

Site condition report template

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COMPLETE SECTIONS 1-3 AND SUBMIT WITH APPLICATION

DURING THE LIFE OF THE PERMIT: MAINTAIN SECTIONS 4-7

AT SURRENDER: ADD NEW DOC REFERENCE IN 1.0; COMPLETE SECTIONS 8-10; & SUBMIT WITH YOUR SURRENDER APPLICATION.

1.0 SITE DETAILS	
Name of the applicant	Grays Biogas Ltd
Activity address	Mona Industrial Estate
National grid reference	SH 42035 75575
Document reference and dates for Site Condition Report at permit application and surrender	3407/819/H February 2016
Document references for site plans (including location and boundaries)	

Note:

In Part A of the application form you must give us details of the site's location and provide us with a site plan. We need a detailed site plan (or plans) showing:

- Site location, the area covered by the site condition report, and the location and nature of the activities and/or waste facilities on the site.
- Locations of receptors, sources of emissions/releases, and monitoring points.
- Site drainage.
- Site surfacing.

If this information is not shown on the site plan required by Part A of the application form then you should submit the additional plan or plans with this site condition report.

2.0 Condition of the land at permit issue	
Environmental setting including: <ul style="list-style-type: none">• geology• hydrogeology• surface waters	AD Plant to be constructed adjacent to waste transfer station EPR/AP3594EC
Pollution history including: <ul style="list-style-type: none">• pollution incidents that may have affected land• historical land-uses and associated contaminants• any visual/olfactory evidence of existing contamination	No recorded incidents of pollution to land, water or air The proposed site was previously part of Mona Airfield which is still operated by the Ministry of Defence N/A

• evidence of damage to pollution prevention measures	N/A
Evidence of historic contamination, for example, historical site investigation, assessment, remediation and verification reports (where available)	No evidence of any previous pollution on site
Baseline soil and groundwater reference data	N/A
Supporting information	<ul style="list-style-type: none"> • Source information identifying environmental setting and pollution incidents • Historical Ordnance Survey plans • Site reconnaissance • Historical investigation / assessment / remediation / verification reports • Baseline soil and groundwater reference data

3.0 Permitted activities	
Permitted activities	Application is for an AD Plant to be constructed next to a HIC waste Transfer Station (EPR/AP3594EC).
Non-permitted activities undertaken N/A	The AD Plant will be housed within a purpose built and specifically designed building. Details of which are submitted with the application.
Document references for: <ul style="list-style-type: none"> • plan showing activity layout; and • environmental risk assessment. 	Drawing No. Doc 819/3407/K

Note:

In Part B of the application form you must tell us about the activities that you will undertake at the site. You must also give us an environmental risk assessment. This risk assessment must be based on the guidance (*Environmental Risk Assessment - EPR H1*) or use an equivalent approach.

It is essential that you identify in your environmental risk assessment all the substances used and produced that could pollute the soil or groundwater if there were an accident, or if measures to protect land fail.

These include substances that would be classified as 'dangerous' under the Control of Major Accident Hazards (COMAH) regulations and also raw materials, fuels, intermediates, products, wastes and effluents.

If your submitted environmental risk assessment does not adequately address the risks to soil and groundwater we may need to request further information from you or even refuse your permit application.

4.0 Changes to the activity	
Have there been any changes to the activity boundary?	If yes, provide a plan showing the changes to the activity boundary. <small>Refer to Drawing No.</small>
Have there been any changes to the permitted activities?	If yes, provide a description of the changes to the permitted activities <small>Refer to 3407/819/EMS</small>
Have any 'dangerous substances' not identified in the Application Site Condition Report been used or produced as a result of the permitted activities?	If yes, list of them NO
Checklist of supporting information	<ul style="list-style-type: none"> Plan showing any changes to the boundary (where relevant) Description of the changes to the permitted activities (where relevant) List of 'dangerous substances' used/produced by the permitted activities that were not identified in the Application Site Condition Report (where relevant)

5.0 Measures taken to protect land	
Use records that you collected during the life of the permit to summarise whether pollution prevention measures worked. If you can't, you need to collect land and/or groundwater data to assess whether the land has deteriorated.	
Checklist of supporting information	<ul style="list-style-type: none"> Inspection records and summary of findings of inspections for all pollution prevention measures Records of maintenance, repair and replacement of pollution prevention measures

6.0 Pollution incidents that may have had an impact on land, and their remediation	
Summarise any pollution incidents that may have damaged the land. Describe how you investigated and remedied each one. If you can't, you need to collect land and /or groundwater reference data to assess whether the land has deteriorated while you've been there.	
Checklist of supporting information	<ul style="list-style-type: none"> Records of pollution incidents that may have impacted on land Records of their investigation and remediation

7.0 Soil gas and water quality monitoring (where undertaken)

Provide details of any soil gas and/or water monitoring you did. Include a summary of the findings. Say whether it shows that the land deteriorated as a result of the permitted activities. If it did, outline how you investigated and remedied this.

Checklist of supporting information	<ul style="list-style-type: none">• Description of soil gas and/or water monitoring undertaken• Monitoring results (including graphs)
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8.0 Decommissioning and removal of pollution risk

Describe how the site was decommissioned. Demonstrate that all sources of pollution risk have been removed. Describe whether the decommissioning had any impact on the land. Outline how you investigated and remedied this.

Checklist of supporting information	<ul style="list-style-type: none">• Site closure plan• List of potential sources of pollution risk• Investigation and remediation reports (where relevant)
--	--

9.0 Reference data and remediation (where relevant)

Say whether you had to collect land and/or groundwater data. Or say that you didn't need to because the information from sections 3, 4, 5 and 6 of the Surrender Site Condition Report shows that the land has not deteriorated.

If you did collect land and/or groundwater reference data, summarise what this entailed, and what your data found. Say whether the data shows that the condition of the land has deteriorated, or whether the land at the site is in a "satisfactory state". If it isn't, summarise what you did to remedy this. Confirm that the land is now in a "satisfactory state" at surrender.

Checklist of supporting information	<ul style="list-style-type: none">• Land and/or groundwater data collected at application (if collected)• Land and/or groundwater data collected at surrender (where needed)• Assessment of satisfactory state• Remediation and verification reports (where undertaken)
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10.0 Statement of site condition

Using the information from sections 3 to 7, give a statement about the condition of the land at the site. This should confirm that:

- the permitted activities have stopped
- decommissioning is complete, and the pollution risk has been removed
- the land is in a satisfactory condition.

For full details, see H5 *SCR guide for applicants* v2.0 4 August 2008

SITE CONDITION REPORT TEMPLATE

For full details, see H5 *SCR guide for applicants* v 2.0 4 August 2008

COMPLETE SECTIONS 1-3 AND SUBMIT WITH APPLICATION

DURING THE LIFE OF THE PERMIT: MAINTAIN SECTIONS 4-7

AT SURRENDER: ADD NEW DOC REFERENCE IN 1.0; COMPLETE SECTIONS 8-10; & SUBMIT WITH YOUR SURRENDER APPLICATION.

1.0 SITE DETAILS	
Name of the applicant	Grays Biogas Ltd
Activity address	Mona AD Plant, Mona Industrial Park Gwalchmai, Holyhead LL65 4RJ
National grid reference	SH 42035 75575
Document reference and dates for Site Condition Report at permit application and surrender	3407/819/H Date of application to vary permit 09/03/2016
Document references for site plans (including location and boundaries)	2033/819/01 Site Location Plan A2529UK_MONA-00-01 proposed Permit Boundary & proposed Layout Plan

Note:

In Part A of the application form you must give us details of the site's location and provide us with a site plan. We need a detailed site plan (or plans) showing:

- Site location, the area covered by the site condition report, and the location and nature of the activities and/or waste facilities on the site.
- Locations of receptors, sources of emissions/releases, and monitoring points.
- Site drainage.
- Site surfacing.

If this information is not shown on the site plan required by Part A of the application form then you should submit the additional plan or plans with this site condition report.

2.0 Condition of the land at permit issue	
Environmental setting including: <ul style="list-style-type: none"> • geology • hydrogeology • surface waters 	Anaerobic Digestion facility (AD Plant) is to be constructed adjacent to waste transfer station EPR/AP3594EC. Due to the proposal to increase the footprint of the AD plant a small part of the site will be on the area of the transfer station. An application may be submitted to reduce the permit boundary of the transfer station in the near future.
Pollution history including: <ul style="list-style-type: none"> • pollution incidents that may have affected land • historical land-uses and associated contaminants • any visual/olfactory evidence of existing contamination • evidence of damage to pollution prevention measures 	There are no recorded incidents of pollution to land, water or air The proposed site was previously part of Mona Airfield which is still operated by the Ministry of Defence. N/A N/A
Evidence of historic contamination, for example, historical site investigation, assessment, remediation and verification reports (where available)	There is no evidence of any previous pollution on site.

Baseline soil and groundwater reference data		N/A
Supporting information	<ul style="list-style-type: none"> • Source information identifying environmental setting and pollution incidents • Historical Ordnance Survey plans • Site reconnaissance • Historical investigation / assessment / remediation / verification reports • Baseline soil and groundwater reference data 	

3.0 Permitted activities		
Permitted activities		Application is for an AD Plant to be constructed next to a household, industrial and commercial waste Transfer Station (EPR/AP3594EC). The AD Plant is being build to a very high specification details of which are specified in the technical summary provided by the tech provider which is submitted with the application.
Non-permitted activities undertaken		N/A
Document references for:	<ul style="list-style-type: none"> • plan showing activity layout; and • environmental risk assessment. 	See Drawing No A2529UK_MONA-00-01 H1 and 819/3407/K

Note:

In Part B of the application form you must tell us about the activities that you will undertake at the site. You must also give us an environmental risk assessment. This risk assessment must be based on our guidance (*Environmental Risk Assessment - EPR H1*) or use an equivalent approach.

It is essential that you identify in your environmental risk assessment all the substances used and produced that could pollute the soil or groundwater if there were an accident, or if measures to protect land fail.

These include substances that would be classified as 'dangerous' under the Control of Major Accident Hazards (COMAH) regulations and also raw materials, fuels, intermediates, products, wastes and effluents.

If your submitted environmental risk assessment does not adequately address the risks to soil and groundwater we may need to request further information from you or even refuse your permit application.

4.0 Changes to the activity		
Have there been any changes to the activity boundary?		<p>If yes, provide a plan showing the changes to the activity boundary.</p> <p><u>This variation to the permit includes increase to permit boundary</u></p>
Have there been any changes to the permitted activities?		<p>If yes, provide a description of the changes to the permitted activities</p> <p>No, still an AD facility</p>
Have any 'dangerous substances' not identified in the Application Site Condition Report been used or produced as a result of the permitted activities?		<p>If yes, list of them</p> <p>No</p>
Checklist supporting information	of	<p>Plan showing any changes to the boundary (where relevant)</p> <p>Description of the changes to the permitted activities (where relevant)</p> <p>List of 'dangerous substances' used/produced by the permitted activities that were not identified in the Application Site Condition Report (where relevant)</p> <p>Ref to application EMS appendices</p>

5.0 Measures taken to protect land		
<p>Use records that you collected during the life of the permit to summarise whether pollution prevention measures worked. If you can't, you need to collect land and/or groundwater data to assess whether the land has deteriorated.</p> <p>N/A SITE NOT YET OPERATIONAL</p>		
Checklist supporting information	of	<p>Inspection records and summary of findings of inspections for all pollution prevention measures</p> <p>Records of maintenance, repair and replacement of pollution prevention measures</p>

6.0 Pollution incidents that may have had an impact on land, and their remediation		
SITE NOT OPERATIONAL		
<p>Summarise any pollution incidents that may have damaged the land. Describe how you investigated and remedied each one. If you can't, you need to collect land and /or groundwater reference data to assess whether the land has deteriorated while you've been there.</p>		
Checklist supporting information	of	<p>Records of pollution incidents that may have impacted on land</p> <p>Records of their investigation and remediation</p>

7.0 Soil gas and water quality monitoring (where undertaken) N/A SITE NOT YET OPERATIONAL

Provide details of any soil gas and/or water monitoring you did. Include a summary of the findings. Say whether it shows that the land deteriorated as a result of the permitted activities. If it did, outline how you investigated and remedied this.

Checklist supporting information	of	Description of soil gas and/or water monitoring undertaken Monitoring results (including graphs)
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8.0 Decommissioning and removal of pollution risk N/A

Describe how the site was decommissioned. Demonstrate that all sources of pollution risk have been removed. Describe whether the decommissioning had any impact on the land. Outline how you investigated and remedied this.

Checklist supporting information	of	Site closure plan List of potential sources of pollution risk Investigation and remediation reports (where relevant)
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9.0 Reference data and remediation (where relevant) N/A

Say whether you had to collect land and/or groundwater data. Or say that you didn't need to because the information from sections 3, 4, 5 and 6 of the Surrender Site Condition Report shows that the land has not deteriorated.

If you did collect land and/or groundwater reference data, summarise what this entailed, and what your data found. Say whether the data shows that the condition of the land has deteriorated, or whether the land at the site is in a "satisfactory state". If it isn't, summarise what you did to remedy this. Confirm that the land is now in a "satisfactory state" at surrender.

Checklist supporting information	of	Land and/or groundwater data collected at application (if collected) Land and/or groundwater data collected at surrender (where needed) Assessment of satisfactory state Remediation and verification reports (where undertaken)
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10.0 Statement of site condition N/A

Using the information from sections 3 to 7, give a statement about the condition of the land at the site. This should confirm that:

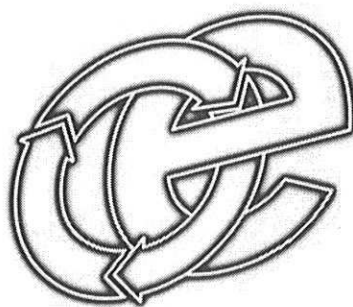
the permitted activities have stopped
decommissioning is complete, and the pollution risk has been removed
the land is in a satisfactory condition.

Аррeндix J

**Anglesey Ecoparc Mon Ltd
Anaerobic Digestion AD Facility.**

**2033/819/J
Site Conditioning Report
19/09/2010 Version 1.0**

Application ref:
EA/EPR/AP3033HY/A001



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1.0	19/08/2010		

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Reviewed by:

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1.0 Introduction

This report has been produced on behalf of **Anglesey Ecoparc Mon Ltd** by Oaktree Environmental Ltd of Unit 5 Oasis Park, 19 Road One, Winsford Industrial Estate, Winsford, Cheshire CW7 3RY.

1.1 Summary

This document represents the Site Condition Report for the Anaerobic Digestion facility (Anglesey Biogas Plant) at Ecoparc Mon, Mona Industrial Estate, Gwalchmai, Isle of Anglesey, submitted as part of an application to the Environment Agency for a permit to operate an installation under Regulation 12 of the Environmental Permitting (England and Wales) Regulations 2010.

Records of the site and surrounding areas have been reviewed in order to describe the condition of the site and, in particular, to identify any substance in, on or under the land that may constitute a pollution risk to the land. Pollution prevention measures have been identified and an assessment of pollution potential to land has been undertaken.

Additions and appendices will be made to this report during the lifetime of the site and it will form part of a final site condition report submitted with the surrender application after permitted activities have permanently ceased.

1.2 Site Location

The site is situated approximately 3 miles west of Llangefni, Anglesey SH419 755 and is part of the Mona Industrial Estate. The site is located at the northern boundary of the industrial estate and is accessed via the estate road, which runs past the western site boundary. The site is bounded on the north side by a Chicken Farm and a council run gritting yard, to the west by Mona Industrial Estate and RAF Mona beyond, to the south by open land which was part of RAF Mona and to the east by an un-named road.

The site predominately comprises open fields, separated by stock proof fences. On the eastside of the site is a concrete base and remnants of an old road. On the eastern boundary there is a culvert/drain running roughly north to south which flows under the un-named road.

2.0 Condition of the land at permit issue

2.1 Introduction

A desk study information searched in order to describe the condition of the installation and, in particular, to determine the potential for substances to be present in, on or under the land associated with present and past uses of the site and its surrounding areas.

A Geotechnical Report was published in February 2009 by Egniol on behalf of Anglesey Ecoparc Mon Ltd and is attached as doc ref 2033-819-G. It concludes that no significant contamination was encountered and the risk of encountering contaminated land in the works is considered to be very low.

For full details of the following please refer to Document Ref 2033-819-H:-

- site history,
- geology,
- hydrology,
- hydrogeology,
- potential for contamination
- unexploded Ordnance survey
- Radan
- Ground investigations- 1996 and 2008
- Ground conditions
- Potential for contamination

Conclusion:

Historically the site was used for agricultural purposes, and as a former RAF base. There is no evidence to suggest that it could be subject to widespread industrial contamination. There may be potential for localised contamination in the areas where unidentified structures were located in the west of the site and there is the possibility of migration of contaminants onto the site boundary from the chicken farm and the local council gritting yard to the north of the site. There is also the possibility of localised contamination by fuel spillages associated with the former RAF base infrastructure.

For all relevant activities at the installation there is little likelihood that land pollution or leaks to the land will occur during the future life of the installation. In view of the recent site investigation it is concluded that no further dedicated site investigation works need to be undertaken. However a watching brief will be maintained during development of the site if areas of suspected contamination are uncovered further investigations will be undertaken.

2.2 Supporting Information

The Government's MAGIC website was accessed to obtain details from the interactive mapping facility, this shows there are no ecologically sensitive areas surrounding the application site. The nearest site of conservation value is the SSSI Cors Bodwrog which more than 1.7 km to the North West of the application site.

3.0 Regulated activities

3.1 Permitted activities

This application is for a biogas plant using Anaerobic Digestion technology.

The plant uses anaerobic digestion (AD) to turn its feedstock into gas for fuel and digestate for spreading as fertiliser.

- 3.1.1 AD is a natural biological process defined as the breakdown of organic matter by naturally occurring bacteria in the absence of air into biogas and biofertiliser and at a temperature, either in the mesophilic range (35-42°C) or in the thermophilic range (52-55°C).
- 3.1.2 The operation involves a series of processes in which microorganisms break down biodegradable material in the absence of oxygen in a computer controlled system to accelerate decomposition. It is widely used to treat wastewater sludges and organic waste because it provides volume and mass reduction of the input material. As part of an integrated waste management system AD also emissions of greenhouse gas into the atmosphere by converting waste into fuels and not breaking down in an uncontrolled manner, thereby releasing gases such as methane (landfill) into the atmosphere. The process also allows the stabilisation of organic waste which cannot now go direct to landfill, the production of renewable energy and an efficient way of recycling nutrients.
- 3.1.3 Anaerobic digestion is a renewable energy source because the process produces a methane and carbon dioxide rich biogas suitable for energy production helping replace fossil fuels. Also, the nutrient-rich solids left after digestion can be used as fertiliser.
- 3.1.4 Biology and chemistry of the process
- i. The digestion process begins with bacterial hydrolysis of the input materials in order to break down insoluble organic polymers such as carbohydrates and make them available for other bacteria.
 - ii. Acidogenic bacteria then convert the sugars and amino acids into carbon dioxide, hydrogen, ammonia, and organic acids.
 - iii. Acetogenic bacteria then convert these resulting organic acids into acetic acid, along with additional ammonia, hydrogen, and carbon dioxide.
 - iv. Methanogens, finally are able to convert these products to methane and carbon dioxide.

- 3.1.5 Agricultural vehicles are used to collect some waste streams for spreading but cannot do so all year round because spreading is weather dependent. The plant will be able to take such waste by bulk tanker and reduce overall movements. Many waste streams are delivered to a site in Widnes for treatment, some 82 miles each way. The closest commercial landfill site permitted to take food waste is 55 miles away.
- 3.1.6 The best practicable means will be used in all waste handling and other operations to ensure that noise levels do not exceed agreed levels. The enclosure of the reception process entirely within the building and sealed nature of the tanks will ensure that noise levels are not significant.
- 3.1.7 The plant has been designed to meet the BAT (Best Available Technology) requirements of the Environmental Permitting regime.

3.2 Non-permitted activities

The proposed development is to be constructed on a site which was once part of Mona RAF airfield. The airbase was active during WWII. It is has therefore been recommended that UXO safety awareness training should be given to all site personnel as part of the site induction.

The level excavation when preparing and constructing the facility will generate Class 2C fill, which will be suitable for re-use on site with little or no pre-treatment to vary the moisture content and reduce oversized cobble and boulders. The suitability of excavated rock to be processed and re-used in the works will be dependent on volumes generated. Any surplus will be taken to an authorised facility for further processing or re-use.

4.0 Raw materials, By-products and Waste

A list of all substances used, stored, manufactured (or which are by-products/waste from the manufacturing process) is contained in document reference 2033-819-D. An assessment of their pollution potential has been made based upon their properties, toxicity and volume stored, used or manufactured. Those substances thus identified in document reference 2033-819-D are listed in Table 4.1 below.

Table 4.1 Pollution potential of all Raw Materials, By products and Wastes associated with the permitted activities			
Substance	Raw material (R) By product (B) Waste (W)	Dangerous (COMAH) Y/N	Polluting to soil/ groundwater Y/N
Organic waste	R/W	N	Y
Non- waste Biomass	R	N	Y
Diesel Fuel Oil	R	N	Y
Lubricating oil	R	N	Y
Disinfectant	R	N	Y
Antifoam	R	N	Y
Antifreeze	R	N	Y
Condensate	W	N	Y
Digestate	R	N	Y
Biogas	R	N	N
Used Engine oil	W	N	Y
Spent Aqueous Filter Materials	W	N	Y
Spent Gas filter Materials	W	N	Y

SITE CONDITION REPORT TEMPLATE

For full details, see H5 *SCR guide for applicants* v 2.0 4 August 2008

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DURING THE LIFE OF THE PERMIT: MAINTAIN SECTIONS 4-7

AT SURRENDER: ADD NEW DOC REFERENCE IN 1.0; COMPLETE SECTIONS 8-10; & SUBMIT WITH YOUR SURRENDER APPLICATION.

1.0 SITE DETAILS	
Name of the applicant	Anglesey Ecoparc Mon Ltd
Activity address	Plot 8+ Mona Industrail Park Gwalchmai, Holyhead LL65 4RJ
National grid reference	SH 42035 75575
Document reference and dates for Site Condition Report at permit application and surrender	2033/819/H Date of application for permit 14/09/2010
Document references for site plans (including location and boundaries)	819/2033/01 819/2033/02 819/2033/03

Note:

In Part A of the application form you must give us details of the site's location and provide us with a site plan. We need a detailed site plan (or plans) showing:

- Site location, the area covered by the site condition report, and the location and nature of the activities and/or waste facilities on the site.
- Locations of receptors, sources of emissions/releases, and monitoring points.
- Site drainage.
- Site surfacing.

If this information is not shown on the site plan required by Part A of the application form then you should submit the additional plan or plans with this site condition report.

2.0 Condition of the land at permit issue	
Environmental setting including: <ul style="list-style-type: none"> • geology • hydrogeology • surface waters 	AD Plant is to be constructed adjacent to waste transfer station EPR/AP3594EC.
Pollution history including: <ul style="list-style-type: none"> • pollution incidents that may have affected land • historical land-uses and associated contaminants • any visual/olfactory evidence of existing contamination • evidence of damage to pollution prevention measures 	There are no recorded incidents of pollution to land, water or air The proposed site was previously part of Mona Airfield which is still operated by the Ministry of Defence. N/A N/A
Evidence of historic contamination, for example, historical site investigation, assessment, remediation and verification reports (where available)	There is no evidence of any previous pollution on site.
Baseline soil and groundwater reference data	N/A

Supporting information	<ul style="list-style-type: none"> • Source information identifying environmental setting and pollution incidents • Historical Ordnance Survey plans • Site reconnaissance • Historical investigation / assessment / remediation / verification reports • Baseline soil and groundwater reference data
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3.0 Permitted activities	
Permitted activities	Application is for an AD Plant to be constructed next to a household, industrial and commercial waste Transfer Station (EPR/AP3594EC). The AD Plant will be housed within a purpose built and specifically designed building. Details of which are submitted with the application.
Non-permitted activities undertaken	N/A
Document references for: <ul style="list-style-type: none"> • plan showing activity layout; and • environmental risk assessment. 	See Drawing No 819/2033/03 H1 and 819/2033/K

Note:

In Part B of the application form you must tell us about the activities that you will undertake at the site. You must also give us an environmental risk assessment. This risk assessment must be based on our guidance (*Environmental Risk Assessment - EPR H1*) or use an equivalent approach.

It is essential that you identify in your environmental risk assessment all the substances used and produced that could pollute the soil or groundwater if there were an accident, or if measures to protect land fail.

These include substances that would be classified as 'dangerous' under the Control of Major Accident Hazards (COMAH) regulations and also raw materials, fuels, intermediates, products, wastes and effluents.

If your submitted environmental risk assessment does not adequately address the risks to soil and groundwater we may need to request further information from you or even refuse your permit application.

4.0 Changes to the activity

Have there been any changes to the activity boundary?	If yes, provide a plan showing the changes to the activity boundary.
Have there been any changes to the permitted activities?	If yes, provide a description of the changes to the permitted activities
Have any 'dangerous substances' not identified in the Application Site Condition Report been used or produced as a result of the permitted activities?	If yes, list of them
Checklist of supporting information	<ul style="list-style-type: none">• Plan showing any changes to the boundary (where relevant)• Description of the changes to the permitted activities (where relevant)• List of 'dangerous substances' used/produced by the permitted activities that were not identified in the Application Site Condition Report (where relevant)

5.0 Measures taken to protect land

Use records that you collected during the life of the permit to summarise whether pollution prevention measures worked. If you can't, you need to collect land and/or groundwater data to assess whether the land has deteriorated.

Checklist of supporting information	<ul style="list-style-type: none">• Inspection records and summary of findings of inspections for all pollution prevention measures• Records of maintenance, repair and replacement of pollution prevention measures
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6.0 Pollution incidents that may have had an impact on land, and their remediation

Summarise any pollution incidents that may have damaged the land. Describe how you investigated and remedied each one. If you can't, you need to collect land and /or groundwater reference data to assess whether the land has deteriorated while you've been there.

Checklist of supporting information	<ul style="list-style-type: none">• Records of pollution incidents that may have impacted on land• Records of their investigation and remediation
--	--

7.0 Soil gas and water quality monitoring (where undertaken)

Provide details of any soil gas and/or water monitoring you did. Include a summary of the findings. Say whether it shows that the land deteriorated as a result of the permitted activities. If it did, outline how you investigated and remedied this.

Checklist of supporting information

- **Description of soil gas and/or water monitoring undertaken**
- **Monitoring results (including graphs)**

8.0 Decommissioning and removal of pollution risk

Describe how the site was decommissioned. Demonstrate that all sources of pollution risk have been removed. Describe whether the decommissioning had any impact on the land. Outline how you investigated and remedied this.

Checklist of supporting information	<ul style="list-style-type: none">• Site closure plan• List of potential sources of pollution risk• Investigation and remediation reports (where relevant)
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9.0 Reference data and remediation (where relevant)

Say whether you had to collect land and/or groundwater data. Or say that you didn't need to because the information from sections 3, 4, 5 and 6 of the Surrender Site Condition Report shows that the land has not deteriorated.

If you did collect land and/or groundwater reference data, summarise what this entailed, and what your data found. Say whether the data shows that the condition of the land has deteriorated, or whether the land at the site is in a "satisfactory state". If it isn't, summarise what you did to remedy this. Confirm that the land is now in a "satisfactory state" at surrender.

Checklist of supporting information	<ul style="list-style-type: none">• Land and/or groundwater data collected at application (if collected)• Land and/or groundwater data collected at surrender (where needed)• Assessment of satisfactory state• Remediation and verification reports (where undertaken)
--	--

10.0 Statement of site condition

Using the information from sections 3 to 7, give a statement about the condition of the land at the site. This should confirm that:

- the permitted activities have stopped
- decommissioning is complete, and the pollution risk has been removed
- the land is in a satisfactory condition.

**EVIDENCE BASE : SOIL QUALITY, THE BEST AND MOST
VERSATILE LAND AND CONTAMINATED LAND**

CURRENT POSITION

- Soil quantity and quality is vital to our well being.
- Wide range of geological processes with various soil types on Anglesey.
- Good practise set by the Soil Code

ISSUES FOR NEXT TEN YEARS

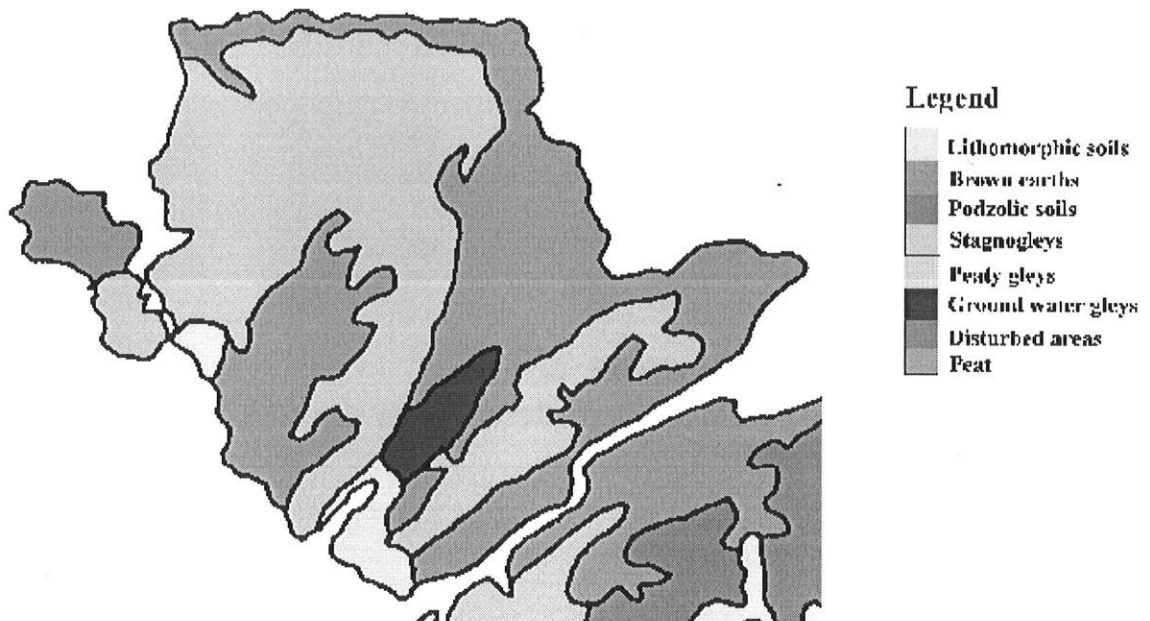
- More input required during consultation on the scoping report to clearly establish key issues.

DETAILED EVIDENCE

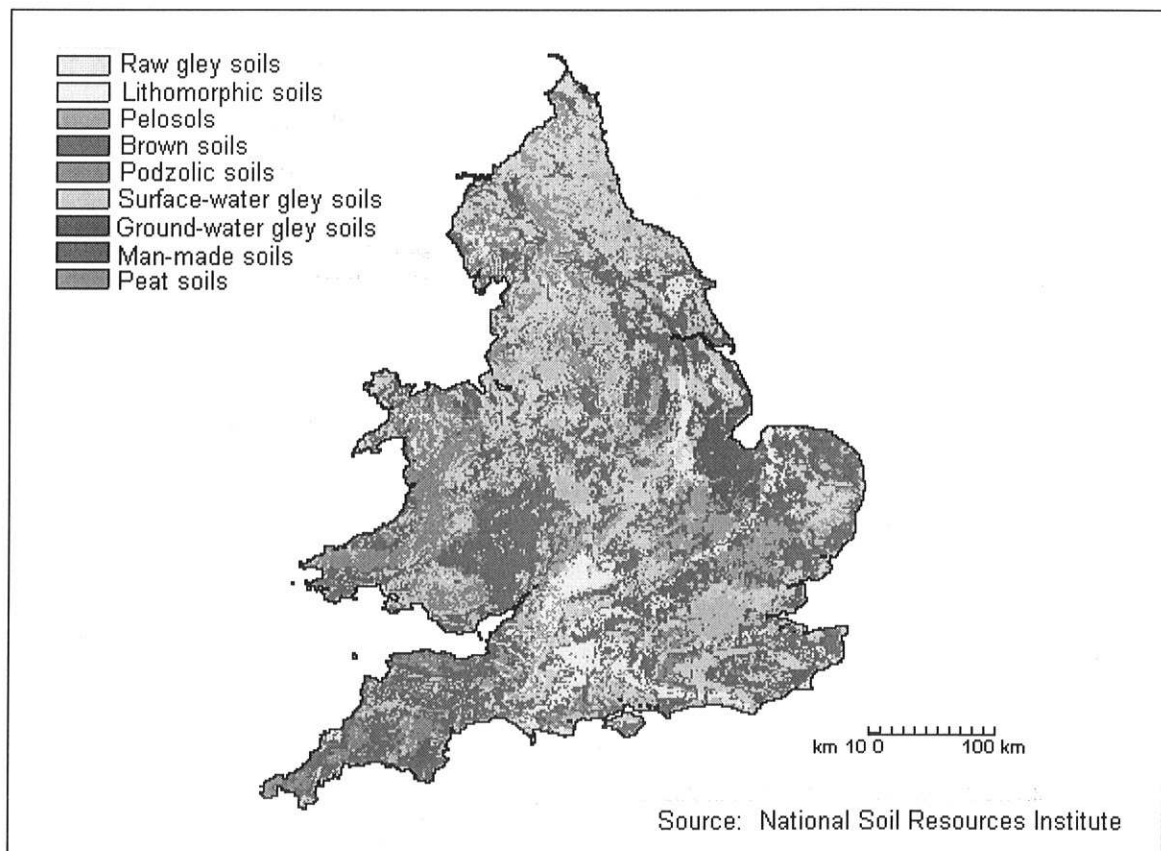
Soil

The Soil Survey of England and Wales provides detailed information on soil types in England and Wales. The Planning Service holds maps from the 1958 survey.

Work carried out by J S Conway (Soils in the Welsh Landscape) provides a further insight to the nature and range of soils on Anglesey. However not a lot of other data is currently held and this will be a topic to be considered further as part of the consultation period on the scoping report to help more clearly establish the issues for the LDP.



Source: RAC Soils Research (<http://royagcol.ac.uk/soils/book/p10.htm>)



Source: National Soil Resources Institute

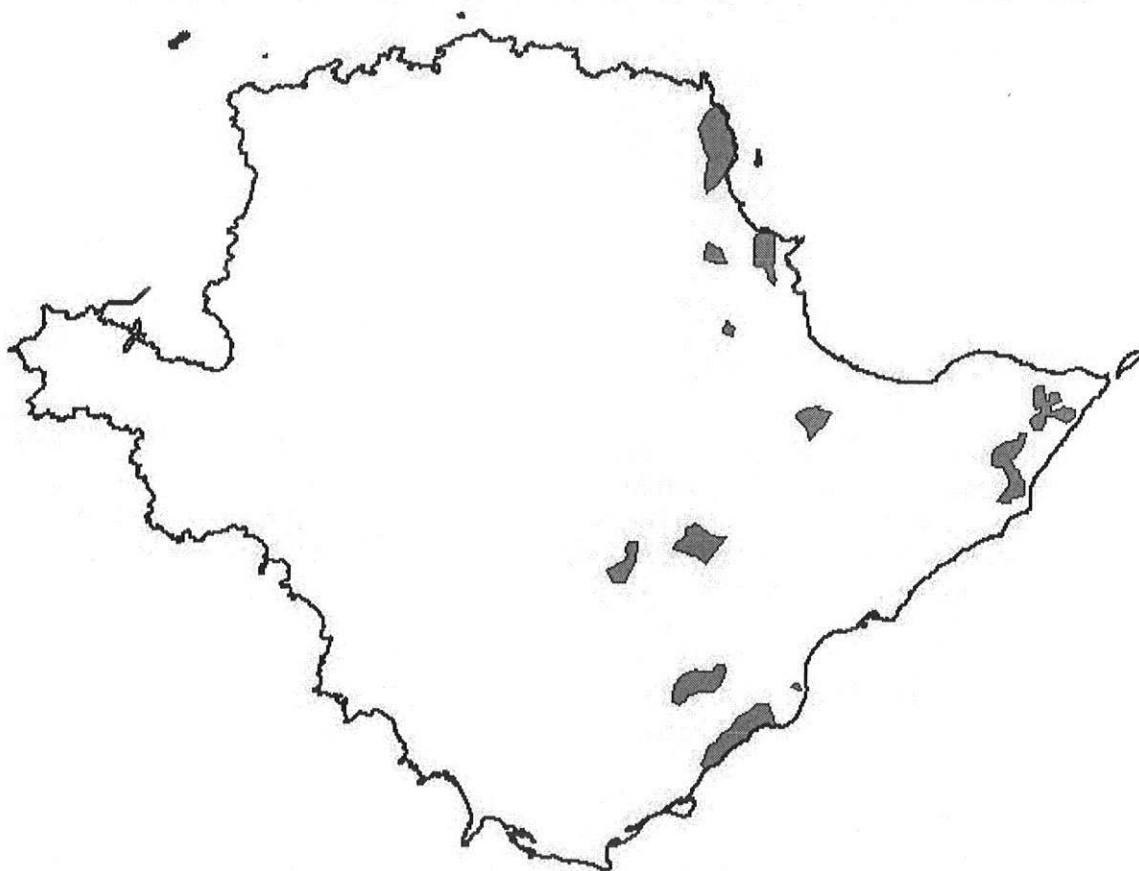
LDP team – 2006

file : planenv/policy/ldp/evidence base/standard format for evidence

Best and Most Versatile Land

One key objective for planning is to protect the best and most valuable land, which in part reflects geological influences and soil quality. Agricultural land is classified in the Agricultural Land Classification and land ranked. The associated maps provide strategic guidance on the quality of land. There is no grade 1 land but the general locations on Anglesey in which grade 2 land can be found are highlighted on the following indicative map.

Indicative map showing location of Grade 2 Agriculture Land on Anglesey



(based on Ordnance Survey Agricultural Land Classification of England and Wales)

Of these the existence of grade 2 agricultural land south of Llangefni the main administrative, and a focal centre in the UDP, has perhaps most significance for planning.

Detailed advice must be taken on the soil and land quality issues.

LDP team – 2006

file : planenv/policy/ldp/evidence base/standard format for evidence

Contaminated land

With the exception of Parys Mountain near Amlwch the industrial history of Anglesey does not point to major areas of ground contamination. Modern day land uses are more likely to have introduced contamination.

Examples of sources of contamination include: petrol filling stations, chemical works, ordnance factories, metal works and other such industrial land use activities.

The council's main aims in dealing with contaminated land are to:

- protect human health
- protect controlled waters
- prevent damage to property
- prevent any further contamination of land
- encourage the voluntary "clean up" of contaminated land

encourage the re-use of contaminated land or as it is known "brownfield" land.

Contaminated Land Inspection Strategy

In accordance with the Environmental Protection Act 1990 - Part IIA, the council is required to inspect land in its district for contamination. A strategy was produced and submitted to the National Assembly for Wales in October 2002. The strategy shows how we plan to tackle the issue of land contamination in a rational, ordered and efficient approach.

The main driver behind the new regime for dealing with contaminated land is the principle of sustainable development and to address our legacy of contaminated land from past economic activity.

Source : IACC web site / contaminated land

**ENVIRONMENTAL
ENGINEERING
PLANNING**

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Anglesey Ecoparc Môn Ltd

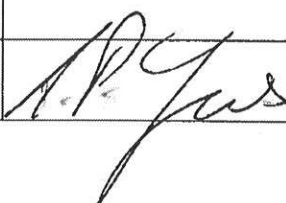
Waste recycling & transfer facility

Geotechnical Report

February 2009

Approval Sheet & Foreword

Client: Anglesey Ecoparc Môn Ltd.
Site: Anglesey Ecoparc, Plot 8+, Mona Industrial Estate
Project Title: 3072 - Geotechnical Report & Ground Investigation
Document: Geotechnical Report – ISSUE v. 1.0
Project Director: Mike Caulfield
Project Manager: Alan Jones

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	DRAFT	FINAL		
Author:	Rhidian Jones			
Checked by:		Alan Jones		
Approved by:		Alan Jones	02/03/2009	

Foreword

1. This document has been prepared by Egniol Consulting Ltd. with all reasonable skill, care and diligence within the terms of the service agreement with the Client and within the limitations of the resources devoted to it by agreement with the Client.
2. This report is confidential to the Client, and Egniol Consulting Ltd accepts no responsibility whatsoever to third parties to whom this report, or any thereof, is made known. Any such parties rely upon the report at their own risk.
3. This report shall not be used for engineering or contractual purposes unless signed by the author and approver, and unless the report status is **FINAL**.

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1. INTRODUCTION

Anglesey Ecoparc Môn Ltd propose to develop a plot of land approximately 8 acres in area, located on the Mona Industrial Estate. It is proposed to develop the site in two phases; Phase 1 involves the construction of a waste recycling and transfer facility in the western part of the site, while the details of the Phase 2 development are currently unknown.

As part of the detailed design of the Phase 1 development, Egniol Consulting Limited has been appointed to carry out a desk study and ground investigation of the site.

This report presents the findings of the desk study and ground investigation and makes specific recommendations regarding the Phase 1 development as well as general recommendations for the Phase 2 development.

The purpose of the report is to interpret ground conditions on the site and provide the following:

- A review of previous and current ground investigations;
- An interpretation of ground conditions at the site;
- Geotechnical recommendations for the proposed Phase 1 development and future developments in Phase 2;
- Recommendations in relation to potentially contaminated land.

This report has been prepared with the aid of third party information and is based on the proposed development layout identified in Figure 3. All third party information has been received in good faith and no warranty is made in relation to its accuracy or sufficiency.

2. THE SITE

2.1 Site Location & Description

The site is situated approximately 3 miles west of Llangefni, Anglesey at OS Grid Reference SH 419 755 and is part of the Mona Industrial Estate, see Figure 1. The site is an irregular shape and covers an area of 7.96 acres, measuring approximately 310m west to east by 160m north to south at the widest parts. The site is located at the northern boundary of the Mona Industrial estate and is accessed via the estate road, which runs past the western site boundary.

The topography of the site is typically gently undulating. The site rises from an elevation of approximately 54.5m in the west to a high point of approximately 58.11mAOD, located on a rock outcrop, towards the centre of the site. It then falls to a relatively flat area at an elevation of between 55mAOD and 54mAOD in the east of the site, which measures approximately 100m x 150m, see Figure 2.

The site is bounded to the north by a Chicken Farm and a council run gritting yard, to the west by Mona industrial estate and RAF Mona beyond, to the south by open land which was part of RAF Mona and to the east by an un-named road.

The site predominantly comprises open fields, separated by stock proof fences with approximately 4m variation on ground level between its highest and lowest points. There is a large soil stockpile in the northern corner adjacent to the gritting yard, a ruined structure and a rock outcrop towards the centre of the site near the northern boundary. Further east there is a concrete base and the remnants of an old road running north-east to south-west. On the eastern boundary of the site is a culvert / drainage ditch running roughly north to south, which flows beneath the un-named road. The eastern end of the site is low lying and predominately marshy.

2.2 Site History

The site history has been researched from both 1:10,000 and 1:2,500 scale historical Ordnance Survey (OS) maps dated between 1889 and 2007. These were obtained from Groundsure and are included in Appendix 1 of this report.

1889 – The site comprised agricultural land. A road ran through the eastern part of the site, running south-west to north-east. There was a single structure, most likely a farmhouse, located towards the centre of the site.

1900 – No significant changes to the site.

1920 – No significant changes to the site.

1926 – An aerodrome was built approximately 400m to the west of the site.

1949 – Mona airfield had been constructed, although the details were not shown on the OS maps. The original road running through the site was replaced by new thoroughfare running along the eastern site boundary.

1959 – The Mona airfield infrastructure was now shown, along with a building located just off the north-west boundary. A taxiway to one of the main runways ran adjacent to the southern site boundary.

1971-1972 – Five unnamed structures and an associated access track were located in the north western part of the site. (These may have been temporary structures as they were represented as dashed lines on the maps).

1973 – 1975 – No significant changes to the site.

1992 – No significant changes to the site

1997 – The single structure in the centre of the site had been removed and the access track for the five un-named (temporary) buildings was redirected.

2002 - An additional two sheds had been added to the chicken farm bordering the site and a gritting yard had been built on the northern corner boundary.

2007 – The five un-named (temporary) buildings in the north of the site had been removed.

2.3 Published Geology

The geology of the area has been researched from the 1:50,000 scale geological map of the area: Anglesey Special Sheet.

Superficial deposits on site are shown to comprise a Glacial Till consisting of poorly sorted sediment with a wide clast range.

The local bedrock comprises Gwna Green Schist, Spilitic lavas and Albite Diabases of the Gwna Group and Mica Schist of the Penmynydd Zone of Metamorphism. All of which are early Cambrian rocks.

There are no geological structures shown to be present the site; however a small fault is present approximately 250m away to the south-east of the site, trending south-west to north-east.

2.4 Hydrology

The Environment Agency flood map does not show the site to be at risk from flooding.

There are no significant water courses within 500m of the site.

2.5 Hydrogeology

The hydrogeology of the site has been researched from the Environment Agency groundwater vulnerability map for the area. The bedrock at the site is classified as a non-aquifer of negligible permeability. The proposed development is therefore unlikely to impart any significant effect on the hydrogeological conditions on site.

2.6 Potential for Contamination

Based on the site history there is no evidence of potentially contaminative industry on the site. However there may be localised contamination around the area of the structure in the centre and around the five RAF structures in the northern corner of the site.

The presence of RAF Mona to the south and west and the chicken farm and gritting yard to the north means there may be potential for migration of low level contamination onto the boundary areas and there is also potential for hotspots of fuel spill derived contamination across the site associated with the former taxiway.

Due to its proximity to Mona airfield, which was an active air field during the Second World War (WWII), there is potential for the site to be contaminated with unexploded ordnance and munitions, which may have been disposed of on the site, or due to enemy sorties. It is therefore considered necessary to conduct an unexploded ordnance survey (UXO) on the site to assess the risk to the proposed development. The report is summarized below.

2.7 Unexploded Ordnance Survey

An Unexploded Ordnance (UXO) Survey was commissioned from EOD Contracts Ltd. Using historical Ministry of Defence records they assessed the likelihood of the site being contaminated with various types of unexploded ordnance. The report states:

"The likelihood of UXO contamination being present on site is possible but unlikely. When considered against the consequences of an encounter being realised; resulting in serious injuries or deaths to site personnel and members of the public, the risk is low. The conclusion has been drawn that limited mitigation is warranted to ensure the project can proceed in the safest possible manner."

The report also makes the following recommendations:

- Communicating the risks; all stakeholders should be made aware of the UXO situation and the possible impact it may have to the project in the unlikely event of encountering an UXO;
- Safety Training; UXO safety awareness training should be given to all site personnel as part of the site induction;
- Risk Review; the UXO risk level should be subject to constant review and should be re-assessed should the situation warrant it.

The UXO report is presented in Appendix 2 of this report.

2.8 Radon

The Building Research Establishment publication, BRE211, provides two sets of maps of England and Wales based on 5km grid squares; the first set is derived from a statistical analysis of Radon measurements of existing residential houses carried out by the National Radiological Protection Board (NRPB); the second set of maps are based on an assessment of geological Radon potential prepared by the British Geological Survey (BGS).

The NRPB map shows the site to be in a grid square where no radon protection is required, however the site was located in a grid square where a geological assessment was required. The BGS report, which is presented in Appendix 8, stated that No Radon Protection measures were required at the site.

3. PROPOSED DEVELOPMENT

It is currently proposed to develop the western areas of the site as a waste recycling and transfer facility, which will comprise the Phase 1 development of the site.

The Phase 1 development includes the following components, which are highlighted on Figure 3:

- Waste recycling and transfer building measuring approximately 40m x 35m;
- Lean-to vehicle workshop area, with pit, measuring approximately 15m x 8m (planning pending);
- Offices for site and support workers (planning pending) with associated permeable car parking area;
- Concrete apron and materials storage area;
- Permeable hardstanding for Inert materials processing area and skip / plant storage area;
- Single weighbridge;
- Associated drainage, including interceptors and surface water attenuation tanks.

The development proposals for the Phase 2 area have not been significantly developed and are currently unknown.

4. GROUND INVESTIGATIONS

4.1 Previous Ground Investigations

An investigation of the site and its surrounding area was carried out by Exploration Associates in 1996. It consisted of 6 trial pit and 7 boreholes, of which two trial pits (TP3 and TP5) fell within the boundary of the site. The relevant exploratory hole logs obtained from the BGS are presented in Appendix 3 and the ground conditions are summarised in the table below:

Strata	Thickness (m)	Description
Topsoil	Surface cover	Topsoil
Made Ground	0.3 to absent	Fine to medium sub angular GRAVEL
Glacial Deposits	2.0	Firm to stiff silty sandy gravelly CLAY with occasional cobbles and boulders
Bedrock (Weathered)	0.5-0.7 (max proven)	Weathered Green Schist recovered as gravelly CLAY

Table 4.1 – Summary of Stratigraphy (previous investigations)

4.2 This Investigation

4.2.1 Site Walkover

The site walk over took place on 01/09/08. This was undertaken to establish existing site conditions and plan the works involved in the site investigation.

The site was generally covered in long grass, conditions underfoot were generally firm in the western and central areas of the site. Towards the east there was significant reed growth and areas of standing water creating boggy conditions.

In the centre of the site near to the northern boundary with the chicken farm, the rock was present as an outcrop and the remains of an old building (base of walls and floor) were present. There were also a number of trees and shrubs lining the disused road, which used to run through the eastern end of the site.

Photographs taken during the site walkover are presented in Appendix 4.

4.2.2 Site Investigation

The site investigation took place from 09/09/08 to 11/09/08. The works comprised of the following elements:

- 22 trial pits, excavated with a 13ton tracked excavator, across the site to provide information on the shallow ground conditions;
- Shallow inspection pits to assess the extent of the rock outcrop;
- Four CBR testing locations across the site;
- Sampling of soil stockpile on site to assess the nature of the material;
- Exploratory locations are recorded on Figure 2 and trial pit logs and photographs are presented in Appendix 5 of the report.

4.2.3 Laboratory Testing

Geotechnical Testing

A suite of physical laboratory testing was undertaken on representative samples of soils to establish geotechnical parameters. The laboratory tests comprised:

- Moisture content x 31 no;
- Particle Size Distribution x 8 no;
- Atterberg Limits x 7 no;
- Density / Moisture Content Relationship x 6 no;
- Organic matter content x 1 no;
- Undrained shear strength x 5 no;
- Particle Density x 6 no.

The results of the testing are presented in Appendix 6 of the report.

Chemical Testing

Soil samples were tested to assess the presence of contamination at the site. The chemical tests undertaken are summarised below:-

- CLEA Metals suit x 5 no;
- Total Petroleum hydrocarbon content x 5 no;
- Asbestos content x 5 no;
- 2:1 Water Soluble Sulphate x 12 no;
- pH x 12 no;
- Total Poly Aromatic Hydrocarbon content x 5 no;
- Phenols x 5 no.

The results of the testing are presented in Appendix 7 of the report

5. GROUND CONDITIONS

5.1 Stratigraphy

In the western and central areas of the site, which corresponds closely to the Phase 1 development area, ground conditions typically comprise of a thin organic topsoil layer underlain by generally firm to stiff brown sandy gravelly silty clay. Bedrock was observed as very strong greenschist rock, typically encountered between 0.5m and 2m, although locally outcropping. Occasionally a thin layer (<200mm) of partially weathered rock, recovered as clayey sub angular gravel, was encountered locally above the un-weathered rock.

Towards the east of the site, the area of future Phase 2 development, the ground conditions typically comprise a thin layer of topsoil with a near surface horizon of firm to stiff brown and bluish brown, sandy gravelly silty clay, overlying very stiff to hard blue grey sandy gravelly clay with a varying cobble and gravel content. A thin layer of medium dense sandy clayey gravel was encountered in the south east of the site; however Bedrock was not encountered in this area, and appeared to fall away relatively steeply at the interface between the Phase 1 and 2 site areas.

Made ground was encountered in several locations in at the eastern end of the site. It was typically found as reworked natural material comprising firm sandy gravelly silty clay, which overlay a soft to firm organic clay layer of buried topsoil. The material was likely placed as part of the earthworks to form the Mona RAF base.

The ground conditions encountered in this investigation are presented below. Geological sections of the site are presented in figure 4 and the section locations are presented on Figure 2 of this report.

Stratigraphy	Thickness	Description
Topsoil	0.2	Organic slightly clayey topsoil. Buried topsoil occasionally buried beneath made ground
Made ground	absent to 0.1m	Typically reworked natural material of brown firm sandy gravelly silty CLAY grading into a brown clayey organic layer. Dense grey sandy GRAVEL with fragment of asphalt encountered on route of former road
Glacial Deposits	0.85m - >3m	Typically near surface horizon of brown slightly sandy gravelly silty CLAY. Lower horizon of stiff to hard blue/grey slightly sandy slightly gravelly CLAY in East of site. Occasional horizons of clayey gravel also encountered locally.
Bedrock	Not proven, occasionally absent	Very hard Green Schist. Typically within 0.5 to 2m of surface Very thin weathered profile locally <200mm. rock outcrops locally
Table 5.1 - Summary of Stratigraphy		

5.2 Made Ground

Made ground was encountered in trial pits 6,7,10 and 12 and ranged from 0.1m to 1.0m in thickness. The principle types encountered were:

- Reworked natural material consisting of firm sandy gravelly clay, most likely resulting from earthworks operations to create the RAF base;
- Dense sandy gravel with fragments of asphalt (former road in east of site).

A stockpile of topsoil is located on the boundary between the council gritting yard and the site in the north western corner. It measures approximately 15m x 20m and is approximately 1.5m to 2m high.

Laboratory testing of a sample of the firm sandy gravelly clay reworked natural material recorded a moisture content of 21.5%. Testing of two samples for Atterberg limits recorded a plastic limit of 22% to 26% and a liquid limit of 40% to 61%, this gave a plastic limit to moisture content relationship of 1.02. When plotted on a Casagrande extended soil classification graph, the material demonstrated intermediate to high plasticity.

5.3 Glacial Deposits

Glacial deposits were found at all locations on the site. Typically the natural ground consisted of firm to stiff well graded cohesive glacial till, the material was often intermediate between cohesive and granular, with varying, but typically high contents of silt, sand and gravel, and with occasional cobbles and boulders.

The proven thickness of glacial till ranged from 0.3m to 2.7m, and three principal types were encountered:

- Firm to stiff, brown, slightly silty, slightly sandy, gravelly CLAY;
- Very stiff bluish grey, silty, slightly sandy, gravelly CLAY with cobbles & boulders;
- Medium dense slightly clayey, sandy GRAVEL.

Laboratory test results for moisture content recorded values ranging from 10.1% to 26.9%. In the west of the site, the recorded moisture content was relatively consistent and ranged between 10.6% and 16% (with the exception of one sample from 0.15m of 19.1%), and averaged 13.6%. There was no significant variation with depth. However in the east of the site, moisture contents ranged between 10.1% and 26.9%, averaging 17.2%, with a distinct reduction in moisture content with depth:

- 0.3 – 1.5m depth, moisture content range 17.5% - 26.9%, av. 19.7%
- 1.6 – 2.5m depth, moisture content range 10.1% - 12.1%, av. 11.6%

Plasticity testing of 6 samples recorded a plastic limit of between 17% and 22% and a liquid limit of between 30% and 39%, with a plasticity index of between 13% and 18%. This represents a generally low to intermediate plasticity Clay. There was no significant variation between the material in the western and eastern part of the site, however there was a variation in the moisture content

to plastic limit ration, which ranged between 0.63 to 0.75 in the west and 0.9 to 1.25 in the east.

Particle Size Distribution (PSD) tests recorded the following range of gradings in the six test samples:

Material	Gravel	Sand	Silt	Clay
Percentage (%)	21 - 37	24 - 30	21 - 29	10 - 21

Table 5.2 - Summary of PSD Grading

The gradings above confirm the well graded nature of the material, and when compared to the Table 6.1 of Series 600 of the Highways Specification, the material is classed as Class 2C stoney cohesive fill.

Compaction testing of six samples from the proposed reduced level excavation for the Phase 1 development was carried out. The tests recorded maximum dry densities ranging from 1.91-1.97 mg/kg and optimum moisture contents of between 12% and 14%, and the significance of these results are discussed in details in Section 7.3 (Material Re-use) of this Report

Undrained shear strength testing of cores obtained from the near surface strata at the site showed triaxial strengths of between 68 kPa and 133 kPa.

California Bearing Ratio testing was carried out at four locations; see Figure 2, across the site, the results are as follows:

Location	Depth taken	CBR Value
CBR1	0.6m	3.1%
CBR2	0.85m	10.8%
CBR3	0.7m	18.6%
CBR4	0.7m	5.3%

Table 5.3 – CBR testing results

5.4 Bedrock

Bedrock at the site comprises strong to very strong metamorphosed schists and lavas, and based on the outcrop and rock encountered in the trial pits it is typically strong to very strong unweathered rock, without any discernable weathering profile that could be established by excavating with the 13ton excavator. Occasionally a thin weather profile, of approximately 200mm was encountered, which was recovered as a fine to coarse sandy clayey gravel and underlain by unweathered rock

Bedrock was encountered in 13 of the 22 trial pits; it was predominantly encountered at shallow depths, typically between 0.3m and 2.0m in the western and central areas of the site. The surface of the rock undulates below ground (see Figure 4), not always following the change in the surface contours, and varies in elevation in the trial pits between 52.5mAOD to 57.4mAOD, although to the west of the Phase 1 area the rockhead was encountered between approximately 55.8mAOD and 56.2mAOD in the four trial pits.

The rock outcrops near the northern boundary in the centre of the site at an elevation of approximately 58mAOD, (see figure 2), then appears to fall away

over a relatively short distance, by as much as 3m over a distance of 10m, and is not encountered in any of the trial pits in the eastern areas of the site.

The variation in rock elevation is highlighted in the table below:

TP Ref	G.L. (mAOD)	Rock (mAOD)		TP Ref	G.L. (mAOD)	Rock (mAOD)	
		Depth	Elevation			Depth	Elevation
TH01	57.04	0.3	56.74	TP13	55.38	2	53.38
TH03	57.57	0.3	57.27	TP14	56.63	1	55.63
TH04	57.61	0.2	57.41	TP15	56.35	2.6	53.75
TP01	56.26	0.3	55.96	TP17	57.471	>3	<54.471
TP01A	56.03	1.65	54.38	TP18	57.667	2.6	55.067
TP02	56.73	2.8	53.93	TP19	57.134	2	55.134
TP03	57.07	0.8	56.27	TP20	56.821	2.1	54.721
TP04	56.77	3	53.77	TP21	56.53	0.7	55.83
TP05	55.7	3.2	52.5	TP22	57.04	1	56.04

Table 5.4 – Summary of Rock Elevations

5.5 Groundwater

Groundwater was recorded in 15 of the 22 trial pits at various depths. In all cases it represented perched water.

In western areas where bedrock was overlaid by the superficial deposits, groundwater was generally encountered as light seepage at the base of the clay horizon directly overlying the bedrock.

In the lower lying eastern parts of the site, ground water ingress varied between light seepage to moderately heavy seepage, generally at depths of between 0.5m and 1m. The water ingress was noted along either granular lenses within the cohesive till or in the case of TP6 and TP7, inflow was noted along the interface of the base of the made ground and the underlying cohesive till. Where the flow was sufficiently heavy, it was noted that the perched water was flowing down-gradient from the higher ground in the west to the east.

6. CONTAMINATION

6.1 Legislation

Current UK legislation on contaminated land is principally contained in Part IIA of the Environmental Protection Act 1990, which was retrospectively inserted by Section 57 of the Environment Act 1995. This legislation endorses the principle of a 'suitable for use' approach to contaminated land, where remedial action is only required if there are unacceptable risks to health or the environment, taking into account the use of the land and its environmental setting. The UK guidance describes a risk assessment methodology based on the 'source-pathway-receptor' model. This model comprises:

- The principal pollutant hazards associated with the property (the sources);
- The principal targets at risk from the identified hazards (the receptors), such as workers on the site, construction workers and the surface water environment; and
- The existence, or absence, of plausible pathways that may exist between the identified hazards and targets.

6.2 Potential for Contamination

Historically the site was used for agricultural purposes, and as a former RAF base. There is no evidence to suggest that it could be subject to widespread industrial contamination. There may be potential for localised contamination in the areas where un-identified structures were located in the west of the site and there is a possibility of migration of contaminants onto the site boundary from the chicken farm and the council gritting yard to the north of the site. There is also a possibility of localised contamination by fuel spillages associated with the former RAF base infrastructure.

6.3 Results

Five samples were obtained from the site and tested in the laboratory for potential contaminants.

Since the withdrawal of published soil guideline values (SGVs) and previous CLR guidance documents, which have been replaced with SR documents, there are no widely accepted thresholds for contaminated land threshold values. In the interim, Tox reports remain valid for use and have been used with the new CLEA guidance documents and software to derive in house soil guideline values.

The values presented in Table 6.1 are for commercial land use based on a pH of 7 and soil organic matter (SOM) of 6% (CLEA default). These values are not peer reviewed and are for guidance only during the interim period before new EA/Defra SGVs are published in the near future.

The results have been compared to derived, in-house, threshold values, which have been calculated as described above, however in the absence of in house values, the withdrawn Soil Guidelines values (SGVs) and thresholds from the 'Land Quality Management Generic Assessment Criteria for Human Health Risk Assessment' have been used for comparative purposes.

A summary of the test results and comparisons to threshold values is presented below in Table 6.1.

Determinand	No. of tests	Range (mg/kg)	Screening Value (mg/kg)	Reference / Derivation
Arsenic	5	10.9 - 26.8	332	CLEA v.1.04 ^b
Cadmium	5	bd - 0.2	294	CLEA v.1.04 ^b
Chromium	5	26.0 - 42.1	330	CLEA v.1.04 ^b
Lead	5	20.8 - 28.1	750	CLEA SGV ^a
Mercury	5	bd - 0.1	584	CLEA v.1.04 ^b
Selenium	5	1.5 - 2.9	9,650	CLEA SGV ^a
Copper	5	16.8 - 64.8	45,800	CLEA v.1.04 ^b
Nickel	5	16.7 - 30.7	1,710	LQM GAC ^c Value
Zinc	5	55.7 - 96.2	1,240,000	LQM GAC ^c Value
Vanadium	5	29.2 - 52.5	5,590	LQM GAC ^c Value
TPH EC10-EC40	5	bd - 118.1	-	-
TPH EC40-EC44	5	bd	-	-
PAH	5	bd - 0.5	100	LQM GAC Value ^c
Phenol	5	bd	-	-
Asbestos	5	bd	-	-
pH	12	4.9 - 6.9	-	-
SO ₄	12	bd	-	-
Notes. bd –below laboratory detection levels ^a Withdrawn CLEA Soil Guideline Value for industrial Land (DEFRA and the Environment Agency (2002) The Contaminated Land Exposure Assessment Model (CLEA). R & D Publications CLR10 and SGV Reports 1, 3, 4, 5, 7, 9 and 10). ^b derived using CLEA v1.04 software to derive in house soil guideline values – for guidance only prior to issue of EA/DEFRA SGVs ^c Land Quality Management Generic Assessment Criteria for Human Health Risk Assessment				
Table 6.1 – Summary of chemical test results				

The chemical test result and laboratory certificates are presented in Appendix 7 of this report.

6.4 Results discussion

A comprehensive range of tests were carried out to assess any potential contamination on the samples taken from the site. The areas targeted were the location of the proposed waste transfer building near the site's northern boundary and the western end of the site where historical mapping had indicated the presence of un-identified structures.

None of the determinants tested exceeded the published threshold values for commercial / industrial land, in fact all the results were significantly below the threshold values and generally consistent with greenfield background values.

Where no thresholds have been derived, or are available, the test results were generally below the laboratory detection limits. The one exception was the recorded concentration of TPH (Total Petroleum Hydrocarbons), which ranged between below detection to 118mg/kg. Concentrations of this nature do not represent any significant risks to human health or the environment, and may be derived from natural organic material within the soils to localised, small spillages of fuel or oils.

It is therefore considered that the risk of the site being subject to any potential industrial contamination is very low to negligible, and no further action is recommended in relation to the Phase 1 development.

It is however recommended that a watching brief is implemented by the contractor during earthworks and groundworks operations. If any areas of potentially contaminated land are encountered it is recommended that the engineers' representative or the employer is immediately informed.

7. GEOTECHNICAL DISCUSSION & RECOMMENDATIONS

7.1 Foundations

The finished floor level (FFL) of the slab for the building is set at an elevation of 56mAOD, which represents a cut of between 0.8 – 1.7m to FFL, although additional excavation will be needed for the slab construction and in particular the footings.

7.1.1 Column Foundations

The proposed founding levels for the footings will vary between approximately 53.8m and 54.7mAOD. The depth to rock is summarized in the table below, which identifies rock at an elevation of between 54.7mAOD to 55.1mAOD (it was not encountered in TP17, where the pit was terminated in very stiff clay at an elevation of 54.4mAOD).

TP	Ground Level (mAOD)	TP Depth (m)	Depth to Rock (m)	Rock Elevation (mAOD)
TP17	57.47	3	> 3m (not encountered)	<54.47
TP18	57.67	2.6	2.6	55.07
TP19	57.13	2	2	55.13
TP20	56.82	2.1	2.1	54.72

Table 7.1 – Column Foundation Formations

It is likely that some, if not all footings, will extend into the rock. The rock is described as strong and a conservative UCS strength of 50MPa may be adopted, along with a safe bearing capacity of 750kPa.

It is recommended that all footing excavations that terminate in the glacial till are extended to the bedrock to provide uniform founding conditions.

The rock will be very difficult to excavate and peckers are likely to be required. The use of anchors may be used as an alternative to resist uplift forces, however additional investigation would be required to prove rock strength in determining the anchor design, though it may be more cost effective to design longer anchors and adopt conservative strength values.

7.1.2 Floor Slab

The founding level for the floor slab construction is at approx 55.6mAOD. The slab will be founded above the rock elevations encountered in the trial pits; however local high spots of rock cannot be discounted and may be encountered during the reduced level dig.

The slab construction will therefore be founded upon typically stiff, slightly sandy gravelly clay with occasional cobbles and boulders, and an acceptable bearing capacity of 250kPa may be adopted for the slab construction. It is recommended that any rock protruding above the base of the sub-base formation should be excavated to enable a uniform regulating layer of sub-base to be placed and compacted.

7.2 Excavations

The main excavations associated with the Phase 1 development is a reduced level dig to accommodate the main building and associated concrete apron. In addition there are numerous localised excavations, as outlined in Table 7.2.

Excavations will typically proceed through a thin layer of topsoil, a variable thickness of glacial till, and in many instances through the bedrock.

Excavations through the overburden will be relatively easy and may be carried out with conventional earthmoving equipment.

Any excavations penetrating the bedrock will result in difficult excavation conditions and slow or very slow progress. It is likely that the extensive use of hydraulic peckers will be required, particularly for narrow or small excavations.

A summary of the various excavations is provided below, although the summary is not exhaustive, and indicative only.

Excavation	Comments
Reduced Level Dig - structure	The building has a finished floor level of 56mAOD, which has resulted in the reduction of site levels. The cut at the building footprint will predominantly be through the overburden, however it is possible that bedrock will be encountered locally.
Reduced Level Dig – concrete apron	The finished level of the main concrete apron is generally at an elevation of approximately 55.6m AOD to 56.2mAOD. Seven trial pits in this area recorded bedrock elevation ranging between approximately 53.9mAOD and 56.1mAOD, with TP 01, 19, 21 and 22 recording rockhead at 55.9m AOD, 55.1m AOD, 55.83m AOD and 56.04m AOD respectively. It will therefore be necessary to progress the excavation for the concrete slab construction through bedrock locally. The use of heavy rippers and hydraulic breakers/peckers are likely to be required.
Column foundations for main structure	As discussed in Section 7.1 above. The use of hydraulic breakers/peckers is very likely to be required.
The vehicle workshop pit	The pit base is at a level of approximately 54.8mAOD, and as such is likely to require some rock excavation. The use of hydraulic breakers/peckers is very likely to be required.
Drainage infrastructure including interceptors and attenuation tanks	The most significant item of drainage infrastructure is the aquacell attenuation tank (38mx13.2mx1m), which has an invert level of approximately 53.5mAOD. The depth to rock in that area is shown to vary between approximately 55.9mAOD and 54.4m AOD in trial pits TP01 and TP01A respectively, which suggests that significant variations in rockhead can be anticipated beneath the footprint. Significant excavation through rock may be anticipated and the use of heavy rippers and hydraulic breakers/peckers is very likely to be required for the aquacell, as well as the use of hydraulic peckers and breakers for all other interceptor tanks.

Excavation	Comments
Drainage runs; foul and storm sewers and manholes	Due to the reduced level excavation for the structure and apron, the invert levels for the sewers are relatively low in relation to the existing site levels. The invert levels for the sewers vary between 54.67mAOD to 52.66mAOD, which represents significant penetration of up to, or locally in excess of 3.5m into bedrock. Significant slow progress with hydraulic peckers and breakers may be anticipated.
Utilities trenches	Utilities trenches are likely to be significantly shallower than the sewers; however it is likely that localised use of hydraulic/pneumatic peckers and breakers will be required.

Table 7.2 – Summary of Excavation Conditions

Due to the various areas of excavations that will penetrate bedrock it is strongly recommended that trial excavations are carried out by the main contractor to establish the most efficient method of working in advance of the main works.

7.3 Materials Re-use

A significant cut exercise is required to lower the footprint of the proposed recycling building to a finished floor level of 56mAOD, which represents a reduction of up to 2m. As stated above in Section 7.2, there will be numerous other excavations required to construct the concrete apron and the drainage and associated infrastructure. As a result significant volumes of arising will be generated.

7.3.1 Glacial Till

Ground conditions in the area of the proposed recycling and transfer building typically comprise cohesive glacial deposits. Laboratory tests carried out on six samples in the area established that the material is classed as Class 2C Stoney Cohesive Fill in accordance with the highways specification, and recorded the following parameters.

TP ref	Depth (m)	Moisture Content (%)		dry density (Kg/m ³)		Air voids (%)	
		Natural W _(nat)	Optimum W _(opt)	@ W _(nat)	@ W _(opt)	@ W _(nat)	@ W _(opt)
TP2	1	12.4	13	1.92	1.93	6	4
TP17	1.7	11.7	12	1.95	1.95	6	5.5
TP17	2.5	11.7	14	1.91	1.95	4.5	2
TP18	1 – 2	10.8	12	1.95	1.97	7.5	4.5
TP19	1-2	14.4	14	1.90	1.91	3.5	4
TP20	1	10.6	12	1.92	1.97	9.5	4.5

Table 7.3 – Summary of Earthworks Testing

Table 7.3 demonstrates that the natural moisture content is slightly below the optimum moisture content. Compaction at natural moisture content demonstrated a marked reduction in the maximum achievable dry density and an increase in the air voids when compared to compaction at the optimum moisture content. It is therefore likely that some wetting will be required to increase the moisture content of material used as general fill, although this will need to be confirmed by on-site testing.

Upon excavation, and unless the material is utilised as general fill STET, it is recommended that the material is placed in segregated, sealed, stockpiles for future use, either in the works or by the site owner.

7.3.2 Rock

It is likely that there will be significant quantities of rock arisings generated as part of the development. Due to the uncertainty in the actual quantities, it is difficult to establish whether it would be feasible or practical to crush and grade the rock for re-use in the works as either general fill or selected granular fill such as Class 6F2 capping. It is recommended that all excavated rock is segregated and stockpiled in individual stockpiles, either for re-use during the works or for future use by the site owner.

7.4 Slope Stability

The reduced level excavation for the waste transfer and recycling building will result in the creation of slopes to the north, east and south. Smaller slopes will also be associated with the car park.

All slopes, whether they are cut of fill slopes, within the glacial till should be limited to maximum slope angles of 1v:2h, unless they are less than 2m in height, where angles of 1v:1.5h are considered acceptable.

Slopes excavated into rock may be constructed at steeper angles, however it is recommended that all slopes, including temporary works slopes are inspected for stability by a suitably qualified engineer or geologist, particularly if any work is to be carried out in close proximity or within the zone of influence of any potential slope failure, or if works are to be carried out in close proximity of the crest.

7.5 Roads and Hardstanding

With the exception of a narrow area of tarmac beside the site entrance, the areas of hardstanding typically comprise a concrete slab. CBR values were obtained for the near surface glacial till, which recorded results ranging between 3.1% and 18.6%.

Due to the reduced level excavation required to construct the proposed hardstanding, see Table 7.2 above, it is likely that significant areas of the slab construction will be founded directly onto bedrock. In this instance it is recommended that any capping is omitted and that the rock is excavated to at least 150mm beneath the base of the slab to provide a consistent surface of sub-base beneath the slab. It is recommended that in areas where rock is not present, that a layer of capping material is laid and compacted to provide a suitable formation and avoid any potential areas of differential settlement.

7.6 Groundwater Control

Localised perched groundwater was encountered at the interface of the glacial till and bedrock, the made ground and glacial till, and in localised granular horizons within the glacial till.

Groundwater inflows from perched water bodies is likely to be relatively low volumes, although the use of localised sumps are likely to be required in larger excavations that remain open for significant periods of time.

7.7 Protection of Buried Concrete

The site has been classified in accordance with BRE Special Digest 1; Concrete in Aggressive Ground. Six samples were tested for pH and sulphate at various depths in the glacial till and at various locations within the site.

Special Digest 1 states that for sites with less than 5 test results, the worst case value should be used to determine the 'characteristic value' of the site, where 5 to 9 results are available the mean of the two worst case results should be used. The results are summarised in table 6.3 below.

Strata	pH		SO ₄ (2:1 extract) g/l		Sulphate Class	ACEC Class
	results	SD-1 Value	Results	SD-1 Value		
Superficial Deposits	5.3 - 8.2	5.4	<0.1	<0.1	DS-1	AC-2 ^z

Table 6.3 – Concrete design class

The site is therefore classified as DS-1 and AC-2^z with respect to the design of buried concrete.

7.8 Phase 2 Recommendations

The following recommendations are made in relation to future developments in the east of the site.

7.8.1 Foundations

Localised areas of made ground were encountered, which were likely associated with the levelling of the site to accommodate the RAF base.

Test results recorded elevated moisture contents to depths of up to 1.5m, which is generally associated with a softening of cohesive strata.

For lightly to moderately loaded structures, depending on their location and exact ground conditions, it may be necessary to extend foundations beyond the made ground and near surface zones of elevated moisture content.

An assessment of suitability of the ground as founding stratum cannot be made until details of the proposed development is known

7.8.2 Excavations

No rock was encountered in the trial pits in this area, therefore it is likely that all excavations would be through glacial till deposits.

7.8.3 Advanced Earthworks

Due to the low lying and relatively flat topography in the east of the site it is likely that some fill would need placing to raise ground levels and create an appropriate development platform. It is unlikely that any fill will be generated from the Phase 2 works; however, the excess arisings generated from the Phase 1 development would be suitable for use as general fill in this area.

It would be necessary to investigate the drainage of this area and consideration given to the provision of a drainage blanket or a series of herringbone drains to drain the area beneath any fill placement.

7.8.4 Additional Ground Investigation

Due to the varying presence of made ground and the elevated moisture content of the near surface material, it is recommended that additional investigation is carried out once the plans for Phase 2 have been sufficiently advanced and prior to the detailed design being undertaken.

8. CONCLUSIONS

The site forms parts of the Mona Industrial Estate, which is located on land which used to be part of the Mona RAF airfield.

The airbase was active during WWII. An UXO survey was carried out, which concluded that the likelihood of UXO contamination being present on site is possible but unlikely. It was recommended that UXO safety awareness training should be given to all site personnel as part of the site induction.

Ground conditions at the site typically comprise a shallow cover of glacial deposits overlying bedrock.

The depth to bedrock in the Phase 1 development area in the western half of the site typically varies between 0.3m and 2m, although bedrock outcrops in the centre of the site, near the northern site boundary. No bedrock was encountered in the trial pits in the east of the site.

It is recommended that foundations for the waste recycling and transfer building are extended to the bedrock to provide uniform founding conditions.

A significant reduced level excavation is required to accommodate the Phase 1 recycling and transfer building and the associated concrete apron. The reduced level excavation will generate Class 2C general fill, which will be suitable for re-use on site with little or no pre-treatment to vary the moisture content and reduce oversized cobble and boulders. The suitability of excavated rock to be processed and re-used in the works will be dependent on volumes generated in the works. Some excavation through rock is likely to be encountered, particularly on the concrete apron to the west of the building.

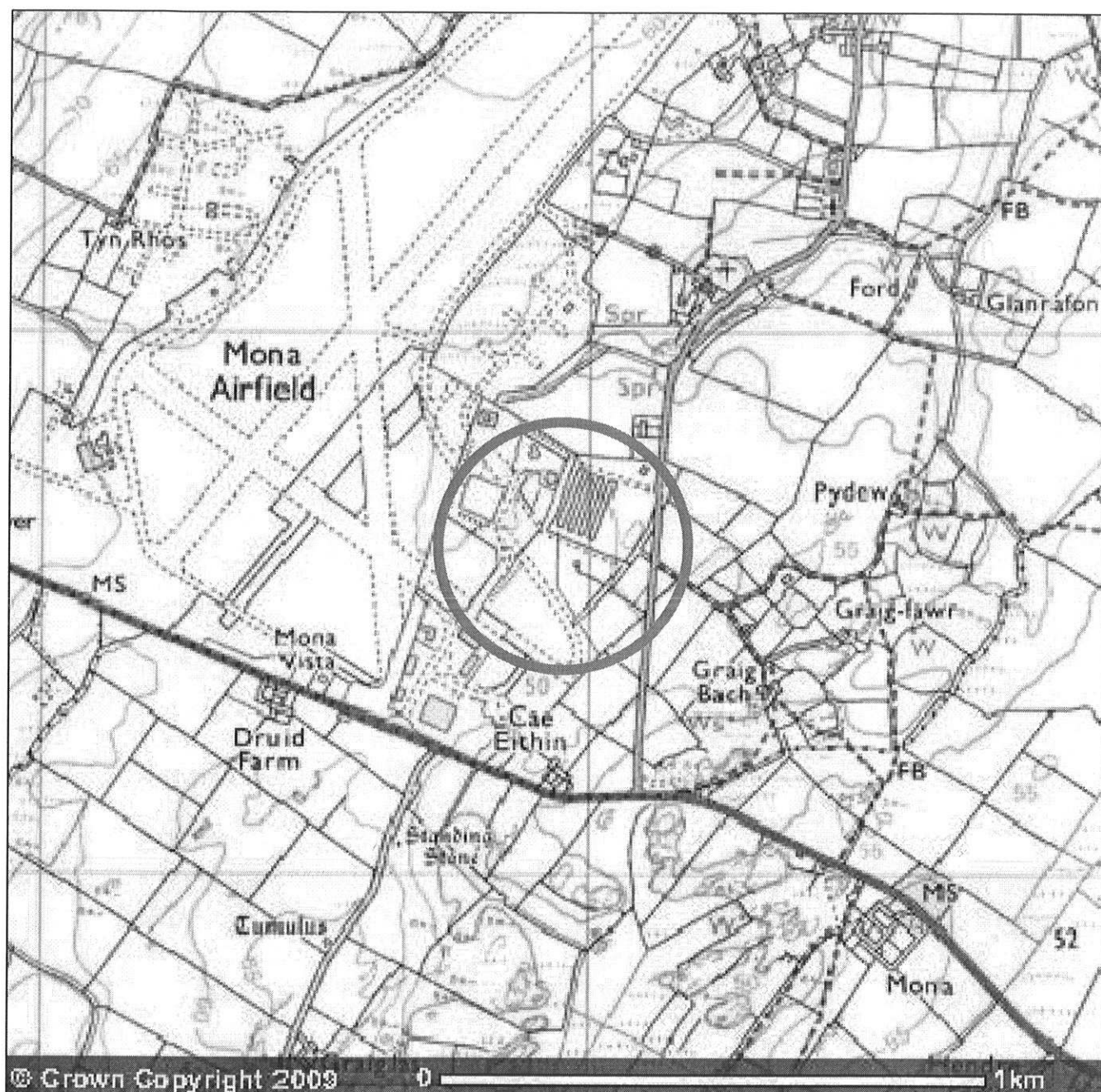
Excavations for foundations and drainage infrastructure will routinely result in penetrating the bedrock, in some areas, by up to 3.5m.

Excavations through the bedrock will result in slow progress and will require the use of hydraulic/pneumatic breakers and peckers. The use of heavy rippers may be suitable for larger areas. Additional investigation and trial excavations in advance of the main work is likely to assist the main contractor in establishing the most efficient method of working.

No significant contamination was encountered and the risk of encountering contaminated land in the works is considered to be very low.

FIGURES

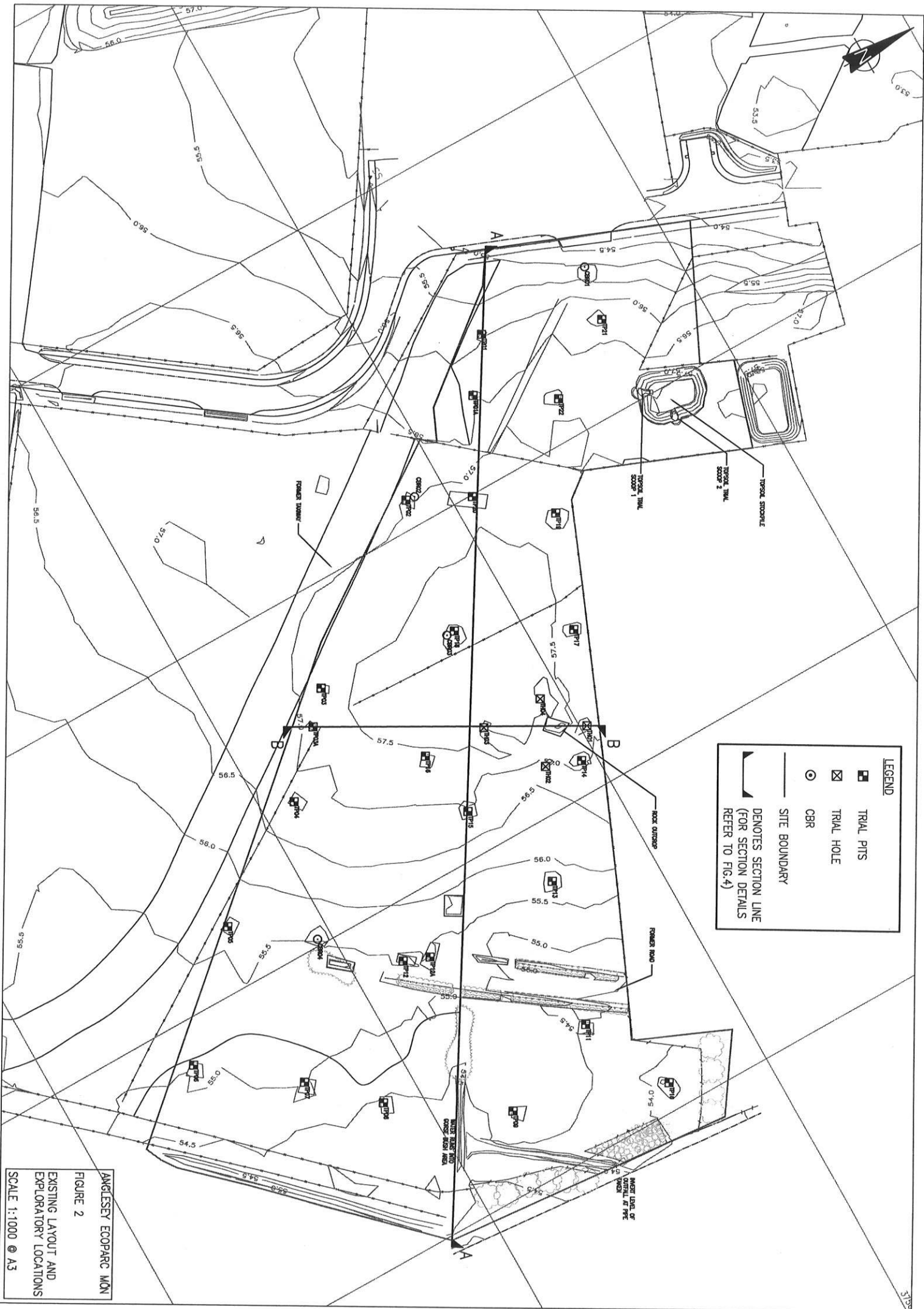
- Figure 1** – Site location plan
- Figure 2** – Existing site layout with exploratory hole locations
- Figure 3** – Proposed site layout (Phase 1 Development)
- Figure 4** – Geological cross sections



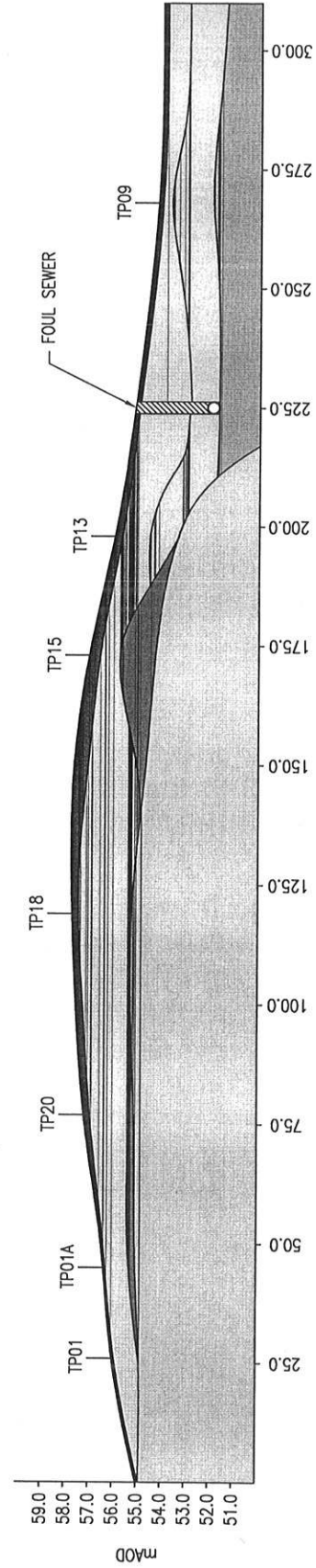
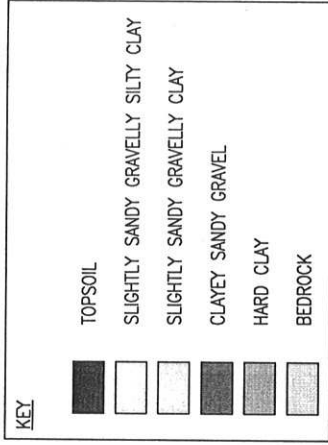
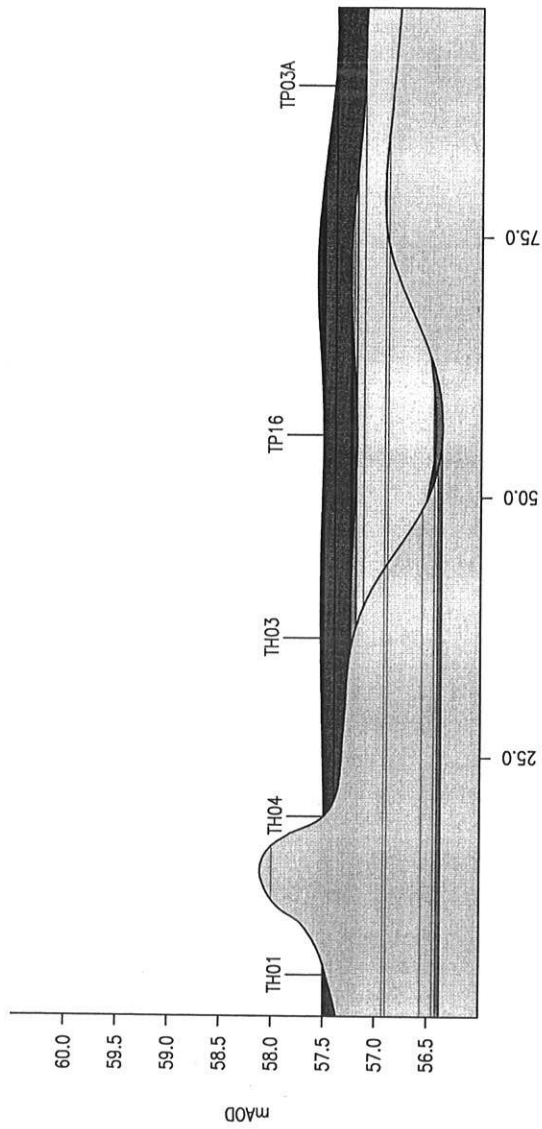
ANGLESEY ECOPARC MÔN

FIGURE 1

SITE LOCATION



ANGLESEY ECO-PARC MON
FIGURE 2
EXISTING LAYOUT AND
EXPLORATORY LOCATIONS
SCALE 1:1000 @ A3



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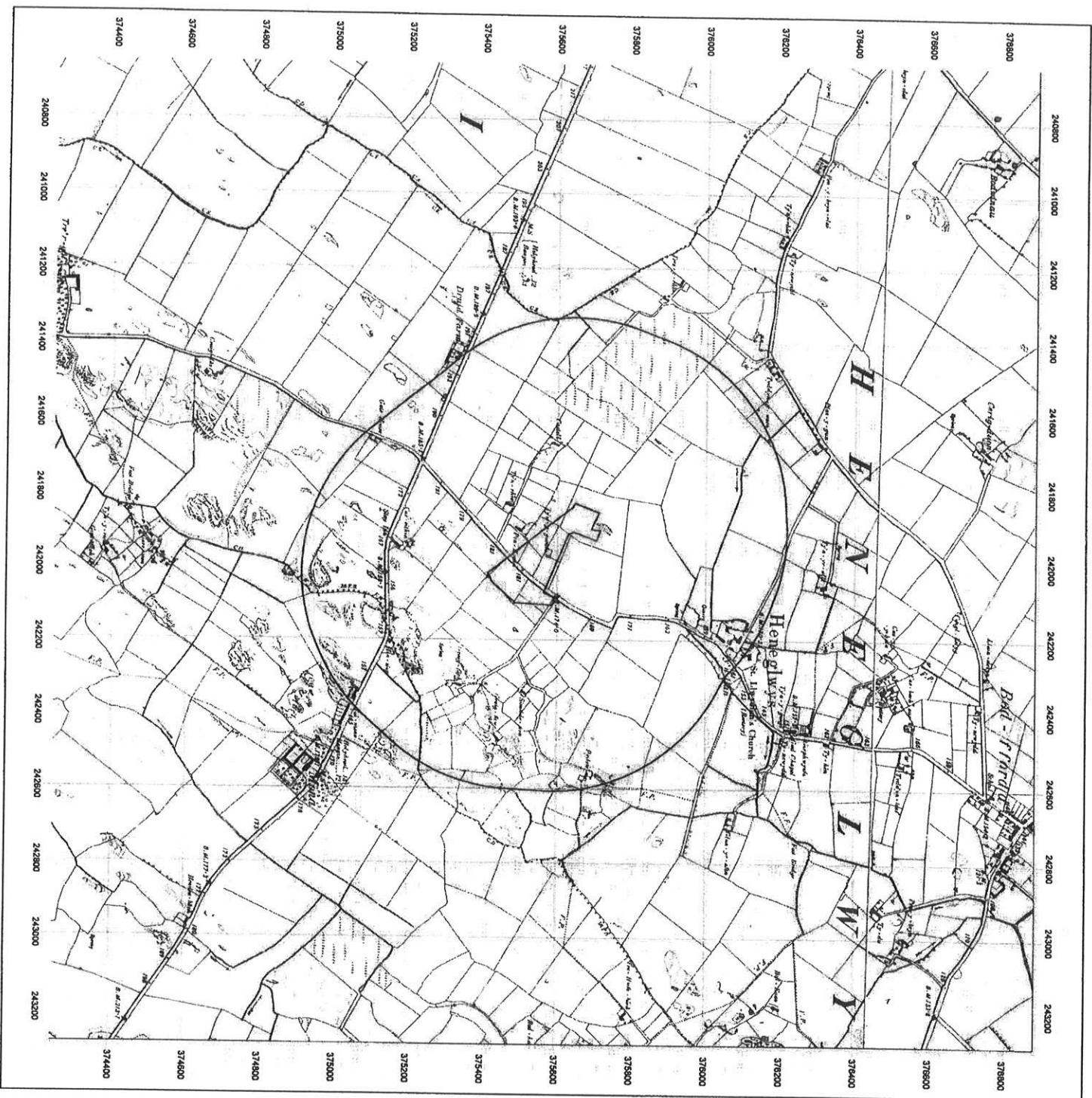


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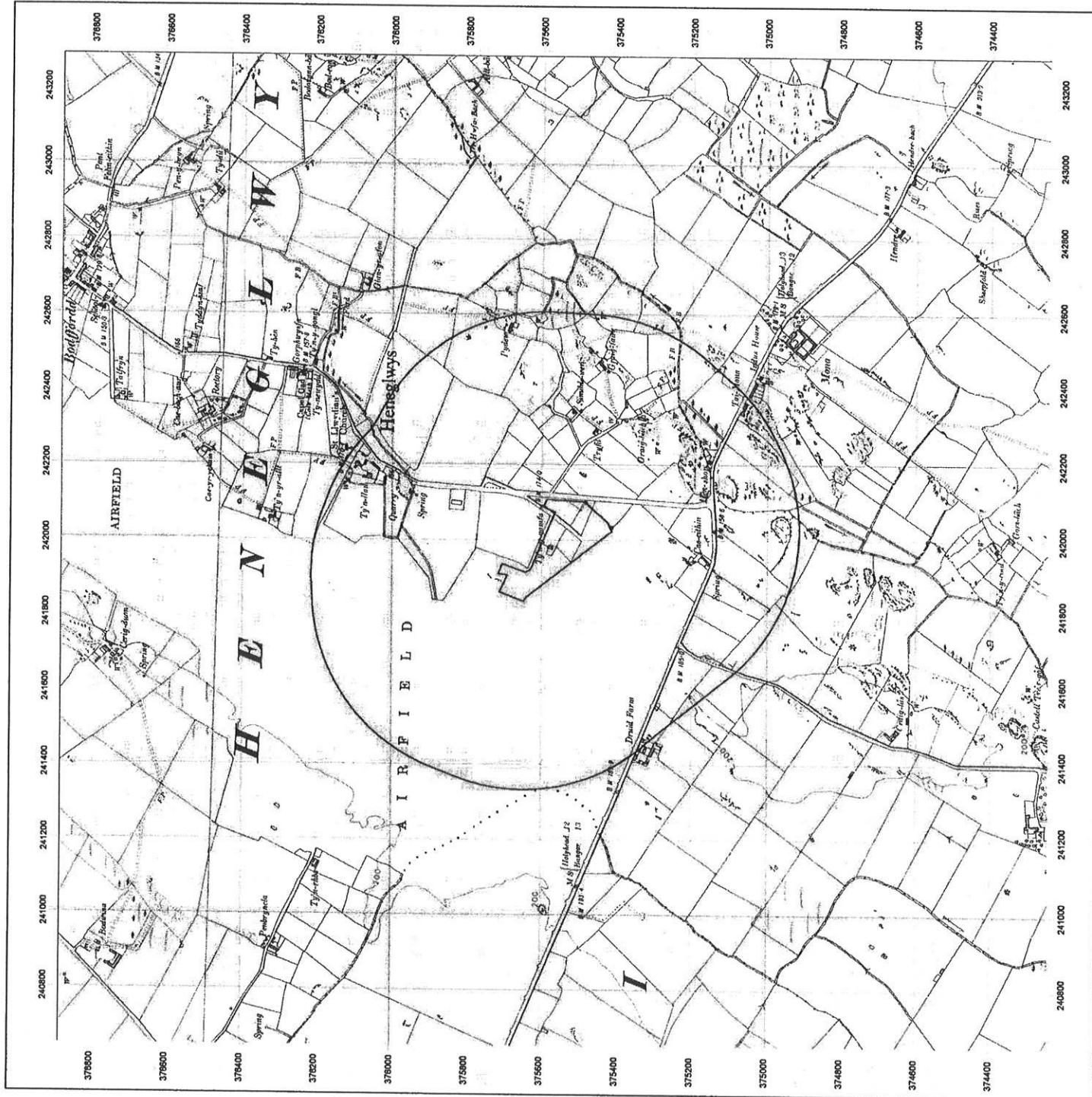
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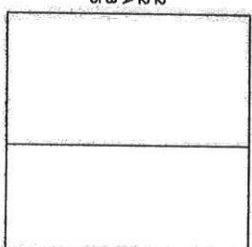
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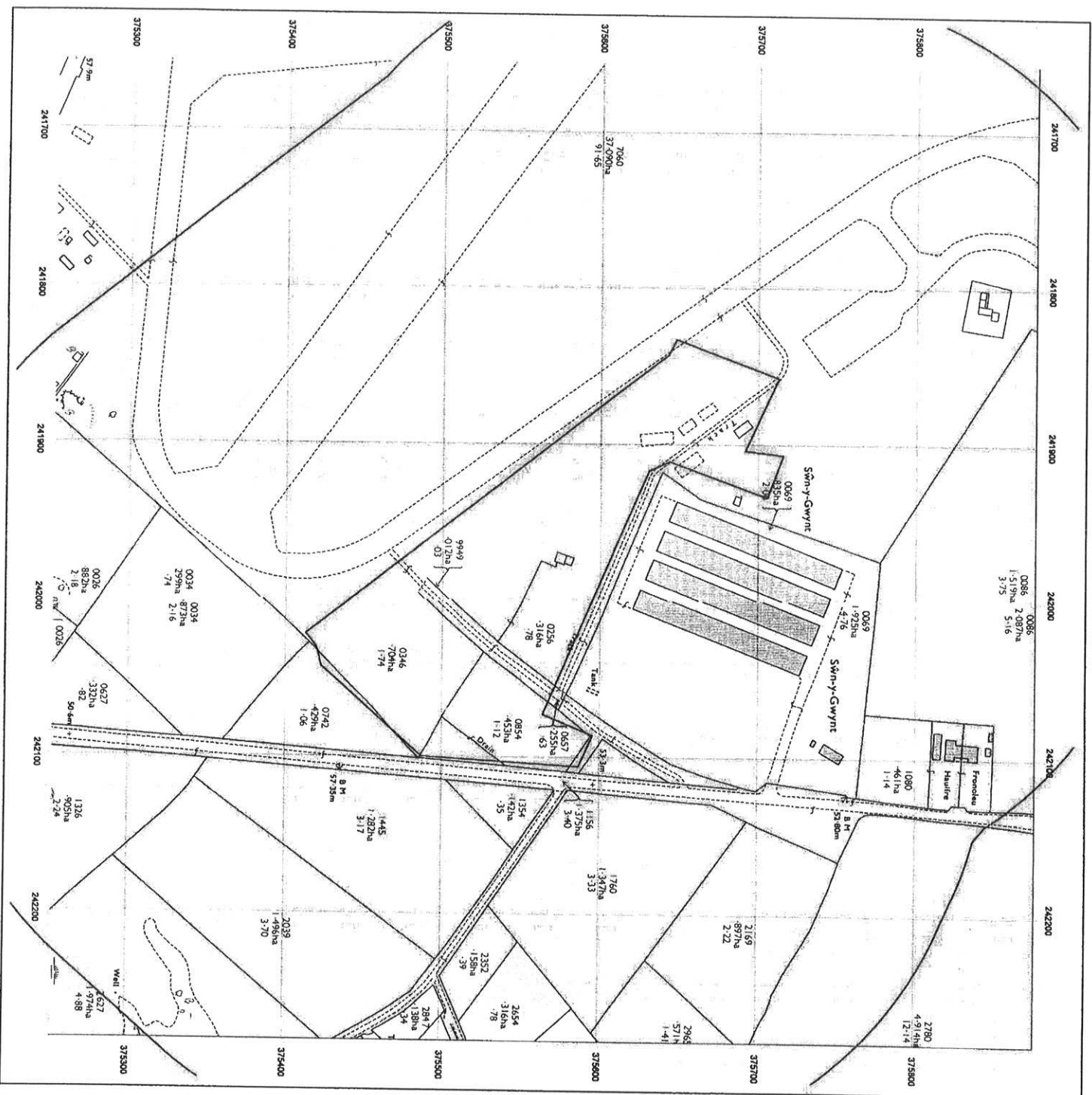


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Appendix 2

Unexploded Ordnance Survey Report

EXPLOSIVE ORDNANCE DESK TOP STUDY

Mona Industrial Park Plot 8+
Anglesey

EGNIOL CONSULTING LIMITED

5th September 2008



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PART 1 – PREFACE

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- Archive** HO192/... These papers deal with observation of and research into allied
Records and enemy bombs, bombing methods and effects, fire prevention and air
 raid damage both in the United Kingdom and in enemy occupied
 territories.
 HO193/... Bomb Survey Maps, Within the Map Series at the National
 Archives.
 HO196 & 199/.... Additional Bomb Papers Held in the National Archives.
- Acknowledgements** EOD Contracts Ltd acknowledges; Egniol with thanks, for
 providing the project background information and the site
 drawings.

List of abbreviations used in this document.

Abandoned Unexploded Bomb	A/UXB
Anti-Aircraft Ammunition	AAA
Anti-Personnel Bomb	APB
Bomb Disposal Officer or Operator	BDO
Bomb Length to Diameter Ratio	L/D
Charge Weight Ratio	CWR
Construction Design & Management Regulations	CDM
EOD Contracts Ltd	ECL
Explosive Ordnance Disposal	EOD
German A-4 Rocket	V2
German Fi-103 Flying Bomb	V1
German General Purpose Bomb	SC
High Explosive	HE
Incendiary Bomb	IB
International Standards Organisation	ISO
London County Council	LCC
Kilo Newton Force	KN
Ministry of Defence	MOD
National Archives (Kew)	NA(kew)
Net Explosive Quantity	NEQ
Parachute Mine	P mine
Royal Air Force	RAF
Royal Naval Air Station	RNAS
Special Operations Executive	SOE
Unexploded Bomb	UXB
Unexploded Ordnance	UXO
United Nations - International Mine Action Standards	UN-IMAS
World War	WW

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PART 1 – EXECUTIVE SUMMARY

1. **Terms of Reference.** Egniol Consulting Ltd, hereafter referred to as “Egniol” instructed EOD Contracts Ltd, hereafter referred to as “ECL” to conduct an Unexploded Ordnance (UXO) Desk Top Study for the area associated with Mona Industrial Park Plot 8+ in Anglesey, centred on OSGB grid SH241990,375585, hereafter referred to as the “Study”. The study area includes all of the ground specified within the hatched line area on drawing reference “Plot 8+, Mona - 14 ID 01 022” and is hereafter referred to as; “the Site”.
2. **The Site.** Plot 8+ of the Mona Industrial Park is located on land adjacent to RAF Mona, 3 miles west of Llangefni on the Isle of Anglesey Wales. Situated to the east of the present aircraft runways, the site is a rough pasture 7.96 acre in size. While the site did contain small structures of unknown type in the past these do not appear to be present on recent aerial photographs of the site today.
3. **Possible Contamination.** Due consideration was given to all possible sources of UXO contamination, all were discounted as improbable with the exception of the following mechanisms that were subjected to further study:
 - a. WWII Enemy bombing raids.
 - b. Anti-Aircraft Shells.
 - c. Airfield Defensive Mining.
 - d. Aircraft Crashes.
 - e. UXO Burial or Dumping.
 - f. Migration of contamination due to bomb building rubble and infill.
4. **Findings.** Having completed the assessment of the available information regarding the likelihood of UXO being present on site and given full consideration to the potential scenarios by which contamination may have occurred. The likelihood of an encounter is considered to be low. The study has reviewed UXO design and detonation mechanisms

and found that the possibility of an explosion occurring as a result of an uncontrolled encounter exists but is an extremely rare event in the United Kingdom. Account has also been taken of the consequences of such an event should the unlikely occur. As a consequence the overall risk is considered to have been established in all areas within the site footprint.

TABLE Summary 1. Pre Mitigation UXO Risk Levels.

Type of UXO contamination	Risk Level	Risk Depth
Airdropped Bombs	LOW	5.0m
Cannon Shells & Anti-Aircraft Projectiles	LOW	2.5m
Miscellaneous Ammunition	LOW	2.5m

5. **Conclusion.** The likelihood of UXO contamination being present on site is possible but unlikely. When considered against the consequences of an encounter being realised; resulting in serious injuries or deaths to site personnel and members of the public, the risk is low. The conclusion has been drawn that limited mitigation is warranted to ensure that the project can proceed in the safest possible manner.
6. **Recommendations.** It is recommended that the following further action be carried out:
 - a. Communicating the risks; all stakeholders should be made aware of the UXO situation and the possible impact it may have to the project in the unlikely event of encountering UXO.
 - b. Safety Training; UXO safety awareness training should be given to all site personnel as part of the site induction procedure.
 - c. Risk Review; the UXO risk level should be subjected to constant review and should be re-assessed should the situation warrant it.
7. **Summary Remarks.** The risk posed by UXO on site is low. The risk can be further reduced by implementing the study's recommendations.

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PART 2 – INTRODUCTION

8. **Terms of Reference.** Egniol Consulting Ltd, hereafter referred to as “Egniol” instructed EOD Contracts Ltd, hereafter referred to as “ECL” to conduct an Unexploded Ordnance (UXO) Desk Top Study for the area associated with Mona Industrial Park Plot 8+ in Anglesey, centred on OSGB grid SH241990,375585, hereafter referred to as the “Study”. The study area includes all of the ground specified within the hatched line area on drawing reference “Plot 8+, Mona - 14 ID 01 022” and is hereafter referred to as; “the Site”.
9. **Aim of Study.** The aim of the UXO Study is to identify all possible sources of UXO contamination and assess an overall level of risk that UXO may pose to the geotechnical investigation works. If deemed appropriate; the study will make recommendations on the most effective way ahead to mitigate the risks.
10. **Study Approach.** An evidential approach has been used in compiling this study. This when considered from a holistic standpoint has included due consideration of the following factors:
- a. The anticipated scope and common geotechnical investigation methodologies of the works were considered.
 - b. The ground conditions were considered and a provisional depth of ground penetration determined for the largest of the common airdropped weapons.
 - c. Sufficient records, reports and papers relating to the site history and potential sources of UXO contamination were researched. The design of German airdropped ordnance and British anti-aircraft ammunition was considered and the threat it poses established; including the potential mechanisms by which a detonation could occur. Account was taken of the age, design and types of UXO and the associated explosive or energetic chemicals used in their construction. The likelihood of detonation was reviewed and scenarios considered for weapon detonation.

- d. **Risk Assessment.** The technical design of the most common items of UXO found on UK sites has been given due consideration and the most likely mechanisms for an unexpected detonation have been identified.
 - e. **Results.** Assumptions have been made, conclusions have been drawn, findings reported and appropriate recommendations made.
11. **Geotechnical Data.** The historic geological conditions have been considered to be extant on site for the assessment of the weapon penetration capabilities. Anglesey is covered with Quaternary glacial deposits of which two thirds are underlain by the Mona complex made up of bedded sedimentary rock, including limestone, some of the material within the complex is highly metamorphosed coarse grained gneiss. The predominant material selected for weapon penetration has been considered to be boulder clay overlying metamorphosed rocks.
12. **Sources of Information.** Multiple information sources are searched and reviewed by ECL in conducting a UXO study; acknowledgement of sources has been made as appropriate. Military records and archived material held in the public domain or requested through the Freedom of Information Act 2000 were considered including information from the following sources:
- a. Historic information contained within, reports, maps and other records held at official archives.
 - b. 33 Engineer Regiment (Explosive Ordnance Disposal) Royal Engineers. These records are supplied under an indemnity protecting the Secretary of State, his servants or agents directly or through any third party from any claim whatsoever arising from its release.
 - c. In house information, Published and unpublished material, research papers, media articles and internet-based material.
13. **Commitment to Safety.** British Health & Safety at Work legislation provides for the safest working environment for all employees. The legislation extends to third parties; including members of the general public who come into contact with industrial activities. The processes of UXO mitigation and methodologies available to specialist explosive ordnance disposal companies are more effective than at any time in the past. This,

coupled with British Industry's proactive approach to UXO mitigation has significantly reduced the risk of unexpected encounter with UXO. However, while the risk of an uncontrolled encounter is significantly reduced by effective mitigation, the potential consequences of any such encounter resulting in a detonation remain catastrophic. This assessment has been conducted in accordance with the United Nations International Mine Action Standards (UN-IMAS): This standard sets out how all matters relating to UXO are to be conducted safely, and directly equates to ISO: 9001. (The Construction Design & Management Regulations (CDM) and Health & Safety at Work legislation placed an obligation on those responsible for intrusive works, to ensure that comprehensive threat assessments are carried out and effective mitigation measures put in place to deal with all underground hazards that may be present.) Currently, a study to produce a guideline document for use by the construction industry in dealing with UXO is underway and due for release by CIRIA in autumn 2008.

14. Recent Significant Events. Recent significant events to this assessment's publication date have been given due consideration and "Lessons Learnt" applied where applicable, in the production of this document:

- a. 15th July 2008; 500kg unexploded bomb was found on a construction site in Berlin, 5000 people were evacuated to shelters overnight while it was made safe. Source tvnz News 15th July 2008.
- b. 3rd June 2008; Bomb found during development of a site in the Lea Valley London. A large 1000kg bomb was found during excavation work. The site and local area was evacuated for four days while EOD Engineers made the weapon safe. Source BBC News 7th June 2008.
- c. 19th April 2008; Bomb found during development of a school in Braintree, Essex. EOD Engineers took 3 hours to safely deal with the small device. Source Essex Chronicle: 19th April 2008.
- d. 15th March 2008; Major explosion occurred while ex-Soviet weapons and ammunition were being destroyed in a storage facility near Tirana (Albania). It is known that at least 160 people were killed and hundreds more injured. Many homes and buildings were completely destroyed. Explosive debris including items

of UXO was thrown several miles, in what may have been one of the largest conventional explosions in history. *Source BBC News 15th March 2008.*

- e. 3rd January 2008; The M62 was closed near Goole after a 500kg wartime bomb was found "deeply buried" in a nearby field. The controlled detonation of the Second World War bomb resulted in the closure of the M62 between junctions 37 and 38, the B1230 south of Skelton Common, and roads around Gate Farm. *Source Howden Courier 4th January 2008.*
- f. 250kg High Explosive bomb found on a construction site on the 15th May 2007 in Hammersmith at Suttons Wharf and the remains of a V1 rocket recovered on the 25th July 2007 from Canary Wharf. *Source BBC news 15th May 2007.*
- g. The detonation of an item of UXO on 23rd October 2006. A highway construction worker was killed when the machine he was operating detonated a bomb beneath an autobahn near Frankfurt. The explosion destroyed the machine and damaged passing cars; four other workers and a motorist were hurt in the blast. *Source New York Post 24th October 2006.*
- h. Two French bomb disposal workers were killed in an explosion while handling WW2 ordnance. The accident occurred on 19th April 2007 at a non military site south of Metz. A third worker was injured in the blast. The depot handles quantities of WW1 and WW2 ordnance unearthed during construction work in northeast France. *Source Safety News website 2008.*

15. Conclusion. Items of UXO are encountered on construction and other project sites. These events, although infrequent, do serve to validate the view that the potential for encountering UXO should be fully considered; if necessary the mitigation of any risks fully assessed. The methodology used to carry out UXO risk assessment should reflect the current UN standards and best practices, regarding UXO and related material.

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PART 3 – SITE HISTORY

16. Site History. Mona Industrial Park is located adjacent to RAF Mona which opened as a relief landing ground for RAF Valley in 1951. However the military use to which the land has been put extends back to 1915, when as a Royal Naval Air Station (RNAS) it was known as the Llangefni Airship Station. In December 1942, and now known as RAF Mona, it was home to No 3 Air Gunnery School equipped with Anson aircraft. The school remained until October 1943, when in the following month No 8 (Observers) Advanced Flying Unit were formed and took over operational control and occupancy of the station until the end of the WWII. At its peak the Station was comprised of extensive facilities spread over a large area, including three runways, over twenty hangars and miles of taxi-way. With the exception of the remaining limited facilities that comprise RAF Mona today; the majority of the station buildings were demolished after WWII and since that time much of the land has been given over to the commercial sector development including the construction of the Mona Industrial Park.

17. Historic UXO Contamination Sources. Table 3.1 provides a summary of the most common UXO contamination sources that are associated with military airfields in the UK. The table highlights possible sources that are considered to apply to the site and are to be subjected to further assessment. It is considered that the following sources of UXO contamination warrant further assessment:

- a. WWII Enemy bombing raids.
- b. Anti-Aircraft Shells or Rockets.
- c. Airfield Defensive Mining.
- d. Aircraft Crashes.
- e. UXO Burial or Dumping.
- f. Migration of contamination due to bomb building rubble and infill.
- g. Airfield & Air Stations.

TABLE 3.1 Common contamination sources pertaining to sites in the UK.

Summary of Potential Contamination Sources		
Source	Applicable	Not Applicable
Enemy Attack & Counter Measures		
Bombing WWI		<input checked="" type="checkbox"/>
Bombing WWII	<input checked="" type="checkbox"/>	
V1 & V2 Rockets		<input checked="" type="checkbox"/>
Shelling or Bombardment		<input checked="" type="checkbox"/>
Anti-Shipping Mines & Depth Charges		<input checked="" type="checkbox"/>
Anti-Aircraft Shells & Rockets	<input checked="" type="checkbox"/>	
Beach Mines & Coastal Defences.		<input checked="" type="checkbox"/>
Airfield & Key Point Defensive Mining (Pipe-mines)	<input checked="" type="checkbox"/>	
Abandoned Unexploded Bomb (A/UXB)		<input checked="" type="checkbox"/>
Migration of UXO		
UXO Migration in Rubble & Infill	<input checked="" type="checkbox"/>	
UXO Migration by Tide & River Current		<input checked="" type="checkbox"/>
UXO Migration by Marine Dredging		<input checked="" type="checkbox"/>
Ship Wrecks		<input checked="" type="checkbox"/>
Dispersal by Explosion, Fire & Accident.		<input checked="" type="checkbox"/>
Aeroplane Crash	<input checked="" type="checkbox"/>	
Private Collections		<input checked="" type="checkbox"/>
Military Use		
Bombing Range		<input checked="" type="checkbox"/>
Artillery, Mortar & Tank Range		<input checked="" type="checkbox"/>
Grenade Range		<input checked="" type="checkbox"/>
Small Arms Firing Range		<input checked="" type="checkbox"/>
Weapon Research & Development Facilities.		<input checked="" type="checkbox"/>
Ammunition Burial Pits & Disposal Grounds	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Offshore Ammunition Dumping Grounds		<input checked="" type="checkbox"/>
Ammunition Storage & Manufacture Sites		<input checked="" type="checkbox"/>
Airfields & Air Stations	<input checked="" type="checkbox"/>	
Bombing Decoy Site		<input checked="" type="checkbox"/>
Army Barracks & Camps		<input checked="" type="checkbox"/>
MOD Training Area		<input checked="" type="checkbox"/>
Home Guard & SOE Weapon Caches		<input checked="" type="checkbox"/>

