decommission of the plant are assessed as no more than negligible, which is not significant.

4.19 Waste

The operation of the proposed development would give rise to a number of different waste streams:

- Feedstock - Operators of the vehicles will be trained to monitor feedstock for contamination as it is being loaded onto their vehicles which would mean feedstock is controlled at source rather than at the operating site. As a further step, all process operatives within the reception building will be trained to visually inspect all incoming loads and where there is contamination, the materials would be removed to a receptacle within the reception hall, for transport offsite at an appropriate treatment facility;

- stone, sand and grit (inert) material collected from the various removal steps across the site will be transferred from small site receptacle into a skip for inert wastes for removal offsite to a suitable inert waste processing facility;
- a metal skip will be kept onsite for the removal of damaged, worn and end of life metal components;
- a receptacle for the collection of used oil and lubricants will be positioned in the maintenance/parts building, within a bunded area. Allowing for safe storage and collection; and
- organic, recycling and general waste bins will be dotted around the site and within the office block for the ease of managing and storing staff wastes for collection and offsite disposal/recycling.

In addition, during the construction phase the principal contractor will be tasked with providing multiple reception skips for the segregation of multiple waste and recycling streams.

4.20 Benefits of the Proposed Anaerobic Digestion Scheme

The benefits that would arise from the operation of the proposed anaerobic digestion plant would be renewable energy generation to meet National and Local targets and climate change goals, with slurry from the dairy unit feeding the AD plant with gas exported back to the grid and electric used to run the AD plant.

4.20.1 Carbon Saving

In addition to the waste management and renewable energy benefits of anaerobic digestion, the AD plant will also have climate change benefits in that it will reduce the amount of carbon from the feedstock by virtue of the following:

- Reduction in the use of nitrogen fertiliser which will be replaced with the end-substrate
- Diversion of untreated slurry and manure from landspreading and therefore the generated methane and;
- Renewable energy produced by the plant will reduce the requirement for fossil fuels to produce energy.

4.20.2 Summary of Benefits

- It will materially contribute to an identified need for renewable energy generation to meet UK renewable energy targets
- The site is an existing agricultural location, relatively remote from residential properties
- The AD plant will generate biogas which is a renewable source of green energy and an end product which can be used as a soil improver/fertiliser
- Improvements in air quality through the control and reduction of ammonia from using untreated slurries and manure as fertiliser
- Water quality benefits from the improved management of nitrogen and other nutrients present in untreated slurries and manures
- Reduction in the need for use of nitrogen fertiliser on farmland
- Reduction in methane levels compared to spreading the untreated slurry and manure directly onto land.

4.21 Vulnerability to Major Accidents and Disasters

It is a requirement of EIA that the potential risks to the project are examined with appropriate mitigation measures in place.

Risk	Issue	Mitigation	Potential Impacts
Fire and explosions	The proposed development is associated with the	The proposed development has been located distant from the nearest highway, residential or	Worker and emergency services safety.

	generation of highly flammable gas and feedstock.	commercial property. A Fire Risk Assessment is to be carried out at the site, with the recommended fire suppression equipment installed/guidance actioned prior to operation.	Short term air pollution.
Burst tanks	The proposed development includes the storage of very large volumes of digestate and feedstock liquids which could be damaging to the water environment.	All of the tanks would be suitable construction to appropriate CIRIA and British Standards. The AD area is surrounded by a bunded wall to 1.9m.	Pollution of surface and groundwaters. Impacts on ecological receptors.
Flooding	There are surface water flows across the site.	The proposed development has been designed with appropriate surface water flood mitigation which accounts for a 100-year rainfall event plus climate change. Surface water flows are unlikely to cause an impact.	Limited impact on the operation of the facility.

Other disasters such as earthquakes, hurricanes, tsunamis etc have not been considered in this ES given that they are extremely unlikely in this location.

CHAPTER 5 – POLICY & LEGISLATION

5. Planning Policy and other Legislation

5.1 Planning Legislation

The Town and Country Planning Act 1990 (as amended) is the principal Act regulating the development of land in England and Wales. As already mentioned, the Statutory requirements for carrying out the EIA process and production of an ES are prescribed within the EIA Regulations 2017.

The Planning and Compulsory Purchase Act 2004 Section 38 (6) states that all planning applications must be determined in accordance with the adopted Local Development Plan (LDP) for the area, unless material considerations indicate otherwise.

5.2 National Planning Policy

5.2.1 Planning Policy Wales (Edition 12, February 2024) – Chapter 5 – Productive and Enterprising Places

5.4.1 For planning purposes the Welsh Government defines economic development as development of land and buildings for activities that generate sustainable long term prosperity, jobs and incomes. The planning system should ensure that the growth of output and employment in Wales as a whole is not constrained by a shortage of land for economic uses.

5.4.2 Economic land uses include the traditional employment land uses (offices, research and development, industry and warehousing), as well as uses such as retail, tourism, and public services. The construction, energy, minerals, waste and telecommunications sectors are also essential to the economy and are sensitive to planning policy. This section focuses primarily on traditional employment land uses (B1, B2 and B8) while policies on other economic sectors are found elsewhere in PPW.

5.6.8 Planning authorities should adopt a constructive approach towards agricultural development proposals, especially those which are designed to meet the needs of changing farming practices or are necessary to achieve compliance with new environmental, hygiene or welfare legislation. They should also adopt a positive approach to the conversion of rural buildings for business re-use.

5.6.13 Diversification activities come in many forms and include both agricultural and non-oagricultural activities. Activities could include, for example, livestock and crop processing, non traditional livestock and crop farming, tourism projects, farm shops, and making and selling non agricultural products. Diversification can also include renewable energy proposals such as anaerobic digestion facilities or solar and wind installations, which will help to increase the viability of rural enterprises by reducing their operating costs. These schemes should be supported where there is no detrimental impact on the environment and local amenity.

5.9.15 Outside identified areas, planning applications for renewable and low carbon energy developments should be determined based on the merits of the individual proposal. The local need for a particular scheme is not a material consideration, as energy generation is of national significance and there is a recognised need to optimise renewable and low carbon energy generation. Planning authorities should seek to ensure their area's renewable and low carbon energy potential is achieved and have policies with the criteria against which planning applications outside of identified areas will be determined.

5.9.20 Planning authorities should also identify and require suitable ways to avoid, mitigate or compensate adverse impacts of renewable and low carbon energy development. The construction, operation, decommissioning, remediation and aftercare of proposals should take into account:

- The need to minimise impacts on local communities, such as from noise and air pollution, to safeguard quality of life for existing and future generations;
- The impact on the natural and historic environment;
- Cumulative impact;
- The capacity of, and effects on the transportation network;

- Grid connection issues where renewable (electricity) energy development are proposed; and
- The impacts of climate change on the location, design, build and operation of renewable and low carbon energy development. In doing so, consider whether measures to adapt to climate change impacts give rise to additional impacts.

5.3 Local Planning Policy

Policy DM2 – The Natural Environment
Development proposals shall demonstrate how they protect, positively manage and enhance biodiversity and geodiversity interests including improving the resilience of biodiversity through the enhanced connectivity of habitats within, and beyond the site.

Development proposals which would impact on the following natural environment assets will only be permitted where they do not unacceptably adversely affect:
1. The important site designations, habitats and species afforded the highest levels of protection through European legislation including:
A. European Sites (SAC, SPA and Ramsar).
i. Development proposals likely to have a significant effect on a European site, when considered alone or in combination with other proposals or plans, will only be permitted where it can be demonstrated that:
a) The proposal is directly connected with or necessary for the protection, enhancement and positive management of the site for conservation purposes; or
b) The proposal will not adversely affect the integrity of the site.

ii. Where it cannot be demonstrated that development proposals would not adversely affect the integrity of the site and there is no satisfactory alternative solution, permission will be refused unless:
a) There are imperative reasons of over-riding public interest; and
b) Appropriate compensatory measures are secured.

B. European Protected Species afforded strict protection by the Conservation of Habitats and Species Regulations 2017 (Habitats Directive Annex IV Species).

Development proposals likely to have an adverse effect on a European Protected Species will only be permitted where it can be demonstrated that:

i. The proposal is for the purposes of preserving public health or public safety or there are imperative reasons of over-riding public interest; and
ii. There is no satisfactory alternative; and
iii. The action authorised will not be detrimental to the maintenance of the habitat or population of the species concerned at a favourable conservation status in their natural range.

1. The important site designations, habitats and species afforded levels of protection in line with national policy and legislation including:
   A. National Nature Reserves and Sites of Special Scientific Interest;
   B. Protected Species including those listed in Wildlife and Countryside Act 1981 (as amended) and the Protection of Badgers Act 1992;
   C. Habitats and Species of principal importance for the purpose of maintaining and enhancing biodiversity conservation in Wales as listed in Section 7 of the Environment (Wales) Act 2016; and
   D. National Biodiversity Action Plan Habitats and Species.

   Development proposals likely to have an adverse effect on the conservation value of nationally protected sites, habitats or species, either directly, indirectly or in combination, will only be permitted where it can be demonstrated that:

   i. The proposal contributes to the protection, enhancement or positive management of the site, habitat or species; or
   ii. There is no suitable alternative to the proposed development; and
   a) It can be demonstrated that the benefits from the development clearly outweigh the special interest of the site, habitat or species; and

b) Appropriate compensatory measures are secured; and
c) The population or range and distribution of the habitat or species will not be adversely impacted.

3. The locally important site designations, habitats and species including:
A. Local Nature Reserves;
B. Local Biodiversity Action Plan Habitats and Species; and
C. Regionally Important Geodiversity Sites and Geological Conservation Review Sites.

Development proposals likely to have an adverse impact upon these sites, habitats or species will only be permitted where it can be demonstrated that:

i. They conserve and where possible enhance the natural heritage importance of the site, habitat or species; or
ii. The development could not reasonably be located elsewhere; and
a) The benefits of the development outweigh the natural heritage importance of the site, habitat or species; and
b) Mitigation and/or compensation measures are provided where adverse effects are unavoidable.

4. The achievement of the Water Framework Directive's overarching objectives.

5. Trees, woodlands and hedgerows of significant public amenity, natural or cultural heritage.

Policy DM4 - Landscape
Proposals for new development outside the Towns, Large Villages, Small Villages and Rural Settlements defined in the Settlement Hierarchy must not, individually or cumulatively, have an unacceptable adverse effect, on the valued characteristics and qualities of the Powys landscape. All proposals will need to:

1. Be appropriate and sensitive in terms of integration, siting, scale and design to the characteristics and qualities of the landscape including its: topography; development pattern and features; historical and ecological qualities; open views; and tranquillity; and
2. Have regard to LANDMAP, Registered Historic Landscapes, adjacent protected landscapes (National Parks and Areas of Outstanding Natural Beauty) and the visual amenity enjoyed by users of both Powys landscapes and adjoining areas.

Proposals which are likely to have a significant impact on the landscape and/or visual amenity will require a Landscape and Visual Impact Assessment to be undertaken.

Policy DM6 – Flood Prevention and Land Drainage
Development proposals must avoid unnecessary flood risk by assessing the implications of development within areas susceptible to all types of flooding; any development that unacceptably increases risk will be refused.

Proposals near a watercourse or within an area of floodplain must comply with the following:
1. In areas identified at risk of flooding (fluvial, tidal, surface water and groundwater) or where a watercourse has insufficient channel capacity, opportunities to improve existing flood risk by using Sustainable Drainage Systems (SuDS), wetlands or other agreed and appropriate measures are investigated and implemented wherever possible.
2. Where possible, opportunities are taken on previously developed land to make space for water by reinstating the functional floodplain.
3. Opportunities to make space for water by undertaking restoration and enhancement as part of the development, are identified and implemented.
4. Actions are taken to de-culvert wherever possible. Where this is not possible, an assessment of the structural integrity of the culvert, with any required remedial work, should be carried out prior to the development. A maintenance schedule should be developed for all culverts to ensure regular clearance, and

5. Any developments located adjacent to a watercourse should leave an appropriate undeveloped buffer strip, maintaining the watercourse and the immediate riparian zone as an enhancement feature and allowing for

routine maintenance. The width of any buffer strip should be agreed with the relevant authorities on a site by site basis. Such sites should have a maintenance strategy for clearing and maintaining the channel, with particular regard to structures such as trash screens and bridges.

Satisfactory provision shall be made for land drainage in all developments and this should include consideration of the use of Sustainable Drainage Systems (SuDS).

Policy DM13 – Design and Resources
Development proposals must be able to demonstrate a good quality design and shall have regard to the qualities and amenity of the surrounding area, local infrastructure and resources.

Proposals will only be permitted where all of the following criteria, where relevant, are satisfied:
1. Development has been designed to complement and/or enhance the character of the surrounding area in terms of siting, appearance, integration, scale, height, massing, and design detailing.
2. The development contributes towards the preservation of local distinctiveness and sense of place.
3. Any development within or affecting the setting and/or significant views into and out of a Conservation Area has been designed in accordance with any relevant adopted Conservation Area Character Appraisals and Conservation Area Management Plans, or any other relevant detailed assessment or guidance adopted by the Council.
4. The development does not have an unacceptable adverse impact on existing and established tourism assets and attractions.
5. The layout of development creates attractive, safe places, supporting community safety and crime prevention.
6. It contains an appropriate mix of development that responds to local need, includes a flexibility in design to allow changes in use of subsequent buildings and spaces as requirements and circumstances change.
7. It is inclusive to all, making full provision for people with disabilities.
8. It incorporates adequate amenity land, together with appropriate landscaping and planting.
9. The public rights of way network or other recreation assets listed in Policy SP7 (3) are enhanced and integrated within the layout of the development proposal; or appropriate mitigation measures are put in place where necessary.
10. The development has been designed and located to minimise the impacts on the transport network - journey times, resilience and efficient operation - whilst ensuring that highway safety for all transport users is not detrimentally impacted upon. Development proposals should meet all highway access requirements, (for all transport users), vehicular parking standards and demonstrate that the strategic and local highway network can absorb the traffic impacts of the development without adversely affecting the safe and efficient flow of traffic on the network or that traffic impacts can be managed to acceptable levels to reduce and mitigate any adverse impacts from the development.
11. The amenities enjoyed by the occupants or users of nearby or proposed properties shall not be unacceptably affected by levels of noise, dust, air pollution, litter, odour, hours of operation, overlooking or any other planning matter.
12. Adequate utility services exist or will be provided readily and timely without unacceptable adverse effect on the surrounding environment and communities.
13. It demonstrates a sustainable and efficient use of resources by including measures to achieve:
i. Energy conservation and efficiency.
ii. The supply of electricity and heat from renewable sources.
iii. Water conservation and efficiency.
iv. Waste reduction.
v. The protection, where possible, of soils, especially important carbon sinks such as thick peat deposits.

14. Investigations have been undertaken into the technical feasibility and financial viability of community and/or district heating networks wherever the development proposal's Heat Demand Density exceeds 3MW/km2.

Policy DM14 – Air Quality Management
Development proposals will only be permitted where any resultant air pollution does not cause or lead to an unacceptable risk of harm to human health or the natural environment. Proposals will need to demonstrate that measures can be taken to overcome any significant adverse risk, with particular attention being paid to:

1. National Air Quality Strategy objectives and any Air Quality Management Areas.
2. The critical levels for the protection of habitats and species within a European site or Site of Special Scientific Interest in accordance with Policy DM2.

5.4 Policy Framework Overview

Examination of the current policy and legislative framework demonstrates that there is an acceptance that agricultural diversification has a continuing role in the rural area. The proposals are consistent with policies and objectives.

CHAPTER 6 – AIR QUALITY, HEALTH & CLIMATE

6. Air Quality, Health and Climate

6.1 Introduction

This Environmental Statement (ES) chapter reports the potential effects on air quality from the construction and operation of the proposed anaerobic digestion at Lower Leighton, Welshpool.

Emissions of nitrogen oxides (NOx), particulate matter (PM10) and sulphur dioxide (SO_2) from the stack serving the CHPs have been assessed and quantified based upon data supplied to Earthcare Technical.

The emission rates so obtained have then been used as inputs to an atmospheric dispersion and deposition model which calculates ammonia exposure levels and nitrogen and acid deposition rates in the surrounding area.

6.2 Competent Experts

Anna Becvar
Anna is Managing Director of Earthcare Technical with oversite on all projects in England and Wales. She has extensive project management and project delivery experience. Anna is from a farming background and has been working mainly in the farming, renewable energy and waste industry sectors for over 30 years. Anna is a BASIS Approved Trainer for FACTS and Waste to land advanced modules and regularly conducts inhouse training for contracting organisations. Anna is a Chartered Soil Scientist with particular expertise in rapid risk assessment work on organic materials, technical assessment/report writing and knowledge transfer.

Christine McHugh
Christine has over 30 years' experience in air quality and emissions. She has particular expertise in modelling, forecasting and altering, and airport air quality, having provided air quality and carbon studies for several major UK airports. She currently specialises in studies of air quality and odour for agricultural and industrial applications, including anaerobic digestion.

She spent 20 years providing modelling expertise and developing models including the world-leading ADMS models and forecasting and altering systems including those for Beijing and London. She has provided planning and other technical support to the Greater London Authority and Transport for London. Christine provided expertise internationally, as the EU expert on air quality in the EU/China Liaoning Integrated Environment Programme and on collaborative international projects or the European Space Agency, EU 7th Framework and the European Commission.

She has provided training internationally to air quality professionals. She led the UK air quality team at Ove Arup & Partners Ltd and Amec Foster Wheeler's team (South). Christine is a Chartered Scientist, a former Chair of the Institute of Air Quality Management (IAQM) and a former member of the Council of the Institution of Environmental Sciences (IES).

6.3 Legislation and Planning Policy

6.3.1 Legislation

Environmental Permitting Regulations 2016

The proposed operation will be applying for a licence to operate under the Environmental Permitting (England and Wales) Regulations 2016 as regulated by Natural Resources Wales. In being issued with the operating permit, the site will demonstrate that Best Available Techniques will be used to minimise emissions to all media. A detailed assessment of controls on air pollutants and any residual air quality effects are required as part of this process; the assessment considers impacts of ammonia on ecological sites.

Habitats Directive

The Conservation of Habitats and Species Regulations 2017 transposes the Habitats Directive (92/43/EEC) into national law. The Regulations provide for the designation and protection of "European sites", and the protection of "European protected species". As part of the determination of the Environmental Permit, Natural resources Wales is required to carry out an appropriate assessment to establish whether the proposed development would adversely affect the integrity of any such European sites.

The Appropriate Assessment must be undertaken by the competent authority, as defined in Regulation 7(1) of the Habitat Regulations, which includes any Minister, Government Department, public or statutory undertaker, public body of any description or person holding a public office.

In situations where a plan or project requires the consent, permission or other authorisation of more than one competent authority then the Local Planning Authority are not required to assess any implications of a plan or project which would be more appropriately assessed by another competent authority as per Section 52 of the Habitat Regulations. In this instance, as emissions will be assessed during the processing of the environmental permit, Natural Resources Wales are the relevant competent authority for the purpose of the regulations. This is especially relevant as the Environmental Permit and Planning applications are being "twin-tracked."

Other Conservation Considerations

Section 28 of The Wildlife and Countryside Act 1981, as amended, provides protection to Sites of Special Scientific Interest (SSSIs) in England and Wales. This includes provisions which apply to owners and occupiers who wish to undertake notified operations likely to damage the special interest of the site, but more important in this context are the requirements that apply to public bodies such as local authorities and Natural Resources Wales. Section 28G places a duty on such bodies to take reasonable steps, consistent with the proper exercise of the authorities' functions, to further the conservation and enhancement of special interest features of SSSIs. The Act also requires that they consult statutory nature conservation bodies before permitting (Section 28I) any operation likely to damage a SSSI.

The environmental permitting regulator has a duty to have regard to the purpose of conserving biodiversity in the exercise of its functions. This duty is provided by Section 40 of the Natural Environment and Rural Communities Act (1 October 2006) which extends the pre-existing duty on Ministers of the Crown, government departments and the National Assembly for Wales to all public authorities (this replaces Section 74(1) of the Countryside and Rights of Way Act 2000).

6.3.2 National Planning Policy

Planning Policy Wales sets out the Government's core policies and principles in relation to planning and pollution control. It affirms that the planning and pollution control systems are separate but complementary. Accordingly, the planning system should focus on whether the development itself is an acceptable use of the land and the impacts of those uses, rather than seeking to control the processes or emissions themselves. It advises that considerations of the quality of land, air or water and potential impacts arising from the development, possibly leading to an impact on health, are capable of being a material consideration. The policies in this statement and the advice in the accompanying Annex 1: Pollution Control, Air and water Quality should be taken into account when making decisions on individual planning applications.

6.3.3 Local Planning Policy

There are no specific local policies that refer to Air Quality,

6.4 Air Quality Assessment

This Air Quality Screening Assessment (AQSA) has been prepared by Earthcare Technical Ltd (ETL) on behalf of Farm Biomethane Ltd, in support of a planning application for the development of an agricultural Anaerobic Digestion (AD) Facility on land at Lower Leighton Farm, Leighton, Welshpool,

Powys, SY21 8HH, on land centred at National Grid Reference (NGR) SJ24130655 ("the AD Plant Site"). Development of the above infrastructure, is hereafter referred to collectively as 'the Proposed Development.' The planning application will be submitted to Powys County Council (PCC).

The AD Plant Site will treat 133,000 tonnes per annum (tpa) of energy crops (silage) and livestock manures and produce approximately 24,465 tpa of solid digestate and 96,004 tpa of liquid digestate.

The design of the AD Plant Site incorporates the latest approaches to covering and containing feedstocks and digestate, and treating odorous air, reducing odour and associated pollutants such as ammonia (NH_3), before air is released to atmosphere.

The assessment presents the results of initial screening of potential air quality impacts relating to the Proposed Development on human health and designated (conservation) sites, bioaerosol impacts on human health and road traffic impacts on human health. During operation of the AD Plant Site there will be emissions associated with combustion, in addition to emissions of ammonia associated with materials storage and from odour control systems.

The results of the screening will inform the need for any further, more detailed assessment which may be required to fully assess the impacts of the proposal.

6.4.1 Assessment scope

The SCAIL screening models,1 SCAIL-Combustion and SCAIL-Agriculture, have been used to assess air quality impacts at human and ecological receptors due to on-site emissions.

SCAIL-Combustion has been used to screen nitrogen dioxide (NO_2) annual mean and sulphur dioxide (SO_2) 15-minute impacts at human receptors and nutrient nitrogen deposition (NDep) and acid deposition (AcidDep) at ecological receptors.

SCAIL-Agriculture has been used to assess ammonia (NH_3), NDep and AcidDep impacts due to emission of NH_3 from non-combustion sources. The NDep and AcidDep impacts from combustion and non-combustion sources can be summed to determine the total impact.

Impacts are compared in the SCAIL models to Environmental Assessment Levels (EALs). EALs that are concentrations are also referred to as Critical Levels (CLevels); those that are deposition fluxes are also referred to as Critical Loads (Cloads).

The Environment Agency's (EA) (recently withdrawn) regulatory position statement on bioaerosol monitoring at regulated facilities2 has been used to screen the need for a bioaerosol risk assessment.

A screening of traffic numbers has been used to screen the need for detailed modelling of road transport.

6.4.2 Site description

Figure 1 shows the AD Plant Site location and Figure 2 the Site layout including infrastructure.

The AD Plant Site lies approximately 2.1km east of the centre of Welshpool, 1.4km north of Leighton and 2.2km southwest of Buttington, bounded by the B4381 to the north and the B4388 to the east. The Site is currently in arable use and land in the immediate vicinity is in agricultural use. There are nearby agricultural and industrial uses: Leighton Farm, Welshpool substation. The closest residential receptors are Lower Leighton, 77m to the east and Cattle Grid 100m to the northeast. Lower Leighton Village Hall and Leighton CP School lie 100-150m south of the Site. There is also a footpath which crosses through the Site.

The Proposed Development is on land that slopes from the southern boundary to the northern boundary with a fall of 20m; it lies at an elevation of between 72m and 91m. The Site lies to the west

of Afon Hafren/ River Severn, on the edge of the wide valley which runs south-southwest to north-northeast.

Within 10km of the AD Plant Site there are two Special Areas of Conservation (SACs): Montgomery Canal SAC and Granllyn SAC; there are no Special Protection Areas (SPAs). Within 2km of the Site there are four Sites of Special Scientific Interest (SSSIs) the closest being Gwaun Bryn (Bryn Pasture) SSSI which lies 1.254km from the Site.

6.4.3 Report structure

The report describes: the human and ecological receptors (section 2); a process description (section 3); relevant legislation and guidance (section 4); the methodology used (section 6); the results of the assessment are presented in section 6 and the conclusion in section 7.

6.5 Receptors

6.5.1 Human receptors

Table 1 lists the human receptors considered in this AQSA with their distance and bearing from the AD Plant Site boundary; they are shown in Figure 3. The receptors include residential properties, workplaces, agricultural and industrial use, leisure use, village hall, primary school and a footpath.

The closest residential receptor to the red line boundary is R4, Lower Leighton, 77m to the east and R5, Cattle Grid 100m to the northeast. Lower Leighton Village Hall and Leighton CP School lie 100m and 113m respectively to the south, along the B4388. A footpath currently crosses the Site. Users of the footpath would be expected not to spend any longer on the footpath than it takes to walk along it, therefore their exposure would be limited in time. They would also have a low expectation of amenity with respect to odour as they are using a footpath in an agricultural area.

Table 1 Human receptors, distance and bearing from red line boundary

Receptor	Type	Description	Easting	Northing	Distance from the Site*	Bearing from the Site
R1	Footpath	Footpath through Site	324262	306568	0	n/a
R2	Agricultural	Lower Leighton Farm 1	324389	306566	15	SE
R3	Leisure	Tennis courts	324234	306333	44	S
R4	Residential	Lower Leighton B4388	324473	306592	77	E
R5	Residential	Cattle Grid B4388	324489	306658	100	NE
R6	Village Hall	Leighton Village Hall	324231	306263	113	S
R7	Primary School	Leighton CP School	324220	306234	142	S
R8	Residential	Bytake Cottages	324153	306901	147	NE
R9	Residential	Oaklea	324271	306236	148	S
R10	Business (Veterinary)	Llinthwaite Nant Y Coed	324516	306706	148	NE

6.5.2 Ecological receptors

Table 2 shows the ecological receptors (generated by SCAIL-Combustion) considered in this AQSA with their distance and bearing from the AD Plant Site boundary; they are shown in Figure 4. Following the Defra/EA guidance for permitting, Special Areas of Conservation (SACs), Special Protection Areas (SPAs) within 10km and Site of Special Scientific Interest (SSSIs) within 2km of the AD Plant Site have been considered.

The closest designated site is Gwaun Bryn (Bryn Pasture) which lies 1.254m to the east of the Site (from the "Installation location," section 5.2.1).

Table 2 Ecological receptors, distance and bearing from red line boundary

Receptor	Designation	Description	Easting	Northing	Distance from the Site	Bearing from the Site
E1	SSSI	Gwaun Bryn (Bryn Pasture)	325392	306657	1.254	E
E2	SSSI	Leighton Bat Roosts	324298	305246	1.33	SE
E3	SAC	Montgomery Canal	323228	307790	1.526	NW
E4	SSSI	Montgomery Canal	323228	307790	1.526	NW
E5	SSSI	Gungrog Flash	323363	308188	1.798	NW
E6	SAC	Granllyn	322327	311083	4.867	NW

6.6 Process description

6.6.1 Process description

The proposed site layout is shown in Figure 2.

6.6.1.1 Feedstock storage and handling

The AD plant will process approximately 133,000 tpa of crops (silage) and livestock manures.

Silage
Silage will be brought in from nearby farms by lorry (Heavy Goods Vehicle) during harvest time to be stored in the clamps. As fresh cut crops, the silage does not have a significant odour. Loads will be deposited onto the **2No. Clamps** (each 90m x 35m, 20,600t total capacity) where they are compressed for storage (ensiled) and covered with an impermeable membrane to exclude oxygen from the ensiled silage to aid preservation of the feedstock and hence ensure the best gas yield, this also excludes rainwater ingress.

Leachate is produced from the ensiled material. The leachate runs forwards (from southeast to northwest) within the clamps into the silage drainage channels and then to the underground leachate tank (80,000 litres capacity). The **Leachate Tank Vent** will exhaust passively to air and will be a small source of NH_3.

Compacted silage will be cut from the clamp face using a top loader; it will be slightly moist and therefore not give rise to dust. It will be transferred once or twice each day from the working face of the clamps to the **2No. feed hoppers** in the **Waste Reception Building** (100m x 30.2m x 12m to eaves), from where it is loaded into the primary digesters. Each loading phase will take approximately 2 hours/day. Standard operating procedures will include the clearing of any silage deposits dropped during loading. The **working face of the clamps** will not be a source of pollutants considered in this AQSA.

Silage dropped during delivery or daily cutting of silage to feed the digesters will be cleared at the end of each loading phase. Run-off from the hardstanding and bunded area will drain to the 1No. **Dirty Water Tank,** from where it will be reused in the process. The Dirty Water Lagoon Tank will vent to the Waste Reception Building Odour where the potentially odorous air is treated (odour reduced) before exhaust to atmosphere. The Dirty Water Tank will not be a source of emissions.

2No. Surface Water Lagoons (2,195m3, 288m3 capacity) will hold rainwater from other hardstanding areas and will not be a source of odour.

Other solid feedstocks
Solid feedstocks: manures, will be delivered throughout the year and will be deposited in the Waste Reception Building once the roller door is shut. They are loaded into the Primary Digesters from the

2No. Feed hoppers in the Waste Reception Building where the potentially odorous air is treated (odour reduced) before exhaust to atmosphere.

Liquid feedstocks

Liquid feedstocks such as slurry, will be delivered by a combination of pipeline from Lower Leighton Farm and via tanker throughout the year. Liquid manures will be pumped from to the 1No. **Slurry Storage Tank** and, if necessary, the 1No. **Liquid Input Reception Tank**. The air displaced from the tanks would exhaust to the Waste Reception Building where the potentially odorous air is treated (odour reduced) before exhaust to atmosphere.

Waste Reception Building Odour Control System

Vehicles will access the Waste Reception Building via fast-acting roller shutter doors. The building will be served by an **Odour Control System (OCS)** with at least two air change per hour (acph) providing a slight negative pressure with respect to the outside, meaning air from inside the building will tend not to leave the building even if the door is open. The air will pass through a wet **Scrubber** and an **Activated Carbon Filter**, before exhausting to atmosphere at 15.5m in height. The OCS will serve to abate emissions of odour, NH_3 and hydrogen sulphide (H_2S). The OCS will be a source of NH_3.

6.6.1.2 Biogas generation

In the **2No. Primary Digesters** and **2No. Post Digester** biogas is generated from the AD process and is stored in the domes above the digesters. The digester tanks will each have pressure and vacuum relief valves (PVRVs) as a safety measure to emit biogas or take in air if there is an over- pressure or under-pressure event respectively. PVRVs will not operate during normal operation, only as an emergency contingency and so releases of biogas and the associated odour from the PVRVs would be short-lived.

There will be a desulphurisation process at the AD Plant. The injection of low levels of oxygen and the addition of ferric chloride will reduce H_2S levels within the digester tanks.

6.6.1.3 Use of biogas and combustion sources

1No. 1,600kWe combined heat and power plant (**CHP**) fired by natural gas will provide heat and power to the facility; it is expected to operate 8,600 hours per year. 1No. 600kWtho biogas-fired **Boiler** will provide heat to the facility if the CHP is unable to provide sufficient heat. An emergency **Flare** (Gasflare MTU 2000 or equivalent ground-enclosed flare) will operate to burn up to 2,000Nm^3/h biogas in the event of an over-pressure in the digesters, conservatively assumed to operate < 250 hours per year. An emergency standby generator will provide power when the CHPs are not operational if the National Grid cannot supply sufficient power, therefore, it would be used only as an emergency backup operating typically less than 12 hours per year (for testing each month) and operating less than 500 hours per year as a 3-year rolling average. The boiler will be sources of NOx and SO_2; the CHP and flare will be sources of NOx. There will be negligible emissions of PM_{10}.

6.6.1.4 Digestate separation and storage

Whole digestate from the AD process will be pumped to 4No. **Screw Press Separators** in the Waste Reception Building, for separation into a digestate liquor and a fibre fraction. Solid digestate drops onto the floor and is stored until it is removed from the AD Plant Site. NH_3 will be treated by the Waste Reception Building OCS before release to atmosphere via the OCS exhaust.

The liquid digestate (liquor) will either be re-circulated within the AD system, stored in the 1No. **Thin Fraction Buffer Tank** or will be transferred via a sealed pipeline to the 1No. 3,170m3 **Digestate Lagoon**. The Digestate Lagoon will have an engineered cover which will be made gas- tight by a concrete ring between the lining and cover. Any gas captured from the space between the digestate and the cover, and emissions from the Thin Fraction Buffer Tank, will exhaust to the Waste Reception Building where the potentially odorous air is treated (odour reduced) before exhaust to atmosphere.

The cover will be fitted with PVRVs which would operate in the unlikely event of an under-pressure or an over-pressure event. There will be no emissions to air from the Digestate Lagoon and Thin Fraction Buffer Tank during normal operation.

At the **Offtake** point tankers will be filled with liquid digestate from the Digestate Lagoon and removed from Site. When tankers are filled with liquid digestate air from the tanker vents to atmosphere as it is displaced. Filling of tankers at the Offtake will be a small, intermittent source of NH_3.

Table 3 shows the sources of emissions considered in this AQSA.

Table 3 Modelled sources

Source	Emissions	Modelled operational profile
1No. 1,600kWe CHP	NOx	Continuous (8,600 h/yr)
Emergency Flare stack	NOx	Emergency back-up, assumed, conservatively, to operate < 250 hours per year
Boiler stack, 600kWtho	NOx, SO_2	Emergency back-up, assumed to operate up to 1,000 hours per year.
Waste Reception Building OCS Stack	NH_3	Continuous
Leachate tank vent	NH_3	Small, continuous emission
Offtake	NH_3	Small, intermittent emission during working hours

6.7 Legislation, policy and guidance

This section describes the legislation, policy, and guidance relevant to this assessment.

While the UK has left the European Union (EU), the EU Withdrawal Act 2018 brought all EU laws and regulations, made while the UK was a member of the EU, into UK law by creating a new category of UK law: EU retained law. Therefore, the EU Directives described in this section still apply in the UK.

6.7.1 Air quality legislation and policy

6.7.1.1 Control of emissions

The Industrial Emissions Directive (IED) 2010/75/EU is for the control industrial emissions from permitted installations and to reduce them based on Best Available Techniques (BAT). It was transposed into UK law in the Environmental Permitting Regulations 2018 (EPR). The Site will require an environmental permit to operate and therefore IED and BAT are relevant.

The Medium Combustion Plant Directive (MCDP) EU/2015/2193 sets ELVs for pollutants from combustion plant of thermal input greater than 1MWth and less than 50MWth.

The National Emissions Ceiling Directive (NECD) sets 2020 and 2030 emission reduction commitments for anthropogenic emissions of five main air pollutants: SO2, NOx, non-methane volatile organic compounds (NMVOCs), NH_3 and Particulate matter less than 2.5 micrometres in diameter ($PM_{2.5}$). The NECD Regulations transposed the NECD into UK law. It is supported by the Clean Air Strategy 2019.

6.7.1.2 Environment Act 1995 and Environmental Act 2021

The Environment Act 1995 established the framework for managing air quality to achieve compliance with air quality objectives. The Environment Act 2021 amended and strengthened the provisions of the 1995 Act, introducing new measures to enhance environmental protection, and introducing a lower limit value for Particulate Matter with an aerodynamic diameter less than 2.5µm ($PM_{2.5}$). It introduced the Office for Environmental Protection for England and Northern Ireland to monitor

compliance, report on the effectiveness of environmental law and enforce compliance when necessary. In Wales the same function if fulfilled by the Office of Environmental Governance (Wales).

6.7.1.3 Air Quality Standards

The Ambient Air Quality Directive 2008/50/EC12 (AAD) and 4th Daughter Directive (Directive 2004/107/EC) contain **Limit Values** and **Target Values** with which the UK must comply. The Ambient Air Quality Directive also addresses common methods and criteria; information on ambient air quality to help combat air pollution and nuisance, to monitor long-term trends; and making information and pollution alerts available to the public.

The Air Quality Standards (Wales) Regulations 2010 as amended in 2016 is the instrument by which the AAD and the 4th Daughter Directive were transposed into law in England and Wales.

6.7.1.4 2024 Welsh Act

The 2024 Welsh Act sets air quality targets and updated the Local Air Quality Management regime. It is supported by the Clean Air Plan for Wales and existing UK-wide regulatory frameworks. These sit alongside retained EU-derived standards and local authority duties for assessment and management of air quality Planning policy.

6.7.1.5 Environment (Air Quality and soundscapes) (Wales) Act 2024

The 2024 Act creates a Wales-specific framework for national air quality targets and amends existing legislation on local air quality management, smoke control, clean/low emission zones, road user charging and vehicle idling.

6.7.1.6 Protection of ecological sites

The Wildlife and Countryside Act 1981 is the primary legislation which protects animals, plants and habitats in the UK and established the protection of Sites of Special Scientific Interest (SSSIs).

The Habitats Directive 92/43/EEC seeks to ensure the conservation of a wide range of rare, threatened, or endemic animal and plant species. It requires national governments to designate special areas of conservation to conserve flora and fauna species and introduced the Natura 2000 ecological network of protected areas. The Natura 2000 network includes SACs and SPAs. It does not explicitly include Ramsar sites, but almost all Ramsar sites in England are also designated as European sites and SSSIs.

The Conservation of Habitats and Species Regulations 2017 provides the legal basis in the UK for candidate SACs (which are designated under the Habitats Directive) and for designated SACs and SPAs. The regulations describe how 'a competent authority must decide if a plan or project proposal that affects a European site can go ahead' by undertaking a Habitats Regulations Assessment (HRA). It must test whether the Proposed Development, a 'project' in HRA terms, could significantly harm the designated features of a European site.

6.7.2 Policy

6.7.2.1 Planning Policy Wales

Odour in Wales is mainly controlled through general planning policy, Planning Policy Wales, and emerging Technical Advice Notes (TAN) plus separate regulatory guidance from Natural Resources Wales (NRW) on odour as "pollution" in environmental permitting. Planning Policy Wales treats odour as part of amenity and environmental quality that planning should manage at plan and project level. There is no Wales specific odour TAN equivalent to England's, so local authorities rely on UK wide odour guidance for planning alongside NRW permitting standards and site-specific Odour Management Plans.

6.7.2.2 Powys County Council

The Powys Local Development Plan (2011-2026) was adopted by Powys County Council on the 17th of April 2018. It sets out the Council's strategy for the sustainable development of the area. There are three policies relevant to air quality impacts on human reports (health) and ecological receptors: DM2 – The Natural Environment; DM13 – Design and Resources; DM14 – Air Quality Management.

- Policy DM2 – The Natural Environment, in respect of internationally, European, nationally and locally designated sites the policy states:

'Development proposals which would impact on the following natural environment assets will only be permitted where they do not unacceptably adversely affect:' the sites listed above.

- Policy DM13 – Design and Resources, development must respect amenity of neighbouring land-uses:

'These amenities include privacy (affected by overlooking), light (natural and man-made), noise (including that which arises from hours of operation), air quality (odour, fumes and dust), and pests (vermin and birds attracted by litter).'

- Policy DM14 – Air Quality Management, proposals must demonstrate that measures can be taken to overcome any significant adverse risk, with particular attention being paid to:

'1. National Air Quality Strategy objectives and any Air Quality Management Areas.

2. The critical levels for the protection of habitats and species within a European site or Site of Special Scientific Interest in accordance with Policy DM2.'

The Local Development Plan point out that NRW has a statutory duty in the regulation of waste and that the planning system must not duplicate those controls. Nevertheless, local planning authorities should be satisfied that proposals are capable of effective regulation, therefore planning applications must demonstrate how matters such as noise, dust, odour, air quality, surface water and pollution of groundwater will be controlled so as to avoid harm or a loss of amenity.

Work is now progressing on a Replacement Local Development Plan (2022 - 2037).

6.7.3 Guidance

Table 4 lists guidance used in this assessment. Throughout the report the guidance is referenced when used.

Table 4 Guidance used in this assessment

Short name	Name	Body	Scope
Defra/EA guidance	Air emissions risk assessment for your environmental permit.[3]	Defra/ Environment Agency	How to undertake an air quality assessment for a permit. Approach can be used in planning applications.
Waste Treatment BREF	BAT Reference Document Waste Treatment[24]	European IPPC Bureau,	Indicative BAT for waste treatment including Associated Emission Levels
Appropriate Measures	Biological waste treatment: appropriate measures for permitted facilities[25]	Environment Agency	Sets out appropriate measures for the treatment of organic materials
Defra SWIP	Specified generators: dispersion modelling assessment[26]	Environment Agency and Natural Resources Wales	Includes reference for conversion of NOx to NO_2
AQTAG06	AQTAG06 Technical guidance on detailed modelling approach for an appropriate assessment for emissions to air[27]	Air Quality Advisory Group	Guidance on calculating deposition

Short name	Name	Body	Scope
LAQM.TG22	Local Air Quality Management, Technical Guidance (TG22)[28]	Department for Environment, Food & Rural Affairs and the Devolved Authorities	Includes general guidance on dispersion modelling
DMRB	Design Manual for Roads and Bridges[29]	Highways Agency	Screening criteria for changes in road traffic
EPUK/IAQM Guidance	Land-use Planning & Development Control: Planning for Air Quality – version 1.2 [30]	Environmental Protection UK (EPUK)/ Institute of Air Quality Management (IAQM)	Screening and assessment criteria for planning applications including road traffic screening

6.8 Methodology

6.8.1 The SCAIL Screening Model

The assessment presented herein has used both SCAIL-Agriculture (Simple Calculation of Atmospheric Impact Limits -Agriculture) and SCAIL-Combustion1 for the preliminary assessment of the range of types of emissions from the Proposed Development. Both online screening tools are available from the UK Centre for Ecology C Hydrology (CEH).

SCAIL-Agriculture calculates emissions of NH_3, particulate matter (PM_{10}) and odour from agricultural installations, calculates the concentrations of each pollutant and the deposition flux of NDep and AcidDep due to nitrogen at sensitive ecological receptors within 10km.

SCAIL-Combustion has been used to model emissions from the CHP, Boiler and Emergency Flare. The tool screens the impact of emissions of NO_2 (strictly, oxides of nitrogen (NOx) treated as if they were NO_2, SO_2, and PM_{10} on air concentrations and on NDep and AcidDep at sensitive habitats.

For both SCAIL screening methods, odour and PM_{10} emissions and output concentrations are not relevant to the impact on ecological receptors; in fact, there are no emissions of PM_{10} from the combustion sources (Table 3).

If the SCAIL screening thresholds are exceeded by the results, the next step is to proceed to 'detailed modelling' using more site-specific input data.

SCAIL has three modes for meteorological data: Conservative, Hybrid and Realistic, and it is the Conservative mode results which are reported here; it is the data set required to be used in reported assessments. Both modes use one of the SCAIL meteorological data sets, but in the Conservative mode the model set up is rotated so that the nearest receptor is downwind of the prevailing wind direction.

The SCAIL output is:

- The Process Contribution (PC) to CLevel and CLoad at each receptor.
- Background concentration or deposition based on the grid reference supplied for the habitat.
- The Predicted Environmental Contribution (PEC) which is the sum of the PC and background.
- An exceedance (PEC – EAL) is then calculated and displayed as both a percentage and an absolute value.

6.8.1.1 Significance of results

A positive value of (PEC – EAL) indicates an exceedance and is shown by SCAIL in red. If the following threshold level is met or exceeded (using the Conservative mode) it is advised that the relevant regulatory authority should be contacted for advice regarding whether further detailed modelling is required:

- NH_3 – greater than the threshold level of 1% of the relevant standard / critical level

When assessing impacts against the critical level for NH_3, two values are shown as they represent comparison with typical (3µg/m³) and worst-case critical levels (1µg/m³). The worst- case critical level for NH_3 is defined for lichens and bryophytes.

6.8.2 Input data

6.8.2.1 SCAIL-Combustion Emissions

The CHP and Boiler will be classified as 'new' under the Medium Combustion Plant (MCP) Directive and will be required to comply with the stipulated MCPD emission limit values (ELVs). The screening assessment has been undertaken based on the technical specification data for the CHP (Appendix A). Data used for the Boiler emissions have been calculated using the technical specification (Appendix B) supplemented by data for similar plant from previous projects assessed by Earthcare Technical Ltd. Actual values of oxygen and moisture used in the combustion exhausts have been obtained from similar plant on different sites where emissions monitoring data is available.

The technical specification for the Emergency Flare is given in Appendix C. For the Emergency Flare there are no MCP ELVs. Guidance for monitoring enclosed landfill gas flares (LFTGN 05) sets out the emission standards for enclosed gas flares and these have been used: 150 mg/Nm³ for NOx (3% O_2), LFTGN 05. There is no ELV for SO_2 or PM_{10}.

The SCAIL Combustion input data are presented in Table 5. In both SCAIL-Combustion and SCAIL-Agriculture the Installation location has been specified as Easting, Northing (324141, 306567), the location of the OCS exhaust.

Table 5 SCAIL-Combustion input data

Parameter	Units	CHP [a]	Boiler [b]	Emergency Flare [c]
Rating	-	1,600kWe	600kWtho	2,000Nm^3/h
Fuel	-	Natural gas	Biogas	Biogas
Source location	Easting, northing (X,Y)	324124, 306591	324118, 306587	324114, 306689
Hours of operation	h/yr	8,600	1,000	<250
Stack height	m	10	6	9
Stack inner diameter	m	0.5	0.4	1.806
Stack gas temperature[b]	°C	180	180	1,000
Volumetric flow	Nm^3/h	4,849	454	13,058
Stack gas velocity	m/s	15.7	2.4	18.6
NOx concentration	mg/Nm^3	250	200	150
NO_x emission rate	g/s	0.337	0.025	0.544
SO_2 concentration	mg/Nm^3	n/a	100	n/a
SO_2 emission rate	g/s	n/a	0.013	n/a

Notes

n/a = not applicable

[a]MWM TCG 2016, 1,600kWe. Estimated oxygen and moisture content based on monitored data for biogas CHPs. Reference conditions: 273K, 101.3kPa, dry, 5% O_2

[b]Unical, Inoxia GJ. 600kWtho. Estimated oxygen and moisture content have been taken from similar plant from previous projects. Reference conditions: 273K, 101.3kPa, dry, 3% O_2

[c]Gasflare MTU 2000, full automatic type. Reference conditions: 273K, 101.3kPa, dry, 3% O_2

6.8.2.2 SCAIL-Agriculture Emissions

In Table 3, three sources of NH_3 emissions are identified. Experience with other sites has shown that emissions from the Leachate Tank vent and at the Offtake vent, will be orders of magnitude lower than the most important sources of NH_3, emitting in the order of 10^{-5} to10^{-4} g/s of NH_3, equivalent to 0.3 to 3 kgNH_3/yr. These sources have therefore been excluded from the screening model, but would be considered in any subsequent detailed modelling, if required.

Table 6 shows the input data to SCAIL-Agriculture. The OCS will have an exhaust equivalent to at least 2 acph (building volume 34,300m^3) and it has been assumed that the NH_3 concentration at exhaust would be 2ppm (equivalent to 1.4mg/m^3 at 22.5°C); this is between the BAT levels, 0.3 mg/m^3 to 20 mg/m^3 and is based on data used at previously modelled sites. It has been modelled as a fan on the roof of a 15.5m tall building.

Table 6 SCAIL-Agriculture input data

Parameter	Units	OCS[1]
Source	-	User-defined emissions
Source location	Easting, Northing	324141, 306567
Source type	-	Housing
Naturally ventilated	Yes/No	No
Building height	m	15.5 (height of release)
Fan location	-	Roof
No. of fans	-	1
Fan diameter	m	1.5
Fan flow rate	m^3/s	19.1
Tonnes fresh manure	t	n/a
Area of storage	m^2	n/a
Emissions per year	$kgNH_3/yr$	843
Notes: n/a = not applicable [1]Modelled as a naturally ventilated		

6.8.3 Assessment of bioaerosol impacts

The EA regulatory position statement on bioaerosol monitoring at regulated facilities, states that if the facility is over 250m from a residential or workplace receptor, there is no requirement to carry out a site-specific risk assessment or to monitor bioaerosols. The position statement was recently withdrawn, with EA referencing updated conditions now included in environmental permits which address bioaerosol risk. It has, nonetheless, been used here as a screening tool to determine whether a more in-depth assessment of bioaerosol should be carried out at this stage.

The 10 receptors listed in Table 1 all lie within 150m of the red line Site boundary. It is there recommended that a site-specific risk assessment of bioaerosols be carried out for submission to PCC as part of the planning application.

6.8.4 Air quality impacts due to road traffic

6.8.4.1 Screening criteria

The DMRB methodology provides the following screening criteria for the determination of potential air quality impacts as a result of vehicle exhaust emissions:

- Daily Annual Average Daily Traffic (AADT) flows change by 1,000 or more;
- Daily HDV (Heavy Duty Vehicle) AADT flows change by 200 or more;
- Daily average speed changes by 10km/hr or more; or
- Peak hour speed changes by 20km/hr or more.

Should changes be lower than these criteria, then the DMRB considers air quality impacts associated with a scheme to be negligible, and no further assessment is required.

The EPUK/IAQM guidance provides further indicative screening criteria in respect of changes in road traffic. Outside an AQMA, an air quality assessment, which would include exhaust, brake and tyre wear, may be required where proposals will:

- Cause a significant change in Light Duty Vehicle (LDV = cars and small vans <3.5t gross vehicle weight) traffic flows on local roads with relevant receptors i.e. a change of LDV (Light Duty Vehicle) flows of more than 500 AADT outside an AQMA, or 100 AADT inside an AQMA; or
- Cause a significant change in HDV33 flows on local roads with relevant receptors i.e. a change of HDV flows of more than 100 AADT outside an AQMA, or 25 AADT inside an AQMA.

Note that AADT is used in the criteria; AADT is a long-term average, as that is what is critical in assessing air quality impacts from road traffic; for long-term health impacts the exact time of the emission is not important. Transport assessments are concerned with network capacity and use a different metric, the number of movements calculated per working day or even per hour.

IAQM guidance recommends that the criteria provided are precautionary and should be treated as indicative. The Site is outside an AQMA and there are no AQMAs in Powys.

6.8.4.2 Operational traffic

The traffic data supplied by Roger Parry C Partners predicts the operational traffic will equate to an AADT of 42 HDVs and 10 LDVs, at total AADT of 52.

According to the EPUK/IAQM and DMRB screening criteria (Section 5.4.1), the increased traffic volumes, less than 100 AADT of HDVs and less than 500 AADT of LDVs, are unlikely to have significant air quality effect on receptors and therefore **no further assessment** is required.

6.8.4.3 Construction traffic

The traffic data supplied which will inform a future Construction Traffic Management Plan predicts an average HDV AADT of 8 and LDV AADT of 56. According to the EPUK/IAQM and DMRB screening criteria (section 4.1.1), the construction traffic volumes are unlikely to have significant air quality effect on receptors and therefore **no further assessment** is required.

6.9 Impact assessment

6.9.1 Significance of results

SCAIL calculates the concentration and deposition due to the Proposed Development, the PC. The PC plus background concentration or deposition is the PEC. Both the PC and PEC are compared to the EAL. If the PEC exceeds EAL then the magnitude of PC/EAL is considered. If it is over 1%, further assessment may be required.

In addition to the SCAIL significance thresholds, this assessment considers the Defra/EA significance thresholds. Following the Defra/EA guidance, a PC can be screened out from further assessment if:

- the short-term PC is less than 10% of the short-term environmental standard, and
- the long-term PC is less than 1% of the long-term environmental standard (if there is one).

The second stage of screening considers the PEC, the sum of the PC and background concentration. A further assessment is not needed if:

- the short-term PC is less than 20% of the 'headroom,' where headroom is defined as the short-term environmental standards minus twice the long-term background concentration, and
- the long-term PEC is less than 70% of the long-term environmental standards (if there is one).

6.9.2 SCAIL-Combustion results for human receptors

Table 7 shows the SCAIL-Combustion results for NO_2 and SO_2 at the human receptors. All PECs are less than the relevant EALs so there is no exceedance of the EALs for human health.

The long-term PC for NO_2 exceeds 1% of the EAL at all receptors, however, the PEC is well below the EAL and well below 70% of the EAL, with a maximum PEC value of 18.5% at R1, Footpath through the Site.

The maximum short-term PC for SO_2 is 0.2%, well under the 1% threshold and the Defra/EA threshold of 10% (section 6.1).

Impacts at **human receptors** are **not significant** and do not require further assessment.

6.9.3 SCAIL-Combustion and SCAIL-Agriculture results for ecological receptors

Output from SCAIL-Combustion and SCAIL-Agriculture for ecological receptors is shown in Table 8 (Combustion NDep an AcidDep), Table 9 (Agriculture NDep and AcidDep) and Table 10 (Agriculture NH_3). In Table 11 the most sensitive habitats to NDep and AcidDep at each receptor are given. In Table 8 to Table 10, if PEC exceeds EAL, the percentage is shown in bold. The total impact of combustion and non-combustion sources can be obtained by adding the PCs and the PC/EAL %. Note that receptor E6, Granllyn SAC, is not sensitive to NDep and most of the receptors are not sensitive to AcidDep; only E2, Leighton Bat Roosts SSSI, is sensitive to AcidDep.

The PEC exceeds the EAL for NDep at all sensitive receptors due to the combustion sources alone and due to the non-combustion sources alone. The PC exceeds 1% of the NDep EAL at all sensitive receptors due to the non-combustion sources alone.

The PEC does not exceed the EAL for AcidDep at the only sensitive receptor, E2, Leighton Bat Roosts SSSI, and the total PC is 0.6%.

The PEC for NH_3 is not predicted to exceed the EAL at any receptor (assuming EAL is equal to 3µg/m^3). The PC is predicted to equal or exceed an EAL of 3µg/m^3 at E1, Gwaun Bryn (Bryn Pasture) SSSI and E2, Leighton Bat Roosts SSSI. In fact, an EAL of 1µg/m^3 will be applicable at some receptors.

The predicted impacts of NH_3 and NDep exceed thresholds and require further assessment. It is likely that the impacts from the OCS are (considerably) over-estimated as SCAIL-Agriculture is not designed to model buoyant releases from stacks.

Impacts at **ecological receptors cannot be screened out** and should be assessed using detailed modelling.

Table 7 SCAIL-combustion results at human receptors

ID	Description	Annual mean NO_2 EAL: 40µg/m³						99.99th percentile of 15-minute means EAL: 266µg/m³					
		PC NOx/NO_2 (µg/m³)	NOx/NO_2 Bgd (µg/m³)	NOx/NO_2 PEC (µg/m³)	NOx/NO_2 EAL (µg/m³)	% of NOx/NO_2 PC to EAL	% of NOx/NO_2 PEC to EAL	PC SO_2 (µg/m³)	SO_2 Bgd (µg/m³)	SO_2 PEC (µg/m³)	SO_2 EAL (µg/m³)	% of SO_2 PC to EAL	% of SO_2 PEC to EAL
R1	Footpath through Site	3.53	3.86	7.39	40	8.8	18.5	0.21	1.68	1.89	125	0.2	1.5
R2	Lower Leighton Farm 1	2.14	3.86	6.00	40	5.4	15.0	0.10	1.68	1.78	125	0.1	1.4
R3	Tennis courts	2.11	3.86	5.97	40	5.3	14.9	0.10	1.68	1.78	125	0.1	1.4
R4	Lower Leighton B4388	1.60	3.86	5.46	40	4.0	13.7	0.07	1.68	1.75	125	0.1	1.4
R5	Cattle Grid B4388	1.47	3.86	5.33	40	3.7	13.3	0.06	1.68	1.74	125	0	1.4
R6	Leighton Village Hall	1.69	3.86	5.55	40	4.2	13.9	0.07	1.68	1.75	125	0.1	1.4
R7	Leighton CP School	1.55	3.86	5.41	40	3.9	13.5	0.06	1.68	1.74	125	0.1	1.4
R8	Bytake Cottages	1.59	3.86	5.45	40	4.0	13.6	0.07	1.68	1.75	125	0.1	1.4
R9	Oaklea	1.49	3.86	5.35	40	3.7	13.4	0.06	1.68	1.74	125	0	1.4
R10	Llinthwaite Nant Y Coed	1.30	3.86	5.16	40	3.3	12.9	0.05	1.68	1.73	125	0	1.4
Notes: Bgd = background													

Table 8 SCAIL-Combustion results at ecological receptors (NDep, AcidDep)

ID	Description	NDep						AcidDep					
		PC NDep (kg/ha/yr)	NDep Bgd (kg/ha/yr)	NDep TOTAL (kg/ha/yr)	NDep CLOAD (kg/ha/yr)	% of NDep PC to CLoad	% of NDep PEC to CLoad	PC AcidDep (kEqH+/ha/yr)	AcidDep Bgd (kEqH+/ha/yr)	AcidDep TOTAL (kEqH+/ha/yr)	AcidDep CLOAD (kEqH+/ha/yr)	% of AcidDep PC to CLoad	% of AcidDep PEC to CLoad
E1	Gwaun Bryn (Bryn Pasture) SSSI	0.07	18.14	18.21	10	0.7	**182.1**	0.000	1.402	1.402	n/a	n/a	n/a
E2	Leighton Bat Roosts SSSI	0.12	31.82	31.94	10	1.2	**319.4**	0.000	2.414	2.414	2.87	0	84.1
E3	Montgomery Canal SAC	0.05	16.68	16.73	2	2.6	**836.6**	0.000	1.300	1.300	n/a	n/a	n/a
E4	Montgomery Canal SSSI	0.05	16.68	16.73	2	2.6	**836.6**	0.000	1.300	1.300	n/a	n/a	n/a
E5	Gungrog Flash SSSI	0.04	16.77	16.81	10	0.4	**168.1**	0.000	1.305	1.305	n/a	n/a	n/a
E6	Granllyn SAC	0.01	16.96	16.97	n/a	n/a	n/a	0.000	1.316	1.316	n/a	n/a	n/a
Notes: Bgd = background; n/a = not applicable; Bold font shows receptors at which PEC exceeds EAL													

Table 9 SCAIL-Agriculture results at ecological receptors (NDep, AcidDep)

ID	Description	NDep						AcidDep					
		PC NDep (kg/ha/yr)	NDep Bgd (kg/ha/yr)	NDep TOTAL (kg/ha/yr)	NDep CLOAD (kg/ha/yr)	% of NDep PC to CLoad	% of NDep PEC to CLoad	PC AcidDep (kEqH+/ha/yr)	AcidDep Bgd (kEqH+/ha/yr)	AcidDep TOTAL (kEqH+/ha/yr)	AcidDep CLOAD (kEqH+/ha/yr)	% of AcidDep PC to CLoad	% of AcidDep PEC to CLoad
E1	Gwaun Bryn (Bryn Pasture) SSSI	0.17	18.14	18.31	10	1.7	**183.1**	0.012	1.402	1.414	n/a	n/a	n/a
E2	Leighton Bat Roosts SSSI	0.24	31.82	32.06	10	2.4	**320.6**	0.017	2.414	2.431	2.87	0.6	84.7
E3	Montgomery Canal SAC	0.13	16.68	16.81	2	6.5	**840.5**	0.009	1.3	1.309	n/a	n/a	n/a
E4	Montgomery Canal SSSI	0.13	16.68	16.81	2	6.5	**840.5**	0.009	1.3	1.309	n/a	n/a	n/a
E5	Gungrog Flash SSSI	0.11	16.77	16.88	10	1.1	**168.8**	0.008	1.305	1.313	n/a	n/a	n/a
E6	Granllyn SAC	0.03	16.96	16.99	n/a	n/a	n/a	0.002	1.316	1.318	n/a	n/a	n/a
Notes: Bgd = background; n/a = not applicable; Bold font shows receptors at which PEC exceeds EAL													

Table 10 SCAIL-Agriculture results at ecological receptors (NH_3)

Site No.	Name	PC NH_3 ($\mu g/m^3$)	NH_3 Bgd ($\mu g/m^3$)	NH_3 PEC ($\mu g/m^3$)	NH_3 EAL ($\mu g/m^3$)	% of NH_3 PC to CLevel	% of NH_3 PEC to vel
E1	Gwaun Bryn (Bryn Pasture) SSSI	0.032	2.00	2.032	1-3	1.1	67.7
E2	Leighton Bat Roosts SSSI	0.030	2.34	2.370	1-3	1.0	79.0
E3	Montgomery Canal SAC	0.026	2.23	2.256	1-3	0.9	75.2
E4	Montgomery Canal SSSI	0.026	2.23	2.256	1-3	0.9	75.2
E5	Gungrog Flash SSSI	0.021	2.15	2.171	1-3	0.7	72.4
E6	Granllyn SAC	0.006	2.03	2.036	1-3	0.2	67.9
Notes: Bgd = Background; n/a = not applicable							

Table 11 Most sensitive habitats to nitrogen and acid deposition

ID	Designation	Description	Nitrogen habitat	Acid habitat
E1	SSSI	Breckland Farmland	Neutral grassland (Cynosurus cristatus-Centaurea nigra meadow and pasture: Danthonia decumbens subcommunity)	No sensitive habitat or species at this site
E2	SPA	Breckland	Rhinolophus hipposideros	Rhinolophus hipposideros
E3	SSSI	Breckland Forest	Luronium natans	No sensitive habitat or species at this site
E4	SSSI	Little Heath, Barnham	Luronium natans	No sensitive habitat or species at this site
E5	SSSI	Berner's Heath, Icklingham	Swamp (Typha latifolia reedbed: Alisma plantago-aquatica subcommunity)	No sensitive habitat or species at this site
E6	SAC	Breckland	Triturus cristatus (Great crested newt)	No sensitive habitat or species at this site

6.10 Conclusion

This AQSA in support of a planning application for the development of an agricultural AD Facility on land at Lower Leighton Farm, Leighton, Welshpool, Powys, SY21 8HH, has been prepared to determine whether air quality impacts at human and ecological receptors and bioaerosol impacts at human receptors, can be screened out of requiring further assessment.

SCAIL-Combustion and SCAIL-Agriculture screening tools were used (in Conservative mode) to evaluate the potential impact of NOx, and NH_3 concentrations and nitrogen and acid deposition on sensitive habitats.

Air quality impacts of NO_2 and SO_2 at **human receptors** are **not significant** and do not require further assessment.

Air quality impacts of NH_3 and NDep at **ecological receptors cannot be screened out** and should be assessed using detailed modelling. It is likely that the sources of NH_3 in particular were not modelled effectively by SCAIL-Agriculture as it is not designed to model buoyant releases from stacks.

Following the EA regulatory position statement on bioaerosol monitoring at regulated facilities, it is recommended that a site-specific risk assessment be carried out for submission to PCC as part of the planning application.

The volumes of construction and operational traffic are unlikely to have significant air quality effect on receptors and therefore **no further assessment** is required.

Based on the screening assessment presented, it is considered that the potential air quality impacts of the Proposed Development at human receptors are likely to result in a not significant effect and do not warrant further detailed assessment. Impacts at ecological receptors require further, more detailed assessment and a bioaerosol risk assessment should be carried out.

CHAPTER 7 – LANDSCAPE & VISUAL ASSESSMENT

7. Landscape and Visual Receptors

7.1 Introduction

The impact of the proposed development on landscape and visual amenity has been assessed in this Chapter.

Natural Resources Wales set out the requirement for an EIA to include assessments of visual effects on the surrounding area and landscape together with any physical effects of the development, such as changes in topography. The EIA should include use of the Landscape Character Assessment (LCA) which provides a sound basis for guiding, informing and understanding the ability of any location to accommodate change and make positive proposals for conserving, enhancing or regenerating character as detailed proposals are developed.

Natural Resources Wales have also advised that *'in order to foster high quality development that respects, maintains, or enhances, local landscape character and distinctiveness, Natural Resources Wales encourages all new development to consider the character and distinctiveness of the area, with the siting and design of the proposed development reflecting local design characteristics and, wherever possible, using local materials. The Environmental Impact Assessment process should detail the measures to be taken to ensure the building design will be of a high standard, as well as detail of layout alternatives together with justification of the selected option in terms of landscape impact and benefit. The assessment should also include the cumulative effect of the development with other relevant existing or proposed developments in the area.*

This chapter also assesses whether the proposed development will have any impact on heritage assets and designated landscapes. Further details can be seen in Chapter 14 Heritage.

The landscape has been reviewed in terms of the existing landscape, and the visual resource in terms of its character, quality (condition) and sensitivity. This will form the baseline from which to assess the significance of any potential landscape or visual impact. The assessment is focussed on an area of 2km radius from the site, however appropriate viewpoints and historic features outside this area have also been considered.

The desk based survey has identified key viewpoints and features and identified potential visual receptors. This also included consultation of the Powys Landscape Character assessment.

There are two distinct components of LVIA:

1. Assessment of landscape effects – assessing effects on the landscape as a resource in its own right
2. Assessment of visual effects – assessing effect on specific views and on the general visual amenity experienced by people.

There are limitations when carrying out a LVIA. There is a degree of subjectivity and no methods to quantify effects, and a level of professional judgement is required.

7.2 Assessment Criteria

Overall landscape and visual impact will depend upon the sensitivity of the landscape but will vary according to the nature of the existing landscape, the nature of the proposed development, and the type of change being considered. The determination of sensitivity can be based on interpretation of a number of parameters; landscape value, landscape scale and the nature of the views. The following table helps to identify landscape sensitivity:

Landscape Value	Landscape Scale	Nature of Views	Sensitivity
High	Small	Long distance, panoramic	High
Medium	Medium	Medium distance, open	Medium
Low	Large	Short distance, closed	Low

The sensitivity of visual receptors ranges from high (such as users of rights of way or local people where the development would result in changes in valued views), medium (including people travelling through the landscape), low (such as people at work) and negligible (such as views from industrialised areas). This will be based on a combination of parameters; the location of the viewpoint, the context of the view, the activity of the receptor, frequency and duration of the view.

7.2.1 Landscape Assessment

The value of a landscape needs to be considered. Existing landscape designations is usually the starting point in understanding landscape value, but the value attached to undesignated landscapes also needs to be considered and individual elements of the landscape such as trees, buildings or hedgerows may also have a value.

Effects of the landscape include the direct effects, and any indirect, secondary, cumulative, short-, medium- and long-term, permanent and temporary, positive and negative and are likely to include:

- Change in and/or partial or complete loss of elements, features or aesthetic or perceptual aspects that contribute to the character and distinctiveness of the landscape;
- Addition of new elements or features that will influence the character and distinctiveness of the landscape;
- Combined effects of these changes on overall character.

Landscape effects can be positive or negative. Assessing the significance of the landscaping effects requires the consideration of the sensitivity of the landscape receptors (bearing in mind the susceptibility to change and the value of the landscape receptor) and the magnitude of landscape effects. The effect on landscape receptors needs to be assessed in terms of its size and scale, the geographical extent of the area influenced and its duration and reversibility. To draw final conclusions about significance, the judgements on the sensitivity of the landscape and the magnitude of the effects need to be combined to allow a final judgement as to whether each effect is significant or not.

The magnitude of change to a particular viewpoint will depend on a combination of parameters; distance of the viewpoint from the development, duration of impact, angle of view in relation to receptor activity, proportion of field of view occupied by the development, background to the development, extent of other built development visible (particularly vertical elements). The following table helps to define magnitude:

Level of Magnitude	Definition of Magnitude
Substantial	Total loss or major alteration to key elements/features/characteristics of the baseline (pre-development) conditions such that post development character/composition of baseline would be fundamentally changed.
Moderate	Partial loss or alteration to one or more key elements/features/characteristics of the baseline (pre-development) conditions such that post development character/composition/attributes of baseline would be partially changed.
Slight	Minor loss of or alteration to one or more key elements/features/characteristics of the baseline (pre-development) conditions. Change arising from the loss/alteration would be discernible but underlying character/composition of the baseline condition would be similar to pre development circumstance/patterns.
Negligible	Very minor loss or alteration to one or more key elements/features/characteristics of the baseline (pre-development) conditions. Change barely distinguishable, approximating to the "no change" situation.

There are no hard and fast rules about what makes a significant effect and circumstances vary with the location and landscape context, and with the type of proposal. At opposite ends of the spectrum it is reasonable to say that:

- Major loss or irreversible negative effects, over an extensive area, on elements and/or aesthetic and perceptual aspects that are key to the character of nationally valued landscapes are likely to be of the greatest significance;
- Reversible negative effects of short duration, over a restricted area, on elements and/or aesthetic and perceptual aspects that contribute to but are not characteristics of the character of landscapes of community value are likely to be of the least significance and may, depending on the circumstances be judged as not significant
- Where assessments of significance place landscape effects between these extremes, judgements must be made about whether or not they are significant.

The following table sets out the matrix used as a guide to correlate the sensitivity and magnitude to determine the significance of the impacts. The significance is assessed as being major, moderate, minor or no impact. This is not a prescriptive tool and in some instances a particular parameter may be considered as having a determining impact on the analysis.

Vis	**Magnitude of Change**			
Landscape and Visual Sensitivity	**Substantial**	**Moderate**	**Slight**	**Negligible**
High	Major	Major/moderate	Moderate	Moderate/minor
Medium	Major/moderate	Moderate	Moderate/minor	Minor
Low	Moderate	Moderate/minor	Minor	Minor/none
Negligible	Moderate/minor	Minor	Minor/none	None

Where the landscape or visual impacts have been classified as major or major/moderate, this is considered to be a significant impact referred to in The Town and Country Planning (Environmental Impact Assessment) (England and Wales) Regulations 2017. However, significant impacts need not be unacceptable or necessarily negative and may be reversible. The potential impacts associated with the proposed development are referred to as adverse, neutral or positive where applicable. If there are significant adverse effects, proposals should be made for preventing/avoiding, reducing, or offsetting or compensating for them (mitigation) should be described and the significant landscape effects remaining after mitigation considered.

7.2.2 Visual Assessment

The baseline study for visual effects should establish the area in which the development may be visible, the different groups of people who may experience views of the development, the viewpoints where they will be affected and the nature of the views at those points. Interrelationships with the cultural heritage topic area need to be borne in mind when developing the visual baseline and identifying visual effects. Mapping locations from where they may be views and identifying land that may potentially be visually connected with the development proposal is an important tool but does not in its own right identify the effects.

Viewpoints from which the proposal will actually be seen by visual receptors should be identified and these may include public viewpoints including rights of way, transport routes and places where people work. In some instances it may also be appropriate to consider private viewpoints, mainly from residential properties. The viewpoints will fall into three groups; representative (to represent the experience of different types of visual receptor where larger numbers of viewpoints cannot be included individually such as where points are taken to represent views of users of footpaths), specific (key viewpoints such as visitor attractions, and illustrative (to demonstrate specific issues). The viewpoints should cover both near and more distant views.

The preparation of the visual baseline is followed by the systematic identification of lively effects on the potential visual receptors. Once the visual effects have been identified they must be assessed to determine their significance.

The sensitivity of visual receptors needs to be established in terms of both their susceptibility to change in views and visual amenity and also the value attached to particular views. The magnitude of

visual effects needs to be evaluated in terms of its size and scale, the geographical extent of the area influenced, and its duration and reversibility.

As with landscape impact, final conclusions about significance will combine the judgements about the sensitivity of the visual receptors and the magnitude of the visual effects.

7.2.3 Cumulative Effects

Guidelines set out that cumulative impacts 'result from additional changes to the landscape or visual amenity caused by the proposed development in conjunction with other developments (associated or separate to it), or actions that occurred in the past, present or are likely to occur in the foreseeable future' (Landscape Institute and IEMA, 2002: 85). The assessment needs to be kept in proportion to the nature of the project under consideration. The emphasis in EIA is on likely significant effects rather than on comprehensive cataloguing of every conceivable effect that might occur. The mitigation of any significant adverse cumulative landscape and visual effects needs to be considered.

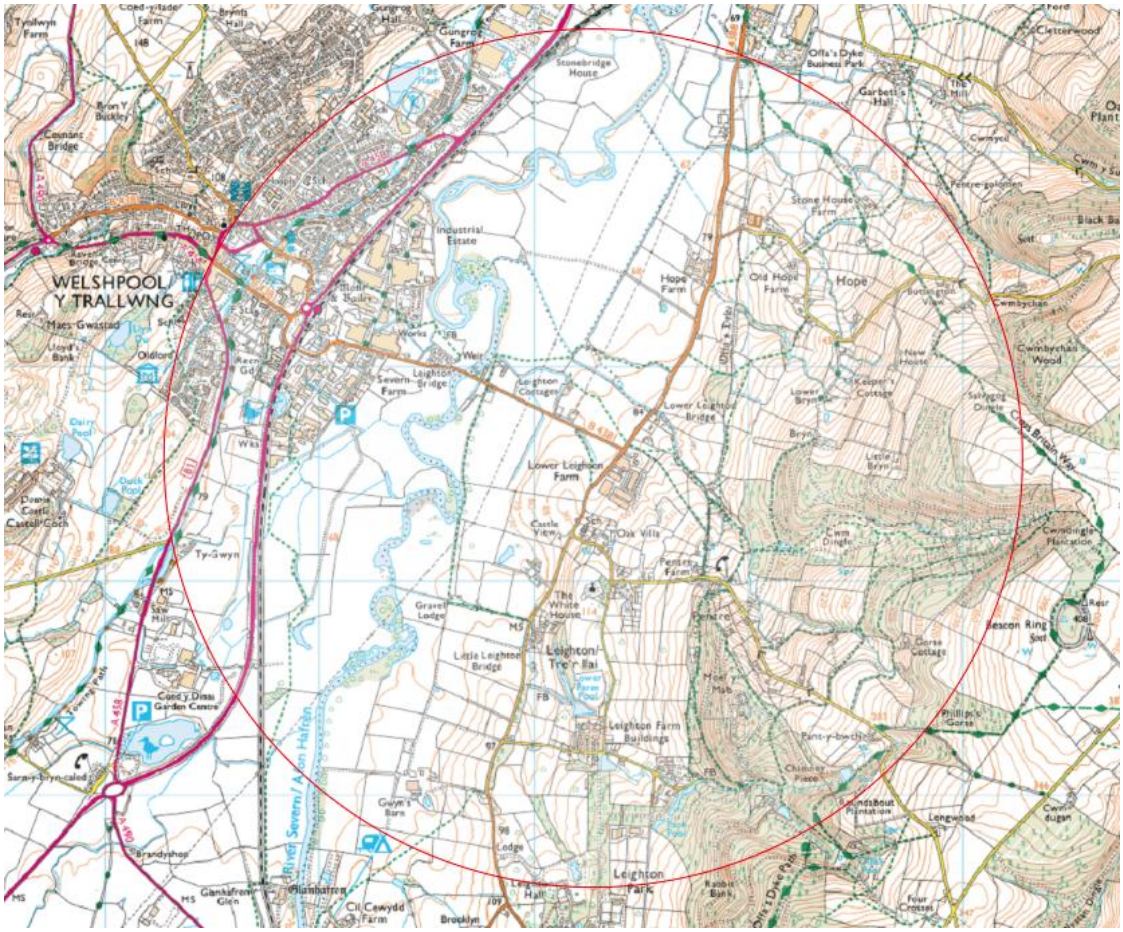
7.3 The Site and Surroundings

This is discussed in Chapter 1 and 4.

7.4 The Focus Study Area

The focus study area involves a 2km radius from the proposed site, although certain locations have also been considered outside this area where appropriate. Not all locations from within the focus study area will be impacted by the proposed development due to the topography of the landscape and intervening landscape features.

A map of the Focus Study Area is below:



7.5 Landscape Character

The site is within the Severn Farmlands Landscape Character Area. This is described as incorporating the valleys of the Severn and Vyrnwy rivers, with settlements of various sizes including Newtown and Welshpool. It wraps around the rolling hills of the Guilsfield LCA to the south and west. It borders the Llanfyllin Farmlands LCA to the north, Pont Llogel LCA and Tregynon LCA to the west, Long Mountain / Breidden Hills LCA to the east and Llandinam to Llandyssil Hillsides LCA to the south. A small unit of the LCA in the south is bordered by the Llandinam to Llandyssil Hillsides LCA to the west, Corndon Hill LCA to the north and Kerry Hills LCA to the south, as well as part of Shropshire to the north and east.

The LCA is within the Severn Valley National Landscape Character Area (NLCA), Montgomeryshire Hills and Vales NLCA and Shropshire Hills NLCA.

The key characteristics of the LCA are:
Topography, geology and drainage

- Extensive, open and low-lying valley of the River Severn and River Vynrwy and their tributaries.
- The valleys have a distinctive wide floodplain, narrowing in the south-west with steep valley sides.
- Geologically, a major river system with notable glacial and fluvioglacial features including well-developed meanders, oxbow lakes, terraces and depositional basins. Several of these are Regionally Important Geological and Geomorphological Sites (RIGS)or Geological Conservation Review (GCR) sites demonstrating fluvial geomorphology, including Severn Roundabout RIGS and Afon Vyrnwy GCR site.
- Numerous RIGS including Castle Rock in Montgomery (notable for its exposure of the Castle Rock conglomerate), Standard Quarry and Powis Castle in Welshpool (the former notable as the source for the grey-green stone found in the latter) and Llanmynech Rocks (the only exposure of the Dinantian age rocks in Powys).

Vegetation Cover

- Hedgerows and mixed broadleaved woodland, much of ancient semi-natural origin, contributes to a strong landscape structure.
- Wooded parkland landscapes occupy parts of the floodplain, including at Lymore Park, Vaynor Park and Bryngwyn.

Agricultural land use and field patterns

- A combination of improved grassland and arable land, with fields varying in scale from small to large with well-defined boundaries of managed hedgerows or post and wire fencing.
- Some traditional species-rich hay meadows.

Semi-natural habitats

- Important habitats present are lowland hay meadows, ancient/species-rich hedgerows, eutrophic standing waters, lowland mixed deciduous woodland and aquatic communities.
- Nationally and regionally protected broadleaved woodland including at Coed yr Allt SSSI and Pendalog Wood Site of Importance for Nature Conservation (SINC) and Moat Wood SINC in the Rhiw Valley.
- Llanmynech and Llynclys Hills SSSI at the edge of the LCA is a group of Carboniferous Limestone hills designated for its limestone plant communities.
- The Montgomery Canal which runs between Llanmynech and Aberbechan is an SAC / SSSI of note for its aquatic emergent and marginal plant communities.

Archaeology and cultural heritage

- Forms part of the Vale of Montgomery Registered Historic Landscape, with notable features including part of Offa's Dyke early medieval political boundary, Forden Gaer Roman Site and the medieval town of Montgomery, with its 13th century Grade I listed castle.

- The medieval Powis Castle is set within an internationally renowned Grade I listed Registered Historic Park and Garden (RHPG), and there are other RHPGs at Bodfach Hall, Bodynfoel Hall, Bryngwyn, Leighton Hall, Vaynor Park, Glansevern Hall, Garthmyl Hall, Cefn Bryntalch, Lymore Park and Mellington Hall.
- Numerous prehistoric defended sites including the remains of Llanymynech Hill Camp, the largest hillfort in Wales.
- The corridor of the mid-18th century and early 19th century Montgomery Canal traverses the LCA, and there are numerous listed structures along its course including bridges, aqueducts and limekilns.

Settlement and road pattern

- Contains the thriving market town of medieval origin at Newtown, with a historic core either side of the River Severn which is a Conservation Area.
- The medieval town of Welshpool is historically centred around the livestock market and has close associations with the medieval Powis Castle.
- The town of Montgomery occupies a prominent position on a hilltop above the Vale of Montgomery, and has a medieval street layout, imposing Town Hall and mix of Georgian, Victorian and timber framed buildings.
- Elsewhere there are nucleated settlements of medieval origin at Meifod, Llanfechain, Llandysilio, Llandrinio and Llanfyllin.
- The Severn and Vyrnwy Valleys contain several major transport routes and a well-developed network of PRoWs and long distance walking and cycling routes including parts of the Severn Way long distance trail, Offa's Dyke National Trail and NCN Route 81.

Views and perceptual qualities

- Sense of place resulting from the broad, flat farmed floodplain, enclosing wooded valley sides (in neighbouring LCAs) and historic settlements.
- Wide views across the valley are available although outward views from the LCA are contained by the enclosing wooded valley sides in neighbouring LCAs including the Long Mountain / Breidden Hills LCA to the south-east.
- Occasional elevated and expansive views across the Severn Valley including from Llanmynech Hill and Montgomery Castle.

7.6 Landscape Context and Consultation

7.6.1 Designated Landscapes

The site is not within a nationally or locally designated landscape area.

Although historic features have been considered in this chapter, further detail can be seen in chapter 14 – Heritage.

7.6.2 Landscape Value and Sensitivity

The site itself is not subject to any national landscape designations such as AONB (Area of Outstanding Natural Beauty) or National Parks.

The area around the site at Lower Leighton is fairly intensively farmed and there are several large farms in the area. The landscape is in relatively good condition and there is an element of scenic quality. It is not a rare landscape and represents a fairly typical farming scene in Powys. It is not a wild landscape and due to the fairly intensive agricultural operation is not overly tranquil. There are no known landscape associations (such as with historic characters). The landscape value can be assessed as medium.

The nature of the views are relatively short distance. The susceptibility to change (the ability of the landscape receptor to accommodate the proposed development) is high in the proposed location, although this would be less further from the existing farmstead.

The overall sensitivity of the landscape is considered to be medium.

7.7 Project Description and Mitigation Measures

The project involves the construction of an anaerobic digestion plant and infrastructure at Lower Leighton. The buildings and infrastructure are purposefully designed with some elements set down in the ground to reduce visual impact.

During the construction phase there will be some effects on the landscape and visual amenity.

7.7.1 Mitigation Measures

There are very limited locations from where the proposed site or the existing buildings can be seen, and the proposed anaerobic digestion plant will or potentially be visible. Although due to surrounding topography and existing structure and landscape features views of the site are limited and an element of landscaping should be incorporated into the scheme.

The main views towards the site are from close by locations along the public right of way which goes through the site. There are very limited views from footpaths further afield or public roads due to the intervening topography and landscape features.

A landscaping scheme for the application site should be designed to utilise the existing landscape and topography. This will ensure that landscaping is provided that is in keeping with the existing landscape character.

No existing hedges or trees will be impacted by the proposed development and any new tree planting will represent an improvement in terms of providing visual mitigation and also from a biodiversity point of view.

Full planting proposals will be devised to address the principal landscape objectives including reasons of biodiversity and nature conservation, visual screening, landscape character and appropriateness and high quality amenity.

Species selected will reflect those locally occurring and appropriate to the existing surrounding woodlands, trees and hedgerows. Overall, the planting would be dominated by native and locally occurring species and would address all of the principal landscape and planting objectives. Some evergreen species will be included to give quick cover and winter screening.

A mix of planting sizes and densities will be adopted to satisfy the differing objectives, principally those of screening and filtering in the short and longer terms and of establishing well balanced woodland and planting habitats. Variations in the woodland and structural planting mixes and percentage ratios will be adopted to create variety and interest across the site and to reflect the differing objectives for the planting areas at different locations within the site.

7.8 Assessment of Residual Landscape and Visual Effects

7.8.1 Direct Impacts

The site forms part of a field to the west of the existing dairy farm. The proposed development would not result in the loss of any important landscape features, however there would be a change of land cover of the site as a result. An area of farmland would be lost resulting in a partial change and a new element created being the anaerobic digester and mitigation measures. The overall sensitivity of the site in relation to direct changes as a result of the development is considered to be low.

The proposals will increase the built environment of the site and there will be level changes which have been fully considered to mitigate impact on the landscape. There will also be opportunity for planting of native trees which will enhance the landscape. The development will not introduce a completely new feature into the landscape bearing in mind the existing dairy farm.

It is considered that the magnitude of change associated with the potential direct impacts from the development would be slight particularly as the buildings are well related to the existing farmstead. This chapter of the ES has examined the potential impacts of the proposed development on the landscape and visual amenity of the study area. It has considered the potential direct impacts on the fabric of the landscape and the potential impacts on the perception of landscape character. The assessment has also considered the potential impacts of the proposed development on visual amenity.

The study area was defined as extending to a 2km radius centred on the proposed site location. Within this area, both landscape and visual receptors were identified and recorded, in effect forming the baseline situation into which the proposed anaerobic digester would be introduced and have the potential to affect. Planning policies relevant to the Landscape and Visual Assessment have also been considered. The assessment considered both the possible effects during the construction phase and the residual effects during the operational phase of the development after mitigation measures have been incorporated. The visual assessment was carried out in context of the site in the first year of operation and the site following the establishment of the landscape scheme.

7.8.2 Landscape Character

In addition to the development having an impact on the character of the application site itself, impacts on the landscape character type within which the site is located is more variable.

The proposed site for the anaerobic digester is within the Severn Valleys Landscape Character Area, and therefore has the potential to impact this character type. The proposed development involves a scale of structures that could be seen through intervening vegetation. The baseline report concludes that the existing buildings at Lower Leighton and therefore the proposed buildings and associated infrastructure could be visible from some locations within the surrounding landscape. However, the topography of the area and existing vegetation will reduce any potential visual impact.

The buildings could be a feature from some near locations within the Severn Valley character type, particularly from the right of way, however it will not introduce a new feature into the landscape, particularly when considering that there are existing large scale agricultural units within the landscape area. The site is also well related to the existing buildings at Lower Leighton. Mixed farming land use is a key use within the landscape type. It is considered that within this landscape character type the magnitude of the change resulting from the buildings associated with the perception of landscape character would be slight, resulting in a minor effect on landscape character. Any, adverse effects will be localised and limited to locations in close proximity to the proposed development. The effects will be mitigated by the landscaping works carried out as a result of the development.

7.9 Assessment of Potential Visual Impacts

7.9.1 Overview of the Development

Planning policy generally supports agricultural development which has regard to any potential impacts on landscape character and visual amenity. Large scale agricultural development needs to fully consider and mitigate any potential impacts. The proposals have been developed to provide a solution that meets with policies of rural economic sustainability whilst minimising the potential for adverse impacts on landscape character and visual amenity.

There will be varying impacts within the 2km focus area with the undulating and sloping landscape and intervening landscape features obscuring the view from many potential visual receptors. There will be certain locations when the building is partly visible, however from the wider landscape as separation distance increases, the screening effect of intervening landform, structures and vegetation has a greater effect.

7.9.2 Visibility Analysis

The views are restricted by the topography of the area and existing landscape features. Views from public roads are limited by the tall roadside hedges and structures and there are limited views from public footpaths.

The main visual receptor has been identified as the public right of way which runs through the site. However it is proposed that this footpath is diverted.

The scale in the change of view from these receptors will therefore be limited as they are already looking towards the existing farm and it will only affect a very short section. Further mitigation will also be provided which will help to screen the new buildings. The main visual impact will be in the short term during the construction phase and before the landscaping has taken full effect. This helps to reduce the magnitude of the effects. Based on the effectiveness of the screening and short section effected the visual impact from this receptor is likely to be minor.

Views from other near footpaths and bridleways will be restricted by intervening topography and landscape features.

There are very limited, if any, views from other footpaths in the vicinity and there will be no significant impact on these receptors.

There are limited views of the site from nearby dwellings, which are considered to be a receptor type susceptible to change. The closest dwelling is at Lower Leighton and occupied by family members. The anaerobic digester will appear as an extension to the existing farmstead and there will be no significant visual impact from this dwelling.

The closest dwellings not associated with the farm business are on the north side of Lower Leighton Farm. However, these are on the other side of the B4388 . Access was not available into the dwellings and it was not possible to ascertain whether there were any views of the site from upstairs windows. However, even if there are views from upstairs windows these are often bedrooms and bathrooms rather than living/reception rooms which are not occupied so much during daylight hours. The visual impact on these properties will be minor.

Views from isolated dwellings further from the site are restricted by the intervening undulating topography and landscape features. Dwellings further from the site may have distant views but there will be no significant visual impact.

There are glimpses towards the site from certain locations from public roads, although these are mostly close to the site and through gaps in roadside hedges. Users of roads are less susceptible to change than footpath users and there will not be a significant magnitude of change due to the location of the site close to the existing buildings. The impact from public roads will be minor or none.

7.10 Conclusions

The direct effects on landscape will be limited. The proposed development is on farmland and no important landscape features or elements will be lost as a direct consequence of the development. The proposed site is well related to existing agricultural buildings. The proposed development will be compatible with the surrounding agricultural land uses.

With regards to indirect effects and the perception of landscape character, it is considered that the proposed development will have a minor effect on the Severn Valleys on which the development site is located. The effects on the other character areas surrounding the site will also be minor.

The impacts on visual amenity have been assessed and considered to be minor. The landscape is capable of accommodating the development and additional mitigation works will further lessen any impact.

Overall, the landscape and assessment has established that the proposed anaerobic digestion plant will have a limited effect on the baseline conditions in terms of both landscape character and visual amenity. The proposed development is considered to be acceptable with regard to the potential effects on landscape character and visual amenity.

There are no other known large scale agricultural developments taking place in the area and therefore no known potential for cumulative landscape of visual effects.

CHAPTER 8 – TRAFFIC

8. Traffic

8.1 Introduction

This chapter examines the relationship between the proposed development and the local highway network, its potential effect on the network and the need to provide improvements to infrastructure and services to accommodate the proposed development.

This chapter describes the assessment methodology, the baseline conditions, the mitigation measures incorporated to prevent, reduce or offset any significant adverse effects and states the effects after these measures have been employed.

8.2 Legislative and Policy Framework

8.2.1 Planning Policy Wales, Edition 12, February 2024

Paragraph 4.1.10 states that:
"The planning system has a key role to play in reducing the need to travel and supporting sustainable transport, by facilitating developments which:
• are sited in the right locations, where they can be easily accessed by sustainable modes of travel and without the need for a car;
• are designed in a way which integrates them with existing land uses and neighbourhoods; and
• make it possible for all short journeys within and beyond the development to be easily made by walking and cycling"

PPW then goes on to say:
"Development proposals must seek to maximise accessibility by walking, cycling and public transport, by prioritising the provision of appropriate on-site infrastructure and, where necessary, mitigating transport impacts through the provision of off-site measures, such as the development of active travel routes, bus priority infrastructure and financial support for public transport services. Importantly, sustainable transport infrastructure and services should be prioritised and put in place from the outset, before people have moved in and travel patterns have been established."

Paragraph 4.1.56 relates to transport assessments:
"Transport Assessments are an important mechanism for setting out the scale of anticipated impacts a proposed development, or redevelopment, is likely to have. They assist in helping to anticipate the impacts of development so that they can be understood and catered for appropriately."

8.2.2 TAN18 Transport

Paragraph 3.11 states:
"Development in rural locations should embody sustainability principles, balancing the need to support the rural economy, whilst maintaining and enhancing the environmental, social and cultural quality of rural areas. Most development should be located in places accessible by a range of travel modes. As part of the settlement strategy of the development plan, planning authorities should consider identifying key local service centres. These centres may comprise a market town, large village or closely associated group of villages. Such service centres should be the preferred locations for most new development including housing and employment provision. The identification of key service centres will help to promote the use of public transport, walking and cycling and minimise the need for journeys to larger centres."

Paragraph 3.14 states:
"Local authorities should adopt a positive approach to development associated with farm diversification in rural areas, irrespective of whether farms are served by public transport (PPW paragraph 7.3.3). This type of small scale economic development is attached to existing farm businesses that are often situated in relative rural isolation. It is important that a realistic assessment of the transport impacts is made, with a view to reconciling traffic issues with the benefits of

encouraging diversification. In the majority of cases, it is expected that any transport problems should be capable of being resolved by appropriate minor junction or other highway modifications. Exceptionally, there may be cases where the anticipated increase in traffic cannot be reasonably accommodated. Such developments are more appropriately located on allocated industrial/ commercial sites, if available in the locality, or in or adjoining local service centres where the highway network is more robust."

8.2.3 Powys Local Development Plan

Policy T1 – Travel, Traffic and Transport Infrastructure

Transport infrastructure, traffic management improvements and development proposals should incorporate the following principal requirements:
1. Safe and efficient flow of traffic for all transport users, including more vulnerable users, and especially those making 'Active Travel' journeys by walking or cycling;
2. Manage any impacts to the network and the local environment to acceptable levels and mitigate any adverse impacts; and,
3. Minimise demand for travel by private transport and encourage, promote and improve sustainable forms of travel including Active Travel opportunities in all areas. Transport infrastructure improvements will be supported where they promote sustainable growth, maximise the efficiency and safety of the transport systems, improve public and private transport integration and encourage passenger and freight rail operations.

8.3 Assessment Methodology and Significance Criteria

8.3.1 Assigning Value

The significance of potential effects has been assessed based on the categories of sensitivity and magnitude as shown in the table below:

Table 3 Environmental Value (Sensitivity) and Descriptions

Value (sensitivity) of receptor/resource	Typical description
Very high	Very high importance and rarity, international scale and very limited potential for substitution, i.e. major motorways and trunk roads
High	High importance and rarity, national scale, and limited potential for substitution, i.e. lesser motorways and trunk roads
Medium	Medium or high importance and rarity, regional scale, limited potential for substitution, i.e. principle routes ('A' classified)
Low	Low or medium importance and rarity, local scale, i.e. primary and secondary distributor roads ('A' and 'B' classified)
Negligible	Very low importance and rarity, local scale, i.e. 'C' classified, unclassified and private roads

8.3.2 Assigning Magnitude of Impact

The descriptions for magnitude of impact are as in the table below:

Table 4 Magnitude of impact and typical descriptions

Magnitude of Impact (Change)		Typical description
Major	Adverse	Loss of resource and/or quality and integrity of resource; severe damage to key characteristics, features or elements
	Beneficial	Large scale or major improvement of resource quality; extensive restoration; major improvement of attribute quality
Moderate	Adverse	Loss of resource, but not adversely affecting the integrity; partial loss of/damage to key characteristics, features or elements

	Beneficial	Benefit to, or addition of, key characteristics, features or elements; improvement of attribute quality
Minor	Adverse	Some measurable change in attributes, quality or vulnerability; minor loss of, or alteration to, one (maybe more) key characteristics, features or elements
	Beneficial	Minor benefit to, or addition of, one (maybe more) key characteristics, features or elements; some beneficial impact on attribute or a reduced risk of negative impact occurring.
Negligible	Adverse	Very minor loss or detrimental alteration to one or more characteristics, features or elements
	Beneficial	Very minor benefit to or positive addition of one or more characteristics, features or elements
No change		No loss or alteration of characteristics, features or elements, no observable impact in either direction

8.3.3 Assigning Significance

The description for significance are as in the table below:

Table 5 Significance categories and typical descriptions

Value (sensitivity) of receptor/resource	Typical description
Very large	Effects at this level are material in the decision-making process
Large	Effects at this level are likely to be material in the decision-making process
Moderate	Effects at this level can be considered to be material decision-making factors
Slight	Effects at this level are not material in the decision-making process
Neutral	No effects or those that are beneath levels of perception, within normal bounds of variation or within the margin of forecasting error

The significance matrix is shown in the table below:

	Magnitude of impact (degree of change)				
Environmental value (sensitivity)	No change	Negligible	Minor	Moderate	Major
Very high	Neutral	Slight	Moderate or large	Large or very large	Very large
High	Neutral	Slight	Slight or moderate	Moderate or large	Large or very large
Medium	Neutral	Neutral or slight	Slight	Moderate	Moderate or large
Low	Neutral	Neutral or slight	Neutral or slight	Slight	Slight or moderate
Negligible	Neutral	Neutral	Neutral or slight	Neutral or slight	Slight

8.3.4 Extent of the Study Area

The extent of the study area consists of the following which form the local highway network:

- Access from the site onto the B4388
- Access from the site onto the B4381

8.3.5 Assessment of Sensitivity

Professional judgement has been used to determine the sensitivity of the local highway network. The sensitivity of the receptors can be defined by the hierarchy of the roads which are connected at the junctions:

- The site access is a private road which has very low importance on a local scale (value = negligible)
- The B4388 is a secondary distributor road which has a low importance on a local scale (value = low)
- The B4381 is a secondary distributor road which has a low importance on a local scale (value = low)

There are no footpaths along any of the roads which form the local highway network and there are no major sensitive receptors which might attract pedestrian or cycle movements located on the highways affected by the proposed development.

On this basis, the following effects are scoped out of any subsequent assessment:

- Severance
- Pedestrian delay
- Pedestrian/cycle amenity
- Fear and intimidation

Given the nature of the proposed development it is considered unlikely that any hazardous road movements would be generated during the construction or operation phases and accordingly these are scoped out of any subsequent assessment.

8.3.6 Assessment of Magnitude

The magnitude of traffic impact is a function of the existing traffic volumes and the increase due to background traffic growth and the traffic generated by the proposed development.

8.3.7 Assessment of Significance

The magnitude of impact is based on the criteria outlined in table 4 above.

8.3.8 Key Parameters for Assessment

The key parameters are to quantify the additional traffic generated by the proposed development and to assess the effect of these increases.

8.4 Baseline Conditions

8.4.1 Accessibility on Foot and Cycle

It is generally accepted that walking is the most important mode of travel at the local level and offers the greatest potential to replace short car trips, particularly under 2km, and that cycling has the potential to substitute for short car trips, particularly those under 5km, and to form part of a longer journey by public transport.

There are no footways or other facilities to assist pedestrians in the vicinity of the proposed development site.

A residential built-up area lies approximately 1.1 mile walk from the site. Having regard to the lack of pedestrian infrastructure it is unlikely that many future members of staff will walk to the site.

The B4381 is on the national cycle route 81 which has a 60mph speed limit, which is not ideal for cyclists. Notwithstanding this, there is a network of lightly trafficked 'B' classified roads surrounding the site which are suitable for cyclists to use relatively safely, and the local topography is conducive to cycling.

The closest built-up area where future staff might live lies 1.1 miles from the proposed development site, including the town of Welshpool.

8.4.2 Accessibility by Public Transport

It is recognised that for public transport to be an attractive alternative mode of transport to the private car it needs to be easily accessible on foot. Ideally, bus users should not have to walk more than 400m to their nearest bus stop and train users should not have to walk more than 800m to their nearest train station. This criterion is sometimes difficult to satisfy comprehensively, particularly outside of the larger conurbations, and therefore it is normally accepted that direct, frequent and easily understood services are more important than a few extra metres of walking distance.

Bus stops are located within Welshpool, but these are served bus services of a frequency which is not ideal suitable for commuting – they appear to be more designed for people to conveniently visit surrounding towns for shopping and leisure, etc., on occasional days. Combined with the substandard local pedestrian facilities, the effect is that few future staff employed at the Proposed Development site are likely to use public transport for commuting, this being consistent with the National Census data for the surrounding area.

8.4.3 Accessibility by Vehicles

Access to the site is currently available from the B4388 via two existing agricultural accesses and an access onto the B4381.

The proposed development site is presently used for agriculture and generates traffic movements to the existing silos on site and for harvesting operations.

8.5 Potential Impacts

Vehicular access to the proposed development site would be provided via improved existing agricultural accesses onto the B4388 and B4381.

The access roads would be provided with a carriageway width of 10m for a length of at least 15m from the junction.

A total of 7 car parking spaces will be provided to cater for the demand by staff and visitors.

8.5.1 Construction Traffic Movements

The volume of construction traffic is currently unknown but has been estimated based on a similar project:

- Construction period – 12 months
- Construction hours of operation – 07:00 to 19:00 hours
- Traffic associated with staff and deliveries – average of 28 car arrivals per day
- HGV traffic – average of 4 HGV arrivals per day

It is anticipated that all construction traffic will travel from the A483 onto the B4381 and B4388.

It is anticipated that a condition of any planning permission for the proposed development will require the submission, agreement and implementation of a Construction Traffic Management Plan (CTMP).

8.5.2 Operational Traffic Movements

The traffic generation of the proposed development has been calculated from first principles by considering the traffic associated with the different elements of the operation of the plant as follows:

- Commuting trips
- Servicing and maintenance trips

- Input material trips
- Output material trips

Commuting Trips

On a typical weekday there would be around 5 members of staff attending the site, with slightly fewer on a Saturday and somewhat fewer on a Sunday. In order to calculate the traffic generation associated with commuting trips on a typical weekday, the following assumptions have been made:

- All staff who work office hours arrive 08:00 to 18:00 Monday to Friday. On weekends there will be a duty employee on site for 4 hours in total (split into 2 shifts)
- Logistics staff (i.e. HGV drivers) will be restricted to the working day (08:00 to 18:00) both entering and exiting the site.
- The worst case scenario where all members of staff travel to and from the site as a single occupancy driver.

Servicing and Maintenance Trips

We understand that the vast majority of servicing and maintenance of the plant would be carried out by the permanent members of staff. There would inevitably be occasionally trips to the site by specialists associated with the servicing and maintenance, but this element will not consistently generate a significant level of traffic.

Input Material Trips

The AD plant will process approximately 133,000 tonnes of material per year.

All of the cattle manure and slurry will originate from farms within the landowners ownership - Lower Leighton Farm, Court Calmore and Wernllwyd (Berriew). The slurry at Lower Leighton is currently pumped to the existing towers on site.

All material will be delivered by Tractor/Trailer at a constant rate Monday to Saturday (i.e. 312 days per year) between 06:00 and 24:00 hours. The amount delivered depends on the type of material. The traffic generation associated with input material is summarised in the following table:

Table 6 Traffic generation associated with input material

Material	Tonnes per Annum	Tonnes per Load	No of Tractors and Trailers	No of Two-Way Movements	No of Two Way Movements per Day
Dairy slurry from Lower Leighton	65,000	Piped to the site	-	-	-
Cattle manure from Lower Leighton	2,000	25	80	160	0.51
Wernllwyd slurry	2,000	30	67	134	0.42
Wernllwyd cattle manure	19,000	25	760	1,520	4.87
Court Calmore slurry	20,000	30	667	1,334	4.27
Rye silage	25,000	25	1,000	2,000	22.22
Totals	133,000		2,574	5,148	32.49

The proposed development would generate 32.49 two-way movements per day associated with input material. However, the rye silage will only be transported in to the anaerobic digester during the summer months – assuming 3 cuts per summer.

Of the 120,269 tonnes of digestate being produced, 21,000 tonnes of solid digestate and 22,000 tonnes of liquid digestate will be exported off site as part of the return trips from taking feedstock to the AD unit.

Output Material Trips

The AD plant produces biomethane which will be injected into the Wales & West Utilities gas network; this element of the process will therefore generate no traffic.

The AD plant will produce 120,269 tonnes of digestate per annum. Of this 77,465 tonnes of digestate per annum which will be transported off site as additional movements. It is expected that the additional movements associated with exporting the digestate off site will be as follows:

Material	Tonnes per annum	Type of transport	Tonnes per Load	No of Loads	No of Two-Way Movements	No of Two-Way Movements per day
Solid digestate	3,465	Tractor and trailer	25	138.6	277.2	0.88
Liquid digestate	74,000	Tractor and tanker	30	2,466.6	4,933.2	15.8
Totals	77,465			2,605.2	5,210.4	16.68

8.6 Design, Mitigation and Enhancement Measures

The site access junctions will be improved as part of the proposed development.

With regard to HGV movements and construction traffic, it is anticipated that all construction vehicles will be required to use only the approved access routes to the site in accordance with an agreed CTMP.

No improvements to the wider highway network are proposed as part of the proposed development.

8.7 Residual Impacts and Conclusion

It has been demonstrated that the proposed development is supported by current policies. The development of the site will provide continued diversity and sustained economic growth in the rural area.

The site is located on a suitable and satisfactory highway network, which is considered to have adequate capacity for the likely small increase in traffic generated by the proposals.

It is concluded that the vehicle movements generated by the development will be conveniently accommodated on the highway network. It will have only a very limited impact of no significance on the local highway conditions. The accesses allow all vehicles to safely turn on and off the highway network and will therefore reduce any impact on the flow of traffic on the highway and increase the safety condition for all road users.

CHAPTER 9 – ODOUR

9. Odour

9.1 Introduction

This chapter reports the potential effects of odour from the construction and operation of the proposed anaerobic digestion plant. The assessment of effects uses computer modelling to assess the impact of odour emissions.

9.2 Competent Experts

Anna Becvar
Anna is Managing Director of Earthcare Technical with oversite on all projects in England and Wales. She has extensive project management and project delivery experience. Anna is from a farming background and has been working mainly in the farming, renewable energy and waste industry sectors for over 30 years. Anna is a BASIS Approved Trainer for FACTS and Waste to land advanced modules and regularly conducts inhouse training for contracting organisations. Anna is a Chartered Soil Scientist with particular expertise in rapid risk assessment work on organic materials, technical assessment/report writing and knowledge transfer.

Christine McHugh
Christine has over 30 years' experience in air quality and emissions. She has particular expertise in modelling, forecasting and altering, and airport air quality, having provided air quality and carbon studies for several major UK airports. She currently specialises in studies of air quality and odour for agricultural and industrial applications, including anaerobic digestion.

She spent 20 years providing modelling expertise and developing models including the world-leading ADMS models and forecasting and altering systems including those for Beijing and London. She has provided planning and other technical support to the Greater London Authority and Transport for London. Christine provided expertise internationally, as the EU expert on air quality in the EU/China Liaoning Integrated Environment Programme and on collaborative international projects or the European Space Agency, EU 7th Framework and the European Commission.

She has provided training internationally to air quality professionals. She led the UK air quality team at Ove Arup & Partners Ltd and Amec Foster Wheeler's team (South). Christine is a Chartered Scientist, a former Chair of the Institute of Air Quality Management (IAQM) and a former member of the Council of the Institution of Environmental Sciences (IES).

9.3 Assessment of Odour

This Odour Assessment (OA) has been prepared by Earthcare Technical Ltd (ETL) on behalf of Farm Biomethane Ltd, in support of a planning application for the development of an agricultural Anaerobic Digestion (AD) Facility on land at Lower Leighton Farm, Leighton, Welshpool, Powys, SY21 8HH, on land centred at National Grid Reference (NGR) SJ24130655 ('the AD Plant Site'). Development of the above infrastructure, is hereafter referred to collectively as 'the Proposed Development.' The planning application will be submitted to Powys County Council (PCC).

The AD Plant Site will treat 133,000 tonnes per annum (tpa) of energy crops (silage) and livestock manures and produce approximately 24,465 tpa of solid digestate and 96,004 tpa of liquid digestate.

The design of the AD Plant Site incorporates the latest approaches to covering and containing feedstocks and digestate, and treating odorous air, reducing odour, before air is released to atmosphere.

This Odour Assessment has been undertaken to risk assess the potential impact of the proposal on human receptors.

9.3.1 Assessment scope

The objective of the assessment presented herein is to assess the likely odour impact risk to human receptors that would occur in the locale as a result of the operation of the Proposed Development.

The risk assessment presented herein follows the framework set out in the Institute of Air Quality Management (IAQM) guidance on the assessment of odour for planning. The IAQM guidance structures the assessment of the emissions, dispersion, and receptors to inform an assessment of the overall odour effect. The qualitative assessment follows this stepwise approach to evaluating the emissions (magnitude, frequency, offensiveness), the dispersion of the emissions (height and momentum of release, factors increasing dispersion), and the human receptors (proximity, sensitivity).

A qualitative risk-based odour assessment has been undertaken that evaluates the potential odour impacts associated with the operational phase of the Proposed Development. The scope of the evaluation includes:

- A process description reviewing the proposed infrastructure at the AD Plant Site and potential for odorous emissions.
- An assessment of the likely magnitude and nature of odour emissions that may be generated from the operation.
- Completion of a qualitative risk-based odour assessment to assess the risk of offsite odour impact occurring during the normal operation of the Proposed Development.

9.3.2 Environmental Permitting

The AD Plant Site will require a Bespoke Part A installation permit from Natural Resources Wales (NRW) to operate. This means the site cannot operate without first undergoing a rigorous assessment of the infrastructure and proposed operations as well as approval of a detailed Odour Management Plan (OMP). The permit dictates how the operational site is managed and requires that activities are free from odour at levels likely to cause pollution outside of the site boundary, "as perceived by an authorised officer of the EA, unless the operator has used appropriate measures, including, but not limited to, those specified in any approved odour management plan, to prevent or where that is not practicable to minimise the odour." A written Environmental Management System will be in place which includes the need for daily odour monitoring, as well as daily checks and monitoring for all aspects of the wider site operation. A complaint procedure providing a clear communication pathway will be in place as part of the OMP should residents wish to raise a concern that will then be addressed.

9.3.3 Site description

Figure 1 shows the AD Plant Site location and Figure 2 the Site layout including infrastructure.

The AD Plant Site lies approximately 2.1km east of the centre of Welshpool, 1.4km north of Leighton and 2.2km southwest of Buttington, bounded by the B4381 to the north and the B4388 to the east. The Site is currently in arable use and land in the immediate vicinity is in agricultural use. There are nearby agricultural and industrial uses: Leighton Farm, Welshpool substation. The closest residential receptors are Lower Leighton, 77m to the east and Cattle Grid 100m to the northeast. Lower Leighton Village Hall and Leighton CP School lying 100-150m south of the Site. There is also a footpath which crosses through the Site.

The Proposed Development is on land that slopes from the southern boundary to the northern boundary with a fall of 20m; it lies at an elevation of between 72m and 91m. Terrain in the vicinity of the AD Plant Site (within 700m of the Site) and nearby receptors are shown in Figure 3. The Site lies to the west of Afon Hafren/ River Severn, on the edge of the wide valley which runs south- southwest to north-northeast. Terrain rises to 420m within 700m to the southeast of the Site. Receptors that lie to the north or west of the AD Plant Site are at a similar elevation to the Site; receptors that lie to the east, including those to the southeast and northeast along the B4388, are on higher ground, at elevations up to just over 120m.

The prevalence of farming in the vicinity will influence baseline odour at the AD Plant Site. Potential odour due to the AD Plant Site will be 'agricultural' in nature.

9.3.4 Report structure

The report describes: the relevant legislation and guidance for odour (section 2); the methodology used (section 3); the qualitative risk-based odour assessment is presented in section 4 and the conclusion in section 5.

9.4 Receptors

Table 1 lists the receptors considered in this Odour Assessment with their distance and bearing from the AD Plant Site boundary; they are shown in Figure 4. The receptors include residential properties, workplaces, agricultural and industrial use, leisure use and a footpath.

The closest residential receptor to the red line boundary is H5, Lower Leighton, 77m to the east and H6, Cattle Grid 100m to the northeast. Lower Leighton Village Hall and Leighton CP School lie 100m and 113m respectively to the south, along the B4388. A footpath currently crosses the Site. Users of the footpath would be expected not to spend any longer on the footpath than it takes to walk along it, therefore their exposure would be limited in time. They would also have a low expectation of amenity with respect to odour as they are using a footpath in an agricultural area.

Table 1 Receptors, distance and bearing from red line boundary

Receptor	Type	Description	Easting	Northing	Distance from the Site*	Bearing from the Site
H0	Footpath	Footpath through Site	324262	306568	0	n/a
H1	Agricultural	Lower Leighton Farm 1	324389	306566	15	SE
H2	Substation	Welshpool substation	324123	306770	16	NE
H3	Agricultural	Lower Leighton Farm 2	324317	306452	40	SE
H4	Leisure	Tennis courts	324234	306333	44	S
H5	Residential	Lower Leighton B4388	324473	306592	77	E
H6	Residential	Cattle Grid B4388	324489	306658	100	NE
H7	Village Hall	Leighton Village Hall	324231	306263	113	S
H8	Primary School	Leighton CP School actual	324220	306234	142	S
H9	Residential	Bytake Cottages	324153	306901	147	NE
H10	Residential	Oaklea	324271	306236	148	S
H11	Business (Veterinary)	Llinthwaite Nant Y Coed	324516	306706	148	NE
H12	Residential	Castle View	324109	306207	185	S
H13	Residential	Brynhafren B4388	324547	306751	200	NE
H14	Residential	Severn Banks	323856	306959	301	NW
H15	Residential	Severn Lodge	323787	306877	321	W
H16	Residential	Shire Oaks	323968	306087	329	S
H17	Residential	Castle Court	324013	306077	329	S
H18	Residential	Rivendell House	323995	306062	347	S
H19	Residential	Church Close	324381	306022	387	SE
H20	Church	Holy Trinity Church	324251	305964	413	S
H21	Industrial/ Business	Castle Court workshops	324022	305986	417	S
H22	Residential	The Wain House Pentre Mill	324804	306417	450	NE
H23	Residential	Walcot B4388	324036	305856	543	S
H24	Residential	Taflog B4388	324036	305856	543	S

Receptor	Type	Description	Easting	Northing	Distance from the Site*	Bearing from the Site
H25	Residential	Pentre House	324417	305864	547	S
H26	Residential	Leighton Arches	323584	307009	560	NW
H27	Residential	The White House B4388	324019	305813	588	S
H28	Residential	West View	324758	307135	631	NE
H29	Residential	Gravel Lodge	323615	305930	652	SW
H30	Residential	Severnleigh B4388	323987	305708	697	S
H31	Industrial/ Business	CDT Sidoli	323364	307061	782	W
H32	Sewage Works	Welshpool STW	323421	307291	849	NW
H33	Residential	Severn Lane	323279	307053	859	W
H34	Agricultural	Hope Farm Barns	324762	307410	873	NE
H35	Residential	Severn Farm	323237	306976	877	W
H36	Residential	3 Henfaes Lane	323230	307190	957	NW
H37	Residential	Ivy Cottage Hope Road	325226	307139	979	NE
H38	Industrial/ Business	Severn Farm Indl Estate	323046	306769	1,023	W
H39	Agricultural/ Livestock	Yorton Farm incl stud	324263	305291	1,086	S
H40	Industrial/ Business	Technocover	323476	307690	1,107	NW
H41	Residential	Old Hope Hope Road	325201	307465	1,169	NE
H42	Residential	Little Hope Hope Road	324975	307690	1,219	NE
Notes: *Distances rounded to the nearest 5m						

9.5 Process description

9.5.1 Process description

The proposed site layout is shown in Figure 2.

9.5.1.1 Feedstock storage and handling

The AD plant will process approximately 133,000 tpa of crops (silage) and livestock manures.

Silage
Silage will be brought in from nearby farms by lorry (Heavy Goods Vehicle) during harvest time to be stored in the clamps. As fresh cut crops, the silage does not have a significant odour. Loads will be deposited onto the **2No. Clamps** (each 90m x 35m, 20,600t total capacity) where they are compressed for storage (ensiled) and covered with an impermeable membrane to exclude oxygen from the ensiled silage to aid preservation of the feedstock and hence ensure the best gas yield, this also excludes rainwater ingress.

Leachate is produced from the ensiled material. The leachate runs forwards (from southeast to northwest) within the clamps into the silage drainage channels and then to the underground leachate tank (80,000 litres capacity). The **Leachate Tank Vent** will exhaust passively to air and will be a source of odour.

Compacted silage will be cut from the clamp face using a top loader; it will be slightly moist and therefore not give rise to dust. It will be transferred once or twice each day from the working face of the clamps to the **2No. feed hoppers** in the **Waste Reception Building** (100m x 30.2m x 12m to eaves),

from where it is loaded into the primary digesters. Each loading phase will take approximately 2 hours/day. Standard operating procedures will include the clearing of any silage deposits dropped during loading. The **working face of the clamps** will be a source of odour.

Silage dropped during delivery or daily cutting of silage to feed the digesters will be cleared at the end of each loading phase.

Run-off from the hardstanding and bunded area will drain to the 1No. **Dirty Water Tank,** from where it will be reused in the process. The Dirty Water Tank will vent to the Waste Reception Building where the potentially odorous air is treated (odour reduced) before exhaust to atmosphere. The Dirty Water Tank will not be a source of odour.

2**No. Surface Water Lagoons** (2,495 m^3 and 288m^3 capacity) will hold rainwater from other hardstanding areas and will not be a source of odour.

Other solid feedstocks

Other solid feedstocks: manures, and waste such as Brewer's Grains will be delivered throughout the year and will be deposited in the Waste Reception Building once the roller door is shut. They are loaded into the Primary Digesters from the 2No. Feed hoppers in the Waste Reception Building where the potentially odorous air is treated (odour reduced) before exhaust to atmosphere.

Liquid feedstocks

Liquid feedstocks such as slurry, will be delivered by a combination of pipeline from Lower Leighton Farm and via tanker throughout the year. Liquid manures will be pumped from to the 1No. **Slurry Storage Tank** and, if necessary, the 1No. **Liquid Input Reception Tank**. The air displaced from the tanks would exhaust to the Waste Reception Building where the potentially odorous air is treated (odour reduced) before exhaust to atmosphere.

Waste Reception Building Odour Control System

Vehicles will access the Waste Reception Building via fast-acting roller shutter doors. The building will be served by an **Odour Control System (OCS)** with at least two air changes per hour (acph) providing a slight negative pressure with respect to the outside, meaning air from inside the building will tend not to leave the building even if the door is open. The air will pass through a wet **Scrubber** and an **Activated Carbon Filter,** before exhausting to atmosphere at 15.5m in height. The OCS will serve to abate emissions of odour, NH_3 and hydrogen sulphide (H_2S). The OCS will be a source of residual odour.

9.5.1.2 Biogas generation

In the **2No. Primary Digesters** and **2No. Post Digester** biogas is generated from the AD process and is stored in the domes above the digesters. The digester tanks will each have pressure and vacuum relief valves (PVRVs) as a safety measure to emit biogas or take in air if there is an over- pressure or under-pressure event respectively. PVRVs will not operate during normal operation, only as an emergency contingency and so releases of biogas and the associated odour from the PVRVs would be short-lived.

There will be a desulphurisation process at the AD Plant. The injection of low levels of oxygen and the addition of ferric chloride will reduce H_2S levels within the digester tanks and resultant biogas.

9.5.1.3 Use of biogas and combustion sources

1No. 1,200kWe combined heat and power plant (**CHP**) fired by natural gas will provide heat and power to the facility; it is expected to operate 8,600 hours per year. 1No. 800kWtho biogas-fired **Boiler** will provide heat to the facility if the CHP is unable to provide sufficient heat. An emergency **Flare** (Gasflare

MTU 2000 or equivalent) will operate to burn up to 2,000Nm3/h biogas in the event of an over-pressure in the digesters, conservatively assumed to operate < 250 hours per year. An emergency standby diesel generator will provide power when the CHPs are not operational if the National Grid cannot supply sufficient power, therefore, it would be used only as an emergency backup operating typically less than 12 hours per year (for testing each month) and operating less than 500 hours per year as a 3-year rolling average. The combustion sources are not expected to be a source of odour.

9.5.1.4 Digestate separation and storage

Whole digestate from the AD process will be pumped to 4No. **Screw Press Separators** in the Waste Reception Building, for separation into a digestate liquor and a fibre fraction. Solid digestate drops onto the floor and is stored until it is removed from the AD Plant Site. Odour will be treated by the Waste Reception Building OCS before release to atmosphere via the OCS exhaust.

The liquid digestate (liquor) will either be re-circulated within the AD system, stored in the 2No. **Existing Storage Tanks**, 1No. **Thin Fraction Buffer Tank** or will be transferred via a sealed pipeline to the 1No. 3,170m3 **Digestate Lagoon**. The Digestate Lagoon will have an engineered cover which will be made gas- tight by a concrete ring between the lining and cover. Any gas captured from the space between the digestate and the cover, and emissions from the Existing Storage Tanks,Thin Fraction Buffer Tank, will exhaust to the Waste Reception Building where the potentially odorous air is treated (odour reduced) before exhaust to atmosphere. The cover will be fitted with PVRVs which would operate in the unlikely event of an under-pressure or an over-pressure event. There will be no emissions to air and hence no odour from the Digestate Lagoon, Existing Storage Tanks and Thin Fraction Buffer Tank during normal operation.

At the **Offtake** point tankers will be filled with liquid digestate from the Digestate Lagoon and removed from Site. When tankers are filled with liquid digestate air from the tanker vents to atmosphere as it is displaced. Filling of tankers at the Offtake will be a small, intermittent source of odour.

9.6 Legislation, policy and guidance

The legislation and guidance relevant to this assessment is summarised below.

9.6.1 National legislation and policies

9.6.1.1 Environmental Protection Act

The Environmental Protection Act 1990 outlines that a local authority can require measures to be taken where any: *"dust, steam, smell or other effluvia arising from industrial, trade or business premises or smoke, fumes or gases emitted from premises so as to be prejudicial to health or a nuisance";* or where *"fumes or gases are emitted from premises so as to be prejudicial to health or cause a nuisance."*

9.6.1.2 2024 Welsh Act

The 2024 Welsh Actsets air quality targets and updated the Local Air Quality Management regime. It is supported by the Clean Air Plan for Wales and existing UK-wide regulatory frameworks. These sit alongside retained EU-derived standards and local authority duties for assessment and management of air quality Planning policy.

9.6.1.3 Environment (Air Quality and Soundscapes) (Wales) 2024

The 2024 Act creates a Wales-specific framework for national air quality targets and amends existing legislation on local air quality management, smoke control, clean/low emission zones, road user charging and vehicle idling.

9.6.1.4 Planning Policy Wales

Odour in Wales is mainly controlled through general planning policy, Planning Policy Wales and emerging Technical Advice Notes (TAN) plus separate regulatory guidance from Natural Resources Wales (NRW) on odour as "pollution" in environmental permitting. Planning Policy Wales treats odour as part of amenity and environmental quality that planning should manage at plan and project level. There is no Wales specific odour TAN equivalent to England's, so local authorities rely on UK wide odour guidance for planning alongside NRW permitting standards and site-specific Odour Management Plans.

9.6.2 Local policies

9.6.2.1 Powys County Council

The Powys Local Development Plan (2011-2026) was adopted by Powys County Council on the 17th of April 2018. It sets out the Council's strategy for the sustainable development of the area. There are two policies relevant to odour: PM13 and W2:

- Policy DM13 – Design and Resources

It states that development proposal: 'must be able to demonstrate a good quality design and shall have regard to the qualities and amenity of the surrounding area, local infrastructure and resources.' At point 11 it specifies:
'11. The amenities enjoyed by the occupants or users of nearby or proposed properties shall not be unacceptably affected by levels of noise, dust, air pollution, litter, odour, hours of operation, overlooking or any other planning matter.'

- Policy W2 – Waste Management Proposals

Development proposals for waste management will be permitted where they are supported by a Waste Planning Assessment and where they meet the following criteria:
'3. There would be no adverse impact on amenity, human health or the environment due to noise, dust, odour or air quality.'

The Local Development Plan point out that NRW has a statutory duty in the regulation of waste and that the planning system must not duplicate those controls. Nevertheless, local planning authorities should be satisfied that proposals are capable of effective regulation, therefore planning applications must demonstrate how matters such as noise, dust, odour, air quality, surface water and pollution of groundwater will be controlled so as to avoid harm or a loss of amenity.

Work is now progressing on a Replacement Local Development Plan (2022 - 2037).

9.6.3 Guidance

9.6.3.1 IAQM Guidance on the assessment of odour for planning

Guidance developed by the IAQM provides a framework for the assessment of odour impacts for planning applications and significance criteria against which the significance of the impacts can be assessed. The assessment presented herein follows the IAQM guideline criteria that is discussed in more detail in Section 3.

9.6.3.2 Environment Agency H4 Guidance

Environment Agency (EA) H4 Odour Management guidance provides guiding principles on odour regulation, assessment, and control. H4 sets out criteria identifying the type of odours which may be classified as 'most offensive' e.g., processes involving septic effluent or sludge, 'moderately offensive' e.g., intensive livestock rearing, and 'less offensive' e.g., brewery.

9.6.3.3 Best Available Techniques Reference Document

The 'Best Available Techniques Reference Document for Waste Treatment sets out indicative Best Available Technique (BAT) or appropriate measures for the AD of organic materials and provides practical guidance on measures that can be employed to prevent or minimise release of emissions to air including odour. The BAT Associated Emissions Level (BAT-AEL) for odour from channelled emissions, such as a stack, is 200-1,0000uE/m^3 for odour.

9.6.3.4 Waste treatment: appropriate measures for permitted facilities

In Wales, the appropriate measures for the biological treatment of waste, particularly biowaste, are guided by the EA's updated guidance. This EA guidance applies to aerobic and anaerobic processes including AD including the combustion or upgrading of the resulting biogas and treating the digestate (AD can include wet, dry, and dry-batch digestion). There is overlap between BAT and necessary measures for waste operations. The EA uses the term 'appropriate measures' to cover both sets of requirements.

9.7 Methodology

9.7.1 Assessment approach

Adverse impacts of odour may include dis-amenity, 'annoyance', 'nuisance' and possibly Complaints. The distinction between the terms is defined by the IAQM as:

- annoyance – the adverse effect occurring from immediate exposure, and
- nuisance – the adverse effect caused cumulatively, by repeated events of annoyance.

Currently, there are no statutory standards for assessing odour annoyance in the UK.

The factors that will determine the degree of odour impact are summarised by the FIDOR acronym as follows:

- **F**requency of detection (frequent odour incidents are more likely to result in complaints),
- **I**ntensity as perceived (intense/ strong odours are more likely to result in complaints),
- **D**uration of exposure (more complaints are likely with prolonged exposure),
- **O**ffensiveness at a particular intensity (concentration) (increased risk of complaints associated with more offensive odours), and
- **R**eceptor sensitivity (tolerance to odours will be reduced in areas where high levels of amenity are expected).

The adopted approach is based on the framework for assessing odour impact set out in IAQM guidance on the assessment of odours for planning. The approach represents a qualitative risk assessment technique, considered appropriate for the screening of odour impacts, and given the scale and location of odorous processes at the Proposed Development in relation to the nearest unrelated third-party receptor locations.

The IAQM method follows the Source-Pathway-Receptor (S-P-R) approach to establishing whether an odour impact could occur. The approach considers the source emission and the pathway that could lead to odour exposure (both a function of FIDO), and the sensitivity of receptors exposed to the odour. As outlined in the guidance, the S-P-R concept is based on:

Effect ≈ Dose x Response.

Where: -

- Dose (impact) is determined by F-I-D-O,
- Response is determined by receptor sensitivity, and
- The effect is the result of the changes on a receptor

Consistent with IAQM approach, the assessment establishes the 'source odour potential' (source magnitude) at the Proposed Development; the 'pathway effectiveness' in terms of proximity and prevailing wind direction; and potential odour effects based on the nature of receptors in the locale of the Proposed Development. The framework set out by IAQM used to estimate the risk of impact occurring and likely magnitude of the impact is outlined below.

Table 2, summarised from Table 9 of the IAQM guidance provides criteria to assist with determining the risk factors for the odour source, pathway and receptor sensitivity.

Table 2 Risk factors for the odour source, pathway and receptor sensitivity

Source Odour Potential	Pathway Effectiveness	Receptor
Factors affecting source odour potential include: • magnitude of odour release • how odorous the compounds are • unpleasantness of the odour	Factors affecting odour transfer to receptor: • distance from source to receptor • frequency (%) of winds from source to receptor or, qualitatively, the direction of receptors • mitigation measures to reduce transfer • effectiveness of dispersion/ dilution in reducing transfer • topography and terrain	Air quality practitioner to apply professional judgement to determine whether a receptor falls into one of the following categories:
Large source odour potential	**Highly effective pathway**	**High sensitivity receptor**
Large-scale, odorous sources, odours unpleasant (-2) to very unpleasant (-4) hedonic tone, process classed as 'Most offensive' in H4,[8] compounds with low odour thresholds (OTs), open air operation with no mitigation/ control.	Small separation distance/ receptor is adjacent to source, high frequency (%) of winds from source to receptor or, qualitatively, receptors downwind of source with respect to prevailing wind, open processes with low-level releases.	Users expect high level of amenity, people may be present continuously or for extended periods e.g., residences, hospitals, schools, tourist.
Medium source odour potential	**Moderately effective pathway**	**Medium sensitivity receptor**
Medium-scale, moderately odorous compounds, odours with neutral (0) to unpleasant (-2) hedonic tone, process classed as 'Moderately offensive' in H4,[8] some mitigation in place but significant residual odour.	Receptor is local to the source; releases are elevated where mitigation relies on dispersion but compromised by building effects.	Users expect reasonable level of amenity, not present continuously or for extended periods e.g., places of work, commercial, recreational facilities.
Small source odour potential	**Ineffective pathway**	**Low sensitivity receptor**
Small-scale, mildly odorous compounds with high OTs, odours with neutral (0) to very pleasant (+4) hedonic tone, process classed as 'Less offensive' in H4,[8] effective mitigation in place e.g., BAT, with little/ no residual odour.	Large separation distance/ receptor is remote from source, low frequency (%) of winds from source to receptor or, qualitatively, receptors upwind of source with respect to prevailing wind, where mitigation relies on dispersion, releases are high-level and not compromised by building effects.	Users would not reasonably expect a high-level of amenity, transient exposure/ present for limited periods only e.g., industrial, farms, footpaths and roads.
Notes: Source - Adapted from IAQM, Guidance on the assessment of odour for planning – version 1.1[1]		

Hedonic tone (Table 2) refers to the degree of pleasantness or unpleasantness associated with an odour. The scale used, ranges typically, from a score of +4 for very pleasant odours such as baking to a score of -4 for foul smells such as rotting flesh. Neutral odours, such as raw potato, have a hedonic tone score of 0. Hedonic tone is just one part of determining the "Offensiveness" in "FIDOR."

Based on the risk criteria in Table 2, the Source odour potential is categorised as small, medium or large and the pollutant pathway from source to receptor categorised as ineffective, moderately effective or highly effective. The risk ratings for each are then considered together to predict risk of odour exposure (impact) at each receptor location using the matrix in Table 3.

The prediction of the likely odour effect at each sensitive receptor can then be determined.

Table 3 Risk of odour exposure (impact) at the receptor location

		Source odour potential		
		Low	**Medium**	**High**
Pathway effectiveness	**Highly effective**	Low risk	Medium risk	High risk
	Moderately effective	Negligible risk	Low risk	Medium risk
	Ineffective	Negligible risk	Negligible risk	Low risk

The next step is to estimate the effect of the odour impact at each receptor location, based on receptor sensitivity using the matrix in Table 4.

Table 4 Likely magnitude of odour effect at the specific receptor location

Risk of odour exposure	**Receptor sensitivity**		
	Low	**Medium**	**High**
High	Slight adverse effect	Moderate adverse effect	Substantial adverse effect
Medium	Negligible effect	Slight adverse effect	Moderate adverse effect
Low	Negligible effect	Negligible effect	Slight adverse effect
Negligible	Negligible effect	Negligible effect	Negligible effect

Source: IAQM, Guidance on the assessment of odour for planning – version 1.1[1]

9.7.1.1 Significance of results

Generally, where the overall effect at a receptor is "Moderate adverse" or "Substantial adverse", the effect is likely to be considered significant.[1] The need for professional judgement from a competent and suitably experienced air quality professional is emphasised by the IAQM guidance. A 'significant' effect does not mean that the proposal is unacceptable, further consideration should be given to additional mitigation measures and balanced against benefits of the proposal.

9.8 Odour impact assessment

9.8.1 Source odour potential

In Table 5 each potential odour source is described: the nature of the emission; description of abatement; intensity and offensiveness of odour emissions; and the frequency and duration of the emissions. The nature of the odours arising at the AD Plant Site are agricultural in character and hence would be hard to distinguish from odours arising on the surrounding farmland.

Using the scheme in Table 2, the source odour potential of each source has been determined. The sources with the greatest odour potential, rated as Medium, are:

- Working face of the clamps
- Waste Reception Building OCS exhaust.

Sources with smaller (Small) odour potential are:

- Delivery of silage to the Silage Clamps
- Offtake of liquid digestate by tanker.
- Leachate tank vent

The following sources have been assessed as having Negligible odour potential due to the low intensity and offensiveness of the emissions and/or because the only emissions would be from PVRVs during abnormal operating conditions:

- Delivery of solid feedstocks to the Waste Reception Building
- Delivery of liquid feedstocks by pipeline or tanker to reception tanks
- Surface Water Lagoon
- PVRVs on the 2No. Primary Digesters, 2No. Post Digester and Digestate Lagoon
- Combustion sources: CHP, Boiler, emergency Flare, backup generator

The overall AD Plant Site Odour Potential for the AD Plant is considered, conservatively, to be Medium. Note this a conservative designation as there are only two sources rated as Medium.

Table 5 Potential odour sources and their odour potential (with controls)

Process	Odour source	Nature of emission and description of abatement	Intensity and offensiveness	Frequency and duration
Delivery of silage to the Clamps	Silage	Silage (freshly cut crops) will be delivered by lorry during the harvest periods. It is deposited on the Clamps, compressed for storage (ensiled) and covered with an impermeable membrane to prevent water damaging the silage. **Source odour potential: Small**	**(Fresh-cut) silage** - low intensity and offensiveness, sweet/ fermented odour. The silage will be from agricultural operations on nearby farms and therefore odours released during transfer and storage will be analogous to baseline odours.	Deliveries of freshly cut crop to the AD Plant Site would occur primarily during harvest time.
Delivery of solid feedstocks to the Waste Reception Building	Straw, vegetable residues and manures, agricultural wastes	Solid feedstock will be delivered by lorry and be deposited in the odour-controlled Building when the roller shutter doors are closed. The Building is held at a slight negative pressure. **Source odour potential: Negligible**	**Manures** – medium to high intensity and offensiveness.	Deliveries throughout the year
Delivery of liquid feedstocks	Slurry	Liquid manures will be delivered by tanker and some will be pumped from Lower Leighton Farm into the 1No. Slurry Storage Tank and, if necessary, the 1No. Liquid Input Reception Tank. The air displaced from the tanks would exhaust to the Waste Reception Building where the potentially odorous air is treated (odour reduced) before exhaust to atmosphere. **Source odour potential: Negligible**	**Cattle slurry** – medium to high intensity and offensiveness,	Deliveries throughout the year
Storage in Clamps and working face of the Clamps	Silage	The (working) face of the clamps will be uncovered to allow loading of the feed hoppers each day. The silage will be cut (disturbed) for loading into the feed hoppers for several hours/day. **Source odour potential: Medium**	**Silage** – low to medium intensity and offensiveness, sweet/ fermented odour. Medium categorisation is likely when it is disturbed. Correct storage conditions off-site should ensure silage product not degraded and/or malodorous.	Loading phases will last for 4 hours per day in total.
Leachate tank vent	Diluted leachate	The contents of the Leachate Tanks are diluted with rainwater and surface water and therefore its odour potential is very low. Moreover, the contents will be	**Leachate** – low odour potential especially if dilute	Continuous

Process	Odour source	Nature of emission and description of abatement	Intensity and offensiveness	Frequency and duration
		pumped frequently from the tank to be used in the process, so there will be little liquid resident in the Leachate Tanks. **Source odour potential: Small**		
Surface water lagoon	Surface water	Run-off of clean water from other hardstanding areas. **Source odour potential: Negligible**	**Surface water** – odourless.	Throughout the year
Waste Reception Building OCS exhaust: **Storage of solid feedstocks, feed hopper loading, screw press separator, storage of solid digestate, odorous air from Slurry Storage Tank, Liquid Input Reception Tank, Existing Storage Tanks and Thin Fraction Buffer Tank**	Silage, straw, vegetable residues and manures; solid digestate; odorous air from tanks	Storage of solid feedstocks, separation of whole digestate and storage of solid digestate will be continuous. Loading of the feed hoppers will take place for 4h per day. Exhaust from the liquid feedstock tankers will be intermittent and low in volume. The OCS will operate continuously with at least two acph (68,600m^3/h) providing a slight negative pressure with respect to the outside, meaning air from inside the building will tend not to leave the building even if the door is open. The air will pass through a wet scrubber and Activated Carbon Filter before exhausting to atmosphere. The OCS will abate emissions of odour, NH_3 and H_2S. **Source odour potential: Medium**	**Silage** - medium intensity and offensiveness, in particular when disturbed. **Manures** – medium to high intensity and offensiveness. **(Whole) digestate** – medium intensity and offensiveness. **Solid digestate** – low to medium intensity and offensiveness **Odorous air** from tank vents – medium to high intensity and offensiveness.	Continuous operation of the OCS
Anaerobic digestion, Digesters	'Raw biogas' and/or whole digestate (substrate)	The digestion process takes place in sealed, airtight vessels. There are no emissions, other than from PVRVs; a safety feature that operate only in (abnormal) over or under-pressure scenarios. PVRV emissions released at height that will ensure effective emissions dispersal. **Source odour potential: Negligible**	**Biogas -** high intensity and offensiveness, (sweet, sulphurous). Sealed system, therefore, no source odour potential at the AD Plant other than infrequent operation of the PVRV (safety devices).	Intermittent and brief release of biogas from PVRVs, only under abnormal operating conditions.

Process	Odour source	Nature of emission and description of abatement	Intensity and offensiveness	Frequency and duration
Liquid digestate storage – Digestate Lagoon	Liquid digestate (liquor)	The Lagoon will have an engineered cover which will be made gas-tight by a concrete ring between the lining and cover. Any gas captured from the space between the digestate and the cover will be extracted and fed back into the digesters. The engineered cover will incorporate a PVRV for over-pressure situations as a safety feature and when activated there will be an intermittent release of odorous air. **Source odour potential: Negligible**	**Liquid digestate** – medium intensity and offensiveness	Continuous
Offtake of liquid digestate	Liquid digestate (liquor)	Some liquid digestate will be taken off-site by tractor-tanker or tanker on public roads. During filling, the tanker vent through which air from the tanker is displaced, will be a source of odour. The odour emission will be short in duration (20 minutes per tanker). **Source odour potential: Small**	**Liquid digestate** – medium intensity and offensiveness	6-7 tankers per day during staffed hours 7am-7pm; filling is expected to take 20 minutes per tanker.
Combustion	Combusted biogas/ Natural gas	1No. 1,600kWe CHP fired by natural gas, operating 8,600h/year – exhaust will not be odorous 1No. 600kWtho Boiler fired by biogas, operating 1,000h/year. 1No. emergency flare, capacity 2,000Nm^3/h biogas. Installed as a safety feature only and will be used infrequently, less than 3% of hours per year. Emissions released at height that will ensure effective emissions dispersal. **Source odour potential: Negligible**	**Combusted biogas** – very low intensity and offensiveness. The combustion of biogas will destroy any potential odorous compounds.	Flare – expected to operate no more than 3% of the time. Boiler – 1,000 h/yr in normal operation.

9.8.2 Pathway effectiveness and risk of odour exposure

The principal sources of odour will be the working face of the clamps and the Waste Reception Building OCS exhaust (OCS exhaust).

The impact of the change in levels on the Site (20m change) and the surrounding terrain is complex. While the windrose in Figure 5, shows a strong 'channelling' of wind directions to those along the valley, the impact of changes in terrain height on dispersion are not straightforward to deduce, other than by carrying out detailed modelling.

There are scattered trees in the vicinity of the Site that would not significantly affect dispersion of odours. On-site infrastructure (large tanks, vessels) in addition to the nearby Lower Leighton Farm buildings will increase turbulence and hence dispersion in the near to medium field. Near field dispersion will also be affected by potential entrainment in the lee of structures.

Figure 4 shows the windrose data, derived from Global Forecasting System (GFS) meteorological data for the Proposed Development site for a 5-year period. The windrose data is summarised numerically in Table 6. It shows the prevailing wind direction is west-southwesterly, with frequent winds also from the southwest, west and south-southwest. Prevalence of winds from these directions means that those receptors that lie to the northeast (from north-northeast through to east) will be those most frequently 'downwind' of the site. For ground and near-ground level sources, low wind speed and stable atmospheric conditions will give rise to the highest concentrations at the closest receptors (H1 to H13).

Table 6 Wind analysis (location: latitude 52.386°, longitude 0.683°)

Speed in m/s/ Direction	<0.3	0.3 - 1.0	1.0 - 2.5	2.5 - 5.0	5.0 - 7.5	7.5 - 10.0	10.0 - 12.5	>12.5	Total probability (out of 100)
N	0.03	0.35	1.71	1.25	0.47	0.05	0.03	0.00	3.88
NNE	0.03	0.28	1.91	1.82	0.40	0.04	-	-	4.47
NE	0.02	0.28	1.88	1.98	0.57	0.10	-	-	4.84
ENE	0.02	0.27	1.58	1.61	0.72	0.10	-	-	4.29
E	0.03	0.31	1.23	1.12	0.49	0.13	-	-	3.31
ESE	0.01	0.35	1.10	0.73	0.31	0.10	0.02	-	2.62
SE	0.02	0.32	1.30	1.09	0.42	0.17	0.00	-	3.33
SSE	0.03	0.30	1.55	1.44	0.71	0.34	0.05	-	4.42
S	0.02	0.34	2.14	2.52	1.33	0.39	0.05	-	6.80
SSW	0.02	0.31	2.36	3.54	1.86	0.75	0.22	0.03	9.10
SW	0.03	0.30	2.85	4.92	3.17	1.67	0.54	0.16	13.63
WSW	0.02	0.38	3.71	4.99	3.72	1.82	0.73	0.20	15.56
W	0.02	0.36	2.57	2.99	2.37	1.30	0.36	0.12	10.08
WNW	0.03	0.44	1.45	1.54	1.38	0.60	0.22	0.04	5.68
NW	0.02	0.39	1.28	1.49	0.77	0.23	0.04	0.02	4.24
NNW	0.01	0.32	1.31	1.30	0.62	0.12	0.02	0.05	3.75
Total probability (out of 100)	0.35	5.31	29.94	34.32	19.31	7.89	2.26	0.62	**100**

Speed in m/s/ Direction	<0.3	0.3 - 1.0	1.0 - 2.5	2.5 - 5.0	5.0 - 7.5	7.5 - 10.0	10.0 - 12.5	>12.5	Total probability (out of 100)
Source: A&S Modelling & Data https://asmodata.co.uk/) Green-filled cells show the top 10% wind direction/wind speed combinations in terms of frequency.									

9.8.3 Receptor sensitivity

Figure 4 shows the receptors which include residential properties, a primary school, village hall, agricultural, industrial, leisure premises and a footpath.

Receptor sensitivities have been determined following the guidance in Table 2. The sensitivity assigned depends on the land use and the expectation of amenity e.g. a person working at a site used for an odorous activity will have a low expectation of amenity. Therefore, residential receptors, the school and village hall have been assigned as 'High' sensitivity. The leisure use and some industrial receptors have been assigned 'Medium' and agricultural, Wastewater Treatment Works, electricity substation and a footpath have been assigned 'Low' sensitivity.

9.8.4 Determination of likely odour effect of the Proposed Development

In accordance with the matrix provided in Table 4, the Estimated Odour Effect of the Proposed development at all receptor locations has determined and is shown in Table 7. At 12 receptors the Odour Effect was determined to be 'Negligible,' and at 24 receptors, 'Slight.' As described in section 3.1.1, impacts that are 'Negligible' or 'Slight adverse' will normally be categorised as 'not significant.'

At six residential receptors the Odour Effect was determined to be 'Moderate,' and are therefore potentially significant. These receptors are:

- H5, Lower Leighton B4388, 77m to the east
- H6, Cattle Grid B4388, 100m to the northeast
- H9, Bytake Cottages, 147m to the northeast
- H11, Llinthwaite Nant Y Coed, 148m to the northeast
- H13, Brynhafren B4388, 200m to the northeast
- H22, The Wain House Pentre Mill, 450m to the northeast

The IAQM guidance emphasises the need for professional judgement in reaching conclusions about significance. The assessment has been conservative in respect of assuming the working face of the clamp would emit odour at the same level throughout the day, whereas working of the face will take place for up to four hours per day, not continuously; when undisturbed, silage has a lower odour intensity. The OCS will exhaust at height (15.5m) with a considerable momentum, leading to good dispersion.

The Proposed Development is in an agricultural area and therefore the baseline level of odour will be agricultural in nature. Nonetheless, odour effects cannot be ruled out insignificant and further assessment is recommended.

Table 7 Summary of the likely odour effects at each receptor

Receptor	Type	Description	Distance from red line boundary	Receptor bearing from Site	Approx. % of time winds from source to receptor	Source odour potential	Pathway effectiveness	Risk of odour exposure	Receptor sensitivity	Likely odour effect
H0	Footpath	Footpath through Site	324262	306568	100.00	Medium	Highly	Medium	Low	Negligible
H1	Agricultural	Lower Leighton Farm 1	324389	306566	4.24	Medium	Highly	Medium	Low	Negligible
H2	Substation	Welshpool substation	324123	306770	13.63	Medium	Highly	Medium	Low	Negligible
H3	Agricultural	Lower Leighton Farm 2	324317	306452	4.24	Medium	Highly	Medium	Low	Negligible
H4	Leisure	Tennis courts	324234	306333	3.88	Medium	Highly	Medium	Medium	Slight
H5	Residential	Lower Leighton B4388	324473	306592	10.08	Medium	Highly	Medium	High	**Moderate**
H6	Residential	Cattle Grid B4388	324489	306658	13.63	Medium	Highly	Medium	High	**Moderate**
H7	Village Hall	Leighton Village Hall	324231	306263	3.88	Medium	Moderately	Low	High	Slight
H8	Primary School	Leighton CP School actual	324220	306234	3.88	Medium	Moderately	Low	High	Slight
H9	Residential	Bytake Cottages	324153	306901	13.63	Medium	Highly	Medium	High	**Moderate**
H10	Residential	Oaklea	324271	306236	3.88	Medium	Moderately	Low	High	Slight
H11	Business (Veterinary)	Llinthwaite Nant Y Coed	324516	306706	13.63	Medium	Highly	Medium	High	**Moderate**
H12	Residential	Castle View	324109	306207	3.88	Medium	Moderately	Low	High	Slight
H13	Residential	Brynhafren B4388	324547	306751	13.63	Medium	Highly	Medium	High	**Moderate**
H14	Residential	Severn Banks	323856	306959	3.33	Medium	Moderately	Low	High	Slight
H15	Residential	Severn Lodge	323787	306877	3.31	Medium	Moderately	Low	High	Slight
H16	Residential	Shire Oaks	323968	306087	3.88	Medium	Moderately	Low	High	Slight
H17	Residential	Castle Court	324013	306077	3.88	Medium	Moderately	Low	High	Slight
H18	Residential	Rivendell House	323995	306062	3.88	Medium	Moderately	Low	High	Slight
H19	Residential	Church Close	324381	306022	4.24	Medium	Moderately	Low	High	Slight
H20	Church	Holy Trinity Church	324251	305964	3.88	Medium	Moderately	Low	High	Slight
H21	Industrial/ Business	Castle Court workshops	324022	305986	3.88	Medium	Moderately	Low	High	Slight
H22	Residential	The Wain House Pentre Mill	324804	306417	13.63	Medium	Highly	Medium	High	**Moderate**

Receptor	Type	Description	Distance from red line boundary	Receptor bearing from Site	Approx. % of time winds from source to receptor	Source odour potential	Pathway effectiveness	Risk of odour exposure	Receptor sensitivity	Likely odour effect
H23	Residential	Walcot B4388	324036	305856	3.88	Medium	Moderately	Low	High	Slight
H24	Residential	Taflog B4388	324036	305856	3.88	Medium	Moderately	Low	High	Slight
H25	Residential	Pentre House	324417	305864	3.88	Medium	Moderately	Low	High	Slight
H26	Residential	Leighton Arches	323584	307009	3.33	Medium	Moderately	Low	High	Slight
H27	Residential	The White House B4388	324019	305813	3.88	Medium	Moderately	Low	High	Slight
H28	Residential	West View	324758	307135	13.63	Medium	Moderately	Low	High	Slight
H29	Residential	Gravel Lodge	323615	305930	4.84	Medium	Moderately	Low	High	Slight
H30	Residential	Severnleigh B4388	323987	305708	3.88	Medium	Moderately	Low	High	Slight
H31	Industrial/ Business	CDT Sidoli	323364	307061	3.31	Medium	Ineffective	Negligible	Medium	Negligible
H32	Sewage Works	Welshpool STW	323421	307291	3.33	Medium	Ineffective	Negligible	Low	Negligible
H33	Residential	Severn Lane	323279	307053	3.31	Medium	Ineffective	Negligible	High	Negligible
H34	Agricultural	Hope Farm Barns	324762	307410	13.63	Medium	Moderately	Low	Low	Negligible
H35	Residential	Severn Farm	323237	306976	3.31	Medium	Ineffective	Negligible	High	Negligible
H36	Residential	3 Henfaes Lane	323230	307190	3.33	Medium	Ineffective	Negligible	High	Negligible
H37	Residential	Ivy Cottage Hope Road	325226	307139	13.63	Medium	Moderately	Low	High	Slight
H38	Industrial/ Business	Severn Farm Indl Estate	323046	306769	3.31	Medium	Ineffective	Negligible	Medium	Negligible
H39	Agricultural/ Livestock	Yorton Farm incl stud	324263	305291	3.88	Medium	Ineffective	Negligible	Medium	Negligible
H40	Industrial/ Business	Technocover	323476	307690	3.33	Medium	Ineffective	Negligible	Medium	Negligible
H41	Residential	Old Hope Hope Road	325201	307465	13.63	Medium	Moderately	Low	High	Slight
H42	Residential	Little Hope Hope Road	324975	307690	13.63	Medium	Moderately	Low	High	Slight

9.9 Conclusion

This Odour Assessment has been prepared to risk assess the potential odour effect of the planning application for the development of an agricultural AD Facility on land at Lower Leighton Farm, Leighton, Welshpool.

The AD Plant Site will treat 133,000 tpa of waste, it will require a Bespoke Part A installation permit from the EA in order to operate. This means the site cannot operate without first undergoing a rigorous assessment of the infrastructure and proposed operations as well as approval of a detailed OMP. A written environmental management system will be in place which includes the need for daily odour monitoring, as well as daily checks and monitoring for all aspects of the wider site operation. A complaint procedure providing a clear communication pathway will be in place as part of the OMP should residents wish to raise a concern that will then be addressed.

The approach adopted in this assessment is based on a qualitative risk assessment technique, that follows IAQM (2018) guidance for assessing odour impact for planning. The framework set out by IAQM has been used to estimate the risk of impact occurring and likely magnitude of the impact and was considered appropriate for the screening of odour impacts given the scale and location of odorous processes at the Proposed Development in relation to the nearest receptor locations.

Following this approach, the overall Source Odour Potential for the AD Plant Site was determined to be Medium. Of the 42 receptors considered the odour effect was determined to be insignificant at 36 and potentially significant at the remaining six receptors, all of which are residential receptors. They lie between 77m and 450m from the red line boundary of the Site to the east and the northeast, downwind of the prevailing wind direction.

While several conservative (pessimistic) assumptions have been made (Section 6.4), the conclusion of this qualitative assessment is that there may be significant effects at six receptors, the change in level across the Site and the surrounding terrain, lead to the conclusion that further assessment is required. Detailed modelling of odour impacts is recommended as well as the preparation and submission to PCC of a detailed Odour Management Plan for the Site.

CHAPTER 10 – ECOLOGY

10. Ecology

This chapter of the ES has been prepared by Arbor Vitae based on the Preliminary Ecological Appraisal and presents an assessment of the likely significant effects of the proposed development with respect to ecology and biodiversity. Mitigation measures are identified, where appropriate, to avoid, reduce or offset any significant adverse effects identified and/or enhance likely beneficial effects. Taking into account the mitigation measures, the nature and significance of the likely residual effects are reported.

10.1 Competent Experts

This report has been prepared by Pip Stirling, Senior Ecologist and Director.

With more than seven years' experience in the role, Pip is licensed in England and Wales to survey bats, great crested newts and hazel dormice and holds a Masters in Wildlife Conservation and UAV Technology. Pip is an Associate Member of CIEEM and trained in Biodiversity Net Gain Assessments.

10.2 Introduction

10.2.1 Background to Development

Planning permission will be sought for the construction of an Anaerobic Digestion Plant on land at Lower Leighton Farm near Welshpool.

Arbor Vitae were commissioned by Roger Parry and Partners to undertake a Preliminary Ecological Appraisal in order to assess the impact of the development on habitats and protected species.

10.2.2 Scope of Survey

The survey is primarily designed to:
- Identify and record habitats and important ecological features on site;
- Evaluate the potential of the proposed development site to provide opportunities for protected species;
- Determine any likely impact which the development and landscape proposals may have on these.
- Identify opportunities for the enhancement of habitats and biodiversity features on site.

10.2.3 Key Principles

All ecological surveys conducted by Arbor Vitae Environment Ltd are underpinned by the following key principles, as outlined by CIEEM (2018):

Avoidance - Seek options that avoid harm to ecological features (for example, by locating on an alternative site).

Mitigation - Adverse effects should be avoided or minimized through mitigation measures, either through the design of the project or subsequent measures that can be guaranteed – for example, through a condition or planning obligation.

Compensation - Where there are significant residual adverse ecological effects despite the mitigation proposed, these should be offset by appropriate compensatory measures.

Enhancements - Seek to provide net benefits for biodiversity over and above requirements for avoidance, mitigation or compensation.

10.3 Site Description

10.3.1 Location, Landscape and Background

Lower Leighton Farm is positioned just east of Welshpool, along the B4388 between Buttington and Leighton. The landscape surrounding the site is dominated by arable fields in all directions, with the

main farmyard on the opposite side of the road to the east. A range of mixed woodland parcels lie further east, running from north to south through the area.

The plans for the site will result in around 8ha of land being repurposed from arable.

10.4 Survey Methodology

10.4.1 Desk Study

An initial desk study was composed to gain background information regarding any protected species or designations within the area. The main sources of information were MagicMap and NBN Atlas.

10.4.2 Site Survey

A site visit was made on 30/10/2025. The survey was carried out in accordance with CIEEM (2017) best practice guidelines. The objective of the survey was to find and record any signs of use by protected species and to note the habitat features present.

An assessment of the available habitats both on and adjacent to the site led to consideration of the potential of the site for the following protected species:
- Badger
- Bats
- Breeding birds
- Great Crested Newt
- Otter

The survey methodology was tailored to evaluate the area for these species in the following ways:

Badger
An area within 50 metres of the site was closely searched for the following signs of badger activity:
- Setts,
- Tracks and footprints,
- Latrines,
- Snuffle holes.

Bats
The site was assessed in terms of its suitability to support bat species. Hedgerow habitat and nearby potential habitat were assessed and recorded and potential impacts from the proposals considered.

Breeding birds
The site was assessed in terms of its suitability to support breeding bird populations. Hedgerow habitat and nearby potential habitat were assessed and recorded.

Great crested newt
A desk study and a ground search were conducted to search for any areas of open water within 250 metres. Waterbodies were then assessed based on the Habitat Suitability Index for great crested newts (Oldham et al., 2000 and ARG UK, 2010).

Otter
Any water courses within the area and appropriate terrestrial land were searched for the following field signs:
- Spraint,
- Footprints,
- Feeding remains.

10.4.3 Personnel

The survey was carried out by Phillipa Stirling MSc ACIEEM: Ecologist.

Natural Resources Wales bat licence number: S094220-1 and GCN licence number: S090921/1.

10.4.4 Constraints

Breeding birds would not have been present at the time of the survey, but previous nesting and appropriate nesting sites would have been apparent.

10.5 Survey Results & Impact Assessment

10.5.1 Desk Study

The desk study found that within 1km of the site there were the following designations:

Name	Designation	Distance from site
Bryn Pasture	SSSI	1000m
Goppas Wood	Ancient Woodland	450m
Cwm Dingle	Ancient Woodland	860m
Woodland at Pentre	Ancient Woodland	920m
Woodland corridor to west	Ancient Woodland	400m
The search included Ramsar, SSSI, SAC, SPA, LWS, NNR and LNR. [1]		

Results from the desk study revealed that within a 1km radius of the proposed development site the following protected species have been recorded:

Species	Distance	Protection
Mammals		
Brown long-eared bat	300m	European Protected Species, Wildlife and Countryside Act 1981.
Birds		
Kingfisher	800m	Wildlife and Countryside Act 1981.
Reptiles		
Grass snake*	900m	Wildlife and Countryside Act 1981.

*Whilst grass snake was recorded in 2022 some 900m from the site, reptiles were not considered as part of this report due to the unsuitable nature of the habitats on site.

10.5.2 Habitats on Site

All habitats are classified using JNCC's Phase 1 Habitat Survey Handbook (JNCC, 2010).

Habitat type & description	Predicted Impact	Proposed mitigation measures
Cereal crops Approximately 7.5ha of land within the development boundary is made up of arable land. A small portion at the northeast corner is currently down as 'temporary grassland' but the majority of the site has been recently harvested from a summer crop.	The arable land will be permanently lost as a result of the plans. The land in its current form provides very little in the way of 'habitat' and the overall value of the site is not expected to change significantly.	A proposed soft landscaping scheme will be adopted on-site to provide vegetated landscaping bunding and permanent grassland. Tree planting is also recommended. See section 5.1.
Developed land Two large tanks have been installed to the east of the site which occupy around 0.2ha of land.	The tanks will be retained on-site, with no ecological impact.	None required.
Bare ground Areas of bare ground are found around the large tanks.	There are no plans to alter this area although natural succession is likely to take place, first with ruderal plant species, and possibly developing into tall forbs.	None required.
Ruderal/ephemeral Small earth bunds have been made around the edges of the tanks. The bunds have become colonised by the following ruderal species: nettle Canadian fleabane, herb Robert, Colt's foot, creeping thistle, and cleavers.	Plans for the site will see these areas left as they are. The bunds currently have limited value but may develop to provide a more varied botanical structure. It is not expected that they will be of any significant ecological value.	None required.
Native hedgerow H1: running along the east boundary of the site, the hedgerow consists of hawthorn and blackthorn, with small amounts of elder and ivy. There are two gateways along the length.	Plans for the site will see the retention of H1-3 an TL1, with the exception of the removal of around 50m from H1 to form two new access points, and 60m from H2. The hedgerows are not	Replacement hedgerow planting will be carried out along the newly created west boundary of the site. This will include around 300m of new native hedgerow on site.
H2: along the north boundary, limited to hawthorn and blackthorn. H3: along the south boundary, includes hawthorn, blackthorn, and ash. There is a dead ash tree and also 1x early mature oak. The hedges are 'box' profile and cut annually. Average height is 2m and width of 1.5m. TL1: a row of mature oak trees set along an embankment, with a ditch at the base.	'important' and other than replacement planting, bespoke compensation is not required.	Hedge protection measures will also be adopted during all work on site for retained hedges/tree lines (Appendix 4).
Ditch A heavily polluted and stagnant length of ditch found at the base of TL1.	Plans do not appear to have any impact upon the ditch habitat although is it recommended that any source of pollutants is stopped from entering the ditch.	Sources feeding into the ditch should be evaluated and all pollutants should not be allowed to enter the ditch system.

10.5.3 Protected Species

Protected species	Predicted Impact	Proposed mitigation measures
Badger	There are no historical records of badger at the site, and no field signs were found within the search area. Opportunities on site for this species are limited, and the plans are not expected to have any impact upon badger.	Reasonable Avoidance Measures will be adopted to remove any residual risk to wildlife on-site (Appendix 1).
Bats	The main habitats on site do not provide suitable opportunities for bats in terms of roosting, foraging, and commuting. There are limited linear landscape features, except for boundary hedges and TL1. There are limited records of bats locally, although Leighton Bat Roost (SSSI) is located some 2km southeast. The plans are not expected to have any impact upon potential roosting features, linear landscape features, or suitable foraging grounds.	A Wildlife Sensitive Lighting Plan will be adopted to reduce overall landscape-scale impact of the project for all nocturnal wildlife (Appendix 2).

Breeding birds	The hedges on site provide some opportunities for generalist nesters but the site is mostly limited in its potential for breeding birds. Removal of hedgerow will need to be carefully timed to avoid the breeding season but otherwise, plans are not expected to have any impact upon this group.	See Appendix 3.
Great crested newt	A total of four areas of standing water are mapped within 500m of the site. One of these lies in the southwest corner of the field and is not a pond. Another lies on the far side of the B4388 and serves as a run-off collection for the farm yard and is therefore entirely unsuitable for breeding GCN. Pond 1 lies 230m southwest from the site boundary and sits on the opposite side of the B4388, plus a small development of residential houses and primary school. Both features form a significant barrier to dispersal and the pond was discounted from the assessment. Pond 2 is located 300m southwest from the site but was not accessible at the time of the survey. However, there are no records of GCN within 1km of the site and studies have demonstrated that 95% of all summer refuges of GCN fall within 63m of their summer breeding pond (Jehle, 2000). Subsequent studies also found that capture rates of GCN were at their highest within 50m of a breeding site with a significant reduction in capture rates beyond 100m (Cresswell and Whitworth, 2004). The development site itself provides sub-optimal terrestrial opportunities for amphibians, given the intensive management regime in place and lack of shelter/foraging areas. It is unlikely that the plans will have any impact upon GCN and no further survey work is deemed necessary.	Reasonable Avoidance Measures to be adopted to remove any residual risk.
Otter	The River Severn lies some 450m west from the site. During the survey, no evidence of otter, nor suitable terrestrial habitat, was recorded on the site. The plans are unlikely to have any impact upon this species and no further survey work is required.	Reasonable Avoidance Measures and Wildlife Sensitive Lighting Plan will remove any residual risk.

10.6 Enhancements

10.6.1 Ecological Enhancement

Soft landscaping for the site should include:

Seeding of permanent grassland, as shown on 29754 - 910 Rev 0 - Proposed Site Layout (DRAFT). The grassland should include some flowering plants, to provide opportunities for pollinators e.g. https://germinalamenity.com/wfg2-flowering-meadow which provides 80% grass to 20% wildflowers.

The landscape bund along the west boundary should also be seeded, as above, with the addition of tree planting to include native species such as field maple, rowan, wild cherry, common oak, and hazel.

The west boundary of the site should be planted with a new native species hedge, to incorporate a mixture of woody species planted at 6 plants per m2. Suitable hedging plants include: hawthorn, blackthorn, hazel, holly, field maple, sycamore, elder, dogrose, Guelder rose.

There are limited opportunities for wildlife boxes on the site but the following should be installed onto retained trees in TL1:

3x Woodcrete open-fronted nestbox. The box/es will be positioned on a mature tree at a height of no less than 2.5m from ground level. The opening of the box/es will face away from the prevailing wind.

3x Woodcrete multi-chamber bat box. The box/es will be positioned within a mature tree at a height of no less than 3m from ground level. Artificial lighting will not be installed within 5m of the box.

10.7 Summary

Planning permission will be sought for the construction of an Anaerobic Digestion Plant on land at Lower Leighton Farm near Welshpool. Arbor Vitae were commissioned by Roger Parry and Partners

to undertake a Preliminary Ecological Appraisal in order to assess the impact of the development on habitats and protected species. The plans for the site will result in around 8ha of land being repurposed from arable.

Plans for the site will see the retention of H1-3 an TL1, with the exception of the removal of around 50m from H1 to form two new access points, and 60m from H2. The hedgerows are not 'important' and other than replacement planting and hedge protection measures, bespoke compensation is not required.

Plans do not appear to have any impact upon the ditch habitat although is it recommended that any source of pollutants is stopped from entering the ditch.

The plans are not expected to have any impact upon protected species, as long as the following measures are adopted:
- Reasonable Avoidance Measures Method Statement
- Wildlife Sensitive Lighting Plan
- Pre-commencement breeding bird inspection
- Hedge protection measures

Ecological enhancement at the site will include:
- Creation of permanent grassland around the southwest of the site and throughout,
- Planting of native trees along the landscape bund to the west boundary,
- Planting of 300m of native hedge along the west boundary,
- Provision of bird and bat boxes, to be installed into trees along TL1.

CHAPTER 11 – NOISE & VIBRATION

11. Noise

This chapter of the ES has been prepared by Matrix Acoustics based on the Plant Noise Assessment and presents an assessment of the likely significant effects of the proposed development with respect to noise. Mitigation measures are identified, where appropriate, to avoid, reduce or offset any significant adverse effects identified and/or enhance likely beneficial effects. Taking into account the mitigation measures, the nature and significance of the likely residual effects are reported.

11.1 Competent Experts

This report has been prepared by Paul Smith BSc MIOA

11.2 Introduction

This acoustic report documents a plant noise assessment for the proposed Anaerobic Digestion Plant at Lower Leighton, Welshpool; Figures 1 and 2.

The report is divided into the following sections:
- Section 2: Overview of the Development
- Section 3: Noise Assessment Criteria
- Section 4: Noise Impact Assessment
- Section 5: Conclusion
- Appendix A: Calculations

11.3 Overview of the Development

The proposed scheme is for an Anaerobic Digestion Plant (ADP) at Lower Leighton, Welshpool; Figures 1 and 2. With the exception for periods of maintenance, the plant will be operational 24/7.

11.3.1 Noise Sources

The proposed ADP has a number of items of fixed plant that generate noise, which will potentially operate 24/7. Table 1 provides the source noise levels of the identified plant, colour coded with refence to Figure 2. Note that the source noise data is either client supplied or based on client provided survey data of an operating ADP at Bangley Quarry, Scotland.

The emergency generator, which is required in the event of failure of one of the CHP units, will be tested once a week during the working day period only.

11.3.2 Nearest Dwellings

The nearest private dwellings (i.e.., not in the client's ownership), labelled Receptors A – E in Figure 1, are between 115m – 310m from the proposed development site boundary. All five receptors have a clear view of the site.

11.3.3 Mitigation Measures

For the assessment an acoustic noise barriers have been included as indicated in Figure 2. The noise barriers must be of a solid construction with a surface mass of no less than 10kg/m^2. The height of the barriers required is expected to be between 2 – 3m; this will be reviewed during detailed design (the line of sight between the receptor and plant must be fully blocked).

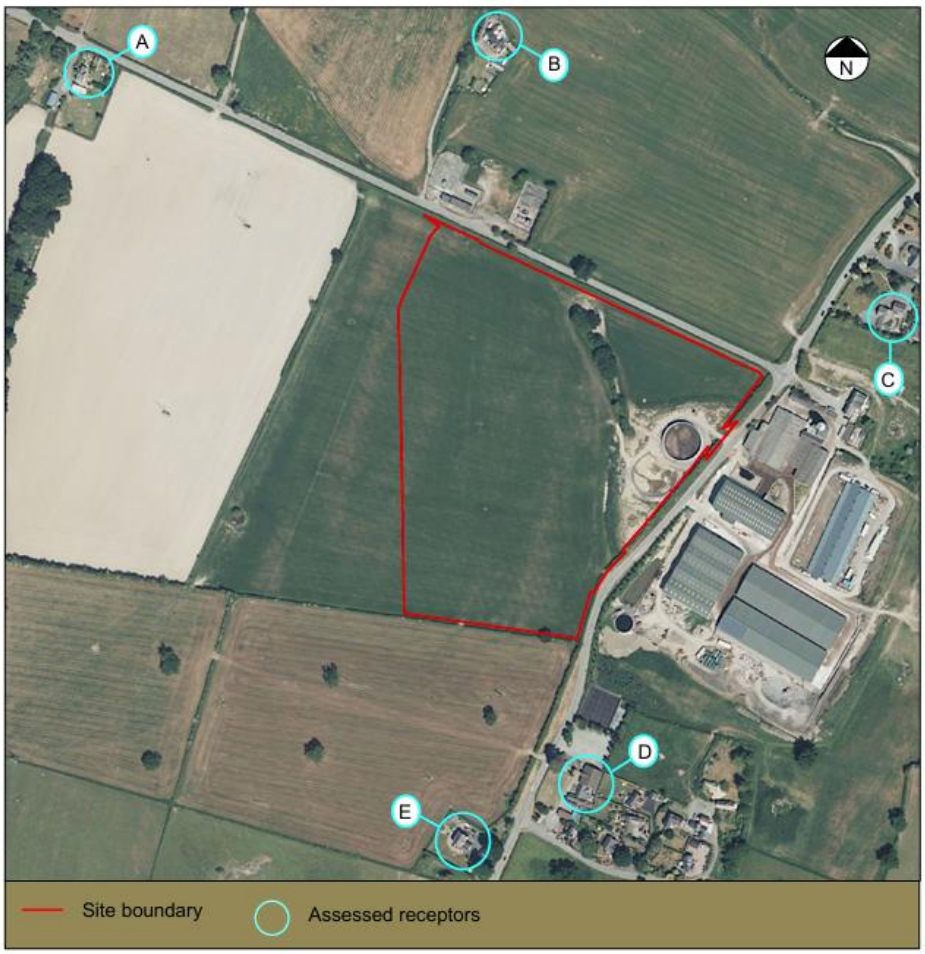


Figure 1. Ariel view (source: www.bing.com) with site boundary and assessed receptors identified

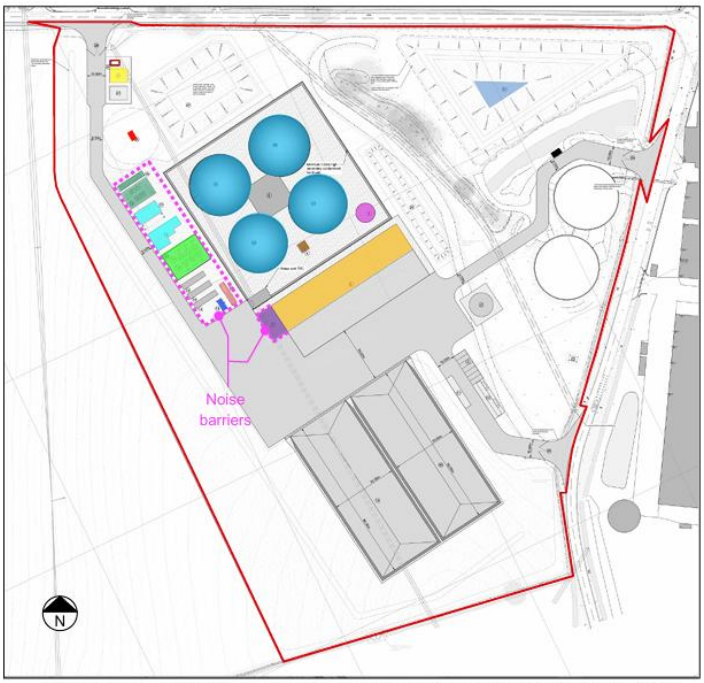


Figure 2. Site plan with noise producing items of fixed plant identified with reference to Table 1

Table 1. Source Noise Levels

No	Noise Source	
2A	Digester (2No. 32.00mØ x 8m high) – 2 Lateral Mixers	63dB(A) at 2m
2B	Digester (2No. 32.00mØ x 8m high) – 2 Submersible Mixer (in digester)	50dB(A) at 1m from container
3A	Post Digester (2No. 32.00mØ x 8m high) – Lateral Mixer	50dB(A) at 1m
3B	Post Digester (2No. 32.00mØ x 8m high) – Submersible Mixer	50dB(A) at 1m from container
4	Ferric Chloride Tank – 1,5kW pump	20dB(A) at 1m
5	Slurry Storage – 15kW Mixer	63dB(A) at 1m
5	Slurry Storage – 11kW Pump	63dB(A) at 1m
7	Technical Building (Control Panel, pumps, gas analyser) – Excentric pumps	50dB(A) at 1m
7	Bio Filter – Blower	67dB(A) at 1m
8	Screw Press Separators & Solid Digestate Storage (Inside Building)	65dB(A) at 1m from building
8	Excentric pump for Digestate Separator	65dB(A) at 1m from container
8	Feedhoppers (2No. Inside Building) - Feeder	45dB(A) at 1m
8	Feedhoppers (2No. Inside Building) - Premix	45dB(A) at 1m
12	Heated tank - Pump	55dB(A) at 1m
12	Heated tank - 11 kW Excentric pump	60dB(A) at 1m from container
12	Heated tank - Rotacut	60dB(A) at 1m
13	Boiler	36dB(A) at 1m from container
15	HCP	75dB(A) at 1m from container
15	Heat Recovery Container (3No.) - Heat pump	74dB(A) at 1m
16 & 17	CO_2 Recovery	80dB(A) at 1m
18 & 19	Gas Pre-Treatment Container / Upgrading	75dB(A) at 1m
20	Flare	75dB(A) at 1m, at 90° lateral
23	Emergency Generator	72dB(A) at 1m
22	Transformer	20dB(A) at 1m
25	Lagoon 3,000m3 – 3 mixers	50dB(A) at 1m
26	Digestate Off-take Point – 30kW pump	65dB(A) at 1m

11.4 Noise Assessment Criteria

To review the noise impact of the proposed development's noise emissions, the following guidance documents have been considered;

11.4.1 BS4142:2014+A1:2019

BS4142 provides a methodology to assess the impact of industrial and commercial noise affecting dwellings, whereby the 'typical' background noise level is deducted from the industrial noise Rating Level (industrial noise corrected to account for the 'on-time' and noise character of the noise source. The following guidance is given based on the established difference:

• A difference of around +10dB or more is likely to be an indication of significant adverse impact, depending on context
• A difference of +5dB is likely to be an indication of an adverse impact, depending on context
• The lower the rating level is relative to the measured background sound level, the less likely it is that the specific sound source will have an adverse impact or a significant adverse impact. Where the rating level does not exceed the background sound level, this
• is an indication of the specific sound source having a low impact, depending on context

Context, as defined in BS4142:2014, includes the consideration of the following factors:

• The absolute level of the noise emissions
• Character and level of the residual sound compared to the character and level of the Specific Level
• Sensitivity of the receptor and any acoustic design measures (e.g., façade sound insulation, use of mechanical ventilation and acoustic screening) incorporated at premises used for residential purposes

To take account of industrial/commercial noise sources that do not operate continually an 'on time' correction is applied using:

$$- 10 \log (r/rref)$$

Where:

rref. = reference time (1hr between 07:00 – 23:00hrs and 15 minutes between 23:00 – 07:00hrs)
r = total 'on-time' during the reference period

Note that the shorter reference time interval between 23:00 – 07:00hrs is designed to penalise industrial/commercial noise events that occur during the night.

BS4142 provides four noise character correction categories with associated penalties that must be applied when determining the Rating Level, namely:

• Tonality:
o Not perceptible = 0dB
o Just perceptible = +2dB
o Clearly perceptible = +4dB
o Highly perceptible = +6dB

• Impulsivity:
o Not perceptible = 0dB
o Just perceptible = +3dB
o Clearly perceptible = +6dB
o Highly perceptible = +9dB

• Intermittency: +3dB if the intermittency of operation is readily distinctive against the residual noise environment

• Other: +3dB applied if the specific sound is neither tonal or impulsive but features noise characteristics that are readily distinctive against the residual noise environment

With regard to noise ingress (noise from outside to inside), BS4142 states that 'The standard is not intended to be applied to the assessment of indoor sound levels' and the assessment methodology '... is not intended to be used to assess the extent of the impact at indoor locations'; in the worked Examples 6 and 8 given in BS4142, comparison with BS8233 noise ingress limits is used to review potential acceptability.

11.4.2 Noise Ingress (BS8233:2014)

BS8233 provides guidance noise ingress limits for habitable rooms within residential premises, namely;
• Living rooms: LAeq,16hr 35dB (day)
• Dining room/area: LAeq,16hr 40dB (day)
• Bedrooms: LAeq,16hr 35dB (day), LAeq,8hr 30dB (night)

In order to avoid sleep disturbance, in accordance with guidance given in PRoPG, individual noise events should not exceed 45 dB LAmax,F more than 10 times within bedrooms during the night period.

The above noise limits must be met with windows closed and trickle vents (if applicable) open.

Where the external noise source has a specific character, such as a strong low-frequency content or is irregular enough to attract attention, BS8233 advises lower noise limits might be appropriate.

Although adverse characteristics of the noise emissions from the proposed development are not expected, as a precautionary measure we consider noise ingress levels 5dB below BS8233 noise ingress limits should be designed for.

Purge ventilation, which could be required on occasion to mitigate against overheating, may require open windows. It is generally accepted that there is a compromise between providing rapid ventilation via an open window and the unavoidable higher noise ingress levels (a façade with an open window provides around a 13dB reduction between outside to inside).

For this situation 'Acoustics Ventilation and Overheating - Residential Design Guide: 2020' (AVO) advises that 'reasonable' internal conditions for habitable rooms may be considered to be noise ingress levels up to 5dB above BS8233's noise ingress limits.

In line with AVO's guidance, we therefore consider that 'reasonable' poultry development noise ingress levels via an open window will be 5dB above are suggested noise ingress level with windows closed; this equates to parity with the noise ingress limits given in BS8233.

11.5 Noise Impact Assessment

11.5.1 Representative background noise level

A noise survey has not been undertaken to establish the existing background noise levels at the nearest dwellings.

In rural locations typical background noise levels are not normally below:
• Day (07:00 – 23:00hrs): LA90 35dB
• Night (23:00 – 07:00hrs): < LA90 30dB

For the assessment the above background noise levels, which are low, have been taken to be representative to the 'typical' background noise levels that will occur at Receptors A - E.

11.5.2 Derivation of aggregate Specific Level

The individual noise level of each identified noise source has been calculated at Receptors A - E; Figures 1 and 2. The following corrections have been applied to the source noise data (Table 1):

• Reflections: 3dB added to account for reflections. Note that this correction is not applicable for high level exhausts i.e., these will be away from any reflective surfaces.

• Distance correction: 20 x log (d1/do), where d1 = distance between receptor and the noise source and do = reference distance.

• Shielding attenuation: Where the line of sight between the noise source and dwelling is fully blocked by a solid barrier (e.g., by suitable noise barrier and/or other solid site structures) a 10dB shielding correction has been applied in accordance with BS5228-1 2009. Where the line of sight is partially blocked, the shielding attenuation is reduced to 5dB

• Ground absorption correction: ISO 9613-2: Attenuation of sound during propagation

$$Agr = 4.8 - (2hm/d)[17 + (300/d)]$$

Where,

hm = mean height of the propagation path above ground
d = distance from source to receptor

In accordance with ISO 9613-2 the ground absorption correction is assumed to be zero when the line of sight of the noise source is partially or fully blocked by a solid body (i.e., when a shielding correction is applicable)

• Atmospheric attenuation: ISO 9613-2: Attenuation of sound during propagation outdoors, Formula 8:

$$Aatm = \alpha d/100$$

Where,

α = is the atmosphere attenuation coefficient for a temperature of 10°C and 70% relative humidity
d = distance from source to receptor

It should be highlighted that the calculations provided in ISO 1996-2 assume a downwind propagation.

In accordance with ISO 9613-2 the attenuation at 500Hz has been used as only the dB(A) value of the noise sources are known.

• On-time: The worst-case scenario of all the plant operating concurrently for the full BS4142 assessment period has been assumed. For transport activities, it has been assumed that they occur over a total of 30miuntes within any 1hr period, which equates to a 3dB 'on-time' correction.

The full calculation is provided in Appendix A, with the resultant aggregate noise levels (Specific Level) provided in Table 2.

11.5.3 Rating Level

The noise characteristics of the individual noise sources are unknown. Due to the low absolute noise emissions of each noise source at the nearest dwellings, their individual noise characteristics are not however expected to be identifiable at the nearest dwellings. As a precautionary measure however a global +3dB BS4142 character correction has been applied to the aggregate Specific Level to establish the Rating Level. The resultant Rating Levels are given in Table 2.

11.5.4 Assessment Level

We define Assessment Level = RL – min LA90 dB, where:

RL = Rating Level, dB(A)
LA90 dB = representative typical background noise level, LA90 (assumed level commensurate with a rural area)

Table 2 provides the resultant day period Assessment Levels at Receptors A - E.

Table 2. Calculated Aggregate Plant Specific, Rating and Assessment Levels

Receptors	Specific Level, dB	Rating Level, dB	Day Period Representative L_{A90} dB	Day Assessment Level, dB
A	29	32	35	-3
B	32	35	35	0
C	31	34	35	-1
D	32	35	35	0
E	31	34	35	-1

Note that the representative background noise levels are assumed values, commensurate with a rural area

Where the Rating Level is at parity with the typical background noise level (Assessment Level = 0 dB) BS4142 states that the Specific Level will have a low impact; an adverse impact is indicated where the Rating Level is ≥ 5dB and <10dB above the typical background noise level.

As can be seen in Table 2, the day Assessment Levels in all cases do not exceed 0dB. We therefore conclude that, with the inclusion of a suitable noise barriers as indicated in Figure 2, the noise impact will be low during the day.

During the night period (23:00 – 07:00hrs) we consider the context that occupiers of the nearest dwellings will be within their houses during is relevant, and consequently it will be noise ingress that will inform on the noise impact. Based on a room with an open window providing 13dB sound reduction from outside to inside, the highest aggregate (all plant running) noise ingress would be LAeq,15min 19dB.

The resultant ambient noise level is very low, being significantly below our suggested noise ingress limit (5dB below the noise ingress limits given in BS8233). We therefore conclude that during the night the plant noise emissions from the proposed ADP will result in a low noise impact.

11.5.5 Assessment Uncertainty

With all calculations there is a level of uncertainty, which in this case we do not expect to be greater than +/-3dB (3dB is a just perceptible change in noise level). This small level of uncertainty does not have any significance to the outcome of the assessment.

The assumed representative typical background noise levels used in the assessment are low, being commensurate with a quiet rural area; with the existing plant and activity noise emissions from Lower Leighton Farm, lower typical background noise levels are not expected.

The assessment has been conducted on the assumption that all plant is running concurrently 24/7. It is likely that this worst-case scenario will not occur for the majority of the time, and consequently the aggregate noise emissions are expected to typically be lower than calculated.

The assessment has been conducted on the supplied data for the proposed plant. If higher noise producing plant is selected than used in the assessment, the assessment can be updated; mitigation measures such as localised noise barriers and/or acoustic enclosures are available if required.

11.6 Conclusion

A noise impact assessment with regard to the proposed Anaerobic Digestion Plant at Lower Leighton, Welshpool; Figures 1 and 2.

The assessment has been based on:
• Noise data for the selected plant; Table 1
• Plant operating 24/7
• The mitigation measures of noise barriers (provisionally between 2 -3m high) around the highest noise producing items of plant as indicated in Figure 2
• Calculations of the plant noise emissions and corresponding Rating Levels at the nearest dwellings; Table A1, Appendix A and Table 2

The findings of the assessment established that:
• Day period: The aggregate plant noise emissions at the nearest private dwellings (Receptors A - E, Figure 1) will not exceed the assumed representative background noise levels commensurate with a rural area. This indicates a low noise impact.
• Night: Taking into account the context that the occupiers of the nearest dwellings will be expected to be indoors during the night period, the noise ingress via an open window has been reviewed. The resultant ambient noise ingress levels are significantly below our suggested noise ingress limit (5dB below the noise ingress limits given in BS8233). We therefore conclude that during the night the noise impact will be low.

On the basis that the plant noise emissions from the proposed development, with the inclusion of the noise barriers, will not result in an adverse noise impact at the nearest dwellings, we conclude that the proposed scheme is acceptable with regard to noise.

CHAPTER 12 – WATER RESOURCES

12. Water Resources

This chapter of the ES has been prepared by Townsend Water Engineering Ltd based on the Flood Consequence Assessment and Drainage Strategy and presents an assessment of the likely significant effects of the proposed development with respect to water. Mitigation measures are identified, where appropriate, to avoid, reduce or offset any significant adverse effects identified and/or enhance likely beneficial effects. Taking into account the mitigation measures, the nature and significance of the likely residual effects are reported.

12.1 Competent Experts

This report has been prepared by Charles Townsend.

Charles Townsend is the Director of Townsend Water Engineering, who has over 19 years of experience undertaking flood risk assessments and drainage design.

He is a chartered scientist and a surface water management and SuDS expert, having worked on multiple FRAs throughout Britain.

Charles is also a chartered Institute of Water and Environment manager (CIWEM), and holds a BSc Hons from Oxford Brookes, with a degree in environmental geotechnology.

12.2 Introduction

12.2.1 Purpose of this Report

Townsend Water Engineering Ltd. has been appointed by Roger Parry & Partners for a Flood Consequence Assessment (FCA) and Drainage Strategy for an AD unit at Lower Leighton Farm, Leighton, Welshpool, Powys, SY21 8HH (Grid Ref: 324296 , 306607). This report has been prepared in support of the planning permission for the aforementioned development.

The report is based on the available flood risk information for the site detailed in Section 1.2 and prepared in accordance with the planning policy requirements set out in Section 1.3. The scope of the FCA is consistent with the 'Technical Advice Note 15: Flood Risk'.

12.2.2 Sources of Information and Consultation

This Report has been informed by:
- Existing Site Plan drawings and respective topographic plan delivered by the client;
- NRW & EA Severn Preliminary Flood Risk Assessment December 2018;
- The NRW online flood maps;
- https://flood-map-for-planning.service.gov.uk/; and
- https://flood-warning-information.service.gov.uk/long-term-flood-risk/.

12.2.3 Policy Context

This report has been prepared in accordance with the relevant national, regional and local planning policy and statutory guidance as follows:
- National policy contained within the Technical Advice Note 15 (TAN15) dated March 2025, issued by Welsh Assembly.

12.2.4 Structure of this Report

The Report has been prepared based on the following structure:
- Section 2 refers to spatial planning considerations by reference to the proposed land use, flood zoning and TAN15 vulnerability;
- Section 3 presents the assessment of existing flood risk at the site;
- Section 4 presents the proposed development and findings of flooding;
- Section 5 presents the drainage strategy; and

- Section 6 provides a summary of the assessments.

Additional Appendices are provided that deal with the following:
- Appendix A: Topographical Survey;
- Appendix B: Location Plan and
- Appendix C: Drainage Strategy & Calculations.

12.3 Spatial Planning Consideration

12.3.1 Location and Background

Figure 1: Site location (Source: Bing Ordanance Survey Map and Figure 2: Aerial View of the site (Source: Google Maps), with location details found in Table 1. The site is located at Lower Leighton Farm, Leighton, Welshpool, Powys, SY21 8HH (Grid Ref: 324296, 306607). (Table 1: Site Details).

The planning application is for the erection of a new AD unit. The entire development site is approximately 4.7ha. The existing site is a mix of brownfield and greenfield - the site is currently a field within a farm.

There is a stream running through the site. It discharges into a culvert that runs along the northern boundary and then the culvert leaves the site and then discharge to a watercourse to the west. According to the anecdotal evidence the culvert is 2.3-5m below ground levels.

To the North of the site is the B4381 followed by fields. To the east of the site is Lower Leighton Farm. To the south-east is Leighton School and to the south is a field. To the west is fields and an ordinary watercourse that is a tributary of the River Severn.

Table 1: Site Details Grid reference details taken from the site https://www.streetmap.co.uk/

Reference	Value
OS X (Eastings)	324296
OS Y (Northings)	306607
Nearest Post Code	SY21 8HH
Nat. Grid	SJ 24293 06624

Figure 1: Site location (Source: Bing Ordanance Survey Map)

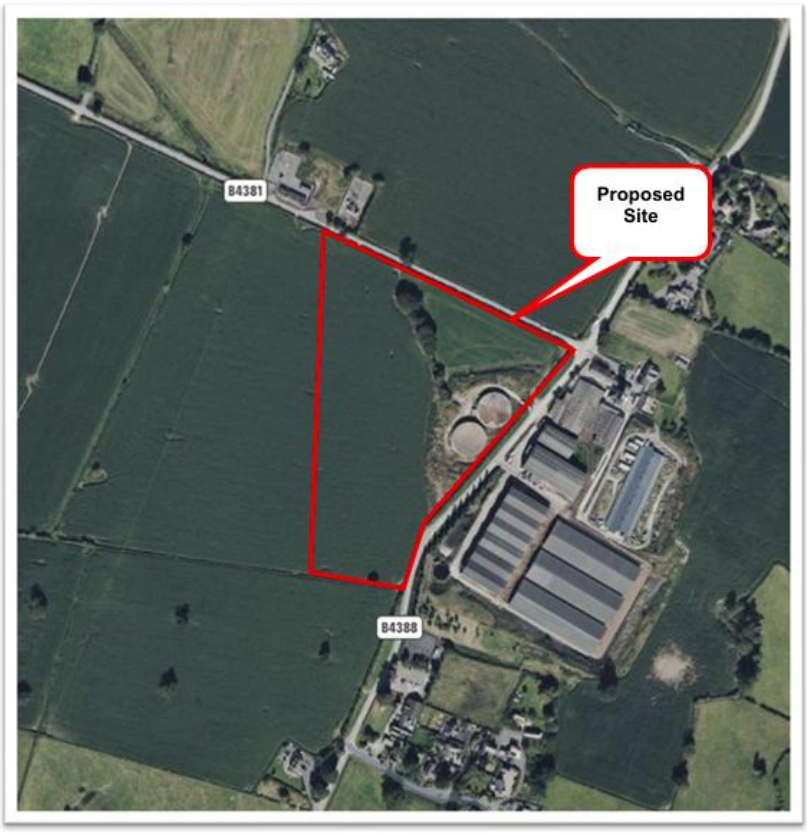


Figure 2: Aerial View of the site (Source: Google Maps)

12.3.2 Topography

According to OS Maps, there is a high point in the south-east of the site and levels fall from there. There is a watercourse running through the site. The lowest point is the north-west entrance to the site and the levels there are approximately 72.59mAOD. The highest point is at the south-eastern site entrance at approximately 91.41mAOD, please see the layout with the levels indicated on it. Please see Appendix A: Proposed Layout.

Figure 3: Contour Levels on OS Maps

12.3.3 Geology and Soil

The geology at the site has been obtained from the British Geological Survey (BGS) website. The bedrock beneath the site is described as 'Stone House Shale Formation - Mudstone'. (Figure 4: Bedrock underneath the Site (Source: BGS Bedrock Geology Mapping)). Superficial deposits are described as 'Glaciofluvial Fan Deposits, Devensian'.

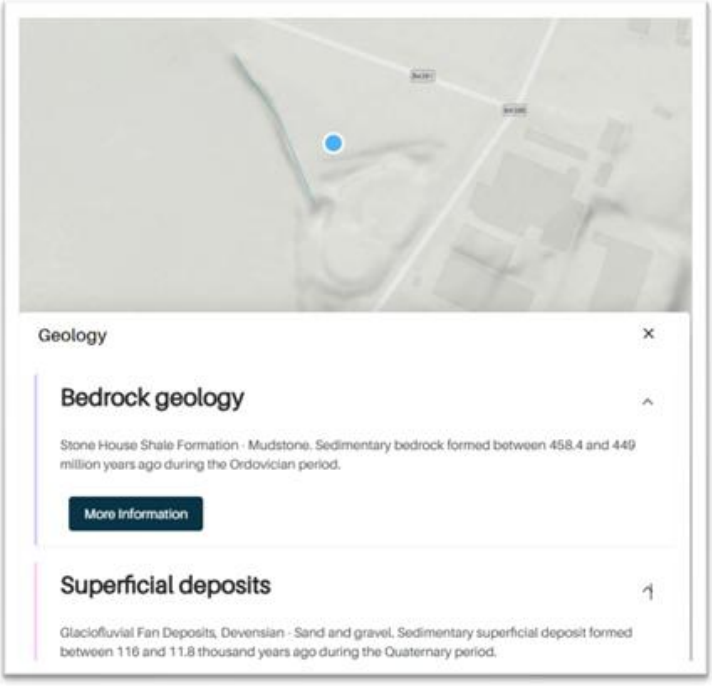


Figure 4: Bedrock underneath the Site (Source: BGS Bedrock Geology Mapping)

Soilscapes Viewer describes the soil conditions at the site as Soilscapes 18 - 'Slowly permeable seasonally wet acid loamy and clayey soils' with impeded drainage. Please see Figure 5 below.

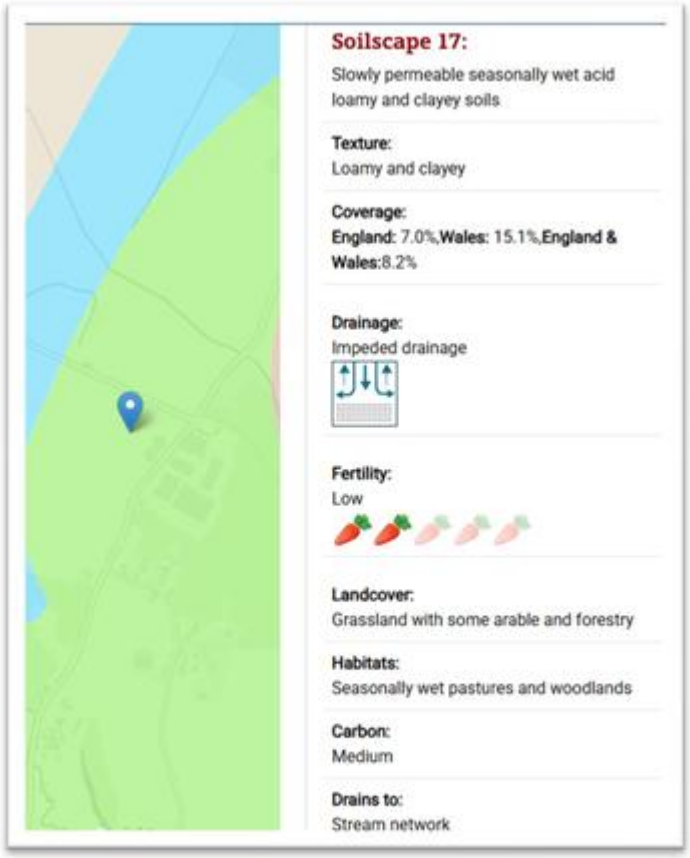


Figure 5: Soilscapes 10

Soilscapes data indicates that the site is unlikely to be suitable for infiltration, and the sites vicinity to the river and watercourses makes it likely that groundwater is too high within the site for infiltration to work successfully.

12.3.4 Flood Zone

12.3.4.1 Fluvial

The existing site is within Flood Zone 1 for rivers and seas, please see Figure 6. Flood Zone 1 is an area at low risk of fluvial flooding (Less than 1 in 1000 (0.1%) (plus climate change) chance of flooding in a given year). This suggests the site is at low risk of fluvial flooding.

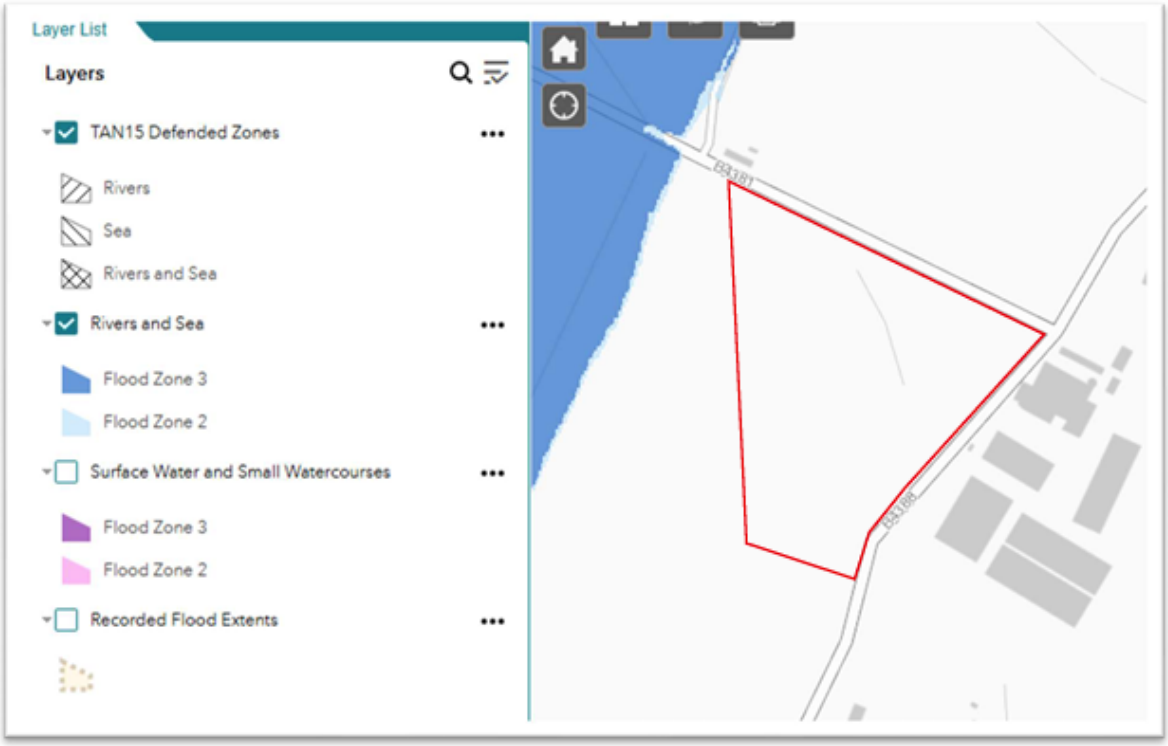


Figure 6: Flood Map for Planning (Source: Natural Resources Wales)

12.3.4.2 Surface Water

The majority of the site is within a Flood Zone 1 for surface water. There is a streak of surface water running through the site, following the path of the stream, that is within Flood Zone 2 (less than 1 in 100 (1%) but greater than 1 in 1000 (0.1%) chance of flooding in a given year, including climate change) and Flood Zone 3 (a greater than 1 in 100 (1%) chance of flooding in a given year, including climate change).

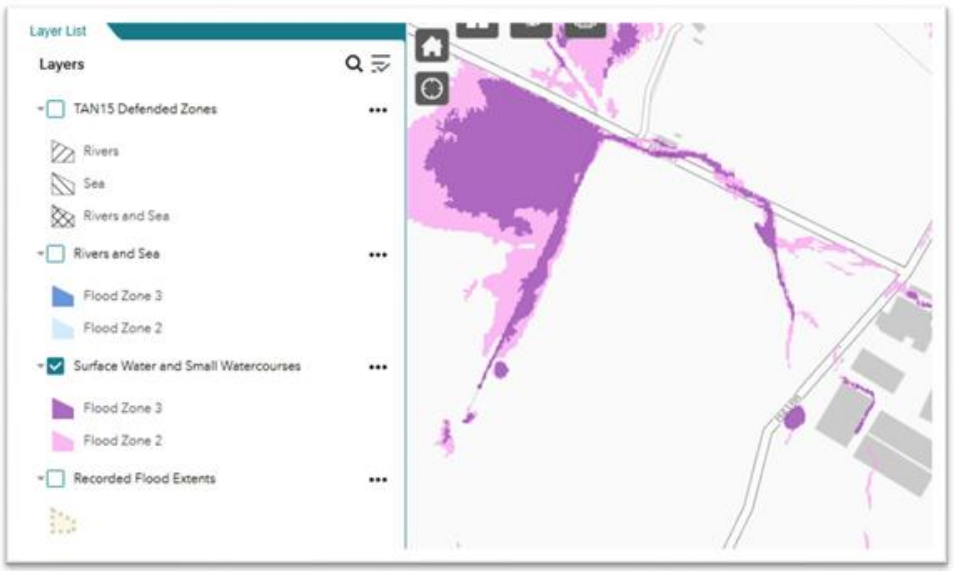


Figure 7: Flood Map for Planning: Surface Water Risk (NRW)

12.3.5 Tan15 Vulnerability

The development will be classed as 'Less Vulnerable' under the TAN15 vulnerability classification (Table 2).

Figure 4- Development vulnerability categories

Vulnerability category	Types
Highly vulnerable development	All residential premises (including hotels, Gypsy and Traveller sites, caravan parks and camping sites). Schools and childcare establishments, colleges and universities. Hospitals and GP surgeries. Especially vulnerable industrial development (e.g. power generating and distribution elements of power stations, transformers, chemical plants, incinerators), and waste disposal sites. Emergency services, including: ambulance stations, fire stations, police stations, command centres, emergency depots. Buildings used to provide emergency shelter in time of flood.
Less vulnerable development	General industrial, employment, commercial and retail development. Transport and utilities infrastructure. Car parks. Mineral extraction sites and associated processing facilities (excluding waste disposal sites). Public buildings including libraries, community centres and leisure centres (excluding those identified as in Highly Vulnerable category and emergency shelters). Places of worship. Cemeteries. Equipped play areas. Renewable energy generation facilities (excluding hydro generation).
Water compatible development	Boatyards, marinas and essential works required at mooring basins. Development associated with canals. Flood defences and management infrastructure. Open spaces (excluding equipped play areas). Hydro renewable energy generation.

Table 2: Flood Risk Vulnerability Classification (Source: NPPF Technical Guide)

As the site is 'Less Vulnerable' and in Fluvial Flood Zone 1 and mostly within a Surface Water Flood Zone 1, the development is acceptable as long as there is no development placed in the Surface Water Flood Zone 2 and 3 areas, and development is appropriately set back from the Flood Zone 2 and 3 areas, to allow for extreme flood events.

12.3.6 Climate Change Allowances for Peak River Flow

Table 3 indicates the anticipated increase in peak river flows for the 3 river basin districts that cover Wales. The allowances present the current national representation of how climate change could impact peak flow. This data will be updated once revised data is made available through UKCP18.

The allowances are based on percentage increases of change from a 1961-1990 baseline and are provided for the:

- 10th percentile (lower end estimate)
- 50th percentile (change factor/central estimate)
- 90th percentile (upper end estimate)

The projected peak river flow change is a range, with the highest estimate equally likely to occur as the lowest estimate. For this reason, it is recommended that the central estimate, or change factor, for the 2080s for the relevant river basin district is used to assess the potential impact of climate change as part of a flood consequence assessment (FCA) and to inform design levels. If a figure other than the central estimate is used, applicants will be expected to provide full justification within the FCA.

The climate change used in this area is 25% for the river Severn central estimate total potential change anticipated by the 2080's.

Table 1: peak river flow allowances by river basin district (using 1961 to 1990 baseline[1])

	Total potential change anticipated by the 2020s	Total potential change anticipated by the 2050s	Total potential change anticipated by the 2080s
Severn			
Upper end estimate	25%	40%	70%
Change factor /central estimate	10%	20%	25%
Lower end estimate	0%	5%	5%
West Wales			
Upper end estimate	25%	40%	75%
Change factor /central estimate	15%	25%	30%
Lower end estimate	5%	10%	15%
Dee			
Upper end estimate	20%	30%	45%
Change factor /central estimate	10%	15%	20%
Lower end estimate	5%	5%	5%

Table 3: Flood Consequence Assessment of Table 1: Peak River Flow allowances by River Basin District (using 1961 to 1990 Baseline)

12.3.7 Climate Change Allowances for Rainfall Intensity

Table 4 shows the anticipated changes in peak rainfall intensity for use in small catchments. Both the central and upper estimates should be assessed to understand the range of impact. As a minimum, development proposals should be assessed against the central estimate to inform design levels. Where the assessment indicates a significant flood risk for the upper estimate (e.g. depths, velocity), the flood consequences assessment will need to indicate the mitigation measures required to protect people and property.

Rainfall allowances should also be applied when considering surface water flooding and drainage assessments. Drainage systems should be designed to ensure there is no increase in site run-off when assessed against the upper estimate.

The climate change used in this area is 40% for the upper estimate total potential change anticipated for 2080s (2070-2115).

Table 4: Climate Change Allowance for Rainfall Intensity (compared to a 1961-90 baseline) :

Applies across all of Wales	Total potential change anticipated for 2020s (2015-2039)	Total potential change anticipated for 2050s (2040-2069)	Total potential change anticipated for 2080s (2070-2115)
Upper estimate	10%	20%	40%
Central estimate	5%	10%	20%

12.4 Flood Hazard for Existing Site

12.4.1 Source of Flood Risk

Flood sources and their possibilities described below.

12.4.2 Flood Risk from Fluvial Sources

The proposed development is situated within Fluvial Flood Zone 1, an area at low risk of fluvial flooding.

12.4.2.1 River Severn Fluvial Flooding

12.4.2.2 Historic Flooding

With regard to historic flooding, there is one recorded instance of flooding in February 2002, to the west of the site. However, this event did not flood the proposed site. Please see Figure 8.

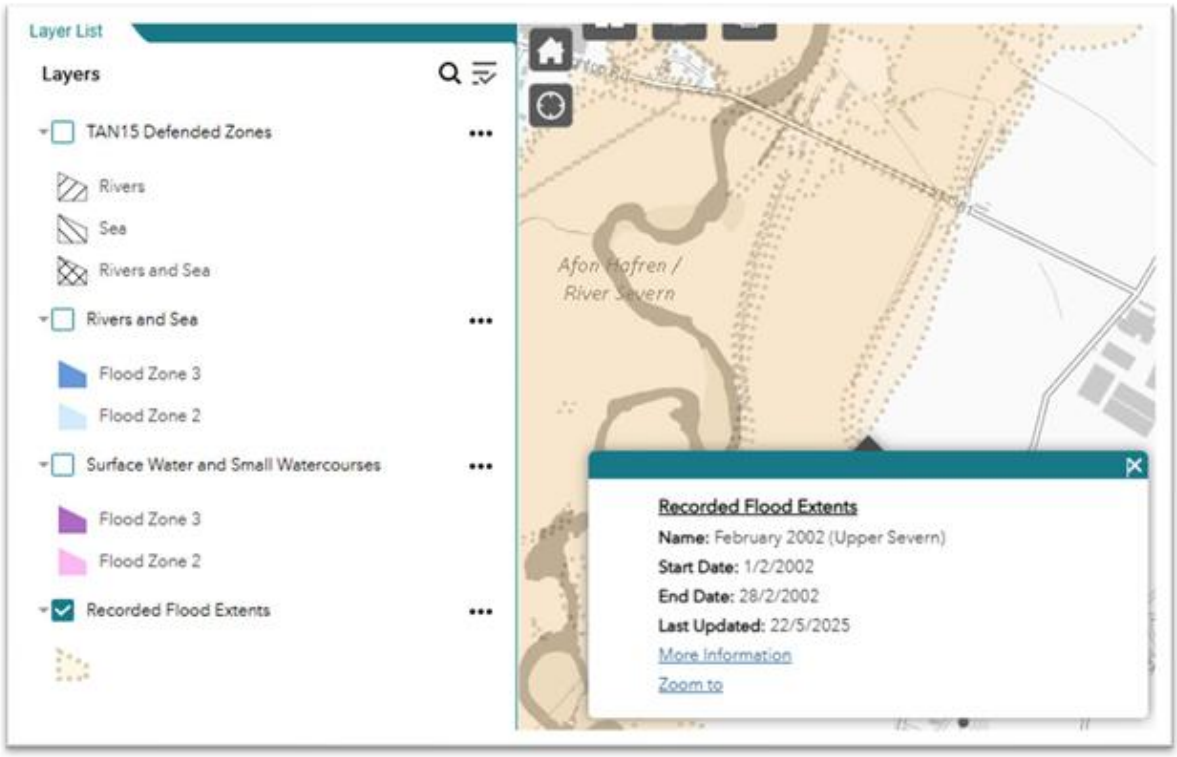


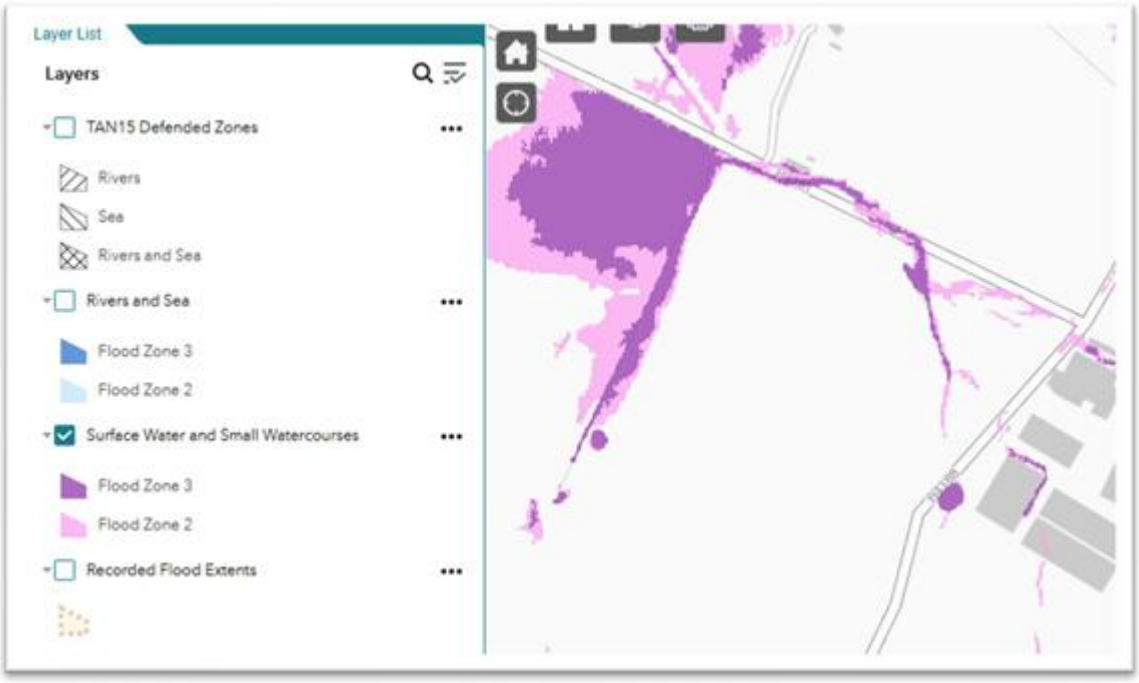
Figure 8: Recorded Flood Extents (Flood Map for Planning)

12.4.2.3 Access and Egress Outside of the Redline Boundary

In the event of any flooding the site would be dry, if the site needed to be evacuated, people could escape to the east of the site.

12.4.3 Surface Water

The NRW surface flood extents have been obtained from the NRW open dataset. The majority of the site is within a Flood Zone 1 for surface water. There is a streak of surface water running through the site, following the path of the stream, that is within Flood Zone 2 (less than 1 in 100 (1%) but greater than 1 in 1000 (0.1%) chance of flooding in a given year, including climate change) and Flood Zone 3 (a greater than 1 in 100 (1%) chance of flooding in a given year, including climate change). Please see Figure 7.



No buildings will be placed in the Surface Water Flood Zone 2 and 3 areas, the only development will be the pond in the north-west of the site. However, this is a pond and can get wet as it is a water body.

Development will be appropriately set back from the surface water Flood Zone 2 and 3 areas, to allow for extreme flood events.

Therefore, flood risk from surface water is believed to be low at the site.

12.4.4 Flood Risk from Reservoir/Canals/Other Artificial Sources

There is no flood risk from reservoirs to the site, please see Figure 9.

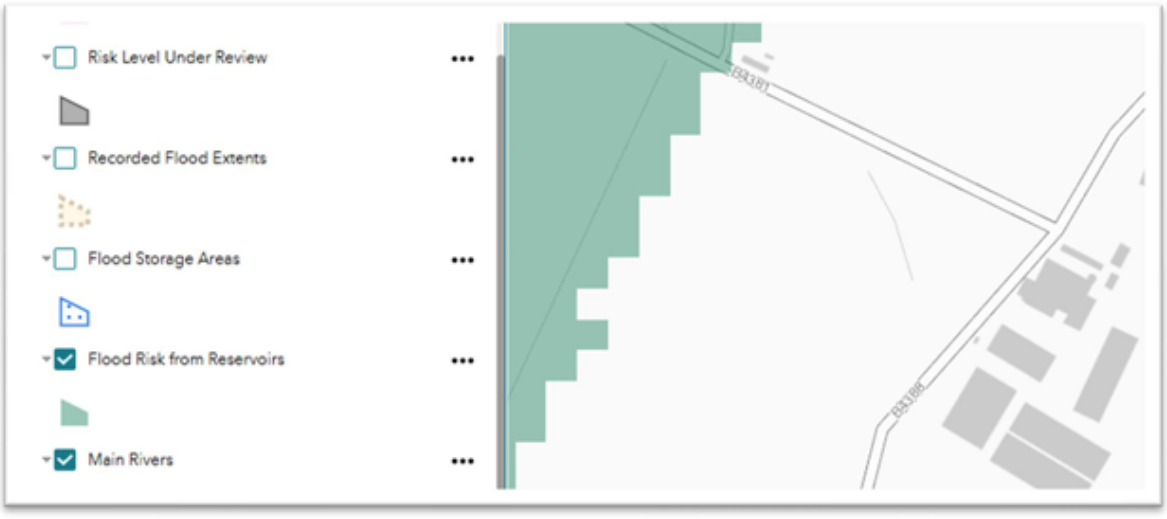


Figure 9: Reservoir Flood Risk Map (Source: NRW)

There is no flood risk from canals or other artificial sources, as there are no canals or artificial sources within the vicinity of the site.

12.4.5 Flood Risk from Groundwater

According to the NRW & EA Severn Preliminary Flood Risk Assessment December 2018, there is a very low likelihood of groundwater flooding in Wales. Please see Figure 10.

Groundwater flooding

Due to the nature of groundwater flooding, it is difficult to map and model. Geological maps can give an indication of areas which may be susceptible to groundwater flooding, of which there are very few in Wales. This means that we have little need to include groundwater flooding in our models in the same way as we do for river, sea and surface water flooding due to the very low likelihood of occurrence.

In Wales, groundwater flooding is most likely to occur from disused mine workings which makes it even more difficult to forecast, map and model as detailed mine works mapping is not available. It is best done on a small-scale, case by case basis when the need arises.

Figure 10: NRW & EA Severn Preliminary Flood Risk Assessment December 2018

Furthermore, BGS maps describes Groundwater Vulnerability Wales: Bedrock Geology & Superficial Deposits as ' Low vulnerability, Secondary aquifer'. Please see Figure 11.

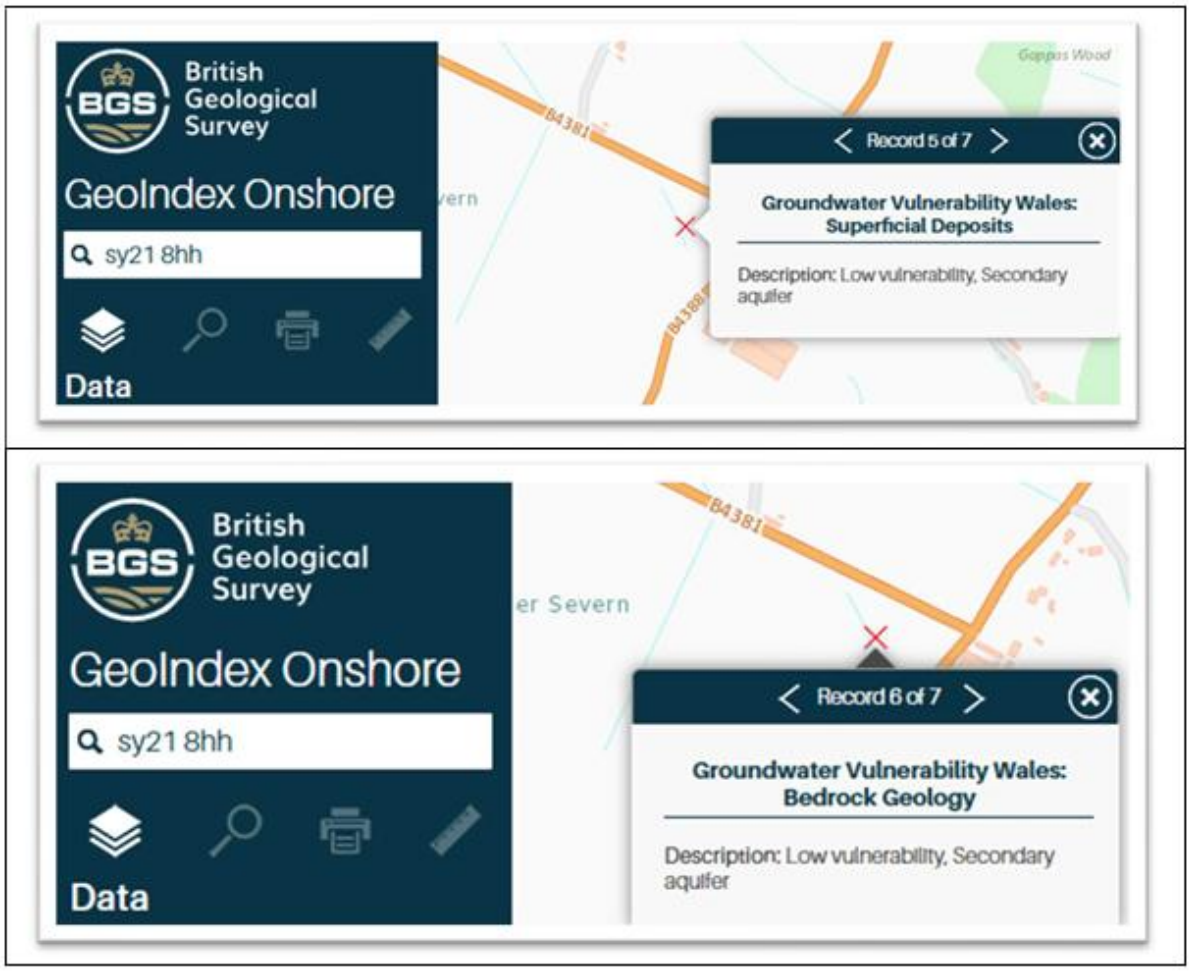


Figure 11:BGS Maps Groundwater Vulnerability Wales: Bedrock Geology & Superficial Deposits

12.4.6 Flood Risk from Sewers

There is no public sewer within the vicinity of the site, therefore there is minimal risk of flooding from sewers in this area.

12.5 Assessment of Flood Risk for Proposed Development

12.5.1 Development Proposals

The planning application is for the erection of an AD unit at Lower Leighton Farm, Leighton, Welshpool, Powys, SY21 8HH. The area of the site is 4.7ha.The site is a field on a farm. Please see the proposed site layout in Figure 12.

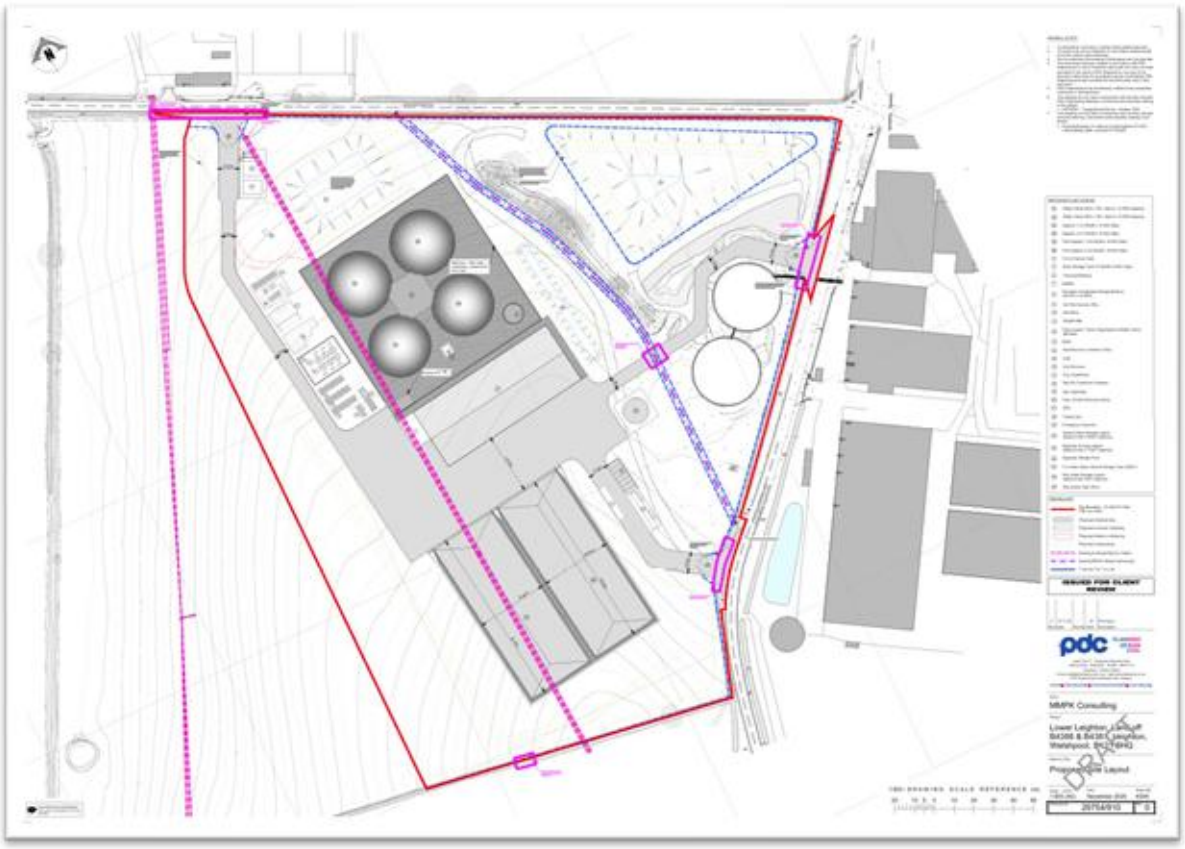


Figure 12: Proposed Site Layout

12.5.2 Fluvial Flood Management

The site is in a Fluvial Flood Zone 1 (low risk) and is not at risk from the River Severn. Therefore, no mitigation is required.

12.5.3 Surface water Flooding

According to the Surface Water Flood maps, the majority of the site is within a Flood Zone 1 for surface water. There is a streak of surface water flooding running through the site, following the path of the stream, that is within Flood Zone 2 and Flood Zone 3.

No development will be placed in the Surface Water Flood Zone 2 and 3 areas, and development will be appropriately set back from the Flood Zone 2 and 3 areas, to allow for extreme flood events.

Therefore, flood risk from surface water is believed to be low at the site.

12.5.4 Groundwater Flooding

As previously stated, groundwater flooding in Wales is thought to be very unlikely according the NRW & EA Severn Preliminary Flood Risk Assessment December 2018. Therefore, the site is thought to be at low risk of groundwater flooding.

12.5.5 Infrastructure Flooding

There is no existing infrastructure on the site, therefore, the risk of flooding from infrastructure to the site is believed to be low.

12.6 Drainage Strategy

Please find below the drainage strategy.

12.6.1 Existing Drainage Arrangements

12.6.1.1 Surface Water

The existing drainage arrangements is that all the surface water from the existing site drains to the ground as it is a field.

12.6.2 Infiltration Rates

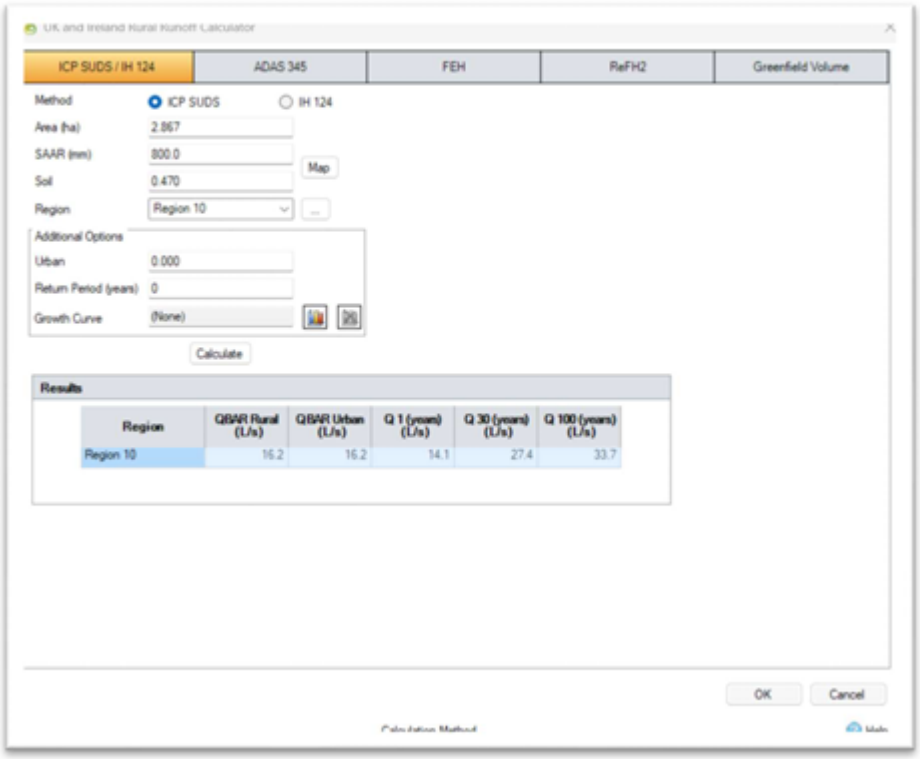
Soilscapes data indicates that the site is unlikely to be suitable for infiltration, and the sites vicinity to the river and watercourses makes it likely that groundwater is too high within the site for infiltration to work successfully.

12.6.3 Run-off

The discharge has been set at a greenfield runoff rate set up to a Q-bar of 16l/s. The discharge has been split between two outfalls. The north part of the site will drain at 5l/s. The southern section of the site will drain at 10l/s. This is less than the Qbar greenfield rates.

Please see the calculations below:

Table 5: Greenfield Rates



12.6.4 Surface Water Drainage Strategy

12.6.4.1 Hierarchy of Discharge

In accordance with the Flood Risk and Coastal Change Planning Practice Guidance, where possible, preference should be given to multi-functional sustainable drainage systems, and to solutions that allow surface water to be discharged according to the following hierarchy of drainage options:

1. Into the ground (infiltration);
2. To a watercourse;
3. To a surface water sewer, highway drain, or another drainage system; and
4. To a combined sewer.

Infiltration: Infiltration has been discounted due to the soil conditions.

Watercourse: There is a stream/watercourse within the site. Both attenuation basins are discharging to the watercourse. The northern basin will discharge at 5l/s into the culvert running on the northern boundary. The southern basin will drain at 10l/s into the watercourse running through the site.

Conclusion: Infiltration is not feasible at this site and there is a watercourse within the site, therefore, it is proposed to discharge the sites surface water to the watercourse.

All lower options on the hierarchy will be discounted.

12.6.4.2 Sizing of SUDS Features

As discussed in section 4.1 of this report, the proposed area of the buildings and associated features is approximately 2.867ha. Infiltration SUDS systems have been discounted due to the soil conditions.

The discharge will be restricted to a greenfield runoff rates of 15l/s in all events via a Hydro-brake up the 1 in 100 year event plus climate change (40%). The storage will be held in 2 lined attenuation basins, up to and including the 1 in 100 year event plus 40% climate change. The attenuation basin to the south will discharge at 10l/s and the northern one will discharge at 5l/s.

Modelling of the surface water runoff to the design parameters was carried out using Infodrainage Flow, an industry leading software which allows design and analysis of SuDS features. The Infodrainage Flow modelling results are in Appendix C. The following conservative assumptions and design parameters have been set within the Hydraulic model:

- Rainfall intensity was obtained using the Flood Studies Report (FSR) methodology, and increased by 40%, over the 100 years design life of the proposed commercial development, in line with the requirements of the TAN15;
- The proposed impermeable area is 2.867ha, the coefficient has been set at 100%;
- No runoff losses have been assumed in the modelling, therefore, all the design rainfall landing on the impermeable surfaces is expected to reach the attenuation basins up to and including the 1 in 100 year event plus 40% climate change;
- As per the conclusions in Section 3.3, the soil has been modelled with an infiltration rate of zero (0.0) m/hr;
- A Hydro-Brake has been used to restrict the total discharge from the site to 15l/s. The northern basin will discharge at 5l/s and the southern basin will discharge at 10l/s.

Please find below a summary of the basins (please note in InfoDrainage ponds and basins are the same thing).

Table 6: Summary of the Results

Stormwater Control	Storm Event	Max. US Level (m)	Max. DS Level (m)	Max. US Depth (m)	Max. DS Depth (m)	Max. Inflow (L/s)	Max. Flooded Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Half Drain Down Time (mins)	Percentage Available (%)	Status
Pond	FSR 100 years +40 % 2160 mins Winter	79.519	79.519	1.239	1.239	35.1	0.000	10.0	1761.894	1022	22	OK
Pond (1)	FSR 100 years +40 % 1440 mins Winter	72.587	72.587	1.157	1.157	42.3	0.000	5.3	771.969	1982	88	OK

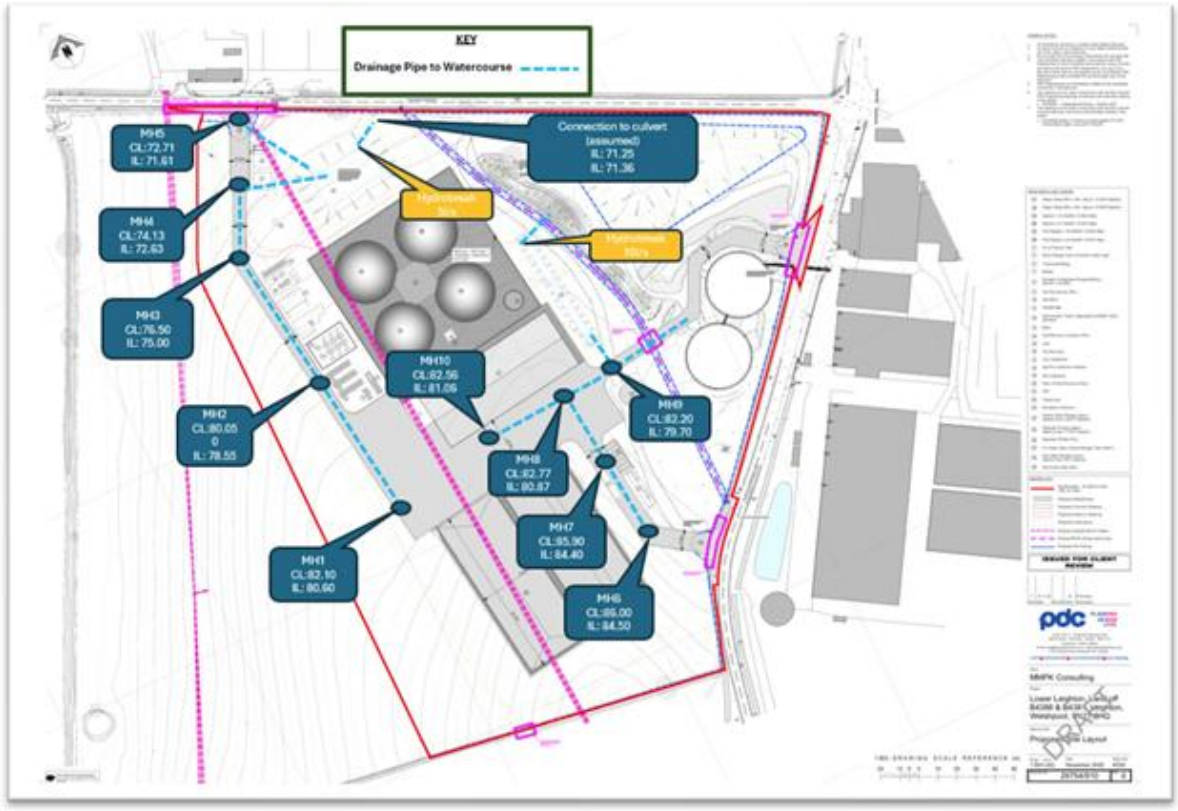


Figure 13: Drainage Strategy Design

Please see Appendix C for the full drainage strategy and calculations.

12.6.4.3 Maintenance Plan

Structures which manage surface water runoff require little maintenance, however a regular maintenance schedule e.g., after heavy rainfall, should be established by the site owners to reduce the risk of blockage within the drainage system and ensure the design remains in good working order. It is proposed the owner will maintain the basins:

Table 7: Operation and Maintenance Requirements for Attenuation Basins

TABLE 22.1 Operation and maintenance requirements for detention basins

Maintenance schedule	Required action	Typical frequency
Regular maintenance	Remove litter and debris	Monthly
	Cut grass – for spillways and access routes	Monthly (during growing season), or as required
	Cut grass – meadow grass in and around basin	Half yearly (spring – before nesting season, and autumn)
	Manage other vegetation and remove nuisance plants	Monthly (at start, then as required)
	Inspect inlets, outlets and overflows for blockages, and clear if required.	Monthly
	Inspect banksides, structures, pipework etc for evidence of physical damage	Monthly
	Inspect inlets and facility surface for silt accumulation. Establish appropriate silt removal frequencies.	Monthly (for first year), then annually or as required
	Check any penstocks and other mechanical devices	Annually
	Tidy all dead growth before start of growing season	Annually
	Remove sediment from inlets, outlet and forebay	Annually (or as required)
	Manage wetland plants in outlet pool – where provided	Annually (as set out in Chapter 23)
Occasional maintenance	Reseed areas of poor vegetation growth	As required
	Prune and trim any trees and remove cuttings	Every 2 years, or as required
	Remove sediment from inlets, outlets, forebay and main basin when required	Every 5 years, or as required (likely to be minimal requirements where effective upstream source control is provided)
Remedial actions	Repair erosion or other damage by reseeding or re-turfing	As required
	Realignment of rip-rap	As required
	Repair/rehabilitation of inlets, outlets and overflows	As required
	Relevel uneven surfaces and reinstate design levels	As required

12.7 Summary & Conclusions

A summary of the main conclusions for the FCA and Drainage Strategy is presented below:

- Development proposals are for a proposed AD unit development at Lower Leighton Farm, Leighton, Welshpool, Powys, SY21 8HH;
- The development site is approximately 4.7ha. The site is a greenfield/brownfield mix;
- The site is within Fluvial Flood Zone 1, an area at low risk of fluvial flooding;
- the majority of the site is within a Flood Zone 1 for surface water. There is a streak of surface water flooding running through the site, following the path of the stream, that is within Flood Zone 2 and Flood Zone 3;
- No development will be placed in the Surface Water Flood Zone 2 and 3 areas, and development will be appropriately set back from the Flood Zone 2 and 3 areas, to allow for extreme flood events. Therefore, flood risk from surface water is believed to be low at the site;
- It is believed that the site is at low risk of groundwater, sewer and infrastructure flooding;
- Infiltration is not feasible at this site due to clay soils that drain to the stream network. There is a watercourse within the site, therefore, it is proposed to discharge the sites surface water to the watercourse;
- The storage will be held in 2 lined attenuation basins, up to and including the 1 in 100 year event plus 40% climate change. The pond will be lined to avoid ingress from groundwater; and
- The total discharge from the site will be 15l/s. The discharge has been split for the northern section the attenuation basin will discharge at 5l/s and the southern section will discharge at 10l/s.

CHAPTER 13 – SOILS

13. Soils

This chapter assesses the impact of the proposals on soils on site. No significant impacts upon soils are envisaged.

13.1 Introduction

13.1.1 Introduction to the Issues

This chapter considers the baseline soil conditions and of the potential impact to soils that may result from the construction, operation and decommissioning of the proposed development.

13.2 Overview of Potential Impacts on Soils

In the absence of mitigation, the potential impacts to soils arising from the proposed development include, but are not limited to, the following:

- Construction: Compaction of soils, and removal of surplus soil and isolated occurrences of soil contamination;
- Operation – on-site: Contamination of soils from potential spillages and leaks on site including hydrocarbons and liquids originating from the development; and
- Decommissioning: Contamination could arise during the decommissioning process from chemicals/materials stored on-site during operation and the exposure of soil as the hard standing is removed.

Impacts on soils may lead to secondary effects on groundwater, surface water and ecological receptors and therefore reference should also be made to Chapters 10 – Ecology, and 12 - Water Resources.

Summary of Potential Impacts

Table 50 provides a summary of the impacts that could potentially occur as a result of the redevelopment of the site as an AD unit. However, it does not necessarily follow that all these impacts would actually occur.

Table 50: Potential Impacts Resulting from Development

Key Activities	Specific Element/Activity	Potential Impacts Potential Effect	Potential Receptors	Sensitive
Construction	Use of heavy Machinery	Compaction of soil, increased runoff	Soils	
Operation	Use of AD unit	Leaks of potential contaminants. Examples include, but not limited to: manure/digestate leachates; dust; process chemicals; oils etc.	Soils	
Decommissioning	Removal of AD unit	Leaks of potential contaminants. Examples include, but not limited to: manure/digestate leachates; dust; process chemicals; oils etc.	Soil	
Decommissioning	Removal of hard standing/buildings	Exposure of soils which could lead to leaching of any contaminants and increased sediment load	Primarily soils	

13.3 Methodology

13.3.1 Methodology and Relevant Guidance/Standards

The assessment of potential impacts on soils arising from the proposed development has been undertaken by analysing any interactions between the construction, operational and decommissioning processes on soil conditions. This assessment is inevitably linked with the assessment of water resources (Chapter 12) and follows a similar methodology.

The assessment identifies the likely risks of soil contamination during the construction, operational and decommissioning phases of the development. This involves assessing the significance of any potential effects by determining the sensitivity of the receptor and the magnitude of the potential effect. A qualitative risk assessment has been undertaken to establish the significance of possible effects through consideration of the likelihood of an event and the severity of the hazard to the soil.

13.3.2 Assessment Criteria

The significance of any impacts of the proposed devleopment on baseline conditions is assessed as part of the impact assessment. The sensitivity of the receptor and the magnitude of any potential impact combine to determine the significance of any impact.

Magnitude, sensitivity and significance criteria were developed for the conditions prevailing at the Lower Leighton site and are detailed below. In this assessment, consideration of likelihood of the effect occurring is also incorporated into a final risk based assessment.

Magnitude

The criteria used to determine the magnitude of a potential impact are defined in Table 51 below. Assessment of magnitude includes consideration of the amount and intensity of impact and the duration of that impact (i.e. whether permanent or temporary).

Table 51: Impact Magnitude Criteria

Magnitude	Definition
Negligible	Unquantifiable or unqualifiable change in soil conditions
Minor	Detectable but minor change to soil conditions. Soil quality standards less than threshold and unlikely to affect most sensitive receptors (e.g. a minor spillage)
Moderate	Detectable change to soil conditions resulting in non-fundamental temporary or permanent consequential changes. Some deterioration in soil quality likely to temporarily affect most sensitive receptors (e.g. a minor spillage).
High	Fundamental change to soil conditions (including deterioration in soil quality) resulting in temporary or permanent consequential changes (e.g. major spillage resulting in dangerous levels of contamination).

Sensitivity

Sensitivity criteria can be based both on the degree of environmental response to any particular impact, as well as the 'value' of the receptor (e.g. greenfield soils with an agricultural land use are more sensitive than brownfield soils present on an industrial/commercial site). The sensitivity criteria developed for this assessment are presented in Table 52.

Table 52: Sensitivity Criteria

Sensitivity	Definition
Negligible	Environment is insensitive to impact, no discernible changes e.g. soils are not in use, the land has an industrial/ commercial land use and/or mainly covered by hard standing.
Low	Environment responds in a minimal way such that only minor changes are detectable e.g. landscaped areas
Medium	Environment clearly responds to effect(s) in quantifiable and/or qualifiable manner e.g. low grade agricultural land, recreational ground.
High	Environment responds to major change(s) e.g. agricultural land use for food production, allotments.

Significance

The combination of magnitude and sensitivity logically combine to provide a matrix categorisation of significance. Significance levels are presented in 53.

Table 53: Significance Matrix

		Sensitivity			
		Negligible	Low	Medium	High
Magnitude	Negligible	Insignificant	Insignificant	Insignificant	Insignificant
	Minor	Insignificant	Minor	Minor	Moderate
	Moderate	Insignificant	Minor	Moderate	High
	High	Insignificant	Moderate	High	Very High

13.3.3 Risk Assessment

Qualitative Risk Assessment Methodology

Risk assessment is the process of collating known information on a hazard or set of hazards in order to estimate actual or potential risks to receptors. The receptors may be human health, agricultural land, a water system, a sensitive local ecosystem or even future construction materials. Receptors can be connected with the hazard under consideration via one or several exposure pathways (e.g. the pathway of direct contact or indirect transport by wind/water etc). Risks are generally managed by isolating or removing the hazard, isolating the receptor, or by intercepting the exposure pathway. Without the three essential components of a source (hazard), pathway and receptor, there can be no risk.

Thus, the mere presence of a hazard at a site does not mean that there will necessarily be attendant risks.

Sources

Potential sources of contamination are identified for the Lower Leighton site, based on a review of the proposed uses. Not only the nature but also the likely extent of any contamination is considered, e.g. whether such contamination is likely to be localised or widespread.

Pathways

The mere presence of a contaminant does not infer a risk. The exposure pathway determines the dose delivered to the receptor and the effective dose determines the extent of the adverse effect on the receptor. The pathway which transports the contaminants to the receptor or target generally involves conveyance via soil, water or air or may be direct.

Receptors

The varying effects of a hazard on individual receptors depend largely on the sensitivity of the receptor. Receptors include any people, animal or plant population, or natural or economic resources within the range of the source which are connected to the source by the transport pathway, although in this instance the assessment is concerned primarily with soils.

Exposure Assessment (Likelihood of Occurrence)

By considering the source, pathway and receptor, an assessment is made for each contaminant on a receptor by receptor basis with reference to the significance and degree of the risk. In assessing this information, a measure is made of whether the source contamination can reach a receptor, determining whether it is of a major or minor significance (as set out above).

The assessment of risk presented here has been based upon the procedure outlined in the Department for the Environment Transport and the Regions (DETR) Circular 02/2000. In addition, the DETR (now Defra) with the EA and the Institute of Environment and Health, has published guidance on risk assessment (Guidelines for Environmental Risk Assessment and Management). This guidance states that the designation of risk is based upon a consideration of both:

- The likelihood of an event; (takes into account both the presence of a hazard and receptor and the integrity of the pathway); and
- The severity of the potential significance (takes into account both the potential severity of the hazard and the sensitivity of the receptor).

Table 54 shows how the risk rating is achieved by combining the likelihood of the event and the degree of significance.

Table 54: Risk Assessment Matrix

		Significance			
		High	Moderate	Minor	Insignificant
Probability (likelihood)	High Likelihood	Very high risk	High risk	Moderate risk	Low risk
	Likely	High risk	Moderate risk	Moderate/Low risk	Low risk
	Low Likelihood	Moderate risk	Moderate/low risk	Low risk	Very Low risk
	Unlikely	Moderate/low risk	Low risk	Very low risk	Very Low risk

Under such a classification system the following categorisation of risk has been developed and the terminology adopted as shown in Table 55.

Table 55: Risk Criteria

Term	Description
Very High Risk	There is a high likelihood that severe harm could arise to a designated receptor from an identified hazard at the site without appropriate remedial action.
High Risk	Harm is likely to arise to a designated receptor from an identified hazard at the site without appropriate remedial action.
Moderate Risk	It is possible that, without appropriate remedial action, harm could arise to a designated receptor. It is relatively unlikely that any harm would be high, and if any harm were to occur it is more likely that such harm would be relatively minor.
Low Risk	It is possible that harm could arise to a designated receptor from an identified hazard but it is likely that, at worst, this harm, if realised, would normally be minor.
Very low risk	The presence of an identified hazard does not give rise to the potential to cause significant harm to a designated receptor.

The assessment of likely significant impacts of the proposed AD unit is initially based on potential impact before mitigation and is addressed in sections to follow. Levels of assessed impact which are moderate or above require mitigation/management to reduce the level of impact to negligible or low levels. Proposed mitigation is discussed in Section 13.7 and the residual effects after mitigation are presented if required following this section.

13.4 The Baseline Environment and Sensitive Receptors

13.4.1 Geology and Soils

The site geology and the geology of soils is summarised in Table 56.

Table 56: Soil types across controlled land

Farm Name	Soil Characteristics
Lower Leighton	Slowly permeable seasonally wet acid loamy and clayey soils

13.5 Assessment of Impacts and Risk

13.5.1 Basis for Assessment and Incorporated Mitigation Measures

The impact assessment for the proposed AD unit on soils has been undertaken assuming the following:

- The AD unit will produce a maximum of 120,269 tonnes of digestate per annum
- Chemicals will be stored on the site for cleaning processes;
- Soils will be excavated and re-graded to allow for a basement level;
- The site will be covered with approximately 80% hard standing and 20% landscaped areas.

The impact assessment for the AD unit on soils also assumes the following incorporated mitigation measures:

- Operation in accordance with Planning Policy Wales (see Chapter12 – Water Resources) and licensed by Natural Resources Wales (NRW) under the Environmental Permitting regime;
- All bulk storage tanks will be appropriately bunded and located on areas of hard standing;
- All tanks, bunds, drains and hard standing will be inspected frequently for damage, maintained and remedial works conducted if necessary.

13.5.2 Potential Sources, Pathways, Receptors and Impacts

A variety of sources, pathways and receptors have been identified as outlined below.

These are generally associated with the release of chemicals, fuels and oils and soil compaction.

Sources

- Storage and use of inorganic and organic chemicals during the construction, operation and decommissioning of the proposed AD unit;
- Use of heavy machinery on site and during application of soil to land (compaction of soils)

Pathways

- Leaching of inorganic and organic chemicals;
- Building works affecting soil structure; and

Primary Receptors

- Soils.

Potential Impacts

The principal potential impacts on soil considered in this assessment comprise:

- The contamination of soils by inorganic and organic chemicals during construction, operation or decommissioning phases;
- Contamination of soils through build up of heavy metals; and
- Direct damage to the soils via compaction.

Soil Compaction from Construction

The compaction of soils during construction may also increase surface runoff. This risk is assessed in Chapter 12 – Water Resources. Direct damage to the soils on-site via compaction is not considered significant as the site will require significant areas of made up ground. The soils also do not support

important habitats and as such the issues of compaction from construction have not been assessed further in this chapter.

The magnitude of impact without mitigation would be moderate.

13.6 Assessment of Impact Significance

The significance of potential impacts is assessed from a combination of the sensitivity of the receptor and the magnitude of the impact. This is summarised in Table 57.

The differences between construction, operation and decommissioning are not deemed relevant for this assessment. Differences in construction, operational and decommissioning phases will have an effect on the probability or likelihood of the impact being realised.

Table 57: Assessment of Significant Unmitigated Impacts

Source	Potential Impact	Receptor	Sensitivity of Receptor	Magnitude of Potential Impact	Resulting Significance (if realised)
Storage and use of inorganic and organic chemicals during the construction, operation and decommissioning of the proposed AD unit	Contaminate Soils	Soils	Negligible	Moderate	Insignificant
Use of heavy machinery on site and during application of soil to land (compaction of soils); and	Compaction	Soils	Negligible	Moderate	Insignificant

13.6.1 Unmitigated Risk

The actual likelihood or probability of the above linkages being realised requires assessment so that the level of overall unmitigated risk can be qualified and the likely significant impacts identified. The overall risk assessment matrices are provided in Table 58. These have been developed based on the combination of the significance of the potential impact and the likelihood of that potential impact occurring.

The assessment of overall risk indicates that there is a low likelihood of many of the impacts has resulted in the risks being very low.

Table 58: Risk Assessment Table – unmitigated risks

Source	Potential Impact	Receptor	Resulting Significance (if realised)	Likelihood Construction	Operation	Decommissioning	Risk Construction	Operation	Decommissioning
Storage and use of inorganic and organic chemicals during the construction, operation and decommissioning of the proposed AD unit;	Contaminate Soils	Soils	Insignificant	Likely	Low	Likely	Low Risk	Very Low Risk	Low Risk
Use of heavy machinery on site and construction of development	Compaction	Soils	Insignificant	Likely	Likely	Likely	Low Risk	Low Risk	Low Risk

13.7 Mitigation and Management

13.7.1 Regulatory Guidance and Best Practice

There are a variety of best practices and recognised measures to mitigate the identified potential impacts, providing appropriate provisions are made in the construction planning and methodology (see below). These include management at the construction stage and monitoring.

The NRW's Pollution Prevention Guidelines (PPGs) are the principal documents used for guidance on preventing contamination from construction activities.

The significance of potential mitigated impacts is assessed from a combination of the sensitivity of the receptor and the magnitude of the impact. This is summarised in Table 59.

Table 59: Assessment of Significant mitigated Impacts

Source	Potential Impact	Receptor	Sensitivity of Receptor	Magnitude of Potential Impact	Resulting Significance (if realised)
Storage and use of inorganic and organic chemicals during the construction, operation and decommissioning of the proposed AD unit	Contaminate Soils	Soils	Negligible	Negligible	Insignificant
Use of heavy machinery on site and during application of soil to land.	Compaction	Soils	Negligible	Negligible	Insignificant

13.7.2 Overall Risk with mitigation

The actual likelihood or probability of the above linkages being realised requires assessment so that the level of overall risk can be qualified and the likely significant impacts identified. The overall risk assessment matrices are provided in Table 60. These have been developed based on the combination of the significance of the potential impact and the likelihood of that potential impact occurring.

The assessment of overall risk indicates that there is a low likelihood of many of the impacts has resulted in the risks being very low.

Table 6o: Risk Assessment Table – mitigated risks

				Likelihood			Risk		
Source	Potential Impact	Receptor	Resulting Significance (if realised)	Construction	Operation	Decommissioning	Construction	Operation	Decommissioning
Storage and use of inorganic and organic chemicals during the construction, operation and decommissioning of the proposed AD unit	Contaminate Soils	Soils	Insignificant	Unlikely	Unlikely	Unlikely	Very Low Risk	Very Low Risk	Very Low Risk
Use of heavy machinery on site and during construction of development	Compaction	Soils	Insignificant	n/a	Low	n/a	Very Low Risk	Very Low Risk	Very Low Risk

13.8 Residual Impacts and Conclusions

Following mitigation the overall risks of the AD unit on soils have been assessed as very low and no further mitigation or management issues need to be addressed. Therefore the proposed development is unlikely to give rise to any significant adverse impacts on the soils of the site.

CHAPTER 14 – HERITAGE

14. Heritage

This chapter assesses the archaeology likely to exist within the boundary of the proposed project and heritage assets which lie in close proximity and may be affected by the scheme.

14.1 Competent Experts

This chapter has been produced by Jenny Hall, BSc, MCIfA.

After graduating in Archaeology and Geology (BSc Joint Hons) from Birmingham University in 1984, she spent 8 years working on archaeological projects across England and Scotland. These included large-scale excavations, such as Stanwick Roman Villa and Sandwell Priory, and post-excavation work. In 1992 she migrated to Wales and from 1993 worked for the Dyfed Archaeological Trust as the Sites and Monuments Record Officer.

In 2004 Jenny moved on to set up Trysor with Paul Sambrook, working on a wide variety of projects. These include many community focused projects alongside traditional archaeological work such as Upland Survey, desk-based assessments, watching briefs and archaeological evaluations.

14.2 Event Record – Heneb CPA

PRN	**Heneb CPA** 218198
Name	Land West of Lower Leighton, Leighton, Welshpool, Powys, SY21 8HH NGR: SJ2425506583
Type	DESK BASED ASSESSMENT
NGR	SJ2425506583
Easting	324255
Northing	306583
Summary (English)	In 2025 Trysor undertook a desk-based assessment for a proposed anaerobic digester plant on 8 hectares of land to the west of the modern farmstead of Lower Leighton, Leighton, Welshpool, Powys, SY21 8HH. © Trysor 2025
Crynodeb (Cymraeg)	Yn 2025, cynhaliodd Trysor asesiad desg ar gyfer system treulio anaerobig arfaethedig ar 8 hectar o dir i'r gorllewin o fferm fodern Lower Leighton, Leighton, Y Trallwng, Powys, SY21 8HH. © Trysor 2025
Description	In 2025 Trysor undertook a desk-based assessment for a proposed anaerobic digester plant on 8 hectares of land to the west of the modern farmstead of Lower Leighton, Leighton, Welshpool, Powys, SY21 8HH. © Trysor 2025
Sources	Trysor, 2025, *Historic Environment Desk-Based Assessment for a Proposed Anaerobic Digester Plant on Land West of Lower Leighton, Leighton, Welshpool, Powys, SY21 8HH NGR: SJ2425506583*
Copyright	© Trysor 2025

14.3 HER Core Historic Assets Records – Heneb CPA

PRN	**Heneb CPA** 223371
Name	LOWER LEIGHTON
Type	FIELD SYSTEM
NGR	SJ2408806500
Easting	324088
Northing	306500
Summary (English)	LiDAR coverage shows that earlier field boundaries survive in the landscape around Lower Leighton farm, predating the present field system. Some of these earlier boundaries compare with field parcels shown on the parish tithe map of the 1840s or even late 19th century Ordnance Survey maps. The field boundaries to the west of the farmstead appear to have been modified in the later 20th century, but across other parts of the estate may changes were made to field boundaries after John Naylor took over the estate in 1847. © Trysor 2025
Crynodeb (Cymraeg)	Mae delweddau LiDAR yn dangos bod olion cloddiau system o gaeau cynharach wedi goroesi yn y dirwedd o amgylch fferm Lower Leighton, yn rhagddyddio'r system gaeau bresennol. Mae rhai o'r ffiniau cynharach hyn yn cymharu â pharseli caeau a ddangosir ar fap degwm y plwyf o'r 1840au neu hyd yn oed fapiau Arolwg Ordnans o ddiwedd y 19eg ganrif. Ymddengys bod ffiniau'r caeau i'r gorllewin o'r fferm wedi'u haddasu yn niwedd yr 20fed ganrif, ond ar draws rhannau eraill o'r ystâd gwnaed newidiadau i ffiniau caeau ar ôl i John Naylor gymryd yr ystâd drosodd ym 1847. © Trysor 2025
Description	LiDAR coverage shows that earlier field boundaries survive in the landscape around Lower Leighton farm, predating the present field system. Some of these earlier boundaries compare with field parcels shown on the parish tithe map of the 1840s or even late 19th century Ordnance Survey maps. The field boundaries to the west of the farmstead appear to have been modified in the later 20th century, but across other parts of the estate may changes were made to field boundaries after John Naylor took over the estate in 1847. © Trysor 2025
Sources	Trysor, 2025, *Historic Environment Desk-Based Assessment for a Proposed Anaerobic Digester Plant on Land West of Lower Leighton, Leighton, Welshpool, Powys, SY21 8HH NGR: SJ2425506583*
Copyright	© Trysor 2025

PRN	**Heneb CPA** 223372
Name	LOWER LEIGHTON
Type	TOLL GATE
NGR	SJ2439006609
Easting	324390
Northing	306609
Summary (English)	The former site of a toll house on the turnpike road connecting Leighton to Welshpool. It is shown on the 1816 Ordnance Survey Original Surveyors Drawings and annotated as "T.G." (Toll Gate). It appears on the 1844 tithe map and again on the 1885 1:10560 scale Ordnance Survey map. It had disappeared by the time of the 1903 version of the Ordnance Survey map. © Trysor 2025
Crynodeb (Cymraeg)	Safle tolldŷ a fu unwaith yn sefyll yn ymyl y ffordd dyrpeg oedd yn cysylltu Leighton â'r Trallwng. Fe'i dangosir fel "T.G." (Toll Gate) ar Mapiau Gwreiddiol Syrfewyr yr Arolwg Ordnans 1816. Mae'n ymddangos ar fap degwm 1844 ac eto ar fap graddfa 1:10560 yr Arolwg Ordnans 1885. Roedd wedi diflannu erbyn amser fersiwn 1903 o fap yr Arolwg Ordnans. © Trysor 2025
Description	The former site of a toll house on the turnpike road connecting Leighton to Welshpool. It is shown on the 1816 Ordnance Survey Original Surveyors Drawings and annotated as "T.G." (Toll Gate). It appears on the 1844 tithe map and again on the 1885 1:10560 scale Ordnance Survey map. It had disappeared by the time of the 1903 version of the Ordnance Survey map. © Trysor 2025
Sources	Trysor, 2025, *Historic Environment Desk-Based Assessment for a Proposed Anaerobic Digester Plant on Land West of Lower Leighton, Leighton, Welshpool, Powys, SY21 8HH NGR: SJ2425506583*
Copyright	© Trysor 2025

PRN	**Heneb CPA** 223373
Name	PENTRE COTTAGES, NUMBERS 8 & 8A
Type	COTTAGE
NGR	SJ2479306059
Easting	324793
Northing	306059
Summary (English)	The RCAHMW report that this building was originally a single box-framed dwelling dating to circa 1600AD. It was apparently converted into a pair of farmworkers cottages during the 18th century. The 1847 parish tithe map records it as a single farmhouse on a 46-acre holding. By the late 20th century, a large extension was added to the western side of the house, extending northwards and was seemingly once again divided into two dwellings. It was still in occupation in 2025. © Trysor 2025
Crynodeb (Cymraeg)	Mae CBHC yn adrodd bod yr adeilad hwn yn wreiddiol yn annedd ffrâm bocs sengl yn dyddio'n ôl i tua 1600 OC. Ymddengys iddo gael ei drawsnewid yn bâr o fythynnod gweithwyr fferm yn ystod y 18fed ganrif. Mae map degwm y plwyf (1847) yn ei gofnodi fel ffermdy sengl ar ddaliad 46 erw. Erbyn diwedd yr 20fed ganrif ychwanegwyd estyniad mawr at ochr orllewinol y tŷ, gan ymestyn tua'r gogledd ac roedd wedi'i rannu'n ddau annedd unwaith eto, i bob golwg. Roedd yn dal i gael ei feddiannu yn 2025. © Trysor 2025
Description	The RCAHMW report that the building was originally a single box-framed dwelling dating to circa 1600AD. It was apparently converted into a pair of semi-detached farmworkers cottages in the 18th century. The 1844 parish tithe map records it as a single farmhouse on a 46-acre holding. By the late 20th century, a large extension was added to the western side of the house, extending northwards and was seemingly once again divided into two dwellings. It was still in occupation in 2025. © Trysor 2025
Sources	Trysor, 2025, *Historic Environment Desk-Based Assessment for a Proposed Anaerobic Digester Plant on Land West of Lower Leighton, Leighton, Welshpool, Powys, SY21 8HH NGR: SJ2425506583*
Copyright	© Trysor 2025

PRN	**Heneb CPA** 223374
Name	LEIGHTON HALL ESTATE
Type	GASWORKS
NGR	SJ2401705993
Easting	324017
Northing	305993
Summary (English)	The site of the former estate gasworks at Leighton. It seems to have been founded in the mid-19th century, probably during the 1860s. Several buildings still stand in the early 21st century, including the listed Retort House (Listed building number 19506). The gasworks supplied gas to Leighton Hall for lighting. © Trysor 2025
Crynodeb (Cymraeg)	Safle hen waith nwy ystâd Leighton. Ymddengys iddo gael ei sefydlu yng nghanol y 19eg ganrif, yn ystod y 1860au yn ôl pob tebyg. Mae sawl adeilad yn dal i sefyll yma ar ddechrau'r 21ain ganrif, gan gynnwys rhan o'r gwait nwy sydd bellach yn adeilad cofrhestredig (rhif adeilad rhestredig 19506). Cyflenwodd y nwy i Blas Leighton er mwyn goleuo'r ty. © Trysor 2025
Description	The site of the former estate gasworks at Leighton. It seems to have been founded in the mid-19th century, probably during the 1860s. Several buildings still stand in the early 21st century, including the listed Retort House (Listed building number 19506). The gasworks supplied gas to Leighton Hall for lighting. © Trysor 2025
Sources	Trysor, 2025, *Historic Environment Desk-Based Assessment for a Proposed Anaerobic Digester Plant on Land West of Lower Leighton, Leighton, Welshpool, Powys, SY21 8HH NGR: SJ2425506583*
Copyright	© Trysor 2025

14.4 Summary

This historic environment assessment has been undertaken by Trysor to examine potential impacts on the historic environment from a proposed new anaerobic digester on land at Lower Leighton, Leighton, Welshpool, Powys, SY21 8HH, centred on SJ2425506583. The development covers 8 hectares to the west of the modernised farmstead at Lower Leighton. It includes 2 digesters, 2 post-digesters, silage clamps, storage lagoons, buildings and associated infrastructure. The tallest structures are the digesters which are up to 16 metres in height.

A site visit was undertaken on 24th October 2025 by Trysor to examine the proposed development plot and its surroundings, and historic assets which may be affected.

The regional Historic Environment Record, managed by Heneb (CPA HER Enquiry E7117), and data from RCAHMW and Cadw, via the Coflein, Côf Cymru and DataMapWales portals, was consulted. Historical mapping was also consulted as well as aerial photographs available online and 1 metre LiDAR available through DataMapWales.

The assessment studied the direct and indirect impacts on all previously and newly recorded historic assets within the 1-kilometre radius HER assessment area, focused on SJ2425506583. In total 88 historic assets were considered and out of these 42 were found to have a potential impact.

Although the development is extensive in plan and includes four structures up to 16 metres high, the placing of the development within the landscape, the local topography, modern development to the east of Welshpool and at Lower Leighton Farm as well as the mitigations already in the proposed scheme including bunds and planting limit impacts on the historic environment and individual historic assets.

One non-designated historic asset was found to experience a Low, direct impact. This was the post-medieval field system at Lower Leighton, PRN 223371, which appears on 19th and 20th century mapping and is not considered to be of a high heritage value. One former field boundary and parts of two others that are part of the post-medieval field system would be removed. They were maintained into the later part of the 20th century and are clearly visible on a 1969 aerial photograph. Since then they have been infilled/flattened and are no longer visible on the ground. They can be seen on LiDAR, and faintly on aerial photographs.

There are 4 scheduled sections of Offa's Dyke within a 1-kilometre metre radius of the centre of the development (MG034; MG152; MG153; MG217). The assessment shows that these scheduled earthworks would not be affected by the proposed development.

There are 13 Listed Buildings within a 1-kilometre radius of the development. Two of these would experience a Low visual impact but with no impact on their setting or significance; Hope Farm Farmhouse, PRN 20322, & Lower Leighton Farmhouse PRN, 20326. The mitigations proposed in association with the development, including tree planting and the creation of a bund, would effectively reduce the visual impact to a Negligible level.

The undesignated Lower Leighton Farmstead, PRN 190363, would experience a Low indirect visual impact and a Low impact on its setting due to the expansion of the farmstead. It would extend the footprint of what is already a very modernised farmstead, and although would alter the setting it would not impact on its current significance.

A further four undesignated historic assets are thought likely to experience a Low indirect visual impact, but with no impact on their setting or significance. Again, the proposed mitigations already within the scheme would reduce these to a negligible level.

Designated historic assets between 1-kilometre and 5-kilometres radius were also assessed. Of these, 30 were found to have a potential visual impact, but upon further assessment only 3 of these were found to experience a Very Low visual impact over distances in excess of 2 kilometres. None would experience an impact on their setting or significance. The mitigations proposed in association with the development, including tree planting and the creation of a bund, would effectively reduce the visual impacts to a Negligible level.

There are no Registered Historic Parks and Gardens within the 1 kilometre radius assessment areas. Between 1-kilometre and 5 kilometre radius there are 5 Registered Historic Parks and Gardens. Four of these are screened from intervisibility with the proposed development by the local topography or intervening trees and hedgerows. Only Powis Castle (PG(Po)35(POW) Park and Garden would experience a Very Low visual impact at distance but this would be reduced markedly by the proposed mitigations relating to creating a bund and planting trees at the western side of the proposed development. The setting and significance will not be affected.

The proposed development does not lie within a Registered Historic Landscape. There are no World Heritage Sites, within the 1-kilometre radius of the development.

There are 3 conservation areas within a 5-kilometre radius of the proposed development (Welshpool; Leighton Centre; Leighton Park). The nature of the local topography and intervening buildings, trees and hedgerows mean that none of these would be intervisible with the proposed development.

The evidence reviewed does not predict a high potential for buried archaeology. There are no recorded prehistoric, Roman or Medieval sites within the 1-kilometre radius assessment area. Offa's Dyke lies 500 metres to the east of the development but there are no identified historic assets associated with it. The landscape is essentially a post medieval creation, linked to the redesign of the Leighton estate during the mid-19th century. Nothing has been noted on aerial photographs or LiDAR that might indicate the presence of archaeological features within the proposed development site, other than evidence of former post medieval field boundaries. The development site lies above the alluvial flood plain, so the ground will not be masked by deep alluvial deposits.

No archaeological mitigations are proposed. The proposed inclusion of an earthwork bund and additional tree planting, as well as the retention of existing hedgerows will help reduce any impacts identified in this assessment. Potential for buried archaeology is assessed as Low. The former field system is though to be of post-medieval date and is evidenced through historic maps, aerial photographs and LiDAR.

14.5 Copyright

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14.6 Introduction

Roger Parry and Partners of The Estates Office, 23 Church Street, Oswestry, SY11 2SU on behalf of their client, have commissioned Trysor heritage consultants to undertake an historic environment desk-based assessment, including impact on setting of designated historic assets, for a proposed development on approximately 8 hectares of land centred on SJ2425506583, at Lower Leighton, Leighton, Welshpool, Powys, SY21 8HH, see Figures 1 & 2.

A Written Scheme of Investigation (WSI), see Appendix D, was prepared guided by the Chartered Institute for Archaeologists' Standard and Guidance for Historic Environment Desk-based Assessment (CIfA, 2020). The WSI approved by the planning archaeologist at Heneb.

14.7 The development

The proposed development is an anaerobic digester plant on 4.5 hectares of land to the west of the Listed farmhouse at Lower Leighton and the modern farm complex to its south.

The development covers 8 hectares to the west of the modernised farmstead at Lower Leighton, see Figure 2. It includes 2 digesters, 2 post-digesters, silage clamps, storage lagoons, buildings and associated infrastructure. The tallest structures are the digesters which are up to 16 metres in height, which lie on the lower parts of the development site. An existing mature hedgeline and ditch within the development will be retained.

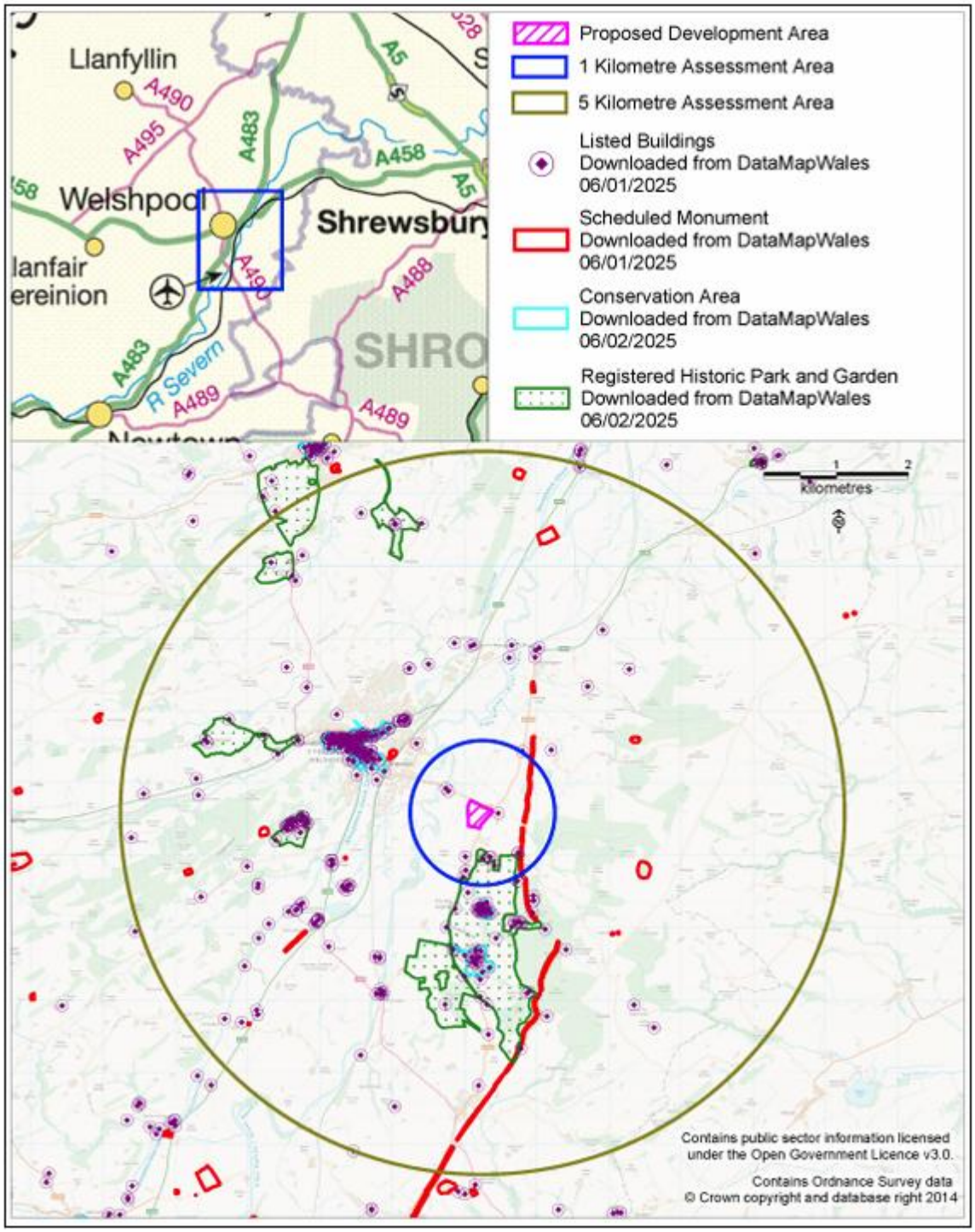

Figure 1: Location of the proposed development, showing the agreed 1-kilometre radius HER assessment area and the 5-kilometre radius for the assessment of designated historic assets.

Figure 2: A plan of the proposed development, as used for assessment purposes. There may be future revisions of this but unless the changes are substantial it will not change the assessment of impact on historic assets. Source PDC Engineering

14.8 Methodology

The desk-based assessment has considered known historic assets within a 1-kilometre radius circle centred on SJ2425506583. This was the area agreed within the Written Scheme of Investigation; see Appendix D and Figure 1.

The desk-based assessment process has helped develop an understanding of the archaeology and landscape of the surrounding area, and to assess any direct or indirect impacts. The PRN in the regional Historic Environment Record has been used as the primary number system; other reference numbers are cross referenced in Appendix A. New PRNs were requested from Heneb for additional historic assets recorded during this study.

Data from the regional Historic Environment Record held by Heneb was acquired for the 1-kilometre radius assessment area (Heneb CPA HER Enquiry 1738).

Historic mapping was consulted. The maps used included the early 19th century Ordnance Survey Original Surveyors Drawings, as well as late 19th and 20th century 1:2500 scale Ordnance Survey mapping and parish tithe maps.

A field visit was made by Trysor to the potential location of the development, and the surrounding area, on 24th October, 2025. Visible archaeological features within the development area that would be directly affected were searched for and any other historic assets on which there may be a direct impact recorded. The wider landscape was also studied taking note of topography, vegetation and structures.

Aerial photographs on Google Earth, dating to 2006, 2008, 2009, 2010, 2014, 2020, 2022 and 2025 were used to inform the assessment. Historic aerial photographs were not requested from the Welsh Aerial photography unit on this occasion, but the 1969 aerial photograph available through the DataMapWales portal was clear and enabled the development site to be seen clearly, although cloud obscured the farm and some parts of the valley. One metre resolution LiDAR data was available the development area from DataMapWales.

Modern mapping was used to assess current public access.

All information gathered during the desktop assessment and site visit was entered into a bespoke database created in Access 2021 to form an assessment dataset.

The final dataset is the source of the material output in this report, including the GIS mapping which illustrates the location of historic assets in the area, and the tables and appendices which provide detailed information on the historic assets within the study area.

Each of the records in the final assessment 1-kilometre radius dataset was assessed for Period, Rarity, Documentation, Group Value, Survival/Condition, Fragility/Vulnerability, Diversity, and Potential1, as well as Evidential Value, Historical Value, Aesthetic Value, Communal Value2. Once these had been considered the significance of each historic asset was determined and their importance scored in accordance with the categories adopted by the Welsh Archaeological Trusts i.e. Nationally Important, Regionally Important, Locally Important, Minor and Features Needing Further Investigation (Unknown), see Figure 8. Full details of this exercise are given in Appendix A. The setting and any impact on significance was assessed following the best-practice guidance set out in Cadw's Setting of Historic Assets (Cadw, 2017).

The Direct and Indirect impact on each historic asset was assessed taking into account both physical and non-physical impacts. Levels of impact are recorded using the terms None, Very Low, Low, Medium, High or Very High. An impact can be negative or positive. Where impacts have approximately equivalent positive and negative values, the term Neutral is used.

14.9 The Development Site

The proposed development is an anaerobic digester plant on some 8 hectares of land to the west of the Listed farmhouse at Lower Leighton and the modern farm complex to its south and is centred on SJ2425506583. The development plot will be located within a single, modern field parcel immediately to the west of the farmyard complex at Lower Leighton farm, bounded to the north by the B4381 road and to the east by a minor rural road, see Figures 1, 2 & 3.

Access into the field is possible from both roads at present. The land rises from 75 metres above Ordnance Datum at the northwest corner of the development area to almost 90 metres at its southeast corner. This puts the proposed development above the floodplain of the Severn Valley, which lies to the west of the site which is between 68 to 72 metres in this part of the valley.

The main farmyard at Lower Leighton lies immediately adjacent and to the east of the proposed development site, from which it is separated by a minor road.

The geology of the development area comprises mainly of sedimentary mudstones of the Forden Mudstone Formation, which formed between 458.4 and 449 million years ago during the Ordovician period (BGS map viewer online). Silurian mudstones and sandstones underly the eastern side of the field, with beds of the Cefn Formation, 443.8 to 433.4 million years old, abutting the Ordovician rocks, with Tarranon Mudstone Formation rock to its east side (also 443.8 to 433.4 million years old).

The superficial deposits are mainly of Devensian Till formed between 116 and 11.8 thousand years ago during the Quaternary period. The northern edge of the field is overlain by glacio-fluvial sand and gravel deposits of the same age.

The soils of the development site are categorised as Soilscape 17: Slowly permeable seasonally wet acid loamy and clayey soils on the LandIS soil map (Cranfield University, 2025). These are soils with low fertility and impeded drainage.

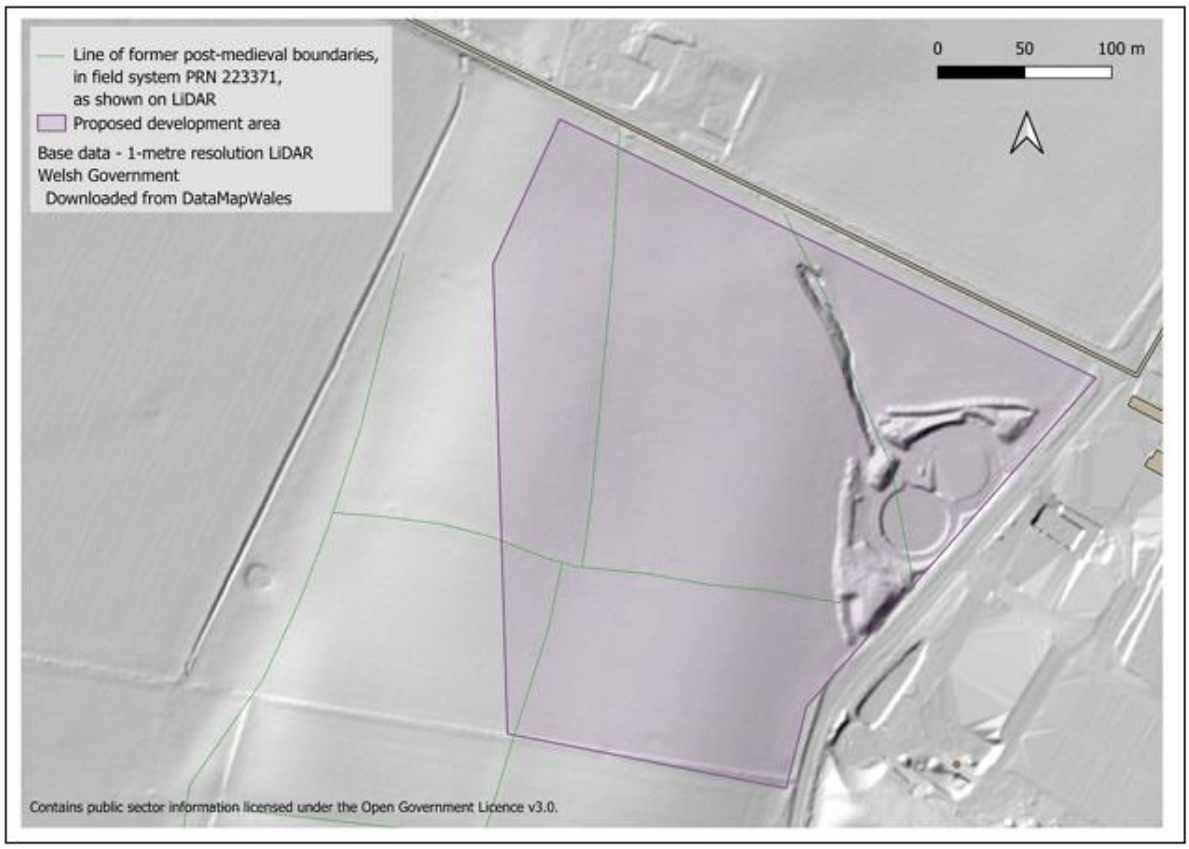

Figure 3: The proposed development site shown on a base layer of the 10metre LiDAR data available from Welsh Government. The former post-medieval system, PRN 223371, is shown by the dotted green lines. These field boundaries still existed into the later 20th century but are now no longer visible on the ground, other than a mature hedge and ditch in the eastern part of the development area which will be retained.

14.10 Archaeological & Historical Overview

There are no confirmed, recorded archaeological sites within 1 kilometre of the proposed development which predate the Early Medieval period, which is represented by a single monument, Offa's Dyke, which is one of the most significant Early Medieval historic assets in the Wales-England borderlands.

A possible Iron Age enclosure recorded near Hope Farm by CPAT (PRN32844) has not been confirmed in the field and no source has been given for the original record. There is no aerial photographic or LiDAR confirmation that the enclosure exists or that the location given is accurate, therefore no assessment of impact or potential can be made.

Offa's Dyke, passes through the assessment area and within 500 metres of the proposed development site. The Dyke is thought to date to the late 8th century AD and to have been constructed to demarcate the western boundary of the English kingdom of Mercia during the reign of Offa. Recent thinking is that the Dyke was intended to serve primarily to mark a border, rather than be a defensive earthwork.

The Dyke can be traced for some 285 kilometres through the borderlands. Many sections have been removed or ploughed down during the past centuries, but some sections are still relatively well preserved as upstanding earthworks. This includes several scheduled sections of the Dyke, which passes just to the east of Lower Leighton farm. These intermittent surviving sections of the Dyke are scheduled as MG034, MG152, MG217, MG153 and MG035 and run north to south through the landscape

of the Leighton estate. At its closest point it passes some 500 metres to the east of the proposed development site, separated from it by the large, modern agricultural sheds of Lower Leighton farm.

14.10.1 Post Medieval & Modern (1536 to present day)

Most of the historic assets recorded within the assessment area are of Post Medieval date, and associated with the history of the Leighton Estate.

The Leighton estate has origins in the 16th century, when it was a property of the Corbett family. In 1845, the Corbett's sold the estate to Liverpool banker Christopher Leyland. In 1847, Leyland gave the estate as a wedding present to his nephew, John Naylor, also a Liverpool banker. Naylor was said to be the richest man in Britain at the time, and he spent liberal amounts of his fortune to transform the entire estate, raising it to particular prominence. Within a few years, the old mansion had been replaced by a new house, designed by Liverpool architect W.H. Gee, with its gardens designed by Edward Kemp, surrounded by an extensive parkland and ringed with numerous woodland plantations.

The whole fieldscape of the estate was remodelled, with the field boundaries shown on the parish tithe map of 1847 largely swept away and new, more regular, fields created. Within the development area, the boundaries were kept within a more regular field system overlying it. The earlier boundaries were removed in the late 20th century, apart from one section of mature hedge and ditch, which will be retained in the development. The former field boundaries are still visible on LiDAR, and some aerial photographs and are believe to be post medieval in origin.

Numerous cottages and farmstead were created by Naylor for tenants, with an impressive model farm also built to serve the needs of the estate, as well as several other farms. The project included the introduction of the most modern technology of the day, including a cutting-edge slurry pumping system covering a large part of the estate. There was also a railway system, including a funicular railway ascending Moel y Mab hill, which was used to move animal feed from the model farm to the farm buildings at the top of the hill.

W.H Gee, was used as the lead architect for much of the work, which included an impressive new parish church (PRN 30429) in Leighton village, set in an elevated position and provided with a high and slender spire which remains an important landmark structure for a wide area around Welshpool to the present day.

Lower Leighton farm (PRN 20326; Listed Building Number 19521) was one of several important farm holdings on the estate which was to be expanded and modernised by Naylor. The farm does not appear on John Roque's 1752 map of Shropshire, which suggests that it was not founded until later in the 18th century, see figure 4. The farmhouse appears on the Ordnance Survey's Original Surveyors Drawings of 1816, see Figure 5. It is an impressive timber-framed building and Grade II Listed as a "good late example of the timber-framed tradition." Under Naylor's ownership, the estate added a substantial range of red-brick outbuildings to the existing farmstead, PRN 190363,, greatly improving the holding. A similar pattern was followed across all the farmsteads of the estate, be they previously existing holdings or newly created ones. By 1971 the Naylor farm buildings had begun to be replaced at Lower Leighton farmstead. The 1973 1:12500 Ordnance Survey map, revised in 1971 shows that the southwestern half of the buildings had been replaced by modern rectangular sheds with a silo to the east.

Figure 4: John Roque's Map of Shropshire of 1752 extends into the Leighton area. No buildings are shown at the site of Lower Leighton or the proposed development site, which both lie within the area circled in red.

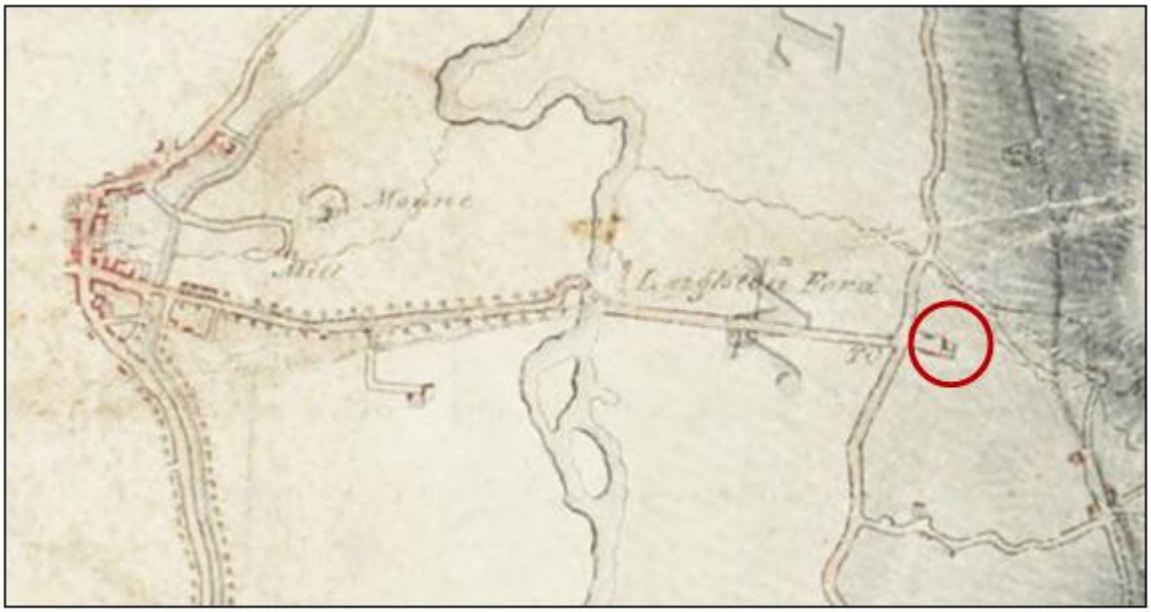

Figure 5: The Ordnance Survey's Original Surveyors Drawings of 1816 show that Lower Leighton farm certainly existed by the early 19th century and is seen here circled in red. Source: British Library.

Figure 6: The 1847 tithe map for the township of Leighton, in the parish of Worthen, captures the pre-Naylor field system. The proposed development would be located in the area covered here by field parcels 241

Figure 7: The Ordnance Survey's 1:10560 map of 1903 captures the layout of Lower Leighton after the improvements made by the estate in the mid-19th century, when a large range of outbuildings was added to the southwest of the house. These had largely been removed by the early 21st century and replaced by modern agricultural sheds. Source: National Library of Scotland.

14.11 Data Collation

The HER enquiry for the 1-kilometre radius assessment area yielded 39 records for historic assets as a mixture of point data and polygons (Heneb CPA HER Enquiry number E7117).

- 45 historic assets supplied as point data only
- 33 historic assets supplied as both point and polygon data
- 1 supplied as polygon only – no entry in pdf gazetteer

After the walkover survey visit, the historic map search, and the rapid assessment of the readily available data the final dataset to assess impact on historic assets within the 1-kilometre radius assessment area contained 42 records for historic assets.

Forty-five records were removed from the dataset. Some of these were not theoretically intervisible and there could be no impact on them, some were considered as parts of overall records, such as farm buildings within a farmstead complex, some were not clear

Six new historic asset records were created, see Table 1 below and Appendix A, and a further two historic assets which had PRNs but were not in the supplied dataset were added; PRNs 20322 and 190340.

HER PRN	Historic Asset name	Historic Asset Type	Period	NGR
218210	LEIGHTON COTTAGES; BYTAKE COTTAGES	HOUSE	Post Medieval	SJ2416306906
218211	LEIGHTON HALL, BRICKWORKS	BRICKWORKS	Post Medieval	SJ2397406087
223371	LOWER LEIGHTON	FIELD SYSTEM	Post Medieval	SJ2408806500
223372	LOWER LEIGHTON	TOLL GATE	Post Medieval	SJ2439006609
223373	PENTRE COTTAGES, NUMBERS 8 & 8A	COTTAGE	Post Medieval	SJ2479306059
223374	LEIGHTON HALL, GASWORKS	GASWORKS	Post Medieval	SJ2401705993

Table 1: New record for historic assets

14.12 Assessment of Significance and Importance

The significance of each historic asset was determined and scored in accordance with the glossary for Importance (Significance) categories for Wales i.e. International, National, Regional, Local, Minor, Not Recorded and Site Requiring Further Investigation (Unknown)3. Full details of this exercise are given in Appendix A and Figure 8 but Table 2 below summarises the assessed importance.

Within the final dataset for the 1-kilometre assessment area there were four Scheduled Monuments, all sections of Offa's Dyke and thirteen Listed Buildings, all part of John Naylor's 19th century estate. There were no Registered Historic Parks and Gardens. No other historic assets were assessed as being of National importance.

HER PRN	Historic Asset name	Historic Asset Type	Significance	Status
10001	OFFA'S DYKE: SECTION AT PENTRE FARM (MG217)	LINEAR EARTHWORK	Nationally Important	Scheduled Monument
20321	WHITEHOUSE FARM, HOUSE	FARMHOUSE	Nationally Important	Listed Building
20322	HOPE FARM	FARMHOUSE	Nationally Important	Listed Building
20326	LOWER LEIGHTON FARM, HOUSE	HOUSE	Nationally Important	Listed Building
20328	LEIGHTON, SEVERN LODGE HOUSE	HOUSE	Nationally Important	Listed Building
26701	OFFA'S DYKE: SECTIONS EXTENDING 675M S FROM CENTRE OF GOPPAS WOOD (MG152)	LINEAR EARTHWORK	Nationally Important	Scheduled Monument
26702	OFFA'S DYKE: SECTION EXTENDING 760M N FROM CENTRE OF GOPPAS WOOD TO HOPE BY-ROAD (MG034)	LINEAR EARTHWORK	Nationally Important	Scheduled Monument
26703	OFFA'S DYKE: PENTRE SECTION (MG153)	LINEAR EARTHWORK	Nationally Important	Scheduled Monument
30429	CHURCH OF THE HOLY TRINITY, LEIGHTON	CHURCH	Nationally Important	Listed Building
30430	LEIGHTON ESTATE, GATES (NORTH)	GATEWAY	Nationally Important	Listed Building
31074	PENTRE HOUSE, LEIGHTON	VICARAGE	Nationally Important	Listed Building

HER PRN	Historic Asset name	Historic Asset Type	Significance	Status
32431	LEIGHTON ESTATE, LODGE (NORTH)	LODGE	Nationally Important	Listed Building
41931	PENTRE FARM, COW HOUSE	COW HOUSE	Nationally Important	Listed Building
41934	LEIGHTON ESTATE, RETORT HOUSE	RETORT HOUSE	Nationally Important	Listed Building
41965	LEIGHTON ESTATE, BRIDGE OVER CHANNEL N OF SEVERN LODGE	BRIDGE	Nationally Important	Listed Building
42514	PENTRE FARM, HOUSE	HOUSE	Nationally Important	Listed building
190364	LEIGHTON, WHITEHOUSE FARM; SEVERN LEIGH	FARMSTEAD	Nationally Important	Listed Building
223374	LEIGHTON HALL, GASWORKS	GASWORKS	Nationally Important	
20295	LEIGHTON ESTATE, CASTLE VIEW HOUSE	HOUSE	Locally Important	
20296	LEIGHTON ESTATE, SMITHY COTTAGE	COTTAGE	Locally Important	
20298	LEIGHTON ESTATE,PENTRE COTTAGE I	HOUSE	Locally Important	
20300	LEIGHTON ESTATE, OAKLANDS COTTAGE	HOUSE	Locally Important	
20301	LEIGHTON ESTATE,OAKLANDS HOUSE	HOUSE	Locally Important	
20303	LEIGHTON ESTATE, GRAVEL LODGE HOUSE	HOUSE	Locally Important	
20308	LEIGHTON ESTATE,WHITEHOUSE COTTAGES	TERRACED HOUSING	Locally Important	
20318	LEIGHTON ESTATE, TIRDU HOUSE	HOUSE;POST OFFICE	Locally Important	
20320	LEIGHTON ESTATE, PENTRE LODGE HOUSE	HOUSE	Locally Important	
26752	LEIGHTON, PENTRE MILL	CORN MILL	Locally Important	
84845	LEIGHTON ESTATE, RESERVOIR	EARTHWORK	Locally Important	
110294	LEIGHTON BRIDGE LEAT	LEAT	Locally Important	
190340	HOPE FARM	FARMSTEAD	Locally Important	
190361	PENTRE LODGE FARM	FARMSTEAD	Locally Important	
190362	PENTRE MILL FARM	FARMSTEAD	Locally Important	
190363	LOWER LEIGHTON FARM	FARMSTEAD	Locally Important	

HER PRN	Historic Asset name	Historic Asset Type	Significance	Status
218210	LEIGHTON COTTAGES; BYTAKE COTTAGES	HOUSE	Locally Important	
218211	LEIGHTON HALL, BRICKWORKS	BRICKWORKS	Locally Important	
222339	LEIGHTON HALL, SAWMILL & FORGE	INDUSTRIAL BUILDING	Locally Important	
223371	LOWER LEIGHTON	FIELD SYSTEM	Locally Important	
223372	LOWER LEIGHTON	TOLL GATE	Locally Important	
223373	PENTRE COTTAGES, NUMBERS 8 & 8A	COTTAGE	Locally Important	
32844	HOPE FARM ENCLOSURE	DEFENDED ENCLOSURE	Unknown	
140750	MALLWYD TO LONG MOUNTAIN, DROVERS' ROAD	DROVE ROAD	Unknown	

Table 2: Assessed significance of historic assets within a 1-kilometre of the centre of the development.

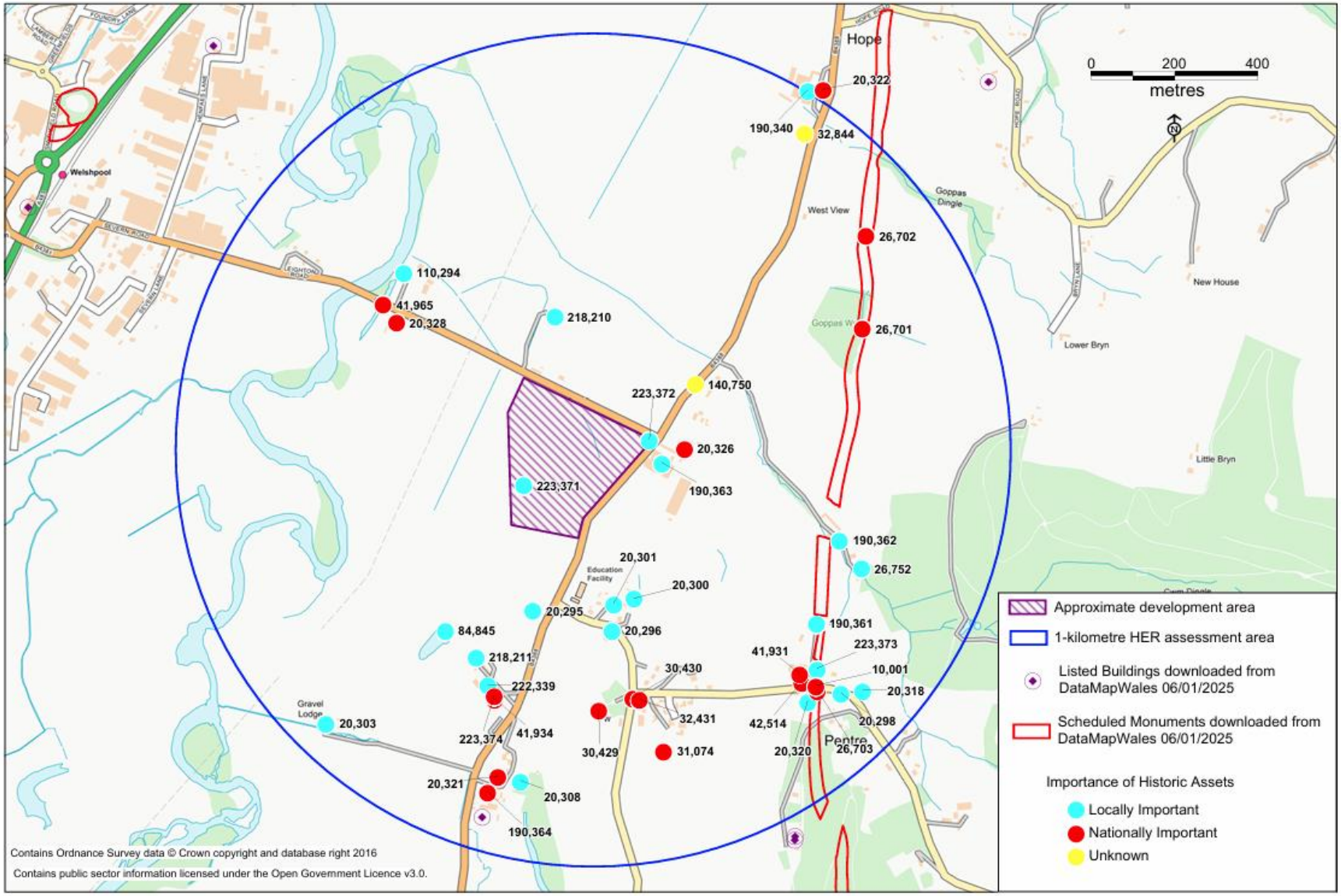

Figure8: The 1-kilometre assessment area showing the importance of assessed historic assets, labelled with HER PRN

14.13 Assessment of Impact

The Direct and Indirect impact on each historic asset was assessed taking into account both physical and non-physical impacts. Each impact was assessed within the scale Very Low, Low, Moderate, High and Very High, taking into account the significance of the historic asset and the nature of the impact. An impact could be Negative or Positive and where impacts have equivalent positive and negative values, the term Neutral is used. A full table is found in Appendix A but a summary is tabulated in Table 3 below and illustrated in Figure 9.

Designated historic assets within 5-kilometres were also assessed, see Figure 10).

HER PRN	Historic Asset Name	Historic Asset Type	Level of Direct Impact	Level of Indirect Impact	Level of Impact on Setting	Level of Impact on Significance
223371	LOWER LEIGHTON	FIELD SYSTEM	Low	None	None	None
20300	LEIGHTON ESTATE OAKLANDS COTTAGE	HOUSE	None	Low	None	None
20295	LEIGHTON ESTATE CASTLE VIEW HOUSE	HOUSE	None	Low	None	None
20301	LEIGHTON ESTATEOAKLANDS HOUSE	HOUSE	None	Low	None	None
20303	LEIGHTON ESTATE GRAVEL LODGE HOUSE	HOUSE	None	Low	None	None
20322	HOPE FARM	FARMHOUSE	None	Low	None	None
20326	LOWER LEIGHTON FARM HOUSE	HOUSE	None	Low	None	None
190361	PENTRE LODGE FARM	FARMSTEAD	None	Low	None	None
190363	LOWER LEIGHTON FARM	FARMSTEAD	None	Low	None	None
20320	LEIGHTON ESTATE, PENTRE LODGE HOUSE	HOUSE	None	None	Very Low	None
41934	LEIGHTON ESTATE, RETORT HOUSE	RETORT HOUSE	None	None	Very Low	None
218211	LEIGHTON HALL BRICKWORKS	BRICKWORKS	None	None	Very Low	None
222339	LEIGHTON HALL, SAWMILL & FORGE	INDUSTRIAL BUILDING	None	None	Very Low	None
223374	LEIGHTON HALL GASWORKS	GASWORKS	None	None	Very Low	None
10001	OFFA'S DYKE: SECTION AT PENTRE FARM (MG217)	LINEAR EARTHWORK	None	None	None	None
20296	LEIGHTON ESTATE SMITHY COTTAGE	COTTAGE	None	None	None	None
20298	LEIGHTON ESTATEPENTRE COTTAGE I	HOUSE	None	None	None	None
20308	LEIGHTON ESTATEWHITEHOUSE COTTAGES	TERRACED HOUSING	None	None	None	None
20318	LEIGHTON ESTATE TIRDU HOUSE	HOUSE;POST OFFICE	None	None	None	None
20321	WHITEHOUSE FARM HOUSE	FARMHOUSE	None	None	None	None

HER PRN	Historic Asset Name	Historic Asset Type	Level of Direct Impact	Level of Indirect Impact	Level of Impact on Setting	Level of Impact on Significance
20328	LEIGHTON SEVERN LODGE HOUSE	HOUSE	None	None	None	None
26701	OFFA'S DYKE: SECTIONS EXTENDING 675M S FROM CENTRE OF GOPPAS WOOD (MG152)	LINEAR EARTHWORK	None	None	None	None
26702	OFFA'S DYKE: SECTION EXTENDING 760M N FROM CENTRE OF GOPPAS WOOD TO HOPE BY-ROAD (MG034)	LINEAR EARTHWORK	None	None	None	None
26703	OFFA'S DYKE: PENTRE SECTION (MG153)	LINEAR EARTHWORK	None	None	None	None
26752	LEIGHTON PENTRE MILL	CORN MILL	None	None	None	None
30429	CHURCH OF THE HOLY TRINITY LEIGHTON	CHURCH	None	None	None	None
30430	LEIGHTON ESTATE GATES (NORTH)	GATEWAY	None	None	None	None
31074	PENTRE HOUSE LEIGHTON	VICARAGE	None	None	None	None
32431	LEIGHTON ESTATE LODGE (NORTH)	LODGE	None	None	None	None
32844	HOPE FARM ENCLOSURE	DEFENDED ENCLOSURE	None	None	None	None
41931	PENTRE FARM COW HOUSE	COW HOUSE	None	None	None	None
41965	LEIGHTON ESTATE BRIDGE OVER CHANNEL N OF SEVERN LODGE	BRIDGE	None	None	None	None
42514	PENTRE FARM HOUSE	HOUSE	None	None	None	None
84845	LEIGHTON ESTATE RESERVOIR	EARTHWORK	None	None	None	None
110294	LEIGHTON BRIDGE LEAT	LEAT	None	None	None	None
140750	MALLWYD TO LONG MOUNTAIN DROVERS' ROAD	DROVE ROAD	None	None	None	None
190340	HOPE FARM	FARMSTEAD	None	None	None	None
190362	PENTRE MILL FARM	FARMSTEAD	None	None	None	None
190364	LEIGHTON WHITEHOUSE FARM; SEVERN LEIGH	FARMSTEAD	None	None	None	None
218210	LEIGHTON COTTAGES; BYTAKE COTTAGES	HOUSE	None	None	None	None
223372	LOWER LEIGHTON	TOLL GATE	None	None	None	None
223373	PENTRE COTTAGES NUMBERS 8 & 8A	COTTAGE	None	None	None	None

Table 3: Impact on historic assets within the 1-kilometre HER assessment area

As Table 3 shows, a relatively small number of sites may experience a Low or Very Low level of indirect, visual impact. There will be no impact on their setting or significance

The assessment studied the direct and indirect impacts on all recorded historic assets within 1-kilometre radius area, focused on SJ2425506583. Of these, 42 were found to have a potential impact. Upon further assessment only 1 of these was found to experience a Low, direct impact. This was a post-medieval field system at Lower Leighton, PRN223371, which appears on 19th century mapping and still shown on aerial photographs and maps in the later 20th century, and is not considered to be of a high heritage value.

Lower Leighton Farmstead (PRN190363) would experience a Low impact on setting due to the expansion of the farmstead. However, the farmstead has been changing since the second half of the 20th century and is now a highly modernised site. The mitigations proposed in association with the development, including tree planting and the creation of a bund, would effectively reduce the impacts to a Negligible level and the significance of the farmstead would not be affected.

A further 4 undesignated historic assets were thought to potentially experience a Low indirect visual impact but with no impact on their setting or significance; these were Pentre Lodge Farmstead (PRN190361); Oaklands Cottage (PRN20300); Oaklands House (PRN20301); Gravel Lodge House (PRN20303).

Four further historic assets would experience a Very Low indirect, visual impact. Again, the mitigations proposed in association with the development, including tree planting and the creation of a bund, would effectively reduce these impacts to a Negligible level.

There are 4 scheduled sections of Offa's Dyke within a 1-kilometre metre radius of the centre of the development (MG034; MG152; MG153; MG217). The assessment shows that these scheduled earthworks would not be affected by the proposed development.

There are 13 Listed Buildings within a 1-kilometre radius of the development. Two of these would experience a Low visual impact but with no impact on their setting or significance (Hope Farm Farmhouse PRN20322 & Lower Leighton Farmhouse PRN20326). The proposed mitigations would reduce the impacts in both cases.

Designated historic assets between 1-kilometre and 5-kilometres radius were also assessed. Of these, 30 were found to have a potential visual impact, but upon further assessment only 3 of these were found to experience a Very Low visual impact over distances in excess of 2 kilometres, see figure 10. None would experience an impact on their setting or significance. However, the mitigations proposed in association with the development, including tree planting and the creation of a bund, would effectively reduce these impacts to a Negligible level.

There are no Registered Historic Parks and Gardens within the 1 kilometre radius assessment areas. Between 1-kilometre and 5 kilometre radius there are 5 Registered Historic Parks and Gardens. Four of these are screened from intervisibility with the proposed development by the local topography or intervening trees and hedgerows. Only Powis Castle (PG(Po)35(POW) would experience a Very Low visual impact at distance but this would be reduced markedly by the proposed mitigations relating to creating a bund and planting trees at the western side of the proposed development.

The proposed development does not lie within a Registered Historic Landscape. There are no World Heritage Sites, within the 1-kilometre radius of the development.

There are 3 conservation areas within a 5-kilometre radius of the proposed development (Welshpool; Leighton Centre; Leighton Park). The nature of the local topography and intervening buildings, trees and hedgerows mean that none of these would be intervisible with the proposed development.

The development is within the LANDMAP Lower Severn Valley Historic Landscape Aspect Area (MNTGMHL441), see Figure 10. This extensive aspect area covers 3982 hectares and is classed as being of Outstanding value. It is summarised as

Predominantly regular valley-bottom fieldscapes of medieval and post-medieval origin along the floodplain of the Severn valley between Crew Green and Garthmyl. Post-glacial river meanders, cut-offs and alluviation. Complexes of Neolithic to Bronze Age burial and ritual monuments at Sarn-y-bryn-caled and Dyffryn Lane. The area is crossed by the course of the early medieval Offa"s Dyke. Roman fort complex and associated civilian settlement at Forden Gaer. Medieval Cistercian abbey complex at Strata Marcella. Former post-medieval industrial complex at the head of the Severn navigation at Pool Quay. Dispersed farms and houses of medieval and post-medieval origin. Historic ford sites and 19th and 20th-century road and railway bridges.

The justification for this designation is as follows;

Regularly enclosed floor of the Severn valley. Ostensibly a post medieval and medieval farming landscape but also contains nationally important earlier prehistoric ritual complexes, a Roman fort and military

settlement, Offa's Dyke and Cistercian Abbey, as well as numerous lesser archaeological sites all of which contribute to its high scores.

The development would not remove any of the key features mentioned and out of the defining features only Offa's Dyke runs through the 1 kilometre HER assessment area.

The field boundaries around the development area are of post medieval and modern age. Formerly the development site was divided into five field parcels, part of PRN 223371 but by the 21st century it had effectively become a single, large parcel as several post medieval boundaries were removed. One of these boundaries still survives as a mature hedge and ditch, and this will be retained. The field parcel is now bounded by hedgerows and fences. These boundaries will not be affected by the development and the shape of the field will not change. Existing access points will be enhanced as part of the development.

There are no field names of archaeological interest recorded on the parish tithe schedule of 1847.

The archaeological potential of the development area is considered to be low. There has been no evidence gathered which indicates the presence of buried archaeology, including from cartographic sources, aerial photographs and LiDAR data. There are no prehistoric, Roman or medieval sites recorded within 1-kilometre of the development area. The local area is dominated by the post-medieval enhancements made by the Leighton estate, including the field system and settlement pattern.

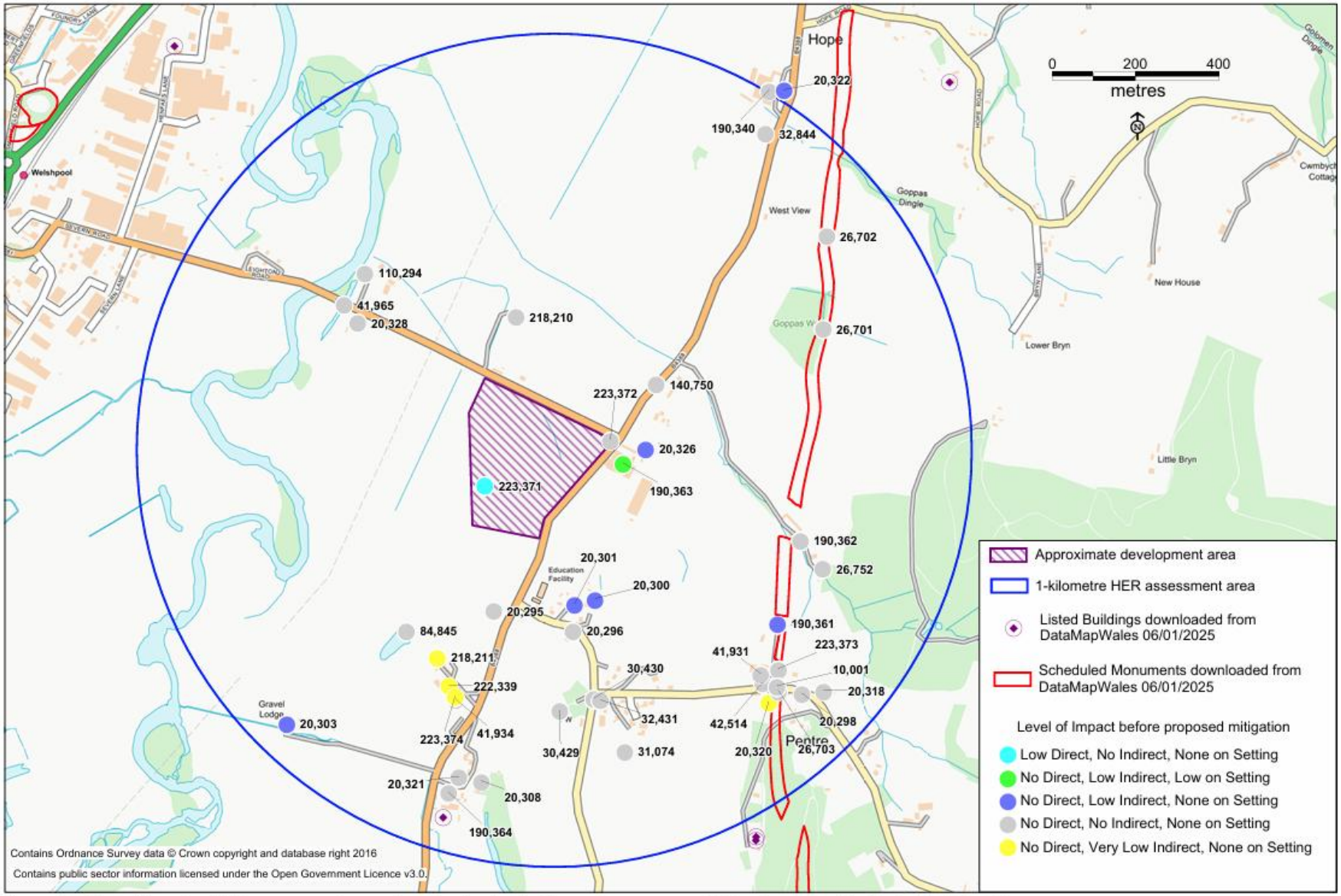

Figure 9: The 1-kilometre HER assessment area showing the level of impact on assessed historic assets, labelled with HER PRN

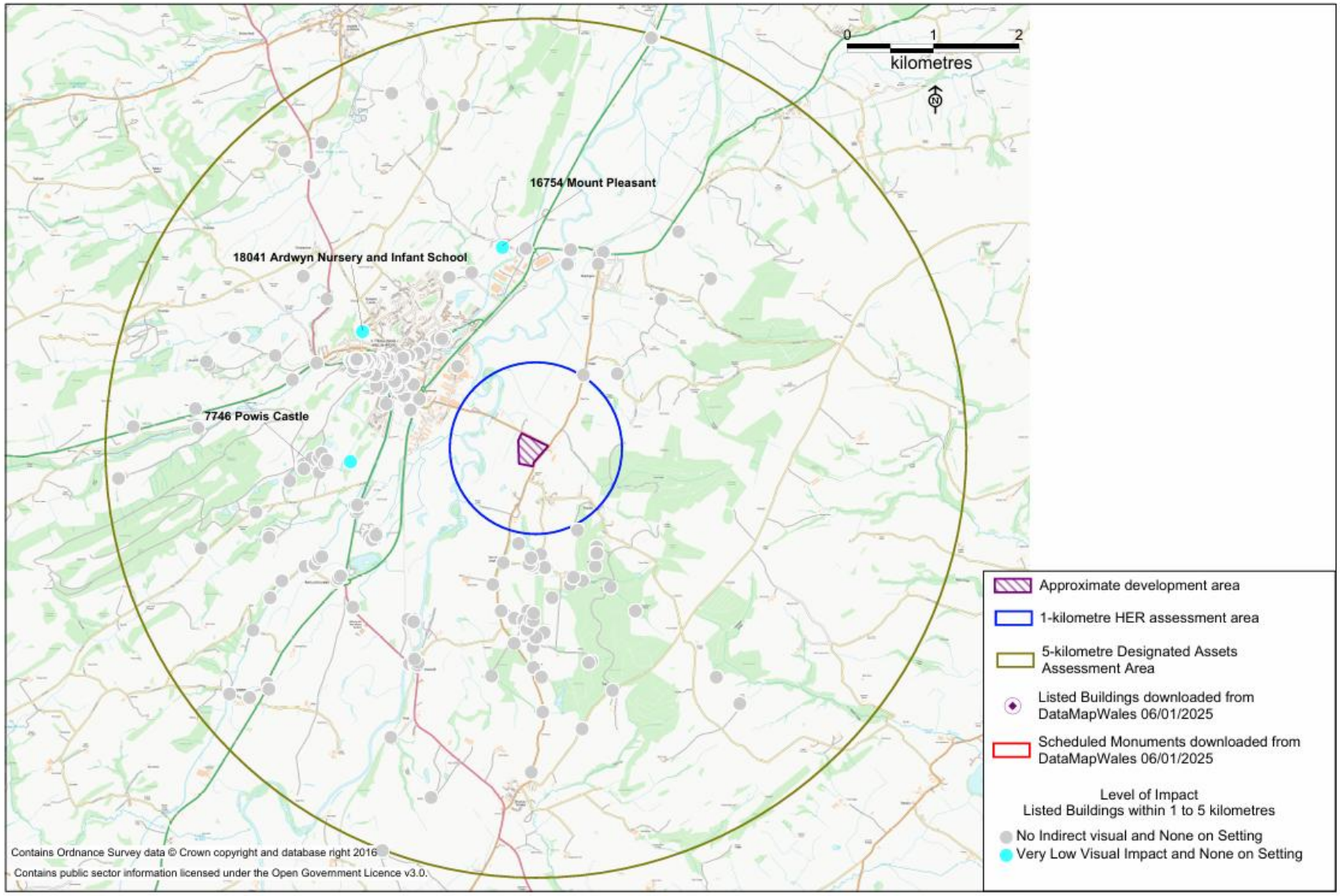

Figure 10: The 5-kilometre assessment area showing the level of impact on assessed historic assets, labelled with Listed Buildling number where an impact

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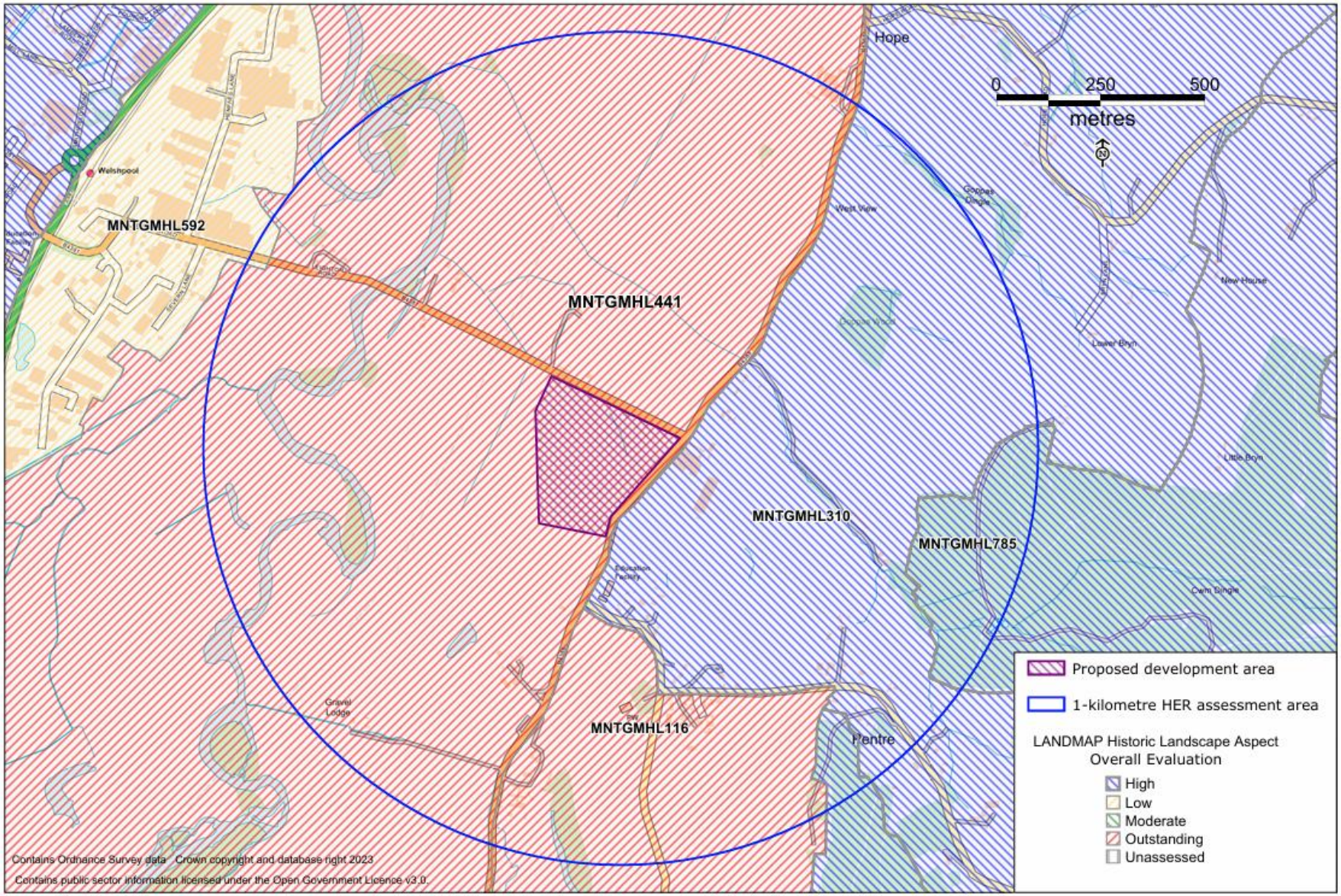

Figure 11: The 1-kilometre assessment area showing the LANDMAP Historic Landscape aspect, labelled with LANDMAP Aspect Area Numbers

14.14 Conclusion

There is no evidence gathered by this assessment which indicates the presence of unknown, buried archaeology. There are no prehistoric, Roman or Medieval sites recorded within 1-kilometre of the development area. Offa's Dyke, an early medieval monument lies over 500 metres to the east, beyond the farm complex of Lower Leighton and would not be affected by the proposed development.

The landscape of the proposed development site and its environs are dominated by the changes made by the Leighton estate from the mid 19th century and more recent adaptations to the built resource and field system made to suit modern agricultural practices. It should be noted that in the 19th century the Leighton estate, under the control of John Naylor, introduced what were at the time cutting edge technologies into the local farmscape, including planned farmsteads, a pumping system to move slurry around the estate and a railway system to move animal feedstuff. The present proposal for an anaerobic digester is in keeping with the historical traditions of the district.

This assessment has identified potential visual impacts and impacts on settings on a relatively small number of historic assets within the assessment area, on both designated and undesignated historic assets. However, the mitigations proposed for the development, which include the creation of an earthwork bund, the planting of screening trees and the retention and maintenance of existing hedgerows, is sufficient to reduce these potential impacts to negligible.

No archaeological mitigations are proposed arising from this assessment.

CHAPTER 15 - CONCLUSION

15. Conclusion

It is clear that, in most cases, even without mitigation, impacts are generally insignificant. This has been achieved by appropriate location and design of the proposed AD plant. Even where significant impacts are identified many are effectively reduced to insignificant by the use of appropriate mitigation. Indeed, in some areas, negative impacts are altered to positive impacts via the application of mitigation and enhancement measures (particularly in relation to traffic and ecology). There are no impacts that remain significantly negative.