Interim Statement of Results

Raw Energy Ltd
Wormslade Farm
Clipston Road
Kelmarsh
Northamptonshire
LE16 9RX

April 2016
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1 Introduction

This Interim Summary Report outlines the results of the Archaeological Field Evaluation (AFE) carried out by Border Archaeology Ltd (BA) for Raw Energy Ltd in respect of the development of land at Wormsland Farm Clipston Road Kelmarsh Northamptonshire LE16 9RX (NGR: SP 73510 81650) (fig. 1). Trench locations were informed by the results of BA’s initial Geophysical Survey and the proposed trench layout was approved by Elizabeth Mordue Assistant Archaeological Advisor Northamptonshire County Council in March 2016 (fig. 2).
The interim statement was requested by Elizabeth Mordue by email on March 24th 2016 for planning purposes.

2 Results

Of the 25 trenches excavated, only Trenches 023 and 025 contained potential archaeological remains. Detailed descriptions of the remaining 23 trenches are outlined in Table 1.

2.1 Trench 023

Trench 023 was orientated in an E-W direction and was excavated to an average depth of 0.45m. Excavation revealed a single linear feature [023004] that had been previously identified during the geophysical survey of the area. This feature ran in a NNE-SSW direction and measured 0.23m in width and 0.09m in depth; it contained a single fill (023005).
2.2 Trench 025

Trench 025 had an average depth of 0.63m and was orientated E-W. It also contained the remains of a single linear feature [025004], which ran in a WNW-ESE direction from the western extent of the trench; it measured 0.35m in width and 0.11m in depth and contained a single fill (025005).

No artefactual evidence was recovered from the evaluation area.
### Table 1: Summary of Evaluation Results

<table>
<thead>
<tr>
<th>Trench No</th>
<th>Orientation and Trench NGR</th>
<th>Context No</th>
<th>Type</th>
<th>F/B</th>
<th>F/O</th>
<th>Context Information</th>
<th>Interpretation</th>
<th>Finds</th>
<th>Date</th>
<th>Comments</th>
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3 Summary conclusion

The results of the evaluation trenching at Wormslade Farm revealed no evidence of archaeological features or deposits.

A number of amorphous features representing areas of bioturbation and a series of modern land-drains were identified in several trenches and these, along with various changes in the natural geology throughout the evaluation area, may account for some of the potential features identified on the geophysical survey.

The narrow and shallow nature of the two linear features identified in Trenches 023 and 025 suggest that they likely represent plough scars; these features are aligned with the remnants of ridge and furrow field systems identified on the geophysical survey of the area.

No finds were recovered during the course of the evaluation.
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<th>Lyndsey Clark BSc</th>
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<td>Reported edited by</td>
<td>George Children MA MCifA</td>
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Written Scheme of Investigation

Raw Energy Ltd
Wormslade Farm
Clipston Road
Clipston
Northamptonshire
LE16 9RX

December 2015
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1 Introduction

Border Archaeology Ltd (BA) has been instructed by behalf of Raw Energy Ltd to undertake an archaeological programme of work in respect of the development of land at Wormslade Farm Clipston Road Clipston Northamptonshire LE16 9RX (NGR: SP 73390 33816) (fig. 1).

The main features of this development are (fig. 2):

- Two digester tanks each 31.31m diameter by 8m high with gas domes extending 4.94m high above; and associated feeders, mixing units and intake tank. It is understood that the floor level of these tanks will be set approximately 3m below the reduced ground level which is equal to approximately 4.6-6.7m below the original sloping field ground levels.
- 4 silage clamps each 119m × 20m × 5.5m high with a safety barrier 1m high on top of the walls. Concrete apron 80m x 15m to open side of clamps.
- bagged digestate stores set into earth banked lagoons (each 50m × 25m);
- 1 black water bagged system set into earth banked lagoons, and one white water attenuation pond.
- 1 Technical building to house the feeders and CHP Unit 37.2m × 14.28m × 4.4m to eaves and 5.5m max.
- Various items of ancillary plant and equipment including a gas flare stack(6.25m), a CHP container, biogas upgrading and control systems, a separation container, rack tanks, a recirculation container, network entry facility, odorant equipment, pumping station and manifolds for water management, a transformer, propane tanks and a weighbridge.
- An office/welfare building (8m × 8m × 4.07m height to ridge).
- A new farm entrance area with alterations to the entrance and visibility splays.
- Existing roadside hedge translocation at the site entrance to accommodate works to improve the highway visibility splays.
- A graded 1:10 bund with large scale landscape planting including a perimeter hedge with trees.

The nominal overall site is approximately 3.7ha in area (fig. 2). In the absence of a specific Brief detailing the proposed programme of archaeological work, Elizabeth Mordue Assistant Archaeological Advisor Northamptonshire County Council has advised that the proposed development area would be subject to archaeological evaluation following initial geophysical survey to be undertaken by Archaeological Surveys Ltd. Evaluation trenching would target any anomalies identified during geophysical survey.

The proposed development site is located c.2.9km to the E of Clipston adjacent to the A508 on land sloping gently to the N. This proposal has been prepared by George Children MA MCIfA for submission to Elizabeth Mordue for her approval as an appropriate methodology for the archaeological programme of work.
Fig. 1: Site location plan
2 Aims & Objectives

The aim of the initial programme of geophysical survey is to inform as far as possible on the presence or absence, character, extent and in some cases, apparent relative phasing of buried archaeology, in order to make an assessment of its merit in the appropriate context (CiFA 2014, 4) and to inform subsequent trench locations.

The aim of the evaluation is to determine, based upon the results of the prior programme of geophysical survey and as far as is reasonably possible, the location, extent, date, character, condition, significance and quality of any surviving archaeological remains likely to be threatened by the proposed solar farm development. An adequate representative sample of all areas where such remains are potentially threatened will be studied and attention given to sites and remains of all periods (including evidence of past environments).
The evaluation will seek to clarify the nature and extent of existing disturbance and intrusion and assess the degree of archaeological survival of buried deposits.

2.1 Objectives

To conduct a programme of archaeological geophysical survey and trial-trenching in order to sample a maximum of 3% of the proposed development area, this resulting in approximately 18 trenches and whose location will be agreed in advance. Trenching will be positioned so as to sample any ground anomalies detected by the geophysical work and to test areas apparently devoid of geophysical response.

To provide sufficient information to facilitate mitigation actions & to discharge the requirement for this WSI pre-commencement, thereby, as appropriate and by agreement, enabling a start on site in a few weeks’ time with road construction and cabling work.

This programme of archaeological works may offer potential to address research aims and themes contained in *The Archaeology of the East Midlands: An Archaeological Resource Assessment and Research Agenda* (Cooper 2006).

3 Soils & Geology

The soils of site are typical stagnogleys of the WICKHAM 2 series (711f) composed of slowly permeable seasonal waterlogged fine loamy soils over clayey, fine silty soils, which in turn are over clayey soils. Small areas of slowly permeable calcareous soils are present on the steeper slopes. This series is described as drift over Jurassic and Cretaceous clay or mudstone (SSEW 1983).

4 Brief Historical & Archaeological Background

The OS 1st Edition 6-inch map (1885) does not show the present farm, the site being occupied at that time by a small unnamed building.

To the S of the farm, a number of rectangular enclosures, with associated ditches, have been identified through aerial photography. These have been tentatively categorized as being either prehistoric or Roman in date. A scatter of Roman pottery has also been recovered from the fields to the S of the farm, and may indicate some form of possible settlement site. This in turn may also date the enclosures observed through aerial photography.

In 2012, an archaeological evaluation was undertaken to the S of the farm, which identified the remains of ditches, likely relating to rural settlement activity (Woodley 2012). The ditches were of an uncertain date, with only one sherd of pottery recovered, which could date to either the Iron Age or early medieval periods. The fact the sherd was recovered from sealed deposits suggested that the ditches were of medieval or earlier date. Zoo-
archaeological and paleo-environmental evidence recovered suggested that the animals keep at the site were not intended for slaughter but were instead utilised for milk (cows), wool (sheep) and as transport (horses), all of which would be typical in a small rural farm of medieval or earlier date (Woodley 2012, 5). Prior to the evaluation, a ‘Cultural Heritage Assessment’ was undertaken, which identified the potential for the remains of a Romano-British settlement to be situated to the S of the site, as well post-medieval agricultural features and buildings (Richards 2012).

To the N of the farm is the former site of Clipston and Oxendon railway station on the LNWR’s Northampton and Market Harborough Railway, opened in 1859. The station itself was opened in 1863. The line was shut to passenger services in 1960 and was re-opened for limited periods before closing permanently in 1981. The line of the former railway is still clearly visible. Also to the N of the farm, on the Harborough Road, is the site of a Second World War road block constructed c.mid-July 1940.

5 Methodology

Work will be carried out in accordance with the Chartered Institute for Archaeologists’ (CIfA) Standard and guidance for archaeological geophysical survey (CIfA 2014) and Standard and guidance for an archaeological field evaluation (CIfA 2014). BA adheres to the CIfA Code of Conduct (2014) and Management of Research Projects in the Historic Environment: The MoRPHE Project Managers’ Guide (Lee 2015).

A separate WSI for the geophysical survey component of the project is included as an Appendix to this document. The results of the geophysical survey will be assessed in order to inform the location of subsequent evaluation trenching.

Approximately 18 trenches will be opened in order to sample a maximum of 3% of the proposed development area. Trenching will be positioned so as to sample any ground anomalies detected by the geophysical work and to test areas apparently devoid of geophysical response.

Trenches will be opened by machine in plan using a wide un-toothed blade ditching bucket or similar. Only undifferentiated topsoil and overburden of recent origin will be removed by machine. Machining will continue under archaeological supervision down to archaeological deposits or to natural and will cease wherever a clear archaeological horizon has been attained. Investigation will proceed manually thereafter.

5.1 Recording

Full written, graphic and photographic records will be made in accordance with BA’s Archaeological Field Recording Manual (2014). Separate written descriptions of each context will be compiled using numbered context recording sheets.

A drawn record will be produced on gridded, archive-stable polyester drafting film at scales of 1:50, 1:20 or 1:10, or appropriate. Representative measured sections will be prepared as appropriate showing the sequence and
depths of deposits where practicable and strictly within established safety parameters. A Temporary Benchmark (TBM) will be established at appropriate locations and plans, elevations and sections will contain grid and level information relative to OS data. All drawings will be numbered and listed in a drawing register, these drawing numbers being cross-referenced to written site records.

A photographic record will be made using a high-resolution digital camera, comprising photographs of archaeological features and appropriate groups of features and structures. An appropriate scale will be included in each photograph and all such records will be indexed and cross-referenced to written site records. Details concerning subject and direction of view will be maintained in a photographic register, indexed by frame number.

5.2 Recovery and assessment of palaeoenvironmental/palaeoeconomic data

Samples for palaeoenvironmental/palaeoeconomic purposes will be collected according to guidance set out in *Environmental Archaeology: A Guide to the Theory and Practice of Methods, from Sampling and Recovery to Post-excavation* (Campbell, Moffet & Straker 2011).

Processing will be undertaken by BA at its Milton Keynes Palaeoenvironmental Processing Facility under the supervision and direction of Amy Bunce BSc MA Director: Palaeoenvironmental Sciences and Robin Putland BSc MSc. This assists on-site guidance for sampling purposes and the ability to ‘rush’ samples to quickly determine their archaeoenvironmental potential whilst still under excavation; this will inform whether additional samples are taken.

Wherever practicable, at least 40ℓ or 100% of each sample (both dry and waterlogged) will be processed by flotation using Siraf-style tanks with a 1mm retent mesh and 250µm flot sieve as standard, with smaller retent meshes to 250µm considered where carbonised material is less likely to float. Heavily waterlogged samples will be considered for analysis without prior processing by flotation.

Retents will be initially scanned by magnet to retrieve archaeometallurgical debris such as flake and/or spheroidal hammerscale. A sieve bank will be used to facilitate visual sorting with the smaller fractions sorted by means of magnifying lamp and/or illuminated stereo zoom microscopy. Non-archaeological, -archaeobotanical, -archaeoosteological and -archaeometallurgical material will be disposed of on site. Retents that are particularly rich in carbonised material may be refloated once dry to assist the separation of archaeobotanical material.

Flots will be sorted using an illuminated stereo zoom microscope, which will have a trinocular head for digital microscopic photography where necessary. Charcoal will only be subjected to species identification where the contextual information suggests it would be advantageous for national research strategies. Archaeological, archaeobotanical, archaeoosteological and archaeometallurgical material from flot and retent will be retained as part of the site assemblage.

Sorting and identification of macro-botanical remains will use an in-house reference collection of botanical material, in conjunction with the consultation of academic, specialist reference books (Palaeoenvironmental Bibliography).
5.2.1 Other environmental sampling

Other environmental sampling, e.g. coring and monoliths for pollen, foraminifera, testate amoeba, diatoms etc., will be undertaken under the guidance of the specialist carrying out the further analysis.

Residue analysis on materials such as ceramics will be advised by the finds department.

Potential further investigation of environmental material, e.g. isotope analysis on bone or teeth, will be dependent upon discovery and will only be considered following discussion with the SAOMKC and Historic England Science Advisor as part of the post-excavation analysis stage.

5.2.2 Sampling for scientific purposes

A range of scientific dating methods will be employed, as appropriate. In addition to techniques such as 14 C and dendrochronology, dating methods applied to inorganic materials exposed to firing or burning may be used, e.g. thermo-luminescence for ceramics, flint artefacts and hearth stones, and archaeomagnetic dating for fired structural remains, such as furnaces and kilns and possibly domestic hearths and ovens. As luminescence and archaeomagnetic dating will require a specialist site visit, this will be arranged by BA at the earliest possible opportunity when suitable features are encountered. Provision for other types of scientific analysis will be discussed with the SAOMKC and the Historic England Science Advisor, should unexpected remains be encountered.

5.2.3 Geoarchaeology

Keith Wilkinson BSc PgCert PhD MCIfA, Director of ARCA Geoarchaeology and Geomatics Winchester, has been appointed to oversee all geoarchaeological issues and he or a nominated colleague will visit site on an appropriate basis. Geoarchaeological works will in general aim to understand how deposits were initially laid down and subsequently modified through time (Ayala et al. 2007).

5.3 Recovery, processing and curation of artefactual data

Finds are herein defined in accordance with CIfA Standard and guidance for the collection, documentation, conservation and research of archaeological materials (2014) as ‘all artefacts, building materials, industrial residues, environmental material, biological remains (including human remains) and decay products’ (2014, 3).

BA will observe the Northamptonshire Museum and Art Gallery retention strategy in respect of the collection and subsequent archiving of finds. The process of selection and retention of archaeological materials will be informed by principles set out by Brown (2011, 23), which in essence specify that this process should be sufficient’ to produce a project archive that allows a full re-examination and interpretation of all the results of the project whilst avoiding replication, repetition or the retention of materials not germane to future analysis’, decisions regarding retention generally being made at the pre-analysis stage of the project.
Again, in accordance with *Standard and guidance for the collection, documentation, conservation and research of archaeological materials* (CIfA, 2014) and *First Aid for Finds* (Watkinson & Neal, 2001), all such artefacts will be bagged and labelled with the site code and context number before being removed off-site. All such materials will be stored in accordance with *First Aid for Finds* (Watkinson & Neal, 2001) and with Historic England technical standards and other relevant sources of information, including standards for data-gathering set out by Brown (2011, 18-20).

Each assemblage will be examined according to typological or chronological criteria and conservation needs identified.

### 5.4 Conservation Requirements

All conservation work, including cleaning sensitive finds, will be carried out by BA’s nominated conservator Ian Panter of the York Archaeological Trust (YAT).

Finds will be appropriately packaged and stored under the direction of an on-site conservation specialist only where significant preserved organic artefactual material is discovered. X-ray photographs of archaeological metalwork will be produced off-site by YAT.

### 6 Post-Excavation Assessment

Dependent upon results, a post-excavation assessment report will be compiled upon completion of fieldwork to comprise an assessment of the nature, date and significance of the stratigraphic, artefactual and palaeoenvironmental evidence. The results will be placed in a local and regional context and will make reference to the regional research framework.

Copies of the report will be forwarded to Raw Energy Ltd and to Elizabeth Mordue for comment & subsequent approval.

All materials identified by the assessment report as appropriate for analysis will be processed by suitable specialists. Analysis will be undertaken as part of an updated project design to inform eventual publication.

### 7 Archive Preparation

All records created during fieldwork will be checked for consistency and accuracy and will form part of the site archive, defined as the ‘paper, photographic and digital records, the finds (including pottery, bone and metalwork objects), building materials and the environmental material (including material from processed soil samples) arising from an archaeological, historic building or other historic environment fieldwork project’ (NARC 2014). The archive will contain all data collected and other specialist materials and will be ordered, indexed, adequately
documented, internally consistent, secure, quantified, conforming to standards required by the archive repository and signposted appropriately to ensure future use in research, as detailed in the *Management of Research Projects in the Historic Environment* (Lee 2015), and will conform to the *Northamptonshire Archaeological Archives Standard* (NARC 2014), currently published in draft form.

The archive will be assembled in accordance with this document and with the guidelines published in *Standard and Guidance for the creation, compilation, transfer and deposition of archaeological archives* (CIfA 2014), *Guidelines for the preparation of excavation archives for long-term storage* (United Kingdom Institute for Conservation 1990), *Standards in the museum care of archaeological collections* (Museums & Galleries Commission 1992) and *Archaeological Archives: A guide to best practice in creation, compilation, transfer and curation* (Brown 2011).

BA undertakes that the following issues will be addressed and concluded to the satisfaction of Elizabeth Mordue.

- The written, drawn and photographic records will be of sufficient quality to facilitate publication in an appropriate specialist journal.
- Data concerning complete identifiable and itemized objects will be transferred to specified object record sheets.

An HER Event UID for this programme of work has been requested via email from Northamptonshire Historic Environment Record. Suitable accession number arrangements will be made by Catherine Hollinghurst BA of the BA Post-Excavation Department. All materials contained within the site archive identified by the assessment report as appropriate for analysis will be processed by suitable specialists and the resultant research archive will be checked and ordered according to MoRPHE criteria (Lee 2015).

At present, there is no county facility for the deposition and storage of new archaeological archives (NARC 2014, 4) and BA thus agrees to store the archive until either the county store becomes available at the proposed Archaeological Resource Centre (ARC) at Chester Farm or as circumstances dictate.

### 8 The Report

The Report will incorporate clearly and accurately information gained from the archaeological programme of works.

The level of reporting will be commensurate with the archaeological results and provision will be made for a phase of assessment, followed by analysis and publication, if deemed appropriate. At the fieldwork stage, BA will provide regular interim reports in tabular format summarising the archaeological resource identified to facilitate the phased release of the individual land areas.

The Report will contain a site plan showing the location of all recorded features etc., as well as plans, sections, detailed drawings and a comprehensive written and photographic record.
Included will also be summaries of artefactual assemblages discovered (if applicable).

The project will be entered in the OASIS (Online Access to the Index of Archaeological Investigations) database.

Copies of the evaluation report will be sent to Raw Energy Ltd and the Assistant Archaeological Advisor, Northamptonshire County Council (two copies). These will comprise a digital copy (in PDF format) and a bound copy. A completed OASIS online form previously initiated at the outset of the project (http://ads.ahds.ac.uk/project/oasis) will be submitted to the Northamptonshire Historic Environment Record, to include an uploaded pdf version of the entire report.

Being cognisant of the shortened construction and regulatory timescales, BA will offer to provide interim reports (detailing work to specific date) to Elizabeth Mordue, Assistant Archaeological Advisor, Northamptonshire County Council, so that she can be kept informed of programme progress, results to date and outline interpretation so as to facilitate interchange of information to assist construction programmes.

Dependent upon discovery and where applicable, a summary report will be offered to the Editor of *Northamptonshire Archaeology* for wider dissemination.

9 Staff & Timescales

Site investigation and recording will be carried out under the supervision of Andrew Tizzard BA PhD MCIfA (Director: Operational Support). It is intended to commence site investigations on the January 4th 2016.

George Children MA MCIfA (Director: Quality and Compliance) will provide editorial guidance to all constituent aspects of the works programme.

Overall project management remains the responsibility of Neil Shurety.

10 Border Archaeology Operating Standards

All projects are carried out in accordance with CIfA *Standard and Guidance* documents as detailed within the Company’s Archaeological *Field Recording Manual* (BA 2014).

A pre-works risk assessment will be completed and lodged in the site Health & Safety File.

Site reporting procedures are completed daily and audited by George Children MA MCIfA.
11 Copyright

BA shall retain full copyright of any commissioned reports, tender documents or other project documents, under the Copyright, Designs and Patents Act 1988, with all rights reserved, excepting that it hereby provides a licence to the client and the Council for the use of the report by the client and the Council in all matters directly relating to the project as described in the Project Specification to use the documentation for their statutory functions and to provide copies of it to third parties as an incidental to such functions.

12 Monitoring

BA staff will be subject to monitoring by Elizabeth Mordue Assistant Archaeological Advisor Northamptonshire County Council. All issues of a technical nature should be addressed to George Children MA MCIfA or Andrew Tizzard BA PhD MCIfA.

13 External Specialists

The following specialists have been appointed to provide, where required, sampling, consulting, analysis & reporting services:

1. Geoarchaeology and Environmental Sampling: Dr. Keith Wilkinson MCIfA ARCA Winchester
2. Prehistoric Pottery: Dr. Alex Gibson University of Bradford
3. Roman Pottery: Rob Perrin M.Litt MCIfA FSA
4. Samian Ware: Dr. Felicity Wild Freelance Specialist
5. Post-Roman and Medieval Pottery: Dr. Alejandra Gutierrez University of Durham
6. Coins: Dr. Peter Guest University of Cardiff
7. Flint: Rebecca Devaney ACIfA Freelance Specialist
8. Glass: Dr. Hilary Cool MCIfA Barbican Research Associates
9. Leather and Metal Objects: Dr. Quita Mould Barbican Research Associates
10. Archaeometallurgy: Dr. David Starley ACIfA Archaeometallurgy Services
11. Glass working: John Shepherd Freelance Specialist
12. Artefact and materials conservation: Ian Panter York Archaeological Trust
13. Building Materials: Dr. Ruth Shaffrey Freelance Specialist
14. On-site conservation: Janice McLeish MA Border Archaeology Ltd
15. Faunal Remains: Dr. Deborah Jaques Palaeoecology Research Services Hull
16. Human Remains: Dr. Catherine Sinnott Border Archaeology Ltd
17. Plant macrofossil assessment: Amy Bunce BSc MA & Robin Putland BSc MSc Border Archaeology Ltd
18. Charcoal & wood ID: John Carrott Palaeoecology Research Services Hull
19. Additional and/or specialist archaeobotanical ID: John Carrott Palaeoecology Research Services Hull
Other specialist suppliers will be sourced, if deemed appropriate, after consultation with and the approval of Neil Shurety and suitable management time will be expended to ensure that such external suppliers’ work complies with accepted national guidance.

### 14 General Bibliography


Border Archaeology Ltd, 2014, *Archaeological Field Recording Manual*


CIfA, 2014, *Standard and Guidance for the collection, documentation, conservation and research of archaeological materials*

CIfA, 2014, *Standard and guidance for archaeological geophysical survey*

CIfA, 2014, *Standard and Guidance for archaeological field evaluation*

CIfA, 2014, *Standard and Guidance for the creation, compilation, transfer and deposition of archaeological archives*

CIfA, 20134, *Code of Conduct*

Cooper, N., 2006, *The Archaeology of the East Midlands: An Archaeological Resource Assessment and Research Agenda*


*Northamptonshire Archaeological Resource Centre (NARC), 2014, Northamptonshire Archaeological Archives Standard*

Northamptonshire Historic Environment Record: HER Printout and Backup Files


### 14.1 Cartography

OS Surveyor’s Drawing of Welford (1817)

OS 1st Edition 6-inch map (1885)
15 Appendix: Magnetometry survey method statement

15.1 Capability Statement

Archaeological Surveys Ltd have undertaken over 500 geophysical surveys within Britain and Europe over the past 10 years. The majority of the surveys have entailed detailed magnetometry from small scale (0.25ha) to large scale (250ha), for all types of development, including residential, renewable energy, pipelines, road schemes, quarrying and for research and conservation projects.

All fieldwork is undertaken by the Director of Archaeological Surveys Ltd, David Sabin (BSc Hons). David is a member of the Chartered Institute for Archaeologists (MCIfA) and has over 20 years’ experience in archaeology and geophysics. Archaeological Surveys Ltd are a Registered Organisation with the Chartered Institute for Archaeologists.

15.2 Magnetometry

15.2.1 Technical synopsis

Detailed magnetometry records localised magnetic fields that can relate to former human activity. Alteration of iron minerals present within topsoil is related to activities, such as burning and the breakdown of biological material. These minerals become weakly magnetic within the Earth’s magnetic field and can accumulate in features such as ditches and pits that are cut into the underlying subsoil. Mapping this magnetic variation can provide evidence of former settlement and land use.

15.2.2 Equipment details and configuration and survey detail

The detailed magnetic survey will be carried out using a SENSYS MAGNETO®MXPDA 5 channel cart-based system. The instrument has five fluxgate gradiometers spaced 0.5m apart, with readings recorded at 20Hz. The cart is pushed at walking speed and not towed. Each sensor is not zeroed in the field as the vertical axis alignment is precisely fixed leaving sensor offsets that are removed during data-processing. The fixing of the vertical alignment ensures the sensors are not unduly influenced by localised magnetic fields and that the vertical component of a magnetic anomaly is measured. The gradiometers have a range of recording data between ±0.1nT and ±10,000nT. They are linked to a Leica GS10 RTK GPS with data recorded by SENSYS MAGNETO®MXPDA software on a rugged PDA computer system. The cart is pushed along a series of straight, parallel transects to achieve 100% coverage of the surveyable land.

15.2.3 Quality control - fieldwork

Fluxgate sensors are highly sensitive to temperature change and this is manifest as drift during the course of a survey. This can be particularly noticeable during the morning as temperatures rise and the equipment warms or
cools. Sensor drift within the course of a traverse will appear as a line trending from negative to positive after processing with a zero median traverse algorithm.

To remove the effects of temperature drift, the surveyor will assess the weather conditions and adjust the length of traverses accordingly. Where temperatures are suspected as rising or falling, traverses will be limited to 30s duration. In more stable conditions, it is possible to survey traverses for several minutes’ duration with no noticeable drift; however, traverses will be limited to approximately 60s. In addition, the surveyor will ensure the sensors are kept perpendicular to the ground surface as this may also produce noise within the dataset.

15.2.4 Data processing and presentation

Magnetic data collected by the MAGNETO®MXPDA cart-based system are initially prepared using SENSYS MAGNETO®DLMGPS software. Georeferenced data are then exported in ASCII format for compensation (destriping), interpolation and clipping using TerraSurveyor. Greyscale images are also produced using TerraSurveyor. Data are resampled to a resolution of effectively 0.5m between tracks and 0.1 to 0.2m along each survey track. Tif files for the greyscale and survey tracks are produced by TerraSurveyor software along with world files to allow automatic geo-referencing (OSGB36) in CAD and GIS software. The following schedule sets out the typical data and image processing:

- clipping of processed data at between ±10 nT and ±3 nT to enhance low-magnitude anomalies
- zero median traverse to remove fixed offset values present within the sensors which do not undergo a zeroing procedure in the field
- a high pass filter may be applied to smooth data and remove lines that may be produced by a rapid temperature gradient or uneven surfaces

The ‘minimally’ processed (see below) data are displayed as a greyscale plot, followed by a plot of filtered data if necessary within the report. A corresponding abstraction and interpretation plot is included using colour linear and area symbols or point objects. The format of the reporting generally follows the English Heritage (2008) *Geophysical survey in archaeological field evaluation. Research and Professional Service Guideline No 1.*

15.2.5 Data processing notes

Due to the fixed offsets within the fluxgate sensors, as a result of the manufacturing and tensioning process, the survey data do not provide a visually useful dataset until a zero median traverse algorithm is applied. It is recognised that this has the potential to affect some anomalies detrimentally by removing linear features orientated parallel to survey transects. However, this has not been noted as a particular problem with the system due to the high resolution data collection, generally long length of traverses and variability within the magnetic characteristics of a linear anomaly.
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| Report written by | George Children MA MCIfA |

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APPENDIX 15

FRIENDS OF THE EARTH TECHNICAL BRIEFING PAPER ON ANAEROBIC DIGESTION PLANTS
Anaerobic Digestion

a technical briefing

for local group campaigners

NOVEMBER 2012
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INTRODUCTION - WHAT IS ANAEROBIC DIGESTION?

Anaerobic Digestion (AD) is a biological process in which bacteria digest organic matter in a sealed vessel so it is deprived of air. The decomposition of the organic matter produces biogas. The composition of biogas varies, but typically comprises 55% biomethane, 40% CO₂ and 5% other gases, including hydrogen sulphide (H₂S) and traces of ammonia (NH₃). Within an anaerobic digester this process is contained - which means that the biogas can be collected and used to generate renewable energy.

The digester is run to maximise the proportion of biomethane in the biogas.

AD is a natural process that occurs, for example, when you see bubbles coming up in a garden pond. It has been used in the UK since Victorian times for sewage and waste water treatment – sewage gas was used in 1895 in Exeter to light the City’s streetlights. The Anaerobic Digestion Portal¹ states there are currently 91 sewage works in the UK using AD.

AD should not be confused with in-vessel composting (IVC), which is an aerobic process. Both involve bacterial action but the bacteria, processes, feedstocks and outputs are very different. While green garden waste can be disposed of using IVC, the AD process is not suitable for disposing of green garden waste due to the levels of lignates. The regulatory regimes, machinery and risk factors are also different.

GENERAL LAYOUT OF AN ANAEROBIC DIGESTER

The diagram below illustrates a generic AD plant and the process.

1. A wide range of organic matter can be used, although digesters like stability so consistent supply of material with limited variation is desirable. The organic matter is generally referred to as “feedstock”. This is discussed further below.
2. A 50,000 tonnes per annum AD plant might require an 11 metre high cylinder with a base diameter of 30 metres. However, the design of AD plants is changing all the time. Some

¹ See page 19 “Other Sources of Information”
new and innovative designs incorporate fully recyclable plastic tanks as well as an increased emphasis on low carbon build and operation. More attention is also being paid to the aesthetics – for example some AD tanks are horizontal rather than vertical and these tanks are mostly buried underground, removing the need for 9-12 metre towers.

**THE ANAEROBIC DIGESTION PROCESS**

3. Once in the digester vessel, the feedstock is stirred or agitated to enable the organic matter and bacteria to mix. There are four key processes performed by different bacteria²:
   - Hydrolosis
   - Acidogenesis
   - Acetogenesis
   - Methanogenesis

4. The AD process is not fast. Organic matter can be in the digester for 30 to 60 days (known as the retention time). There are advantages to having as high a retention time as possible (e.g. more gas collected and less smelly digestate), but these are offset by the higher capital costs of bigger tanks. In simple terms this means that doubling the retention time from 30-60 days requires double the tank capacity. Typically, longer retention times apply to slurries where an animal has already digested the material and the AD process is in effect secondary digestion.

5. The other driver of digester size is the volatile solids³ loading. This varies according to the design of digester and the feedstock.

6. The tank needs heating as the bacteria thrive at elevated temperatures. There are two possible regimes –
   - *Mesophillic*, which thrive at around 39°C and
   - *Thermophillic*, which are happier at 55-60°C. The heat required to raise the organic material/contents of the digester to this temperature is significant, as are the thermal losses. This has significant energy and cost implications. The overwhelming majority of plants operate in the *mesophillic* range.

7. If a digester loses temperature the biogas yield falls as bacterial activity diminishes. If the temperature loss is substantial or protracted bacteria start to die. If the biogas yield falls recovery takes time, possibly months, as the numbers of bacteria have to grow through reproduction. An AD operator is in fact a bacteria farmer – success depends upon being able to provide feed and a convivial environment for the “bugs”.

8. To ensure that the various species of bacteria have constant access to nutrients, digester contents are agitated either by mechanical pumps or (increasingly) by bubbling gas through them. Traditional stirring is very energy intensive so the gas based system has the advantage of being cheaper and having no moving parts and is thus more reliable. The very latest agitation technology involves a patented system of using the gas generated to aggressively agitate the digestate, rather than passive bubbling. This technology is said to generate higher gas yields by virtue of the frequency and strength of agitation.

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² For those particularly interested in the chemistry there is currently (July 2012) a very full explanation of the chemical processes available on Wikipedia.

³ Volatile solids are the parts of the feedstock that are converted to biogas by the bacteria. The proportion of the volatile solids is different for each type of feedstock. There is a reference list of yields on [http://biogas-info.co.uk/index.php/biogas-yields.html](http://biogas-info.co.uk/index.php/biogas-yields.html)
9. This note is mainly concerned with mesophillic rather than thermophillic digestion as the latter is less common. However there are a number of AD plants using the thermophillic process. One appears to be the Vertal plant in Mitcham which happens to be where about 50% of the food waste collected by Waverley Borough Council is taken. This is not advertised as a thermophillic plant on the Vertal website but the food waste feedstock takes only 3 days to digest so we have concluded that it must be\(^4\).

**Stable Anaerobic Digestion**

10. Keeping the bacteria healthy requires many things. The more obvious are:-

- Maintaining the correct temperature
- Keeping pH within bounds – around pH 7 is ideal for the methanogenic phase, where the majority of gas is produced.
- Providing a constant amount of food, at a rate that all the bacteria can work at. This is more complicated than it may sound. Variation in the loading of Volatile Fatty Acids (VFAs) causes imbalances
- Maintaining the carbon to nitrogen ratio within a specific range

11. If something goes wrong bacteria will quickly die and biogas yields will fall. It is also likely that the composition of the biogas will alter, reducing energy yield and potentially causing ammonia which can lead to an odour issue with the digestate and other problems.

12. While much can be achieved through computer control to stabilize the process, external daily temperature variation, which can be as much as 20\(^o\)C, also has a significant impact on the process. Some of the most modern digesters incorporate insulation to counter some of the effects of external temperature swings and reduce energy consumption on heating the tanks.

**Wet and Dry Digesters**

13. One common way of classifying digesters is into “wet” and “dry”. Whether a digester is a wet digester or a dry digester is determined by the feedstock being used. Food waste and cattle slurry are wet, maize silage is dry.

14. In most wet digesters, the feedstock is at a dry matter content of under 20% (more often under 10%) and it is simply pumped into the digester vessel. In a dry digester the dry matter content is over 25%. The feedstock is typically loaded into the digester floor by a loading shovel and left to decompose. The biogas is collected and, when the decomposition is complete, the digestate is removed by a loading shovel. Dry digesters are in fact very similar to IVC plants.

15. Wet digesters are larger than dry digesters with the same yield, but a dry digester is generally more expensive to construct and operate.

16. Wet digesters operate on a continuous process with a constant yield. Dry digesters tend to operate on a batch process with a varying yield.

17. Wet digesters are far more common, not least because most feedstock has dry matter content under 25%, and it is easier to reduce the dry matter content by adding water than reduce it by removing water. This has implications for the volumes and concentrations of digestate.

\(^4\) As a Friends of the Earth local group will be seeking more information on this particular digester as clearly the energy required to heat the feedstock to the required temperatures must be very significant.
FEEDSTOCK

18. While digesters can use almost any organic material (except lignates) it is useful to classify them into types. Different feedstocks have different handling requirements and fall under different legislation. An AD operator is basically a bacteria farmer. Keeping bacteria healthy is what generates biogas. Digesters cannot process lignates, i.e. woody materials (including straw) as the cell walls are too strong for the bacteria to break down. This is why AD plants do not process garden or forestry waste. Different feedstocks produce different volumes of biogas and mixing feedstocks (e.g. food waste with manure) can make a substantial difference to biogas output. Different feedstocks also require different pre-treatments and come under different legislative regimes.

SLURRY AND MANURE

19. AD requires bacteria and the best source of bacteria is manure. By far the most common manure used in AD is cow manure, usually from dairy herds, with pig manure coming second. The cattle are usually kept in concrete floored buildings, and the manure is removed with a minimum amount of straw in it. If stale bedding (i.e. manure and urine impregnated) is used the straw presents a problem and has to be chopped before being used for AD.

20. Cattle manure yields about 20m$^3$/tonnes biogas, or about 5 KWh per tonne. The average dairy cow produces 20 tonnes of manure a year.

21. Generally the pre-treatment required for slurry is simply a macerating pump. If farmyard manure is also used then the chopping load will be higher as it is desirable to remove the straw as this is not digested. The digestate produced from farmyard manure is used in exactly the same way as cattle slurry, under the same spreading regimes.

22. There is some evidence to show that the Nitrogen, Phosphorous and Potassium (NPK) from digestate is taken up better by plants than it is from straight slurry, although the complexities of fertilising soil should not be underestimated. The small number of AD plants operating in the UK means that only a small amount of trial data is available.

ENERGY CROPS

23. Leaving the ethics of growing energy crops aside for the purposes of this technical note, from an operator’s point of view certain crops are particularly suitable for anaerobic digestion. The most common are maize, wheat and sugar beet. Maize is turned into silage, usually in clamps but bales are more efficient. Wheat is harvested before it is ripe, then baled and wrapped. This then becomes “whole crop” wheat silage. Sugar beet is grown and harvested in the normal way, and then chopped or pulped before being fed to the digester.

24. A comprehensive explanation of the use of energy crops including a comparison of yields can be found in the IEA Energy publication “Biogas from Energy Crop Digestion” by Rudolf Braun, Peter Weiland and Arthur Wellinger.

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WASTE SILAGE

25. The easiest way for a farmer to boost the yield of an AD plant is to put in higher yielding gas feedstocks. The most obvious material to use is silage, which is a well used cattle feed, usually produced on farm and stored close to the cattle sheds. There is a relatively high wastage in clamp made silage, typically 5 -10%, as once the clamp is opened it is vulnerable to attack by the weather and air. For a 750 cow herd, housed for half the year, 5% silage wastage represents 350 tonnes. While this silage waste may not be palatable for cattle, the bugs in an AD plant are less choosy. The alternative, wrapping bales of silage, is not perfect as wrapping is susceptible to damage. Putting an additional 350 tonnes of maize silage through the digester would generate an additional 385,000KWh.

26. Silage however requires more processing than farmyard manure. As well as transporting it from the clamp to the digester, it will need more chopping to reduce fibre lengths (some chopping will have been performed in making the silage). It may also be necessary to add water to control the dry matter content of the overall feedstock, easing pumping and keeping the volatile solids loading within bounds.

27. The digestate produced by using silage can be spread back onto the growing areas under existing systems, thereby recycling at least some of the NPK.

VEGETABLE WASTES

28. Many vegetable wastes such as potato peelings and sugar beet pulp are potentially excellent feedstocks, having a high biogas yield.

29. Several vegetable processors are investigating AD plants, and some have been built. These AD plants are usually located on-site or near the vegetable processing company where the waste arises thus saving transport costs. There is also an on-site energy demand and a source of heat.

30. The treatment required for this waste is similar to that for silage (i.e. chopping and dry matter content control). The digested wastes can usually be returned to the farm, often as fertiliser to the vegetable growers supplying the AD plant. Unfortunately it is unlikely that there will be a return load of digestate on the vehicle bringing the feedstock as vegetable production is seasonal but AD plants run all year. This can significantly increases the space required to store feedstock and digestate on site.

31. Alternatively, those operating silage/manure digesters may contract to take in vegetable waste (possibly in place of energy crops). This may or may not add to the transport burden of the vegetable processor.

DAIRY WASTES

32. Dairy products generate waste from the parts of the milk not used. These are excellent AD fuels. Typically the AD becomes part of the waste water treatment at the dairy processing plant.

33. Dairy products also form a significant part of the waste from supermarkets, as once they are out of date they have to be removed from the food chain. While they are an excellent fuel, removing the cartons that they are stored in adds complexity and cost to the AD plant.

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7 A dairy cow typically consumes 50Kg silage per day. [http://www.dardni.gov.uk/ruralni/pub41_dpdb.pdf](http://www.dardni.gov.uk/ruralni/pub41_dpdb.pdf)

8 Nitrogen, Phosphorous and Potassium (Potash)
34. The huge advantage of using food waste is that (at the moment at least) processing food waste generates an additional revenue source as a result of being taken out of landfill. This revenue, known as a gate fee, ranges from around £36/tonne to £60/tonne depending upon location and the sort of waste. Packaged food waste attracts a higher gate fee because of the need for more pre-processing and additional equipment. AD plants taking in food waste are subject to higher plant costs, planning issues are more complicated and expensive and they are also subject to more extensive regulation and controls, which again makes the cost of these facilities considerably higher.

35. Food waste comes in a variety of types:

- **Source segregated, unpackaged domestic kitchen waste.** This is collected on behalf of councils by waste collections businesses. Some counties and boroughs have separate waste collections for kitchen scraps, and these are perfect for AD, yielding about 150m³ biogas/tonne. Others do not collect separately, so the food waste is enmeshed in the municipal waste and is generally not (yet) separated at waste transfer stations. Recent government changes to the Landfill Tax have meant that it is currently unlikely that non segregated waste will be processed through AD facilities. Kitchen scraps are deemed to contain animal by-products – i.e. meat and meat products, which means that any plant processing this type of food waste will fall under Animal By-product Regulations (ABPR) and needs to follow strict rules relating to the receipt and processing of the feedstock.

- **Unpackaged Commercial Food Waste.** Typically collected from restaurants, hotels, prisons, hospitals and schools. It is likely to come in skips or wheelie bins, and may have been bulked up. The collection contracts usually lie outside of local government responsibility and private operators compete for contracts. Little, if any, central data exists on locations and tonnage. Within this category is also the waste from food processors such as bakers. This waste makes excellent feedstock due to high biogas yields, but care needs to be taken by the AD operator to ensure that the feed to the digester remains constant. There can also be problems with pH, preservatives (which may kill bacteria), salt and the like. These issues are not likely to be problematic for commercial scale digesters as the volumes of contaminants are relatively low. However, although the food is unpackaged, there are material issues with contamination with anything from glass to cutlery. It also comes frequently with plastic bags – the biggest problem in recycling, followed by textiles. This feedstock is also subject to ABPR.

- **Abattoir Waste.** There are many AD plants that run on abattoir waste, although in the UK this is complicated by the precautions against BSE – so brain tissue and spinal cords of cattle have to be incinerated and cannot be treated in any other way. Animal blood is an excellent AD fuel, but other parts may need significant amount of processing (macerating and grinding) to make them suitable. Again, any AD processing abattoir waste will fall under ABPR.

- **Packaged Food Waste.** This is almost entirely out of date supermarket food, of which there is a bewildering array including sandwiches, soft drinks, and packed meat. While this is generally a good feedstock, taking advantage of it requires a de-packaging process (which adds at least £200,000 to the capital costs of the AD plant) and the subsequent removal of the packaging from the AD plant also adds to operational costs. Again, the operator has to be careful about maintaining digester stability. This feedstock is also almost certain to fall within ABPR.
GLYCEROL

36. Glycerol (also known as glycerine) is a by-product of the bio-diesel industry. It is a very high yielding fuel, (over 500m$^3$ biogas/tonne) and has the advantage of containing no nitrogen. It is therefore often used by AD operators to maintain the carbon to nitrogen ratio. Most AD plants have the capacity to use a little glycerol.

37. When the biodiesel industry started glycerol was free. It now commands prices of £100 to £400 per tonne as it is a useful industrial chemical so it is not a cheap fuel.

38. Because glycerol is so high powered a fuel, it has to be used with caution as the large amount of volatile fatty acids produced can lead to “foaming” within the AD reactor. Generally levels of glycerol are kept to less than 5% (by mass) of the feed stock.

ENERGY PRODUCTION

39. Any significant AD plant must have a connection to the grid, be it electric or gas. Occasionally there are opportunities for the energy to be channelled through a ‘private wire’ to a neighbouring facility such as a factory.

40. Hypothetically there is no need for a grid connection if the AD plant is connected directly to an energy user. However in practice the energy user will already have a grid connection and will be unwilling to swap the reliability of the national networks with its multiple power stations for the risk of failure of one (or even two) small generators. As a result in almost all cases the grid will end up acting as a back-up and buffer by accepting surplus supply and relieving surplus demand. This can make for very complicated (and expensive) power purchase agreements (PPA) with the energy purchaser and the grid owner.

ELECTRICITY PRODUCTION

41. The most common use of biogas is to generate electricity by feeding it into a reciprocating piston engine, which in turn drives a generator. The advantages of this process are that it is simple, uses proven technology and produces energy in a form that can either be used locally or sold into the national grid. However, more recently the advent of biogas turbines may improve the cost and reliability of electricity and heat generation.

42. Supply of the resulting electricity into the grid is relatively straightforward, although the grid operators are (anecdotally) generally ‘reluctant’ to provide new grid connections for small plants. Not surprisingly, domestic grid connections are inadequate. The cost of a grid connection is significant and, if substantial additional power lines are required, can become exorbitant.

43. There are fundamental disadvantages to electricity production from AD:-

- **Low Efficiency.** Small reciprocating engines driving generators are an inefficient method of producing electricity. Typically less than 40% of the energy available in the biogas is delivered into the grid as electricity. The remainder is converted to low grade heat, in the engine exhaust, the cooling of the engine and irrecoverable heat losses. While some of this heat can be recovered for use in heating the AD process through heat exchangers, these too have inherent inefficiencies. Even if more heat is recovered from the process than is needed in the AD (although this is unlikely if pasteurisation is involved) it is often hard to find a viable use for it.
- **Low Voltage.** Small generators on AD plants operate at low voltages. This means that to raise the voltage to grid transmission levels requires the use of transformers, a further cost and efficiency loss.

- **Engine Damage.** Biogas contains H₂S and NH₃, both of which attack the oils and indeed the metals of the engine. While this can be contained, a high level of monitoring of the engine oil is necessary. If the digester gets a little out of kilter it can increase the levels of the attacking gases, with concomitant increased wear.

- **Inability to Store the Energy.** As electricity cannot be stored, there will be increasing pressures on the generation of electricity and the ability of the grid system to absorb it at all times.

44. Unlike landfill gas, biogas from AD should not contain significant levels of siloxanes, which increase engine wear.

45. The most efficient electricity producing AD plants are those on dairy farms and food processing plants, where there is use for hot water and electricity within the production process. On a dairy farm there are also plenty of acres to use the digestate.

46. Most food waste processing plants with AD currently generate electricity, there are very few producing gas for grid injection, although this is set to increase. Typically a plant processing 50,000 tonnes/year of food waste will produce about 1.5 to 2 MW electricity, and consume most of the heat produced by the generators in the AD and pasteurisation heating.

**BIO-METHANE PRODUCTION**

47. The alternative to turning biogas into heat and electricity is to remove the impurities and inject the resultant bio-methane into the gas grid. This has the attraction of avoiding the inefficiencies inherent in changing the energy from gas to electricity.

48. There are a variety of technologies available to remove the CO₂, NH₃ and H₂S from the biogas. The biogas upgrade industry is fledgling across Europe with 3 main types of process – Pressure Swing Absorption (PSA), Cryogenic and Membrane technology. They are expensive and there are differing views regarding reliability and cost of operation. Prices for example for 100 cubic metres of biogas per hour range from c£300k for membrane technology to £900k for PSA. In addition the grid injection costs are added although these are falling.

49. The first challenge is to find a connection in the intermediate pressure gas rid, rather than the domestic one. Laying pipe is expensive, so proximity to the intermediate pressure gas grid is very important.

50. Then there is a specification for gas quality in the grid. Clearly any gas being injected has to meet this. In the UK, where parts of the gas grid are still iron, the specification contains a very low target for oxygen content compared to the rest of Europe (where the gas pipes are plastic). The grid companies are generally helpful in finding ways to achieve the target, but it is not straightforward. Currently, the Health and Safety Executive require a very low oxygen threshold – 0.1%, but are granting exemptions for oxygen content of up to 1% and this is likely to be adopted in the near future as a general standard.

51. Having upgraded the biogas to at least 97% biomethane, the gas has to be injected into the gas grid system. Until very recently, OFGEM would only allow this to be done with injection equipment that is used on North Sea gas interconnectors – there was simply no regulatory framework for biomethane injection. Depending upon the region this injection equipment could cost up to £1.5m per facility. However, OFGEM have now agreed a
framework for biomethane injection, which will see the price come down initially to around £300,000. There is scope for further improvement but this is a good start.

52. The final piece of complexity can be adjusting what is known as the “Wobbe Index”. This requires the addition of varying amounts of propane at the point of injection to ensure that the energy (the calorific value) content of the gas (which varies with pressure and temperature) matches the billing system. Biomethane is very close in composition to North Sea gas, but the latter has additional gases which enhance the calorific value (CV). Biomethane can only reach this CV by the addition of propane, which is both a fossil fuel and adds significant cost. For example, the propination plant can cost up to £200,000 to buy and install and then the running costs are £20-40,000 per annum. However, National Grid in conjunction with Bio Group has established an alternative option for certain areas, where propination can be avoided. In the UK’s first AD plant built to put green gas into the grid, the biomethane is first mixed with North Sea gas to dilute it in the system, such that the issue of lowering CV is overcome. This cannot work everywhere, but where it does, it is both environmentally and economically preferable.

53. The gas clean up and injection process does not yield heat for the AD process. This means that the heat for the digester and pasteuriser has to be provided. Either some of the gas produced is burned, or waste heat is extracted from some other source – for example the exhaust from a kiln or industrial process. In a plant in Suffolk, heat is generated in the spring and summer using solar thermal panels to enhance the biogas boiler and maximise efficiency. As a rule of thumb in traditional AD systems, the heating requirement is 30% of the yield. In other words, for every 10KWh of methane produced in the AD, only 7KWh will be injected into the grid, the other 3KWh being used to heat the digester and pasteuriser. Using other renewable sources changes the profile of this. The advantages of co-locating with a heat source are therefore substantial.

DIGESTATE

54. The estimates provided by AD operators of the volume of the original feedstock which will emerge as digestate can vary. One operator puts this figure at 85%. What is beyond doubt is that it is always a very significant percentage and causes transportation and disposal issues. There are also tight regulatory constraints around the use and timing of use of digestate, which is applied to land.

55. A 2MW electrical plant processing 50,000 tonnes of food waste will produce in excess of 40,000 tonnes of digestate containing 120 tonnes of nitrogen. This will require an area in the order of 685 hectares or 1,700 acres of arable land to be spread on. Ignoring woods, towns and other non-agricultural land, that is a circle with a radius of one mile. The more dispersed this land bank is, the further the digestate will have to be hauled (by road) with concomitant increases in cost, congestion, CO₂ emissions etc.

56. Typically the digestate is 10% solids and 0.3% nitrogen, 0.05% phosphorous and 0.3% potash (potassium). Values vary widely, depending on the feedstock. The digestate also contains useful fibre and other trace elements. In a simple world it is a good, possibly excellent, fertiliser. As southern England is said by some to be rapidly approaching pre-desertification, it is very important that organic matter is re-introduced to soils and compost and digestate have an important role in this.

57. Unfortunately this not a “simple world”. Most of the farmland in England is in Nitrate Vulnerable Zones (NVZ), and weather complicates agricultural processes of spreading fertiliser on the land. Moreover, all farms already have a fertiliser programme and
changing to using digestate requires different spreading equipment – which is a cost that most farmers are unwilling to bear. The combined effect of farming cycles and the NVZ regulations mean that digestate can only be put to land around 10-12 weeks of the year.

58. Finally digestate is a waste product, and the Environment Agency requires form filling to enable it to be spread on land, or even moved. While the form filling is not particularly complex, it adds cost and time to a weather dependant process. However, in addition to the forms themselves, various soil samples and product testing has to be undertaken which adds to cost. The processing of the forms and issuance of the appropriate EA permits also takes at least 8 weeks.

59. A solution to this is the PAS110 standard – digestate that conforms to this is NOT viewed as a waste by the EA, and thus spreading it is easier (see below for more on PAS110). At the moment PAS110 does not permit use of digestate as a horticultural fertiliser (so it can’t be used on domestic vegetable patches). The list of allowed uses is being refined and developed all the time. However, legislation is being planned in Europe which would reclassify all digestate as a waste – notwithstanding PAS 110, and this would cause massive problems to the traditional AD sector. Again in Suffolk, pioneering work is being done using biomass and capturing the CO2 from the gas upgrade so that the digestate itself is being upgraded to water that can be used in agriculture all year round. Near the Suffolk coast, the area has less rainfall per annum than Jerusalem, so water conservation and sustainability are key issues, and AD can be used as a contribution to the solution.

**Nitrate Vulnerable Zones (NVZ)**

60. Historically the enthusiastic application of nitrogen based fertilisers to farmland caused elevated nitrate levels in waterways. This affected the biology of the waterways, to the detriment of many fish species. The solution to this has been to limit the application of nitrogen in areas where this is a problem, and these are known as nitrate vulnerable zones. NVZs have been successful in improving water quality and aquatic life, but they make digestate disposal more complex.

61. In a NVZ there is a limit to the amount of nitrogen that can be applied. For grassland it is 250Kg/Ha, for other agricultural land it is 175Kg/Ha. There are also constraints on proximity to water courses etc. Nitrogen fertiliser can only be applied between January and September and if the land is to be grazed by cattle there is a block ban on grazing after an application of slurry, typically 2-6 weeks.

62. The AD plant needs access to a substantial land bank to spread its digestate. A 22,500 tonne/year AD plant will require around 750 acres of grassland or 1,000 of arable land. This is not a problem for slurry and energy crop plants (where the land is being used to produce the feedstock), but is a significant challenge for food waste plants. Spreading costs (which are borne by the AD plant operator) rise dramatically with distance that digestate has to be hauled. There are thus strong arguments for building food waste processing AD plants in rural areas and many farmers welcome the opportunity to reduce their chemical costs through the use of digestate.

63. The application of low nitrogen content fertiliser is protracted and complex. It must be integrated into the rest of the farm management. Many farm fields cannot be worked by tractors in late winter as the ground is too soft. If the field is a hay or silage field, applying in late spring will damage crops. This means that in practical terms there are probably

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The extent of NVZs can be seen on [http://defranvz.adas.co.uk/a4website.pdf](http://defranvz.adas.co.uk/a4website.pdf)

There is some local variation on this.
only 3 or 4 windows of opportunity in any 12 month period to apply digestate to any one field.

64. During the non-application season all digestate will have to be stored (other than when the new technology referred to above is applied). For a 22,500 tonne/year plant this could require storage for 10 million litres of digestate.

**Animal By-Products Regulations (ABPR)**

65. ABPR are run by DEFRA, and they control the treatment of any waste (including food waste) that contains or might contain animal by-products. In practice, all food waste falls under ABPR.

66. The rules are complex. The most significant requirements are:
   - That all operations involving food waste have to be conducted in air tight buildings with bio-filters.
   - All the digestate must be pasteurised before it can be released for use as a fertiliser. The success of the pasteurisation is monitored by DEFRA, who test digestate for certain specific types of bacteria, including salmonella. Until the test is passed, the batch cannot be released, which further complicates the storage of digestate.

67. The practical effect of ABPR on the design and operation of the AD plant is as follows:
   - A pasteuriser has to be included as part of the plant - this has to be capable of raising all digestate to a given temperature and holding it there for a required period of time. For instance a temperature of 68°C would need to be held for an hour and the waste has to have a particle size of less than 12mm.
   - The heat load is significantly increased – although this can be mitigated through the use of a heat exchanger to recycle heat from the digestate as it exits the pasteuriser to that coming in.
   - The site operator tests outputs on an agreed basis with the EA and has digestate samples tested at independent labs. The operator maintains records and self regulates on an ongoing basis, with the duty to re-process batches which fail the testing procedure. These records are audited by the EA as part of their regular inspections.

**Ground Damage and Compaction**

68. Current nitrogen fertilisers are typically 35% nitrogen by mass. Sufficient fertiliser for one hectare for a year weighs a total of 714Kg. Applying the same quantity of nitrogen from digestate at 0.3%N requires 8,333Kg of digestate i.e. almost 12 times as much weight. The potential impact is 12 times as much ground compaction during spreading and, in the early season, the potential for substantial wheel ruts. It also requires 12 times as much energy (and therefore cost) to spread the digestate.

69. The ground compaction and wheel-rut problems can be solved, in part, by using low ground pressure machinery. While this exists it is expensive, still relatively rare and also unlikely to be in use on the farms close to the AD plant. It is therefore entirely possible that an AD plant operator will have to buy their own digestate spreading equipment.

**Digestate De-Watering**

70. One way to improve digestate’s utility as a fertiliser is to remove surplus water. At the AD plant to be built at Selborne Brickworks in Hampshire the proposal is to use a process
called ‘reverse osmosis’ to get the water to a suitable quality to meet EA licence standards.

71. Separating solids from the digestate is relatively straightforward. The first step is to use a mechanical belt or screw press. This removed the larger solid components, typically at 25% dry matter (i.e. for each Kg of solid, there is also 3 Kg of water). The second step is to pass the liquid component through the reverse osmosis process, which will remove around 80% of the water, and that water will be close to potable\(^{11}\). The remaining matter is a thick liquid with a relatively high level of nitrates.

72. Unfortunately a de-watering plant is expensive, typically costing between £250,000 and £500,000. Its performance is largely dependent upon the feedstock’s composition and the retention time of the digester. The plant is not cheap to operate either, requiring significant power and regular replacement of filters and membranes. It may even be necessary to add an aerobic digestion stage.

PAS110

73. A standard for digestate has been defined, it is called PAS110. Digestate meeting this standard is not a waste, and can therefore be transported and spread without further reference to the Environment Agency or DEFRA. The Soil Association has recently accepted PAS110 digestate as an organic fertiliser.

74. PAS110 limits the uses of digestate, specifically excluding horticulture and thus the retail market. There are plans to extend its application, but these are progressing slowly. In any case, the price of a 25Kg bag of compost is around £2.50 (or £100/tonne). Allowing a margin of 50% for the retailer and transport costs of £25/tonne leaves the AD operator £25 to bag, label, palletise and load one tonne of separated digestate. Operators maintain this is not financially viable.

OTHER ISSUES

LICENSING AND REGULATION

75. Operating an AD plant requires licensing. The administrative burdens of operating even a simple AD plant are significant. The licenses required depend upon the plant type and location.

76. The simplest is the purely agricultural plant. The farm will already be regulated by the Environment Agency and (if it has livestock) DEFRA (although there are restrictions on the processing of ABPR waste on cattle farms). The existing licenses will need amending, but this is not a major problem. Similarly an industrial plant will have existing licenses, and all that is required is to amend them.

77. A food waste processing plant taking animal waste has to obtain and maintain ABPR approvals through regular Animal Health inspections if the plant is to run under ABPR.

78. Waste management permits are not hard to get, but the process is complex. The process can take 6 months and cost £15,000 or more. The annual charges for the license will vary depending upon the site, but are substantial. The application cannot be submitted until planning permission is granted.

\(^{11}\) Submarines use reverse osmosis to make their drinking water. The RO membrane is impenetrable by bacteria and larger molecules.
79. In the case of an AD plant producing electricity, the energy grid operators will regulate the connection from the plant, possibly using third party contractors. They may well also monitor the actual performance of the plant in terms of efficiency and availability.

80. Other regulators involved are likely to include the Health and Safety Executive, District and County Councils, Environmental Health, OFGEM (which regulates the energy connections and markets and pays subsidies) and DECC.

SIZE OF OPERATING PLANT

81. At its simplest a digester comprises two or more large storage tanks, one of which is the digester vessel. Most digesters are cylindrical, and there are trade-offs between height and diameter. For a 10,000 tonne/year plant the digester may comprise one 25m diameter vessel, 8m high with a further 5m high gas holding membrane on top. Digestate storage would require another two vessels of similar size. New innovations include burying tanks, using recyclable materials and minimising visual intrusion.

82. If the plant is processing food waste it will require a feedstock processing building, which will also contain the pasteurisers and dewatering equipment. This will be at least 1,200m of floor area, with an eaves height of 8-10m and can have a ridge height of 12-15m.

83. The buildings are similar to modern agricultural buildings and an AD plant is a substantial construction, particularly when you add in offices, weighbridges, generators, and in some circumstances gas holders, flares and access roads.

LOCATION OF AD PLANTS

84. There is much debate about where best to site AD plants. There are a number of sometimes conflicting requirements. For straightforward agricultural plants growing and digesting energy crops there is a fair amount of flexibility. For those plants disposing of food waste the issues are more complex.

85. In general terms the key requirements for a successful and efficient AD plant are:
   • on site access to the energy grid - an intermediate or high pressure gas grid connection being the preferred option – see above
   • proximity to a bank of agricultural land to dispose of digestate – see above
   • in the case of food waste plants, access to the road network
   • a complimentary activity e.g. a manufacturing or agriculture or forestry process

COMPLIMENTARY ACTIVITIES/CO-LOCATION

86. For environmental (resource efficiency), financial and operational reasons it is desirable that the AD plant be co-located with complimentary activities. These will usually be energy users with a requirement for electricity, gas or low level heat.

87. The most appropriate type of complimentary activity probably depends on whether the AD plant is near a gas grid connection or will be using the biogas to produce electricity for the electricity grid.

88. A very example of a good complimentary activity for an AD plant with a gas grid connection is a brickworks. An AD plant adjoining a brickworks can produce biogas for
use in the brick kilns. The brickmaking process will itself then produce a lot of surplus heat which can be captured to warm the digestate. As previously explained, all AD plants require some heat to warm the digestate and they usually take some of the energy they are producing to do this. This is what is called the 'parasitic load'. In the case of a brickworks, which obviously requires very high temperatures to make bricks, there may be more surplus heat than is required to heat the feedstock. Other possible users of low level heat could be for wood drying (for sustainable biomass) or to provide the heating for commercial greenhouses.

89. In the case of an AD plant on the electricity grid the best fit may be to co-locate with a heat producer because the surplus heat can be captured to warm the digestate and reduce the parasitic load.

90. However there may be operational and safety reasons, such as fire hazards, which mean that an AD plant cannot be included on certain sites.

91. In our experience the planning system currently lacks sufficient flexibility to be able to recognise the best sites for heart producers and heat users including AD plants. In the case of AD plants the current system is geared towards on trying to fit them into existing waste facility sites which often offer no opportunity for co-location or processes and result in energy being wasted.

ACCESS TO THE ROAD NETWORK

92. 25,000 tonnes of food waste in 20 ton loads (i.e. articulated tippers) represents 12 round trips per working day as not all tippers will be full. Disposing of the digestate is another 8 round trips per working day.

93. For planning purposes it is a requirement that any plant be located close to the HGV network – essentially the “A” road infrastructure. Typically the required proximity is 2Km.

ODOUR

94. Today well run AD plants are virtually odourless on the exterior. There can be a very faint odour when you are within a few feet of a plant but what you can smell is actually the biogas. However some of the early plants, through a combination of inappropriate design and bad operation, have a well-documented history of odour problems.12

95. Odour problems in general only arise if waste is stored in buildings for several days and/or the odour treatment is insufficient. Food waste will always smell and it is how this is controlled and treated that is the key – the operation of a plant is key in this regard. Friends of the Earth local group members who have visited large AD food processing plants say that other than internally in the main food waste reception hall odour was not noticeable. If the AD process itself causes odour then this means that the sealed process is leaking, or that it is not digesting and undigested waste is being taken out of the back end of the plant.

NOISE

96. Most AD operations are relatively quiet and the noise is controlled by planning permission. Building design and mitigation measures can render the noise negligible at the site boundary (which is where it counts). AD plants built on existing industrial sites probably have an advantage as there is already a high background noise level.

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12 Holdsworthy Farm and Ludlow being good examples of this.
97. Flaring of gas is not essential. Flaring is a back up and can be used to avoid the need for gas holders as temporary storage devices. Where it is used, bottom down flares – essentially upside down patio heaters – are used, so there is no visible sign of flaring. The emissions are not problematic and although undesirable when flaring does take place it is a green gas not a fossil fuel. Bio Group has developed a system that does not require either a flare or a gas holder in its new plant in Stockport.

**BIO-AEROSOLS**

98. Although there is no evidence that they are a problem with anaerobic digesters, residents often worry about the potential health impacts of bio-aerosol. This concern can arise because residents find reports on the internet of problems with bio-aerosols on open composting sites where bio-aerosols can be released when the compost windrows (which are in the open) are turned by a digger. There is extensive guidance on bio-aerosols at composting sites and the research concludes that at a distance of 100m to 200m even from an open composting site bio-aerosols are at background levels.

99. There is less planning and environmental guidance on bio-aerosols at AD plants. The Environment Agency permitting regime appears to have added to public confusion and concern. If there is a sensitive receptor (which includes a dwelling) within 250m of an AD plant it will require a “bespoke” EA license which involves a higher level of monitoring and regulation - but this requirement has been interpreted by some members of the public as meaning that the EA does not permit any receptors to be located within 250m of an AD plant, and that is simply not the case.

100. AD plants using food waste as a feedstock will have a closed processing building, running at under-pressure and exhausting its air through a bio-filter. Some operators treat air emissions from within the reception hall with ozone. This process deals with odour, and thus will also deal with spores and bacteria (which are many, many times larger than a single molecule).

101. In addition AD plants also fall under Health and Safety regulations.

**BIOSECURITY**

102. The regulatory regime reflects the significant concerns about the risk of food waste getting back into the food chain. Any livestock farmers adjoining a proposed AD plant are also likely to be wary. While the extreme fear is foot and mouth, any decomposing food that ended up on grazed land is a potential source of (at the least) bacterial infection. The regulations governing the transport of food are very tight, but one problem is that there is a low faith in the efficacy of government regulation (particularly in the farming community which is well aware that the last Foot and Mouth outbreak was actually caused by the DEFRA laboratory near Pirbright in Surrey).

**THE SAFETY OF AD PLANTS**

103. Everyone knows that gas can explode, and those that read up on the subject will also find that H₂S is about as toxic as hydrogen cyanide. In the past there have been fatalities at

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AD plants arising from both explosions and gas poisoning. More recent innovations mean that tanks are sealed and therefore not accessible and regulations on equipment and operations with regard to gas are tightly monitored in the UK.

104. Today the safety is designed into the plant from the outset as the plant has to meet specific regulations that are equivalent to building regulations for gas plants. The planning application will have to cover the safe operation of the plant and will in some part cover this. In addition there are requirements for gas producing plants to have specific gas safety training before for example the National Grid will allow connections.

105. The reality is that the biogas in an AD plant is at a very low pressure, typically well under 10mb which is less than a tenth of the pressure of a domestic gas supply. Moreover, the biogas is at least 40% CO₂, and there is no air present (by definition). It is therefore impossible for it to explode within the system. If there is a leak, the amount leaking is small and is more likely to diffuse than ignite. Biomethane is also more difficult to ignite than petrol, because of the way it behaves.

**Carbon Emissions**

106. Estimates of the contribution to carbon emissions reduction for every ton of food waste treated by anaerobic digestion vary over quite a large range and estimates of the savings also vary! We are doing further research into this and hope to expand this section in the form of a short addendum to this briefing note at some point.

**Other Sources of Information**

Wikipedia – Anaerobic Digestion currently (August 2012) contains a detailed explanation of the process

For relevant EA and EU legislation on waste Houses of Parliament POSTNOTE Number 387 September 2011 ‘Anaerobic Digestion’ is useful.

The main dedicated policy document relating to AD is the Anaerobic Digestion Strategy and Action Plan published by DECC in 2011

There is a website dedicated to AD developed with support from DECC and DEFRA (but claimed to be independent of both) to help all sectors interested in development AD see [http://www.biogas-info.co.uk/](http://www.biogas-info.co.uk/)

A trade body called the Anaerobic Digestion and Biogas Association has a useful website [http://www.adbiogas.co.uk/](http://www.adbiogas.co.uk/)

For a good guide to community AD see the website of Plan Local [www.planlocal.org.uk](http://www.planlocal.org.uk) and the short films they have produced (these are better and more realistic guides to AD than the one on the Local United website).
Standard rules SR2012 No9

On-farm anaerobic digestion facility using farm wastes only, including use of the resultant biogas

Part A installation – capacity over 100 tonnes of waste per day

Introductory note

This introductory note does not form part of these standard rules

These rules are limited to premises used for agriculture and to wastes arising from on-farm, including dairies and are available to operators with an anaerobic digestion capacity of over 100 tonnes of waste or a combination of waste and non-waste – both solid and liquid – on any one day. For anaerobic digesters operating below this threshold, standard rules for waste recovery operations are available.

When referred to in an environmental permit, these rules will allow the operator to carry out the anaerobic digestion of wastes and the combustion of the resultant biogas in gas engines with an aggregate rated thermal input of up to 5 megawatts. The rules also allow use of gas turbines, boilers, fuel cells and treatment and/or upgrading the biogas to biomethane.

Permitted wastes do not include hazardous wastes. The total quantity of waste or a combination of waste and non waste including both solid and liquids must not exceed 100,000 tonnes per year.

Any wastes controlled by the Animal By-Products Regulations must be treated and handled in accordance with any requirements imposed by those Regulations.

These standard rules do not allow any emission into surface waters or groundwater except clean water from roofs and parts of the site not used for waste activity including storage of wastes. However, under the emissions of substances not controlled by emission limits rule, biogas condensate, treated digestate and waste waters may be discharged to a sewer subject to a consent issued by the local water company.

These rules do not apply to installations with more than one operator.

End of Introductory Note
Rules

1 Management

1.1 General management

1.1.1 The operator shall manage and operate the activities:
(a) in accordance with a written management system that identifies and minimises risks of pollution, including those arising from operations, maintenance, accidents, incidents, non-conformances closure and those drawn to the attention of the operator as a result of complaints; and
(b) using sufficient competent persons and resources.

1.1.2 Records demonstrating compliance with condition 1.1.1 shall be maintained.

1.1.3 Any person having duties that are or may be affected by the matters set out in these standard rules shall have convenient access to a copy of them kept at or near the place where those duties are carried out.

1.1.4 The operator shall comply with the requirements of an approved competence scheme.

1.2 Energy efficiency

1.2.1 The operator shall:
(a) take appropriate measures to ensure that energy is used efficiently in the activities;
(b) review and record at least every 4 years whether there are suitable opportunities to improve the energy efficiency of the activities; and
(c) take any further appropriate measures identified by a review.

1.3 Efficient use of raw materials

1.3.1 The operator shall:
(a) take appropriate measures to ensure that raw materials and water are used efficiently in the activities;
(b) maintain records of raw materials and water used in the activities;
(c) review and record at least every 4 years whether there are suitable alternative materials that could reduce environmental impact or opportunities to improve the efficiency of raw material and water use; and
(d) take any further appropriate measures identified by a review.

1.4 Avoidance, recovery and disposal of wastes produced by the activities

1.4.1 The operator shall take appropriate measures to ensure that:
(a) the waste hierarchy referred to in Article 4 of the Waste Framework Directive is applied to the generation of waste by the activities; and
(b) any waste generated by the activities is treated in accordance with the waste hierarchy referred to in Article 4 of the Waste Framework Directive; and
(c) where disposal is necessary, this is undertaken in a manner which minimises its impact on the environment.
1.4.2 The operator shall review and record at least every four years whether changes to those measures should be made and take any further appropriate measures identified by a review.
2 Operations

2.1 Permitted activities

2.1.1 The operator is only authorised to carry out the activities specified in table 2.1 below ("the activities").

<table>
<thead>
<tr>
<th>Description of activities</th>
<th>Limits of activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Section 5.4 Part A(1) of the Environmental Permitting Regulations – Recovery of Waste</td>
<td>All activities must be carried out on premises used for Agriculture.</td>
</tr>
<tr>
<td>R13: Storage of wastes pending the operations numbered R1 and R3</td>
<td>Treatment of waste including shredding, sorting, screening, compaction, bailing, mixing and maceration.</td>
</tr>
<tr>
<td>R3: Recycling or reclamation of organic substances that are not used as solvents</td>
<td>Digestion of wastes including pasteurisation and chemical addition</td>
</tr>
<tr>
<td>R1: Use principally as a fuel or other means to generate energy.</td>
<td>Gas cleaning and upgrading to biomethane.</td>
</tr>
<tr>
<td></td>
<td>Gas storage and drying</td>
</tr>
<tr>
<td></td>
<td>Treatment of digestate including screening to remove plastic residues, centrifuge or pressing, addition of thickening agents (polymers) or drying.</td>
</tr>
<tr>
<td></td>
<td>Composting and maturation of digestate</td>
</tr>
<tr>
<td></td>
<td>The total quantity of waste or a combination of waste and non-waste including solids and liquids accepted at the site shall be less than 100,000 tonnes a year.</td>
</tr>
<tr>
<td></td>
<td>Burning of biogas in gas engines, gas turbines, boilers and use in fuel cells.</td>
</tr>
<tr>
<td></td>
<td>Except for the auxiliary flare, the aggregate rated thermal input of all appliances used to burn biogas shall be less than 5 megawatts.</td>
</tr>
<tr>
<td></td>
<td>Use of an auxiliary flare required only for short periods of breakdown or maintenance of the facility.</td>
</tr>
<tr>
<td></td>
<td>Use of pressure release valves to protect the integrity of the plant. Such systems should not be used routinely to vent unburnt biogas.</td>
</tr>
</tbody>
</table>

2.1.2 All process plant and equipment shall be commissioned, operated and maintained, and shall be fully documented and recorded, in accordance with the manufacturers recommendations.

2.2 The site

2.2.1 The activities shall not extend beyond the site, being the land shown edged in green on the site plan attached to the permit.
2.2.2 The activities shall not be carried out within:
   (a) 10 metres of any watercourse;
   (b) a groundwater source protection zone 1, or if a source protection zone has not been
defined then within 50 metres of any well, spring or borehole used for the supply of water
for human consumption. This must include private water supplies;
   (c) a specified Air Quality Management Area.

2.2.3 The gas engine stack must be a minimum of 3 metres in height and must not be located within:
   (a) 500 metres of a European Site or a Site of Special Scientific Interest (excluding any site
designated solely for geological features);
   (b) 200 metres from the nearest sensitive receptor in cases where the stack does not have an
“effective” stack height of 3 metres or more, or the stack is less than 7 metres in height.

2.3 Waste acceptance

2.3.1 Waste shall only be accepted if:
   (a) it is of a type and quantity listed in tables 2.1 and 2.3 of these rules;
   (b) it conforms to the description in the documentation supplied by the producer and holder;
   (c) the waste is biodegradable; and
   (d) wastes that are animal by-products or contain animal by-products must be handled and
processed in accordance with any requirements and restrictions imposed by the animal by-
products legislation

2.3.2 Records demonstrating compliance with rule 2.3.1 shall be maintained.

<table>
<thead>
<tr>
<th>Table 2.3 Waste Types</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Waste Codes</strong></td>
</tr>
<tr>
<td>02</td>
</tr>
<tr>
<td>02 01</td>
</tr>
<tr>
<td>02 01 01</td>
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<tr>
<td>02 01 03</td>
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<tr>
<td>02 01 06</td>
</tr>
<tr>
<td>02 05</td>
</tr>
<tr>
<td>02 05 01</td>
</tr>
<tr>
<td>02 05 02</td>
</tr>
</tbody>
</table>
2.4 Operating techniques

2.4.1 The activities shall be operated using the techniques and in the manner described in Table 2.4 below.

<table>
<thead>
<tr>
<th>Table 2.4 Operating Techniques</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Measures</strong></td>
</tr>
<tr>
<td>1) All waste solids, liquids and sludges shall be securely stored. In the event of a leak, spill or failure, material can be contained and recovered.</td>
</tr>
<tr>
<td>2) All storage and process tanks shall be fit for purpose and shall be regularly inspected and maintained in accordance with paragraph 2.1.2. In the event of a leak, spill or failure, material can be contained and recovered.</td>
</tr>
<tr>
<td>3) Digestate shall be stored within containers or lagoons and should be of a design and capacity fit for purpose. The lagoon shall have a free board of 750mm.</td>
</tr>
<tr>
<td>4) Gas engine stack height shall be no less than 3 metres.</td>
</tr>
<tr>
<td>5) All biogas condensate shall be discharged into a sealed drainage system or recirculated back into the digester.</td>
</tr>
<tr>
<td>6) Emissions of unburned biogas and the operation of the auxiliary flare shall be minimised. Any significant emissions of unburned biogas (including the operation of the pressure relief valves) and the operation of the auxiliary flare shall be recorded.</td>
</tr>
</tbody>
</table>
3 Emissions and monitoring

3.1 Emissions to air, water or land

3.1.1 There shall be no point source emissions to air, water or land, except from the sources and emission points listed in table 3.1.

3.1.2 The limits given in table 3.1 shall not be exceeded.

<table>
<thead>
<tr>
<th>Emission Point and Source</th>
<th>Parameter</th>
<th>Limit (including units)</th>
<th>Monitoring Frequency and Standard or Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stacks on engines</td>
<td>Oxides of Nitrogen</td>
<td>500 mg/m$^3$</td>
<td>Annual monitoring</td>
</tr>
<tr>
<td></td>
<td>Carbon monoxide</td>
<td>1400 mg/m$^3$</td>
<td>Monitoring equipment, techniques, personnel and organisations employed for the engine stack emissions monitoring programme (including the measurement of exhaust gas temperature) shall have either MCERTS certification or MCERTS accreditation (as appropriate).</td>
</tr>
<tr>
<td></td>
<td>Sulphur dioxide</td>
<td>350 mg/m$^3$</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Total volatile organic compounds</td>
<td>1000 mg/m$^3$</td>
<td></td>
</tr>
<tr>
<td></td>
<td>including methane</td>
<td>Emission levels at Normal Temperature and Pressure and 5%O2, unless otherwise agreed in writing by the Environment Agency. Uncertainty allowance as stated in EA guidance LFTGN08 v2 2010. To ensure effective plume breakaway, minimum stack gas exit velocity shall be no less than 15 m/s or the gas exit temperature shall be no less than of 200°C.</td>
<td></td>
</tr>
<tr>
<td>Stacks on boilers</td>
<td>Oxides of Nitrogen</td>
<td>No limit set</td>
<td>None specified</td>
</tr>
<tr>
<td>burning biogas</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AUXILIARY FLARE</td>
<td>Oxides of Nitrogen</td>
<td>No limit set</td>
<td>Record of operating hours.</td>
</tr>
<tr>
<td>PRESSURE RELIEF VALVES</td>
<td>Biogas</td>
<td>No limit set</td>
<td>Weekly visual or remote monitoring to ensure valves are correctly seated.</td>
</tr>
</tbody>
</table>

3.1.3 Periodic monitoring shall be carried out at least once every 5 years for groundwater and 10 years for soil, unless such monitoring is based on a systematic appraisal of the risk of contamination.

3.2 Emissions of substances not controlled by emission limits

3.2.1 Emissions of substances not controlled by emission limits (excluding odour) shall not cause pollution. The operator shall not be taken to have breached this rule if appropriate measures, including, but not limited to, those specified in any approved emissions management plan, have been taken to prevent or where that is not practicable, to minimise, those emissions.
3.2.2 The operator shall:

(a) if notified by the Environment Agency that the activities are giving rise to pollution, submit to the Environment Agency for approval within the period specified, an emissions management plan;

(b) implement the approved emissions management plan, from the date of approval, unless otherwise agreed in writing by the Environment Agency.

3.2.3 All liquids in containers, whose emission to water or land could cause pollution, shall be provided with secondary containment, unless the operator has used other appropriate measures to prevent or where that is not practicable, to minimise leakage and spillage from the primary container.

3.3 Odour

3.3.1 Emissions from the activities shall be free from odour at levels likely to cause pollution outside the site, as perceived by an authorised officer of the Environment Agency, 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.

3.3.2 The operator shall:

(a) maintain and implement an odour management plan;

(b) if notified by the Environment Agency that the activities are giving rise to pollution outside the site due to odour, submit to the Environment Agency for approval within the specified period, a revised odour management plan;

(c) implement any approved revised odour management plan from the date of approval, unless otherwise agreed in writing by the Environment Agency.

3.4 Noise and vibration

3.4.1 Emissions from the activities shall be free from noise and vibration at levels likely to cause pollution outside the site, as perceived by an authorised officer of the Environment Agency, unless the operator has used appropriate measures, including, but not limited to, those specified in any approved noise and vibration management plan, to prevent or where that is not practicable, to minimise, the noise and vibration.

3.4.2 The operator shall:

(a) if notified by the Environment Agency that the activities are giving rise to pollution outside the site due to noise and vibration, submit to the Agency for approval within the period specified, a noise and vibration management plan;

(b) implement the approved noise and vibration management plan, from the date of approval, unless otherwise agreed in writing by the Environment Agency.

3.5 Monitoring

3.5.1 The operator shall, unless otherwise agreed in writing by the Environment Agency, undertake the monitoring specified in table 3.1.

3.5.2 The operator shall maintain records of all monitoring required by these standard rules including records of the taking and analysis of samples, instrument measurements (periodic and continual), calibrations, examinations, test and surveys and any assessment or evaluation made on the basis of such data.
4 Information

4.1 Records

4.1.1 All records required to be made by these standard rules shall:

(a) be legible;
(b) be made as soon as reasonably practicable;
(c) if amended, be amended in such a way that the original and any subsequent amendments remain legible or are capable of retrieval; and
(d) be retained, unless otherwise agreed by the Environment Agency, for at least 6 years from the date when the records were made, or in the case of the following records until permit surrender:
   (i) off-site environmental effects; and
   (ii) matters which affect the condition of land and groundwater

4.1.2 The operator shall keep on site all records, plans and the management system required to be maintained by these standard rules, unless otherwise agreed in writing by the Environment Agency.

4.2 Reporting

4.2.1 The operator shall send all reports and notifications required by these standard rules to the Environment Agency using the contact details supplied in writing by the Environment Agency.

4.2.2 Within one month of the end of each quarter, the operator shall submit to the Environment Agency using the form made available for the purpose, the information specified on the form relating to the site and the waste accepted and removed from it during the previous quarter.

4.3 Notifications

4.3.1 (a) In the event that the operation of the activities gives rise to an incident or accident which significantly affects or may significantly affect the environment, the operator must immediately—

   (i) inform the Environment Agency,
   (ii) take the measures necessary to limit the environmental consequences of such an incident or accident, and
   (iii) take the measures necessary to prevent further possible incidents or accidents;

(b) in the event of a breach of any standard rule the operator must immediately

   (i) inform the Environment Agency, and
   (ii) take the measures necessary to ensure that compliance is restored within the shortest possible time;

(c) in the event of a breach of standard rule which poses an immediate danger to human health or threatens to cause an immediate significant adverse effect on the environment, the operator must immediately suspend the operation of the activities or the relevant part of it until compliance with the standard rules has been restored.

4.3.2 Any information provided under standard rule 4.3.1 shall be confirmed in writing within 24 hours.
4.3.3 Where the Environment Agency has requested in writing that it shall be notified when the operator is to undertake monitoring and/or spot sampling, the operator shall inform the Environment Agency when the relevant monitoring and/or spot sampling is to take place. The operator shall provide this information to the Environment Agency at least 14 days before the date the monitoring is to be undertaken.

4.3.4 The Environment Agency shall be notified within 14 days of the occurrence of the following matters except where such disclosure is prohibited by Stock Exchange rules:

(a) Where the operator is a registered company:
   • any change in the operator's trading name, registered name or registered office address; and
   • any steps taken with a view to the operator going into administration, entering into a company voluntary arrangement or being wound up.

(b) Where the operator is a corporate body other than a registered company:
   • any change in the operator's name or address; and
   • any steps taken with a view to the dissolution of the operator.

(c) In any other case:
   • the death of any of the named operators (where the operator consists of more than one named individual);
   • any change in the operator’s name(s) or address(es); and
   • any steps taken with a view to the operator, or any one of them, going into bankruptcy, entering into a composition or arrangement with creditors, or, in the case them being in a partnership, dissolving the partnership.

4.4 Interpretation

4.4.1 In these standard rules the expressions listed below shall have the meaning given.

4.4.2 In these standard rules references to reports and notifications mean written reports and notifications, except when reference is being made to notification being made “without delay”, in which case it may be provided by telephone.

“accident” means an accident that may result in pollution.

“anaerobic digestion” means a process of controlled decomposition of biodegradable materials under managed conditions where free oxygen is absent, at temperatures suitable for naturally occurring mesophilic or thermophilic anaerobe and facultative anaerobe bacteria species, which convert the inputs to a methane-rich biogas and whole digestate.

“agriculture” means as defined in The Agriculture Act 1947 including:-“horticulture, fruit growing, seed growing, dairy farming and livestock breeding and keeping, the use of land as grazing land, meadow land, osier land, market gardens and nursery grounds, and the use of land for woodlands where that use is ancillary to the farming of the land for other agricultural purposes, and ‘agriculture’ shall be constructed accordingly”

“animal by-products legislation” refers to animal by-products which are subject to the requirements and controls in Regulation (EC) 1069/2009 (as amended) and its corresponding implementing Regulation (EC) 142/2011 (as amended). These are enforced through The Animal By-Products (Enforcement) (England) Regulations 2011 and The Animal By-Products (Enforcement) (No2) (Wales) Regulations 2011. You will need to add NI and Scot legislation if QP covers the UK.

“animal by-products” are defined in Article 3 of Regulation (EC) 1069/2009 as ‘entire bodies or parts of animals, products of animal origin or other products obtained from animals that are not intended for human consumption’. This includes catering waste, used cooking oil, former foodstuffs, butcher and slaughterhouse waste, blood, feathers, wool, hides and skins, fallen stock, pet animals, zoo and circus animals, hunt trophies, manure, ova, embryos and semen not intended for breeding purposes.

“animal waste” means any waste consisting of animal matter that has not been processed into food for human consumption.
“authorised officer” means any person authorised by the Environment Agency under section 108(1) of The 
Environment Act 1995 to exercise, in accordance with the terms of any such authorisation, any power 
specified in Section 108(4) of that Act.

“D” means a disposal operation provided for in Annex IIA to Directive 2006/12/EC of the European 

“digestate” means material resulting from an anaerobic digestion process

“domestic purposes” has the same meaning as in section 218 of the Water Industry Act 1991.

“emissions of substances not controlled by emission limits” means emissions of substances to air, water or 
land from the activities, either from the emission points specified in these standard rules or from other 
localised or diffuse sources, which are not controlled by an emission limit.

“European Site” means candidate or Special Area of Conservation and proposed or Special Protection Area 
in England and Wales, within the meaning of Council Directives 79/409/EEC on the conservation of wild 
birds and 92/43/EEC on the conservation of natural habitats and of wild flora and fauna and the 
Conservation of Habitats and Species Regulations 2010. Internationally designated Ramsar sites are dealt 
with in the same way as European sites as a matter of government policy and for the purpose of these rules 
will be considered as a European Site.

“food production purposes” means the manufacturing, processing, preserving or marketing purposes with 
respect to food or drink for which water supplied to food production premises may be used, and for the 
purposes of this definition “food production purposes” means premises used for the purposes of a business 
of preparing food or drink for consumption otherwise than on the premises.

“Gas engine effective stack height” means:

a) If away from buildings actual stack height is no less than 3 meters.

b) If attached to or on top of a building the stack tip must be no less than 3 meters above roof ridge.

c) If there are other buildings within a distance of 5L from the point of discharge, the top of the stack 
must be no less than 3 meters above the roof ridge of the highest building. L is the lesser of 
the two measurements of building height and maximum width of the building.

“groundwater” means all water, which is below the surface of the ground in the saturation zone and in direct 
contact with the ground or subsoil.

“groundwater source protection zone” has the meaning given in the document titled “Groundwater 

“impermeable surface” means a surface or pavement constructed and maintained to a standard sufficient 
to prevent the transmission of liquids beyond the pavement surface, and should be read in conjunction 
with the term “sealed drainage system” (below).

“MCERTS” means the Environment Agency’s Monitoring Certification Scheme.

“nearest sensitive receptor” means the nearest place to the permitted activities where people are likely to be 
for prolonged periods. This term would therefore apply to dwellings and associated gardens (including 
farmhouses) and to many types of workplaces. We would not normally regard a place where people are 
likely to be present for less than 6 hours at one time as being a sensitive receptor. The term does not apply 
to the operators of the permitted facility, their staff when they are at work or to visitors to the facility, as their 
health is covered by Health and Safety at Work legislation.

"pollution” means emissions as a result of human activity which may—

(a) be harmful to human health or the quality of the environment,

(b) cause offence to a human sense,

(c) result in damage to material property, or

(d) impair or interfere with amenities and other legitimate uses of the environment.

"quarter” means a calendar year quarter commencing on 1 January, 1 April, 1 July or 1 October.

“R” means a recovery operation provided for in Annex IIB to Directive 2006/12/EC of the European 
“sealed drainage system” in relation to an impermeable surface, means a drainage system with impermeable components which does not leak and which will ensure that:

(a) no liquid will run off the surface otherwise than via the system;
(b) except where they may lawfully be discharged to foul sewer, all liquids entering the system are collected in a sealed sump.

“secure storage” means storage where waste cannot escape and members of the public do not have access to it.

“site” means the location where waste storage and treatment activities can take place.

“specified AQMA” means an air quality management area within the meaning of the Environment Act 1995 which has been designated due to concerns about oxides of nitrogen.

“SSSI” means Site of Special Scientific Interest within the meaning of the Wildlife and Countryside Act 1981 (as amended by the Countryside and Rights of Way Act 2000).

“year” means calendar year commencing on 1st January.

End of standard rules
Dear Phil,

TOWN AND COUNTRY PLANNING (ENVIRONMENTAL IMPACT ASSESSMENT) (ENGLAND AND WALES) REGULATIONS 2011: REGULATION 5 SCREENING OPINION

FARM BASED ANAEROBIC DIGESTION GAS TO GRID PLANT AND ANCILLARY HIGHWAY IMPROVEMENT WORKS, LANDSCAPING AND CONNECTION TO NATIONAL GRID GAS NETWORK AT WORMSLADE FARM, CLIPSTON ROAD, KELMARSH, LE16 9RX

Thank you for your correspondence of 20 October 2015 requesting a screening opinion in respect of the above development. The proposals you have outlined are for the erection and operation of a farm based anaerobic digestion plant and associated works on 8 hectares of current agricultural land at Wormslade Farm, Kelmarsh.

The proposed development is not listed under Schedule 1 of the above regulations and therefore the requirement for an Environmental Impact Assessment (EIA) is not mandatory. The proposals do however fall within Schedule 2 to the regulations as a project for the disposal of non-hazardous waste.

The National Planning Policy Guidance provides indicative thresholds and criteria for the identification of Schedule 2 development requiring EIA. It is written in Annex A that EIA on installations for the disposal of non-hazardous waste is more likely to be required where new capacity exceeds 50,000 tonnes per annum (tpa). Based on the information you have submitted I understand a 36,000 tpa throughput of farmyard manure and crops grown locally by the landowner is proposed for the facility, with 30,000 tonnes of digestate being produced and applied as fertilizer to the land used for growing the feedstock crops.

Schedule 3 of the Regulations outlines selection criteria for screening Schedule 2 development and establishing whether the project is likely to have significant effects on the...
environment by virtue of its characteristics, location and potential impacts. In this instance it is not considered that there are any such factors that would justify the requirement for an EIA. As such it is considered that on the basis of information provided in your submission, the proposal is not EIA development. Detailed assessment of the potential impact of the operations would however be expected in any subsequent planning application. Particular attention should be paid to the following aspects of the proposal:

- Local amenity (particularly odour, dust and noise)
- Highways and traffic
- Catchment area
- Landscape and visual amenity

Pre-application consultation with relevant technical bodies, in particular the Environment Agency and the Highways Authority, as well as Daventry District Council and the local parish councils is recommended.

Yours sincerely,

Claire Spokes
Senior Planner
APPENDIX 16
PLANNING STATEMENT
PLANNING STATEMENT FOR THE INSTALLATION AND OPERATION OF AN ANAEROBIC DIGESTION FACILITY INCLUDING THE ERECTION OF SILAGE CLAMPS, DIGESTER TANKS, TECHNICAL BUILDING, GAS FLARE, WEIGHTBRIDGE AND SITE OFFICE/WELFARE BUILDING AND THE INSTALLATION OF ANCILLARY PLANT AND EQUIPMENT, ALTERATIONS TO THE HIGHWAY ACCESS AND INTERNAL ROAD, INSTALLATION OF LAGOONS AND ATTENUATION POND, HIGHWAY IMPROVEMENTS AND LANDSCAPING AND ENVIRONMENTAL ENHANCEMENT MEASURES

AT

WORMSLADE FARM
CLIPSTON ROAD
KELMARSH
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1. **NON-TECHNICAL SUMMARY**

1.1 This report is written as a submission in support of the planning application by Raw Biogas Ltd, to Northamptonshire County Council for the installation and operation of an anaerobic digestion facility at Wormslade Farm, Clipston Road, Kelmarsh, Northamptonshire LE16 9RX.

1.2 The proposals comprise the erection of silage clamps, digester tanks, technical building, gas flare, weighbridge and site office/welfare building, and the installation of ancillary plant and equipment, alterations to the highway access and internal road, the installation of lagoons and attenuation pond, highway improvements and landscaping and environmental enhancement measures.

1.3 The proposed application site is on agricultural land adjacent to existing agricultural buildings, forming part of Wormslade Farm which extends to approximately 80.40 hectares. Wormslade Farm is well located to a viable point of connection to the National Grid gas network.

1.4 This proposal is for the extraction of bio-gas from locally sourced farm produce such as grass silage, maize silage, rye silage and a small proportion of farm animal manures. No food waste will be imported to the site.

1.5 The proposal is to produce bio-gas from agricultural sources for upgrading to bio-methane for use in a gas-to-grid scheme whereby the bio-methane produced will be piped directly to the national gas grid located nearby the plant. The gas will then be available for domestic, commercial and industrial gas consumers.

1.6 The production of bio-methane for the national grid, ultimately to be used by businesses and householders is a more efficient use of the energy crops produced in the locality for this plan than if the gas was used to generate electricity on site. This also allows for greater (gas) energy flexibility and security for the UK by utilising the gas produced at Wormslade Farm in the national gas grid, and leaving green electricity production to wind, solar and anaerobic digestion plants that are not located closely to the gas grid for direct connection.

1.7 The site selection process therefore is founded on the premise that the site already has large agricultural buildings, and is ideally located for the production of bio-gas and direct connection to the high pressure gas pipeline located very near to the farm. The site is also excellent in terms of the availability, locally, of good quality feedstock which provides an alternative market for local farm produce, thus underpinning farm gate prices in the locality.

1.8 It is crucial to the successful operation of the plant that the regular, secure and local supply of feedstock is obtained. It is equally important to ensure the distribution of digestate locally. Local land agent advice obtained during the feasibility study leading up to this planning application confirms that there is sufficient availability of farmland to support the anaerobic digestion plant in this location.

1.9 The site is ideally positioned to receive the feedstock from the surrounding farmland, and for distributing the mainly liquid digestate back to the farmland as excellent fertiliser which will replace manufactured, often imported fertilisers on farms receiving the digestate. The site allows the more economical and sustainable
transportation of crops for feedstock and digestate back to the land which would not be possible if the plant were to be located in an urban location.

1.10 The proposed development of the anaerobic digestion plant facility has been the subject of a request for a screening opinion under the (Environmental Impact Assessment) (England and Wales) regulations 2011 with Northamptonshire County Council. The advice received for the Council is that the proposed development is not EIA development.

1.11 The supplier of the anaerobic digestion plant equipment and main contractor for the scheme is Envitec Biogas UK Ltd, a firm based in Rugeley, Staffordshire. The use of relatively local suppliers is a high priority for the developers and operators; RAW Biogas Ltd.

1.12 This report considers the application against national planning policy (NPPF)\(^3\) policies currently in place, and the Northamptonshire Minerals and Waste Local Plan\(^4\) document which was adopted in September 2014. Good Practice Measures-Principles for the Design of Minerals and Waste Development by Northamptonshire County Council has also been taken into account.

1.13 This proposal is in line with the recent Government announcement\(^1\) on 24 October 2014 stating that the European Union agreement is a major win for the UK, which has been leading efforts in Europe for an ambitious but flexible deal that cuts carbon emissions by 40% by 2030. The UK's Climate Change Act and Electricity Market Reforms have put the UK on a clear path to become a low carbon economy, which is further enhanced by these measures announced in October, with no expected additional cost impact for UK bill and tax payers.

1.14 This report concludes that the applicant has a site suited to the production of farm based bio-methane which can readily be piped into the UK gas grid for consumption by householders and businesses. This use of locally sourced farm produce will assist the UK to reach the commitment of reducing carbon emissions by 40% by 2030, and increase energy security for the UK. The proposal will help sustain the rural economy by diversifying agricultural production and markets for produce and increase good quality employment opportunities in the locality.

1.15 This proposal accords with national and local planning polices as well as helping to develop renewable energy production, in particular bio-methane production for injection into the National Grid and to help maintain energy security for the United Kingdom.
2. INTRODUCTION

2.1 The preparation of this report by Mid West Planning Ltd has been commissioned by Mr Stuart Homewood of Raw Biogas Ltd, the prospective lessee and operator of the proposed anaerobic digestion (A.D.) plant at Wormslade Farm.

2.2 This planning support statement is prepared by Philip Plant BSc (Hons) MRICS of Mid West Planning Limited in accordance with these instructions. Phil Plant is a member of the Royal Institution of Chartered Surveyors (RICS) and has over fourteen years’ experience in rural planning matters, advising both private and public sectors.

2.3 A number of site visits have taken place from May 2015 to 21 July 2015 at Wormslade Farm. Subsequent project meetings have taken place to develop the proposals prior to the submission of the Environmental Impact Assessment screening opinion request and the pre-application planning enquiry, both made to Northamptonshire County Council. The content of this report is based on the information received at the meetings and subsequent discussions and correspondence.

2.4 The anaerobic digestion plant will be operated as a farm-based anaerobic digestion plant utilising predominately agricultural crops sourced locally for feedstock for the digesters. A relatively small proportion on farm animal manure will be part of the permitted feedstock mix to allow for flexibility in operation and to secure local sourcing of the feedstock supply. The facility will not process any waste other than the stated agricultural manures. No food waste will be processed at the Wormslade Farm Anaerobic Digestion Plant.
3. BACKGROUND INFORMATION

**Wormslade Farm**

3.1 Wormslade Farm is land owned by The Trustees of Mr and Mrs Newton’s Children’s Settlement whose address is The Old Rectory, Church Langton, Market Harborough, Leicestershire, LE16 7SX. Raw Biogas Ltd is the prospective lessee of the site and will develop and operate the site.

**The Anaerobic Digestion Plant Development**

3.2 The proposal is for the erection of an anaerobic digester facility with associated infrastructure, landscaping and ancillary structures to produce bio-methane for injection into the nearby national Gas Grid. Details of the proposed layout are indicated on the submitted plan reference P15-WORMSLADE-AD-03-Proposed Site Layout Plan. Please see Appendix Two.

**Pre-application Advice**

3.4 An initial pre-application advice request was made to Northamptonshire Council by email on 15 January 2015 by Mid West Planning Ltd outlining the proposals and the operation of the plant, including details of the feedstock split of approximately 20% from farm animal manures and slurries, and approximately 80% from locally grown farm crops. The purpose of this initial enquiry was to confirm that if the proposal crystallised into a planning application, it would in fact be determined by Northamptonshire County council.

3.5 During the pre-application discussions that followed it was determined that the planning application would be a County matter rather than a matter for Daventry District Council. Mr Watson replied by email on 19 January 2015 confirming that because the proposed anaerobic digestion plant would require the importation of feedstocks, including manures, it would be a County matter, and that Daventry District Council has accepted this.

3.6 Northamptonshire Highways Department were also contacted by Mr Phil Watson, requesting advice about potential highway implications. Verity Chilver, Development Management Engineer at Northamptonshire Highways responded with a specification for the improvements required for the site access and Clipstone Road east of the access to the site. Improved visibility splays of 4.5m x 215m in each direction, and a minimum road width of 5.5m were recommended.

3.7 A formal pre-application enquiry was submitted to Mr Watson at Northamptonshire County Council on 9 October 2015. We understand that there has been a delay in obtaining a response to the enquiry and unfortunately the application has preceded this advice.

**EIA Screening Opinion**

3.8 A formal request for a screening opinion under the Town and Country Planning (Environmental Impact Assessment) Regulations 2011 was made to Northamptonshire Council on 20 October 2015. The opinion of Northamptonshire County Council (Senior Planner, Claire Spokes) was that "the proposed development is not listed under Schedule 1 of the above regulations and therefore the requirement for an Environmental Impact Assessment (EIA) is not mandatory. The proposals do however fall within Schedule 2 to the regulations as a project for the disposal of non-hazardous waste.”
3.9 "The National Planning Policy Guidance provides indicative thresholds and criteria for the identification of Schedule 2 development requiring EIA. It is written in Annex A that EIA on installations for the disposal of non-hazardous waste is more likely to be required where new capacity exceeds 50,000 tonnes per annum (tpa). Based on the information you have submitted I understand a 36,000 tpa throughput of farmyard manure and crops grown locally by the landowner is proposed for the facility, with 30,000 tonnes of digestate being produced and applied as fertilizer to the land used for growing the feedstock crops."

3.10 The letter goes on to state: “Schedule 3 of the Regulations outlines selection criteria for screening Schedule 2 development and establishing whether the project is likely to have significant effects on the environment by virtue of its characteristics, location and potential impacts. In this instance it is not considered that there are any such factors that would justify the requirement for an EIA. As such it is considered that on the basis of information provided in your submission, the proposal is not EIA development. Detailed assessment of the potential impact of the operations would however be expected in any subsequent planning application. Particular attention should be paid to the following aspects of the proposal:

- Local amenity (particularly odour, dust and noise)
- Highways and traffic
- Catchment area
- Landscape and visual amenity

Pre-application consultation with relevant technical bodies, in particular the Environment Agency and the Highways Authority, as well as Daventry District Council and the local parish councils is recommended."

Public Consultation

3.11 Public consultation is an important part of the planning process, recommended by planning authorities and considered good practice. Raw Energy Ltd organised, with the assistance of Great Oxendon Parish Council and Clipstone Parish Council, a public consultation event on Monday 12 November 2015 between 3pm and 7pm. The meeting was publicised through both Parish Councils and by numerous posters displayed in and around the village. Approximately 120 people visited the exhibition which was attended by Bruce Galliford and Stuart Homewood of Raw Biogas Ltd and Phil Plant and Vicky Cawley of Mid West Planning Ltd to answer questions.

3.12 At the exhibition the details of the scheme were exhibited together with information about the need for renewable energy, in particular bio-methane for injection directly into the national Grid, and the need for increased energy security in the UK. A video loop showing an identical anaerobic digestion plant developed by Envitec Ltd in Oxfordshire was played throughout the event to allow visitors to see a similar anaerobic digestion facility in operation and to aid the answering of questions from the general public.

3.13 The visitors to the event were generally aware of global warming and the impact on the climate in the UK, and aware of energy security issues for the UK. Most people were either unsure or did not believe that gas produced by anaerobic digestion is a sustainable method of generating green gas in the UK.

3.13 The main concerns of people who attended the consultation event were increased traffic generation, visual impact of the facility and concerns about odour emissions.

These concerns arose largely as a result of an email circulated in the locality by the "Against Oxendon Wind Turbines" action group describing the number of daily vehicle movements as being 80 each way per day, the digesters being 8m tall, and reference to a food and industrial waste anaerobic digestion facility at Rothwell Lodge Farm with a "poor history on bad smells (odour)."

3.14 Raw Energy Ltd has taken into account these comments, which are largely unfounded and misleading, in the development of this planning application. The scheme has been significantly redesigned to include highway improvements on the road to Clipstone, including the junction improvements with the A 508. The layout of the facility has been greatly improved to reduce the height of the tallest component; the digester tanks, which have been dug into the ground further to reduce the visual impact as much as possible. In addition, the layout has been changed to give the opportunity for much greater landscaping to the northern side of the development, and the recommendation by the Landscape Architect to translocate the existing hedge to the new hedge-line to greatly shorten the establishment time for effective screening of the site from the road to Clipstone.

3.15 The Rothwell Lodge A.D. plant accepts segregated food wastes from homes and businesses which the Wormslade farm A.D. plant will not. The Rothwell Lodge site has a capacity of 49,000 tonnes of food and food processing waste, and also has an integrated plastics recycling facility to enable the recycling of food packaging recovered from the waste processed at the site, which the Wormslade site will not have.

3.16 Other, less frequent objections were based on the minimal gain to the local community, for example we were told that there was no mains gas in Great Oxendon village and therefore the local community would not benefit from the scheme directly.
4. THE NEED FOR RENEWABLE ENERGY TO COMBAT CLIMATE CHANGE AND TO ENSURE ENERGY SECURITY IN THE UK

4.1 Climate change is well researched and documented. It is widely accepted that there is a need for a huge reduction in worldwide greenhouse gas emissions. In the UK this will be achieved through both the conservation of energy by moving to low energy appliances and better insulated buildings, and through the production of all forms of renewable and low carbon energy.

4.2 The European Union has reached a historic deal to cut greenhouse gases by at least 40% domestically by 2030\(^1\). The target is part of a package of measures to make Europe’s energy system more secure, sustainable and competitive, announced in October 2014 by European leaders at the European Council meeting in Brussels. The agreement is a major win for the UK, which has been leading efforts in Europe for an ambitious but flexible deal that cuts carbon emissions whilst giving the UK and other Member States the flexibility to decide how they will decarbonise at least cost to consumers - while also improving energy security by reducing the EU’s reliance on imported energy. The UK’s Climate Change Act and Electricity Market Reforms have put the UK on a clear path to become a low carbon economy.

4.3 Former Department of Energy and Climate Change (DECC) Secretary Edward Davey said: “This is a historic moment. Europe has sent a clear and firm message to the world that ambitious climate action is needed now. True to our word, we have delivered a highly ambitious EU climate target while also significantly strengthening Europe’s energy security by making us less reliant on imported energy. This morning only five countries in Europe had climate targets post 2020, now 28 countries do. The UK has been leading the climate debate pushing for an ambitious deal in Europe and by building alliances and working constructively with our European partners, we’ve agreed a package of measures that meet all the UK’s top priorities. It lays down the gauntlet to the world to come forward with ambitious climate targets, reforms EU energy policy so it’s flexible and affordable and tackles energy security - reducing Europe’s energy import bill for fossil fuels by around €285 billion by 2030.”

4.4 Edward Davey continued to say; “It’s good for consumers because we can decarbonise at the lowest possible cost using a diverse mix of technologies. And it’s good for business as it provides the certainty they have been calling for to unlock billions in low carbon investment.”

4.5 The current DECC Secretary of State Amber Rudd’s recently (29 October 2015) leaked letter to member of the Cabinet sets out the obligation on HMG to deliver 15% of the UK’s final energy consumption across electricity, heat and transport from renewable sources by 2020. Failure to do so would result in HMG facing the real possibility of fines being imposed by the EU Court of Justice until the UK reaches the target level. We are currently on target to meet the obligation for interim milestones until 2018. The trajectory then increases substantially and leads to an overall shortfall in 2020.

4.6 Amber Rudd’s letter explains that the highest potential for additional renewable heat is from bio-methane injection into the gas grid, which would account for 0.4% of the target shortfall which currently stands at 2.1-4.5%. The result of this announcement is that it is likely that GMG will continue to support renewable heat from bio-methane.
4.8 In 2013 the UK obtained just 13% of its primary energy from low carbon sources. Bioenergy was the second largest component of low carbon, accounting for around a quarter of low carbon energy.

4.9 The generation of low-carbon energy is crucial to the rebalancing of energy supply in the UK. In the 1970’s the UK was a net importer of energy. Following development of oil and gas production in the North Sea, the UK became a net exporter of energy in 1981. Output fell back in the late 1980’s following the Piper Alpha disaster, with the UK regaining a position as a net exporter in the mid 1990’s. North Sea production peaked in 1999, and the UK returned to being an energy importer in 2004.

4.10 In 2013, according to the Department of Energy and Climate Change 47% of energy used in the UK was imported, up sharply from the 2010 level, due to the general
decline in oil and gas output from the North Sea. Alongside increasing demand for gas in the UK as demonstrated in the table above, the UK has transitioned from a stable net exporter to a totally dependent importer of gas in 2004, a situation that has only accelerated year on year to 2015. This level of energy importation leaves the UK in a vulnerable position; both economically and socially should global energy demand grow, or shortages of energy push prices higher. It therefore makes good sense to produce energy in the UK from a wide range of renewable sources to both reduce our carbon footprint, and to reduce our reliance upon imports from countries that are unstable.

Figure Three: Table showing the percentage of energy imported into the UK between 1970 and 2013. (UK Energy in Brief 2014. Dept. of Energy and Climate Change. 2014)

<table>
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<th>Year</th>
<th>Net Gas Production</th>
<th>Net Gas Demand</th>
<th>Net Gas Imports (imports)</th>
<th>Gas Import as % of Demand</th>
<th>Gas Import Dependency</th>
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<td>82</td>
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<tr>
<td>1980</td>
<td>94</td>
<td>98</td>
<td>4</td>
<td>7%</td>
<td>7%</td>
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</table>

Figure Four: Table showing the percentage of gas import dependency in the UK 1998 to 2015. Dept. of Energy and Climate Change. 2015.
5. THE PROPOSED ANAEROBIC DIGESTION PLANT

Proposed Scheme for the Wormslade Farm Anaerobic Digestion Plant

5.1 This proposal is for the development and operation of a farm-based anaerobic digestion plant at Wormslade Farm, principally to produce bio-methane for supply direct to the national gas grid rather than on-site electricity production.

5.2 The proposed scheme will produce on average, around 450 cubic meters, but up to 600 cubic metres of bio-methane per hour which will be injected at high pressure into the gas main running alongside the A508 highway east of the site. When upgraded bio-methane is directly injected, the green energy source can be transported for later decentralised use at any location. For feeding biogas into an existing natural gas network, it must first be cleaned and conditioned.

5.3 The proposal is for the erection of an anaerobic digester facility with associated infrastructure, landscaping and ancillary structures to produce bio-methane for injection into the nearby national Gas Grid. Details of the proposed layout are indicated on the plan reference P15-WORMSLADE-AD-03-Proposed Site Layout Plan.

5.4 The main features of this development are summarised below:

- Two digester tanks each 31.31m diameter by 8.00m high with gas domes extending 4.94m high above; and associated feeders, mixing units and intake tank. It is understood that the floor level of these tanks will be set approximately 3.0m below the reduced ground level which is equal to approximately 4.6-6.7m below the original sloping field ground levels. Due to the difference in ground levels across the site the top of the gas dome is therefore likely to be about 2.1m lower than the ridge of the existing farm storage building and about 3.8m lower than the ridge of the nearby open barn.
- 4 silage clamps each 119.00m x 20.00m x 5.50m high with a safety barrier 1.00m high on top of the walls. Concrete apron 80m x 15m to open side of clamps.
- 3 bagged digestate stores set into earth banked lagoons (each 50.00m x 25.00m);
- 1 black water bagged system set into earth banked lagoons, and one white water attenuation pond.
- 1 Technical building to house the feeders and CHP Unit 37.20m x 14.28m x 4.4m to eaves and 5.5m max.
- Various items of ancillary plant and equipment including a gas flare stack(6.25m), a CHP container, biogas upgrading and control systems, a separation container, rack tanks, a recirculation container, network entry facility, odourant equipment, pumping station and manifolds for water management, a transformer, propane tanks and a weighbridge.
- An office/welfare building (8.00m x 8.00m x 4.07m height to ridge).
- A new farm entrance area with alterations to the entrance and visibility splays.
- Existing roadside hedge translocation at the site entrance to accommodate works to improve the highway visibility splays.
- A graded 1:10 bund with large scale landscape planting including a perimeter hedge with trees.
5.5 It is anticipated that the construction period would last for approximately 9 months. During that period construction vehicles and machinery would be active on the site including excavators, dump trucks, cranes and haulage lorries.

5.6 Landscaping would be completed during the first planting season following occupation of the proposed building and operation of the anaerobic digestion plant.

5.7 Midlands based bio-methane experts Envi-Tec Biogas UK Ltd of Rugeley will be suppliers and installers of the anaerobic digestion plant and equipment on behalf of the developer; RAW Biogas Ltd. Please see Appendix Three for details of similar installations by Envi-Tec Biogas Ltd.

5.8 Envi-Tec Biogas UK has prepared a series of plans of the buildings, equipment and layout, which are submitted as part of this planning application. The plans submitted are:

- Location Plan Ref: P15-WORMSLADE-AD-001
- Existing Site Layout Plan Ref: P15- WORMSLADE -AD-002
- Proposed Site Layout Plan Ref: P15- WORMSLADE -AD-003
- Technical Building Plan and Elevations Ref: P15- WORMSLADE-AD-004
- Digester Tank Plan and Elevations Ref: P15- WORMSLADE -AD-005
- Silage Clamp Plan and Elevations Ref: P15- WORMSLADE -AD-006
- Flare Stack Elevations Ref: P15- WORMSLADE -AD-007
- Site Scene Elevations Ref: P15- WORMSLADE -AD-008
- Office Plan and Elevations Ref: P15- WORMSLADE -AD-009

5.9 Detailed plans have been prepared showing the site layout, access road, and elevations of the silage clamps and other structures within the site. Site scene elevations (Ref P15- WORMSLADE-AD-08) of the site have been prepared showing the development from the north, south, east and west viewpoints in context and with the beneficial effects of the proposed landscaping scheme nearing maturity.

5.10 Mid West Planning Ltd has prepared a plan detailing the required highway improvements to the road to Clipstone and the junction with the A508. Please refer to plan (ref HI01-R1-Wormslade-A0-Highway Improvements).
6. **THE APPLICATION SITE AND THE SURROUNDING AREA**

6.1 The application site is adjoining the existing substantial range of farm buildings, on agricultural land forming part of Wormslade Farm, Kelmarsh, Northamptonshire.

![Aerial Photograph of Site (May 2009)](image)

Figure One: Aerial photograph of the site showing the buildings and access road as existing.

**Site Selection**

6.2 Whilst the need for renewable and low carbon energy production is overwhelmingly accepted, consideration must be given to the type and the location of renewable and low carbon energy production. The Wormslade Farm site is considered acceptable for the farm crop and manure based anaerobic digestion plant due to good access to the highway network and feedstocks, the reasonable distance of separation with other land uses, including dwellings and non-farming activities, and the screening with existing hedges, trees and agricultural buildings at the site.

6.3 The Wormslade Farm site is also ideally located for bio-methane gas production being very close to the high pressure gas main, which runs along the eastern side of the A508. The gas main has the capacity to accept bio-methane injection at this location.

6.4 The site is well placed to receive farm produce from local farmers with a good highway network and excellent highway access as depicted in Figure One above. An important part of the feasibility study was to assess the availability of sufficient locally produced feedstock on land which would also be suitable for the application of the resulting spent feedstock, or “digestate” as a cost-effective replacement for artificial fertilisers. The Wormslade Farm landowner has 80.40Ha (198.65 acres) of

land adjacent to the application site which will be used for feedstock production and take digestate. Please see the plan showing the location of the land at Appendix Four. RAW Bio-gas Ltd will enter into contractual agreements with local farmers to supply feedstock and to use the digestate as a replacement fertiliser, on five year contracts. This will offer local farmers certainty for farm crop prices and fertiliser input costs which is an attractive offer to farmers who have faced volatile crop and fertiliser prices over recent years.

6.5 Local Land Agents, Fisher German have been commissioned by the applicants, RAW Biogas Ltd to manage the sourcing the supply of feedstocks and distribution of digestate in the locality. Fisher German has confirmed that there farmers willing to contract to supply the plant with sufficient land available locally to meet the feedstock and digestate supply requirements.

6.6 UK Sustainability Standards

Alternative sites such as those closely related to urban areas are usually favoured in planning policy for commercial development; however this particular renewable energy development is required to take place in a rural location where the feedstock can be sourced locally, and the digestate distributed locally with minimum distance for highway transportation. This requirement is based on two important elements to the success of the anaerobic digestion facility, firstly the economic argument that locally sourced feedstock will be more cost effectively purchased and transported to the site, and secondly that under the recently introduced UK Sustainability Standards for biogas production, operators of anaerobic digestion plants will be required to demonstrate under stringent criteria that their plants are sustainably operated.

6.7 The U.K. Department of Energy & Climate Change (DECC) has announced that starting in 2015, the bio-gas industry must show its fuel is sustainable to receive financial support. According to information released by the DECC, all producers of 1 megawatt (MW) capacity or higher that use solid biomass or biogas feedstock will be required to demonstrate that they are meeting certain sustainability criteria in order to claim support under the Renewables Obligation (RO). The Wormslade Farm anaerobic digestion plant will therefore need to meet this requirement for the supply of feedstock, use of the digestate, including production inputs such as fuel and fertiliser, transportation, and overall operation of the plant.

6.8 The U.K. Government will now require generators with a capacity of 1 MW or higher to provide an independent sustainability audit with their annual sustainability report showing that their operation produces energy that is truly low-carbon in an all-encompassing assessment of carbon levels from inputs such as fuels and fertilisers used in production of the feedstock, transportation of feedstock and digestate, and plant operation. Biomass fuel used by RHI participants must meet a lifecycle greenhouse gas (GHG) emissions target of 34.8g CO2 equivalent per MJ of heat, or 60% GHG savings against the EU fossil fuel average.

Landscape and Visual Impact

6.9 The site lends itself to the development of the anaerobic digestion plant as depicted on the site layout plan because it is possible to closely locate the anaerobic digestion plant to existing significant, well-established range of farm buildings. The application site is relatively low-lying and is seen from the north with the back-drop of the rising fields to the south and existing buildings to the west. Significant additional tree and hedge planting recommended by Allan Moss in his Landscape and Visual Impact
Visual Impact assessment will minimise the impact of the development on the landscape and help to reduce any effects on visual amenity or landscape quality.
7. **PLANNING POLICY**

**National Planning Policy**

7.1 The National Planning Policy Framework (NPPF) was introduced in March 2012 to streamline planning policy at the national level. At the heart of the NPPF is the presumption in favour of sustainable development – the “golden thread” running through the plan making a decision making process. The pursuit of sustainable development includes seeking improvements in the quality of the built environment, natural and historic environment through the gains obtained through the planning system.

7.2 Section 3, paragraph 28 “Supporting a prosperous rural economy”, concerns economic growth and job creation in rural areas.

*To promote a strong rural economy, local and neighbourhood plans should:*

- support the sustainable growth and expansion of all types of business and enterprise in rural areas, both through conversion of existing buildings and well designed new buildings;
- promote the development and diversification of agricultural and other land-based rural businesses;
- support sustainable rural tourism and leisure developments that benefit businesses in rural areas, communities and visitors, and which respect the character of the countryside. This should include supporting the provision and expansion of tourist and visitor facilities in appropriate locations where identified needs are not met by existing facilities in rural service centres; and
- promote the retention and development of local services and community facilities in villages, such as local shops, meeting places, sports venues, cultural buildings, public houses and places of worship.

7.3 Section 10; "Meeting the challenge of climate change, flooding and coastal change“, is most relevant to this proposal. Local Planning Authorities (LPAs) should accept the requirement for renewable or low carbon energy without the applicant having to demonstrate it, and adopt proactive strategies to mitigate and adapt to climate change in accordance with the provisions of the Climate Change Act 2008.

**Local Planning Policy**

7.4 Pre-application discussions with Northamptonshire County Council concluded that the proposals were “Waste Development” due to the fact that farm animal excrements would be used at the plant. Therefore the planning application would be determined by Northamptonshire County Council. Northamptonshire County Council (NCC) Minerals and Waste Local Plan was formally adopted 1 October 2014. The Plan period is from 1 January 2011 to 1 January 2031.

7.5 The Local Plan is applicable to all proposals for minerals and waste related development, made in Northamptonshire. This is regardless of whether or not the proposal relates to an allocated site (or location) identified in the Local Plan or to any other site. In this instance agricultural waste will be used. Agricultural waste is waste material generated from agricultural premises, which unlike all the wastes described above is not classed as “controlled waste” and hence has not historically been regulated. The vast majority of agricultural wastes are bulk materials such as animal waste slurries.

The Development and Implementation Principles Supplementary Planning Document (SPD) accompanies the Local Plan. There is also a document entitled “Good Practice Measures – Principle for the Design of Minerals and Waste Development. A copy of this document is at Appendix One.

A Local Assessment of Waste Management Needs (November 2013) was undertaken to inform the plan-making process in relation to the current situation and future Waste planning requirements. This included forecasts (or projections) of how much Waste is likely to be generated throughout the plan period for each waste stream: Municipal Solid Waste (MSW), Commercial and Industrial (C&I), Construction Demolition and Excavation (CD&E) and hazardous waste. Waste in the form of agricultural manures does not feature in this assessment however, the classification of farm animal excrement as waste has led to the application being dealt with as waste development.

Municipal Solid Waste (MSW), Commercial and Industrial (C&I), Construction Demolition and Excavation (CD&E) and hazardous waste are wastes that are targeted to be dealt with primarily in the central spine near to where they likely to arise. However, "waste generated in the rural hinterlands will normally be expected to go to the most appropriate facilities within the respective catchment for the waste for treatment".

Policy 12 “Spatial strategy for waste management” confirms that Northamptonshire’s waste management network, particularly advanced treatment facilities with a sub-regional or wider catchment, will be focused within the central spine and the sub-regional centre of Daventry. Development should be concentrated in Northampton, Wellingborough, Kettering, Corby and Daventry. Development in the smaller towns should be consistent with their local service role.

Facilities in urban areas should be co-located together and with complementary activities.

At the rural service centres, facilities with a local or neighbourhood catchment will provide for preliminary treatment in order to deal with waste generated from these areas.

In the rural hinterlands only facilities with a local or neighbourhood catchment providing for preliminary treatment, or that are incompatible with urban development, should be provided. Where it is the latter they should deal with waste generated from identified urban areas and be appropriately located to serve those areas.

Facilities in rural areas should, where possible, be associated with existing rural employment uses.

Policy 12 “Spatial strategy for waste management” confirms that Northamptonshire’s waste management network, particularly advanced treatment facilities, will be focussed within the central spine. Policy 12 does, however recognise that not all waste produced in the rural hinterlands will be compatible with urban development and that facilities in rural areas should, where possible, be associated with existing rural employment uses.

The development criteria for waste management facilities is set out in Policy 13 and includes the provision of waste management facilities outside of the central spine, including specific sites within rural areas.
Policy 13: Development criteria for waste management facilities (non-inert and hazardous)

Proposals for waste management facilities on non-allocated sites (including extensions to existing sites and extensions to allocated sites) must demonstrate that the development:

- does not conflict with the spatial strategy for waste management,
- promotes the development of a sustainable waste network and facilitates delivery of Northamptonshire’s waste management capacity requirements,
- clearly establishes a need for the facility identifying the intended functional role, intended catchment area for the waste to be managed, market base for any outputs, and where applicable the requirement for a specialist facility,
- is in general conformity with the principles of sustainability (particularly regarding the intended catchment area),
- facilitates the efficient collection and recovery of waste materials, and
- where intended for use by the local community, is readily and safely accessible to those it is intended to serve.

Development should also, where appropriate, and particularly in the case of advanced treatment facilities:

- ensure waste has undergone preliminary treatment prior to advanced treatment,
- integrate and co-locate waste management facilities together and with complementary activities,
- maximise the re-use of energy, heat and residues, and
- maximise the use of previously developed land (particularly existing and designated industrial land, and derelict, despoiled, or brownfield urban land) or redundant agriculture and forestry buildings (and their curtilages).

Locations for waste management facilities

5.58. The allocation of specific sites for waste management facilities, and the identification of specific locations where waste management uses would be acceptable in principle are addressed within policy in the following manner:

- Sites for integrated waste management facilities - sites on which an integrated facility should be sited, and which would comprise either a mix of advanced and preliminary treatment facilities, or a mix of preliminary treatment facilities. Three sites for integrated facilities have been identified; these are in or adjacent to, the main urban areas in the county and are within the central spine. Some of these sites already have a waste-related use.
- Sites for waste management use in or adjacent to urban areas - specific sites within urban areas where waste management uses or, where there is already a waste-related use, intensification or expansion of those uses would be acceptable.
- Industrial area locations for waste management uses - specific industrial estate locations within the main urban areas, smaller towns and some of the rural service centres where waste management facilities would be acceptable in principle.
- Sites for waste management use in rural areas - specific sites within rural areas where those waste management uses most appropriately located in these areas (particularly composting and anaerobic digestion) would be acceptable.
7.11 Policy 22 “Addressing the impact of proposed minerals and waste development” considers the various forms of local impact that has to be addressed before any development can be allowed to proceed. The various impacts that need to be addressed will also apply the operation of the development.

Policy 22: Addressing the impact of proposed minerals and waste development

Proposals for minerals and waste development must demonstrate that the following matters have been considered and addressed:

- protecting Northamptonshire’s natural resources and key environmental designations (including heritage assets),
- avoiding and / or minimising potentially adverse impacts to an acceptable level, specifically addressing air emissions (including dust), odour, bioaerosols, noise and vibration, slope stability, vermin and pests, birdstrike, litter, land use conflict and cumulative impact,
- impacts on flood risk as well as the flow and quantity of surface and groundwater,
- ensuring built development is of a design and layout that has regard to its visual appearance in the context of the defining characteristics of the local area,
- ensuring access is sustainable, safe and environmentally acceptable, and
- ensuring that local amenity is protected.

Where applicable a site-specific management plan should be developed to ensure the implementation and maintenance of mitigation measures throughout construction, operation, decommissioning and restoration works.

7.12 Sustainable transport is a key consideration of waste development. Policy 23 seeks to minimise transport movements and encourages developers to prepare a sustainable transport statement for submission with an application.

Policy 23: Encouraging sustainable transport

Minerals and waste related development should seek to minimise transport movements and maximise the use of sustainable or alternative transport modes. Where possible minerals and waste related development should be located, designed and operated to enable transport by rail, water, pipeline or conveyor.

Minerals and waste related development should be well placed to serve their intended markets or catchment area(s) in order to reduce transport distances and movements in order to support the development of sustainable communities that take responsibility for the waste that they produce and work towards self-sufficiency.

Proposals for new development or development that would result in a significant increase in transport movements should include a sustainable transport statement to demonstrate how the above has been taken into consideration.

7.13 Natural assets and resources are afforded protection and net gains are sought through minerals and waste development and operations. Policy 24 requires developers to undertake assessments to determine if natural assets and resources will be impacted by the development and to maximise the opportunities for environmental enhancements as a result of the scheme.
Policy 24: Natural assets and resources

Minerals and waste development should seek to achieve a net gain in natural assets and resources, through:

- protecting and enhancing international and national designated sites,
- delivery of wider environmental benefits in the vicinity where development would adversely affect locally designated sites or other features of local interest,
- protecting and enhancing green infrastructure and strategic biodiversity networks, in particular the River Nene and other sub-regional corridors, and
- contributing towards Northamptonshire Biodiversity Action Plan targets for habitats and species.

Proposals for minerals and waste development will be required to undertake an assessment (where appropriate) in order to:

- identify and determine the nature, extent and level of importance of the natural assets and resources, as well as any potential impacts, and
- identify mitigation measures and/or requirement for compensation (where necessary) to avoid, reduce and manage potentially adverse impacts.

Policy 25: Landscape character

Minerals and waste development should seek to reflect Northamptonshire’s landscape character. Development should mitigate potentially adverse impacts on the local character and distinctiveness of Northamptonshire’s landscape where necessary during the development, operational life, restoration, aftercare and after-use. Opportunities for enhancement should be maximised through restoration, aftercare and after-use.

Proposals for minerals and waste development will be required to undertake a landscape impact assessment (where appropriate) based on the landscape character assessment in order to identify:

- the presence of landscape values (including their nature, extent and level of importance) and determine any potential impacts,
- any necessary measures to mitigate potentially adverse impacts, and
- opportunities to protect and enhance particular features that create a specific aspect of local distinctiveness or character.

Policy 26 “Historic environment” seeks to protect Northamptonshire’s historic environment. The most effective protection of the historic environment is through appropriate site selection.

Policy 27 “Layout and design quality” requires developers of minerals and waste development to design facilities that support local identity and relate well to existing buildings. The use of materials and finishes used locally is encouraged, as is built-in safety and security.

7.17 Policy 28 “Restoration and after use” recognised that often minerals and waste
development is of a temporary nature and seeks to ensure that satisfactory
reinstatement and after use obligations are imposed on developments of a
temporary nature. This reflects the often imposed obligations for developers of
renewable energy generating facilities such as wind turbines and solar farms to
reinstate the land back to agricultural land after the end of the development’s useful
life.

7.18 The Northamptonshire County Council Good Practice Measures document considers a
wide range of issues relevant to the design and siting of minerals and waste
development, which accords with the requirements of the policies above.

Daventry District Local Planning Policies
Daventry District Local Planning policies are held in the West Northamptonshire Joint
Core Strategy Local Plan (Part 1) which was adopted in December 2014.

7.19 Two of the key objectives relevant to the proposals for the development of the
anaerobic digestion facility at Wormslade Farm are Objective 12 – “Protecting and
Supporting Rural Communities”, which seeks “to protect and support rural
communities to ensure they thrive and remain vital”; and Objective 13 – “Rural
Diversification and Employment”. This objective seeks to “support rural
diversification and rural employment opportunities, in particular those related to
agriculture, horticulture and forestry.”

7.20 Local planning policies relevant to these proposals include Policy SA “Presumption in
favour of sustainable development”, which reflects the positive approach contained
within the National Planning Policy Framework.

7.21 Policy S7 “Provision of jobs” confirms the Council’s commitment to provide 28,500
new jobs in the period 2008 – 2029 in order to maintain a broad balance between
homes and jobs and to maintain a diverse economic base.

7.22 The West Northamptonshire Joint Core Strategy Local Plan (Part 1) considers the
opportunities for renewable energy technologies. Paragraph 5.104 specifically refers
to the potential for generation of renewable energy from energy crops and plant
biomass. Paragraph 5.105 identifies some of the potential benefits and negative
effects on local communities. As well as the generation of renewable energy, rural
diversification, employment opportunities and business opportunities need to be
balances against the potential negative effects including transport, landscape and
the protection of the environment, (natural and historic) and residential amenity.
5.103 A study\textsuperscript{22} has assessed the potential for the full range of renewable energy technologies in West Northamptonshire. With the exception of Northampton, onshore wind energy forms the largest potential renewable resource for West Northamptonshire. At the micro scale, combinations of solar/ photovoltaic and heat pumps also have significant potential, especially when combined with fabric improvements to improve the energy efficiency of buildings sought through the Code for Sustainable Homes and BREEAM (Building Research Establishment Environmental Assessment Method) for non-domestic buildings.

5.104 In the central areas of Northampton and Daventry, the greatest heat demand was identified, which could have potential for the development of decentralised energy networks. Daventry and South Northamptonshire were also identified as having potential for the generation of energy from biomass, in particular from energy crops and plant biomass. Northampton, as an urban area also has potential for the use of energy from waste, sewage gas and waste wood.

5.105 The deployment of larger scale low carbon and renewable energy schemes can have a range of positive or negative effects on nearby communities. They could provide landowners with the opportunity for rural diversification, deliver local jobs and opportunities for community based schemes and benefits. However, proposals can have a range of impacts that will vary depending on the scale of development, type of area where the development is proposed and type of low carbon and renewable energy technology deployed.

5.106 When considering planning applications for low carbon and renewable energy, an assessment will need to take account of impacts on landscape, townscape, natural, historical and cultural features and areas and nature conservation interests. Proposals should also use high quality design to minimise impacts on the amenity of the area, in respect of visual intrusion, noise, dust, and odour and traffic generation.

7.23 Policy R2 supports proposals that sustain and enhance rural employment opportunities where they are of an appropriate scale for their location and respect the environmental quality of the area.
8. CONSIDERATION OF THE ISSUES AGAINST PLANNING POLICY

The National Planning Policy Framework

8.1 At the heart of the National Planning Policy framework is the presumption in favour of sustainable development. Seldom is any development measured for sustainability as rigorously, and regularly, throughout the lifetime of the development as the anaerobic digestion plant will be under the UK Sustainability Standards. These standards ensure that the operation of the facility, including the importation of feedstock and the export and use of the digestate is continually assessed and meets the required threshold for sustainable operation. Therefore there is a guarantee that the facility will operate sustainably and as such the presumption in favour of the development should be upheld.

8.2 Section 3, paragraph 28 “Supporting a prosperous rural economy”, concerns economic growth and job creation in rural areas. This agriculturally based anaerobic digestion plant proposal will create work locally for farmers and agricultural contractors and estimated 2.5 full time equivalent jobs at Wormslade Farm. The Wormslade Farm facility will provide an alternative outlet for farm produce grown locally, such as maize silage, grass silage and cereal whole crops as well as for manures from local livestock operations.

8.3 The resultant digestate is an excellent fertiliser with low odour content and soil conditioner which will be used in agriculture locally. As artificial fertiliser prices rise and farming incomes fall due to low commodity prices on the world market, the digestate will increasingly become a sought after source of nitrogen, phosphate and potash fertiliser. The proposal diversifies agricultural production by providing an alternative outlet for farm crops and manures which sustains rural employment and the local rural economy and is therefore compliant with paragraph 28 of the NPPF.

8.4 Paragraph 97 of the NPPF states that LPAs should consider identifying areas where renewable and low carbon energy sources and infrastructure can be sited. LPAs are required to approve applications, (unless material considerations indicate otherwise) but only if the impacts of such development are (or can be made) acceptable. This is an existing anaerobic digestion plant site for farm crop and manure bio-methane production, albeit originally for the generation of electricity for the national grid. This proposal is to update the plant to modern, more efficient gas extraction facilities using two circular digester tanks rather than a single concrete rectangular tank. The proposal is to produce renewable energy; bio-methane to supply direct to the national gas grid, in line with Government policy seeking more renewable energy production, and also to help maintain and increase energy security for the UK in the present challenging political climate. The case for increasing low carbon energy production and for improving energy security is contained at 3.11 to 3.17 above.

8.5 The Wormslade Farm site is ideally situated for the production of agricultural crop based bio-methane because of:-

- Very close connection to the gas pipeline network.
- Agreement with the National Grid for connection to the network at this location.
- Existing large agricultural buildings at the site.
- Excellent highway connectivity and network.
- Minimal disruption to traffic in urban areas.
Rural location essential for the sustainable sourcing, including transportation of feedstocks and digestate which is essential for meeting the UK Sustainability Standards.

The facility can be readily assimilated into the landscape using existing features and a strong landscaping scheme combined with good design.

The extent of any impact would be low and highly localised and of a nature where mitigation is available.

Impacts on neighbouring residential properties and other land uses will be minimal due to this location.

Assessment of County and District Planning Policy Objectives

8.6 Climate change is a significant issue facing everyone and can only be tackled by making changes, such as to how energy is produced. Decentralised renewable energy production is good for addressing climate change and for diversifying and strengthening the local rural economy by providing jobs for local people and income for local business such as farmers, agricultural contractors, rural service industries, and installers of anaerobic digestion plants, such as Envi-Tec Ltd. Investment in the private sector to create employment opportunities is a key issue identified in local planning policies.

8.7 The Northamptonshire County Council Minerals and Waste Local Plan policy 12 “Spatial strategy for waste management” acknowledges that not all waste applications are compatible with the central spine and urban areas. Agricultural anaerobic digestion plants are not compatible with urban development, due to partly to the land area required to accommodate the feedstock clamps and digestate storage vessels. Urban areas are not suitable due to the operational requirements of the plant such as the transportation of feedstock, often outside of normal working hours during harvesting times. Agricultural vehicles are not compatible with urban traffic flows. Consequently, farm crop based anaerobic digestion plants would conflict with other urban or urban fringe land uses and traffic flows. Because of these reasons a rural location, near to where feedstocks can be sourced, and land is available nearby to benefit from the digestate as organic fertiliser is the most appropriate location for such schemes.

8.8 The location of the anaerobic digestion plant at Wormslade Farm is associated with existing rural employment in the locality, and will help to sustain jobs in agriculture, agricultural contracting, and the supply industries such as machinery dealers, agricultural engineers, and other suppliers servicing these rural industries.

8.9 Policy 13 Development criteria for waste management facilities (non-inert and hazardous) requires there to be an identified need for the facility. Section 5 of this Statement addresses the issue of need for renewable energy sources, and if that need can be partly met by using material considered as waste (manures), through preliminary treatment (screening and mixing with other feedstocks) before the extraction of bio-gas, the facility is consistent with Policy 13 criterial requiring the maximisation of energy, heat and residues from waste material. The production of bio-methane through anaerobic digestion is safe and suitable for farm diversification projects. The Friends of the Earth Guildford and Waverly group has prepared a useful technical briefing7 about anaerobic digestion plants which describes the bacterial process and the use of energy crops such as maize and grass silage, and slurries and manures to produce bio-methane. The guidance note confirms that the
removal of impurities and injection of the gas to the gas grid is more efficient than on-site electricity production.

8.10 Non-allocated sites in rural areas (particularly composting and anaerobic digestion) are considered acceptable if they are appropriately located to the source of the waste under this policy. The Wormslade Farm site is appropriately located to receive the feedstock (including the waste element) and to distribute the resulting digestate back to the fields as liquid fertiliser. The digestate will meet PAS 110 accreditation requirements.

8.11 Policy 22 “Addressing the impact of proposed mineral and waste development” seeks to protect Northamptonshire’s natural resources, including heritage assets. An Ecological assessment of the site and impact of the proposals has been undertaken by Christopher Seabridge & Associates.

8.12 The marginal loss of ecological habitat including the loss of some trees will be off-set with the Landscaping Scheme, including the proposal to translocate the hedge to the northern site boundary and to plant substantial numbers of native species trees. Translocation will minimise the adverse effect of actually removing and replanting the hedge. Existing hedges will be reinforced with native species. A new attenuation pond will provide additional habitat variety for a range of species including insects, amphibians, small mammals and birds.

8.13 The potential impact from flood risk have been assessed by Senior hydrologist, Chris Nugent of Hydrological who has considered the impact of the development in terms of National Planning policy Framework and local Planning Policy. The site is located in Flood Zone 1 and therefore the Sequential and Exception tests are not required. The assessment then went on to consider the management of surface water and recommends the segregation of water not likely to be polluted, (white water) from water that could be polluted (black water). White water is from areas not likely to be in contact with feedstock (silage and manures) and is collected into the attenuation pond for gradual release into the adjacent ditch. Black water is collected and stored in sealed bagged storage lagoon. It can be used as digestate in the plant and then eventually goes to the digestate store before being used as liquid fertiliser.

8.14 The appearance of the digesters, silage clamps, liquid intake tank and buildings is of contemporary agrarian design which is emphasised through the use of concrete, juniper green profiled sheeting and the use of dark grey colours for the fabric covers of the digesters.

8.15 The proposed anaerobic digestion plant will require improvements to the existing access road and visibility splays on to Clipston Road. Clipston Road to the junction will require widening by up to 1 metre, and the radius to the junction increased to 14m and 15m respectively.

8.16 The location of the site away from residential dwellings was a factor in selecting this site. Loss of residential amenity was a serious consideration when selecting the site for the anaerobic digestion plant.

8.17 Landscape and Visual Impacts were assessed in Allan Moss’ Landscape and Visual Impact Assessment report. In terms of the “Assessment of Landscape Effects” the proposals were summarised in table 6. The effects on landscape over the long term

were found to be considered to “moderate adverse” at worst. The gain of new trees and hedging was considered to be “minor beneficial” effect in the long term.

<table>
<thead>
<tr>
<th>Effect</th>
<th>Sensitivity of Landscape Receiver</th>
<th>Magnitude of Landscape Effect</th>
<th>Level of Landscape Effect</th>
</tr>
</thead>
<tbody>
<tr>
<td>Loss of agricultural land</td>
<td>Local</td>
<td>Medium</td>
<td>Minor adverse</td>
</tr>
<tr>
<td>Loss of hedgerows</td>
<td>Local</td>
<td>Low/median adverse</td>
<td>Minor adverse</td>
</tr>
<tr>
<td>Gain of new trees &amp; hedgerow planting</td>
<td>Local</td>
<td>Low/Median adverse</td>
<td>Minor adverse</td>
</tr>
<tr>
<td>Changes to landscape character</td>
<td>Local</td>
<td>Median</td>
<td>Moderate adverse</td>
</tr>
</tbody>
</table>

8.18 The LVIA assessed the impact on public and privates views. Visual impacts from the road to Clipston are considered high adverse but localised, mainly due to the requirement for landscaping measure to become established. This is why the Landscape Architect has recommended the translocation of the hedge along this boundary to hasten the establishment of the field boundary hedge to reduce the impacts.

8.19 Views from residential properties are also considered. Mr Moss’ report states that:

"Whilst the visual effects of the proposed development on residential properties at Great Oxendon may be raised by local residents, as explained in Section 10.0 there is no provision in planning law to protect such views. It is unlikely therefore that such issues would be regarded as key decision making issues. The overall level of visual effect on these properties is therefore considered to be Minor adverse."

8.20 Notwithstanding the statement above, the developers have taken note of the concerns raised at the public consultation meeting held on 12 November at great Oxendon Parish Hall where local residents saw the draft proposals and commented about being able to see the plant from their homes in the village. The developers have taken this on board and reduced the height of the digester tanks, being the tallest component parts of the development by a significant amount in order to address this issue. Details of the height of the digester relative to the existing farm buildings can be seen clearly on plan ref:- Site Scene Elevations Ref: P15- WORMSLADE -AD-008.

8.21 Crops are grown on fields and transported, often long distances to their place of processing or consumption. The growing of crops for feedstock to supply an anaerobic digestion plant that has to meet the requirements of the UK Sustainability Standards. The UK Sustainability Standards will be used to measure the level of sustainability of various parts of the anaerobic digestion process including the growing of crops, fertiliser inputs, energy expended in growing and transportation to the facility and use of the resultant digestate. These Standards will ensure the reduction in carbon footprint for the renewable energy produced when compared with fossil fuel equivalents, and the long-term sustainability of the development in terms of operational performance, and will additionally help to ensure sustainable renewable de-centralised energy production in this locality.

8.22 The transport Statement which accompanies this application quantifies the number of large vehicle movements associated with feedstocks and digestate on a weekly basis over a period of year. The maximum number of vehicle movements is 21 per day, less than two per hour in a typical 12 hour harvest day. Vehicle movements on the nearby A508 have reduced very significantly over the past 14 years (28% for HGV and 13.25% for all vehicles) and therefore it is reasonable to assume that this road has the capacity to deal with the vehicles arising from this development.

8.23 A landscape impact assessment has been carried out in accordance with the requirements of Policy 24. Please refer to the LVIA by Mr Allan Moss.

8.24 Policy 25 “Landscape character” requires the Landscape Assessment to consider landscape values, including their significance, and potential mitigation of impacts and to also consider opportunities to protect and enhance particular features of the landscape character. The LVIA has identified landscape character and landscape
value and susceptibility before assessing the impact of the proposal and making recommendation for mitigation and protection of the landscape.

8.25 **Policy 26** “Historic environment” seeks to protect heritage assets that are identified as being at risk form the minerals or waste development. Assets on the site of proposed development as well as the setting of those heritage assets nearby should be considered. In light of the location of the development it is considered that the proposal will not affect Listed Buildings or Scheduled Monuments. A recent archaeological dig on the field immediately to the south of the application site revealed very little and therefore at this stage the applicant respectfully suggests that a pre-commencement planning condition is considered, requiring a sequential approach to investigations, starting with a desk based assessment of the area.

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8.26 Layout and design quality criteria set out in Policy 27 is met through the use of buildings and structure of agricultural appearance and the use of martials often found on local farms such as green profiled steel sheets, concrete and fibre-cement roofs. The development has to be functional and this limits the opportunities for innovative or traditional materials, however the good quality layout including pond and trees will help to assimilate the development into the landscape.

8.27 These proposals have a design life expectancy of some 25 years, therefore they are considered permanent. The developers considered the option of demolition and reinstatement of the site back to agriculture, but recognised that in 25 years the trees and hedges will be nearing maturity and very little would be achieved by bulldozing the embankments to reinstate the field. Ecological and environmental harm would most likely outweigh the benefits of reinstatement.

8.28 The West Northamptonshire Joint Core Strategy Objective 12 Protecting and Supporting Rural Communities (“to protect and support rural communities to ensure they thrive and remain vital”). Objective 13 Rural Diversification and Employment” seeks to support rural diversification and rural employment opportunities, in particular, those related to agriculture, horticulture and forestry.

8.29 **Policy SA “Presumption in Favour of Sustainable Development”** advocates a presumption in favour of sustainable development where any adverse effects can be mitigated for by the applicant, or the benefits of the proposal outweigh any such significant effects. This proposal is for the sustainable production of renewable energy from farm crops and manures derived from local sources which is recognised as a positive activity because not only with this proposal contribute to the requirement for more renewable heat production (gas to grid is considered renewable heat production), to meet the obligation HMG has to the European Union to increase renewable energy consumption to 15% of total consumption, by 2020, it will also provide alternative markets, and certainty in pricing for local farmers, therefore sustaining agriculture in the locality. Jobs will be sustained and created as a result of the proposals, both during the construction phase and during the operational phase of the development.
9. **CONCLUSION**

9.1 Potential adverse effects are considered to be relatively low at this location and the adverse effects that do arise can be mitigated for as part of the scheme design which includes lowering the overall height of the tallest components keeping odour to a minimum and by storing digestate in bags rather than open lagoons. High quality design is a key principle of the Good Practice Measures document, in particular consideration of the landscape and use of high quality materials and finishes when designing the facility. The proposal is agrarian in design, with silage clamps, dirty water lagoons, buildings identical to agricultural buildings in terms of design and the use of materials commonly found on farm buildings, and cylindrical structures similar to those used on livestock farms.

9.2 The modern and efficient production of bio-methane from farm crops and manures is virtually odourless. This is confirmed in the Friends of the Earth technical briefing (para 94). There is no significant increase in noise levels over and above those normally encountered on a working farm, mainly from the loaders feeding the plant and vehicle movements which are activities associated with rural farming activities; therefore there will be no significant impact on nearby residential amenity.

9.3 The site will benefit from leakage detection technology for the liquid digestate stores and surface water tanks to ensure protection of local water resources. All surface water will be segregated according to whether it is clean or potentially dirty water. Clean surface and roof water will be directed to soakaways and dirty water to the liquid digestate storage facilities. Silage clamps will contain effluent storage tanks and the effluent will be pumped to the digester tanks as feedstock. Therefore the facility will have no impact on the integrity of the water environment.

9.4 The plant is expected to require approximately 46,000 tonnes of feedstock crops each year. The UK Sustainability Standards, and economics dictate that preference will be for local farmers to produce maize, grass and whole crop cereals for ensiling for use as feedstock rather than bringing feedstock from further afield. As and when required, manures and slurries will also be sourced from local livestock farmers.

9.5 This proposal is to develop modern, efficient gas extraction facilities using two circular digester tanks and ancillary cutting edge technology for cleaning and processing the gas produced. The proposal is to pressurise the bio-methane and inject it directly into the nearby national gas grid to supply domestic and business consumers.

9.6 Whilst the principle of the requirement for renewable and low carbon energy production is well established, planning policy requires developers to choose sites for renewable energy production carefully to minimise impacts from the development on the landscape character, visual impact and the amenity of nearby residents. Potential adverse impacts of the development on wildlife and the setting of heritage assets such as listed buildings, ancient monuments and archaeological assets are also important material considerations in determining applications. It is considered that this proposal at Wormslade Farm meets these requirements.

9.7 The request made to Northamptonshire County Council in October 2015 for a Screening Opinion under The Town and Country Planning (Environmental Impact Assessment) Regulations 2011 concluded that that the development is not Environmental Impact Assessment development.
9.8 It is essential that a rigorous site selection process has been adopted to ensure that the anaerobic digestion plant is well located to agricultural land to enable local supply of feedstock and the satisfactory disposal of the liquid and solid digestate to meet the recently introduced UK Sustainability Standards. These standards ensure that such facilities are truly sustainable and operate using locally sourced feedstocks grown using digestate rather than manufactured fertilisers. Under these standards each operator needs to demonstrate, through regular audited returns, that the plant uses sustainably sourced feedstocks. This ensures supplies are sourced locally and grown using digestate to replace artificial fertilisers.

9.9 The site is capable of assimilating the development into the landscape due to the close proximity of existing buildings forming a backdrop to the development and existing screening of the site from the A508 highway in easterly and westerly directions. Additional landscaping including the planting of a new native species trees along the eastern (A508) side and the north side of the development will help to screen the development. In order to help with quick establishment of screening it has been recommended that the Clipston Road hedge be translocated to the new position following the establishment of suitable visibility splays and junction improvements with the A508.

9.10 The site is sufficiently distant from residential dwellings and protected buildings to not have a significant impact on nearby residential amenity arising from odour, dust or noise form the site.

9.11 The proposal is measurably sustainable, not least through the recently introduced UK Sustainability Standards, and therefore is considered sustainable development for the purpose of the National Planning Policy Framework and Northamptonshire’s Minerals and Waste Local Plan. The proposal accords also with the West Northamptonshire Joint Core Strategy Objectives 12 and 13, and policies S7 and txt at paragraph 5.104 to 5.106.

9.12 The proposal accords with national and local planning policies in terms of the development objectives, the assessment of potential impact and mitigation and protection measures both through the design and through suitable worded planning conditions governing both the development and the operation of the facility.

Phil Plant
Mid West Planning
November 2015
10. REFERENCES


GOOD PRACTICE MEASURES-PRINCIPLES FOR THE DESIGN OF MINERALS AND WASTE DEVELOPMENT
### Good Practice Measures - Principles for the Design of Minerals and Waste Development

**High quality design**
- Consideration of landscape and townscape character (Northamptonshire Environmental Characterisation Process - ECP) and rural proofing.
- Reflect scale, mass and design of existing buildings.
- Low key external appearance in context with surrounds. Includes shape and size of built form (e.g. buildings, roof pitch and other structures), colour treatments on facades, fencing and gates (neutral or those that blend into the landscape, avoid colours that are light-reflective), as well as the use of high quality materials (materials should be fit-for-purpose yet still consistent with the styling of the various other components of the built form, for e.g. specific to fencing the use of powder coated mesh, palisade or vertical bars are considered high quality whereas chain link, galvanised steel palisade, concrete posts and barbed wire are not).
- Innovative design and technologies addressing the SPD design principles.
- The level of investment in high quality and innovative design measures and technologies should reflect the life of the building and nature of operations and be of a scale that is both reasonable and practicable. That is, long-term or permanent buildings and structures require higher quality of design and innovation than those of a temporary nature. However, temporary buildings, structures and plant are still required to incorporate the SPD design principles.

**Holistic design**
- Consistent architectural treatment applied to all components of built form, such as matching styles for fencing and gates that also complements main components of built form and landscape.

**Local distinctiveness**
- Consideration of landscape and townscape character (Northamptonshire Current Landscape Character Assessment - LCA and ECP).
- Consideration of local architectural styling.
- Use of appropriate materials, locally sourced where possible (for example materials, colour treatments, landscaping, etc) which reflect the local built and natural environment.

**Environmental protection and enhancement**
- Avoid adverse environmental impacts and where necessary employ mitigation measures to reduce environmental nuisance and pollution, or alternatively compensatory measures (on or off site) for residual impacts that cannot be mitigated for.
- Minimise building and infrastructure footprint to reduce adverse biodiversity and amenity impacts.
- Maximise habitat creation and nature conservation opportunities. Consideration of Biodiversity Action Plan (BAP) and Biodiversity Character Assessment (BCA).
- Application of appropriate soil handling strategies.
### Good practice measures

**Principles for the Design of Minerals and Waste Development**

- Protection and enhancement of waterways (specifically quality and availability of water resources).
- Retain existing or important trees and hedgerows where possible.
- Conservation and enhancement of significant environmental and archaeological features (includes individual sites or features and the wider environment) (Historic Landscape Character Assessment HLCA and ECP).

### Sustainable development

- Waste minimisation and sustainable waste management methods.
- Maximise use of existing features including buildings, infrastructure and components.
- Sustainable procurement.
- Design for deconstruction.
- Materials resource efficiency.
- Use of energy efficient technologies.
- Minimise greenhouse gas emissions.
- Ensure no increase in flood risk.
- Use of materials with reduced pollution potential and low life cycle impacts.
- Use of materials and components that are able to be re-used or recycled including the use of 10% (by value) recycled products in construction projects.
- Use of locally sourced materials.
- Sustainable water management methods (e.g. SuDS).

### Strategic site layout

- Strategic location of buildings (specifically operational and storage areas), plant, buffers, etc to assist in protection of amenity.
- Consideration of broad landscape impact and context, including views from existing rights of way and other important vantage points.

### High quality landscaping and boundary treatments

- Complement and enhance local landscape character (LCA and East Midlands Green Infrastructure Strategy - GI), in doing so avoid creation of monotonous uninteresting boundaries.
- Establish or enhance connectivity between landscape and townscape.
- Where appropriate landscape features (both hard and soft) may act as screening or visual buffers (e.g. sensitive ground modelling where appropriate, off-site planting, vegetative screens, etc).
- Use native species of local provenance.
- Retain existing or important trees and hedgerows where possible.
- Maximise opportunities for habitat creation, corridor connectivity and enhancement of the historic environment and biodiversity (BAP targets and BCA).
- Provision of adequate space, management and maintenance resources.
- Provision of management measures relating to pest and erosion control.

### Effective buffers

- Buffers may be either physical or visual and, where appropriate, may include combinations of landscape features, boundary treatments, and other low level functions.
## Good practice measures

**Principles for the Design of Minerals and Waste Development**

- Requires provision of adequate space to allow for buffers between development and sensitive areas.
- Consider the use of buffers to create habitats and contribute towards BAP targets.
- Public access opportunities in buffer zones should be maximised where possible and safe to do so (e.g., public rights of way).
- It may be possible to combine design components of the built form and strategic site layout to allow for the development to act as a physical buffer between sensitive areas and more intrusive land-uses, such as residential and heavy industry and major transport or infrastructure networks, or agricultural land and urban sprawl.
- Buffers may be required during development and or operations to protect historic assets and other historic sites or buildings, including the protection of sites that may be adversely affected by dewatering (this would also apply to some biodiversity sites), as well as the use of buffers for the longer term protection of the setting of historic sites, buildings or areas from any adverse impacts of landscape change.

### Lighting

- Minimise environmental nuisance associated with light pollution through consideration of strategic site layout (locate highly lit areas located on less sensitive aspects), or mitigation measures such as screening. Maximise benefits associated with lighting such as opportunity for lighting to be included as part of the design or architectural treatment.

### Site access

- High quality landscaping and boundary treatments.
- High standard of maintenance and general “house keeping” of public access areas, car parks, wheel wash facilities, vehicle access, reception, security buildings, signage and associated landscaping features (may assist in increasing public perception of operations).
- Retain public rights of way where possible. Compensatory measures may need to be investigated where retention is not a viable option.

### Sustainable transport

- Reduce reliance on road transport through use of alternate transport methods (such as rail, waterways and conveyor).
- Increase efficiency of transport methods.
- Maximise opportunities for increasing use of sustainable transport methods (e.g., staff access to public transport, bicycle access and related facilities).

### Integrated development

- Co-location of facilities where possible.
- Locate facilities in proximity to related industry or source, where possible.

### Public safety

- Access and movement: places with well-defined routes, spaces and entrances that provide for convenient movement without comprising security.
- Structure: places that are structured so that different uses do no cause conflict.
- Surveillance: places where all publicly accessible spaces are overlooked.
- Ownership: places that promote a sense of ownership, respect, territorial responsibility and community.
### Good practice measures

**Principles for the Design of Minerals and Waste Development**

- **Physical protection:** places that include necessary, well-designed security features.
- **Activity:** places where the level of human activity is appropriate to the location and creates a reduced risk of crime and a sense of safety at all times.
- **Management and maintenance:** places that are designed with management and maintenance in mind, to discourage crime in the present and the future.
- **Consideration:** of potential arson risk through design, security, and site management measures.
APPENDIX TWO

PROPOSED SITE LAYOUT PLAN
(NOT TO SCALE)
EXAMPLES OF ANAEROBIC DIGESTION PLANTS BUILT BY ENVITEC BIOGAS UK

Rogerstone
Capacity: 499 kWe
Feedstock: Food waste from the RF Brookes and effluent sludge
Location: Insource Energy - Rogerstone, Caerphilly, Gwent
Commissioned: 2011
Input: 18,000 tonnes per annum

Stowell Farms
Capacity: 499 kWe
Feedstock: Farm slurry and sustainable crops
Location: West Stowell
Commissioned: 2012
Input: 15,000 tonnes per annum
Output: Combined heat & power
Buttermilk Hall Farm
Capacity: 1067 kW
Feedstock: Sustainable crops (maize)
Location: Baldock Road, Buntingford, SG9 9RH.
Commissioned: 2012
Input: 20,000 tonnes per annum
Output: Combined heat and power
Further information: See http://hallwickenergy.com

Trinity Hall Farm
Capacity: 1067 kW
Feedstock: maize and farm residues
Commissioned: 2012
Location: Trinity Hall Farm, Leighton Buzzard, Hertfordshire
Input: 20,000 tonnes a year
Highlights: Long-term, stable income from Feed in Tariffs, short return on investment, soil improvement, crop diversity
**Melrose Farm**

Capacity: 499 kWe  
Feedstock: pig slurry, maize silage and grass silage  
Commissioned: 2012  
Input: 8000 tonnes pig slurry plus 8000 tonnes silage a year  
Highlights: five-year return on investment expected, business planning predictability, slurry lagoon storage eliminated, long-term revenues from Feed in Tariffs

**Station Works**

Capacity: 1067 kWe  
Feedstock: maize and farm residues  
Location: Station Works, Thaxted, Essex  
Commissioned: 2012  
Input: 20,000 tonnes a year  
Highlights: Long-term, stable income from Feed in Tariffs, short return on investment, soil improvement, crop diversity
APPENDIC FOUR

PLAN SHOWING LANDOWNER LAND AVAILABLE FOR FEEDSTOCK PRODUCTION AND DIGESTATE USE.
APPENDIX 17

ARCHAEOLOGY FINAL REPORT
Archaeological Field Evaluation

Raw Energy Ltd
Wormslade Farm
Clipston Road
Kelmarsh
Northamptonshire
LE16 9RX

April 2016
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April 2016

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1 Executive Summary

Border Archaeology Ltd (BAL) was instructed by Raw Energy Ltd to undertake a programme of Geophysical Survey and Archaeological Field Evaluation in respect of the proposed development of land at Wormslade Farm Clipston Road Kelmarsh Northamptonshire LE16 9RX (NGR: SP 73510 81650) (fig. 1).

Twenty-three trenches, each of $30 \times 1.8m$, were opened, together with two smaller trenches ($20 \times 1.8m$ & $10 \times 1.8m$), representing approximately 4% of the development area (nominally 4ha). Trenches were located both to sample ground anomalies detected by the geophysical work and to test areas apparently devoid of any geophysical response (fig. 2).

A number of amorphous features representing areas of bioturbation and a series of modern land drains were identified in several trenches and these, together with the various changes in the natural geology noted throughout the evaluation area, may account for some of the potential features identified in the geophysical survey results.

Two narrow, shallow linear features were identified in Trenches 023 and 025 which were, based on their form and depth, interpreted as plough scars; the features were aligned with the remnants of ridge-and-furrow cultivation recorded on the geophysical survey.

A modern agricultural waste pit or drainage feature identified in Trench 018 represented an area of disturbance which was identified in the geophysical survey results. The feature contained 20th century agricultural waste and building material, including barbed-wire fencing, metal agricultural equipment, bricks and glass and appears to have been backfilled during the recent past.

It can thus be confirmed that no evidence of significant archaeological features, deposits or finds was revealed during the course of the evaluation.

The natural substrate was encountered at a depth of between 0.36m-0.95m below ground level.
2 Introduction

Border Archaeology Ltd (BAL) was instructed by Raw Energy Ltd to carry out a programme of work comprising Geophysical Survey (GS) followed by Archaeological Field Evaluation (AFE) in respect of the proposed development of land at Wormslade Farm Clipston Road Kelmarsh Northamptonshire LE16 9RX (NGR: SP 73510 81650) (fig. 1).

In summary, the proposed development comprises the following elements:

- Two digester tanks each 31.31m diameter by 8m high and associated feeders, mixing units and intake tank
- Silage clamps each 119m × 20m × 5.5m and concrete apron 80m × 15m
- Bagged digestate stores set into earth banked lagoons (each 50m × 25m)
- Black water bagged system set into earth banked lagoons, and one white water attenuation pond
- Technical building to house the feeders and CHP Unit 37.2m × 14.28m × 4.4m
- Ancillary plant and equipment
- Office/welfare building
- New farm entrance

Trench locations were informed by the results of the initial magnetometer survey, which showed that the site contains a number of weakly positive linear anomalies, some with curvilinear or rectilinear elements. However, these were widespread, weak, short, fragmented and incoherent and their origin could not be determined. A number of pit-like responses were noted, with a concentration in the SE corner of the site, but, as with the linear anomalies, it was not clear if their origin was natural or anthropogenic. Evidence for former ridge-and-furrow cultivation, a field boundary, possible land drains and an infilled pond was also located. Based upon these findings, a proposed trench layout was approved by Elizabeth Mordue Assistant Archaeological Advisor Northamptonshire County Council in March 2016 (fig. 2).

3 Site Location

The evaluation trenches were located on land adjacent to the A508, c.2.9km to the E of Clipston. The nominal overall site is approximately 4.2ha in area and slopes gently to the N.

The site is bounded to the N by Clipston Road, to the E by the A508 and to the S and W by agricultural fields. The grid reference of the site (taken approximately from its centre) is NGR: SP 73510 81650.

3.1 Soils and Geology

The site is characterised by typical stagnogleys of the WICKHAM 2 series (711f), composed of slowly permeable seasonal waterlogged fine loamy soils over clayey, fine silty soils, which in turn are over clayey soils. Small areas of slowly permeable calcareous soils are present on the steeper slopes. This series is described as drift over Jurassic and Cretaceous clay or mudstone (SSEW 1983).
Fig. 1: Site location plan
4 Aims and Objectives

The overall aim of the programme of archaeological evaluation was to determine, utilising the results of the prior programme of magnetometer survey and as far as was reasonably possible, the location, extent, date, character, condition, significance and quality of any surviving archaeological remains likely to be threatened by the proposed development, and to produce an appropriate mitigation strategy, if required, for further archaeological investigation.

5 Methodology

The programme of archaeological work was carried out in accordance with the Chartered Institute for Archaeologists’ (CIfA) Standard and guidance for archaeological field evaluation (CIfA 2014a), Standard and guidance for archaeological geophysical survey (CIfA 2014b), Geophysical Survey in Archaeological Field Evaluation (David, Linford & Linford 2008) and Standard and Guidance for the collection, documentation, conservation and research of archaeological materials (CIfA 2014c). BAL adheres to the CIfA Code of Conduct (2014d) and to project management advice set out in Management of Research Projects in the Historic Environment: The MoRphe Project Managers’ Guide (Lee 2015).

Trench positions were identified using GIS and laid out using Survey-Grade GPS. Trenching was excavated to the first significant archaeological horizon or natural (whichever was the shallower) using a 360° tracked machine equipped with a 1.8m-wide toothless bucket.

Approximately 4% of the development area was subject to evaluation, this representing 23 trenches measuring 30 × 1.8m and two smaller trenches, one of 20 × 1.8m and the second of 10 × 1.8m. The trenches were positioned so as to sample the anomalies recorded in the geophysical survey results and to test areas apparently devoid of any geophysical response (fig. 2).

5.1 Recording

Full written, drawn and photographic records were made in accordance with BAL's Archaeological Field Recording Manual (2014). Records included the following:

- A completed standard context record sheet for each stratigraphic unit examined
- A graphic record based upon Survey-Grade GPS data in combination with hand-drawn plans and sections at appropriate scales to show the extent of the area, the extent of all stratigraphic units and appropriate detail within stratigraphic units. Overall site plans were based on Survey-Grade GPS data (scale 1:100). All hand-drawn records were produced using gridded, archive-stable polyester film. These were numbered and listed in a drawing register, with drawing numbers cross-referenced to written site records.
Fig. 2: Plan of trench layout in relation to the abstraction and interpretation plan showing magnetometer anomalies
6 Results

Of the 25 trenches excavated, only Trenches 023 and 025 contained potential archaeological remains. Table 1 provides descriptions of the remaining 23 trenches.

6.1 Trench 023

Trench 023 (Plate 1; figs 2, 3, 5 & 6) was orientated in an E-W direction and was excavated to an average depth of 0.45m. Excavation revealed a single linear feature [023004] that had been previously identified in the geophysical survey results. This feature ran NNE-SSW, continuing beyond the trench limits and revealed a moderate break of slope at the top, with moderately sloping sides breaking gradually to a slightly undulating base (Plate 1; figs. 3, 5 & 6). The feature measured 0.23m wide and was 0.09m deep and contained a single fill (023005) of friable, light brownish-grey silty clay; no finds were recovered from the fill of this feature.

Plate 1: View NW showing ditch [023004]
Fig. 3: Plan of Trench 023

Fig. 4: Plan of Trench 025
Fig. 5: ENE-facing section through ditch [023004]

Fig. 6: N-facing section of Trench [023] showing continuation of ditch [023004]
6.2 Trench 025

Trench 025 (*Plate 2; figs. 2, 4, 7-10*) had an average depth of 0.63m and was orientated E-W. It also contained the remains of a single linear feature [025004], which was oriented WNW-ESE across the SW extent of the trench; this had moderate breaks of slope at the top, with moderately sloping sides breaking gradually to an undulating base (*Plate 2; figs. 4, 7-10*). The feature measured 0.35m wide and 0.11m deep and also extended beyond the trench limits. The fill (025005) was composed of friable, mid-brownish-grey silty clay, no artefactual evidence was recovered from the fill.

*Plate 2: View S showing linear feature [025004]*
Fig. 7: Plan of ditch [025004]

Fig. 8: W-facing section through ditch [025004]
Fig. 9: E-facing section through ditch [025004]

Fig. 10: E-facing section showing continuation of ditch [025004]
### 6.3 Trench Descriptions (Table 1)

<table>
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<th>Trench No</th>
<th>Orientation and Trench NGR</th>
<th>Context No</th>
<th>Type</th>
<th>F/B</th>
<th>F/O</th>
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<th>Interpretation</th>
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<td>NAI</td>
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<td>005</td>
<td>Deposit</td>
<td>ENE-WSW</td>
<td>Mid-brown-orange silty clay; 0.36m deep.</td>
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<td>Deposit</td>
<td>ENE-WSW</td>
<td>Mid-brown silty clay, very occasional small to medium stones &amp; gravel.</td>
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<td>Deposit</td>
<td>ENE-WSW</td>
<td>Mid-brown-orange silty clay; 0.41m deep.</td>
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<td>ENE-WSW</td>
<td>Yellow-orange clay, occasional gravel.</td>
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<td>006</td>
<td>Deposit</td>
<td>E-W</td>
<td>Mid-brown silty clay, very occasional small stones &amp; gravel; 0.30m deep.</td>
<td>Topsoil</td>
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<td>Deposit</td>
<td>E-W</td>
<td>Mid-orange-brown silty clay, very occasional gravel; 0.19m deep.</td>
<td>Subsoil</td>
<td>Post-medieval</td>
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<td>E-W</td>
<td>Mid-brown-orange silty clay; 0.41m deep.</td>
<td>Colluvium</td>
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<td></td>
<td>Deposit</td>
<td>E-W</td>
<td>Yellow-orange clay, occasional gravel.</td>
<td>Natural</td>
<td>Natural</td>
<td>NAI</td>
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<td>007</td>
<td>Deposit</td>
<td>N-S</td>
<td>Mid-brown silty clay, very occasional small stones &amp; gravel; 0.25m deep.</td>
<td>Topsoil</td>
<td>Modern</td>
<td>NAI</td>
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<td></td>
<td>Deposit</td>
<td>N-S</td>
<td>Mid-orange-brown silty clay, very occasional gravel; 0.13m deep.</td>
<td>Subsoil</td>
<td>Post-medieval</td>
<td>NAI</td>
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<td>Deposit</td>
<td>N-S</td>
<td>Mid-brown-orange silty clay; 0.34m deep.</td>
<td>Colluvium</td>
<td>Natural</td>
<td>NAI</td>
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<td>Deposit</td>
<td>N-S</td>
<td>Yellow-orange clay, occasional gravel.</td>
<td>Natural</td>
<td>Natural</td>
<td>NAI</td>
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<td>008 WNW-ESE</td>
<td>A: 281686 473398</td>
<td>(008001)</td>
<td>Mid-brown silty clay, very occasional small stones &amp; gravel; 0.25m deep.</td>
<td>Topsoil</td>
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<td>B: 281681 473428</td>
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<td>Mid-orange-brown silty clay, very occasional gravel; 0.13m deep.</td>
<td>Subsoil</td>
<td>Post-medieval</td>
<td>NAI</td>
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<td>(008003)</td>
<td>Yellow-orange clay.</td>
<td>Natural</td>
<td>Natural</td>
<td>NAI</td>
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<td>009 ENE-WSW</td>
<td>A: 281699 473471</td>
<td>(009001)</td>
<td>Mid-brown silty clay, very occasional small stones &amp; gravel; 0.30m deep.</td>
<td>Topsoil</td>
<td>Modern</td>
<td>NAI</td>
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<td>B: 281684 473444</td>
<td>(009002)</td>
<td>Mid-orange-brown silty clay, very occasional gravel; 0.10m deep.</td>
<td>Subsoil</td>
<td>Post-medieval</td>
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<td></td>
<td>(009003)</td>
<td>Mid-brown-orange silty clay; 0.15m deep.</td>
<td>Colluvium</td>
<td>Natural</td>
<td>NAI</td>
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<td>(009004)</td>
<td>Yellow-orange clay.</td>
<td>Natural</td>
<td>Natural</td>
<td>NAI</td>
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<td>010 WNW-ESE</td>
<td>A: 281687 473477</td>
<td>(010001)</td>
<td>Mid-brown silty clay, very occasional small stones &amp; gravel; 0.38m deep.</td>
<td>Topsoil</td>
<td>Modern</td>
<td>NAI</td>
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<td>B: 281678 473506</td>
<td>(010002)</td>
<td>Mid-orange-brown silty clay, very occasional gravel; 0.12m deep.</td>
<td>Subsoil</td>
<td>Post-medieval</td>
<td>NAI</td>
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<td>(010003)</td>
<td>Yellow-orange clay.</td>
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<td>011 WNW-ESE</td>
<td>A: 281670 473572</td>
<td>(011001)</td>
<td>Mid-brown silty clay, very occasional small stones &amp; gravel; 0.40m deep.</td>
<td>Topsoil</td>
<td>Modern</td>
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<td>B: 281656 473599</td>
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<td>Mid-orange-brown silty clay, very occasional gravel; 0.30m deep.</td>
<td>Subsoil</td>
<td>Post-medieval</td>
<td>NAI</td>
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<td>(011003)</td>
<td>Yellow-orange clay.</td>
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<td>NAI</td>
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<td>012 NNW-SSE</td>
<td>A: 281677 473466</td>
<td>(012001)</td>
<td>Mid-brown silty clay, very occasional small stones &amp; gravel; 0.40m deep.</td>
<td>Topsoil</td>
<td>Modern</td>
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<td>B: 281648 473473</td>
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<td>Mid-orange-brown silty clay, very occasional gravel; 0.12m deep.</td>
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<td>Post-medieval</td>
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<td>Description</td>
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<td>NW-SE</td>
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<td>(013001) Deposit</td>
<td>Natural</td>
<td>Mid-brown silty clay, very occasional small stones &amp; gravel; 0.36m deep.</td>
<td>Topsoil</td>
<td>Modern</td>
<td>NAI</td>
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<td>(013002) Deposit</td>
<td>Natural</td>
<td>Mid-orange-brown silty clay, very occasional gravel; 0.30m deep.</td>
<td>Subsoil</td>
<td>Post-medieval</td>
<td>NAI</td>
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<td></td>
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<td>(013003) Deposit</td>
<td>Natural</td>
<td>Yellow-orange clay.</td>
<td></td>
<td>Natural</td>
<td>NAI</td>
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<tr>
<td>013</td>
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<td>(014001) Deposit</td>
<td>Natural</td>
<td>Mid-brown silty clay, very occasional small stones &amp; gravel; 0.28m deep.</td>
<td>Topsoil</td>
<td>Modern</td>
<td>NAI</td>
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<td></td>
<td></td>
<td>(014002) Deposit</td>
<td>Natural</td>
<td>Mid-orange-brown silty clay, very occasional gravel; 0.30m deep.</td>
<td>Subsoil</td>
<td>Post-medieval</td>
<td>NAI</td>
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<td></td>
<td></td>
<td>(014003) Deposit</td>
<td>Natural</td>
<td>Yellow-orange clay.</td>
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<td>Natural</td>
<td>NAI</td>
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<td>014</td>
<td>WNW-ENE</td>
<td>(015001) Deposit</td>
<td>Natural</td>
<td>Mid-brown silty clay, very occasional small stones &amp; gravel; 0.30m deep.</td>
<td>Topsoil</td>
<td>Modern</td>
<td>NAI</td>
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<td></td>
<td>(015002) Deposit</td>
<td>Natural</td>
<td>Mid-orange-brown silty clay, very occasional gravel; 0.12m deep.</td>
<td>Subsoil</td>
<td>Post-medieval</td>
<td>NAI</td>
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<td></td>
<td></td>
<td>(015003) Deposit</td>
<td>Natural</td>
<td>Yellow-orange clay.</td>
<td></td>
<td>Natural</td>
<td>NAI</td>
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<td></td>
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<td>(015004) Deposit</td>
<td>Natural</td>
<td>Yellow-orange clay.</td>
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<td>Natural</td>
<td>NAI</td>
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<tr>
<td>015</td>
<td>NE-SW</td>
<td>(016001) Deposit</td>
<td>Natural</td>
<td>Mid-brown silty clay, very occasional small stones &amp; gravel; 0.30m deep.</td>
<td>Topsoil</td>
<td>Modern</td>
<td>NAI</td>
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<td></td>
<td>(016002) Deposit</td>
<td>Natural</td>
<td>Mid-orange-brown silty clay, very occasional gravel; 0.20m deep.</td>
<td>Subsoil</td>
<td>Post-medieval</td>
<td>NAI</td>
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<td>(016003) Deposit</td>
<td>Natural</td>
<td>Mid-orange-brown silty clay, very occasional gravel; 0.40m deep.</td>
<td>Colluvium</td>
<td>Natural</td>
<td>NAI</td>
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<td>(016004) Deposit</td>
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<td>Yellow-orange clay.</td>
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<td>017</td>
<td>N-S</td>
<td>Deposit</td>
<td>Mid-brown silty clay, very occasional small stones &amp; gravel; 0.30m deep.</td>
<td>Topsoil</td>
<td>-</td>
<td>Modern</td>
<td>NAI</td>
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<td>(017001)</td>
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<td>(017002)</td>
<td>Mid-orange-brown silty clay, very occasional gravel; 0.32m deep.</td>
<td>Subsoil</td>
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<td>Post-medieval</td>
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<td>(017003)</td>
<td>Grey-orange clay.</td>
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<td>NAI</td>
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<tr>
<td>018</td>
<td>NW-SE</td>
<td>Deposit</td>
<td>Mid-brown silty clay, very occasional small stones &amp; gravel; 0.34m deep.</td>
<td>Topsoil</td>
<td>-</td>
<td>Modern</td>
<td>NAI</td>
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<td>(018002)</td>
<td>Mid-orange-brown silty clay, very occasional gravel; 0.29m deep.</td>
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<td>Post-medieval</td>
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<td>(018003)</td>
<td>Yellow-orange clay.</td>
<td>Natural</td>
<td>-</td>
<td>Natural</td>
<td>NAI</td>
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<td></td>
<td></td>
<td>Cut</td>
<td>Unknown size and shape in plan; sides slightly concave; c. 0.8m deep.</td>
<td>Pit/drainage feature containing C20 agricultural waste &amp; building material</td>
<td>-</td>
<td>Modern</td>
<td>NAI</td>
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<td>(018004)</td>
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<td>Basal fill of [018004]</td>
<td>Brick</td>
<td>Wood</td>
<td>Modern</td>
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<td></td>
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<td>(018005)</td>
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<td>Deposit</td>
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<td>Glass Brick Metal Wood</td>
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<td>019</td>
<td>WNW-ESE</td>
<td>Deposit</td>
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<td>Topsoil</td>
<td>-</td>
<td>Modern</td>
<td>NAI</td>
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<td>(019002)</td>
<td>Mid-orange-brown silty clay, very occasional gravel; 0.20m deep.</td>
<td>Subsoil</td>
<td>-</td>
<td>Post-medieval</td>
<td>NAI</td>
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<td>(019003)</td>
<td>Grey-orange clay.</td>
<td>Natural</td>
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<tr>
<td>020</td>
<td>ENE-WSW</td>
<td>281578 473526 / 281567 473498</td>
<td>(020001)</td>
<td>Deposit</td>
<td>Mid-brown silty clay, very occasional small stones &amp; gravel; 0.30m deep.</td>
<td>Topsoil</td>
<td>Modern</td>
<td>NAI</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>(020002)</td>
<td>Deposit</td>
<td>Mid-orange-brown silty clay, very occasional gravel; 0.26m deep.</td>
<td>Subsoil</td>
<td>Post-medieval</td>
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<td></td>
<td></td>
<td></td>
<td>(020003)</td>
<td>Deposit</td>
<td>Grey-orange clay.</td>
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<td>Natural</td>
<td>NAI</td>
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<tr>
<td>021</td>
<td>NE-SW</td>
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<td>Topsoil</td>
<td>Modern</td>
<td>NAI</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(021002)</td>
<td>Deposit</td>
<td>Mid-orange-brown silty clay, very occasional gravel; 0.09m deep.</td>
<td>Subsoil</td>
<td>Post-medieval</td>
<td>NAI</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>(021003)</td>
<td>Deposit</td>
<td>Grey-orange clay.</td>
<td>Natural</td>
<td>Natural</td>
<td>NAI</td>
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<td>022</td>
<td>N-S</td>
<td>281606 473609 / 281596 473609</td>
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<td>Modern</td>
<td>NAI</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>(022002)</td>
<td>Deposit</td>
<td>Mid-orange-brown silty clay, very occasional gravel; 0.09m deep.</td>
<td>Subsoil</td>
<td>Post-medieval</td>
<td>NAI</td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td>(022003)</td>
<td>Deposit</td>
<td>Yellow-orange clay.</td>
<td>Natural</td>
<td>Natural</td>
<td>NAI</td>
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<td>NAI</td>
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<td></td>
<td></td>
<td>(023002)</td>
<td>Deposit</td>
<td>Mid-orange-brown silty clay, very occasional gravel; 0.11m deep.</td>
<td>Subsoil</td>
<td>Post-medieval</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>[023004]</td>
<td>Cut</td>
<td>Linear in plan; orientated NNE-SSW; break of slope top moderate, sides moderately sloping, break of slope base gradual, base slightly undulating to near-flat; L=N/A W=0.23m D=0.09m.</td>
<td>Cut of a probable plough scar</td>
<td>Post-medieval</td>
<td>No significant archaeology identified (NSA)</td>
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<tr>
<td>024</td>
<td>(023005) Deposit</td>
<td>NW-SE A: 281567 473599 B: 281550 473624</td>
<td>Friable, light brownish-grey silty clay; L=N/A W=0.23m D=0.09m.</td>
<td>Fill of probable plough scar [023004]</td>
<td>-</td>
<td>Post-medieval</td>
<td>NSA</td>
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<tr>
<td></td>
<td>(024001) Deposit</td>
<td></td>
<td>Mid-brown silty clay, very occasional small stones &amp; gravel; 0.30m deep.</td>
<td>Topsoil</td>
<td>-</td>
<td>Modern</td>
<td>NAI</td>
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<td>Post-medieval</td>
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<td></td>
<td>(024003) Deposit</td>
<td></td>
<td>Yellow-orange clay.</td>
<td>Natural</td>
<td>-</td>
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<td>Mid-brown silty clay, very occasional small stones &amp; gravel; 0.40m deep.</td>
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<tr>
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<td>(025002) Deposit</td>
<td></td>
<td>Mid-orange-brown silty clay, very occasional gravel; 0.23m deep.</td>
<td>Subsoil</td>
<td>-</td>
<td>Post-medieval</td>
<td>NAI</td>
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<tr>
<td></td>
<td>(025003) Deposit</td>
<td></td>
<td>Mid-orange clay, pockets of sandy silty clay, occasional small stones &amp; gravel.</td>
<td>Natural</td>
<td>-</td>
<td>Natural</td>
<td>NAI</td>
<td></td>
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<tr>
<td></td>
<td>[025004] Cut</td>
<td>(025005)</td>
<td>Linear in plan; orientated WNW-ESE; break of slope top moderate, sides concave to moderately sloping, break of slope base gradual, base undulating; L=N/A W=0.35m D=0.11m.</td>
<td>Cut of a probable plough scar</td>
<td>-</td>
<td>Post-medieval</td>
<td>No significant archaeology identified (NSA)</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>(025005) Deposit</td>
<td></td>
<td>Friable, mid-brownish-grey silty clay; L=N/A W=0.35m D=0.11m.</td>
<td>Fill of probable plough scar [025004]</td>
<td>-</td>
<td>Post-medieval</td>
<td>NSA</td>
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</tbody>
</table>
7 Conclusions

The evaluation trenching revealed no evidence of significant archaeological features or deposits.

The natural substrate was encountered at a depth of between 0.36m-0.95m below ground level. The natural varied from mid-brownish-orange clay containing pockets of sandy silty clay and occasional small stones and gravel to yellowish-/greyish-orange clay with occasional small to medium stones and gravel.

A number of amorphous features representing areas of bioturbation and a series of modern land drains were identified in several trenches and these, together with the various changes in the natural geology noted throughout the evaluation area, may account for some of the potential features identified in the geophysical survey results.

The narrow and shallow nature of the two linear features identified in Trenches 023 and 025 suggest these probably represented plough damage; the features were aligned with the remnants of ridge and furrow cultivation recorded by the geophysical survey.

The area of disturbance identified towards the SE corner of the site in the survey results represented a modern pit/drainage feature [018004] revealed in Trench 018, which appears to have been backfilled approximately 30 years ago (Mark Newton (landowner) pers. comm.). The fill consisted of 20\textsuperscript{th} century agricultural waste and building material, including barbed-wire fencing, metal agricultural equipment, bricks and glass (not retained). Investigation to the base of the feature confirmed its date as modern and, following on-site discussion with the archaeological monitor, no further recording of this feature was undertaken.

No finds were recovered during the course of the evaluation.

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9 Bibliography


CIfA, 2014a, Standard and Guidance for archaeological field evaluation
CIfA, 2014b, *Standard and guidance for archaeological geophysical survey*

CIfA, 2014c, *Standard and Guidance for the collection, documentation, conservation and research of archaeological materials*

CIfA, 2014d, *Code of conduct*


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</tr>
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<td>Final</td>
<td>April 2016</td>
<td>Neil Shurety Dip. M G M Inst M</td>
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APPENDIX 18

TRANSPORT STATEMENT
TRANSPORT STATEMENT

TRANSPORT STATEMENT IN RELATION TO THE PLANNING APPLICATION FOR THE INSTALLATION AND OPERATION OF AN ANAEROBIC DIGESTION FACILITY INCLUDING THE ERECTION OF SILAGE CLAMPS, DIGESTER TANKS, TECHNICAL BUILDING, GAS FLARE, WEIGHBRIDGE AND SITE OFFICE/WELFARE BUILDING AND THE INSTALLATION ANCILLARY PLANT AND EQUIPMENT, ALTERATIONS TO THE HIGHWAY ACCESS AND INTERNAL ROAD, INSTALLATION OF LAGOONS AND ATTENUATION POND, HIGHWAY IMPROVEMENTS AND LANDSCAPING AND ENVIRONMENTAL ENHANCEMENT MEASURES

AT

WORMSLADE FARM
CLIPSTON ROAD
KELMARSH
NORTHAMPTONSHIRE
LE16 9RX

Prepared by:

Phil Plant BSc (Hons) MRICS
Rural Planning Consultant
Mid West Planning Ltd
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Shropshire
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November 2015
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2. EXISTING USE OF THE FARM 5
3. LOCALLY SOURCED FEEDSTOCK 7
4. IMPLICATIONS OF THE SCHEME ON THE A508 TRAFFIC FLOW 7
5. LAYOUT OF THE SITE 8
6. CONCLUSION 9

APPENDIX ONE:- A508 TRAFFIC MOVEMENT FROM A14 TO A508 LOCAL AUTHORITY BOUNDARY (JUST SHORT OF MARKET HARBOROUGH - DAILY FLOWS
1. **INTRODUCTION**

1.1 This report has been produced by Philip Plant of Mid West Planning Ltd and is based on the information provided by the applicants and the prospective operators of the anaerobic digestion facility at Wormslade Farm.

1.2 Philip Plant holds a Bachelor of Science with Honours Degree in Rural Enterprise and Land Management and is a member of the Royal Institution of Chartered Surveyors.

1.3 Philip Plant is a Director of Mid West Planning Limited and is a former employee of ADAS and Acorus Rural Property Services. Mid West Planning Ltd has been established for over five years and specialises in rural planning consultancy to both the private and public sectors.

1.4 The preparation of this report by Mid West Planning Ltd has been commissioned by the applicant; Mr Stuart Homewood of Raw Energy Ltd.

**Plate One:** Location of application site at Wormslade Farm showing the access to the Clipston Lane, and the junction with the A508.

1.5 The site is located in open countryside at Wormslade Farm, Kelmarsh, Northamptonshire LE16 9RP. Please see Plate One above which shows the location of the site to the west of the A508 highway north of Clipston Road.
2. **EXISTING USE OF THE FARM**

2.1 The field in which the proposed anaerobic digestion facility will be located is all currently laid down to arable production. The farm buildings at Wormslade Farm comprise a large grain storage building which is currently used in associated with the farming operation, a small range of traditional buildings, Dutch barn and a disused grain drying building.

![Existing grain storage building and access road.](image)

**Plate Two:** Existing grain storage building and access road.

2.2 The proposals involve the annual movement to the Wormslade Farm anaerobic digestion facility, feedstock consisting of 46,000 tonnes of material comprising: -

<table>
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<tr>
<th>Feedstock/ Digestate</th>
<th>Tonnage</th>
<th>Vehicle Movements</th>
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<tbody>
<tr>
<td>Maize Silage</td>
<td>18,000</td>
<td>1,286 x 14 tonne farm trailers</td>
</tr>
<tr>
<td>Grass Silage</td>
<td>5,000</td>
<td>351 x 14 tonne farm trailers</td>
</tr>
<tr>
<td>Wholecrop Rye</td>
<td>18,000</td>
<td>1,286 x 16m³ tanker loads</td>
</tr>
<tr>
<td>Slurry</td>
<td>5,000m³</td>
<td>250 x 20m³ tanker loads</td>
</tr>
<tr>
<td>Total feedstock</td>
<td>46,000</td>
<td>3,173 vehicle movements in</td>
</tr>
</tbody>
</table>

2.3 In addition to the movement of feedstock to the facility there will be the movement away from the plant and onto surrounding fields of approximately 12,000 tonnes solid digestate and approximately 24,000 tonnes of liquid digestate.

<table>
<thead>
<tr>
<th>Digestate</th>
<th>Tonnage</th>
<th>Vehicle Movements</th>
</tr>
</thead>
<tbody>
<tr>
<td>Solid Digestate</td>
<td>12,000</td>
<td>857 x 14 tonne farm trailers</td>
</tr>
<tr>
<td>Liquid Digestate</td>
<td>24,000m³</td>
<td>1,500 x 16m³ tanker loads</td>
</tr>
<tr>
<td>Total</td>
<td>36,000</td>
<td>2,357 vehicle movements out</td>
</tr>
</tbody>
</table>
2.4 In reality to save time and to maximise efficiency vehicles returning to fields will have the opportunity to carry solid digestate on some return journeys which will reduce the number of vehicle movements for feedstock and digestate transfers. However in a worst-case-scenario a maximum of approximately 5,530 can be expected throughout the year. This equates to 15-16 movements per day on average.

2.5 It is important to remember that the crops grown on the land used for feedstock already generate vehicle movements at harvest time, and throughout the year. Often crops such as grain can be transported much greater distance to their final place of processing or consumption. Likewise, artificial fertilisers are transported many miles from the place of manufacture to the field. The use of locally sourced organic fertiliser in the form of digestate will greatly reduce the carbon footprint relating to the manufacture and transportation of such fertiliser inputs on farms contracted to supply Wormslade Anaerobic Digestion Plant.

2.6 As requested at the public consultation meeting at Great Oxendon, an assessment to quantify peak vehicle movements associated with the movement of feedstock and digestate assumptions have been made. This assessment has necessarily made assumptions about the timing of operations. Seasonal and other factors will affect these assumptions.

### Table One: Depict estimated vehicle movements associated with feedstock and digestate on a daily basis throughout the year.

2.7 The maize harvest will take place in the autumn. If we assume an 80 day harvest window during October, November and the first 10 days of December each year, there will be some 19 vehicle movements a day attributed to bringing in the maize crop and returning to the field. During this period total peak vehicle movements will be 21 per day of manures brought to the site for feedstock. The use of manures at this time of year will help local farmers meet the no spreading obligation during this part of the year.
2.8 Grass and whole crop silage harvest is likely to take place over a longer period between May and August resulting in peak vehicle movements of approximately 19 per day.

2.9 During December and January when there are no crops to harvest and digestate cannot be applied to the land, vehicle movements will fall to around four to five per day.

3. **LOCALLY SOURCED FEEDSTOCK**

3.1 The recently introduced UK Sustainable Standards for the operation of the anaerobic digestion facility ensure that the operation, including the supply of feedstocks and disposal of the digestate is carried out to the highest standards of sustainable production. These standards are in place to ensure that renewable energy production is in fact sustainably achieved. In order to meet these standards the operator of the facility will have to prepare audited reports about where the feedstock is sourced, where the digestate is disposed of, and how the plant is run. Only locally sourced feedstock using the digestate as a fertiliser replacing artificial fertilisers will meet the required level of sustainability, therefore it is essential to source feedstock from the immediate locality.

3.2 Please refer to the Planning Statement for more information about the UK Sustainability Standards.

3.3 The applicants and operators will have to keep records of the sources of feedstocks and destination of digestate materials to comply with the Environment Agency’s Standard Rules and to be able to demonstrate compliance with the UK Sustainability Standards.

3.4 A suitably worded planning condition ensuring that the Local Planning Authority should be given access to these records to check that the stated quantities are not exceeded and that the feedstock is sourced, and the digestate is disposed of within a ten mile radius of the facility, is considered a reasonable measure to ensure that the anaerobic digestion plant at Wormslade Farm minimises the potential impact on the highway network and maintains a positive economic and employment benefit to the local community.

4. **IMPLICATIONS OF THE SCHEME ON THE A508 TRAFFIC FLOW**

4.1 Data has been obtained for traffic flow on the A508 from year 2000 to 2014. The number of heavy goods vehicle movements has decreased from 271 per day in 2000 to 194 in 2014. This represents a decrease in HGV numbers by 77 vehicles per day, or approximately 28.5% over this period. Please see Appendix One for more information.

4.2 Total vehicle numbers have fallen from 6298 in year 2000 to 5462 in 2014. This represents a decrease in all vehicle numbers by 836 vehicles per day, or approximately 13.25% over this period.
Table Two: Chart showing the decline in the number of HGVs and all vehicles using the A508 between years 2000 & 2014.

4.3 The decrease in vehicle movements on this section of the A508 is significant and will not be materially affected by the introduction of the Wormslade Anaerobic Digestion Plant traffic.

5. LAYOUT OF THE SITE

5.1 The extract from the site plan (P15-WORMSLADE-AD-003) contained below at Plate Three shows the proposed layout and arrangement of the site with dedicated access road for digester facility traffic.

5.2 Pre-application discussions with Northamptonshire Highways Department confirmed that the existing access onto the Clipston Road would require improvement works to meet current highways standards. The improvement works comprise the establishment of visibility splays to the east and west 4.0m x 215m and the widening of the site access road to 8m in order to accommodate traffic accessing and exiting the site simultaneously. It is recommended by the Landscape Architect in his Landscape and Visual Impact Assessment of the proposals, that the existing roadside hedge is translocated to the new position if possible.
5.3 County Highways have also recommended widening the road to Clipston from the access to the site to the junction with the A508. This will be widened slightly to 6m for this length of highway.

5.4 As part of the scheme we propose to make highway improvements to the junction of the road to Clipston and the A508 to allow for the safer flow of traffic when vehicles are turning into the road to Clipston. These improvements include increasing the turning radius on the northern side of the junction from 5m to 14m, and on the south side from 5m to 15m, whilst retaining visibility splays of 4m x 215m. Please refer to the plan submitted (ref: HI01-R1-Wormslade-A0-Highway Improvements) for more details about this improvement scheme.
6. CONCLUSION

6.1 This application is to develop and operate a farm based anaerobic digestion plant at Wormslade Farm which will operate using approximately 90% farm crops and 10% agricultural animal faeces only. The resulting bio-methane will be injected directly into the nearby National Gas Grid rather than generate electricity on site or be transported by road form site.

6.2 The vehicle movements required for the transportation of feedstocks and digestate equate to peak season journeys per day of 21. There will be peaks and troughs in vehicle movements, particularly during the maize harvesting season in October, November and early December. The figures for transportation need to be considered in light of the fact that crops are already produced and transported on the land that will be used for feedstock production, as is fertiliser and other inputs, therefore the transportation impacts are somewhat less than stated.

6.3 The vehicle movements associated with the proposed Wormslade Anaerobic Digestion Plant will not have a materially significant impact on the reducing numbers of HGV and all vehicle movements on the A508.

Phil Plant BSc (Hons) MRICS
Planning Consultant
Mid West Planning Ltd.

November 2015.
APPENDIX ONE

A508 TRAFFIC MOVEMENT FROM A14 TO A508 LOCAL AUTHORITY BOUNDARY
(JUST SHORT OF MARKET HARBOROUGH - DAILY FLOWS)
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<td>914</td>
<td>194</td>
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</tbody>
</table>
Proposed Site Layout

Client: RAW Energy

Project: Wormslade Farm AD Facility

Great Oxendon

Northamptonshire

LE16 9RP
1.0 Introduction

1.1 This Construction Traffic Management Plan (CTMP) has been prepared on behalf of RAW Energy to support the proposed development for an Anaerobic Digestion (AD) Facility on land at Wormslade Farm, off the Clipston Road, Kelmarsh, Northamptonshire.

1.2 The works described in this CTMP involve the construction of an AD facility which will generate renewable gas for connection to the local gas distribution network. The AD process will produce a biogas, consisting of methane and carbon dioxide, and this is cleaned, processed and upgraded before being injected into the National Grid. In essence, the AD plant will be an extension of existing agricultural operations. The site masterplan is included in Appendix A.

2.0 Site Location

2.1 The site is currently open agricultural land in arable cultivation, in immediate proximity to the west and south of the site is a range of existing agricultural buildings.

2.2 Access to the site will be from the A508 and then head eastwards along the Clipston Road for a short distance to the site entrance. Pre-application consultation with Verity Chilver, Development Management Engineer at Northamptonshire Highways Department resulted in advice about the required visibility splay from the site on to Clipston Road, and the widening of the road to the junction with the A508. Any works necessary at the site access and any carriageway widening proved to be required would need to be carried out by the developer under a Section 278 Agreement with the local highway authority.

3.0 Local Highway Network

3.1 The junction with the A508 will require improvement which will be of benefit to the community, particularly Clipston village.
4.0 Management of the Plan

4.1 Contact details for the site supervisor/manager are not currently available at this time, but will be provided to the Northamptonshire County Council (Local Planning Authority) prior to commencement of works.

5.0 Traffic Generation

5.1 The largest quantities of material to be delivered to the site will be ready mix concrete and aggregate. It is anticipated that for the construction process approximately 400-500 tonnes of aggregate (20-30 deliveries), a day will be required for the first 60 days (When practical we will use articulated trucks to reduce the number of deliveries). The second phase will relate to the input of concrete and will generate around 50m$^3$ a day (approximately 8 deliveries). The final phase will be for the concrete for internal road construction and during this phase it is anticipated there will be between 10 and 20 deliveries a day.

5.2 Precast silage clamp wall units will be delivered on articulated lorries at a frequency of approximately 3 loads per day, when required. Local residents will be made aware of significant deliveries along the construction route. It is anticipated that the site manager will approach residents individually if necessary.

5.3 Precast tank panels will be delivered by flatbed articulated lorries over a 2 day period, up to 15 loads per day may be required. This will happen on two separate occasions during the course of the project.

5.4 The majority of the deliveries will be made by concrete trucks and low loader vehicles. The average maximum number of deliveries a day will therefore be 25. Based on a 10 hour working day, with a restriction of 2 one-hour peak periods (and therefore allowing 8 hours delivery time), this equates to around a maximum of 3 deliveries per hour. Deliveries of concrete and aggregate at the same time will only occur on 1 or 2 days throughout the construction period. On such
occasions traffic management measures will be in place, as set out further in section 12.

6.0 Traffic Routeing and Distribution

6.1 Further detail of the delivery route is not currently available, it is within the environmental policy procedures of the contractors to source local materials and generally delivery distances dictate cost, therefore it is in all interests to source materials as locally as possible.

6.2 Construction deliveries will not be permitted to reach site via Clipston or Arthingworth. The deliveries will be routed by the A508 only. Deliveries will pass by Great Oxendon on the A508 but will not be permitted to access the village itself.

7.0 Pre-Commencement and Post Construction Highway Condition Survey

7.1 A Pre-Commencement Highway Condition Survey will be carried out on the Clipston Road in conjunction with the Highways Authority prior to the commencement of the project.

7.2 A Post Construction Highway Construction Survey will also be undertaken in conjunction with the Highways Authority to determine if any damage has been caused by construction traffic to the Clipston Road on completion of the project.

8.0 Site Working Hours

8.1 Unless otherwise agreed in writing by the Local Planning Authority, working hours will be Monday-Friday 07:30-18:30 and Saturday 09:00-13:30. At the current time construction activities are not envisaged on Sundays or Bank Holidays.

8.2 Deliveries can be timed outside of network peak periods, if requested by the Local Planning Authority.
9.0 Site Control and Security

9.1 All necessary measures required for the protection of the public have been planned taking into account Section 3 of the Health and Safety at Work etc. Act 1974 and particularly, the recommendations contained in the Health and Safety Executive Guidance HSG151 'Protecting the Public – Your next move'.

9.2 The site will be made secure at the start of the works and this will be maintained during the construction period. The proposed access junction will be kept unobstructed at all times. The entrance gates will be set back from Clipston Road to enable a minimum of one HGV vehicle to park off the public road.

10.0 Parking and Loading Arrangements / Access to Site

10.1 Principal access to the site will be via Clipston Road. It is understood that the access will be used for construction and operation.

10.2 The site is large enough to accommodate all site parking during the construction period; therefore no additional off-site parking is necessary.

10.3 There are no options available for the use of rail or waterway to deliver materials to the site given its location.

10.4 Vehicular movements to / around / within the site will be controlled in a manner which:

- confines all site traffic to the designated sign-posted routes to limit any potential off-site impact as far as is feasible;
- segregates pedestrian movements from construction and vehicular traffic so far as is reasonably practicable;
- ensures the access is wide enough to accommodate two vehicles, or alternatively prevent two vehicles using the access at the same time through site management/delivery management procedures;
- reversing vehicles are to be avoided so far as reasonably practicable.
11.0 Scheduling Deliveries

11.1 If feasible, a delivery timing/booking system will be adopted, but all deliveries are requested to arrive on site outside the hours of 08:00-09:00 and 17:00-18:00.

11.2 Where applicable, construction material will be procured from local suppliers. This will help to further reduce travelling distances and numbers of deliveries to the site.

12.0 Cranes / Road Closures

12.1 It is not anticipated that any complete road closures will be necessary for the construction of the AD facility. However the Section 278 works and Gas Connection will require some form of Traffic management. This will be carried out in accordance with Chapter 8 guidelines and will be notified to NCC as required.

13.0 Site Tidiness

13.1 Materials will be delivered to site in quantities that can be reasonably stored, to suit site progress and enable uninhibited access around the construction site.

14.0 Control & Prevention of Debris from Public Roads and Places

14.1 There is no intention to remove surplus soils from site and as such it is not anticipated that significant quantities of existing material will be taken from the site.

14.2 All efforts will be made to ensure that soils or debris are not carried on to the public road by vehicles. A pressure washer shall be kept on site to clean wheels of outgoing construction traffic as and when conditions require.

15.0 Noise Control
15.1 Any noise (direct and indirect) generated by the operations necessary for construction work will be assessed and appropriate action will be implemented to protect everyone who could be affected (site personnel, neighbouring personnel in surrounding buildings and general public) as required by *The Control of Noise at Work Regulations 2005*. Noise will be suppressed at source wherever practicable, to comply with the current site environmental conditions and restrictions/regulations.

16.0 **Air Quality and Dust Management Plan**

16.1 Dust is a potential health hazard to anyone in the vicinity (site personnel and the general public) and this includes smoke and fumes. Dust concentration will be maintained below the levels set out in the current edition of *EH 40/2005 Workplace Exposure Limits*.

17.0 **Summary/ Conclusions**

17.1 The site has been reviewed in terms of construction traffic impacts with regards to traffic generation, routeing and general site operations.

17.2 Traffic management measures will be adopted on certain occasions to ensure deliveries can travel to and from the site without causing congestion.
APPENDIX 19

LANDSCAPE AND VISUAL IMPACT ASSESSMENT
PROPOSED AD PLANT AT WORMSLADE FARM, KELMARSH NORTHAMPTONSHIRE

LANDSCAPE & VISUAL IMPACT APPRAISAL

Prepared for: Green Bee Planning Ltd

Prepared by: Allan Moss Associates Ltd
Culmeyre House
Holmer Lane
Telford
TF3 1QJ

November 2015
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1.4 Study Area

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2.3 Range of Potential Landscape & Visual Effects

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11.1 Definition
11.2 Magnitude of Visual Effects Criteria
11.3 Assessment of Magnitude of Visual Effects

12.0 OVERALL LEVEL OF VISUAL EFFECTS
12.1 Approach to Combining Judgements
12.2 Overall Level of Effects Criteria
12.3 Assessment of Overall Level of Visual Effects

13.0 LANDSCAPE MITIGATION AND ENHANCEMENT
13.1 Recommendations

REFERENCES

APPENDICES
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B Location Plan
C Aerial Photographs (May 2009)
D Photographs 1 to 12
E Public Rights of Way
F Visual Receptor Plan
G Descriptions of National Character Area 89: Northamptonshire Vales and National Character Area 95: Northamptonshire Uplands
H Extracts from Northamptonshire Current Landscape Character Assessment Strategy and Guidelines
I Extracts from Northamptonshire Historic Landscape Character Assessment Strategy and Guidelines
J Extracts from Northamptonshire Biodiversity Character Assessment Strategy and Guidelines
1.0 INTRODUCTION

1.1 Scope of Report

1.1.1 Green Bee Planning Ltd is proposing to develop an anaerobic digester plant on land at Wormslade Farm, Kelmarsh, Northamptonshire. Allan Moss Associates Ltd has been appointed as the landscape consultant to this project.

1.1.2 This Landscape & Visual Impact Appraisal provides an evidence base to inform the decision making process from a landscape character and visual amenity perspective. In particular the report covers the following matters:

- Description of the proposed development and identification of the range of potential landscape and visual effects;
- Description of the site and the surrounding locality and the identification of potential visual receptor locations relevant to the proposed development;
- Identification of relevant landscape character classifications;
- Assessment of landscape value and landscape susceptibility against appropriate criteria;
- Assessment of the magnitude of the landscape effects of the proposed development against appropriate criteria;
- Assessment of the overall level of landscape effects against appropriate criteria;
- Assessment of visual amenity value and visual receptor susceptibility against appropriate criteria;
- Assessment of the magnitude of the visual effects of the proposed development against appropriate criteria;
- Assessment of the overall level of visual effects against appropriate criteria;
- Making recommendations for appropriate landscape mitigation and enhancement measures.

1.1.3 The report has been prepared by Allan Moss who is a chartered landscape architect and town planner with over 35 years' experience in both private and public sectors. He was involved in preparing the Landscape Institute/IEMA’s Guidelines on best practice for landscape and visual impact assessment (GLVIA), published in April 2002(1).

1.1.4 The site and the surrounding landscape was visited in October/November 2015 for the purpose of preparing this appraisal.

1.1.5 A list of references is given at the end of this report and the various plans and photographs referred to are included as appendices. All the photographs, apart from aerial views, have been taken with a Canon EOS 5D MkIII DSLR camera (full frame sensor) fitted with a fixed 50mm lens. Photograph locations are indicated on the plan at Appendix F.
1.2 **Methodology**

1.2.1 The methodology used in this appraisal takes account of the 'Guidelines for Landscape and Visual Impact Assessment: Third Edition 2013’ (GLVIA3) \(^{(2)}\). The guidelines are not intended as a prescriptive set of rules. They indicate that landscape and visual impact studies can be undertaken at differing levels of detail depending on the scale and nature of the project. The approach adopted should be proportional to the scale of the project that is being assessed and the nature of its likely effects. The guidelines also advise that assessments should focus on the identification of the main effects. There is no requirement to assess all effects.

1.2.2 For non-EIA projects the guidelines specifically state that an assessment of the significance of effects should not be undertaken.

1.2.3 This is a non-EIA project and the level of detail provided in this landscape appraisal is considered to be sufficient to inform the decision making process for a development of this nature from a landscape character and visual amenity perspective.

1.3 **Limitations**

1.3.1 The effects of the proposed development on the surrounding locality are considered on the basis of views from publicly accessible locations only. No attempt is made to negotiate blocked or hazardous routes that may be unsafe to the assessor. Views from private property are generally considered on the basis of inter-visibility with the application site rather than visits to individual properties.

1.3.2 The assessment is based on fieldwork carried out during the autumn period when the trees were still partially in leaf. It is possible that parts of the site may be more visible in winter when there are no leaves on the trees.

1.3.3 Any heritage assets referred to in the assessment are assessed in accordance with the GLVIA3 guidelines (ie. as effects on people or the landscape resource at those locations). The assessment is not intended to be an assessment on heritage assets or their settings, as different guidance and methodology has to be used for assessing such potential heritage impacts.

1.4 **Study Area**

1.4.1 The study area is indicated on the plan at Appendix F, which identifies the main locations from where the proposed development might potentially be seen. This has been established by way of desk study and detailed observations in the field.
2.0 NATURE OF PROPOSED DEVELOPMENT

2.1 Summary of Proposed Development

2.1.1 The proposal is for the erection of an anaerobic digester facility with associated infrastructure, landscaping and ancillary structures to produce bio-methane for injection into the nearby national Gas Grid. Details of the proposed layout are indicated on the plan at Appendix A. The main features of this development are summarised below:

- 2 digester tanks each 31.31m diameter by 8.00m high with gas domes extending 4.94m high above. The floor level of these digester tanks will be set approximately 3.0m below the reduced ground level which is equal to approximately 4.6-6.7m below the original field ground levels. Taking account of the difference in ground levels the top of the gas domes will be approximately 2.1m lower than the ridge of the existing farm storage building and about 3.8m lower than the ridge of the open barn.
- 4 silage clamps each 119.00m x 20.00m x 5.50m high with a safety barrier 1.50m high on top of the walls.
- 3 bagged digestate stores set into earth banked lagoons (each 50.00m x 25.00m).
- A black water bagged system set into earth banked lagoons, and a white water attenuation pond.
- A technical building to house the feeders and CHP Unit 37.20m x 14.28m x 5.44m high.
- Various items of ancillary plant and equipment including a gas flare stack (6.25m high), intake tank, biogas upgrading and control systems, a separation container, network entry facility, propane tanks and a weighbridge.
- An office/welfare building (8.00m x 8.00m x 4.07m high to ridge).
- A new farm entrance area with alterations to the entrance and visibility splays.
- A graded 1:10 bund to the south and east with extensive landscape planting.
- Existing roadside hedge translocation at the site entrance to accommodate works to improve the highway visibility splays.

2.1.2 The digester tank walls would be finished in a dark green colour (Juniper Green) with dark grey gas domes. The Technical building would also be clad in Juniper green steel profiled sheets with fibre-cement roofing. The office/welfare building would be timber clad (Dark Oak) with Slate Grey profiled steel roofing. The silage clamps walls would have a natural concrete finish.

2.2 Construction Phase

2.2.1 It is anticipated that the construction period would last for approximately 9 months. During that period construction vehicles and machinery would be active on the site including excavators, dump trucks and haulage lorries.
2.2.2 Landscaping would be completed during the first planting season following occupation of the proposed buildings.

2.3 **Range of Potential Landscape & Visual Effects**

2.3.1 The range of potential landscape and visual effects that may arise from a development such as this are summarised below:

Direct effects on landscape elements, such as:
- agricultural land loss
- tree/hedgerow loss
- tree/hedgerow gain
- loss or gain of other characteristic landscape features

Effects on landscape character, such as:
- introduction of new buildings, structures, hardstandings, earthworks etc
- introduction of new landscaping

Effects on visual amenity, such as:
- public views from roads, footpaths & bridleways etc
- private views from residential properties
3.0 LANDSCAPE & VISUAL BASELINE

3.1 Description of Site and Surrounding Locality

3.1.1 The application site lies approximately 1.5km south of Great Oxendon, to the west of Harborough Road (A508), as indicated on the location plan at Appendix B.

3.1.2 The site is contained within a single field, currently in arable use, bounded by mature hedgerows, which are generally in good condition. The land falls gently across the site from south to north, between the 115-120m contours, as illustrated on the location plan. There is a group of existing agricultural buildings in the south-western corner of the site and some overhead cables running along the western site boundary. All the surrounding land is in agricultural use.

3.1.3 Existing features on the site and in the wider landscape are illustrated on the aerial photographs at Appendix C, which date from May 2009. Views towards the site from the surrounding locality are illustrated in the photographs at Appendix D.

3.1.4 Access to the site is from the north via an existing field entrance onto the unnamed road to Clipston, which runs along the northern site boundary. Harborough Road (A508) runs along the eastern boundary of the application site field. There is a disused railway line which runs partially on embankment and partially in cutting to the east of the A508. This has been transformed into a linear walk called the Brampton Valley Way. It is also used as part of other promoted routes including the MacMillan Way and the Midshires Way.

3.1.5 There are no public rights directly affecting the application site although there are a number of public rights of way in the local area with potential views of the site. A map is provided at Appendix E which identifies all public rights of way in the vicinity of the application site.

3.1.6 The site occupies the lower part of a minor valley through which flows Sidom’s Ford, a tributary to the River Ise. The valley sides rise immediately to the south of the site and to the north of Sidom’s Ford towards Great Oxendon. The valley supports a mix of arable and livestock farming. There is a mix of small, medium and large scale fields, regular to sub-regular in shape, bounded by hedgerows. There is good tree cover along the watercourse; in the hedgerows along the valley bottom; and along the dis-used railway. The valley sides tend to be more open.

3.2 General Visibility

3.2.1 Views of the application site are well contained to the south by rising ground; to the east by tree cover along the disused railway; and to the west by tree cover in the hedgerows and along the watercourse. There are longer distance views
towards the site from the north as the land rises towards Great Oxendon. However from this direction the site is seen against the backdrop of rising ground, with wooded slopes and a wind farm in the distance.

3.2.2 The general extent of visibility is represented by the visual envelope on the Visual Receptor Plan at Appendix F, which has been established by way of desk study and detailed observations in the field. The visual envelope is well defined to the north and south by local ridgelines and to the east by the tree-lined disused railway. To the west it is less well defined. It potentially extends to the high ground around Clipston although there is considerable intervening vegetation in between.

3.2.3 The main public views are from the north along the road to Clipston, the A508, and the settlement of Great Oxendon.

3.3 Visual Receptors

3.3.1 The main visual receptor locations with potential views of the site, based on detailed observations in the field, are listed in Table 1 below. Each location is numbered and can be cross referenced to the Visual Receptor Plan at Appendix F.

<table>
<thead>
<tr>
<th>Ref</th>
<th>Receptor Location</th>
<th>Distance from Site</th>
<th>Elevation (AOD)</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Road to Clipston</td>
<td>Adjacent</td>
<td>115-116m</td>
<td>Close view from site entrance (Photo 1)</td>
</tr>
<tr>
<td>2</td>
<td>Harborough Road (A508)</td>
<td>110-170m</td>
<td>115-120m</td>
<td>Site largely screened by perimeter vegetation (Photos 2 &amp; 3)</td>
</tr>
<tr>
<td>3</td>
<td>Bridleway CZ5</td>
<td>130-270m</td>
<td>115m</td>
<td>Partial view across north-east corner (Photo 4)</td>
</tr>
<tr>
<td>4</td>
<td>Footpath CZ4</td>
<td>100-400m</td>
<td>115m</td>
<td>Site largely screened by perimeter vegetation (Photo 5)</td>
</tr>
<tr>
<td>5</td>
<td>Brampton Valley Way</td>
<td>280-360m</td>
<td>118m</td>
<td>Occasional minor filtered views (Photo 6)</td>
</tr>
<tr>
<td>6</td>
<td>Clipston Road, Great Oxendon</td>
<td>1100-1400m</td>
<td>124-150m</td>
<td>Elevated long distance views (Photos 7 &amp; 8)</td>
</tr>
<tr>
<td>7</td>
<td>Bridleway DH10</td>
<td>1360-1460m</td>
<td>130-140m</td>
<td>Site largely screened by intervening vegetation (Photo 9)</td>
</tr>
<tr>
<td>8</td>
<td>Footpath DH6/CB14</td>
<td>1200-1500m</td>
<td>115-145m</td>
<td>Elevated long distance views (Photo 10)</td>
</tr>
<tr>
<td>9</td>
<td>Braybrooke Road</td>
<td>1760-1860m</td>
<td>145m</td>
<td>Elevated long distance views (Photo 11)</td>
</tr>
<tr>
<td>10</td>
<td>Footpath CB5</td>
<td>1620-1870m</td>
<td>135-145m</td>
<td>Elevated long distance views (Photo 12)</td>
</tr>
</tbody>
</table>
### Private locations with views of site:

<table>
<thead>
<tr>
<th></th>
<th>Dwellings on southern edge of Great Oxendon</th>
<th>1450-1550m</th>
<th>130-150m</th>
<th>Potential elevated long distance views</th>
</tr>
</thead>
</table>

NB. Elevations for receptor locations compare with an elevation of 115-120m AOD for the site.

3.3.2 The extent to which the proposed development would be seen from each of these receptor locations is considered in Section 11.3.
4.0 LANDSCAPE CHARACTER CLASSIFICATIONS

4.1 Definitions

4.1.1 GLVIA3 provides the following definitions:

"Landscape character: A distinct, recognisable and consistent pattern of elements in the landscape that makes one landscape different from another, rather than better or worse."

"Landscape classification: A process of sorting the landscape into different types using selected criteria but without attaching relative values to different sorts of landscape."

4.2 National Landscape Character Classifications (2014)

4.2.1 Natural England has published a national study describing broad areas of distinct landscape character. These national character areas provide a useful framework within which more detailed local studies can be carried out.

4.2.2 The application site is located at the interface of National Character Area 89: Northamptonshire Vales and National Character Area 95: Northamptonshire Uplands. Detailed descriptions of these character areas are provided at Appendix G.

4.3 Northamptonshire Environmental Character Assessment and Green Infrastructure Strategy (2006)

4.3.1 The Northamptonshire Environmental Character Assessment classifies the application site as falling within the ‘West Northamptonshire Uplands’ environmental character area.

4.3.2 The Environmental Character Assessment is comprised from three other more detailed studies: the Current Landscape Character Assessment, the Historic Landscape Character Assessment and the Biodiversity Character Assessment.

4.3.3 Under the Current Landscape Character Assessment the site is classified as falling within the ‘Undulating Hills and Valleys’ (13d Cottesbrooke and Arthingworth) near to the interface with the ‘Clay Plateau’ (5a Naseby Plateau). Relevant extracts for the ‘Undulating Hills and Valleys’ are provided at Appendix H.

4.3.4 Under the Historic Landscape Character Assessment the site is classified as falling within an area of ‘Pre-19th Century Non-Parliamentary Enclosure’ (1b Brampton Brook-River Ise Watershed). Relevant extracts for areas of ‘Pre-19th Century Non-Parliamentary Enclosure’ are provided at Appendix I.
4.3.5 Under the Biodiversity Character Assessment the site lies at the interface of the ‘Liassic Slopes’ (2i Ise Valley Liassic Slopes) and the ‘Minor Floodplain’ (101 River Ise). Relevant extracts both of these character areas are provided at Appendix J.
5.0 LANDSCAPE VALUE

5.1 Definition

5.1.1 GLVIA3 provides the following definition:

*Landscape value: The relative value that is attached to different landscapes by society. A landscape may be valued by different stakeholders for a whole variety of reasons."

5.1.2 Landscape value therefore involves a degree of subjectivity, in that it calls for comparisons between one landscape and another. All landscapes have value to someone. Landscapes of recognised value at a national, county or district level have traditionally been recognised by the making of landscape designations. However, in recent years national planning policy has discouraged the use of local landscape designations and these have now been revoked over substantial parts of the country.

5.2 Landscape Value Criteria

5.2.1 The landscape value criteria in Table 2 below have been developed to provide a recognisable scale against which any landscape area or landscape feature can be assessed.

<table>
<thead>
<tr>
<th>Table 2: Landscape Value Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>National/International Level</td>
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<tr>
<td>County/Regional Level</td>
</tr>
<tr>
<td>Parish/District Level</td>
</tr>
<tr>
<td>Local Level</td>
</tr>
<tr>
<td>Negligible or Negative</td>
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</tbody>
</table>
5.3 **Landscape Value Assessment**

5.3.1 There are no national or local landscape designations affecting the application site or the surrounding landscape.

5.3.2 The Brampton Valley Way to the east of the A508 is a promoted recreational route facilitating good public access to the countryside. However footpath provision to the west of the A508 is rather limited as illustrated on the plan at Appendix E.

5.3.3 Taking account of the criteria in Table 2, the application site and the immediate surrounding countryside is assessed as having Local Level Value. Similarly, existing landscape features on the site, such as the agricultural land, trees and hedgerows would have Local Level Value.
6.0 LANDSCAPE SUSCEPTIBILITY

6.1 Definition

6.1.1 GLVIA3 provides the following definition:
"Susceptibility: The ability of a defined landscape or visual receptor to accommodate the specific proposed development without undue negative consequences."

6.2 Landscape Susceptibility Criteria

6.2.1 The landscape susceptibility criteria in Table 3a below have been developed to provide a recognisable scale against which landscape areas or landscape features can be assessed in terms of their ability to accommodate the development proposed.

<table>
<thead>
<tr>
<th>Table 3a: Landscape Susceptibility Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>High</td>
</tr>
<tr>
<td>Medium/High</td>
</tr>
<tr>
<td>Medium</td>
</tr>
<tr>
<td>Low/Medium</td>
</tr>
<tr>
<td>Low</td>
</tr>
</tbody>
</table>

6.2.2 Table 3b identifies some of the factors that can affect landscape susceptibility, based on Natural England’s Technical Note TIN101. It provides a general guide, but it is not a rigid checklist, as most landscapes will display a mixture of factors indicating both a greater and lesser degree to which development can be accommodated. These factors therefore need to be considered ‘in the round’.
## Table 3b: Landscape Character Susceptibility Factors

<table>
<thead>
<tr>
<th>Factor</th>
<th>Indicators of lower susceptibility (Increased chance that development can be accommodated in the landscape)</th>
<th>Indicators of moderate susceptibility</th>
<th>Indicators of higher susceptibility (Reduced chance that development can be accommodated in the landscape)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Landform (also related to visual factors such as elevation and viewing angle)</td>
<td>Absence of strong topographical variety. Featureless, convex or flat.</td>
<td>Moderate topographical variety.</td>
<td>Presence of strong topographical variety or distinctive landform features.</td>
</tr>
<tr>
<td>Landscape pattern and complexity</td>
<td>Simple, regular or uniform.</td>
<td>Sub-regular.</td>
<td>Complex, rugged and irregular.</td>
</tr>
<tr>
<td>Settlement and man-made influence</td>
<td>Presence of major contemporary structures, for example, utility, infrastructure or industrial elements.</td>
<td>Some contemporary development.</td>
<td>Absence of modern development, presence of small scale, historic or vernacular settlement.</td>
</tr>
<tr>
<td>Inter-visibility with adjacent landscapes</td>
<td>Little inter-visibility with adjacent sensitive landscapes or viewpoints.</td>
<td>Moderate inter-visibility with sensitive landscapes or viewpoints.</td>
<td>Strong inter-visibility with sensitive landscapes. Forms an important part of a view from sensitive viewpoints.</td>
</tr>
<tr>
<td>Perceptual aspects (sense of remoteness, tranquillity)</td>
<td>Close to visible signs of human activity and development.</td>
<td>Some signs of human activity and development.</td>
<td>Physically or perceptually remote, peaceful or tranquil.</td>
</tr>
<tr>
<td>Existing mitigating features or potential for new mitigation</td>
<td>Presence of existing mitigating features (eg. woodlands and hedgerows).</td>
<td>Some existing mitigating features. Opportunities for new planting.</td>
<td>Absence of mitigating features (eg open moorland).</td>
</tr>
<tr>
<td>Proximity of sensitive landscape features</td>
<td>Absence of sensitive features</td>
<td>Presence of more distant sensitive features (eg. designated heritage assets)</td>
<td>Presence of closer sensitive features (eg. designated heritage assets)</td>
</tr>
</tbody>
</table>

Adapted from Natural England Technical Information Note TIN101 (September 2011)
6.3 Landscape Susceptibility Assessment

6.3.1 The landscape character of the application site and surrounding locality has been considered in Sections 3.0 & 4.0 above. The factors set out in Table 3b are considered below on a site specific basis.

Landform

6.3.2 The application site sits relatively low in the landscape adjacent to the existing farm buildings at Wormslade Farm. It occupies the lower slope of a minor valley through which flows Sidom’s Ford, a tributary to the River Ise. The valley sides rise immediately to the south of the site and to the north of Sidom’s Ford towards Great Oxendon.

Landscape Patterns and Complexity

6.3.3 The field patterns in the vicinity of the site are regular to sub-regular in shape with a mix of small, medium and large scale fields.

Settlement and Man-Made Influences

6.3.4 There are no dwellings in close proximity to the site. The closest village is Great Oxendon approximately 1.5km to the north. Other nearby villages include Arthingworth (1.5km to the east) and Clipston (1.9km to the west). The A508 lies immediately to the east.

Inter-visibility with Adjacent Landscapes

6.3.5 Views of the application site are well contained to the south by rising ground; to the east by tree cover along the disused railway; and to the west by tree cover in the hedgerows and along the watercourse. The only open views towards the site are from the north as the land rises towards Great Oxendon. However from this direction the site is seen against the backdrop of rising ground, with wooded slopes and a wind farm in the distance. There are no sensitive landscapes or views likely to be unduly affected by the proposed development.

Perceptual Aspects

6.3.6 Although the site is located in open countryside, away from settlements there are visible signs of human activity and development. Any sense of remoteness or tranquillity is diminished by the busy A508 to the east and the wind farm to the south.
**Existing Mitigating Features or Potential for New Mitigation**

6.3.7 There are a number of existing mitigating landscape features nearby including good tree cover along the nearby watercourse; in the hedgerows along the valley bottom; and along the dis-used railway. The valley sides tend to be more open. The roads adjacent to the site are largely screened by perimeter vegetation and there is the potential to further strengthen this with new planting.

**Proximity of Sensitive Landscape Features**

6.3.8 There are no sensitive landscape features such as designated heritage assets in close proximity to the site.

**Conclusion**

6.3.9 There are some indicators of lower landscape susceptibility in the vicinity of the application site but most of the indicators point towards moderate landscape susceptibility. There is an absence of factors that might suggest higher landscape susceptibility. The site therefore appears to be reasonably capable of accommodating a development of the type proposed without giving rise to unacceptable effects on the character of the wider landscape.

6.3.10 Taking account of the criteria in Tables 3a & 3b the application site is assessed as having Medium Landscape Susceptibility to an AD plant of this scale.

6.3.11 Similarly, existing landscape components on and around the application site (ie. agricultural land & hedgerows), are also assessed as having Medium Susceptibility to a development of this nature.
7.0 MAGNITUDE OF LANDSCAPE EFFECTS

7.1 Definition

7.1.1 GLVIA3 provides the following definition:
"Magnitude (of effect): A term that combines judgements about the size and scale of the effect, the extent of the area over which it occurs, whether it is reversible or irreversible and whether it is short or long term in duration."

7.2 Magnitude of Landscape Effects Criteria

7.2.1 The criteria in Tables 4, 5, 6 & 7 below have been developed to provide a recognisable scale against which the magnitude of landscape change can be assessed.

| Table 4: Criteria for Scale of Effect on Landscape Features (adverse or beneficial) |
|---------------------------------|---------------------------------------------------------------------------------|
| High                            | Major change to characteristic landscapes features eg. substantial loss or gain of mature woodland or parkland trees. |
| Medium/High                     | Notable change to characteristic landscape features eg. prominent but not necessarily substantial tree or hedgerow loss |
| Medium                          | Moderate change to characteristic landscape features or notable change where such features are more readily replaced eg. translocation or re-planting of hedgerows, or replacement of dry stone walls. |
| Low/Medium                      | Minor change to characteristic landscape features eg. small scale tree or hedgerow loss or moderate change where such features are more readily replaced. |
| Low                             | Slight change to characteristic landscape features where such change would be barely noticed or minor change where such features are more readily replaced. |

| Table 5: Criteria for Scale of Effect on Landscape Character (adverse or beneficial) |
|---------------------------------|---------------------------------------------------------------------------------|
| High                            | A major change in landscape characteristics such as the introduction or removal of a dominant large scale development (eg. extensive industrial complex; tall structures above tree canopy level or large quarries) and/or a substantial loss of characteristic landscape features, whilst taking account the effectiveness of any landscape mitigation measures. |
| Medium/High                     | A notable change in landscape characteristics such as the introduction or removal of a prominent development (eg. medium industrial complex; large structures up to tree canopy level; large housing estates; medium quarries) and/or a notable loss of characteristic landscape features, whilst taking account the effectiveness of any landscape mitigation measures. |
| Medium                          | A moderate change in landscape characteristics such as the introduction or removal of a readily noticeable development (eg. large industrial units, high farm buildings, medium housing estates) and/or a moderate loss of characteristic landscape features. |
features, whilst taking account the effectiveness of any landscape mitigation measures.

<table>
<thead>
<tr>
<th>Level</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low/Medium</td>
<td>A minor change in landscape characteristics such as the introduction or removal of a less noticeable development (eg. domestic scale buildings, low farm buildings) and/or a minor loss of characteristic landscape features, whilst taking account the effectiveness of any landscape mitigation measures.</td>
</tr>
<tr>
<td>Low</td>
<td>A slight change in landscape characteristics and/or a slight loss of characteristic landscape features, whilst taking account the effectiveness of any landscape mitigation measures.</td>
</tr>
</tbody>
</table>

### Table 6: Criteria for Geographical Extent of Landscape Effect

<table>
<thead>
<tr>
<th>Level</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>High</td>
<td>Substantial change on a scale influencing landscape character or landscape features over several landscape types or character areas.</td>
</tr>
<tr>
<td>Medium/High</td>
<td>Notable change on a scale influencing landscape character or landscape features over a broad area such as the landscape type or character area within which the proposal lies.</td>
</tr>
<tr>
<td>Medium</td>
<td>Moderate change on a scale influencing landscape character or landscape features within the local area.</td>
</tr>
<tr>
<td>Low/Medium</td>
<td>Minor change on a scale influencing landscape character or landscape features within the immediate setting of the site.</td>
</tr>
<tr>
<td>Low</td>
<td>Slight change on a scale influencing landscape character or landscape features within the development site itself.</td>
</tr>
</tbody>
</table>

### Table 7: Criteria for Duration and Reversibility of Landscape Effects

<table>
<thead>
<tr>
<th>Level</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Long Term</td>
<td>Permanent landscape effects likely to last for over 20 years.</td>
</tr>
<tr>
<td>Medium/Long Term</td>
<td>Permanent landscape effects capable of reasonable mitigation within 15 to 20 years.</td>
</tr>
<tr>
<td>Medium Term</td>
<td>Permanent landscape effects capable of reasonable mitigation within 10 to 15 years.</td>
</tr>
<tr>
<td>Short/Medium Term</td>
<td>Permanent landscape effects capable of reasonable mitigation within 5-10 years.</td>
</tr>
<tr>
<td>Short Term</td>
<td>Permanent landscape effects capable of reasonable mitigation within 5 years.</td>
</tr>
<tr>
<td>Temporary</td>
<td>Developments seeking temporary planning permission after which the land will be reinstated eg some windfarm developments; or developments where use will only last over a certain period, after which the land will be restored eg. mineral workings</td>
</tr>
<tr>
<td>Seasonal</td>
<td>Some developments may be of a seasonal nature eg. polytunnel covers</td>
</tr>
<tr>
<td>Intermittent</td>
<td>Some developments may be of an intermittent nature eg. polytunnels forming part of arable rotations</td>
</tr>
</tbody>
</table>
7.3 **Assessment of Magnitude of Landscape Effects**

**Effects on landscape components**

7.3.1 The proposed development would result in approximately 4.0ha of arable farmland being permanently lost (to buildings/structures/plant, hardstandings, and ground modelling/landscaping etc). Arable farmland is the dominant land use in the local countryside. Taking account of the criteria in Tables 4, 6 & 7 this level of agricultural land loss is assessed as having a Medium adverse scale of effect; across a Low geographical extent; over a Long Term period.

7.3.2 The improved access and visibility splays would affect a length of approximately 150m of existing hedgerow on the east side of the entrance and 165m on the west side of the entrance. These hedgerows would either be translocated or replanted behind the visibility splays. This level of hedgerow loss is assessed as having a Low/Medium adverse scale of effect; across a Low geographical extent; over a Short/Medium Term period.

7.3.3 The associated landscape proposals would result in a net increase of approximately 8700m² of new woodland planting. This would equate to a Low/Medium beneficial scale of effect; across a Low geographical extent; over a Long Term period.

**Effects on landscape character**

7.3.4 There will inevitably be a change in the character of this site from agricultural land to AD plant should the planning application be approved. However the proposed development would occupy relatively low lying ground which is well contained visually by the perimeter vegetation, the rising ground to the south and by strong tree cover in the wider landscape to the east and west. The only open views towards the site are from the north as the land rises towards Great Oxendon. However from this direction the site is seen against the backdrop of rising ground, with wooded slopes and a wind farm in the distance (Photos 7, 10, 11 & 12).

7.3.5 The digester tanks and buildings will be finished in dark receding colours which will help to reduce their impact. The associated landscape mitigation and enhancement measures will further help to soften the effect of the development on the wider landscape.

7.3.6 Taking account of the criteria in Tables 5, 6 & 7 the proposed development is assessed as having a Medium adverse scale of effect on the character of the local landscape during construction and on completion. The effect would be of Medium geographical extent over a Long Term period.
8.0 OVERALL LEVEL OF LANDSCAPE EFFECTS

8.1 Approach to Combining Judgements

8.1.1 With respect to determining the overall level of effects the GLVIA3 guidelines advise that there are two main alternative approaches to combining the individual judgements made under the various contributing criteria:

"1. They can be sequentially combined: susceptibility to change and value can be combined into an assessment of sensitivity for each receptor, and size/scale, geographical extent and duration and reversibility can be combined into an assessment of magnitude for each effect. Magnitude and sensitivity can then be combined to assess overall significance.
2. All the judgements against the individual criteria can be arranged in a table to provide an overall profile of each identified effect. An overview can then be taken of the distribution of the judgements for each criterion to make an informed professional assessment of the overall significance of each effect."

8.1.2 This assessment follows the second approach.

8.2 Overall Level of Effects Criteria

8.2.1 The criteria in Table 8 below provide a recognisable scale against which the level of landscape effects can be assessed. The criteria are based on Environmental Impact Assessment: A Guide to Good Practice and Procedures Consultation Paper (DCLG 2006)(6).

<table>
<thead>
<tr>
<th>Level of effect</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Severe</td>
<td>Landscape effects that represent key factors in the decision-making process. They are generally, but not exclusively associated with sites and features of national importance and resources/features which are unique and which, if lost, cannot be replaced or relocated.</td>
</tr>
<tr>
<td>Major</td>
<td>Landscape effects that are likely to be important considerations at a regional/district scale and, if adverse, are potential concerns to the project, depending upon the relative importance attached to the issue during the decision making process.</td>
</tr>
<tr>
<td>Moderate</td>
<td>Landscape effects that while important at a local scale, are not likely to be key decision making issues. Nevertheless, the cumulative effect of such issues may lead to an increase in the overall effects on a particular area or on a particular resource.</td>
</tr>
<tr>
<td>Minor</td>
<td>Landscape effects that may be raised as local issues but are unlikely to be of importance in the decision making process. Nevertheless, they are of relevance in the detailed design of the project.</td>
</tr>
<tr>
<td>Negligible</td>
<td>Landscape effects that are so slight that there is no need to take them into consideration in the design or mitigation of the development.</td>
</tr>
</tbody>
</table>

Table 8: Overall Level of Effect Criteria (adverse or beneficial)

8.3 Assessment of Overall Level of Landscape Effects

8.3.1 All the judgements relating to landscape value, landscape susceptibility, scale of effect, geographical extent, duration and reversibility have been arranged in Table 9 below to provide an overall profile of each identified effect. An informed professional judgement has then been made of the overall level of each effect, as explained in the following paragraphs.

8.3.2 The main direct effect of the proposed development on existing landscape features would be the loss of approximately 4.0ha of arable farmland. Although the scale of effect has been assessed as Medium adverse and Long Term these factors have to be weighed against the landscape value and susceptibility of arable farmland to change, which have been assessed as Local and Medium respectively. Whilst such an effect may be raised as a local issue, arable farmland is the dominant land use in this locality and loss on this scale is unlikely to be a key decision making issue. The overall level of this effect is therefore considered to be Minor adverse.

8.3.3 In addition the existing hedgerows affected by the improved access and visibility splays, would give rise to a Low/Medium adverse scale of effect of Short/Medium Term duration until the replanting takes effect. These landscape features have been assessed as having Local Level value and Medium susceptibility to change. Again the overall level of effect is considered to be Minor adverse.

8.3.4 The proposed landscaping would result in a Low/Medium beneficial effect of Long Term benefit to the local landscape. The overall level of effect is therefore considered to be Minor beneficial.

8.3.5 The most important landscape consideration is the effect that the proposed development will have on the character of the local landscape. This landscape has been assessed as having Local Level value and Medium susceptibility to this type of development. The scale of landscape effect has been assessed as Medium adverse and Long term over a Medium geographical area. Whilst such considerations are important at a local level they are unlikely to be of overriding importance to the decision making process. The overall change to landscape character is therefore assessed as being a Moderate adverse level of effect.
<table>
<thead>
<tr>
<th>Effect</th>
<th>Sensitivity of Landscape Receptor</th>
<th>Magnitude of Landscape Effect</th>
<th>Level of Landscape Effect</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Landscape Value</td>
<td>Landscape Susceptibility</td>
<td>Scale of Landscape Effect</td>
</tr>
<tr>
<td>Loss of agricultural land</td>
<td>Local</td>
<td>Medium</td>
<td>Medium adverse</td>
</tr>
<tr>
<td>Loss of hedgerows</td>
<td>Local</td>
<td>Medium</td>
<td>Low/ Medium adverse</td>
</tr>
<tr>
<td>Gain of new tree &amp; hedgerow planting</td>
<td>Local</td>
<td>N/A</td>
<td>Low/ Medium beneficial</td>
</tr>
<tr>
<td>Changes to landscape character</td>
<td>Local</td>
<td>Medium</td>
<td>Medium adverse</td>
</tr>
</tbody>
</table>
9.0 VISUAL AMENITY VALUE

9.1 Definition

9.1.1 GLVIA3 provides the following definition:
"Visual amenity: The overall pleasantness of the views people enjoy of their surroundings, which provides an attractive visual setting or backdrop for the enjoyment of activities of the people living, working, recreating, visiting or travelling through an area."

9.1.2 The guidelines also offer the following guidance about judging the value attached to views:

"Judgements should also be made about the value attached to the views experienced. This should take account of:

- recognition of the value attached to particular views, for example in relation to heritage assets, or through planning designations;
- indicators of the value attached to views by visitors, for example through appearances in guidebooks or on tourist maps, provision of facilities for their enjoyment (such as parking places, sign boards and interpretive material) and references to them in literature or art (for example 'Ruskin's View' over Lunedale, or the view from the Cob in Porthmadog over Traeth Mawr to Snowdonia which features in well-known Welsh paintings, and the 'Queen's View' in Scotland)."

9.2 Visual Amenity Value Criteria

9.2.1 The visual amenity value criteria in Table 10 below have been developed to provide a recognisable scale against which the value of views can be assessed.

<table>
<thead>
<tr>
<th>Table 10: Visual Amenity Value Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>National/International Level</td>
</tr>
<tr>
<td>County/Regional Level</td>
</tr>
<tr>
<td>Parish/District Level</td>
</tr>
<tr>
<td>Local Level</td>
</tr>
<tr>
<td>Negligible or Negative</td>
</tr>
</tbody>
</table>
9.3 Visual Amenity Value Assessment

9.3.1 The views identified on the Visual Receptor Plan at Appendix F are generally of value at a Local Level to local residents and users of the local roads and footpaths.

9.3.2 The only views identified in this study as being of more than local level value are those from Footpath DH6 and Bridleway DH10 in the vicinity of the air shaft for the disused railway tunnel. This elevated location on the edge of Great Oxendon appears to be a well-used publicly accessible viewpoint of Parish/District Level Value.
10.0 VISUAL RECEPTOR SUSCEPTIBILITY

10.1 Definitions

10.1.1 GLVIA3 provides the following definitions:
"Visual receptors: Individuals and/or defined groups of people who have the potential to be affected by a proposal."

"Susceptibility: The ability of a defined landscape or visual receptor to accommodate the specific proposed development without undue negative consequences."

10.1.2 The guidelines also offer the following guidance about judging the susceptibility of visual receptors to change:
"The susceptibility of different visual receptors to changes in views and visual amenity is mainly a function of:
• the occupation or activity of people experiencing the view at particular locations; and
• the extent to which their attention or interest may therefore be focused on the views and the visual amenity they experience at particular locations."

10.1.3 Whilst the guidelines indicate that visual receptors most susceptible to change are likely to include residents at home it should be noted that there is no provision in English law to protect such private views. There have been a number of planning appeal decisions in recent years where Planning Inspectors considering the outlook from residential properties have adopted a stringent approach, whereby a visual impact would have to be overwhelming to the degree that a property would come to be widely regarded as an unattractive and unsatisfactory place in which to live, before giving rise to a reason for refusal. This has become known as the 'Lavender Test'.

10.1.4 As with landscape susceptibility, the susceptibility of visual receptors is also likely to vary according to the type of development envisaged. For example, residential properties on existing farmsteads are likely to be less susceptible to agricultural development than residential properties not associated with farmsteads.

10.2 Visual Receptor Susceptibility Criteria

10.2.1 The criteria in Table 11 below have been developed to provide a recognisable scale against which potential visual receptors can be assessed in terms of their susceptibility to the development proposed.
Table 11: Visual Receptor Susceptibility Criteria

<table>
<thead>
<tr>
<th>Level</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>High</td>
<td>People engaged in activities where landscape views are likely to be the prime focus of their attention eg: Visitors to scenic viewpoints Users of strategically promoted footpath routes Visitors to heritage attractions or to other attractions where views of the surroundings are an important contributor to the experience.</td>
</tr>
<tr>
<td>Medium/High</td>
<td>People engaged in activities where landscape views might be important but not necessarily the prime focus of their attention eg: Users of other public rights of way Occupiers of residential properties in open countryside Residents at home occupying principle daytime rooms. Motorists on rural scenic routes</td>
</tr>
<tr>
<td>Medium</td>
<td>People engaged in activities where landscape views provide a backdrop to their main activity eg: Motorists on minor rural roads Users of other open space/outdoor recreational facilities Occupiers of residential properties on existing farmsteads Occupiers of residential properties in urban fringe locations Residents at home occupying non-principle daytime rooms.</td>
</tr>
<tr>
<td>Low/Medium</td>
<td>People engaged in activities who might only get a fleeting glance or occasional view of a particular landscape eg: Users of public rights of way in urban areas Low usage or inaccessible public rights of way Motorists on rural A &amp; B roads and motorways Users of railways Occupiers of residential properties in urban areas</td>
</tr>
<tr>
<td>Low</td>
<td>People engaged in activities whose attention is unlikely to be focused on the landscape eg: Motorists on urban roads People at their place of work</td>
</tr>
</tbody>
</table>

10.3 Visual Receptor Susceptibility Assessment

10.3.1 Potentially susceptible visual receptor locations are listed in Table 12 below. Each location is numbered and can be cross referenced to the Visual Receptor Plan at Appendix F. The susceptibility of each receptor is also assessed in Table 12, using the criteria from Table 11 above.

Table 12: Assessment of Visual Receptor Susceptibility

<table>
<thead>
<tr>
<th>Ref</th>
<th>Receptor Location</th>
<th>User Type</th>
<th>Susceptibility</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Public views:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Road to Clipston</td>
<td>Walkers</td>
<td>Medium/High</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Motorists</td>
<td>Medium</td>
</tr>
<tr>
<td>2</td>
<td>Harborough Road (A508)</td>
<td>Motorists</td>
<td>Low/Medium</td>
</tr>
<tr>
<td>3</td>
<td>Bridleway CZ5</td>
<td>Walkers/horse riders</td>
<td>Medium/High</td>
</tr>
<tr>
<td>4</td>
<td>Footpath CZ4</td>
<td>Walkers</td>
<td>Low/Medium</td>
</tr>
<tr>
<td>5</td>
<td>Brampton Valley Way</td>
<td>Walkers/horse riders/cyclists</td>
<td>High</td>
</tr>
</tbody>
</table>
10.3.2 Users of the Brampton Valley Way have been treated as having High susceptibility on the basis that these are people using a promoted trail where landscape enjoyment is likely to be the prime focus of their attention. Visitors to the viewpoint near the air shaft for the disused railway tunnel (Footpath DH6/Bridleway DH10) have also been treated as having High susceptibility as the view from this location is likely to be the prime purpose of their visit.

10.3.3 Walkers using the other local footpaths and roads have generally been treated as having Medium/High susceptibility on the basis that these are people engaged in activities where landscape views might be important but not necessarily the prime focus of their attention. Footpath CZ4 is the exception as this route is not waymarked and it is inaccessible from the A508 direction. It has therefore been treated as having Low/Medium susceptibility.

10.3.4 Motorists using minor rural roads have been treated as having Medium susceptibility on the basis that these are people going about their everyday business. Motorists using the A508 have been treated as having Low/Medium susceptibility on the basis that this is a busy A road with people travelling at faster speeds.

10.3.5 Occupants of residential properties at Great Oxendon have been treated as having Medium/High susceptibility as these are properties on the edge of the village where landscape views might be important, but not always the prime focus of their attention.

10.3.6 The extent of potential visibility and degree of visual impact for each receptor location is discussed in Section 11.3 below.
11.0 MAGNITUDE OF VISUAL EFFECTS

11.1 Definition

11.1.1 GLVIA3 provides the following definition:
"Magnitude (of effect): A term that combines judgements about the size and scale of the effect, the extent of the area over which it occurs, whether it is reversible or irreversible and whether it is short or long term in duration."

11.2 Magnitude of Visual Effects Criteria

11.2.1 The criteria in Tables 13, 14, & 15 below have been developed to provide a recognisable scale against which the magnitude of visual change can be assessed.

<table>
<thead>
<tr>
<th>Table 13: Criteria for Scale of Visual Effects (adverse or beneficial)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>High</strong></td>
</tr>
<tr>
<td><strong>Medium/High</strong></td>
</tr>
<tr>
<td><strong>Medium</strong></td>
</tr>
<tr>
<td><strong>Low/Medium</strong></td>
</tr>
<tr>
<td><strong>Low</strong></td>
</tr>
</tbody>
</table>


<table>
<thead>
<tr>
<th>Table 14: Criteria for Geographical Extent of Visual Effects</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>High</strong></td>
</tr>
<tr>
<td><strong>Medium/High</strong></td>
</tr>
<tr>
<td><strong>Medium</strong></td>
</tr>
<tr>
<td><strong>Low/Medium</strong></td>
</tr>
<tr>
<td><strong>Low</strong></td>
</tr>
</tbody>
</table>
### Table 15: Criteria for Duration and Reversibility of Visual Effects

<table>
<thead>
<tr>
<th>Duration</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Long Term</td>
<td>Permanent visual effects unlikely to be capable of reasonable mitigation within 20 years.</td>
</tr>
<tr>
<td>Medium/Long Term</td>
<td>Permanent visual effects capable of reasonable mitigation within 15 to 20 years.</td>
</tr>
<tr>
<td>Medium Term</td>
<td>Permanent visual effects capable of reasonable mitigation within 10 to 15 years.</td>
</tr>
<tr>
<td>Short/Medium Term</td>
<td>Permanent visual effects capable of reasonable mitigation within 5 to 10 years.</td>
</tr>
<tr>
<td>Short Term</td>
<td>Permanent visual effects capable of reasonable mitigation within 5 years.</td>
</tr>
<tr>
<td>Temporary</td>
<td>Temporary visual effects after which the view will be reinstated.</td>
</tr>
<tr>
<td>Seasonal</td>
<td>Seasonal visual effects.</td>
</tr>
<tr>
<td>Intermittent</td>
<td>Intermittent visual effects.</td>
</tr>
</tbody>
</table>

#### 11.3 Assessment of Magnitude of Visual Effects

**Road to Clipston**

11.3.1 The road to Clipston runs along the northern site boundary. The site is largely screened from view by the northern boundary hedgerow although there is a view into the site from the existing field entrance as illustrated in Photograph 1 at Appendix D.

11.3.2 A length of approximately 150m of existing hedgerow would need to be removed in order to accommodate the improved access and visibility splay on the east side of the site entrance. This would open up the proposed development to view from the road to Clipston in the short term. The hedgerow would either be translocated or replanted behind the visibility splay and once established any views would again be restricted to the site entrance.

11.3.3 Taking account of the criteria in Tables 13, 14, & 15 the proposed development is assessed as having a High adverse scale of effect of Low/Medium geographical extent along the road to Clipston during construction and on completion. The duration of this effect would be Short/Medium Term until the perimeter hedgerow replanting and on-site landscaping takes effect.

**Harborough Road (A508)**

11.3.4 Harborough Road (A508) runs along the eastern site boundary. The site is largely screened from view by the field boundary hedgerows as illustrated in Photographs 2 & 3. However there are occasional filtered views through this boundary vegetation, more so in winter.

11.3.5 In the short term proposed development would be partially visible through any gaps in the perimeter vegetation and particularly through the section of hedgerow that needs to be relocated to accommodate the entrance visibility...
The proposed development is therefore assessed as having a Medium adverse scale of effect along Harborough Road during construction and on completion. The geographical extent would be Low/Medium and the duration of this effect would be Medium Term until the proposed landscaping takes effect.

**Bridleway CZ5**

Bridleway CZ5 runs between the A508 and Brampton Valley Way. It continues eastwards towards Arthingworth as Bridleway CB2, although the site is screened from view from that section of the route by intervening vegetation along the disused railway line. There are views of the existing farm buildings on site from Bridleway CZ5 across the north-eastern corner of the application site field, where the perimeter hedgerow weaker at that point, as illustrated in Photograph 4.

Parts of the proposed development may be visible through this weak section of hedgerow in the short term although most of the development would be screened by the proposed landscaping in due course.

The proposed development is therefore assessed as having a Low adverse scale of effect of Low/Medium geographical extent along Bridleway CZ5 during construction and on completion. The duration of this effect would be Medium Term until the proposed landscaping takes effect.

**Footpath CZ4**

Footpath CZ5 runs between the A508 and the road to Clipston. However this route is not waymarked and it is inaccessible from the A508 direction. The site is largely screened by the northern boundary hedgerow from this direction, although there are views of the existing farm buildings through the site entrance as illustrated in Photograph 5.

In the short term the proposed development would be visible through the section of hedgerow that needs to be relocated to accommodate the entrance visibility splays. However once the proposed landscaping takes effect the development would be largely screened from view.

The proposed development is assessed as having a Medium/High adverse scale of effect along Footpath CZ4 during construction and on completion. The geographical extent would be Medium and the duration of the effect would be Medium Term.
Brampton Valley Way

11.3.13 Brampton Valley Way runs in a north/south direction, to the east of the A508 along a disused railway line. The section nearest to the site is on embankment, although it is lined with trees and scrub. Views of the site are therefore restricted to the occasional minor filtered view through this vegetation as illustrated in Photograph 6.

11.3.14 Any views of the proposed development in the short term would be similarly limited to the occasional minor filtered glimpse.

11.3.15 The proposed development is assessed as having a Low adverse scale of effect along Brampton Valley Way during construction and on completion. The geographical extent would be Low and the duration of the effect would be Medium Term.

Clipston Road, Great Oxendon

11.3.16 Clipston Road runs from Great Oxendon towards Clipston in a south-westerly direction, approximately 1100-1400m away from the application site. There are elevated long distance views from the higher ground along this road near to Great Oxendon as illustrated in Photograph 7. As the road drops in height towards Spinney Farm the site becomes gradually more difficult to identify (Photograph 8). In all cases though, the site is seen against the backdrop of rising ground and wooded slopes.

11.3.17 Similarly, the proposed development would be more noticeable from the higher ground than the lower ground, but always seen against the backdrop of rising ground and wooded slopes.

11.3.18 The proposed development is assessed as having a Low/Medium adverse scale of effect along Clipston Road during construction and on completion. The geographical extent would be Medium and the duration of the effect would be Medium/Long Term as it would take longer for the proposed landscaping to become effective from more elevated viewpoints.

Bridleway DH10

11.3.19 Bridleway DH10 links the Brampton Valley Way to Braybrooke Road allowing users to avoid the disused railway tunnel below. There are elevated views of the surrounding countryside from this route, but the application site is largely screened from view by intervening vegetation as illustrated in Photograph 9.

11.3.20 The proposed development would be partially visible from this bridleway but largely obscured by the intervening vegetation.

11.3.21 The proposed development is assessed as having a Low adverse scale of effect along Bridleway DH10 during construction and on completion. The
geographical extent would be Low and the duration of the effect would be Medium/Long Term until the proposed landscaping takes effect.

Footpath DH6/CB14

11.3.22 Footpath DH runs from Braybrooke Road, Great Oxendon in a south-easterly direction towards Arthingworth. It becomes Footpath CB14 where it crosses the Parish boundary. There are elevated views of the site at a distance of 1200-1500m from this footpath as illustrated in Photograph 10. However the site only takes up a small proportion of the overall view from this footpath and it is seen against the backdrop of rising ground, wooded slopes and the recently erected windfarm adjacent to the A14 at Kelmarsh.

11.3.23 The proposed development would be visible in the distance from this footpath against the backdrop of rising ground, wooded slopes and the windfarm.

11.3.24 The development is assessed as having a Low/Medium adverse scale of effect along Footpath DH6/CB14 during construction and on completion. The geographical extent would be Medium and the duration of the effect would be Medium/Long Term as it would take longer for the proposed landscaping to become effective from more elevated viewpoints.

Braybrooke Road

11.3.25 Braybrooke Road runs out of Great Oxendon in an easterly direction. The site is largely screened from view by roadside hedgerows. However there is one section of road with no hedges giving rise to elevated views towards the site at a distance of 1760-1860m as illustrated in Photograph 11. Again the site is seen against the backdrop of rising ground, wooded slopes and the windfarm.

11.3.26 The proposed development is assessed as having a Low adverse scale of effect along Braybrooke Road during construction and on completion. The geographical extent would be Low/Medium and the duration of the effect would be Medium/Long Term.

Footpath CB5

11.3.27 Footpath CB5 runs from Braybrooke Road in a southerly direction towards Arthingworth. There are elevated views of the site at a distance of 1620-1870m from this footpath as illustrated in Photograph 12. Once again the site is seen against the backdrop of rising ground, wooded slopes and the windfarm.

11.3.28 The proposed development is assessed as having a Low adverse scale of effect along Footpath CB5 during construction and on completion. The geographical extent would be Low/Medium and the duration of the effect would be Medium/Long Term.
Dwellings on southern edge of Great Oxendon

11.3.29 Based on observations from the site there are approximately 15 properties on the southern edge of Great Oxendon with potential views of the site. These would be elevated distant views similar to the views illustrated in Photographs 7 & 10 taken from either end of the village.

11.3.30 The proposed development is assessed as having a Low/Medium adverse scale of effect at these properties during construction and on completion. The geographical extent across the village would be Low/Medium and the duration of the effect would be Medium/Long Term.
12.0 OVERALL LEVEL OF VISUAL EFFECTS

12.1 Approach to Combining Judgements

12.1.1 With respect to determining the overall level of effects the GLVIA3 guidelines advise that there are two main alternative approaches to combining the individual judgements made under the various contributing criteria:

"1. They can be sequentially combined: susceptibility to change and value can be combined into an assessment of sensitivity for each receptor, and size/scale, geographical extent and duration and reversibility can be combined into an assessment of magnitude for each effect. Magnitude and sensitivity can then be combined to assess overall significance.

2. All the judgements against the individual criteria can be arranged in a table to provide an overall profile of each identified effect. An overview can then be taken of the distribution of the judgements for each criterion to make an informed professional assessment of the overall significance of each effect."

12.1.2 This assessment follows the second approach.

12.2 Overall Level of Effects Criteria

12.2.1 The criteria in Table 16 below provide a recognisable scale against which the level of visual effects can be assessed. The criteria are based on Environmental Impact Assessment: A Guide to Good Practice and Procedures Consultation Paper (DCLG 2006)(6).

<table>
<thead>
<tr>
<th>Level of effect</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Severe</td>
<td>Visual effects that represent key factors in the decision-making process. They are generally, but not exclusively associated with sites and features of national importance and resources/features which are unique and which, if lost, cannot be replaced or relocated.</td>
</tr>
<tr>
<td>Major</td>
<td>Visual effects that are likely to be important considerations at a regional/district scale and, if adverse, are potential concerns to the project, depending upon the relative importance attached to the issue during the decision making process.</td>
</tr>
<tr>
<td>Moderate</td>
<td>Visual effects that while important at a local scale, are not likely to be key decision making issues. Nevertheless, the cumulative effect of such issues may lead to an increase in the overall effects on a particular area or on a particular resource.</td>
</tr>
<tr>
<td>Minor</td>
<td>Visual effects that may be raised as local issues but are unlikely to be of importance in the decision making process. Nevertheless, they are of relevance in the detailed design of the project.</td>
</tr>
<tr>
<td>Negligible</td>
<td>Visual effects that are so slight that there is no need to take them into consideration in the design or mitigation of the development.</td>
</tr>
</tbody>
</table>

12.3 Assessment of Overall Level of Visual Effects

12.3.1 All the judgements relating to visual amenity value, visual receptor susceptibility, scale of effect, geographical extent, duration and reversibility have been arranged in Table 17 below to provide an overall profile of each identified effect. An informed professional judgement has then been made of the overall level of each effect, as explained in the following paragraphs.

12.3.2 The main publicly accessible view of the proposed development would be from the road to Clipston which runs along the northern site boundary. The scale of visual effect here would be High adverse over a Low/Medium geographical extent during the construction phase and in the Short/Medium term of the operational phase until the boundary hedgerow is re-established and the on-site landscaping starts to take effect. Walkers using this road have been assessed as having Medium/High susceptibility and motorists would have Medium susceptibility, although the visual amenity value along this road is at a Local Level only.

12.3.3 Such effects, whilst important at a local scale are rarely considered to be key decision making issues in their own right and therefore the overall level of visual effect is assessed as Moderate adverse.

12.3.4 Although there would be a Medium/High adverse scale of effect of Medium geographical extent along Footpath CZ4 access difficulties suggest that this is a low usage path. Susceptibility is therefore considered to be Low/Medium and the overall level of visual effect is considered to be Minor adverse. Similarly, the overall visual effects on users of the A508 are considered to be Minor adverse due to the Low/Medium susceptibility of motorists driving at faster speeds on A roads.

12.3.5 Whilst walkers using Bridleway CZ5, Footpath DH6/CB14, and Clipston Road, Great Oxendon have all been treated as having Medium/High susceptibility, the scale of visual effect along these routes is much lower (Low to Low/Medium). Whilst such effects may be raised as local issues they are unlikely to be important factors in the decision making process. The overall level of visual effect is therefore considered to be Minor adverse.

12.3.6 The overall level of visual effect at the other publicly accessible locations identified is considered to be Negligible adverse.

12.3.7 Whilst the visual effects of the proposed development on residential properties at Great Oxendon may be raised by local residents, as explained in Section 10.0 there is no provision in planning law to protect such views. It is unlikely therefore that such issues would be regarded as key decision making issues. The overall level of visual effect on these properties is therefore considered to be Minor adverse.
### Table 17: Summary of Assessment of Visual Effects

<table>
<thead>
<tr>
<th></th>
<th></th>
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<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Visual Amenity Value</td>
<td>Scale of Visual Effect</td>
<td>Geographical Extent</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Visual Receptor Susceptibility</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Road to Clipston</td>
<td>Local</td>
<td>High</td>
<td>Low</td>
</tr>
<tr>
<td></td>
<td>Walkers</td>
<td>Medium/High</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Motorists</td>
<td>Medium</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Harborough Road (A508)</td>
<td>Local</td>
<td>Medium</td>
<td>Low</td>
</tr>
<tr>
<td></td>
<td>Motorists</td>
<td>Low/Medium</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Bridleway CZ5</td>
<td>Local</td>
<td>Low</td>
<td>Low</td>
</tr>
<tr>
<td></td>
<td>Walkers/horse riders</td>
<td>Low/Medium</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Footpath CZ4</td>
<td>Local</td>
<td>Medium/High</td>
<td>Medium</td>
</tr>
<tr>
<td></td>
<td>Walkers</td>
<td>Low/Medium</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Brampton Valley Way</td>
<td>Local</td>
<td>Low</td>
<td>Low</td>
</tr>
<tr>
<td></td>
<td>Walkers/horse riders/cyclists</td>
<td>Medium</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Clipston Road, Great Oxendon</td>
<td>Local</td>
<td>Low/Medium</td>
<td>Medium</td>
</tr>
<tr>
<td></td>
<td>Walkers</td>
<td>Medium/High</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Motorists</td>
<td>Medium</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Bridleway DH10</td>
<td>Parish/District</td>
<td>Low</td>
<td>Low</td>
</tr>
<tr>
<td></td>
<td>Walkers/horse riders</td>
<td>High</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Footpath DH6/CB14</td>
<td>Parish/District</td>
<td>Low/medium</td>
<td>Medium</td>
</tr>
<tr>
<td></td>
<td>Walkers</td>
<td>High</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Braybrooke Road</td>
<td>Parish/District</td>
<td>Low</td>
<td>Low/medium</td>
</tr>
<tr>
<td></td>
<td>Walkers</td>
<td>Medium/High</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Motorists</td>
<td>Medium</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Footpath CB5</td>
<td>Local</td>
<td>Low</td>
<td>Low/medium</td>
</tr>
<tr>
<td></td>
<td>Walkers</td>
<td>Medium/High</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Dwellings on southern edge of Great Oxendon</td>
<td>Local</td>
<td>Low/medium</td>
<td>Low</td>
</tr>
<tr>
<td></td>
<td>Residents/visitors</td>
<td>Medium</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
13.0 LANDSCAPE MITIGATION AND ENHANCEMENT

13.1 Recommendations

13.1.1 The following recommendations are made for incorporation into the proposed development:

Hedgerow Translocation

13.1.2 Consideration should be given to translocating the existing northern boundary hedgerow to its new position behind the entrance visibility splay in preference to removal and replanting. Hedge translocation has significant advantages over the alternative of removal and replanting. The surviving roots will remain in contact with the soil and as a result of the removal of the canopy through coppicing the translocated hedges will be capable of vigorous growth compared with new planting. In addition, the hedgerow soils will also be retained and these will contain the seeds of appropriate ground cover plants that grow naturally along the bases of hedgerows.

13.1.3 Hedgerow translocation will require the affected sections of hedgerow to be coppiced prior to movement to compensate for root damage. The receptor location will need to be prepared to receive the hedge. The hedge will then need to be undercut to sever the roots and free it from its surroundings. It can then be gradually pulled into place by an excavator with railway sleepers attached to the bucket to maintain the integrity of the hedge. Any gaps will need to be filled with new planting. The translocation operation will need to be carried out in the dormant season (November to March) in order to minimise impact on the hedge and outside the bird nesting season (early March to late July) in order to avoid disturbance to nesting birds. That leaves a window of opportunity between November and February for the completion of such work.

Hedgerow Reinforcement

13.1.4 Any gaps in the remaining perimeter hedgerows will need to be reinforced with new planting. New hedgerow trees should also be introduced at appropriate intervals.

13.1.5 Once established all perimeter hedgerows should be managed at a height of 4.0m+ in order to minimise any views of the proposed development from the surrounding locality.

Existing Tree & Hedgerow Protection

13.1.6 All existing trees and hedgerows to be retained should be protected in accordance with BS5837:2012 during the construction phase.
New Planting

13.1.7 Appropriate indigenous species should be used for all the new tree and hedgerow planting proposed in order to respect the character of the surrounding countryside and to maximise wildlife potential. A proportion of quicker growing species such as Aspen could be incorporated into the woodland mix in order to speed up the screening effect, but climax species such as Oak and Field Maple should be the dominant species for the long term.

Allan Moss BA (Hons), BPl, MRTPI, Dip LA, CMLI
November 2015
REFERENCES


APPENDIX A

Proposed Layout
(Not to Scale)