

Schedule
Barry Renewable Energy Project – R1 Calculation

Type of energy	energy Ex [MWh]
amount of incinerated waste (without 1.2 and 1.3)	321,840
e.g amount of incinerated sewage sludge	0
e.g. amount used activated carbon incinerated	0
Ew: energy input to the system by waste	321,840
Ef1: amount of light fuel oil for start up (after connection with the steam grid)	0
Ef2: amount of light fuel oil for keeping the incineration temperature	0
Ef3: amount of natural gas for start up and keeping incineration temperature	0
S Ef: energy input by imported energy with steam production	0
Ei1: amount of light fuel oil for start up/shut down (no connection with the steam grid)	350
Ei2: e.g. natural gas for heating up of flue gas temperature for SCR and start up/shut down	0
Ei3: imported electricity (multiplied with the equivalence factor 2.6)	0
Ei4: imported heat (multiplied with the equivalence factor 1.1)	0
S Ei: energy input by imported energy without steam production	350
E _{pel internal used} : electricity produced and internally used for the incineration process	10,400
E _{pel exported} : electricity delivered to a third party	74,080
S E_{pel produced} = E_{pel internal used} + E_{pel exported}	84,480
E _{phat exp.1} : steam delivered to a third party without backflow as condensate	0
E _{phat exp.2} : district heat delivered to a third party with backflow as condensate (hot water)	0
S E_{phat exported} = E_{phat exp.1} + E_{phat exp.2}	0
E _{phat int.used1} : for steam driven turbo pumps for boiler water, backflow as steam	0
E _{phat int.used2} : for heating up of flue gas with steam, backflow as condensate	0
E _{phat int.used4} : for concentration of liquid APC residues with steam, backflow as condensate	0
E _{phat int.used5} : for soot blowing without backflow as steam or condensate	6,484
E _{phat int.used7} : for heating purposes of buildings/instruments/silos, backflow as condensate	0
E _{phat int.used8} : for deaeration - demineralization with condensate as water input	0
E _{phat int.used9} : for NH4OH (water) injection without backflow as steam or condensate	0
S E_{phat int.used} = S E_{phat int.used1-9}	6,484
R1 = (E_p - (E_f + E_i)) / (0.97 * (E_w + E_f))	0.73
E_p = 2.6*(S E_{pel int.used}+S E_{pel exported}) + 1.1*(S E_{phat int.used}+S E_{phat exported})	226,780

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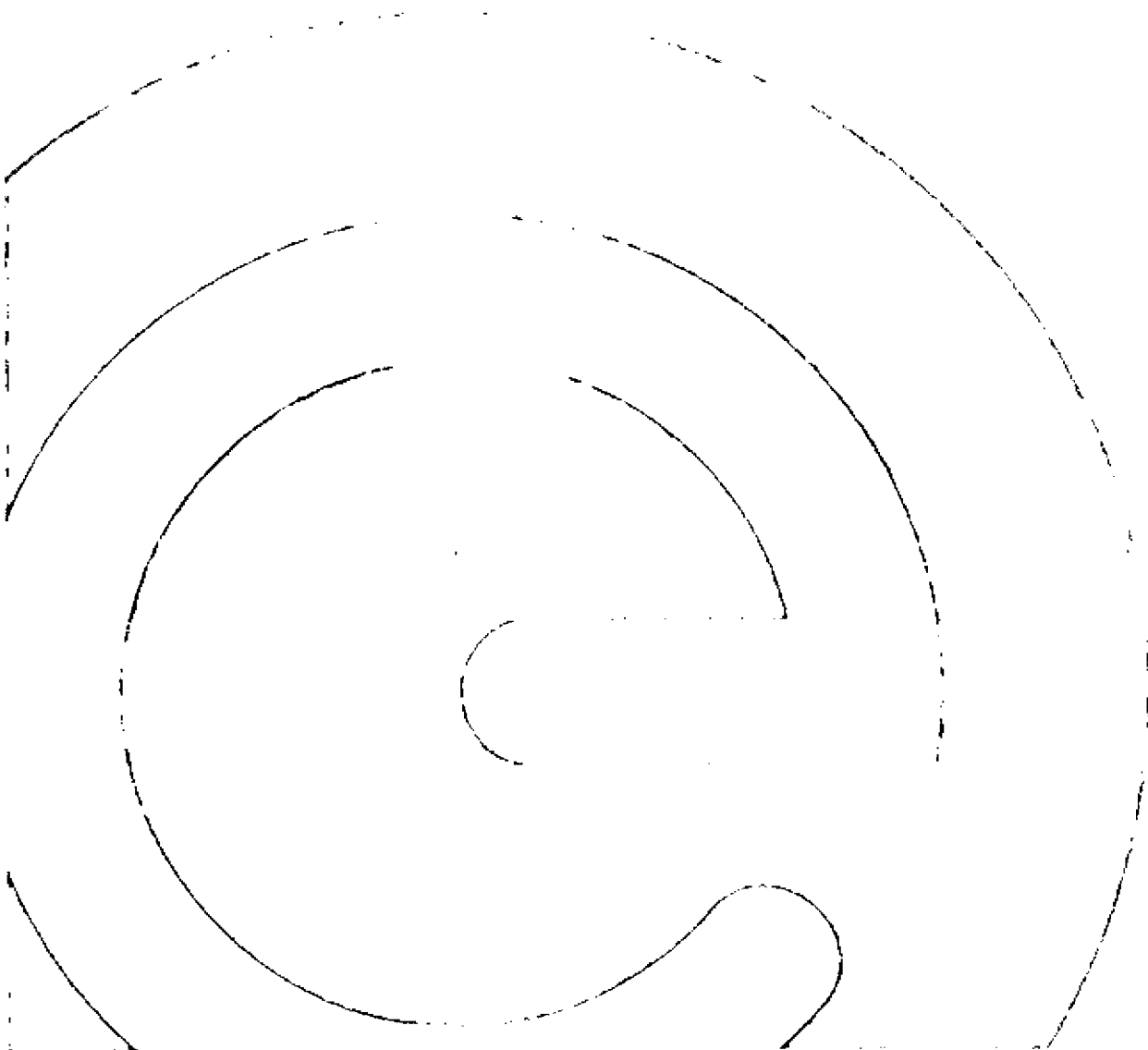
12 June 2015



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environmental & transportation

**Proposed Wood Gasification Facility
Woodham Road, Barry**

Air Quality Assessment





**Proposed Wood Gasification Facility
Woodham Road, Barry**

Air Quality Assessment

Revision	Date	Notes	Author	Checked	Approved
1	05/05/15		SD	ND	Dr N Davey
2	12/06/15		SD	ND	Dr N Davey

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1 INTRODUCTION

1.1 Entran Limited was commissioned by Power Consulting Midlands Ltd to undertake an air quality assessment in support of the environmental permit application for a proposed wood gasification facility at Woodham Road, Barry. The Site location and layout are identified in Figures 1 and 2 respectively.

1.2 The proposed plant would consist of a gas boiler utilising synthetic gas (Syngas) generated from the gasification of waste wood. The high-pressure steam generated by the boiler would be directed to a steam turbine and used to generate electricity for supply to the National Grid. The facility is designed to operate 24 hours a day, 365 days per year. Emissions to air would be via a single 43m stack.

1.3 Emissions to air from the facility will be governed by the Industrial Emissions Directive (IED)¹, which requires adherence to emission limits for the following pollutants:

- nitrogen oxides (NO_x as NO₂)
- carbon monoxide
- total dust (as PM₁₀ and PM_{2.5})
- gaseous and vaporous organic substances, expressed as total organic carbon;
- sulphur dioxide;
- hydrogen chloride;
- hydrogen fluoride;
- twelve trace metals; and
- dioxins and furans.

1.4 The assessment has also considered emissions of Polycyclic aromatic hydrocarbons (PAH, as Benzo[a]pyrene) and polychlorinated biphenyls (PCBs).

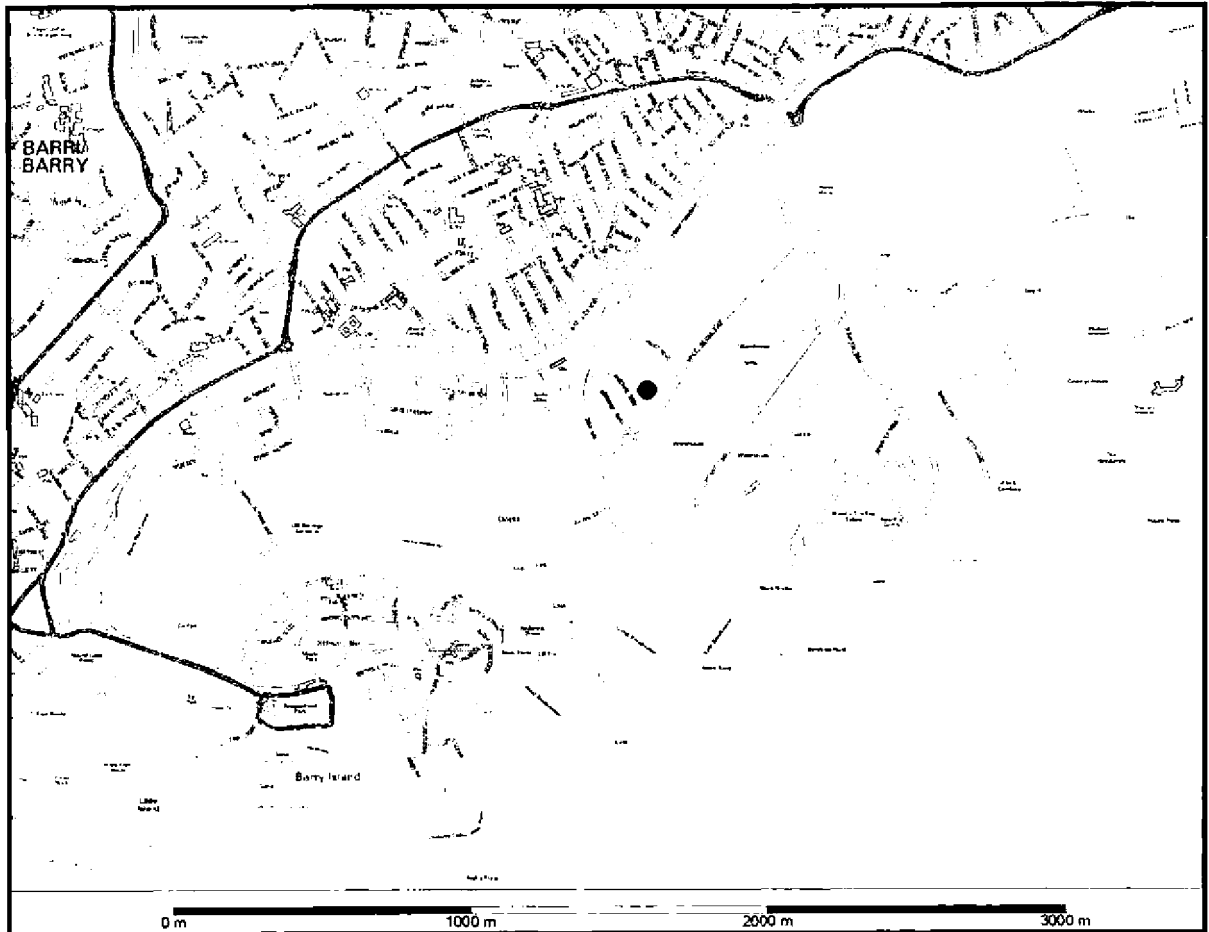
1.5 Predicted ground level concentrations of these pollutants are compared with relevant air quality standards and guidelines for the protection of health and sensitive habitat sites.

1.6 A glossary of common air quality terminology is provided in **Appendix A**.

¹ The Industrial Emissions Directive, 2010/75/EU



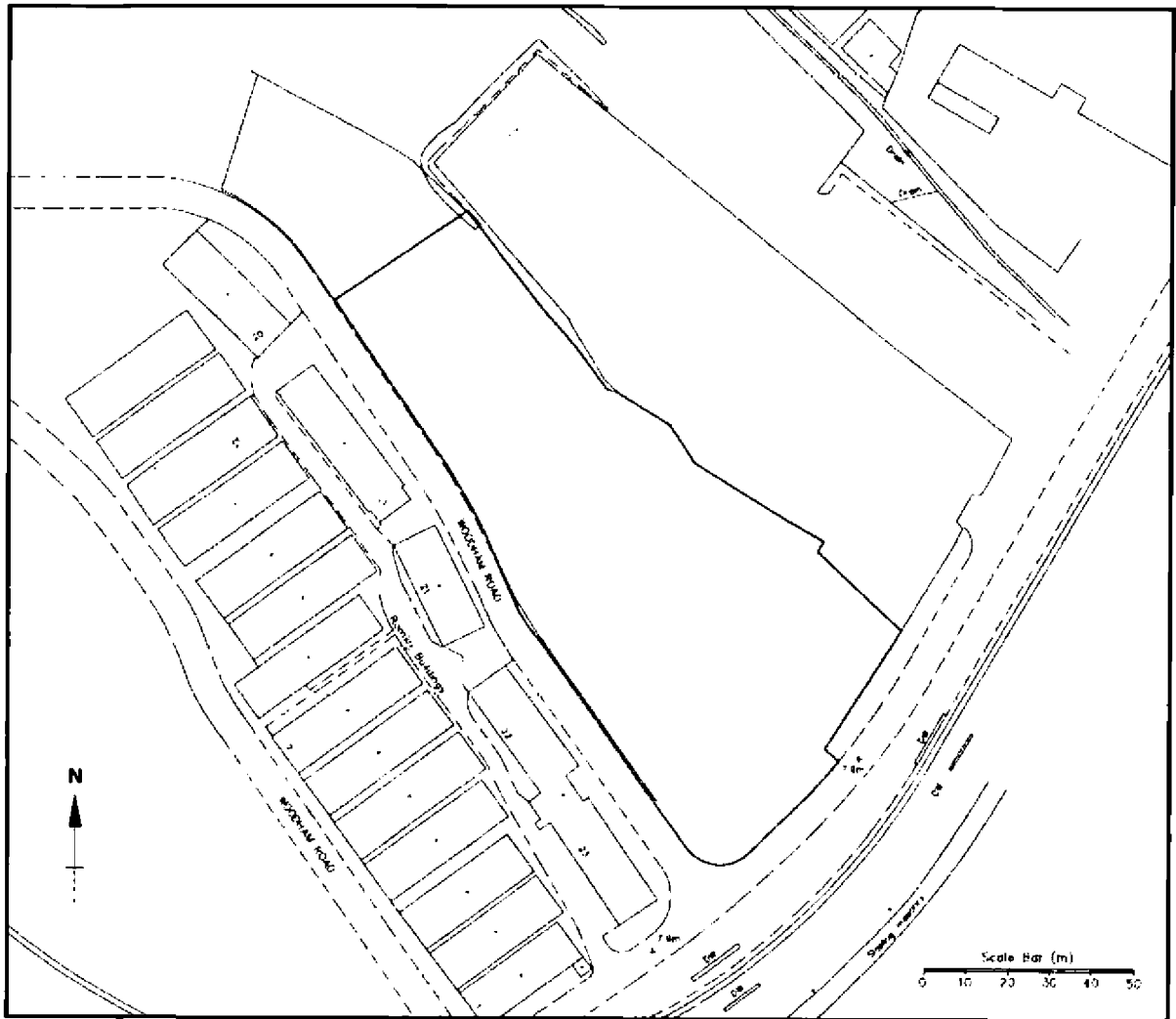
Figure 1: Site Location Plan



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Figure 2: Site Layout





timescale. Some objectives are equal to the EPAQS recommended standards or WHO guideline limits, whereas others involve a margin of tolerance, i.e. a limited number of permitted exceedences of the standard over a given period.

2.7 For some pollutants there is both a long-term (annual mean) standard and a short-term standard. In the case of NO₂, the short-term standard is for a 1-hour averaging period, whereas for PM₁₀ it is for a 24-hour averaging period. These periods reflect the varying impacts on health of differing exposures to pollutants (e.g. temporary exposure on the pavement adjacent to a busy road, compared with the exposure of residential properties adjacent to a road).

Air Quality (England) Regulations

2.8 Many of the objectives in the AQS were made statutory in England with the *Air Quality (England) Regulations 2000*³ and the *Air Quality (England) (Amendment) Regulations 2002* (the Regulations)⁴ for the purpose of Local Air Quality Management (LAQM).

2.9 The Air Quality Standards Regulations 2010⁵ have adopted into UK law the limit values required by EU Directive 2008/50/EC and came into force on the 10th June 2010. These regulations prescribe the 'relevant period' (referred to in Part I2V of the Environment Act 1995) that local authorities must consider in their review of the future quality of air within their area. The regulations also set out the air quality objectives to be achieved by the end of the 'relevant period'.

2.10 Ozone is not included in the Regulations as, due to its trans-boundary nature, mitigation measures must be implemented at a national level rather than at a local authority level.

2.11 The EALs, air quality standards and objectives for the pollutants considered in the assessment are presented in **Appendix B**.

Local Air Quality Management (LAQM)

2.12 Part IV of the Environment Act 1995 also requires local authorities to periodically Review and Assess the quality of air within their administrative area. The Reviews have to consider the present and future air quality and whether any air quality objectives prescribed in Regulations are being achieved or are likely to be achieved in the future.

³ The Air Quality (England) Regulations 2000 - Statutory Instrument 2000 No.928

⁴ The Air Quality (England) (Amendment) Regulations 2002 - Statutory Instrument 2002 No.3043

⁵ The Air Quality Standards Regulations 2010 – Statutory Instrument 2010 No. 1001



2.13 Where any of the prescribed air quality objectives are not likely to be achieved the authority concerned must designate that part an Air Quality Management Area (AQMA).

2.14 For each AQMA, the local authority has a duty to draw up an Air Quality Action Plan (AQAP) setting out the measures the authority intends to introduce to deliver improvements in local air quality in pursuit of the air quality objectives. Local authorities are not statutorily obliged to meet the objectives, but they must show that they are working towards them.

2.15 The Department of Environment, Food and Rural Affairs (DEFRA) has published technical guidance for use by local authorities in their Review and Assessment work⁶. This guidance, referred to in this chapter as LAQM.TG(09), has been used where appropriate in the assessment.

Industrial Emissions Directive

2.16 The Industrial Emissions Directive (2010/75/EU) came into force on the 6th January 2011, replacing the seven existing Directives, including the Waste Incineration Directive (WID) and Large Combustion Plant Directive (LCPD), implemented through the Environmental Permitting Regulations (EPR). The aim of the new Directive is to simplify the existing legislation and reduce administrative costs, whilst maintaining a high level of protection for the environment and human health. Permits will still be issued under EPR; however existing and new sites will be required to comply with the requirements of the IED, which places greater emphasis on new plant best available technology (BAT).

2.17 The IED has been transposed into UK law via the Environmental Permitting (England and Wales) (Amendment) Regulations 2013 (SI 2013 No, 390), which came into force on 27 February 2013.

2.18 The design and operation of all new waste incinerations facilities must ensure compliance with emission limit values (ELVs) set out in the IED; these ELVs are summarised in Table 1.

⁶ Department for Environment, Food and Rural Affairs (DEFRA), (2009): Part IV The Environment Act 1995 Local Air Quality Management Review and Assessment Technical Guidance LAQM.TG(09).



Table 1: IED Limit Values (mg/Nm³)

Pollutant	ELV (referenced to 11% O₂)
Daily Average	
Total dust	10
Total organic carbon (TOC)	10
Hydrogen chloride (HCl)	10
Hydrogen fluoride (HF)	1
Sulphur dioxide (SO ₂)	50
Oxides of nitrogen (NO _x)	200
Carbon monoxide (CO)	50
Half-hourly Average	
Total dust	30
Total organic carbon (TOC)	20
Hydrogen chloride (HCl)	60
Hydrogen fluoride (HF)	4
Sulphur dioxide (SO ₂)	200
Oxides of nitrogen (NO _x)	400
Carbon monoxide (CO)	100
Average over a sample period between 30 minutes and 8-hours	
Group 1 metals (a)	0.05
Group 2 metals (b)	0.05
Group 3 metals (c)	0.5
Average over a sample period between 6-hours and 8-hours	
Dioxins and furans (d)	1 x 10 ⁻⁷
(a) Cadmium (Cd) and Thallium (Tl)	
(b) Mercury (Hg)	
(c) Antimony (Sb), arsenic (As), lead (Pb), chromium (Cr), cobalt (Co), copper (Cu), manganese (Mn), nickel (Ni) and vanadium (V)	
(d) I-TEQ	



3 METHODOLOGY

Scope of Assessment

3.1 The scope of the assessment has been determined in the following way:

- consultation with the Rebecca Athay Environmental Health Officer at Vale of Glamorgan Council (VGC);
- review of air quality data for the area surrounding the Site, including data from the Defra Air Quality Information Resource (UK-AIR);
- desk study to confirm the location of nearby areas that may be sensitive to changes in local air quality; and
- review of emission parameters for the proposed development and dispersion modelling using the Breeze AERMOD 7 dispersion model) to predict ground-level concentrations of pollutants at sensitive human and habitat receptor locations.

Dispersion Modelling Parameters

Normal Operational Emission Scenario

3.2 IED emission limits have been assumed for the purposes of the modelling assessment and the plant is assumed to be operating at full load, continually throughout the year. Stack emission parameters (flow rate, temperature etc.) have been provided by the technology supplier (Outotech). In the absence of actual emissions data 'worst-case' IED emission limits have been assumed.

3.3 For the Group III trace metal predictions, it has been assumed in accordance with the Environment Agency's (EA) metals guidance⁷, that each of the metals is emitted at the maximum IED ELV (0.5 mg/Nm³) as a worst case. The same approach has also been adopted for the Group I and II metals.

3.4 Where the screening criteria set out in the guidance are not met, an emission concentration equal to half of the ELV for Group I metals and 1/9th of the ELV for Group III metals has been assumed. If the screening criteria are still not met, typical emission concentrations for energy from waste plants have been used, as specified in the guidance.

⁷ Guidance to Applicants on Impact Assessment for Group 3 Metals Stack Releases – V.3 September 2012



3.5 It is anticipated that the process will not result in significant emissions of polychlorinated biphenyls (PCBs) or polycyclic aromatic hydrocarbons (PAHs), however emission limits of 0.005 mg/Nm³ and 0.001 mg/Nm³ respectively, have been assumed based on measurements at European waste incineration facilities as specified in the IPPC Reference Document on BAT for Waste Incineration⁸.

3.6 The input parameters for the boiler exhaust stack are identified in **Appendix C**.

3.7 The proposed stack height of 43m is based on the stack height screening assessment that has been undertaken for the proposed facility⁹.

Local Meteorological Data

3.8 The dispersion modelling has been carried out using five years (2009-2013) of hourly sequential meteorological data in order to take account of inter-annual variability and reduce the effect of any atypical conditions. Data from the meteorological station at Cardiff Airport (approximately 6 km west of the proposed facility) have been used for the assessment, which is the most representative data currently available for the area.

3.9 Wind roses for each year of meteorological data are presented in **Appendix D**.

Topography

3.10 The presence of elevated terrain can significantly affect the dispersion of pollutants by increasing turbulence and reducing the distance between the plume centre line and the ground level.

3.11 Information relating to the topography of the area surrounding the proposed facility has been used in the dispersion modelling to assess the impact of terrain features on the dispersion of emissions.

Building Downwash / Entrainment

3.12 The presence of buildings close to emission sources can significantly affect the dispersion of pollutants by leading to a phenomenon called downwash. This occurs when a

⁸ European Commission, Integrated Pollution prevention and Control Reference Document on the Best Available Techniques for Waste Incineration, August 2006.

⁹ Stack Height Assessment for a 10 MWe Wood Gasification Facility at Barry Docks, Barry Island, Stopford Energy and Environment Document Number: R6270-PM-0001, M. Kett and M. Wilkinson, September 2014.



building distorts the wind flow, creating zones of increased turbulence. Increased turbulence causes the plume to come to ground earlier than otherwise would be the case and result in higher ground level concentrations closer to the stack.

3.13 Downwash effects are only significant where building heights are greater than 30 to 40% of the emission release height. The downwash structures also need to be sufficiently close for their influence to be significant.

3.14 All potential downwash structures have been included in the model.

Nitric Oxide to NO₂ Conversion

3.15 Oxides of nitrogen (NO_x) emitted to atmosphere as a result of combustion will consist largely of nitric oxide (NO), a relatively innocuous substance. Once released into the atmosphere, NO is oxidised to NO₂. The proportion of NO converted to NO₂ depends on a number of factors including wind speed, distance from the source, solar irradiation and the availability of oxidants, such as ozone (O₃).

3.16 A conversion ratio of 70% NO_x:NO₂ has been assumed for comparison of predicted concentrations with the long-term objectives for NO₂. A conversion ratio of 35% has been utilised for the assessment of short-term impacts, as recommended by Environment Agency guidance¹⁰.

Sensitive Human Health Receptors

3.17 LAQM.TG(09) describes in detail typical locations where consideration should be given to pollutants defined in the Regulations. Generally, the guidance suggests that all locations 'where members of the public are regularly present' should be considered. At such locations, members of the public will be exposed to pollution over the time that they are present, and the most suitable averaging period of the pollutant needs to be used for assessment purposes.

3.18 For instance, on a footpath, where exposure will be transient (for the duration of passage along that path) comparison with short-term standard (i.e. 15-minute mean or 1-hour mean) may be relevant. In a school, or adjacent to a private dwelling, however; where exposure may be for longer periods, comparison with long-term (such as 24-hour mean or annual mean) standards may be most appropriate. In general terms, concentrations associated with long-term standards

¹⁰ Environment Agency AQMA11, Conversion Rates for NO_x and NO₂



are lower than short-term standards owing to the chronic health effects associated with exposure to low level pollution for longer periods of time.

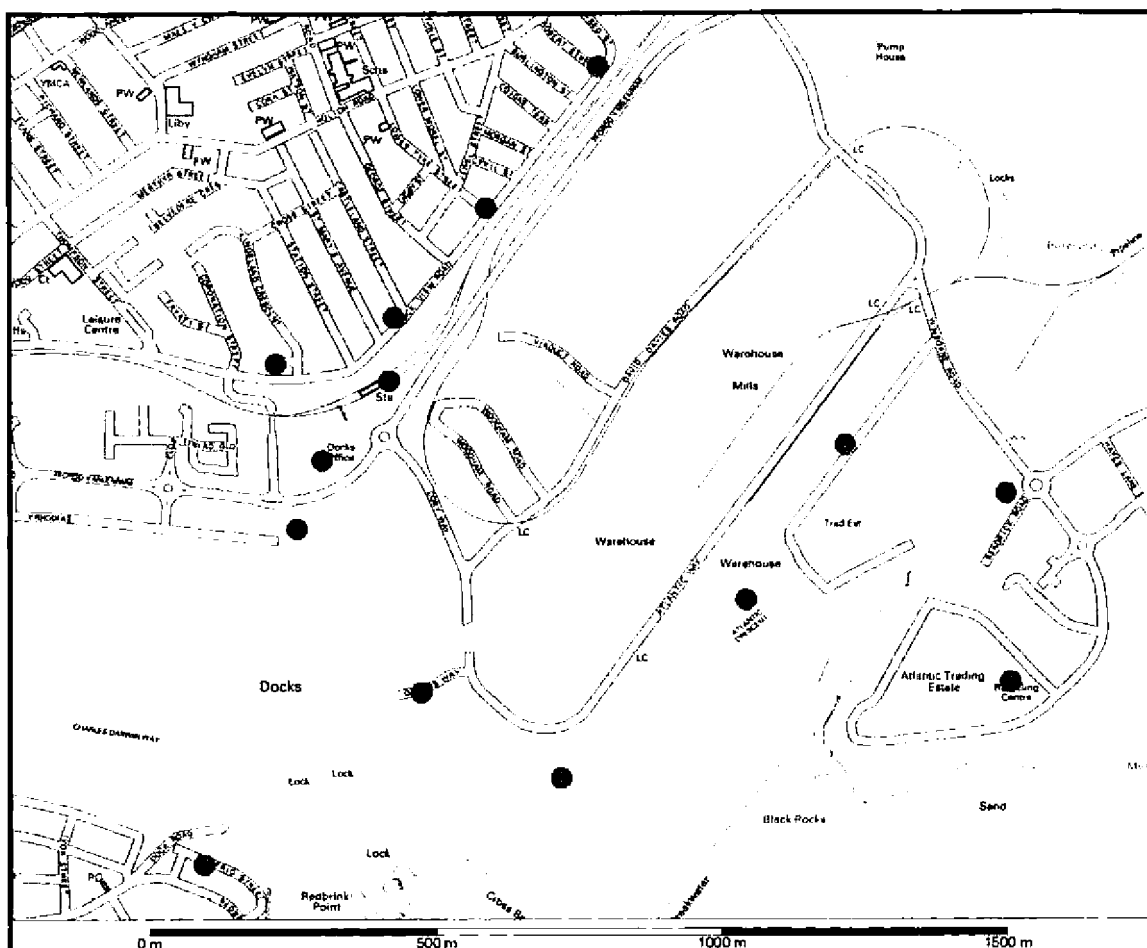
3.19 The location of the discrete sensitive receptors selected for the assessment is presented in Table 3 and Figure 3.

Table 3: Location of Sensitive Receptors

ID	Receptor	Type	Easting	Northing
1	Vistamar House	Residential	312199	167543
2	Docks Office	Industrial	312243	167664
3	Phillipa Freeth Court	Residential	312162	167836
4	Barry Dock Station	Station	312359	167806
5	54 Dock View Road	Residential	312368	167918
6	89 Dock View Road	Residential	312528	168111
7	131 Dock View Road	Residential	312724	168359
8	Wimbourne Buildings	Industrial	313155	167691
9	Bendrick Road	Residential	313437	167606
10	Public Recycling Facility	Recycling Facility	313445	167271
11	Atlantic Crescent	Industrial	312983	167416
12	Port Office	Industrial	312659	167100
13	Queens Way	Industrial	312414	167253
14	Dyfrig Street	Residential	312037	166947



Figure 3: Sensitive Receptor Locations



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3.20 Pollutant concentrations have been predicted at both discrete receptor locations and over a 3 km by 4 km Cartesian grid of 50 m resolution.

3.21 The maximum predicted ground level concentrations are compared with the relevant air quality standards and guidelines for the protection of health.

Habitat Assessment

3.22 The Environment Agency's H1 guidance¹¹ states that the impact of emissions to air on vegetation and ecosystems should be assessed for the following habitat sites within 10 km of the source:

¹¹ Environment Agency (August 2010), Horizontal Guidance Note H1, Annex (f) Air Emissions, Version 2.2.



-
- Special Areas of Conservation (SACs) and candidate SACs (cSACs) designated under the EC Habitats Directive¹²;
 - Special Protection Areas (SPAs) and potential SPAs designated under the EC Birds Directive¹³; and
 - Ramsar Sites designated under the Convention on Wetlands of International Importance¹⁴.

3.23 Within 2 km of the source:

- Sites of Special Scientific Interest (SSSI) established by the 1981 Wildlife and Countryside Act;
- National Nature Reserves (NNR);
- Local Nature Reserves (LNR);
- local wildlife sites (LWS), county wildlife sites (CWS) and potential wildlife sites (PWS);
- Sites of Importance for Nature Conservation (SINC) and
- ancient woodland.

3.24 Habitat receptor designations and locations relevant to the assessment are presented in Table 4. There are two SSSI's within 2 km of the proposed facility (Hayes Point to Bendrick Rock SSSI and Barry Island SSSI) however these sites have been designated for geological interest only and have therefore not been included in the assessment.

¹² Council Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora.

¹³ Council Directive 79/409/EEC on the conservation of wild birds

¹⁴ Ramsar (1971), The Convention of Wetlands of International Importance especially as Waterfowl Habitat



Table 4: Location of Sensitive Habitat Receptors

ID	Receptor	Approximate Location of Nearest Boundary to Boiler Stack
H1	Cadoxton River SINC	690 m east
H2	Cadoxton Wetlands SINC	780 m northeast
H3	Fields at Merthyr Dyfan SINC	1.9 km northwest
H4	Friars Point SINC	1.98 km southwest
H5	Gladstone Road Pond SINC	1.2 km west-northwest
H6	Nells Point East SINC	1.1 km south-southwest
H7	North of North Road SINC	1.98 km northeast
H8	Cadoxton Ponds Wildlife Trust Reserve	780 m northeast
H9	Severn Estuary Ramsar	3.9 km east
H10	Severn Estuary SPA	6.2 km east
H11	Ancient Woodland (Hayes Lane)	1.1 km east

3.25 The habitat sites have been represented in the model by a discrete receptor at the nearest boundary of the designated area.

3.26 The modelled ground level pollutant concentrations are used to predict deposition rates, using typical deposition velocities. A summary of typical NO₂, SO₂ and HCl dry deposition velocities is presented in Table 5.

Table 5: Dry Deposition Velocity (m/s)

Pollutant	Grassland	Woodland
Nitrogen Dioxide (NO ₂)	0.0015	0.0030
Sulphur Dioxide (SO ₂)	0.012	0.024
Hydrogen Chloride (HCl)	0.025	0.06

3.27 The predicted nitrogen deposition rates assume a 100% NO_x: NO₂ conversion. This represents a worst-case for the assessment since nitric oxide (NO) has a lower deposition velocity than NO₂ and consequently results in lower deposition rates.

3.28 A wet deposition rate for HCl has been calculated using a dry to wet deposition ratio, as follows:

$$\text{HCl wet deposition rate} = \text{HCl dry deposition rate} \times \text{wet-to-dry deposition ratio}$$

3.29 Within a few kilometres of the source, the wet deposition rate is comparable to the dry deposition rate and with increasing distance, the wet deposition fraction becomes a smaller



fraction of the total HCl deposition. As a worst-case, the wet-to-dry deposition ratio is assumed to be 1 at all the identified habitat sites.

3.30 A background HCl deposition rate has been calculated for each of the habitat sites using the UK average annual mean concentration of $0.24 \mu\text{g}/\text{m}^3$.

3.31 Predicted ground level concentrations and acidification/ deposition rates are compared with relevant air quality standards, critical levels and critical loads for the protection of sensitive ecosystems and vegetation (see **Appendix E**).

Significance Criteria

3.32 The Environment Agency has developed criteria for assessing the significance of an impact compared with relevant air quality standards and background air quality¹¹. A process concentration (PC) is considered potentially significant if:

- The long term PC > 1% of the long-term air quality standard
- The short term PC > 10% of the short-term air quality standard

3.33 At 1% of the long term air quality standard, the impact of a development is unlikely to be significant compared with background air quality. Both the short and long term criteria are also designed to ensure that there is a substantial safety margin to protect public health and the environment.

3.34 If the screening criteria are not met, the process contribution should be considered in combination with relevant ambient background pollutant concentrations. The air quality standards are likely to be met if:

- The long term PC + background concentration < 70% of the air quality standard
- The short term PC < 20% of the 'headroom' (air quality standard – short term background concentration), where the short term background concentration is assumed to be twice the long term background concentration.



4 BASELINE CONDITIONS

Local Air Quality Management

VGC carries out frequent review and assessments of air quality within the area and produces Updating and Screening Assessments and Progress Reports in accordance with the requirements of DEFRA.

A number of locations have been identified where concentrations of NO₂ are close to the annual mean air quality objective, however to date no AQMAs have been declared.

Nitrogen Dioxide

4.1 There are no automatic air quality monitoring stations measuring NO₂ in the vicinity of the proposed facility, however routine monitoring of NO₂ concentrations is undertaken by passive diffusion tube at a number of locations in Barry. A summary of bias adjusted annual mean NO₂ concentrations measured between 2009 and 2012 is presented in Table 6. The data were extracted from VGCs 2013 Air Quality Progress Report¹⁵. The locations of the monitoring sites is presented in Figure 4.

Table 6: NO₂ Diffusion Tube Monitoring Data (bias adjusted)

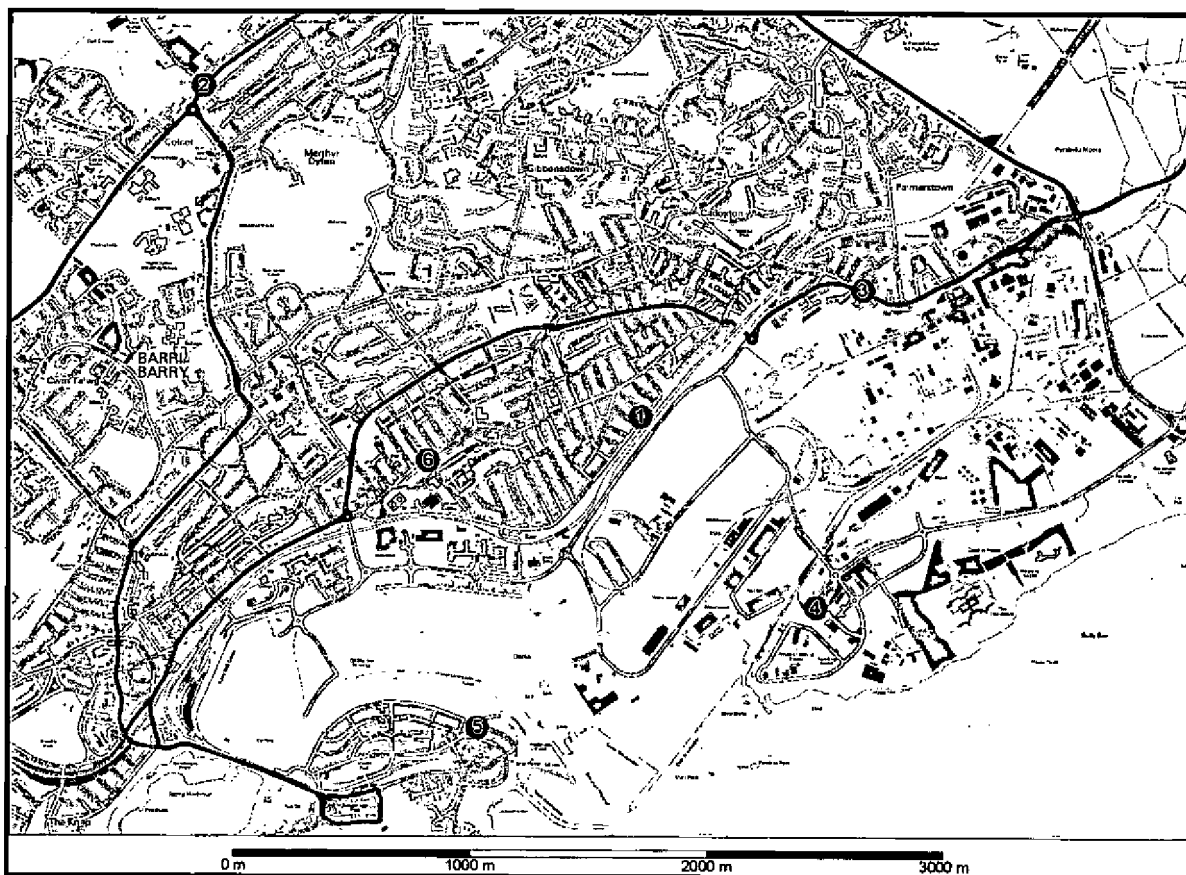
ID	Site Name	Type (a)	OS Grid Reference	2009	2010	2011	2012
1	110 Dock View Road	R	312663, 168289	17	20	19	20
2	Port Road East	R	310813, 169693	23	26	26	27
3	24 Cardiff Road	R	313597, 168829	29	30	28	32
4	Bendrick Road	UB	313407, 167477	14	17	15	15
5	Thalasa, Dyfrig Street	UB	311980, 166965	13	14	14	17
6	Holton Road	R	311768, 168101	26	27	31	37

(a) B = Background, UB = Urban Background

¹⁵ 2013 Air Quality Progress Report for Vale of Glamorgan, September 2013



Figure 4: Diffusion Tube Monitoring Locations



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4.2 The diffusion tube monitoring data indicate that urban background concentrations of NO₂ in Barry are less than 50% of the air quality objective of 40 µg/m³.

4.3 The nearest monitoring site to the proposed facility is at 110 Dock View Road, where the maximum concentration measured between 2009 and 2012 was 20 µg/m³. This concentration is assumed to provide a reasonable estimate of the baseline concentration at the Site and the sensitive receptors on Dock View Road and a worst-case baseline for receptors to the south of the proposed facility (where the urban background monitoring sites indicate that the annual mean concentrations are somewhat lower).

Carbon Monoxide, Particulate Matter, Sulphur Dioxide and Total Organic Carbon (as Benzene)

4.4 Continuous monitoring of PM₁₀ concentrations has been undertaken at a roadside site on Cardiff Road in Barry since 2010. Unfortunately data capture at this location has been relatively poor; therefore the data has not been used to inform the baseline for the assessment.

4.5 In the absence of local monitoring data background concentrations of CO, PM₁₀, PM_{2.5}, SO₂ and benzene have been obtained from the DEFRA UK Background Air Pollution maps¹⁶ for use in the assessment. These 1 km grid resolution maps are derived from a complex modelling exercise that takes into account emissions inventories and measurements of ambient air pollution from both automated and non-automated sites.

4.6 The latest background maps for NO₁₀ and PM_{2.5} were issued in June 2014 and are based on 2011 monitoring data. DEFRA guidance issued in conjunction with the new background maps¹⁷ suggests that unusually high particulate concentrations were measured in 2011. A scaling factor of 0.91 is provided to adjust the mapped concentrations to more typical levels.

4.7 The CO, SO₂ and benzene mapped concentrations are based on 2001 monitoring data. For CO, factors are available to project the concentrations to future years¹⁸. The 2013 SO₂ concentrations are assumed to be 75% of the 2001 estimates, in accordance with the 2003 Local

¹⁶ <http://uk-air.defra.gov.uk/data/laqm-background-home>

¹⁷ <http://laqm.defra.gov.uk/documents/Background-maps-user-guide-v1.0.pdf>

¹⁸ <http://laqm.defra.gov.uk/tools-monitoring-data/year-adjustment.html>



Air Quality Management Technical Guidance¹⁹. The 2001 mapping includes projected benzene concentrations for 2010 and these are assumed to be representative of the existing concentrations for the purposes of the assessment.

4.8 A summary of the mapped annual mean background concentrations assumed for the assessment is presented in Table 7. The concentrations were derived from contour plots of the mapped data to determine the maximum at sensitive receptor locations. These concentrations are assumed to provide a reasonable representation of the existing and future air quality in the vicinity of the proposed facility.

Table 7: Mapped Annual Mean Background Concentrations for PM₁₀, PM_{2.5}, CO, SO₂ and Benzene (µg/m³)

Pollutant	Annual Mean	AQO/EAL
Particles (PM ₁₀)	13.5	40
Particles (PM _{2.5})	9.4	25
Sulphur Dioxide (SO ₂)	2.2	n/a
Carbon Monoxide (CO)	140	n/a
Benzene (C ₆)	0.35	5

Hydrogen Chloride

4.9 Ambient monitoring of Hydrogen Chloride is carried out as part of the Defra Acid Gases and Aerosols Network (AGANET) at a number of locations around the UK.

4.10 The closest monitoring sites to the proposed facility are at at Narbeth in Pembrokeshire and Rosemaund in Herefordshire. Over the period 2010 to 2012, the average annual mean HCl concentration at these sites was the same as the UK average at 0.24 µg/m³. This concentration is assumed to provide a reasonable estimate of the background concentration of HCl at the Site.

Hydrogen Fluoride

4.11 Monitoring of ambient levels of hydrogen fluoride is not currently carried out in the UK, however the Expert Panel on Air Quality Standards (EPAQS) report on halogen and hydrogen halides in ambient air²⁰ cites a modelling study which suggests that the typical natural

¹⁹ Department for Environment, Food and Rural Affairs (2003): Part IV The Environment Act 1995 Local Air Quality Management Review and Assessment Technical Guidance, LAQM.TG(03).



background HF concentration is $0.5 \mu\text{g}/\text{m}^3$, with an elevated background of $3 \mu\text{g}/\text{m}^3$ where there are local anthropogenic emission sources.

4.12 The natural background HF concentration of $0.5 \mu\text{g}/\text{m}^3$ is assumed to be applicable at sensitive human health and habitat receptors in the vicinity of the Site.

Trace Metals

4.13 DEFRA has undertaken monitoring of trace elements at a number of locations in the UK since 1976 as part of the UK Urban and Rural Heavy Metals Monitoring Networks.

4.14 To provide an indication of the range of trace metal concentrations that occur in the UK the average concentrations measured at rural and urban sites between 2008 and 2011 are summarised in Table 8.

4.15 With the exception of Cr(VI), all the measured concentrations are well below their respective EAL's. Guidance issued by the Environment Agency⁷ for the assessment of Group 3 metals, states that for screening purposes it should be assumed that Cr(VI) comprises 20% of the total background chromium). On this basis the urban average Cr(VI) concentration substantially exceeds the EAL.

4.16 For the purposes of the assessment, the UK average urban concentrations are assumed to be reasonably representative of the baseline trace metal concentrations at the Site.

²⁰ EPAQS (February 2006), Guidelines for Halogen and Hydrogen Halides in Ambient Air for Protecting Human Health Against Acute Irritancy Effects.



Table 8: Average UK Trace Metal Concentrations (ng/m³)

Metal	Rural	Urban	EAL
Antimony (Sb)	Not measured	Not measured	5,000
Arsenic (As)	0.47	0.68	3
Cadmium (Cd)	0.10	0.30	5
Chromium (Cr)	0.76	4.2	n/a
Trivalent Chromium (Cr(III))	0.61 (a)	3.4 (a)	5,000
Hexavalent Chromium (Cr(VI))	0.15 (b)	0.85 (b)	0.2
Cobalt (Co)	0.047	0.21	1,000
Copper (Cu)	2.8	16.8	10,000
Lead (Pb)	4.4	13.9	250 – 500
Manganese (Mn)	2.2	13.2	150
Mercury (Hg) (c)	1.2	2.0	250
Nickel (Ni)	0.83	3.8	20
Thallium (Tl)	Not measured	Not measured	1,000
Vanadium (V)	1.1	1.7	5,000
(a) 80% of total chromium			
(b) 20% of total chromium			
(c) Total particulate and vapour			

Dioxins and Furans

4.17 Monitoring of PCDD/Fs is currently carried out by Defra at six locations in the UK (Hazelrigg, High Muffles, London, Manchester, Auchencorth Moss and Weybourne) as part of the Toxic Organic Micropollutants (TOMPs) Network.

4.18 To provide an indication of the range of PCDD/F concentrations that occur in the UK, a summary of the annual mean concentrations measured between 2008 and 2010 is presented in Table 9.



Table 9: UK PCDD/Fs Concentrations (fg TEQ/m³)

Metal	Type	2008	2009	2010
London	Urban background	10.9	41.4	38.6
Manchester	Urban background	19.0	14.2	48.7
Auchencorth Moss	Rural background	6.4	0.56	5.0
High Muffles	Rural background	1.7	9.38	2.8
Hazelrigg	Rural background	3.7	13.5	8.0
Weybourne	Rural background	-	22.82	2.5

4.19 In general, the concentration of dioxins and furans at rural locations is considerably lower than at urban locations.

4.20 The average concentration measured at the two urban background monitoring sites from 2008 to 2010 is 28.8 fg/m³ and is assumed to be reasonably representative of the baseline dioxin and furan concentration at the proposed facility and nearby sensitive receptors.

Polycyclic Aromatic Hydrocarbons (as benzo[a]pyrene)

4.21 Monitoring of benzo(a)pyrene (B[a]P) is currently carried out by DEFRA at a number of locations in the UK as part of the TOMPS and PAH monitoring and analysis network. A summary of concentrations measured in the UK is issued by the National Physical Laboratory (NPL) on behalf of Defra on an annual basis. The most recent report was published in January 2014 and provides annual mean B[a]P concentrations measured by the network in 2012²¹.

4.22 The average urban and rural background concentrations measured in the UK between 2010 and 2012 were 0.33 ng/m³ and 0.062 respectively.

4.23 The average urban background concentration is assumed to provide a reasonable estimate of the background concentration in the vicinity of the Site.

Polychlorinated Biphenyls

4.24 Monitoring of PCBs is currently carried out by DEFRA at six locations in the UK as part of the TOMPs Network. The average PCB concentration measured at the urban background monitoring sites (London and Manchester) from 2008 to 2010 is 0.00044 µg/m³ and is assumed

²¹ Annual Report for 2012 on the UK PAH Monitoring and Analysis Network, NPL Report AS 84, January 2014.



to be reasonably representative of the baseline PCB concentration at the Site and nearby sensitive receptors.

Summary of Background Concentrations

4.25 A summary of the annual mean and short-term background concentrations assumed for the assessment is presented in Table 10.



Table 10: Summary of Assessment Background Concentrations (a)

Pollutant	Annual Mean	Short-term
Particles (PM ₁₀)	13.5 µg/m ³	15.9 µg/m ³ (d)(e)
Particles (PM _{2.5})	9.4 µg/m ³	n/a
Nitrogen Dioxide (NO ₂)	20.0 µg/m ³	40.0 µg/m ³ (d)
Sulphur Dioxide (SO ₂)	2.2 µg/m ³	2.6 µg/m ³ (d)(e) 4.4 µg/m ³ (d) 5.9 µg/m ³ (d)(g)
Carbon Monoxide (CO)	140 µg/m ³	196 µg/m ³ (d)(f) 280 µg/m ³ (d)
Hydrogen Fluoride (HF)	0.50 µg/m ³	1.0 µg/m ³ (d)
Hydrogen Chloride (HCl)	0.24 µg/m ³	0.48 µg/m ³ (d)
Benzene (C ₆)	0.35 µg/m ³	n/a
Dioxins and Furans (PCDD/Fs)	28.8 fg/m ³ (b)	n/a
Antimony (Sb)	No data available	n/a
Arsenic (As)	0.68 ng/m ³	n/a
Cadmium (Cd)	0.30 ng/m ³	n/a
Total Cr	4.2 ng/m ³	8.4 ng/m ³ (a)
Cobalt (Co)	0.21 ng/m ³	0.42 ng/m ³ (a)
Copper (Cu)	16.8 ng/m ³	33.6 ng/m ³
Lead (Pb)	13.9 ng/m ³	n/a
Manganese (Mn)	13.2 ng/m ³	26.4 ng/m ³ (a)
Mercury (Hg)	2.0 ng/m ³	4.0 ng/m ³
Nickel (Ni)	3.8 ng/m ³	n/a
Thallium (Tl)	No data available	n/a
Vanadium (V)	1.7 ng/m ³	3.4 ng/m ³ (a)
Polycyclic Aromatic Hydrocarbons (PAH, as BaP)	0.33 ng/m ³	n/a
Polychlorinated biphenyls (PCBs)	0.00044 µg/m ³	0.00088 µg/m ³ (a)

(a) Where background concentrations are expressed as range (e.g. trace metals) the average concentration has been used.

(b) Units are fg/m³ (femtogram per cubic metre) equivalent to 1 x 10⁻¹⁵ grams per cubic metre

(c) Units are ng/m³ (nanogram per cubic metre) equivalent to 1 x 10⁻⁹ grams per cubic metre

(d) 1-hour mean background concentration estimated by multiplying the annual mean by a factor of 2 in accordance with the H1 Guidance.

(e) 24-hour mean background concentration estimated by multiplying the 1-hour mean by a factor of 0.59 in accordance with the H1 Guidance.

(f) 8-hour mean background concentration estimated by multiplying the 1-hour mean by a factor of 0.70 in accordance with the H1 Guidance.



(g) 15-minute mean background concentration estimated by multiplying the 1-hour mean by a factor of 1.34 in accordance with the H1 Guidance.



5 ASSESSMENT OF IMPACT

Human Health Impacts

Introduction

5.1 Predicted process concentrations (PC) for the five years of meteorological data are presented as the maximum arising off-site and at each of the discrete receptors identified in Table 3.

5.2 The maximum PC is compared with the relevant air quality standard to determine the significance of the impact, in accordance with the EA H1 guidance. Where a potentially significant impact is identified, the total; predicted environmental concentration (process + background) is compared with the air quality standard to assess the likelihood of an exceedence.

Nitrogen Dioxide

5.3 The predicted annual mean and 99.8th percentile of 1-hour mean ground level NO₂ process concentrations are presented in Table 11.



Table 11: Predicted NO₂ Concentrations (µg/m³)

Receptor	Annual Mean		99.8 th Percentile of 1-Hour Means	
	PC	PC (% AQO)	PC	PC (% AQO)
Maximum Off-Site	0.78	2.0%	23.9	11.9%
Vistamar House	0.35	0.88%	6.13	3.1%
Docks Office	0.23	0.57%	6.64	3.3%
Phillipa Freeth Court	0.28	0.71%	7.08	3.5%
Barry Dock Station	0.24	0.60%	7.59	3.8%
54 Dock View Road	0.26	0.65%	8.12	4.1%
89 Dock View Road	0.26	0.65%	7.67	3.8%
131 Dock View Road	0.16	0.40%	5.96	3.0%
Wimbourne Buildings	0.54	1.4%	8.75	4.4%
Bendrick Road	0.49	1.2%	7.43	3.7%
Public Recycling Facility	0.34	0.85%	6.9	3.4%
Atlantic Crescent	0.49	1.2%	10.9	5.4%
Port Office	0.26	0.66%	8.6	4.3%
Queens Way	0.67	1.7%	10.3	5.2%
Dyfrig Street	0.44	1.1%	6.9	3.5%
AQO	40.0		200	
Background	20.0		40.0	

5.4 The maximum off-site annual mean process concentration is 0.78 µg/m³, which is potentially significant at 2.0% of the AQO. However, the total predicted concentration, PEC (process plus background) is just 52% of the AQO, therefore the risk of an exceedence of the annual mean air quality objective is considered to be negligible at any off-site location.

5.5 For the short-term predictions, the maximum off-site PC is 11.4 µg/m³, which is potential significant at 11.9% of the AQO, however the PC is <20% of the 'headroom' and therefore the risk of an exceedence of the hourly mean AQO off-site is considered to be negligible. The predicted short-term impacts are of negligible significance (<10% of the AQO) at all of the identified sensitive receptors.

5.6 Predicted annual and 99.8th percentile of hourly mean NO₂ concentrations for 2011 (the year in which the highest off-site annual mean concentrations are predicted) are presented as contour plots in Figures 5 and 6 respectively.



5.7 The influence of locally elevated terrain is clearly seen in the short-term concentrations, with the maximum impact occurring approximately 1.5 km northwest of the proposed facility.

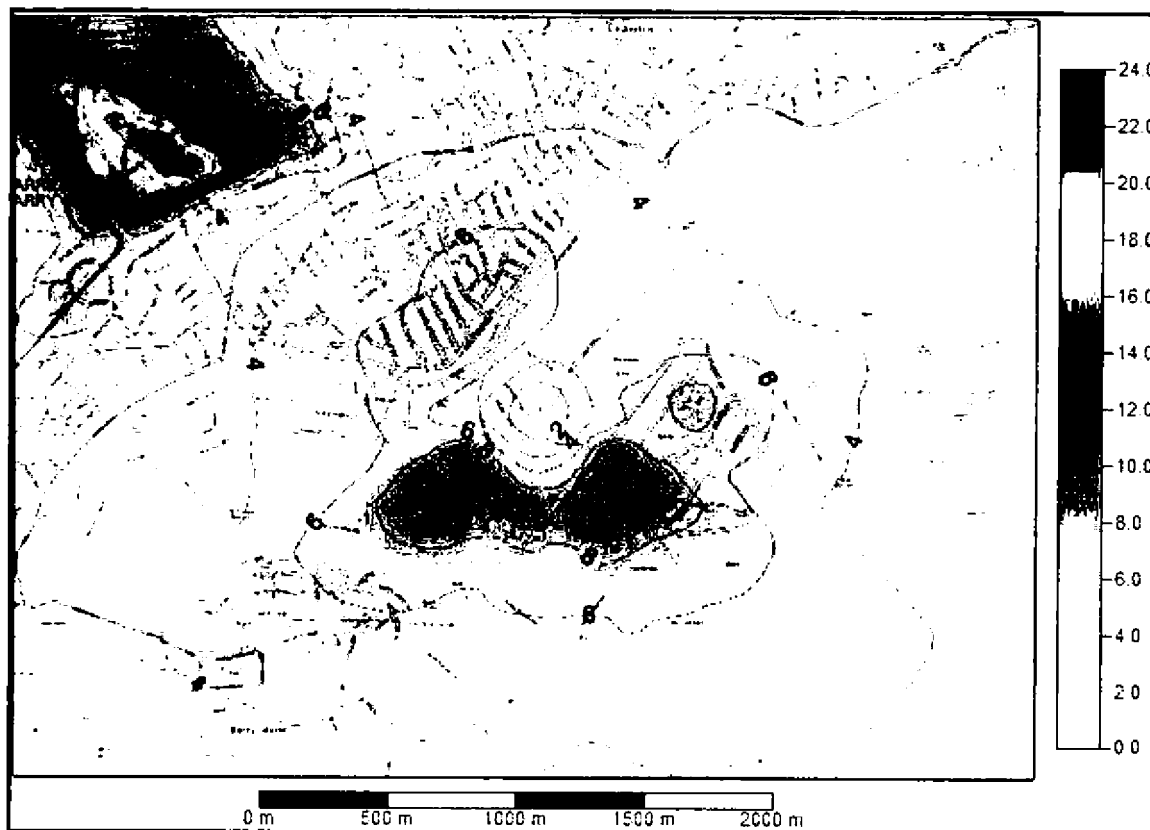
Figure 5: Predicted Annual Mean NO₂ Process Concentration (µg/m³)



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Figure 5: Predicted 99.8th Percentile of 1-Hour Mean NO₂ Process Concentrations ($\mu\text{g}/\text{m}^3$)



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Carbon Monoxide (CO)

5.8 The predicted maximum 1-hour and 8-hour mean ground level CO process concentrations are presented in Table 12.



Table 12: Predicted CO Concentrations ($\mu\text{g}/\text{m}^3$)

Receptor	Maximum 8-Hour Mean		Maximum 1-Hour Mean	
	PC	PC (% AQO)	PC	PC (% EAL)
Maximum Off-Site	12.9	0.13%	51.3	0.17%
Vistamar House	3.9	0.039%	5.3	0.018%
Docks Office	3.9	0.039%	5.7	0.019%
Phillipa Freeth Court	4.6	0.046%	6.7	0.022%
Barry Dock Station	4.8	0.048%	6.5	0.022%
54 Dock View Road	4.7	0.047%	6.7	0.022%
89 Dock View Road	4.8	0.048%	6.3	0.021%
131 Dock View Road	3.5	0.035%	4.7	0.016%
Wimbourne Buildings	5.4	0.054%	7.9	0.026%
Bendrick Road	4.1	0.041%	7.9	0.026%
Public Recycling Facility	2.8	0.028%	6.0	0.020%
Atlantic Crescent	5.7	0.057%	8.3	0.028%
Port Office	5.0	0.050%	7.1	0.024%
Queens Way	6.6	0.066%	7.9	0.026%
Dyfrig Street	4.0	0.040%	5.2	0.017%
AQO/ EAL	10,000		30,000	
Background	196		280	

5.9 The maximum predicted 8-hour and 1-hour PCs are less than 10% of the relevant air quality objectives, therefore according to the Environment Agency's criteria the significance of the impact is *negligible*.

Sulphur Dioxide (SO₂)

5.10 Predicted SO₂ process concentrations are presented in Table 13.



Table 13: Predicted SO₂ Concentrations (µg/m³)

Receptor	99.2 nd Percentile of 24-Hour Means		99.7 th Percentile of 1-Hour Means		99.9 th Percentile of 15-Minute Means	
	PC	PC (% AQO)	PC	PC (% AQO)	PC	PC (% AQO)
Maximum Off-Site	2.7	2.1%	23.6	6.7%	93.2	35.0%
Vistamar House	0.91	0.73%	8.4	2.4%	12.5	4.7%
Docks Office	0.71	0.57%	9.0	2.6%	13.5	5.1%
Phillipa Freeth Court	1.1	0.89%	9.9	2.8%	14.3	5.4%
Barry Dock Station	0.81	0.65%	10.4	3.0%	15.5	5.8%
54 Dock View Road	0.91	0.73%	11.1	3.2%	16.3	6.1%
89 Dock View Road	0.97	0.78%	10.8	3.1%	15.4	5.8%
131 Dock View Road	0.68	0.54%	8.1	2.3%	11.9	4.5%
Wimbourne Buildings	1.1	0.89%	12.0	3.4%	17.7	6.7%
Bendrick Road	0.92	0.74%	10.4	3.0%	14.9	5.6%
Public Recycling Facility	0.87	0.69%	9.4	2.7%	13.7	5.1%
Atlantic Crescent	1.5	1.2%	15.1	4.3%	21.2	8.0%
Port Office	1.1	0.87%	11.5	3.3%	17.7	6.6%
Queens Way	2.3	1.9%	14.6	4.2%	20.1	7.5%
Dyfrig Street	1.2	0.98%	9.7	2.8%	13.5	5.1%
AQO	125		350		266	
Background	2.6		4.4		5.9	

5.11 The maximum predicted ground level 24-hour and 1-hour mean SO₂ process concentrations are less than 10% of the relevant AQOs and are therefore of *negligible* significance.

5.12 The maximum off-site 15-minute mean concentration is potentially significant, however background SO₂ concentration is low and it is considered unlikely that an exceedence will occur at any location. The maximum 15-minute mean concentrations are of negligible significance at all the identified receptor locations.

Particulate Matter (as PM₁₀)

5.13 Predicted annual mean and 90.4th percentile of 24-hour mean ground level PM₁₀ process concentrations are presented in Table 14. The predictions assume that 100% of the particulate matter is emitted from the stack is PM₁₀.



Table 14: Predicted PM₁₀ Concentrations (µg/m³)

Receptor	Annual Mean		90.4 th Percentile of 24-Hour Means	
	PC	PC (% AQO)	PC	PC (% AQO)
Maximum Off-Site	0.056	0.14%	0.20	0.40%
Vistamar House	0.025	0.063%	0.10	0.20%
Docks Office	0.016	0.040%	0.061	0.12%
Phillipa Freeth Court	0.020	0.050%	0.083	0.17%
Barry Dock Station	0.017	0.043%	0.062	0.12%
54 Dock View Road	0.019	0.046%	0.073	0.15%
89 Dock View Road	0.019	0.047%	0.066	0.13%
131 Dock View Road	0.011	0.029%	0.037	0.073%
Wimbourne Buildings	0.039	0.097%	0.11	0.23%
Bendrick Road	0.035	0.088%	0.11	0.22%
Public Recycling Facility	0.024	0.061%	0.077	0.15%
Atlantic Crescent	0.035	0.087%	0.12	0.23%
Port Office	0.019	0.047%	0.068	0.14%
Queens Way	0.048	0.12%	0.18	0.37%
Dyfrig Street	0.031	0.078%	0.12	0.25%
AQO	40		50	
Background	13.5		15.9	

5.14 The predicted maximum ground level PM₁₀ concentrations are less than 1% and 10% of the long and short-term AQOs respectively and are therefore of *negligible* significance.

Particulate Matter (as PM_{2.5})

5.15 Predicted annual mean ground-level PM_{2.5} process concentrations are presented in Table 15. The predictions assume that 100% of the particulate matter emitted from the stack is PM_{2.5}.



Table 15: Predicted PM_{2.5} Concentrations (µg/m³)

Receptor	Annual Mean	
	PC	PC (% LV)
Maximum Off-Site	0.056	0.22%
Vistamar House	0.025	0.10%
Docks Office	0.016	0.065%
Phillipa Freeth Court	0.020	0.081%
Barry Dock Station	0.017	0.069%
54 Dock View Road	0.019	0.074%
89 Dock View Road	0.019	0.074%
131 Dock View Road	0.011	0.046%
Wimbourne Buildings	0.039	0.15%
Bendrick Road	0.035	0.14%
Public Recycling Facility	0.024	0.10%
Atlantic Crescent	0.035	0.14%
Port Office	0.019	0.076%
Queens Way	0.048	0.19%
Dyfrig Street	0.031	0.12%
Limit Value	25	
Background	9.5	

5.16 Maximum predicted annual mean PM_{2.5} concentrations are less than 1% of the EU limit value are therefore of *negligible* significance.

Total Organic Carbon (as Benzene)

5.17 Predicted annual mean ground-level benzene process concentrations are presented in Table 16.



Table 16: Predicted Benzene Concentrations ($\mu\text{g}/\text{m}^3$)

Receptor	Annual Mean	
	PC	PC (% AQO)
Maximum Off-Site	0.056	1.1%
Vistamar House	0.025	0.50%
Docks Office	0.016	0.32%
Phillipa Freeth Court	0.020	0.40%
Barry Dock Station	0.017	0.34%
54 Dock View Road	0.019	0.37%
89 Dock View Road	0.019	0.37%
131 Dock View Road	0.011	0.23%
Wimbourne Buildings	0.039	0.77%
Bendrick Road	0.035	0.71%
Public Recycling Facility	0.024	0.49%
Atlantic Crescent	0.035	0.69%
Port Office	0.019	0.38%
Queens Way	0.048	0.96%
Dyfrig Street	0.031	0.62%
AQO	5	
Background	0.35	

5.18 The predicted impact on annual mean benzene concentration is of negligible significance at all of the identified sensitive receptors,

5.19 The maximum off-site annual mean process concentration is $0.056 \mu\text{g}/\text{m}^3$, which is potentially significant at 1.1% of the AQO. However, the total predicted concentration, PEC (process plus background) is just 8.1% of the AQO, therefore the facility is unlikely to result an exceedence of the annual mean air quality objective at any off-site location.

Hydrogen Chloride (HCl)

5.20 The maximum predicted 1-hour mean ground-level HCl process concentrations are presented in Table 17.



Table 17: Predicted HCl Concentrations ($\mu\text{g}/\text{m}^3$)

Receptor	1-Hour Mean	
	PC	PC (% GV)
Maximum Off-Site	30.8	4.1%
Vistamar House	3.2	0.42%
Docks Office	3.4	0.45%
Phillipa Freeth Court	4.0	0.54%
Barry Dock Station	3.9	0.52%
54 Dock View Road	4.0	0.53%
89 Dock View Road	3.8	0.51%
131 Dock View Road	2.8	0.37%
Wimbourne Buildings	4.8	0.63%
Bendrick Road	4.7	0.63%
Public Recycling Facility	3.6	0.48%
Atlantic Crescent	5.0	0.67%
Port Office	4.3	0.57%
Queens Way	4.7	0.63%
Dyfrig Street	3.1	0.42%
Guideline Value	750	
Background	0.24	

5.21 Predicted maximum 1-hour mean ground level HCl concentrations are less than 1% of EPAQS guideline value for protection from irritant and respiratory effect at all of the identified receptor locations, therefore the significance of the impact is *negligible*.

5.22 The maximum off-site 1-hour mean process concentration is $30.8 \mu\text{g}/\text{m}^3$, which is potentially significant at 4.1% of the AQO. However, the total predicted concentration, PEC (process plus background) is just 4.1% of the AQO, therefore the facility is unlikely to result an exceedence of the 1-hour mean air quality objective at any off-site location.



Hydrogen Fluoride (HF)

5.23 The predicted annual and maximum 1-hour mean ground-level HF process concentrations are presented in Table 18.

Table 18: Predicted HF Concentrations ($\mu\text{g}/\text{m}^3$)

Receptor	Annual Mean		1-Hour Mean	
	PC	PC (% GV)	PC	PC (% GV)
Maximum Off-Site	0.0056	0.035%	0.21	1.3%
Vistamar House	0.0025	0.016%	0.23	0.13%
Docks Office	0.0016	0.010%	0.27	0.14%
Phillipa Freeth Court	0.0020	0.013%	0.26	0.17%
Barry Dock Station	0.0017	0.011%	0.27	0.16%
54 Dock View Road	0.0019	0.012%	0.25	0.17%
89 Dock View Road	0.0019	0.012%	0.19	0.16%
131 Dock View Road	0.0011	0.0072%	0.32	0.12%
Wimbourne Buildings	0.0039	0.024%	0.32	0.20%
Bendrick Road	0.0035	0.022%	0.24	0.20%
Public Recycling Facility	0.0024	0.015%	0.33	0.15%
Atlantic Crescent	0.0035	0.022%	0.29	0.21%
Port Office	0.0019	0.012%	0.31	0.18%
Queens Way	0.0048	0.030%	0.21	0.20%
Dyfrig Street	0.0031	0.019%	0.21	0.13%
Guideline Value	16		160	
Background	0.5		1.0	

5.24 Maximum predicted ground level annual mean and 1-hour mean hydrogen fluoride concentrations are less than 1% and 10% of the long and short-term EPAQS guideline values, therefore the significance of the impact is *negligible*.

Dioxins and Furans

5.25 The predicted annual mean ground-level dioxin and furan process concentrations at identified sensitive receptor locations are presented in Table 19. The results are presented in femtograms (fg) per cubic metre ($10^{-15} \text{ g}/\text{m}^3$).



Table 19: Predicted Dioxin and Furan Concentrations (fg/m³)

Receptor	Annual Mean
	PC
Maximum Off-Site	0.56
Vistamar House	0.25
Docks Office	0.16
Phillipa Freeth Court	0.20
Barry Dock Station	0.17
54 Dock View Road	0.19
89 Dock View Road	0.19
131 Dock View Road	0.11
Wimbourne Buildings	0.39
Bendrick Road	0.35
Public Recycling Facility	0.24
Atlantic Crescent	0.35
Port Office	0.19
Queens Way	0.48
Dyfrig Street	0.31
Background	28.8

5.26 There are no assessment criteria for dioxins and furans. The predicted maximum contribution from the proposed development is 1.9% of the average background concentration measured at urban monitoring sites in the UK.

PAH (as Benzo[a]pyrene)

5.27 The maximum predicted 1-hour mean ground-level B[a]P process concentrations are presented in Table 20. The results are presented in nanograms (ng) per cubic metre (10⁻⁹ g/m³).



Table 20: Predicted B[a]P Concentrations (ng/m³)

Receptor	Annual Mean	
	PC	PC (% LV)
Maximum Off-Site	0.0056	0.56%
Vistamar House	0.0025	0.25%
Docks Office	0.0016	0.16%
Phillipa Freeth Court	0.0020	0.20%
Barry Dock Station	0.0017	0.17%
54 Dock View Road	0.0019	0.19%
89 Dock View Road	0.0019	0.19%
131 Dock View Road	0.0011	0.11%
Wimbourne Buildings	0.0039	0.39%
Bendrick Road	0.0035	0.35%
Public Recycling Facility	0.0024	0.24%
Atlantic Crescent	0.0035	0.35%
Port Office	0.0019	0.19%
Queens Way	0.0048	0.48%
Dyfrig Street	0.0031	0.31%
EU Limit Value	1.0	
Background	0.33	

5.28 The maximum predicted off-site annual mean ground level B[a]P concentration is less than 1% of the EU limit value, therefore the impact of the proposed facility is of *negligible* significance.

Polychlorinated Biphenyls (PCBs)

5.29 The predicted annual and maximum 1-hour mean ground-level PCB process concentrations are presented in Table 21. The results are presented in nanograms (ng) per cubic metre (10⁻⁹ g/m³).



Table 21: Predicted PCB Concentrations (ng/m³)

Receptor	Annual Mean		1-Hour Mean	
	PC	PC (% EAL)	PC	PC (% EAL)
Maximum Off-Site	0.028	0.014%	2.6	0.043%
Vistamar House	0.013	0.0063%	0.27	0.0044%
Docks Office	0.0081	0.0040%	0.28	0.0047%
Phillipa Freeth Court	0.010	0.0050%	0.33	0.0056%
Barry Dock Station	0.0086	0.0043%	0.32	0.0054%
54 Dock View Road	0.0093	0.0046%	0.33	0.0056%
89 Dock View Road	0.0093	0.0047%	0.32	0.0053%
131 Dock View Road	0.0057	0.0029%	0.23	0.0039%
Wimbourne Buildings	0.019	0.0097%	0.40	0.0066%
Bendrick Road	0.018	0.0088%	0.40	0.0066%
Public Recycling Facility	0.012	0.0061%	0.30	0.0050%
Atlantic Crescent	0.017	0.0087%	0.42	0.0069%
Port Office	0.0095	0.0047%	0.36	0.0060%
Queens Way	0.024	0.012%	0.39	0.0066%
Dyfrig Street	0.016	0.0078%	0.26	0.0044%
EAL	200		6000	
Background	0.44		0.88	

5.30 Maximum predicted ground level annual mean and 1-hour mean PCB concentrations are less than 1% and 10% of the long and short-term EALs, therefore the significance of the impact is *negligible*.

Trace Metals

Step 1: Screening

5.31 The predicted maximum long and short-term trace metal impacts at sensitive receptors for emissions at maximum IED limits are presented in Tables 22 and 23 respectively.

5.32 For the group 3 metals (Sb, As, Pb, Cr, Co, Cu, Mn, Ni and V), if both the long and short term PCs are within the relevant EALs, then the impact is considered insignificant, in accordance with the Environment Agency's metals guidance⁷.



5.33 The Step 1 screening has assumed that the background concentration is equal to the average measured at urban sites for each pollutant. The predicted and background concentrations are apportioned 80% Cr (III): 20% Cr(VI).

Table 22: Long-Term Trace Metal Predictions - Step 1

Pollutant	EAL ($\mu\text{g}/\text{m}^3$)	Max. PC ($\mu\text{g}/\text{m}^3$)	Background ($\mu\text{g}/\text{m}^3$)	PC (% EAL)	PEC (% of EAL)	Further Assessment Required?
Cd	0.005	0.00024	0.00030	4.8%	10.8%	No
Tl	1	0.00024	n/a	0.024%	0.024%	No
Hg	0.25	0.00024	0.0020	0.096%	0.90%	No
Sb	5	0.0024	n/a	0.048%	0.048%	No
As	0.003	0.0024	0.00068	79.9%	103%	Yes
Cr (III)	5	0.0019	0.0034	0.038%	0.106%	No
Cr (VI)	0.0002	0.00048	0.00085	240%	665%	Yes
Co	1	0.0024	0.00021	0.24%	0.26%	No
Cu	10	0.0024	0.017	0.024%	0.19%	No
Pb	0.25	0.0024	0.014	0.96%	6.5%	No
Mn	0.15	0.0024	0.013	1.6%	10.4%	No
Ni	0.02	0.0024	0.0038	12.0%	31.0%	No
V	5	0.0024	0.0017	0.048%	0.082%	No



Table 23: Short-Term Trace Metal Predictions - Step 1

Pollutant	EAL ($\mu\text{g}/\text{m}^3$)	Max. PC ($\mu\text{g}/\text{m}^3$)	Background ($\mu\text{g}/\text{m}^3$)	Max PC (% EAL)	Further Assessment Required?
Tl	30	0.0042	n/a	0.014%	No
Hg	7.5	0.0042	0.0040	0.055%	No
Sb	150	0.042	n/a	0.028%	No
Cr (III)	150	0.033	0.0068	0.022%	No
Cr (VI)	3	0.0083	0.0017	0.28%	No
Co	30	0.042	0.00042	0.14%	No
Cu	200	0.042	0.034	0.021%	No
Mn	150	0.042	0.026	0.028%	No
V	1	0.028	0.0034	2.8%	No

5.34 On the basis of the Step 1 screening, further assessment is required for long-term arsenic and chromium (VI) only. The maximum predicted short-term impacts are *negligible* for all trace metals.

Step 2: Emissions at 11% of IED Limits

5.35 Maximum predicted concentrations of arsenic and chromium (VI) are presented in Table 24 for emissions at 11% of the maximum IED limits (1/9th of ELV). No Cr(III):Cr(VI) apportionment has been applied to either the emissions or background concentration. The results show that the EAL for Cr(VI) continues to be substantially exceeded and further assessment is required.



Table 24: Long-Term As and Cr(VI) Predictions - Step 2

Pollutant	EAL ($\mu\text{g}/\text{m}^3$)	Max. PC ($\mu\text{g}/\text{m}^3$)	Background ($\mu\text{g}/\text{m}^3$)	PC (%EAL)	Further Assessment Required?
As	0.003	0.00027	0.00068	31.5%	No
Cr (VI)	0.0002	0.00027	0.0042	133%	Yes

Step 3: Typical Operational Emissions

5.36 The EA metals guidance provides a range of emission concentrations (corresponding fractions of the total Group III emission) measured at twenty municipal waste incineration (MWI) facilities in the UK. These data suggest that, on average, chromium comprises 2.2% of the total Group III emission. The guidance also provides a maximum chromium Cr(VI) emission based on the analysis of total chromium residues at the plant of $1.3 \times 10^{-4} \text{ mg}/\text{Nm}^3$.

5.37 Predicted annual mean Cr(VI) concentrations at this maximum operational emission rate are presented as a percentage of the EAL in Table 25.



Table 25: Predicted Annual Mean Chromium (VI) Concentration (ng/m³)

Receptor	Annual Mean	
	Maximum	Average
Maximum Off-Site	0.00073	0.36%
Vistamar House	0.00033	0.16%
Docks Office	0.00021	0.11%
Phillipa Freeth Court	0.00026	0.13%
Barry Dock Station	0.00022	0.11%
54 Dock View Road	0.00024	0.12%
89 Dock View Road	0.00024	0.12%
131 Dock View Road	0.00015	0.07%
Wimbourne Buildings	0.00050	0.25%
Bendrick Road	0.00046	0.23%
Public Recycling Facility	0.00032	0.16%
Atlantic Crescent	0.00045	0.23%
Port Office	0.00025	0.12%
Queens Way	0.00062	0.31%
Dyfrig Street	0.00040	0.36%
EAL	0.2	
Background	4.2	

5.38 For maximum typical operational emissions, the maximum predicted annual mean Cr(VI) concentrations off-site and at the identified receptors are *negligible* (<1%) compared with the EAL.

Summary of Stack Emissions Impact

5.39 A summary of the significance of the predicted significance of the impact on pollutant concentrations at receptor locations is presented in Table 26.



Table 26: Summary of Impact Significance for Maximum Off-Site Concentrations

Pollutant	Significance
Particles (PM ₁₀)	Negligible
Particles (PM _{2.5})	Negligible
Nitrogen Dioxide (NO ₂)	Negligible
Sulphur Dioxide (SO ₂)	Negligible
Carbon Monoxide (CO)	Negligible
Hydrogen Fluoride (HF)	Negligible
Hydrogen Chloride (HCl)	Negligible
Benzene (C ₆)	Negligible
Dioxins and Furans (PCDD/Fs)	Negligible
Cadmium (Cd)	Negligible
Thallium (Tl)	Negligible
Mercury (Hg)	Negligible
Arsenic (As)	Negligible
Chromium (CrIII)	Negligible
Chromium (CrIV)	Negligible
Cobalt (Co)	Negligible
Copper (Cu)	Negligible
Lead (Pb)	Negligible
Manganese (Mn)	Negligible
Nickel (Ni)	Negligible
Antimony (Sb)	Negligible
Vanadium (V)	Negligible
PAHs (as B[a]P)	Negligible
PCBs	Negligible



Habitat Impacts

Airborne Concentrations of NO_x, SO₂ and HF

5.40 Predicted maximum ground level concentrations of NO_x, SO₂ and HF at the sensitive habitat sites are compared with the relevant critical level (CL) and background concentrations obtained from APIS in Tables 27 to 29.

Table 27: Predicted Airborne NO_x Concentrations as a Percentage of the Critical Level (µg/m³)

Habitat Site	Annual Mean		Daily Mean	
	PC	PEC (a)	PC	PEC (b)
Cadoxton River SINC	2.6%	48.1%	7.0%	29.6%
Cadoxton Wetlands SINC	0.65%	48.0%	2.2%	24.9%
Fields at Merthyr Dyfan SINC	0.57%	48.0%	4.7%	27.3%
Friars Point SINC	0.79%	48.0%	2.9%	25.5%
Gladstone Road Pond SINC	0.62%	48.0%	3.8%	26.4%
Nells Point East SINC	1.5%	48.0%	6.9%	29.5%
North of North Road SINC	0.24%	48.0%	0.89%	23.5%
Cadoxton Ponds Wildlife Trust Reserve	0.65%	48.0%	2.2%	24.9%
Severn Estuary Ramsar	0.27%	39.7%	0.71%	19.5%
Severn Estuary SPA	0.19%	39.7%	0.89%	19.6%
Ancient Woodland (Hayes Lane)	1.8%	48.0%	3.9%	26.6%
Critical Level	30		75	
(a) Includes annual mean NO _x backgrounds obtained from APIS				
(b) Includes 24-hour mean NO _x background concentration (annual mean x 2 x 0.59, in accordance with the EA H1 guidance).				



Table 28: Predicted Annual Mean SO₂ Concentrations as a Percentage of the Critical Level (µg/m³)

Habitat Site	PC	PEC
Cadoxton River SINC	0.96%	12.0%
Cadoxton Wetlands SINC	0.24%	11.3%
Fields at Merthyr Dyfan SINC	0.22%	11.3%
Friars Point SINC	0.30%	11.3%
Gladstone Road Pond SINC	0.23%	11.3%
Nells Point East SINC	0.55%	11.6%
North of North Road SINC	0.091%	11.1%
Cadoxton Ponds Wildlife Trust Reserve	0.24%	11.3%
Severn Estuary Ramsar	0.10%	9.6%
Severn Estuary SPA	0.071%	9.5%
Ancient Woodland (Hayes Lane)	0.66%	11.7%
Critical Level	20	



Table 29: Predicted HF Concentrations as a Percentage of the Critical Level ($\mu\text{g}/\text{m}^3$)

Habitat Site	Daily Mean		Weekly Mean	
	PC	PEC (a)	PC (b)	PEC (c)
Cadoxton River SINC	0.52%	12.3%	0.77%	n/a
Cadoxton Wetlands SINC	0.20%	12.0%	0.19%	n/a
Fields at Merthyr Dyfan SINC	0.47%	12.3%	0.17%	n/a
Friars Point SINC	0.26%	12.1%	0.24%	n/a
Gladstone Road Pond SINC	0.34%	12.1%	0.19%	n/a
Nells Point East SINC	0.52%	12.3%	0.44%	n/a
North of North Road SINC	0.10%	11.9%	0.073%	n/a
Cadoxton Ponds Wildlife Trust Reserve	0.20%	12.0%	0.19%	n/a
Severn Estuary Ramsar	0.068%	11.9%	0.082%	n/a
Severn Estuary SPA	0.078%	11.9%	0.057%	n/a
Ancient Woodland (Hayes Lane)	0.31%	12.1%	0.53%	n/a
Critical Level	5		0.5	
<p>(a) Includes 24-hour mean HF background concentration (annual mean x 2 x 0.59, in accordance with the EA H1 guidance).</p> <p>(b) It is not possible to predict weekly concentrations using the dispersion model, therefore the annual mean concentrations have been compared with the CL.</p> <p>(c) There is no current guidance available with regard to calculating a weekly mean background concentration from the annual mean.</p>				

5.41 There are no predicted exceedences of the critical levels for NO_x, SO₂ or HF any of the identified sensitive habitat sites. At the statutory habitat sites, the process impacts are less than 1% of the critical level and therefore of *negligible* significance.

5.42 Potentially significant long-term impacts (>1% of the critical level) occur at Nells Point East SINC and the ancient woodland at Hayes Lane, however the PECs (process + background) are less than 70% of the critical load, therefore the risk of an exceedence is considered to be *negligible*.

5.43 The short-term NO_x process concentrations are of *negligible* significance at all of the identified habitat sites.



Eutrophication

5.44 Predicted maximum nutrient nitrogen deposition rates are compared with the critical load for eutrophication in Table 30.

Table 30: Predicted Eutrophication Rates (kg N/ha/yr)

Habitat Site	Critical Load (CL)	PC (as a %age of CL)	PEC (as a %age of CL)
Cadoxton River SINC	15	0.74%	81.0%
Cadoxton Wetlands SINC	15	0.19%	80.5%
Fields at Merthyr Dyfan SINC	20	0.12%	60.3%
Friars Point SINC	20	0.17%	60.4%
Gladstone Road Pond SINC	n/a	n/a	n/a
Nells Point East SINC	20	0.32%	60.5%
North of North Road SINC	15	0.070%	80.3%
Cadoxton Ponds Wildlife Trust Reserve	15	0.19%	80.5%
Severn Estuary Ramsar	10	0.12%	104%
Severn Estuary SPA	10	0.082%	104%
Ancient Woodland (Hayes Lane)	10	1.5%	216%

5.45 With the exception of the ancient woodland at Hayes Lane, the maximum predicted nutrient nitrogen deposition rates are <1% of the lower critical load and are therefore of *negligible* significance.



Acidification

5.46 Predicted nitrogen and sulphur acidification rates are compared with the relevant critical loads and background acidification rates in Table 31.

Table 31: Predicted Acidification Rates (keq/ha/yr)

Habitat Site	PC (as a %age of the CLF)	PEC (as a %age of the CLF)
Fields at Merthyr Dyfan SINC	0.19%	22.5%
Friars Point SINC	0.26%	22.6%
Nells Point East SINC	0.48%	22.8%
Ancient Woodland (Hayes Lane)	1.8%	60.3%

5.47 With the exception of the ancient woodland at Hayes Lane, maximum predicted acidification rates (PC) are less than 1% of the CLFs and therefore of *negligible* significance.

5.48 At the ancient woodland the process impacts are potentially significant, however the total predicted acidification rates (including the background) are less than 70% of the CLF, therefore the risk of an exceedence is considered to be *negligible*.



6 CONCLUSIONS

6.1 An assessment has been carried out to determine the local air quality impacts associated with the operation of the proposed wood gasification facility.

6.2 Detailed air quality modelling using the AERMOD 7 dispersion model has been undertaken to predict the impacts associated with stack emissions from the Site. As a worst-case, emissions from the site have been assumed to occur at the IED limits. Actual emissions from the site are anticipated to be significantly lower.

6.3 For a proposed stack height of 43m, predicted maximum off-site process concentrations are well within the relevant air quality standards for all pollutants considered. The significance of the impacts has been assessed as negligible, in accordance with the Environment Agency's H1 guidance.

6.4 The predicted process contributions are also negligible compared with the critical levels and critical loads for nutrient nitrogen deposition and acidification at nearby statutory sensitive habitat sites. However, a potentially significant impact occurs at ancient woodland adjacent at Hayes Lane.

6.5 Based on the above information, it is considered that air quality does not pose a constraint to development of the site as proposed.



APPENDIX A - AIR QUALITY TERMINOLOGY

Term	Definition
Accuracy	A measure of how well a set of data fits the true value.
Air quality objective	Policy target generally expressed as a maximum ambient concentration to be achieved, either without exception or with a permitted number of exceedences within a specific timescale (see also air quality standard).
Air quality standard	The concentrations of pollutants in the atmosphere which can broadly be taken to achieve a certain level of environmental quality. The standards are based on the assessment of the effects of each pollutant on human health including the effects on sensitive sub groups (see also air quality objective).
Ambient air	Outdoor air in the troposphere, excluding workplace air.
Annual mean	The average (mean) of the concentrations measured for each pollutant for one year. Usually this is for a calendar year, but some species are reported for the period April to March, known as a pollution year. This period avoids splitting winter season between 2 years, which is useful for pollutants that have higher concentrations during the winter months.
AQMA	Air Quality Management Area.
DEFRA	Department for Environment, Food and Rural Affairs.
Exceedence	A period of time where the concentrations of a pollutant is greater than, or equal to, the appropriate air quality standard.
Fugitive emissions	Emissions arising from the passage of vehicles that do not arise from the exhaust system
LAQM	Local Air Quality Management.
NO	Nitrogen monoxide, a.k.a. nitric oxide.
NO₂	Nitrogen dioxide.
NO_x	Nitrogen oxides.
O₃	Ozone.
Percentile	The percentage of results below a given value.
PM₁₀	Particulate matter with an aerodynamic diameter of less than 10 micrometres.
ppb parts per billion	The concentration of a pollutant in the air in terms of volume ratio. A concentration of 1 ppb means that for every billion (10 ⁹) units of air, there is one unit of pollutant present.
ppm parts per million	The concentration of a pollutant in the air in terms of volume ratio. A concentration of 1 ppm means that for every million (10 ⁶) units of air, there is one unit of pollutant present.
Ratification (Monitoring)	Involves a critical review of all information relating to a data set, in order to amend or reject the data. When the data have been ratified they represent the final data to be used (see also validation).
µg/m³ micrograms per cubic metre	A measure of concentration in terms of mass per unit volume. A concentration of 1 µg/m ³ means that one cubic metre of air contains one microgram (millionth of a gram) of pollutant.
UKAS	United Kingdom Accreditation Service.
Uncertainty	A measure, associated with the result of a measurement, which characterizes the range of values within which the true value is expected to lie. Uncertainty is usually expressed as the range within which the true value is expected to lie with a 95% probability, where standard statistical and other procedures have been used to evaluate this figure. Uncertainty is more clearly defined than the closely related parameter 'accuracy', and has replaced it on recent European legislation.
USA	Updating and Screening Assessment.
Validation (modelling)	Refers to the general comparison of modelled results against



Term	Definition
	monitoring data carried out by model developers.
Validation (monitoring)	Screening monitoring data by visual examination to check for spurious and unusual measurements (see also ratification).
Verification (modelling)	Comparison of modelled results versus any local monitoring data at relevant locations.



APPENDIX B - AIR QUALITY STANDARDS AND OBJECTIVES

Table B1: Air Quality Standards and Environmental Assessment Levels

Pollutant	Averaging Period	EAL / AQS ($\mu\text{g}/\text{m}^3$)	Comments
Nitrogen Dioxide (NO_2)	annual	40	UK AQO
	1-hour	200	UK AQO, not to be exceeded more than 18 times per annum, equivalent to the 99.8 th percentile of 1-hour means
Sulphur Dioxide (SO_2)	24-hour	125	UK AQO, not to be exceeded more than 3 times per annum, equivalent to the 99.2 nd percentile of 24-hour means
	1-hour	350	UK AQO, not to be exceeded more than 24 times per annum, equivalent to the 99.7 th percentile of 1-hour means
	15-minute	266	UK AQO, not to be exceeded more than 35 times per annum, equivalent to the 99.9 th percentile of 15-minute means
Carbon Monoxide (CO)	8-hour	10,000	AQO
	1-hour	30,000	EAL, H1
Particulate Matter (as PM_{10})	annual	40	AQO
	24-hour	50	UK AQO, not to be exceeded more than 35 times per annum, equivalent to the 90.4 th percentile of 24-hour means
Particulate Matter (as $\text{PM}_{2.5}$)	annual	25	EU Limit Value
Benzene (C_6H_6)	annual	5	AQO (England and Wales)
Hydrogen Chloride (HCl)	1-hour	750	EPAQS Guideline Value
Hydrogen Fluoride (HF)	1-hour	160	EPAQS Guideline Values
	annual	16	
Antimony (Sb)	annual	5	EAL derived from long-term occupational exposure limits
	1-hour	150	EAL derived from long-term occupational exposure limits as no short-term limit exists
Arsenic (As)	annual	0.003	EPAQS Guideline Value
Cadmium (Cd)	annual	0.005	WHO Guideline Value
Chromium III (CrIII)	annual	5	EAL derived from long-term occupational exposure limits
	1-hour	150	EAL derived from long-term occupational exposure limits as no short-term limit



			exists
Chromium VI (CrVI)	annual	0.0002	EPAQS Guideline Value
	1-hour	3	EAL derived from long-term occupational exposure limits
Cobalt (Co)	annual	1	EAL derived from long-term occupational exposure limits
	1-hour	30	EAL derived from long-term occupational exposure limits as no short-term limit exists
Copper (Cu)	Annual	10	Copper as dusts and mists. EAL derived from long-term occupational exposure limits
	1-hour	200	EAL derived from short-term occupational exposure limits
Manganese (Mn)	annual	0.15	WHO Guideline Value
	1-hour	150	EAL derived from long-term occupational exposure limits as no short-term limit exists
Lead (Pb)	annual	0.25	UK AQO
Mercury (Hg)	annual	0.25	EAL derived from long-term occupational exposure limits
	1-hour	7.5	EAL derived from long-term occupational exposure limits as no short-term limit exists
Nickel (Ni)	annual	0.02	EPAQS Guideline Value
Thallium (Tl)	annual	1	EAL derived from long-term occupational exposure limits
	1-hour	30	EAL derived from long-term occupational exposure limits as no short-term limit exists
Vanadium (V)	annual	5	EAL derived from long-term occupational exposure limits
	24-hour	1	WHO Guideline Value
Polycyclic Aromatic Hydrocarbons (PAH) as Benzo(a)Pyrene	annual	0.00025	UK AQO
	annual	0.001	EU Limit Value
Polychlorinated Biphenyls (PCBs)	annual	0.2	EAL derived from long-term occupational exposure limits
	1-hour	6	EAL derived from long-term occupational exposure limits as no short-term limit exists



APPENDIX C – BOILER EMISSION PARAMETERS

Table C1: Emission Parameters

Source ID	ATT Stack	
Stack Height (m)	43.0	
Stack diameter (m)	1.23	
Temperature of release (K)	411	
Actual flow rate (Am ³ /s)	35.2 (a)	
Emission velocity at stack exit (m/s)	29.6	
Normalised flow rate (Nm ³ /s)	22.5 (b)	
Emission Concentration (mg/Nm ³)	Long-Term	Short-Term
PM ₁₀	10	30
TOC	10	20
HCl	10	60
HF	1	4
CO	50	100
SO ₂	50	200
NO _x	200	400
Group I (Cd, Tl)	0.05	
Group II (Hg)	0.05	
Group III (Sb, As, Pb, Cr, Co, Cu, Mn, Ni, V)	0.50	
Dioxins and Furans	1.0 x 10 ⁻⁷	
PAHs (as B[a]P)	0.001	
PCBs	0.005	
Emission Rate (g/s)	Long-Term	Short-Term
PM ₁₀	0.22	0.67
TOC	0.22	0.45
HCl	0.22	1.3
HF	0.02	0.090
CO	1.1	2.2
SO ₂	1.1	4.5
NO _x	4.5	9.0
Group I (Cd, Tl)	0.0011	
Group II (Hg)	0.011	
Group III (Sb, As, Pb, Cr, Co, Cu, Mn, Ni, V)	2.2 x 10 ⁻⁹	
Dioxins and Furans	2.2 x 10 ⁻⁵	
PAHs (as B[a]P)	1.1 x 10 ⁻⁴	
PCBs	2.9 x 10 ⁻⁵	
(a) Actual flow rate at 411 K and 9.7% O ₂ , 101.3 kPa, 15% H ₂ O		
(b) Reference conditions: 273 K and 11% O ₂ , 101.3 kPa, dry gas		



APPENDIX D – WIND ROSES

Figure D1: 2009

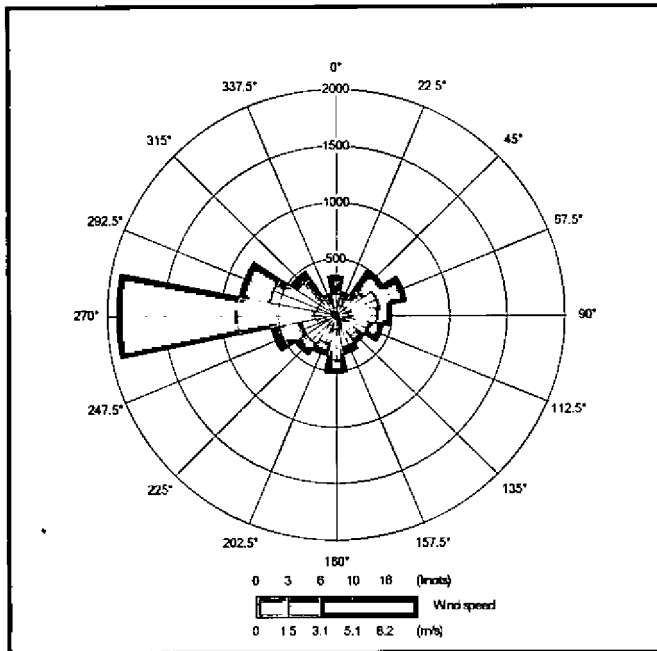


Figure D2: 2010

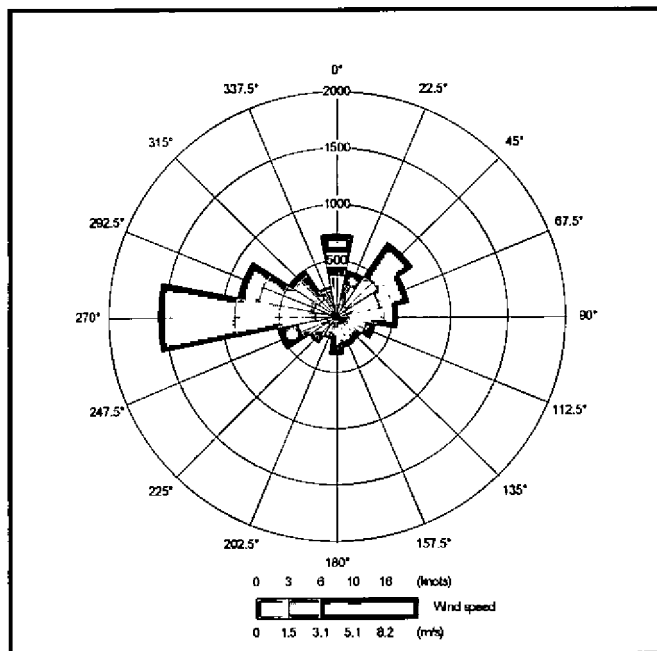




Figure D3: 2011

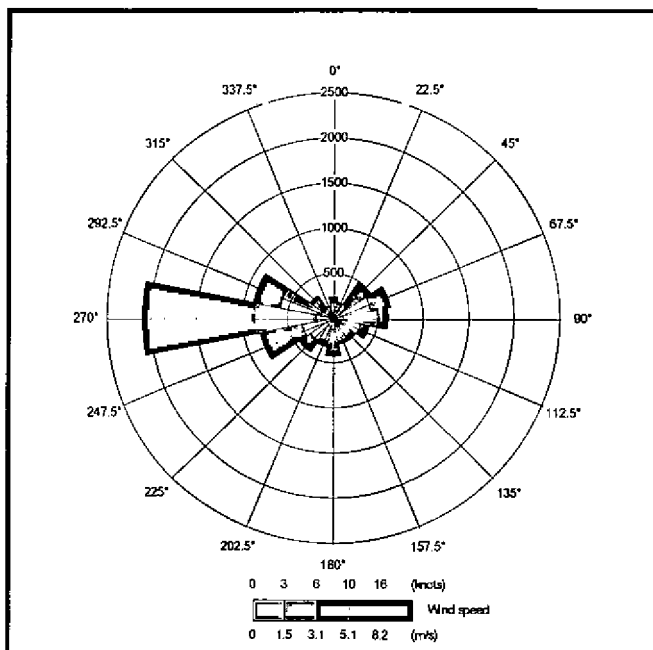


Figure D4: 2012

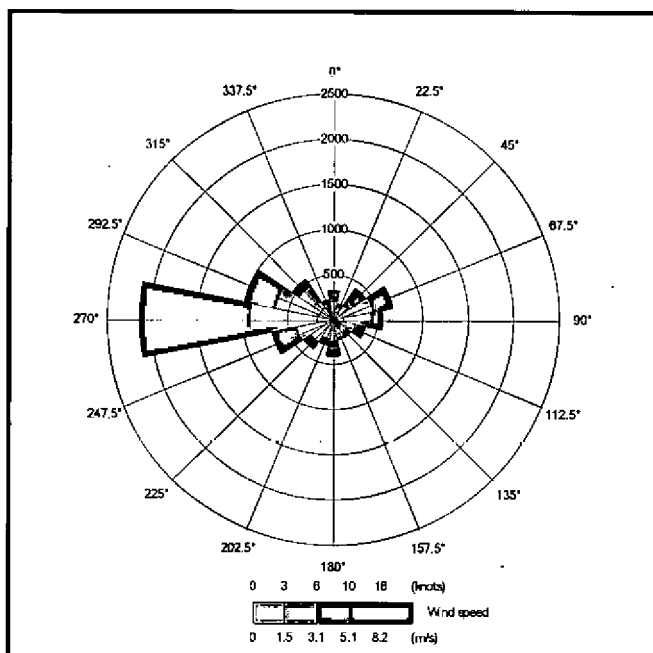
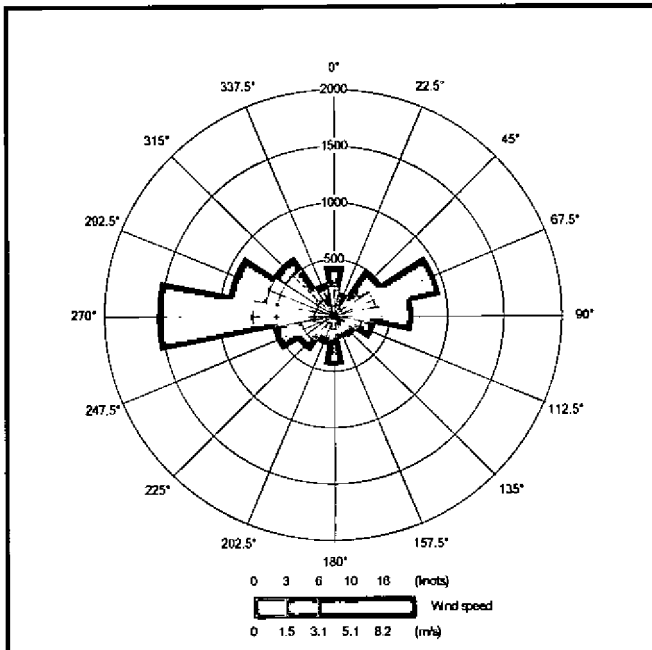




Figure D5: 2013





APPENDIX E - ENVIRONMENTAL ASSESSMENT LEVELS FOR THE PROTECTION OF VEGETATION AND ECOSYSTEMS

Critical Levels

Critical levels are thresholds of airborne pollutant concentrations above which damage may be sustained to sensitive plants and animals.

The critical levels for the protection of vegetation and ecosystems as defined by the EU Directive 2008/50/EC and the 2010 UK Air Quality Standards Regulations are summarised in Table E1.

Table E1: Critical Levels for the Protection of Vegetation and Ecosystems

Pollutant	Averaging Period	Concentration ($\mu\text{g}/\text{m}^3$)
Oxides of Nitrogen (NO _x)	Annual Mean	30
	Daily Mean	75
Sulphur Dioxide (SO ₂)	Annual Mean	10 (sensitive habitats with lichen and bryophytes)
		20 (all other habitats)
Hydrogen Fluoride (HF)	Weekly Mean	0.5
	Daily Mean	5

The critical levels are based on monitoring criteria and only apply in the following areas:

- more than 20 km from agglomerations; and
- more than 5 km away from other built up areas, industrial installations motorways and major roads with a traffic count of more than 50,000 vehicles per day.

Nationally, around 37% of designated sites currently do not fall within the above criteria and are therefore excluded from the objectives. None of the habitat sites within 10 km of the proposed development are sufficiently rural for the objectives to apply; however, the Environment Agency's H1 guidance states that

"the critical levels should be applied at all locations as a matter of policy, as they represent a standard against which to judge ecological harm".

Background NO_x and SO₂ concentrations for the identified habitat sites have been obtained from Air Pollution Information System (APIS) and are summarised in Table E2. In the absence of site specific data, the rural background HF concentration of 0.5 $\mu\text{g}/\text{m}^3$ is assumed to provide a reasonable estimate of the background concentration at the designated sites.



Table E2: Annual Mean Background NO_x and SO₂ Concentrations (µg/m³)

Habitat Site	NO _x	SO ₂
Cadoxton River SINC	14.4	2.2
Cadoxton Wetlands SINC	14.4	2.2
Fields at Merthyr Dyfan SINC	14.4	2.2
Friars Point SINC	14.4	2.2
Gladstone Road Pond SINC	14.4	2.2
Nells Point East SINC	14.4	2.2
North of North Road SINC	14.4	2.2
Cadoxton Ponds Wildlife Trust Reserve	14.4	2.2
Severn Estuary Ramsar	11.9	1.9
Severn Estuary SPA	11.9	1.9
Ancient Woodland (Hayes Lane)	14.4	2.2

Critical Loads

Critical loads refer to the threshold beyond which deposition of pollutants to water or land results in measurable damage to vegetation and habitats. This takes the form of either gravitational settling of particulate matter (dry deposition) or wet deposition, where atmospheric pollutants dissolve in water vapour and then precipitate to the ground (e.g. as rain, snow, fog etc.).

Critical loads for eutrophication (nutrient nitrogen deposition) and background nutrient nitrogen deposition rates have been obtained from APIS and are summarised in Table E3 for the identified habitat sites.



Table E3: Critical Loads (Eutrophication) and Background Nutrient Nitrogen Deposition

Habitat Site	Primary Sensitive Habitat	Critical Load (kg N/ha/a)	Background N Deposition (kg N/ha/a)
Cadoxton River SINC	Reedbeds	15	12.0
Cadoxton Wetlands SINC	Reedbeds	15	12.0
Fields at Merthyr Dyfan SINC	Lowland meadow	20	12.0
Friars Point SINC	Lowland meadow	20	12.0
Gladstone Road Pond SINC	Pond	n/a	12.0
Nells Point East SINC	Lowland meadow	20	12.0
North of North Road SINC	Reedbeds	15	12.0
Cadoxton Ponds Wildlife Trust Reserve	Reedbeds	15	12.0
Severn Estuary Ramsar	Improved grassland	10	10.4
Severn Estuary SPA	Improved grassland	10	10.4
Ancient Woodland (Hayes Lane)	Broadleaved Woodland	10	21.4

The background nutrient nitrogen deposition rates are within the critical loads at the majority of the identified habitat sites.

For acidic deposition, the critical load of a habitat site is largely determined by the underlying geology and soils. The critical load of acidification is defined by a critical load function (CLF), which describes the relationship between the relative contributions of sulphur (S) and nitrogen (N) to the total acidification.

The critical load function is defined by the following parameters:

- CL_{maxS}, the maximum critical load of acidity for S, assuming there is no N deposition;
- CL_{minN}, is the critical load of acidity due to nitrogen removal processes in the soil only (i.e. independent of deposition); and
- CL_{maxN}, is the maximum critical load of acidity for N, assuming there is no S deposition.

Where available from APIS, the critical loads for acidification for the identified habitat sites are presented in Table E4. For comparison with the critical load function (CLF), the HCl acidification rate is combined with the S acidification rate.



Table E4: Critical Loads (Acidification) and Background Nitrogen and Sulphur Acidification Rates

Habitat Site	Critical Load (keq/ha/a)			Background Acidification (keq/ha/a)			Background (as a %age of CLF)
	Max S	Min N	Max N	N	S	HCl (a)	
Cadoxton River SINC	n/a	n/a	n/a	0.86	0.14	0.053	n/a
Cadoxton Wetlands SINC	n/a	n/a	n/a	0.86	0.14	0.053	n/a
Fields at Merthyr Dyfan SINC	3.9	0.85	4.7	0.86	0.14	0.053	22.3%
Friars Point SINC	3.9	0.85	4.7	0.86	0.14	0.053	22.3%
Gladstone Road Pond SINC	n/a	n/a	n/a	0.86	0.14	0.053	n/a
Nells Point East SINC	3.9	0.85	4.7	0.86	0.14	0.053	22.3%
North of North Road SINC	n/a	n/a	n/a	0.86	0.14	0.053	n/a
Cadoxton Ponds Wildlife Trust Reserve	n/a	n/a	n/a	0.86	0.14	0.053	n/a
Severn Estuary Ramsar	n/a	n/a	n/a	0.74	0.14	0.053	n/a
Severn Estuary SPA	n/a	n/a	n/a	0.74	0.14	0.053	n/a
Ancient Woodland (Hayes Lane)	2.8	0.36	3.1	1.5	0.17	0.13	58.5%
(a) Based on background HCl concentration of 0.24µg/m ³							

The majority of the habitat sites are insensitive to acidification according to APIS, however where CLFs exist the background acidification rates are well within the relevant levels.



Answer to question 1

Sunrise Renewables (Barry) Ltd - Renewable Power Plant at David Davies Road, Barry ("Project")

Responses to questions raised by Biofuelwatch ("BfW")

1. What is the explanation for changes in emissions?

Answer: All new power plants are required by law to meet the requirements of the Industrial Emissions Directive (Directive 2010/75/EU of The European Parliament and of The Council on industrial emissions (integrated pollution prevention and control)). In Wales this is administered by Natural Resources Wales. The revised project has been designed so that on a worst case basis it will meet these limits.

Feedback from the Applicant's Air Quality Consultant, Entran, in response to this question confirms that although the emissions are higher than the previous consented scheme, the stack height has been sized accordingly by means of detailed dispersion modelling in order to ensure that impacts at relevant receptors are negligible. As a worst-case, emissions from the site have been assumed to occur at the IED limits. Actual emissions from the site are anticipated to be significantly lower. Predicted maximum off-site process concentrations are well within the relevant air quality standards for all pollutants considered.

2. Is the Plant less efficient than the original consented Plant?

Answer: The previous selected technology pyrolysed 72,000 tonnes of dried wood to produce 9MWe export capacity. In comparison the proposed technology will convert the same amount of dry wood into 10MW export capacity. Therefore it is more efficient

3. Will the new plant use more waste wood?

Answer: Waste wood, just like any wood, contains moisture and this can vary from very low (eg ~5%) to quite high (eg ~40%). When you process wetter wood, it means you are effectively 'boiling off' more water which does not contribute to generating electricity (in fact it detracts since you have to use energy to boil it off).

The technology selected is warranted to process waste wood with a moisture content in the range 5% up to 30%. Of course you never know how much moisture you will be receiving in a delivery (and indeed it varies according to the time of the year). This is why you often convert it back to dry wood equivalent meaning what it would weigh if it was kiln dry.

For Barry, we are expecting to process up to 72,000 dry tonnes equivalent. In fact it might well be less than this since the equipment may be up to 5% more efficient than warranted which would mean ~68,500 dry tonnes equivalent would be needed. As to how many wet tonnes this will equate to will just depend on the delivery (and in effect how much water is being transported in along with the fuel component).

In contrast, for the Sunrise project in Barrow-in-Furness, the calculations were based on the design fuel used by the manufacturers of 20% moisture. At 20% moisture this equates to up to 86,000 tonnes of wet wood, less if the efficiency level hoped for is achieved. Also at Barrow the connection is for 12MW so the plant is able to operate above 10MW at times so long as the

average does not exceed 10MW whereas for Barry the connection is capped at 10MW at all times which does not therefore allow for this flexibility so you would expect Barry to use less waste wood in any case.

As can be seen, it is not possible to be precise on the number of tonnes of actual wood brought into the site and when submitting for Barry it was felt that specifying it in dry tonnes for Barry would be the most accurate and indeed consistent with the previous application. This was in part because the previous proposal was based around pyrolysis requiring delivered wood to be processed and dried on site before being used for pyrolysis. It was planned for 72,000 tonnes of prepared (therefore dried) wood to be pyrolysed. Nothing has therefore changed in this respect.

4. Will the Plant be a Waste Disposal Plant?

Answer: No it is not. Attached below is the 'R1 Calculation' for the Project showing that it comfortably exceeds the 0.65 threshold required under the "Guidance on applying the Waste Hierarchy", issued by Defra June 2011. As such the energy recovery from the facility is sufficiently high for it not to be considered a 'waste disposal facility' and it is not therefore a Waste Disposal Facility for the Incineration of hazardous or non-hazardous waste under Schedule 1 Development of the EIA Regulations.

5. Is the information supplied 'Contradictory'?

Answer: As has been explained in the responses above, the contradictions claimed by BfW do not in fact exist and instead seem to be incorrect speculation on their part.

Schedule
Barry Renewable Energy Project – R1 Calculation

Type of energy	energy Ex [MWh]
amount of incinerated waste (without 1.2 and 1.3)	321,840
e.g amount of incinerated sewage sludge	0
e.g. amount used activated carbon incinerated	0
E_w: energy input to the system by waste	321,840
E _{f1} : amount of light fuel oil for start up (after connection with the steam grid)	0
E _{f2} : amount of light fuel oil for keeping the incineration temperature	0
E _{f3} : amount of natural gas for start up and keeping incineration temperature	0
S E_f: energy input by imported energy with steam production	0
E _{i1} : amount of light fuel oil for start up/shut down (no connection with the steam grid)	350
E _{i2} : e.g. natural gas for heating up of flue gas temperature for SCR and start up/shut down	0
E _{i3} : imported electricity (multiplied with the equivalence factor 2.6)	0
E _{i4} : imported heat (multiplied with the equivalence factor 1.1)	0
S E_i: energy input by imported energy without steam production	350
E _{p_{el} internal used} : electricity produced and internally used for the incineration process	10,400
E _{p_{el} exported} : electricity delivered to a third party	74,080
S E_{p_{el} produced} = E_{p_{el} internal used} + E_{p_{el} exported}	84,480
E _{p_{heat} exp.1} : steam delivered to a third party without backflow as condensate	0
E _{p_{heat} exp.2} : district heat delivered to a third party with backflow as condensate (hot water)	0
S E_{p_{heat} exported} = E_{p_{heat} exp.1} + E_{p_{heat} exp.2}	0
E _{p_{heat} int.used1} : for steam driven turbo pumps for boiler water, backflow as steam	0
E _{p_{heat} int.used2} : for heating up of flue gas with steam, backflow as condensate	0
E _{p_{heat} int.used4} : for concentration of liquid APC residues with steam, backflow as condensate	0
E _{p_{heat} int.used5} : for soot blowing without backflow as steam or condensate	6,484
E _{p_{heat} int.used7} : for heating purposes of buildings/instruments/silos, backflow as condensate	0
E _{p_{heat} int.used8} : for deaeration - demineralization with condensate as water input	0
E _{p_{heat} int.used9} : for NH4OH (water) injection without backflow as steam or condensate	0
S E_{p_{heat} int.used} = S E_{p_{heat} int.used1-9}	6,484
R1 = (E_p - (E_f + E_i)) / (0.97 * (E_w + E_f))	0.73
E_p = 2.6*(S E_{p_{el} int.used}+S E_{p_{el} exported}) + 1.1*(S E_{p_{heat} int.used}+S E_{p_{heat} exported})	226,780



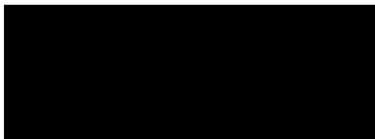
Sunrise Renewables

67 Bewsey Street, Warrington, WA2 7JQ

2015/00031/OUT - David Davies Road, Woodham Road, Barry

Declaration in accordance with TAN21 (Annex B)

The attached statement sets out how the waste hierarchy has been considered in developing the proposals currently forming this planning application.



.....
Signed: Howard J Davies
Sunrise Renewables (Barry) Limited
Date: 17th June 2015

NPA (WASTE MANAGEMENT ASSESSMENT)
Received
16/06/15

Power Consulting Midlands Ltd

**Renewable Energy Plant at Barry Docks,
Woodham Road, Barry**

**Waste Planning Assessment Prepared for
Sunrise Renewables (Barry) Ltd**

June 2015

1.0 INTRODUCTION

- 1.1 The Applicant, Sunrise Renewables (Barry) Limited, is developing a renewable energy plant based on an advanced conversion technology (ACT) at Woodham Road, Barry, CF63 4JE within the Port of Barry (the "Project").
- 1.2 The principle of establishing a wood fuelled power plant at the Project site was established by planning permission reference 2008/01203/FUL, as approved by appeal reference APP/Z69S0/A/09/2114605 on 2nd July 2010 (the "2010 Permission").
- 1.3 Power Consulting Midlands Ltd (PCML) has been commissioned by the Applicant to provide a Waste Planning Assessment in accordance with the guidelines set out in TAN21 2014 (Annex B).
- 1.4 The Planning Application Waste Audit and Facilities Strategy from the original Sunrise Application in 2010 is provided for information purposes (Appendix A).

2.0 REQUIREMENTS FROM TAN21 2014 (ANNEX B) FOR A WASTE PLANNING ASSESSMENT

TAN21 (Wales) Requires the following to be included in a Waste Planning Assessment:

Waste Policy Statement

- A description of how the proposals will contribute to the relevant provisions of 'Towards Zero Waste' and the Collections, Infrastructure and Markets Sector Plan.
- A statement of compliance with policy related to need & location requirements.
- A calculation of existing and projected future demand.
- Identify the markets that will be served by the proposed development.
- A calculation to identify the current shortfall in treatment capacity.
- A description of the consultation undertaken by the applicant.
- A signed declaration that in making the application the applicant has paid due regard to the waste hierarchy (see [Box] below)

Development

Time-scale

- Lifespan of the operation, including any proposed measures for future proofing
- Days and hours of operation.

Types and quantities of waste to be managed

- Estimated annual quantity of each waste type to be received, and estimated total capacity where relevant.
- The destination of any end product (residues and any hazardous materials) from the site should be submitted.
- The minimum and maximum quantities that the facility could process and remain operational.
- The amount of waste (in tonnes) the facility is designed to treat.

Design, layout, buildings and plant – a full description of the proposed development including:

- The processes involved, including transportation to and from the site.
- Layout and design of buildings, plant, operational areas, haul roads and external lighting.
- If relevant - Details on landfill gas and leachate control infrastructure should also be identified.
- Proposed restoration and aftercare

Amenity and Nuisance

- The compatibility of the proposed development with existing or neighbouring land uses.
- Measures to prevent and control land contamination, light pollution, noise, smell, dust, birds and vermin, litter,
- Any emissions associated with the proposed operations.

Air pollution

- The impact of emissions to atmosphere of any product gasses resulting from specialist treatment/recovery processes.

Energy Efficiency (if relevant)

- Explanation of how energy recovered from the incineration process will be maximised (e.g. through combined heat and power, district heating or the supply of steam / hot water to neighbouring industrial users).
- Evidence that the proposal would or would not meet the R1 energy efficiency calculation.

Declaration

This statement sets out how the waste hierarchy has been considered in developing the proposals currently forming this planning application.

3.0 WASTE PLANNING ASSESSMENT

Applicant: Sunrise Renewables (Barry) Limited
Site: Barry Docks, Woodham Road, Barry
Application: Erection of New Industrial Building and Installation of 10MW Wood Fuelled Renewable Energy Plant

3.1 Waste Planning Assessment Introduction

The objective of a Waste Planning Assessment is to provide consistent information in the submission to demonstrate to the proposed development will contribute towards meeting Wales' overriding objectives. These objectives are set out in the overarching waste strategy document for Wales 'Towards Zero Waste' and is supplemented by a number of Sector Plans, including the Collections, Infrastructure and Markets Sector (CIMS) plan (adopted July 2012) and the Construction and Demolition (C&D) Sector plan (adopted November 2012).

This document provides supporting information in respect to the specific requirements for a Waste Planning Assessment as set out in Annex B of Technical Advice Note 21: Waste (Welsh Government, 2014). It is noted that TAN21 requires the Waste Planning Assessment to be appropriate and proportionate to the nature, size and scale of the development proposed. The assessment does not repeat information already provided in the Planning Statement for the application and supporting documents but makes cross-references as applicable.

It is the opinion of the Applicant that the proposed development does not constitute a 'waste development'. However, it is fully recognised that the proposed development will require waste wood as a feedstock and will also produce some waste, mostly as ash, as a by-product. Accordingly, TAN21 has been considered as part of the Planning Statement and supporting documents as a key policy document applicable to the proposed development.

It is recognised that the requirements for a Waste Planning Assessment as set out in TAN21 has been written largely in regard to waste developments, where the need to justify the development relates to a wide set of associated impacts driven by the requirement to manage waste. The proposed development is an *energy development*, which includes the capacity to treat certain waste streams which have been processed 'off-site' as a fuel and as such the associated considerations are much simpler.

This Waste Planning Assessment has been prepared for the purposes of clarification and completion and provides detail appropriate to the scale and potential significant of a development of this size.

3.2 Waste Policy Statement

Appendix 6 of the Planning Statement provides an account of the waste policy context for the proposed development and how the proposed development helps contribute to the relevant provisions of the strategy document. The main objectives of the strategy include landfill diversion, waste recovery and reducing waste generation in accordance with the Waste Hierarchy:

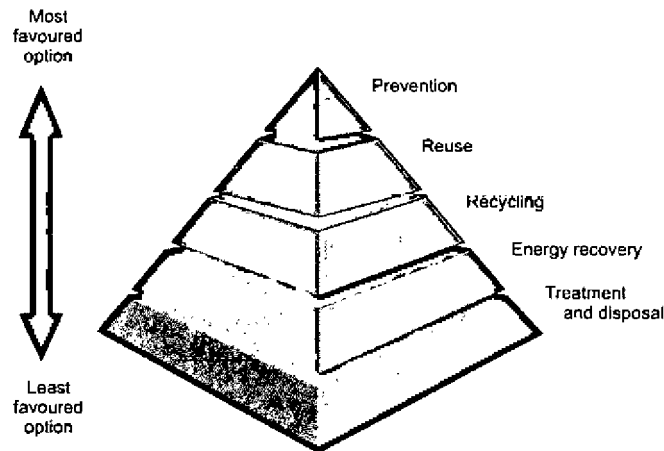


Fig 1. The Waste Hierarchy

In accordance with Towards Zero Waste and the Collections, Infrastructure and Markets Sector Plan high efficiency energy from waste facilities are encouraged. The R1 Formula, defined in Annex II of the Waste Framework Directive, allows a distinction to be made between disposal and recovery in respect of incineration based upon the energy efficiency of the facility. Under the R1 Formula, incineration facilities dedicated to the processing of municipal waste only must have energy efficiency above 0.65 to be categorised as recovery operation. While the proposed development is to utilise waste wood rather than municipal waste, the same principles of the Waste Framework Directive have been applied to this development. The proposed development will have an energy efficiency above 0.65 and therefore constitutes a Recovery operation.

By using waste wood that would otherwise be disposed of via landfill, the proposed development takes the waste higher up the waste hierarchy, and as such provides the following overall benefits:

- Recovery helps gain more value from limited resources
- Significantly reduce global greenhouse gas emissions by not using fossil fuels
- For certain separated wastes, optimised energy recovery options offer the best environmental option due to their mixed nature or the lack of reuse or recycling options
- Increase skills, employment and social justice
- Replaces the need for virgin materials or fossil fuels

The CIMS Plan requires the waste industry in Wales to turn itself into a resource management industry. The plan seeks to create a sustainable approach to resource management by developing markets for recycled material (within Wales as far as possible). The proposed development contributes to the market development for recovered wood. While the feedstock for the wood could come from England or Wales, it is the Welsh local grid and a Wales-based company which will benefit from the energy and steam production onsite.

The waste produced as a by-product of the operation of the plant will be regulated under an Environmental Permit and will be managed with due regard to the Waste Hierarchy. Additionally, the Environmental Permit requires that applicants demonstrate why their development represents the best overall environmental outcome in terms of the

technologies and techniques applied onsite. This is a “Best Available Techniques” (BAT) assessment and is a requirement of the permit application.

3.2.1 Compliance with Policy in relation to Need and Location requirements

Section 1 in the Planning Statement gives an account of the need for the proposed development, being to modify the technology for use at the Site previously approved for planning. The consideration of other locations is not relevant in this application in respect to feasibility.

3.2.2 Assessment of existing and future demand for the project

The Planning Statement provides an account of how the proposed development is anticipated to meet 100% of the site’s future energy requirement in due course.

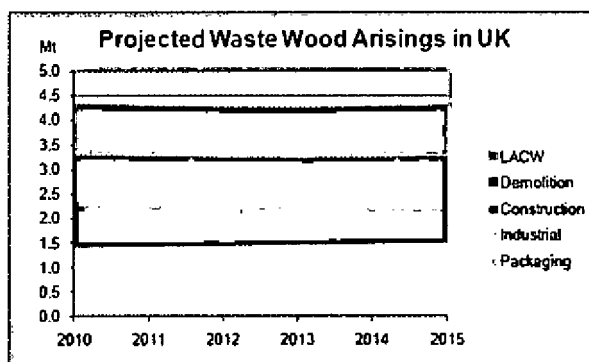
3.2.3 Market that will be served by the proposed development

The Planning Statement provides details on the wood that is to be used as a fuel feedstock in the proposed development. While this wood will be supplied under a contract and as a commercial arrangement to ensure that feedstock is consistently available, consideration has been given to the security of supply on a national level.

Wood waste can arise from a number of sources (municipal, commercial and industrial (C&I), construction and demolition (C&D)) and in many different forms. In 2012 DEFRA¹ published a review of recent research on the waste wood market. The report provided a summary of various research that has sought to quantify the overall UK wood waste tonnages, and to the extent possible, identify the quantities arising from each source.

The Tolvik report found that in 2010, UK wood waste arisings were 4.3 Million tonnes (Mt) (see Fig 2 below). According to the Tolvik report, wood waste arisings are not expected to increase in the near future.

Fig 2. Projected wood waste arisings to 2015 (Tolvik, 2011)



While the report finds that the waste wood arisings are expected to be stable or declining slightly up to 2015, it recognises that there are various factors that will influence these results. These include waste reduction but also the degree of growth in the wider economy. The report goes on to identify that large quantities of waste wood are still going to landfill and that further advances could be made in collection and sorting infrastructure thereby increasing the availability of waste wood for recovery.

¹ DEFRA (July, 2012): Waste Wood: A Short Review of Recent Research

In the wider legislative context it is anticipated that while arisings may not increase other than in relation to economic development, greater quantities of waste wood are expected to become available as landfill diversion targets, driven by the Landfill (England and Wales) Regulations 2002, cause waste wood to enter the feedstock market and greater investment in municipal waste collection and sorting, driven the Waste (England and Wales) Regulations 2011, means that more wood will become available from material Recycling Facilities.

It is recognised that as the resource management industry grows waste wood is increasing part of a commodity market and therefore the relationship between supply and demand will be driven by economic forces.

3.2.4 Identification of current shortfall in treatment capacity

For the reasons set out above, the objective of the proposed development is not to achieve a waste *treatment* objective. Rather it is driven by combining a need for green energy and the increasing availability of waste wood in the commodity market. Therefore it is not applicable to consider treatment capacity in the context of waste *treatment*.

3.2.5 Consultation undertaken by the applicant

This includes the following activities:

1. Pre-application discussions with the Vale of Glamorgan Planning Officers
2. Pre-application discussions with the Vale of Glamorgan Ecology Specialist
3. Scoping meeting – Natural Resources Wales Officers
4. Consultation with the future operator throughout the process
5. Mailshot to local residents February 2014.
6. Feedback to consultees

3.3 Timescale

The development has a design life of 25 years. The development will provide electricity in to the local electricity grid on a 24/7 basis. Boilers will be shut down once a year for annual maintenance but in planned sequence.

The details and impact of deliveries has been assessed and is included in the Planning Statement; however, in summary, wood fuel will normally be delivered to the site during a 12 hour day between 07:00 and 19:00 hours on weekdays (in contrast to the 2010 Permission which also allowed for deliveries on Saturdays and Sundays). Weekend deliveries would be restricted to emergency deliveries only (where required to avoid an interruption in the operation).

3.4 Type and Quantities of Waste to be Managed

The waste that will be managed by this plant is pre-prepared waste wood chippings, which is delivered to the plant prior to being gasified. At the time of delivery, feedstock has a variable moisture content, the water having a function as a reformation agent in the gasification process. The waste wood fuel is fed into the gasifier system where it is converted into a raw natural gas ('syngas').

The Outotec gasifier will process up to 72,000 dry tonnes of wood waste per year to produce an average net output of up to 10 MW (compared to 9 MW with the Prestige system planned for the 2010 Permission) and is more flexible with respect to moisture content - the facility could handle between 60,000 tonnes and 86,000 tonnes of wood chip per annum depending on the amount of water accompanying the fuel in the form of moisture content.

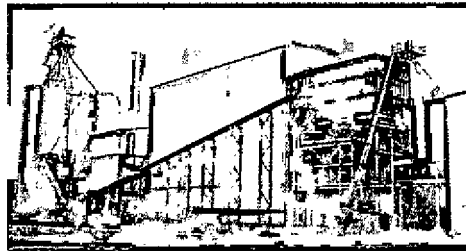
The process results in residual ash (8% of the input fuel), which is collected automatically from the various stages of the process. Two types of ash are produced depending on the point of origin in the system and these are automatically segregated into two sealed storage tanks for weekly collection by sealed tankers. One of the ash types is taken off site by the collection organisation and then recycled into various building products and aggregates. The other type of ash will be disposed of via a registered hazardous waste facility.

3.5 Design, Layout, Buildings and Plant

3.5.1 Technology

It is proposed to replace the system detailed in the 2010 Permission manufactured by Prestige Thermal Equipment (which produced a 9 MW average net output) with an alternative system made by the globally established manufacturer Outotec (www.outotec.com). The Outotec technology is more efficient and will result in the average net output increasing to 10MW for the same amount of fuel input.

Photo 1 - Example of operational Outotec gasification plant in USA



The Outotec equipment produces syngas through a fluidized-bed process while the Prestige Thermal Equipment produces syngas through a pyrolysis process. Both technologies are forms of 'gasification'. The general sequence of the proposed gasification process is as follows:

- Wood-waste feedstock is chipped off-site and delivered to the plant prior to being gasified. At the time of delivery, feedstock has a variable moisture content, the water having a function as a reformation agent in the gasification process.
- The wood fuel is fed into the gasifier system where it is converted into a raw natural gas ('syngas'), which is reformed and used as the primary fuel in the gasification boiler to generate steam to power the steam turbine. The Outotec gasifier will process up to 72,000 dry tonnes of wood waste per year to produce an average net output of up to 10 MW (compared to 9 MW with the Prestige system) and is more flexible with respect to moisture content.
- The steam turbine uses the steam to produce electricity and the plant transfers electricity to the grid via an alternator, transformer and on-site substation. The turbine is enclosed in an acoustically attenuated extension to the electricity switch room, to reduce noise to a minimum. The process is regulated from a computerised control room. The buildings will be lit internally using electricity generated from the process.
- The Outotec equipment utilises a single turbine-alternator which replaces the previously proposed system of multiple reciprocating piston engines.
- Burning of the refined syngas in the gasifier to produce energy combined with various plant and equipment used to reduce emissions results in cleaned exhaust emissions from the facility.

3.5.2 Design

There will be no change to the mobile plant deployed at the site. This will include a loading shovel and / or grab, a water bowser to control dust as necessary in vehicle circulation areas and a road sweeper to maintain the site access road and the highway in a clean condition, primarily for use during the construction phase.

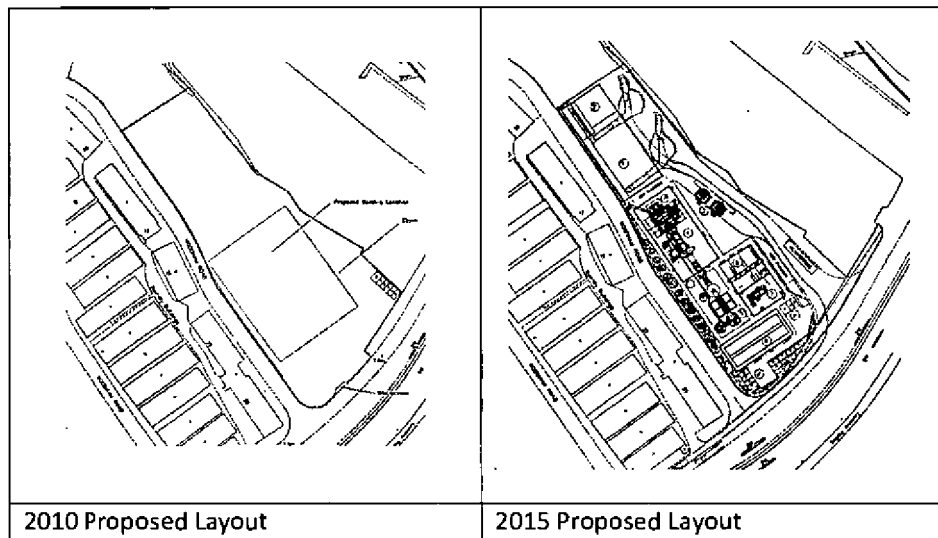
The proposed buildings will continue to be of steel portal frame construction. The colour and specification of external cladding will be agreed with the planning authority prior to construction. The floor slab of the building will be surfaced with reinforced concrete to a specification approved by Natural Resources Wales.

The amended plant design will continue to require an Environmental Permit from Natural Resources Wales. The Applicant consulted extensively with Natural Resources Wales' predecessor agency at the time of the original application and is consulting again in connection with the present application.

Internal surfaces will continue to drain to a sealed sump or foul sewer. External surfaces including roof water will drain to a sustainable surface water system.

3.5.3 Layout and Elevations

For convenience, the revised plant layout (see Appendix 3 of Planning Statement) is shown below in comparison to the layout for the 2010 Permission:



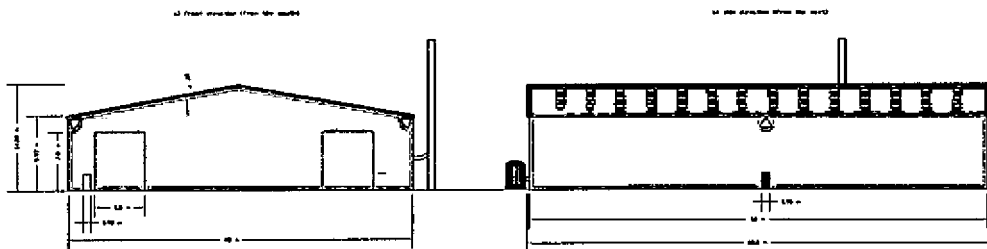
Originally all plant operations were located within a single structure with a total footprint of 2700 sqm. Under the revised arrangements it is proposed to separate the power plant functions into separate structures to accommodate the revised plant (total building footprint 2,497 sqm). The result will therefore be a net 7.5% reduction in building footprint at the site. Details of the structures are as follows:

- Wood Storage and Feed Building: The wood storage and feed building (at 52.4 x 21.6 x 13.7m high) remains similar in height to that of the previously approved building

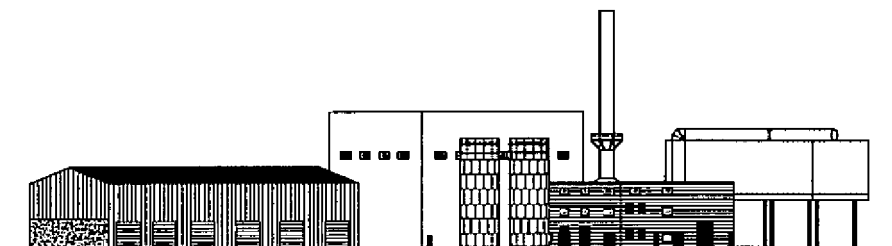
(14m). The submitted Traffic Movement plan (in Appendix 5) prepared by the project contractor confirms there is adequate space for articulated vehicles to access the building.

- Turbine, Welfare & Ancillaries Building: This building (29.1 x 17.9 x 11m high) has a reduced height compared to that of the previously approved building and incorporates switchgear, the main control room and a turbine room (to replace the formerly proposed piston engines).
- Main Process Building: The gasification equipment will be entirely enclosed within a bespoke structure (41.4 x 20.4 x 23m high). This will significantly improve containment of the process as a whole. The maximum height of the previous plant was 14m so there will be a net increase in height of 9m for this element.
- ACC Unit: An external air-cooled condenser (ACC) unit (32m x 14.5m x 20m high) mounted on steel stilts is now proposed adjacent to the Turbine, Welfare & Ancillaries Building.
- External Equipment: ash residue from the combustion process will be stored in two externally located silos (18.4m high x 6.7m diameter) allowing ease of access (see Traffic Movement Plan included in Appendix 5). Flue Gas treatment (FGT), exhausting to the chimney stack will also be external to the buildings.
- Chimney Stack: the chimney stack being re-sited some 20m to the south-east relative to the original location and in order to meet emissions requirements, the stack height will be increased to 43m (which is less than the stack height approved for the waste-energy plant approved for construction at Atlantic Way on the opposite side of the dock).

Appendix 4 of the Planning Statement contains the elevations for the revised layout; however, for convenience Elevations A and B, below illustrate the differences between the elevations for the 2010 Permission and the current application.



Elevation A: Elevations for the 2010 Permission



Elevation B: Elevations for the revised layout

The revised layout comprises two buildings that are lower and one that is higher than the building height in the 2010 Permission, as more particularly detailed in Section 3.5.3 above and Appendix 4 to the Planning Statement. Main points to note are:

- The average building height of the 2010 Permission is 14m while the average building height in the revised layout is 16.3m.
- The change in chimney stack height has been determined in order to comply with the requirements of the Waste Incineration Directive (WID)/Industrial Emissions Directive (IED). This will result in the chimney stack increasing in height from 20m to 43m with adjustments to the diameter to allow for the increase in height – the diameter will increase from 1.0m to 2.75m.

3.5.4 Proposed restoration and aftercare

At the end of the plant's useful life (25 years unless extended at the time), the plant will be decommissioned. In line with standard industry practice, the cost of site remediation will be funded from the proceeds decommissioning.

3.6 Amenity and Nuisance

3.6.1 Compatibility of Proposed Development with existing / neighbouring land uses

The site is partially vacant and occupied by a container storage and refurbishment operation; there are no compatibility concerns with the neighboring land uses.

As under the 2010 Permission, the Applicant intends to maintain flexibility as to where best to source wood products for energy conversion by the plant and how best to transport them to site, be it by road, rail or sea. In so far as the Applicant arranges such transportation by road, the maximum number of annual deliveries will remain unchanged from the 2010 Permission, being 4015 per year (or 77 per week).

The comments of the Director of Environmental and Economic Regeneration to the Planning Committee relating to the 2010 Permission, dated 21 May 2009, are recalled: "Since the trip generation in the scale of things for Barry Docks is minimal, and the highway network is already designed to take such large HGVs, the Highways Authority has no objection to the proposals."

3.6.2 Noise

Best practicable means will be used during site operations to ensure that noise does not exceed agreed levels. The Applicant has selected a leading national contractor to carry out such work and it is well versed in compliance procedures in this regard. The enclosure of the operating process within structures and/or buildings will ensure that noise levels are not significant.

The plant has been designed to meet the BAT (Best Available Technology) requirements of the Environmental Permitting regime, which include noise emissions controls. The steam turbine produces the most noise, but is enclosed within an acoustically attenuated compound within the Turbine, Welfare & Ancillaries building.

The plant as a whole is designed to be fully compliant with applicable dBA requirements. The roller shutter doors will generally be closed except to receive deliveries in order to provide additional acoustic attenuation.

The Applicant has consulted extensively with the main contractor selected for the project to ensure that the plant is fully compliant and obligations have been imposed on them to ensure that the design, procurement, construction and operation comply with all applicable

law and guidelines. These include the following:

- Welsh Statutory Instrument 2006 No. 2629 (W.225)
- The Environmental Noise (Wales) Regulations 2006 (as amended by the Environmental Noise (Wales) (Amendment) Regulations 2009 (SI2009/47)).
- Welsh Statutory Instrument 2007 No. 3519 (W.311) The Environmental Noise (identification of Noise Sources) (Wales) Regulations 2007
- Technical Advice Note (Wales) 11, 'Noise'
- Welsh Statutory Instrument 2006 No. 2629 (W.225)
- The Environmental Noise (Wales) Regulations 2006. See also Welsh Statutory Instrument 2007 No. 3519 (W.311)
- The Environmental Noise (identification of Noise Sources) (Wales) Regulations 2007
- <http://wales.gov.uk/docs/desh/publications/140731planning-policy-wales-edition-7-en.pdf>
- <http://wales.gov.uk/docs/desh/publications/131217noise-action-plan-for-wales-en.pdf>

The contractors are carrying out their work taking these points into account and also the findings from the Noise Study for the Project, which has been updated for the purposes of the present application (refer to Appendix 9 of the Planning Statement).

Verification that noise levels continue to comply with such legislation and guidelines will take place during commissioning of the plant in accordance with a background noise measurement scheme to be agreed with the Local Authority prior to commencement of construction.

3.6.3 Dust

There is no material change to the proposed environmental control measures.

Site operations will be carried out to minimise the creation of dust. A mains water supply will be available and all external water pipes are to be lagged to prevent frost damage. Water sprays and/or bowsers will be used as necessary to reduce dust levels in external circulation areas. Staff will monitor dust emissions continuously whilst the plant is in operation and will take appropriate action when required. Regular visual inspection will take place with recording of results in a diary.

3.6.4 Mud / detritus

Measures will be put in place to prevent any deposit of debris on the highway. There will be regular visual inspection and a road sweeper will be deployed as necessary, including during the construction phase.

3.6.5 Odour

No material will be accepted which is likely to cause an odour nuisance. The biomass plant itself does not produce odorous emissions.

3.6.6 Pests / vermin

The proposed fuel type will ensure that the site will not suffer from a vermin infestation. However, the site will be inspected daily given the presence of nearby water bodies and a

pest control contractor will be hired if necessary.

3.7 Air emissions & pollution

In order to operate, the Project will require an Environmental Permit and this will only be given provided the plant continues to be WID/IED compliant, as was the case for the 2010 Permission. This includes a need to agree the proposed abatement technology to minimise air emissions before the site can operate and confirmation that the Best Available Technology (BAT) has been employed. Therefore, local air quality will not be adversely affected by the proposals. In this respect there is therefore no material change from the 2010 Permission.

The Applicant has commissioned an Air Emissions Assessment for the present application (see attached at Appendix 2 of the Planning Statement). This exercise was pre-scoped in conjunction with the local officers of Natural Resources Wales with the agreed objective of determining the increase in stack height necessary to achieve a negligible change of environmental impact relative to the previously improved scheme.

3.8 Energy Efficiency

The purpose of the project is to generate electricity for the local grid. There are no feasible heat off takers in the vicinity therefore the plant is designed to convert as much of the fuel energy to electricity as is possible.

The selection of the technology discussed above also results in an increase in the average annual generating capacity to 10 MWe compared to 9.0 MWe for the 2010 Permission as a result of improved efficiency. Such increased efficiency means there will be no surplus heat generated (i.e. it is not a Combined Heat and Power (CHP) plant). Such increased output has no visual or technical impact and will be limited by the capacity of the transmission network to transmit the power (which is separately regulated). From a technical standpoint the change is neutral.

Utilising established biomass energy technology contributes to national targets for renewable energy provision. The facility will supply electricity via the electricity grid, which is equivalent to the annual energy usage of approximately 23,600 households (increased from the previous level of 22,000) based on an average UK household consumption of 3,300kWh.

The following table shows the R1 calculation for this plant showing that it comfortably exceeds the 0.65 threshold required under the "Guidance on applying the Waste Hierarchy", issued by Defra June 2011.

R1 Calculation for the Sunrise Renewables Limited Application:

Type of energy	energy Ex [MWh]
amount of incinerated waste (without 1.2 and 1.3)	321,840
e.g amount of incinerated sewage sludge	0
e.g. amount used activated carbon incinerated	0
Σ E_w: energy input to the system by waste	321,840
E _{r1} : amount of light fuel oil for start up (after connection with the steam grid)	0
E _{r2} : amount of light fuel oil for keeping the incineration temperature	0
E _{r3} : amount of natural gas for start up and keeping incineration temperature	0
Σ E_r: energy input by imported energy with steam production	0
E _{i1} : amount of light fuel oil for start up/shut down (no connection with the steam grid)	350
E _{i2} : e.g. natural gas for heating up of flue gas temperature for SCR and start up/shut down	0
E _{i3} : imported electricity (multiplied with the equivalence factor 2.6)	0
E _{i4} : imported heat (multiplied with the equivalence factor 1.1)	0
Σ E_i: energy input by imported energy without steam production	350
E _{pe1} internal used: electricity produced and internally used for the incineration process	10,400
E _{pe1} exported: electricity delivered to a third party	74,080
Σ E_{pe1} produced = E_{pe1} internal used + E_{pe1} exported	84,480
E _{phe1} exp.1: steam delivered to a third party without backflow as condensate	0
E _{phe1} exp.2: district heat delivered to a third party with backflow as condensate (hot water)	0
Σ E_{phe1} exported = E_{phe1} exp.1 + E_{phe1} exp.2	0
E _{phe1} int. used1: for steam driven turbo pumps for boiler water, backflow as steam	0
E _{phe1} int. used2: for heating up of flue gas with steam, backflow as condensate	0
E _{phe1} int. used4: for concentration of liquid APC residues with steam, backflow as condensate	0
E _{phe1} int. used5: for soot blowing without backflow as steam or condensate	6,484
E _{phe1} int. used7: for heating purposes of buildings/instruments/silos, backflow as condensate	0
E _{phe1} int. used8: for deaeration - demineralization with condensate as water input	0
E _{phe1} int. used9: for NH4OH (water) injection without backflow as steam or condensate	0
Σ E_{phe1} int. used = Σ E_{phe1} int. used1-9	6,484
R1 = (E_p - (E_f + E_i)) / (0.97 * (E_w + E_f))	0.73
E_p = 2.6*(Σ E_{pe1} int. used + Σ E_{pe1} exported) + 1.1*(Σ E_{phe1} int. used + Σ E_{phe1} exported)	226,780

APPENDIX A

PLANNING APPLICATION WASTE AUDIT AND FACILITIES STRATEGY (from 2010)

Applicant: Sunrise Renewables Limited

Site: Barry Docks, Woodham Road, Barry

Application: Erection of New Industrial Building and Installation of 10MW Wood Fuelled Renewable Energy Plant

SCOPE OF DOCUMENT: ESTIMATION OF THE TYPE AND QUANTITY OF WASTE LIKELY TO BE PRODUCED DURING THE LIFE OF THE DEVELOPMENT AND IDENTIFICATION OF WASTE MANAGEMENT TARGETS

1. The application proposals represent the redevelopment of part of an existing industrial site with the erection of a new industrial building.

2. Since the project planning started there have been several changes in secondary legislation, which affect the development. Of these The Site Waste Management Plan Regulations 2008 (SI 314/2008) and The Environmental Permitting (England and Wales) Regulations 2007 are the most relevant to waste generation from the development construction, operation and decommissioning stages.

3. As the project cost is greater than £300,000 the development would appear to be regulated by The Site Waste Management Plan Regulations 2008. However, Regulation 3 exempts the project from the requirement to have a Site Waste Management Plan (SWMP) if it is a Part A installation as defined in the Environmental Permitting (England and Wales) Regulations 2007. However, the details required by a SWMP will be submitted as part of the permit application i.e. waste generation and minimisation.

4. As the biomass plant is defined as a Part A installation it will require an Environmental Permit, issued by the Environment Agency. The application for the permit is a comprehensive process which requires the submission of detailed information on all emissions to air, water or land which will be regulated by the imposition of conditions in the permit.

5. The planning statement (version 1.3, 03/09/08, ref: 816_891_SRB/PS) details waste arising from the operation of the plant in Section 8.10.

6. Waste arising from the construction phase will be closely controlled. Any material arising from the excavation of existing concrete floor slabs will be taken off site to a materials recycling facility for recycling if it cannot be reused on site. Any waste produced by the development will be dealt with as follows:

- i. Redundant fencing - reused or recycled on site
- ii. Soil - removed from site and deposited at a suitably licensed or exempt infill operation.
- iii. Bricks and concrete - taken off site for crushing and screening to produce secondary aggregates, which will be used in the development.

7. The development is a recovery activity, which will utilise approximately 72,000 tonnes of wood per annum to generate electricity. The wood fuel arises from natural sources and recycling sites so the development sits well in the waste hierarchy as markets for recycling construction and demolition timber are volatile, with large quantities still being deposited to

landfill. The other main recycling activities for wood are board (MDF etc) and animal bedding manufacture, which have limited capacity. The biomass plant uses 'new carbon' which is stored in natural wood and timber rather than 'old carbon' which is locked up in fossil fuel reserves, peat bogs etc. The degradation of wood deposited in landfill produces methane, which is 25 times more potent than carbon dioxide as a greenhouse gas, which can be avoided by the use of sustainable development such as the application plant.

8. 95% of waste generated by the development will be reused or recycled at a transfer station. Where possible vehicles will use the return trip to bring recycled aggregates to the site for use in the development.

9. All raw materials will be sourced from local suppliers to the detailed design specification of the building to reduce waste generation from the building works.

10. All waste carriers used in the project will have a carrier registration certificate issued by the Environment Agency.

11. All off site waste management operations will have an environmental permit or exemption issued by or registered with the Environment Agency.

12. All waste removal from the site will be documented to comply with the Duty of Care (S.34 of the Environmental Protection Act 1990).

13. Contractors have not yet been selected to carry out the construction works as the project size necessitates the issue of a tender document inviting companies to bid for the works. Tenders will be evaluated on an equivalent basis to 'best value' to ensure that the selected companies meet the requirements of this waste audit and SWMP requirements submitted with the environmental permit application.

14. Waste hierarchy - the biomass plant will process wood fuel (derived from waste wood), most of which cannot be recycled, reused or composted. The plant has been designed to prevent and minimise the generation of waste and will be able to provide waste heat to users up to 1 km from the development site, if required.

15. Proximity principle - the wood fuel will be primarily sourced from local suppliers.

16. High quality innovative design - the plant meets the BAT (Best Available Technology) requirements of the environmental permitting regime. Pyrolysis is an advanced conversion technology, which turns the inputs into gas fuel, which feeds an engine and also generates heat for re-use, rather than relying on heat alone (like traditional mass burn plants).

17. Provision of complementary facilities – Complementary facilities will be provided for within the site boundary.

18. Environmental protection and enhancement - the site's emissions will be regulated by the Environment Agency and the plant will not be able to operate before the environmental permit is issued. The permitting process also requires consideration of site history and completion and closure of the plant before a permit can be surrendered.

19. Adequate space and access – The site was chosen as it is an existing site with good access and sufficient space to accommodate the development.

20. Environmental education - the design and access statement in the planning statement refers to the use of the site for educational purposes.

21. Public safety - the plant will operate as a 24 hour process and be manned at all times, with remote telemetry for technical assistance and monitoring.

1500031 OUT

Stack Height Assessment for a 10 MWe Wood Gasification Facility at Barry Docks, Barry Island

for

Sunrise Renewables (Barry)

Project Number 6270

11/09/2014

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Issue P1

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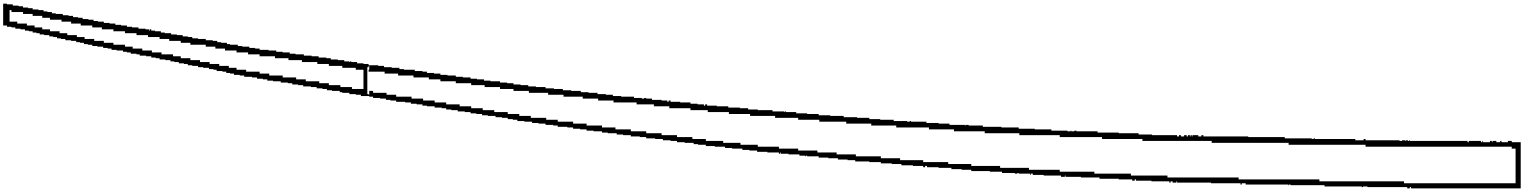
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Revision History

Issue	Reviewed by (date)	Approved by (date)	Comments
P01	MJW (26/09/2014)	MJW (26/09/2014)	Draft for Comment

Executive Summary

Sunrise Renewables is proposing to install a wood gasification, energy recovery facility (ERF) at Barry Docks, Barry Island, and has asked Stopford Energy and Environment to undertake a stack height assessment to support their planning application. The results for the stack height assessment will be used in subsequent dispersion modelling to support Sunrise Renewables' application to the Environment Agency for an environmental permit under the Environmental Permitting Regulations 2013.

A stack height assessment for Sunrise Renewables' proposed ERF has been completed following industry guidelines that have been prepared by the Environment Agency, EPUK and IAQM and following consultation with the Vale of Glamorgan Council.

The stack height assessment was conducted for a range of stack heights between 30 m and 55 m using ADMS, an industry standard dispersion modelling tool. Worst case emission limits for NO₂, as defined in the Industrial Emissions Directive (IED), were assumed and five years of meteorological data were used to take account of inter-annual variability in local weather conditions. It was assumed that for long term impacts, all NO_x emissions have been converted to NO₂, whereas for short term emissions, a worst case assumption was made whereby 50% of NO_x emissions have been converted to NO₂.

The impact of Sunrise Renewables' proposed ERF was assessed across a 2 km x 2 km modelling domain from which the highest modelled ground level pollutant concentrations have been extracted and used to calculate a stack height for which the impact of emissions can be described as 'NEGLECTABLE'.

It is the conclusion of this assessment that a stack height of 43 m will be sufficient for adequate dilution and dispersion of residual emissions from the plant and it is shown that there would only be very minor appreciable benefits gained by increasing the stack height further.

1 Introduction

1.1 Background

Sunrise Renewables is proposing to install a wood gasification, energy recovery facility (ERF) at Barry Docks, Barry Island. The facility will use approximately 86,000 tonnes of recycled/recovered wood, with the syngas generated during the gasification process combusted in a boiler to generate steam. The combustion process will be fully compliant with the operational requirements specified in the Industrial Emissions Directive (IED). The operation of the ERF will be regulated by the Environment Agency in line with the requirements of the Environmental Permitting Regulations (England and Wales) 2013.

The steam generated from the combustion process will drive a turbine capable of generating approximately 10 MW_e of renewable power, sufficient to supply ca. 18,000 homes. Flue gas exiting the boiler is discharged to air via a stack, the height of which has been determined using industry best practice guidance.

This report describes the data used in the stack height assessment, the methodology applied, the assumptions that have been made and the results generated by the model. The assessment was based upon the process data supplied by Outotech (technology provider), site drawings provided by Sunrise Renewables and worst-case emission limits as defined in the IED. The site drawings are provided in Appendix I.

The objective of the assessment was to determine the stack height required to ensure that emissions to air from Sunrise Renewables' ERF do not significantly impact local air quality.

1.2 Site location

Sunrise Renewables' ERF is to be located on land at Barry Docks in Barry Island. The area is predominantly industrial with the site located at grid reference: 312617,167667. The proposed facility will be bounded to the north by a railway and residential areas; and to the east, south and west by industrial land and docks. The nearest residential properties are directly northwest of the facility across the railway and Ffordd Y Mileniwm and are approximately 300 metres from the site perimeter. The nearest school to the ERF is approximately 1 km to the north. There are several

ecological receptors in proximity to the ERF, including sites with Ramsar and SSSI status. Figure 1 shows the location of the ERF relative to its surroundings.

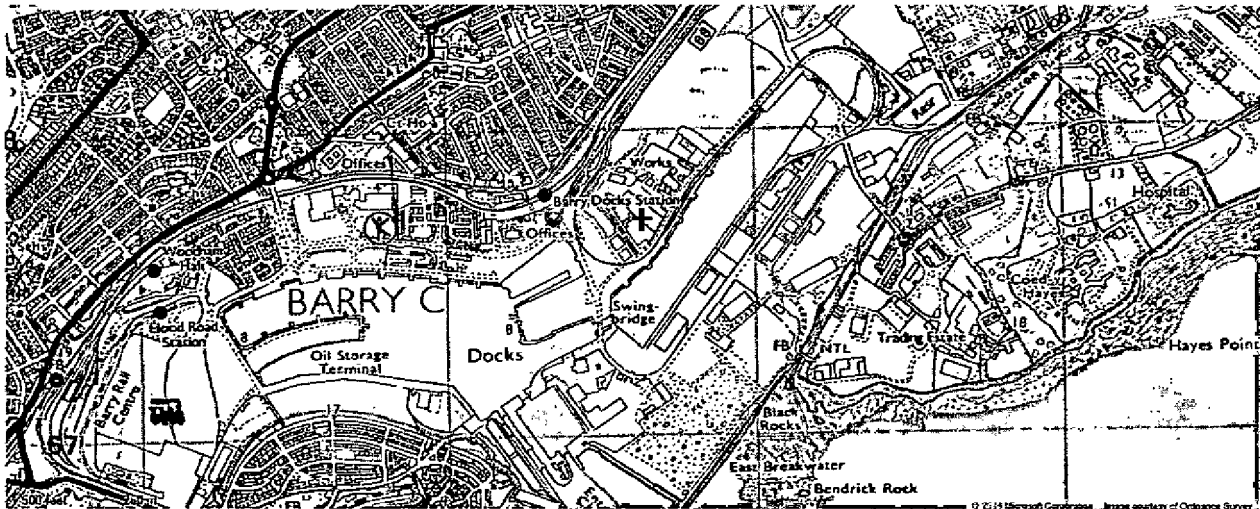


Figure 1 Location of the Energy Recovery Facility shown by the red cross

2 Stack Height Assessment

Even with the comprehensive flue gas treatment that will be in place at the proposed ERF, there will still be residual emissions which need to be discharged via an elevated stack to ensure resulting pollutant concentrations are acceptable by the time they reach ground level at sensitive receptor locations. Additionally, the stack should also be sufficiently high to ensure that the exhaust flow at stack exit is not within the aerodynamic influence of nearby buildings because downwash effects from buildings can cause poor dispersion with pollutants grounding quicker than anticipated, resulting in elevated ground level concentrations.

2.1 Stack Height Assessment Methodology

The stack height assessment was undertaken using an iterative approach for a range of stack heights between 30 m and 55 m. Impacts were quantified using ADMS, which is a "new generation" Gaussian plume dispersion model that was developed and licensed by Cambridge Environmental Research Consultants (CERC). ADMS is an industry standard tool for assessing the impact of emissions to air on human health and the wider environment. The aim of this stack height assessment was two-fold:

- To establish the minimum stack height above which emissions will have negligible impacts on local receptors; and
- To establish the height above which there will be minimal additional environmental benefit associated with the cost of increasing the stack height further.

This in accordance with Annex K of EA H1 guidance which states the following:

“The principal consideration in whether an option represents an acceptable environmental risk is that the costs of its implementation should not be disproportionate to the environmental benefit it realises. Thus it may not be reasonable to implement an option of significantly higher cost which achieves only a marginal environmental improvement compared with another option.”

Two criteria have been used as a basis for determining a suitable minimum stack height as follows:

- Achieving negligible impacts on short and long term NO₂ concentrations; and
- Ensuring no ground level exceedances of short- and long-term air quality limit values for NO₂ anywhere within the modelling domain.

2.1.1 Process and Emission Data

Process data for the ERF was supplied by Outotech, Sunrise Renewables' technology supplier and is summarised in Table 1. In the absence of actual emissions data "worst case" IED emission limits have been assumed (Table 2). IED emission rates have been corrected from IED reference conditions to actual conditions of 9.7% O₂, 15% water, and 411K. In order to calculate emission rates, the IED limit values have been converted to the equivalent concentration at flue gas conditions and then multiplied by the stack exhaust volumetric flow rate at flue gas conditions (Table 3).

Table 1 Emission source parameters for Sunrise Renewables' energy recovery facility

Parameter	Value
Stack Diameter (m)	1.23
Efflux Temperature (K)	411
Efflux Velocity (m.s ⁻¹)	29.6
Volumetric Flow Rate (m ³ .s ⁻¹)	35.2
Location (X,Y)	312660,167664

Table 2 IED Emission Limits for NO₂

Pollutant	Long-Term ELVs 100% output (mg.m ⁻³)	Short-Term ELV 100% output (mg.m ⁻³)
NO _x as NO ₂	200	400

Table 3 Modelled pollutant emission data (9.7% O₂, 15% water and 411K)

Pollutant	Long-Term ELVs 100% output (g.s ⁻¹)	Short-Term ELV 100% output (g.s ⁻¹)
NO _x as NO ₂	4.49	8.98

2.1.2 Atmospheric Chemistry

Nitric oxide (NO) and NO₂ are normally measured as oxides of nitrogen (NO_x), but when comparing against health standards, NO_x is usually expressed as its individual components. The principal pathway for the oxidation of nitrogen oxide (NO) to NO₂ is via reaction with ozone. With consideration to the rate of conversion of NO_x to NO₂ and the short distance the pollutant has to travel from the stack before the maximum concentration is reached at ground level, it is unlikely that more than 30% of NO_x is converted to NO₂ at ground level. However, for the purpose of this assessment, and to provide a conservative estimation of impacts, it has been assumed that 50% of NO_x is converted to NO₂ as a short term emission, whilst it has been assumed that 100% of NO_x is converted to NO₂ as a long-term emission. This is in accordance with screening criteria contained in Horizontal Guidance Note H1 Annex (f).

2.1.3 Nearby Buildings and Structures

The proximity of structures to an emission source can adversely impact plume dispersion by entraining the emissions into the turbulent wake which may draw emissions to the surface quicker and in higher concentration than would normally occur in the absence of the structure. The dimensions of the main on-site buildings were obtained following consultation with Sunrise Renewables and their technology provider, and have been included in the model. The location of the main site buildings relative to the emission source are shown in Figure 2 and their dimensions are provided in Table 4.

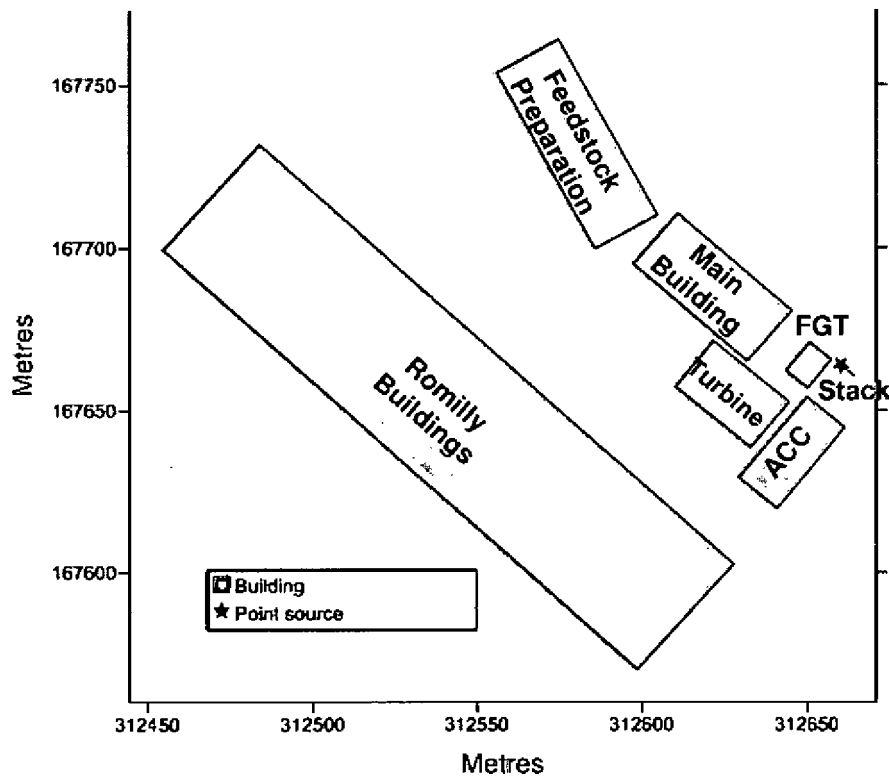


Figure 2 Location of the modelled stack relative to on-site buildings and other structures

Table 4 Modelled building data

Building	Height (m)	Length (m)	Width (m)	Angle (degrees)
Main Plant Building*	22.3	45.6	20.5	131
Feedstock Preparation	19	61.6	21.5	151
FGT	15.6	11.3	8.5	39.4
Turbine	11.3	29.5	18.2	129.5
ACC	18.2	32.3	12.9	39.4
Romilly Buildings	7.0	193.4	43.6	132

* The main plant building is considered as having the greatest affect on plume dispersion

2.1.4 Modelling Domain

When setting up a receptor grid it is necessary to ensure that there are sufficient receptor points to allow the location and magnitude of the highest ground level pollutant concentration to be

predicted. If the receptor points are too widely spaced, the maximum process contribution may be underestimated. The stack height assessment was undertaken using 40 m grid spacing across a 2 km x 2 km modelling domain with the stack located at the centre of the grid (X,Y: 312660,167664).

2.1.5 Meteorological Data

The meteorological data used in the assessment was obtained from Cardiff Airport which is approximately 5.7 km west of the proposed site. Local Air Quality Management Technical Guidance (LAQM.TG(09); Defra, 2009) states that met stations within 30 km of a study site are suitable for dispersion modelling assessments.

Five years of meteorological data recorded 2009-2013 were provided by Atmospheric Dispersion Modelling Limited, an established distributor of met data within the UK. The five years of met data are summarised in Figure 3 which shows prevailing winds in the area are from the west and east. The wind roses for individual years are provided in Appendix II.

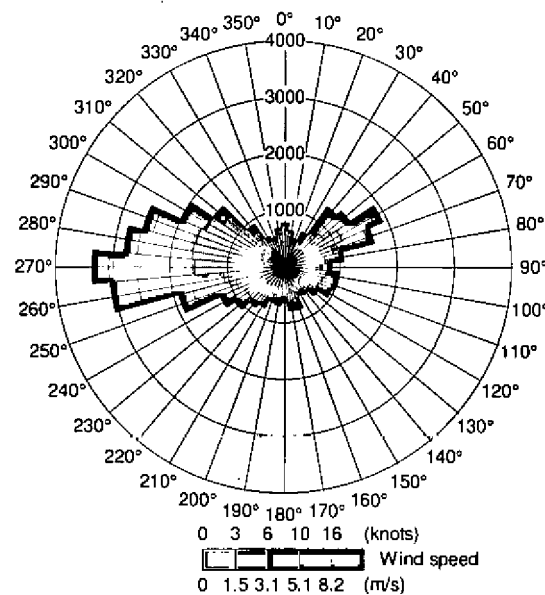


Figure 3 Cardiff Airport wind rose (2009 - 2013)

2.1.5.1 Meteorological Sensitivity Analysis

In order to ensure a worst-case scenario, a sensitivity analysis was conducted to identify which year over the period 2009-2013 produced the highest modelled ground level NO₂ concentration across

the modelling domain. The maximum modelled short- and long-term NO₂ concentrations for each assessment year are presented in Table 5. These are based upon an assumed stack height of 40 m.

Table 5 Maximum Modelled NO₂ Ground Level Process Contribution for Each Assessment Year

Year	Maximum Modelled NO ₂ Concentration (µg.m ⁻³)				
	2009	2010	2011	2012	2013
NO ₂ Annual Mean	4.46	3.36	4.37	5.07	3.79
Maximum short-term NO ₂	39.91	39.18	39.92	39.76	39.62

As shown in Table 5, 2012 meteorological data resulted in the highest long-term NO₂ concentration, whilst 2011 meteorological data resulted in the highest short-term NO₂ concentrations. Therefore all long-term pollutant emissions have been modelled using the 2012 meteorological data set and all short-term modelling was completed using the 2011 meteorological dataset to ensure a worst-case scenario.

2.1.6 Terrain Data

Local terrain can affect wind flow patterns, and hence affect pollutant dispersion. The effects of terrain are not normally considered significant where the gradient is less than 1:10. There is a steep incline approximately 20-30 m northwest of the proposed site boundary with a gradient exceeding 10% and resulting in a change in elevation of 26 m. In order to consider the effects of surrounding terrain, an additional 'complex terrain' file was created using data supplied by Ordnance Survey (OS) which was converted for use in the stack height assessment using ADMS' Terrain Converter facility.

2.1.7 Surface Roughness

The roughness of a surface can significantly affect the movement of air across it. Similarly, pollutant dispersion may be influenced by variations in land surface types that affect turbulence in the lower troposphere. Given that a significant fraction of the modelling domain is open coastal water, it was necessary to generate a surface roughness file to take account of the changes in surface roughness across the modelling domain. ADMS default surface roughness values of 0.5 m were applied to land-based grid points and a default value of 0.0001 m was used for coastal waters.

2.1.8 Background Air Quality

Background pollutant mapping is undertaken on a 1km by 1km grid square basis by NETCEN on behalf of DEFRA. Table 6 also shows the mapped background NO₂ concentration for the grid square containing the proposed plant for the years 2011 - 2014. The forecast annual mean NO₂ concentration for 2014 is 12.66 µg.m⁻³.

The Vale of Glamorgan undertakes monitoring of local air quality and has provided background NO₂ concentrations recorded at Cwm Parc, Barry. Cwm Parc is the closest background monitoring site to the proposed ERF at approximately 2.4 km to the northwest of the facility. The most recent complete monitoring annual dataset recorded at Cwm Parc is for 2013 (Table 6).

Table 6 Annual mean NO₂ concentrations

Source	Background NO ₂ (µg.m ⁻³)			
	2011	2012	2013	2014
Cwm Parc	16.42	16.75	16.62	—
DEFRA background maps	13.27	13.07	12.86	12.66

The data collected from the monitoring site at Cwm Parc was used as the background concentration for subsequent calculations as it is higher than that predicted by the DEFRA background maps and provides a conservative estimate of impacts. For the purposes of this assessment, and in accordance with LAQM.TG(09), the short-term background NO₂ concentration has been assumed to be twice the mapped annual mean background.

2.2 Stack Height Assessment Results

Potential impacts have been quantified using matrix tables contained within Environmental Protection UK and Institute of Air Quality Management guidance documents (Table 7 and Table 8). The significance of an impact is defined using an impact descriptor scale which ranges from "Negligible" to "Substantial Adverse". The guidance states that an imperceptible change in air quality would be described as Negligible. The impact descriptor is a function of the change in ambient air quality relative to the annual mean NO₂ air quality limit value (AQLV) of 40 µg.m⁻³ (process emissions only - Table 7) and the impact this has on the predicted environmental concentration (PEC - Table 8).

Table 7 Generic Basis of Definition of Impact Magnitude for Changes in Ambient Pollutant Concentrations as Percentage of Objective/Limit Value/Environmental Assessment Level.

Magnitude of Change	Annual Mean
Large	Increase/decrease >10%
Medium	Increase/decrease 5 - 10%
Small	Increase/decrease 1 - 5%
Imperceptible	Increase/decrease <1%

Table 8 Air Quality Impact Descriptors for increases to the Annual Mean Nitrogen Dioxide Concentration at a Receptor

Absolute Concentration in Relation to Objective/Limit Value	Change in Concentration		
	Small	Medium	Large
Increase in NO ₂ with Scheme			
Above Objective/Limit Value With Scheme (>40 µg.m ⁻³)	Slight Adverse	Moderate Adverse	Substantial Adverse
Just Below Objective/Limit Value With Scheme (36-40 µg.m ⁻³)	Slight Adverse	Moderate Adverse	Moderate Adverse
Below Objective/Limit Value With Scheme (30-36 µg.m ⁻³)	Negligible	Slight Adverse	Slight Adverse
Well Below Objective/Limit Value With Scheme (<30 µg.m ⁻³)	Negligible	Negligible	Slight Adverse

Table 9 contains the maximum predicted annual mean NO₂ concentrations at ground level locations surrounding the proposed plant based upon stacks heights assessed between 30 m and 55 m.

Table 9 Maximum Modelled Annual Mean NO₂ Concentrations and Predicted Impacts

Stack Height (m)	Max predicted Increase in Ground Level Annual Mean NO ₂ (µg/m ³)	Magnitude of Change	PEC (Process Contribution + Background) with Scheme	Impact on Annual Mean NO ₂ Concentration
30	15.88	Large	32.48	Slight Adverse
32	13.33	Large	29.93	Slight Adverse
34	9.73	Large	26.33	Slight Adverse
36	7.82	Large	24.42	Slight Adverse
38	6.19	Large	22.79	Slight Adverse
40	5.07	Large	21.67	Slight Adverse
42	4.24	Large	20.84	Slight Adverse
42.5	4.06	Large	20.66	Slight Adverse
43	3.93	Medium	20.53	Negligible
44	3.93	Medium	19.89	Negligible
46	2.81	Medium	19.41	Negligible
48	2.44	Medium	19.04	Negligible

Stack Height (m)	Max predicted Increase in Ground Level Annual Mean NO ₂ (µg/m ³)	Magnitude of Change	PEC (Process Contribution + Background) with Scheme	Impact on Annual Mean NO ₂ Concentration
50	2.16	Medium	18.76	Negligible
55	1.60	Small	18.20	Negligible

As shown in Table 9, a minimum stack height of 43 m will have "Negligible" impacts on resulting ground level annual mean NO₂ concentrations. Table 9 also shows that the largest benefits in terms of increased dilution and dispersion of emissions occurs as the stack is increased in height to 43 m and that there are no appreciable additional benefits gained above this height.

Table 10 contains the maximum modelled 1-hour mean NO₂ concentrations, based upon stack heights between 30 m and 55 m. In accordance with EA H1 guidance, if the short term process contribution is <10% of the AQLV, impacts can be screened as insignificant.

Table 10 Modelled maximum 1-Hour Mean NO₂ Concentrations and the percentage contribution it makes to the short-term Air Quality Limit Value of 200 µg.m⁻³

Stack Height (m)	Predicted Process contribution to 1-Hour Mean NO ₂ Concentrations (99.8 th percentile) (micrograms/m ³)	Total Concentration (Process Contribution + Background)	Percentage Contribution of Process to AQLV
30	32.30	65.5	16.2
32	28.68	61.9	14.3
34	23.50	56.7	11.7
36	19.97	53.2	10.0
38	16.51	49.7	8.3
40	13.17	46.4	6.6
42	10.79	44.0	5.4
44	9.52	42.7	4.8
46	8.42	41.6	4.2
48	7.50	40.7	3.7
50	6.78	40.0	3.4
55	6.24	39.4	3.1

As indicated by Table 10, for stack heights greater than 36 m the maximum modelled process contribution to the 1-hour mean AQLV for NO₂ is <10% at ground level locations. Therefore, a stack height of 43 m or more will not have a significant impact on the 1-hour mean NO₂ AQLV in accordance with EA H1 guidance.

3 Stack Height Assessment Conclusion

With consideration to the above, the proposed stack height of 43 m has been assessed to be sufficient for adequate dilution and dispersion of residual emissions from the plant and it is shown that there would only be very minor appreciable benefits gained by increasing the stack height further. It should be noted that this assessment is conservative, as worst case assumptions have been made for background pollutant concentrations, NO_x to NO₂ conversion rates, emission rates and worst case meteorology from 5 years of data. Given that the assessment was based on site specific dispersion modelling, confidence in a stack height of 43 m not having a significant impact on local air quality is high.

Appendices

Appendix I. Site drawings

Wind Roses

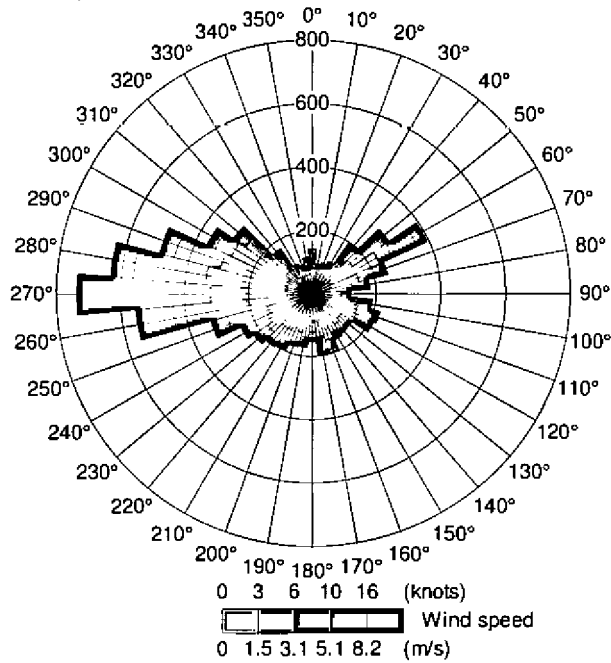


Figure 4: Cardiff Airport Wind Rose - 2009

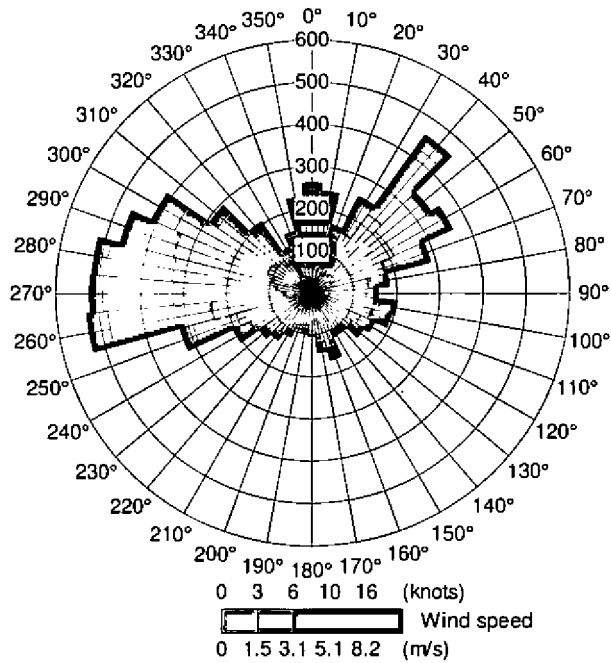


Figure 5: Cardiff Airport Wind Rose - 2010

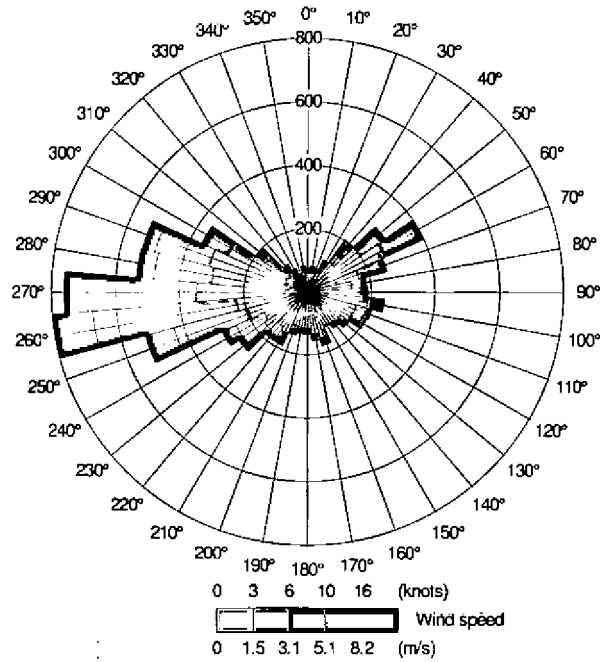


Figure 6: Cardiff Airport Wind Rose - 2011

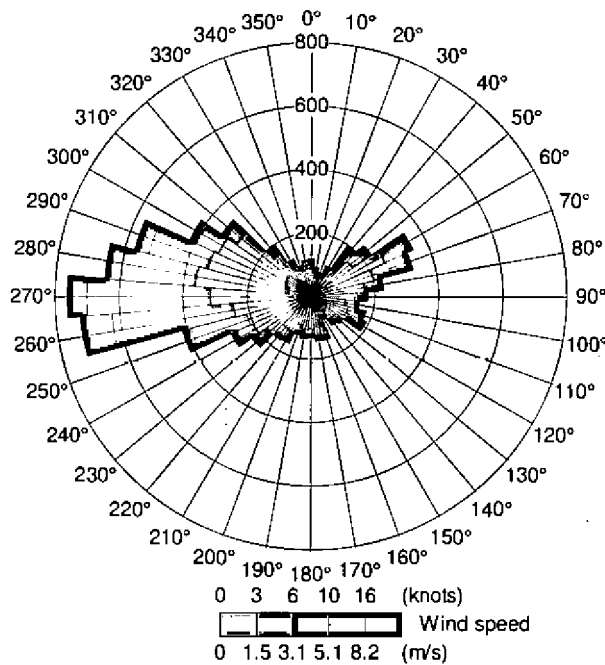


Figure 7: Cardiff Airport Wind Rose - 2012

**Stack Height Assessment for a 10 MWe Wood
Gasification Facility at Barry Docks, Barry Island
for**

Sunrise Renewables (Barry)

11/09/2014

Project 6270

Document Number: R6270-PM-0001

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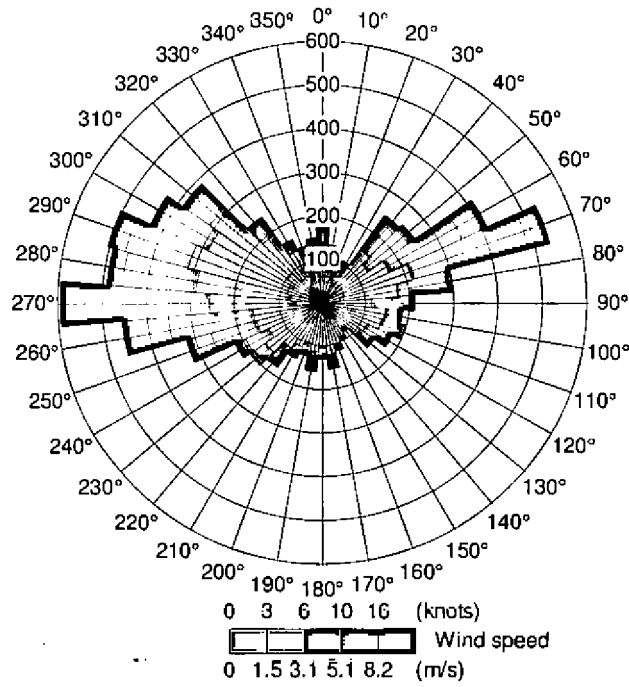


Figure 8: Cardiff Airport Wind Rose - 2013

15 00 03 1 OUT

Policy Appraisal

**in support of an application for
Outline Planning**

by

Sunrise Renewables (Barry) Limited

under

the Town and Country Planning Act 1990



Sunrise Renewables
67 Bewsey Street,
Warrington,
WA2 7JQ, United Kingdom

1. Introduction

- 1.1 The Applicant, Sunrise Renewables (Barry) Limited, is developing a renewable energy plant based on an advanced conversion technology (ACT) at Woodham Road, Barry, CF63 4JE within the Port of Barry (the "Project").
- 1.2 The principle of establishing a wood fuelled power plant at the Project site was established by planning permission reference 2008/01203/FUL, as approved by appeal reference APP/Z6950/A/09/2114605 on 2nd July 2010 (the "2010 Permission").
- 1.3 The Applicant has prepared the present report into changes to policy considerations since the 2010 Permission, drawing on published sources. In particular, credit is given to Dow Corning and their consultants whose 2014 policy appraisal for a similar project in the Barry dockland area has been especially helpful.

2. National Energy Policy

2.1 Climate Change Act (2008)

- 2.1.1 The Climate Change Act 2008 makes it the duty of the Secretary of State to ensure that the net UK carbon account for all six Kyoto greenhouse gases for the year 2050 is at least 80% lower than the 1990 baseline, toward avoiding dangerous climate change. 5.20 The Act aims to enable the United Kingdom to become a low-carbon economy and gives ministers powers to introduce the measures necessary to achieve a range of greenhouse gas reduction targets. An independent Committee on Climate Change has been created under the Act to provide advice to UK Government on these targets and related policies. In the act Secretary of State refers to the Secretary of State for Energy and Climate Change.
- 2.1.2 The proposed Project would be a secure low carbon energy development and would therefore make a direct contribution towards the Government's Climate Change objectives.
- 2.1.3 It is considered that the principle of the Project is in accordance with European policy as it is an established technology which will successfully direct waste wood away from landfill and generate a renewable source of energy and heat, without significant adverse effects on the environment and human health.

2.2 UK Bioenergy Strategy (April 2012)

- 2.2.1 It is widely recognised that bioenergy has an important role to play if the UK is to meet its low carbon objectives by 2050. The strategy sets out the Coalition Government's approach to securing the benefits of bioenergy.
- 2.2.2 The UK Government has a responsibility to ensure that its policies only support bioenergy use in the right circumstances. This strategy is based on a statement of four principles which will act as a framework for future government policy on bioenergy. The four principles state that:
- *Policies that support bioenergy should deliver genuine carbon reductions that help meet UK carbon emissions objectives to 2050 and beyond;*
 - *Support for bioenergy should make a cost effective contribution to UK carbon emission objectives in the context of overall energy goals; and*
 - *Support for bioenergy should aim to maximise the overall benefits and minimise costs (quantifiable and non-quantifiable) across the economy.*

2.3 2020 Renewables Target

The 2009 Renewable Energy Directive sets a target for the UK to achieve 15% of its energy consumption from renewable sources by 2020. This compares to 3.3% in 2010. The scale of the increase over the next 8 years represents a huge challenge and will require strong contributions from all sectors of electricity, heat and transport.

2.4 2050 Carbon Reduction Target

- 2.4.1 The Climate Change Act 2008 establishes a long-term framework to tackle climate change.
- 2.4.2 The Act aims to encourage the transition to a low-carbon economy in the UK through unilateral legally binding emissions reduction targets. This means a reduction of emissions of at least 34% by 2020 and a

domestic greenhouse gas emissions reduction of at least 80 percent by 2050. Both targets are against a 1990 baseline.

2.4.3 It is clear there is a need for renewable energy developments in relation to both demand and the achievement of the Government's climate change objectives. On this basis substantial weights should be given to the contributions made by renewable energy developments such as the proposed Project.

2.5 UK Biomass Strategy (2007)

2.5.1 This strategy, published with the Government's Energy White Paper, meets the commitment made in the Energy Review (2006) and in the Government's response to the 2005 Biomass Task Force Report and brings together current UK Government policies in biomass for energy, transport and industry.

2.5.2 The Biomass Strategy acknowledges the importance of fuels sourced from biomass in tackling climate change. Biomass will have a central role to play in meeting the EU target of 20% renewable energy by 2020. The Climate Change Bill, published in draft in March 2007, sets out a proposed UK target of at least 60% cuts in carbon dioxide emissions by 2050 and a strong new system of carbon budgeting. We need to explore every avenue for achieving these cuts in emissions in sustainable ways over the decades ahead.

2.5.3 Biomass is renewable and generally has low carbon characteristics. Where biomass is produced and processed with due regard to sustainability and carbon savings, it can be carbon-neutral (the CO₂ released when it is used to create energy can be offset by the CO₂ it consumes when growing).

2.5.4 Biomass is also very versatile and can be used as fuel across the energy spectrum for electricity, heat and transport as well as the production of industrial material. At current usage levels biomass can be considered as an untapped resource.

2.5.5 The Government's strategy for biomass is intended to:

- *“realise a major expansion in the supply and use of biomass in the UK*
- *Facilitate the development of a competitive and sustainable market and supply chain*
- *Promote innovation and low-carbon technology development so biomass can deliver relatively higher energy yields contribute to overall environmental benefits and the health of ecosystems through the achievements of multiple benefits from land use*
- *Facilitate a shift towards a bio-economy through sustainable growth and development of biomass use of fuels and renewable materials*
- *Maximise the potential of biomass to contribute to the delivery of our climate change and energy policy goals: to reduce CO₂ emissions, and achieve a secure, competitive and affordable supply of fuel”*

2.5.6 Paragraph 2.1 of the strategy states:

“Biomass is an important tool for tackling climate change, as well as offering new commercial opportunities. For the purposes of this strategy, we are taking biomass to mean any biological material, derived from plant and animal matter, which can be used for producing heat and/or power, fuels including transport fuels, or as a substitute for fossil fuel-based materials and products”

2.5.7 The proposed development will contribute to a more diverse and secure energy generation, and in turn contributes to the security of the UK's renewable energy supply at a time when energy demand is increasing and the impacts of climate change are gaining prominence in Government policy agendas.

2.5.8 National waste and energy policy contains a clear message: positive planning which facilitates renewable energy developments is essential if the government commitments to climate change and renewable energy are to be met. The role of Biomass in helping to meet these commitments is widely recognised and its use is encouraged.

2.6 The 2007 White Paper: Meeting the Energy Challenge

2.6.1 UK Energy policy is set out in the Energy White Paper of May 2007 and Low Carbon Transition Plan of July 2009.

2.6.2 The 2007 White Paper: “Meeting the Energy Challenge” sets out the Government's international and domestic energy strategy to address the long term energy challenges faced by the UK, and to deliver four key policy goals:

1. *"To put the UK on a path to cut carbon dioxide emissions by some 60% by about 2050, with real progress by 2020;*

2. *To maintain reliable energy supplies;*

3. *To promote competitive markets in the UK and beyond, helping to raise the rate of sustainable economic growth and to improve productivity; and*

4. *To ensure that every home is adequately and affordably heated"*

5. *To ensure that every home is adequately and affordably heated"*

2.6.3 The Government has set national targets for electricity generated from renewable sources and expects 10% of total electricity generation by 2010, 15% by 2013 and 20% by 2020.

2.6.4 The Government recognises the importance of recovering energy from biomass. Facilities should be sized and contracts designed in accordance with the local availability of fuel. The Government's targets on renewable energy generation, power generation processes such as energy from biomass must be considered.

2.6.5 There are a number of benefits of recovering energy from biomass, as follows:

- Improved energy security;
- Meeting UK energy demand in more sustainable way;
- Biomass heat generation can provide a cheap sustainable heat source;
- Biomass heat generation can replace coal for industrial sites, industrial processes and off grid locations; and
- Energy is recovered from material that may otherwise be landfilled or exported.

2.6.6 In particular, the White Paper confirms that applicants for energy development do not need to demonstrate either the overall need for renewable energy or its distribution, nor question the energy justification for why a proposal for such development must be sited in a particular location.

3. National Planning Policy

3.1 Wales Spatial Plan, update 2008

3.1.1 The Wales Spatial Plan sets out the national spatial planning framework for Wales, adopted by the Welsh Assembly. Key sections of the spatial plan provide significant encouragement of new developments as proposed in this application.

- Paragraph 11.6 of the spatial plan calls for a joint approach between local authorities and others to the delivery of regional energy and waste infrastructure to support the development of a sustainable economy
- Paragraph 12.3 calls for rethink of how energy and other resources are used in order to minimise future climate change.
- Paragraph 19.3 describes a low carbon city region that reduces its resource use, energy and travel footprints, and greenhouse gas emissions as an important measure of success for the South East Wales Capital City Region.
- Paragraph 19.22 calls for the economy of South East Wales to seize opportunities to create jobs in renewable energy, recycling and waste.
- Paragraph 19.28 says that the projected growth of housing and employment across the Capital Region (South East Wales) means that access to sustainable forms of energy generation will be crucial to the long term viability of the City Region. Local energy generation approaches will also have an increasingly important role to play.

3.1.2 The Wales Spatial Plan provides ample strategic policy support. The proposed Project will provide a source of local renewable energy to directly support the local economy, improve the sustainability of waste management in the South East Wales Region and reduce the contribution made to the emission of greenhouse gases from local economic growth. The proposals will directly create local jobs in construction and operation of the facility. Overall, the proposed Project will make a strong contribution to

long term viability of the Capital City Region through the provision of sustainable and local renewable energy generation.

3.2 Planning Policy Wales (March 2002)

3.2.1 Planning Policy Wales (PPW) sets out the land use planning policies of the Welsh Government. It is supplemented by a series of Technical Advice Notes (TANs). Procedural advice is given in circulars and policy clarification letters. It translates the commitment to sustainable development into the planning system so that it can play an appropriate role in moving towards sustainability.

3.2.2 Paragraph 4.9.1 states:

“Previously developed (or brownfield) land should, wherever possible, be used in preference to Greenfield sites, particularly those of high agricultural or ecological value. If the Welsh Government’s objectives for the more sustainable use of land and buildings and the re-use of previously developed sites are to be achieved, local authorities and other stakeholders will need to be more proactive”.

The proposed Project will be constructed on brownfield land and is entirely contained within the Project site. It is therefore considered that the proposed development is consistent with the intent of Planning Policy Wales.

3.2.3 Paragraph 12.8.8 states:

“The Welsh Government is committed to using the planning system to:

- *Optimise renewable energy generation;*
- *Optimise low carbon energy generation;*
- *Facilitate combined heat and power systems (combined cooling, heat and power) where feasible; and*
- *Recognise that the benefits of renewable energy are part of the overall commitment to tackle climate change by reducing greenhouse gas emissions as well as increasing energy security”...local planning authorities should facilitate the development of all forms of renewable and low carbon energy to move towards a low carbon economy to help tackle the causes of climate change”*

The proposed Project will accommodate technologies which will successfully direct waste wood away from landfill to generate a renewable source of energy with all heat being used within the plant to maximise efficiency. The proposed location is on previously developed land, consistent with the locational policies and criteria set out in local plans.

3.2.4 Paragraph 12.10.1 states:

“In determining applications for renewable and low carbon energy development and associated infrastructure local planning authorities should take into account:

- *the contribution a proposal will play in meeting identified national, UK and European targets and potential for renewable energy, including the contribution to cutting greenhouse gas emissions;*
- *The wider environmental, social and economic benefits and opportunities from renewable and low carbon energy development;*
- *The impact on the natural heritage (see 5.5), the Coast (see 5.6) and the Historic Environment (see 6.5);*
- *The need to minimise impacts on local communities to safeguard quality of life for existing and future generations;*
- *Ways to avoid, mitigate or compensate identified adverse impacts;*
- *The impacts of climate change on the location, design, build and operation of renewable and low carbon energy development. In doing so consider whether measures to adapt to climate change impacts give rise to additional impacts (see 4.5);*
- *Grid connection issues where renewable (electricity) energy developments are proposed; and the capacity of and effects on the transportation network relating to the construction and operation of the proposal”*

The proposed development comprises a sustainable development in this context, by increasing the use and supply of renewable and low carbon energy and providing the potential for the supply of energy to local users.

3.3 Technical Advice Notes

National planning policy and advice in respect of spatial and land-use planning is contained in a range of policy documents, statements, circulars and TANs.

3.3.1 Technical Advice Note 8: Planning for Renewable Energy (2005): This TAN relates to the land use planning considerations of renewable energy, however UK and national energy policy provide its context. Energy policy is a reserved function that is not devolved to the Assembly Government. Nevertheless, all decisions relating to renewable energy in Wales must take account of the Assembly Government's policy. A summary statement on Assembly Government energy policy is contained in Annex A to this TAN. A number of other annexes to this TAN also provide background to the development of planning policy for renewable energy in Wales.

3.3.2 Paragraph 2.15 states:

"Developers, in consultation with local planning authorities, should take an active role in engaging with the local community on renewable energy proposals. This should include pre-application discussion and provision of background information on the renewable energy technology that is proposed"

The proposal for a renewable energy project using advanced conversion technology processing waste wood was consulted extensively with interested stakeholders in connection with the 2010 Permission. In connection with the present application, the Applicant has discussed the proposed changes with Associated British Ports as owner of the Port of Barry site within which the Project will be located and has obtained their support (refer to letter attached to this Policy Appraisal).

3.3.3 Paragraph 14.1 states:

"The Renewables Obligation 2002 states that only electricity derived from "biomass" will be eligible for Renewable Obligation Certificates (ROCs). "Biomass" is defined here as a fuel of which at least 98% of the energy content is derived from plant or animal matter or substances derived directly or indirectly therefrom (whether or not such matter or substances are waste) and includes agricultural, forestry or wood wastes or residues, sewage and energy crops"

The proposed Project will utilise biomass for 100% of fuel input and should be eligible for ROCs.

3.3.4 Technical Advice Note 21: Waste (2001): This guidance note provides advice about how the land use planning system should contribute to sustainable waste resource management. It is intended to facilitate the introduction of a comprehensive, integrated and sustainable land use planning framework for waste management in Wales.

Sustainable Waste Management

Achieving sustainable development is an integral part of the Assembly's policies. The movement towards sustainable development in relation to planning for waste should be guided by principles on which any framework for waste management should be founded. The land use planning system has an important role to play in facilitating sustainable waste management and should:

- *"Provide a planning framework which enables adequate provision to be made for waste resource management facilities to meet the needs of society for the re-use, recovery and disposal of waste;*
- *Help meet the needs of businesses and encourage competitiveness;*
- *Encourage sensitive waste management, enhance the overall quality of the environment and avoid risks to human health;*
- *Have regard to the need to protect areas of designated landscape and nature conservation value from inappropriate development;*
- *Have regard to the need to protect the amenity of the community and of land uses and users affected by existing or proposed waste management facilities;*

- *Minimise adverse environmental impacts resulting from the handling, processing, transport and disposal of waste;*
- *Consider what new facilities may be needed, in the light of waste forecasts; and, ensure that opportunities for incorporating re-use/recycling facilities in new developments are properly considered"*

Paragraph 6.1 of the TAN states that;

"When considering development proposals for waste management facilities, local planning authorities should take into account their potential contributions to the objectives and principles set out in the Waste Strategy, the Regional Waste Plan, the UDP and the network of waste management facilities (when these are available).

A number of technical assessments have been produced to support the Project, both for the purposes of the 2010 Permission and for the present application, and confirms that the proposed Project will have no unacceptable environmental or social impacts in the local or wider area that cannot be satisfactorily mitigated through the incorporated measures put forward in the development proposals.

Location of waste management facilities

Annex C: Specific Planning Considerations (C35) states:

"Locations should be considered within the context of the aims of the Wales Waste Strategy, the regional area of search process, and the provisions of the development plan for the area. In general, the most appropriate locations will be those with the least adverse impacts on the local population and the environment, and with the best potential contribution to a facilities framework.

C36 states:

"There are numerous factors that may influence the type of location of new waste management facilities. New sites might for instance, be located, if appropriate, within or adjacent to:

- *industrial areas, especially those containing other heavy or specialised industrial uses;*
- *Active or worked out quarries - landfill is commonly used in quarry restoration but there may be opportunities for other types of waste management facilities at some quarried sites. It should be noted that quarry depth and the nature of the local water table will affect the feasibility of using such sites;*
- *degraded, contaminated or derelict land - well-located, planned, designed and operated waste management facilities may provide good opportunities for remediating and enhancing sites which are damaged or otherwise of poor quality, or bringing derelict or degraded land back into productive use;*
- *existing or redundant sites or buildings - which could be used, or adopted, to house materials recycling facilities, or composting operations;*
- *sites previously or currently occupied by other types of waste management facilities"*

The site is located on vacant brownfield land within the existing Project site owned by Associated British Ports. It is therefore considered that the proposed Project is located within a suitable location and is compliant with the above statement.

3.4 The Environment Strategy for Wales (2006)

3.4.1 The Environment Strategy for Wales (2006) outlines the Welsh Government's long-term strategy for the environment of Wales, setting out the strategic direction for the next 20 years. The purpose of the strategy is to provide a framework within which to achieve an environment that is clean, healthy, biologically diverse and valued to people of Wales.

3.4.2 The results of the technical assessments undertaken to the support the planning application for the show that the proposed Project will not undermine the overarching objectives of the Environment Strategy for Wales and is considered to be entirely consistent with its relevant purposes.

3.5 Regional Planning Policy

3.5.1 Regional Waste Plan 1st Review (2008)

The Regional Waste Plan (RWP) provides a long-term strategic waste management strategy and land-use planning framework for the sustainable management of waste and recovery of resources in South East Wales. The aims of the RWP 1st Review are:

- *To minimise adverse impacts on the environment and human health;*
- *To minimise adverse social and economic impacts and maximise social and economic opportunities;*
- *To meet the needs of communities and businesses; and*
- *To accord with the legislative requirements, targets, principles and policies set by the European and National legislation and policy framework.*
- *5.69 The RWP 1st Review comprises two main elements:*
- *The RWP Technology Strategy which provides strategic information on the types of waste management/resource recovery facilities required in the South East Wales; and*
- *The RWP Spatial Strategy, which provides strategic information on the types of locations likely to be acceptable.*

The proposed development comprises a sustainable development in this context, by increasing the use and supply of renewable and low carbon energy and providing the potential for the supply of energy to local users.

3.5.2 Regional Transport Plan (2010): The South East Wales Transport Alliance (SEWTA) is an alliance of 10 South-East Wales local authorities working with others to deliver better transport in the South East Wales region. It is constituted as a joint local government committee.

SEWTA's vision for the Regional Transport Plan (RTP) is to provide a modern, integrated and sustainable transport system for South East Wales that increases opportunity, promotes prosperity and protects the environment, where public transport, walking, cycling and sustainable freight provide real travel alternatives. The priorities of the RTP are to:

- *“Improve access to services, facilities and employment, particularly by public transport, walking and cycling;*
- *Provide a transport system that increases the use of sustainable modes of travel;*
- *Reduce the demand for travel;*
- *Develop an efficient and reliable transport system with reduced levels of congestion and improved transport links within the Sewta region and to the rest of Wales, the UK and Europe;*
- *Provide a transport system that encourages healthy and active life styles, is safer and supports local communities;*
- *Reduce significantly the emission of greenhouse gases and air pollution from transportation;*
- *Ensure that land use development in south east Wales is supported by sustainable transport measures; and*
- *Make better use of the transport system”*

3.5.3 The Transport Statement for the Application confirms that the traffic impacts of the proposal are acceptable. In terms of sustainable transport, there are a number of bus services on Ffordd Y Mileniwm (which staff can use) in close proximity to the site's main entrance on David Davies Road and that the nearest railway station (Barry Docks) is located less than 0.5 km away.

4. Local Planning Policy

4.1 The Vale of Glamorgan Adopted Unitary Development Plan 1996-2011

As a result of the provisions in the Local Government (Wales) Act 1994 each Local Planning Authority in Wales is now required to prepare a Unitary Development Plan (UDP) for its administrative area. This UDP provides the strategic and detailed policy framework within which provision will be made for development and conservation needs. It guides development for 15 years.

4.1.1 Policy ENV 16: Protected Species

“Permission will only be given for development that would cause harm to or threaten the continued viability of a protected species if it can be clearly demonstrated that:

- i) There are exceptional circumstances that justify the proposals;*

ii) There is no satisfactory alternative; and

iii) Effective mitigation measures are provided by the developer”

There are no known protected species within the site boundary of the proposed development (refer to the Ecology Report update (November 2014)). It is therefore considered that the proposed development is consistent with policy ENV16.

4.1.2 Policy ENV 18: Archaeological Field Evaluation

“Where development is likely to affect a known or suspected site of archaeological significance, an archaeological evaluation should be carried out at the earliest opportunity and may be required before the proposal is determined. Detailed plans would need to reflect the conclusions of the evaluation”

There are no known archaeological features within the site boundary. It is therefore considered that the proposed development is consistent with the principles set out in Policy ENV 18.

4.1.3 Policy ENV 26: Contaminated Land and Unstable Land

“Proposals for the redevelopment of contaminated land and unstable land will be permitted where the contamination and/or instability will be removed or reduced to a level where there is no unacceptable risk to the health and safety of those living or working on the site or nearby, to flora and fauna on the site or nearby, and to the quality of air and water on these sites or nearby”

The site is located within Barry Port owned by Associated British Ports. The Environmental Report (see Appendix 12) produced for the Project to assess the implications of any potential environmental risks associated with constructing and operating a renewable energy plant on the site concluded

- the site is partially vacant and occupied by a container storage and refurbishment operation;
- the site is within an area affected by flooding and is within the indicative Zone 3 floodplain;
- the site is not located over a groundwater Source Protection Zone (SPZ). In any event the site will not impact upon groundwater as any potentially polluting outputs will be discharged to foul sewer in accordance with the requirements of a trade effluent consent or removed from the site by vehicle;
- an ecological survey is not required [although one was carried out] as the site is previously developed and consists only of a compacted hard standing surface which is not vegetated. There are no sites with sensitive flora or fauna having a statutory or local nature conservation designation within 500 metres of the site. The nearest designated site is the SSSI named “Hayes Point to Bendrick Rock” at a distance of 616 metres from the site (SSSI 510 administered by the Countryside Council for Wales) and covering an area of 29 hectares;
- the site has no clearly defined planning history but historical maps indicate that the following uses have occurred on the site:

1879: Undeveloped estuarine land and river bed of Cadoxton River

1898 to 1900: Land reclaimed to rail head, coal tip/loading dock

1920 to 1973: Railway engineering works/rail head

1989: Builder’s yard

It is therefore considered that there is a low risk from potential contamination.

4.1.4 Policy ENV 27: Design of New Developments

“Proposals for new development must have full regard to the context of the local natural and built environment and its special features. New development will be permitted where it:

i) Complements or enhances the enhances the local character of buildings and open spaces;

ii) Meets the councils approved standards of amenity and open space, access, car parking and servicing;

- iii) Ensures adequacy or availability of utility services and adequate provision for waste management;*
- iv) Minimises any detrimental impact on adjacent areas;*
- v) Ensures existing soft and hard landscaping features are protected and complemented by new planting, surface or boundary features;*
- vi) Ensures clear distinction between public and private spaces;*
- vii) Provides a high level of accessibility, particularly for public transport, cyclists, pedestrians and people with impaired mobility;*
- viii) Has regard to energy efficiency in design, layout, materials and technology; and*
- ix) Has regard to measures to reduce the risk and fear of crime"*

A Design and Access Statement (DAS) has been produced in support of this Project. The DAS demonstrates that an appropriate design approach has been adopted and will be followed throughout the process, to result in a development that can integrate successfully with the surrounding environment. The proposed Project is industrial in nature and the main components of the development will be industrial in appearance.

- 4.1.5 Policy ENV27 sets out criteria of the design, siting and external appearance of proposals. These have been taken into account in the design of the Project. This is further explained in the D&AS accompanying this planning application.

The design and layout of the proposals have been designed to make best use of the land available and to fit into the local context and topography.

The proposed development is considered to be entirely appropriate to the proposed location. The development is located within an existing industrial site and is therefore consistent with the policy ENV27.

4.1.6 Policy ENV 29: Protection of Environmental Quality

"Development will not be permitted if it would be liable to have an unacceptable effect in either people's health and safety or the environment:

- i) By releasing pollutants into water, soil or air, either on or off site; or*
- ii) From smoke, fumes, gases, dust, smell, noise, vibration, light or other polluting emissions"*

Technical assessments which support this application confirm the proposal will not have an unacceptable impact on the environment and is therefore consistent with Policy ENV 29.

4.1.7 Policy EMP 2: New Businesses and Industrial Development

"Proposals for new businesses and industrial development including agricultural service industries and the extension, conversion and replacement of existing premises for such purposes, will be permitted if all of the following criteria are met:

- i) The proposal does not lie within the countryside except for those proposals acceptable under the terms of ENV 8 (Rural Buildings) or COMM 2 (Redundant Hospitals);*
- ii) The proposal minimises the loss of good quality agricultural land (grades 1, 2 and 3a) and does not have an unacceptable impact on areas of attractive landscape and high quality townscape or on areas of historical, archaeological or ecological importance;*
- iii) The size and relationship of any new building and/or alteration or extension is not disproportionate to its size and setting;*
- iv) Access and parking arrangements are in accordance with the councils approved standards;*
- v) Adequate landscaping is provided;*

- vi) The proposal does not have an unacceptable effect on residential amenity by virtue of traffic congestion, noise, smell, safety, health impacts and emissions;*
- vii) Adequate utility and infrastructure services exist or are reasonably accessible or capable of being readily and economically provided;*
- viii) Does not present additional risk to the health or safety of users of the site and does not unacceptably pollute air, water, or land; and*
- ix) Does not unacceptably affect the use of the adjoining land by virtue of the risk and impact of potential pollution"*

The criteria of policy EMP2 covers a wide range of environmental and amenity issues that have been identified and it is considered that the proposed development will not pose any detrimental impacts to the environment.

4.1.8 Policy EMP 4: Protection of land for Employment Uses

"On existing employment sites and sites identified in policy EMP 1 Development of uses that are not contained in classes B1, B2 and B8 of the Town and Country Planning (Use Classes) Order 1987 (as amended) will not be permitted". *B1 Businesses, B2 General Industry and B8 Storage or Distribution use as defined by Town and Country Planning (Use Classes) Order 1987 (as amended).*

The proposed Project will be an employment generating use which will continue to provide employment opportunities within the Barry Port zone.

4.1.9 Policy TRAN 1: Strategic Highways

"Land will be protected and provision made for the development of the strategic highway network, including:

- iv) The airport access road, and*
- v) The Barry Waterfront to Cardiff Link"*

The access arrangements for proposed Project will utilise existing access into the proposed site from David Davies Road within the Port of Barry complex. A Transport Statement has been prepared and is submitted in support of this application, which assesses the traffic impacts of the proposed Project. The Transport Statement concludes that traffic impacts arising will be insignificant. It is therefore considered that the proposed development is consistent with policy TRAN 1.

4.1.10 Policy TRAN 6: Rail Freight

"Development which would attract a significant amount of freight movement will be favoured where existing or potential rail facilities are available"

At this present time Sunrise Renewables Ltd is not proposing to consider the utilise rail-freight. The additional road trips generated by the Project in terms of the existing traffic movements of the Sunrise Renewables site are considered to have a negligible impact of the local highway network. Feedstock may also be imported to the site via the port itself.

4.1.11 Policy TRAN 10: Parking

"The provision of parking facilities will be in accordance with the approved parking guidelines, and will be related to the type of land use, its density and location: accessibility to existing and potential public transport facilities: and the capacity of the highway network"

Internal parking provision under the 2010 Permission comprises 5 spaces plus 1 disabled space and 4 cycle parking spaces. It is considered that the proposed level of parking provision remains appropriate for the number of staff and visitors likely to be using the facility. This is given that staff can share vehicles in accordance with the requirements of the current planning permission.

4.1.12 Policy TRAN 11: Road Freight

"In order to reduce the unacceptable environmental effects of heavy goods vehicles:

- i) Developments which generate HGV movements which would unacceptably affect the amenity and character of the existing or neighbouring environments by virtue of noise, traffic congestion, or parking problems will not be permitted;*
- ii) Sufficient operational parking within the curtilage of HGV operating centres will be required; and*
- iii) Traffic management measures will be used where appropriate"*

The proposed Project will generate only 30 additional HGV movements (in and out) per normal week-day, within normal working hours. The proposed development is located in close proximity to the highway network and therefore reduces the impact of HGVs on the local road network. In addition, HGV traffic will utilise existing junction access points which work well. Therefore the proposed development is consistent with policy TRAN 11.

4.1.13 Policy COMM 8: Other Renewable Energy Schemes

"Proposal for other renewable energy schemes will be permitted if all of the following criteria are met:

- i) The proposal has no unacceptable effect on the immediate and surrounding countryside;*
- ii) The proposal has no unacceptable effect upon the sites of conservation, archaeological, historical, ecological and wildlife importance;*
- iii) Adequate measures are taken, both during and after construction, to minimise the impact of the development on local land use and residential amenity"*

The site is located within an existing industrial estate and the technical assessments which accompany this application demonstrate that the proposed development would not adversely impact any sites of conservation, archaeological, historical, ecological and wildlife importance.

4.2 The Vale of Glamorgan Deposit Local Development Plan 2011-2026

4.2.1 The Local Development Plan (LDP), once adopted, will provide a framework for sustainable development within the Vale of Glamorgan up to 2026. It is an extremely important policy document that will guide the growth of the Vale of Glamorgan over a fifteen year period and also identify the infrastructure needs of our communities in terms of employment, facilities and services needed to support that development.

Wherever possible the plan's emphasis is on re-using previously developed land and minimising the need to develop on green fields.

The Local Development Plan objectives are as follows:

"Objective 2: To ensure that development within the Vale of Glamorgan makes a positive contribution towards reducing the impact of and mitigating the adverse effects of climate change"

"Objective 4: To protect and enhance the Vale of Glamorgan's historic, built and natural environment"

Objective 10: To ensure that development within the Vale of Glamorgan uses land effectively and efficiently and to promote the sustainable use and management of natural resources".

4.2.2 Policy SP8-Sustainable Waste Management

The capacity requirements of 291,600 tonnes identified in the Regional Waste Plan will be met through a combination of in building waste management solutions.

The following locations are considered suitable for the development of in-building waste management solutions:

- *Atlantic trading estate;*
- **The operational port of Barry Docks;**
- *Llandow Industrial Estate; and*
- *On suitable existing and allocated class B2 Employment sites*

The provision of open air facilities such as civic amenity sites, composting and recycling of commercial and demolition waste will also be permitted in existing class B2 employment sites, operational mineral

working sites or within or adjoining existing farm complexes where they do not conflict with existing or proposed neighbouring uses.

The site is located within the operational port of Barry Docks. It is therefore considered that the proposed development is compliant with policy SP8.

4.2.3 Policy SP 10- Built and Natural Environment

“Development proposals must preserve and where appropriate enhance the rich and diverse built and natural environment and heritage of the Vale of Glamorgan including:

- 1. The architectural and/ or historic qualities of individual buildings or conservation areas;*
- 2. Historic Landscapes, parks and gardens;*
- 3. Special Landscape Areas;*
- 4. The Glamorgan Heritage Coast;*
- 5. Sites designated for their local, national and European nature conservation importance; and*
- 6. Important Archaeological and Geological features”*

The site is located within the operational port of Barry Docks and does not have any known sites of architectural or historic value in close proximity to the proposed development site. It is therefore considered that the proposed development is consistent with policy SP10.

4.2.4 Policy MD1- Location of New Development

“To ensure that new development on unallocated sites assists in delivering the strategy, development will be favoured where it:

- 1. Has no unacceptable impact on the countryside ;*
- 2. Reinforces the role and function of the key settlement of Barry, the service centres settlements, primary settlements and minor rural settlements as key providers of commercial, community and healthcare facilities;*
- 3. Promotes new enterprises, tourism, leisure and community facilities in the rural Vale of Glamorgan;*
- 4. In the case of residential development, supports the delivery of affordable housing in areas of identified need;*
- 5. Has access to or will promote the use of sustainable modes of transport;*
- 6. Will benefit from existing infrastructure provision or where new infrastructure can be provided without any unacceptable effect on the natural or built environment;*
- 7. Promotes sustainable construction and makes beneficial use of previously developed land and buildings;*
- 8. Provides a positive context for the management of the water environment by minimising or avoiding areas of flood risk and safeguards resources; and*
- 9. Does not have an unacceptable impact on green wedges, sites of importance for nature conservation, special landscape areas and/ or the Glamorgan Heritage Coast”*

The proposed Project is located within an existing industrial site on previously developed land. The Flood Risk Assessment prepared in support of the Project (Appendix 13) concluded that:

- the proposed development is located within Zone B but outside Zone C2, as identified by Technical Advice Note 15: Development & Flood Risk (July 2004) (TAN15). Zone B can be defined as “*areas known to have been flooded in the past evidenced by sedimentary deposits*” and Zone C2 as “*areas of floodplain without significant flood defence infrastructure*”. Any development within Zone C would require a full Flood Consequences Assessment (FCA);

- the proposed development is also located outside the Environment Agency Wales (EAW) extreme (0.1%) Flood Map, which would normally underlay Zone B;

A topographic survey of the site (prepared on a precautionary basis, in line with EAW recommendations) produced three cross sections from north of the site through to the direction of the dock to confirm that the development is above the adjacent extreme flood outline and corresponding Zone C2;

Following submission of this information to the EAW, the Development Control Officer of the EAW confirmed that the site was not at risk of flooding and the cross sections were acceptable.

Policy changes within the EAW at the time meant that applications in Zone B were taken on a risk-based approach and since the zone is outside the Q1000 Flood Map, there is no perceived risk to the development.

4.2.5 Policy MD2-Place Making

“Development will be favoured where it contributes to creating high quality, healthy, sustainable and locally distinct places, in particular proposals should:

- 1. Be of a high standard of design that positively contributes to the context and character of the surrounding natural and built environment;*
- 2. Respond appropriately to the local context and character of neighbouring buildings in terms of type, form, scale, mix, and density;*
- 3. Identify opportunities to provide new or enhanced areas of public realm particularly in key locations such as town centres, major routes and junctions;*
- 4. In the case of retail centres, provide active street frontages to create attractive and safe urban environments;*
- 5. Provide a safe and accessible environment, giving priority to pedestrians, cyclists and public transport users;*
- 6. Where appropriate, conserve and enhance the quality of, and access to, existing open spaces and community facilities;*
- 7. Safeguard existing public and residential amenity, particularly with regard to privacy, overlooking security, noise and disturbance;*
- 8. Incorporate sensitive landscaping including the retention and enhancement of existing features and biodiversity interest; and*
- 9. Make a positive contribution towards tackling the causes of and adapting to the impacts of climate change by promoting renewable and low carbon energy use”*

As already detailed, the site is contained within the operational port of Barry Docks and has been designed with regard to the context and character of the site. The proposed Project will provide an effective and sustainable means by which to reduce waste sent to landfill within Barry, and will make a direct contribution towards the Welsh Assembly's and the UK Government's Climate Change objectives.

4.2.6 Policy MD 3: Design of New Development

“Development proposals will be permitted where:

- 1. They are of a high standard of design that positively contributes to the context and character of the surrounding natural and built environment;*
- 2. They respond appropriately to the local context and character of neighbouring buildings in terms of type, form, scale, mix and density;*
- 3. Existing features of townscape or biodiversity interest are preserved or enhanced;*
- 4. There would be no unacceptable impact on the amenities of neighbouring occupiers;*
- 5. The development would be compatible with other uses in the locality;*

6. They promote the creation of healthy and active environments and reduce the opportunity for crime and anti-social behaviour;

7. They provide a safe and accessible"

The proposed development is located in an existing industrial site. As detailed in the landscape and visual impact assessment, the proposed design of the facility is considered to be functional in nature and therefore suitable for the application site.

4.3 Compliance with the Development Plan

This planning statement demonstrates that the development proposal is consistent with the Development Plan and represents sustainable development. It is therefore considered that the development as proposed is afforded a high level of support by the Wales Spatial Plan and Planning Policy Wales.

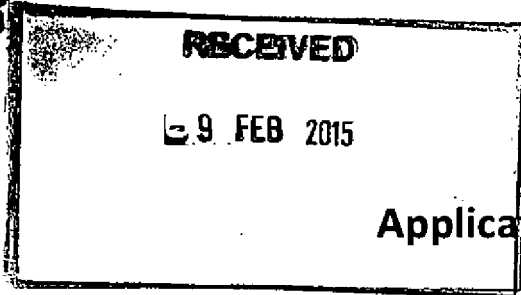
The proposed development will make a direct contribution to achieving renewable energy generation and renewable heat targets thereby implementing Government policy at the European and UK levels which encourages more electricity generation from renewable sources.

The proposed development in relation to the relevant policies concludes that the proposed development is in accordance with the objectives of renewable energy policy at the EU, UK and Local Government levels. There is a strong policy drive at a European and UK level to continue to develop renewable energy. These latest European and UK Government policies establish a strategic need for renewable energy provision in the UK to assist in tackling Climate Change.

5. Policy Conclusions

Policies set out in the national, regional and local level all place emphasis on a reduction in the quantities of waste being directed towards landfill, and an increase in recycling levels. The general theme within the planning policy statements is the encouragement of renewable sources of energy, the use of brownfield land and sustainable development. The proposed development is supported by the aims and objectives set out in the planning policy guidance documents described above. It is considered that there are no overriding planning constraints specific to the site, and the proposed development would not conflict with development plan policies set out in local and national policy documents.

There have been no material changes to the policy context of the application site since the 2010 Permission was granted for the facility. National guidance remains supportive of well-conceived renewable energy schemes. Regional and local policy also remains supportive of industrial / employment development in the docklands area, provided there are no unacceptably adverse environmental impacts. The information submitted in support of the application demonstrates that the proposed amendments are primarily focused on implementing the previously approved scheme in an efficient and economic fashion and would not result in any such impacts. Consequently, the proposals remain compliant with relevant policies and guidance.



Application to modify the Elevations

for the

Port of Barry Renewable Power Plant

15 00 03 1 OUT

VISUAL IMPACT ANALYSIS

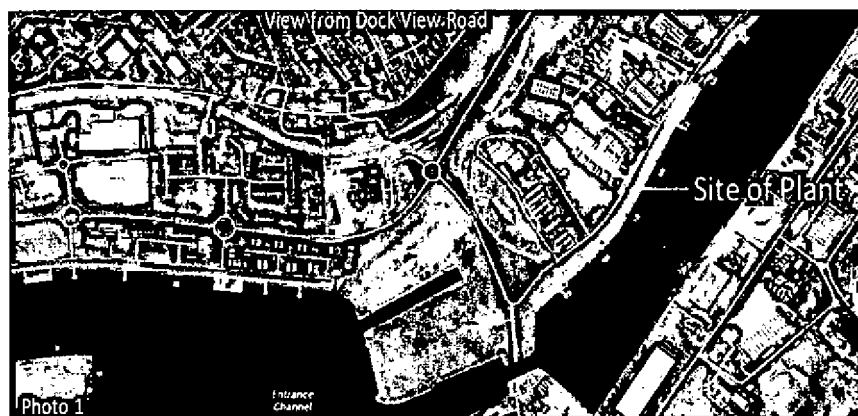
in support of an application under
the Town and Country Planning Act 1990

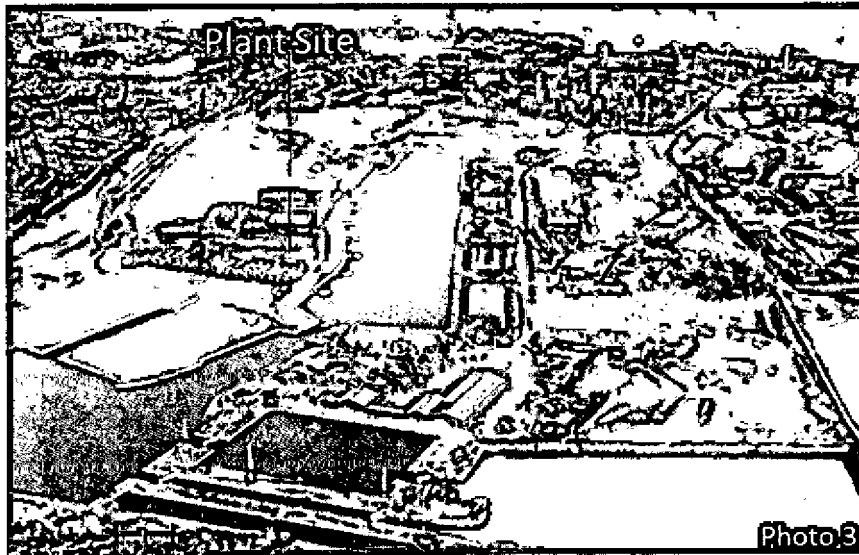
9th January 2015



Stoketon House
Windmill Hill
East Sussex
BN27 4RS
Tel 01323 833824

1. UK Power Development Partners is representing the Applicant, Sunrise Renewables (Barry) Limited, which is developing a renewable energy plant based on an advanced conversion technology.
2. The principle of establishing a wood fuelled power plant on land at Woodham Road, Barry, CF63 4JE within the Port of Barry was established by planning permission reference 2008/01203/FUL as approved by appeal reference APP/Z6950/A/09/2114605, subject to conditions, on 2nd July 2010 (the "2010 Permission").
3. The Applicant has submitted an outline planning application to amend the layout and elevations in order to accommodate a change in technology for the project. This Document addresses issues relating to the Visual impact of the proposed changes by way of update of the previous Visual Impact Assessment for the Project prepared for the 2010 Permission, a copy of which is annexed to this report.
4. The 2010 Permission was for a Renewable Power Plant fuelled by waste wood. In this regard it contributes to the Vale of Glamorgan meeting its renewable energy obligations, set out in the (current) Unitary Development Plan, notably those required in response to the National Planning Guidance in respect of renewable energy (contained within Chapter 12 of Planning Policy Wales 2002, supplemented by Planning Policy Wales Technical Advice Note (Wales) 8: Planning for Renewable Energy (2005)). In particular TAN 8 highlights the environmental implications and seeks to promote the use of renewable energy technologies.
5. A further contextual consideration is that, as required by Planning Policy Wales Edition 7 – July 2014 (at para 2.1.2), "LDPs should provide a firm basis for rational and consistent decisions on planning applications and appeals". In this connection the Applicant requests the Planning Authority to proceed in its review of the present application in a manner that is consistent with its past decisions on such matters.
6. The Sunrise Renewables project itself is located within Barry Port at the centre of an industrial and commercial area (see Photos 1 to 3 below). To the east of the site are large modern warehouse/industrial buildings and a scrap yard. Further east is a large chemical factory and on the opposite side of the Dock an 8 storey grain store. Immediately to the west is a series of large Nissen Huts which house a range of uses.
7. To the south, the site is bordered by David Davies Road and a railway track which serves the Docks. 300 metres to the south-west lies the site for the renewable energy plant at Atlantic Way, previously approved under Planning Reference 2009/00021/FUL.

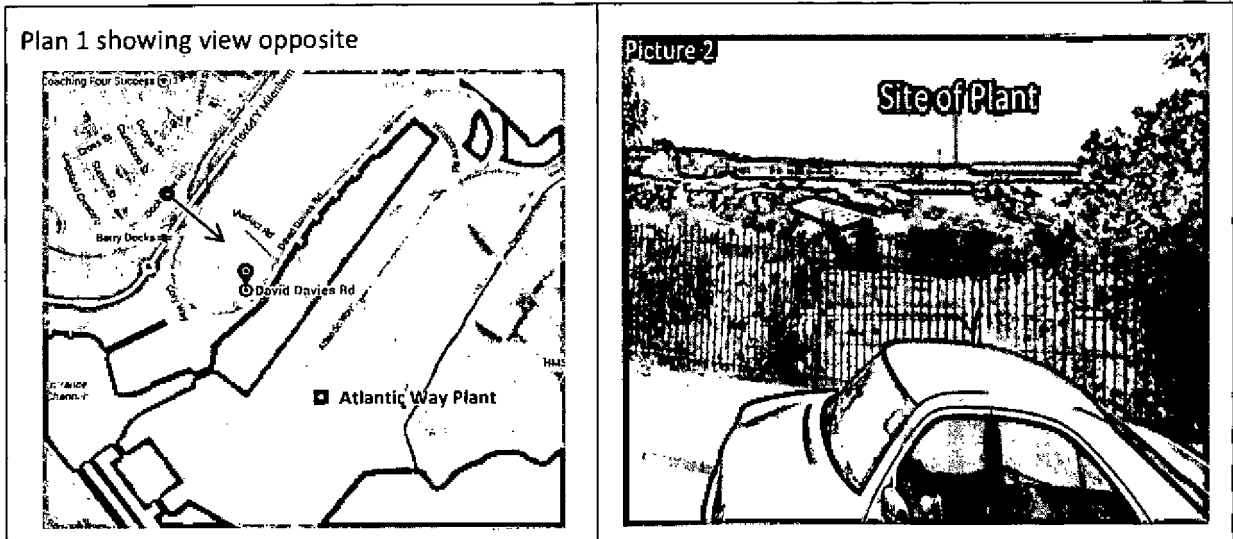




8. As was observed by Planning Inspector Thickett during the planning appeal in respect of the 2010 Permission:

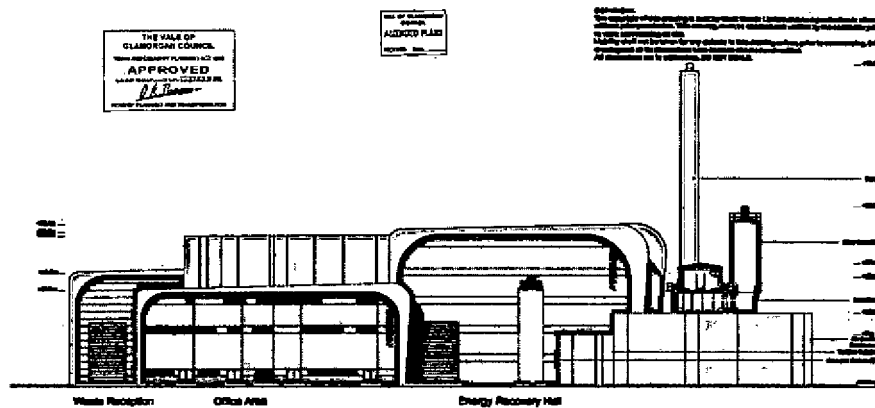
"8. Local residents may wish otherwise but the site lies in an industrial area. The Council conceded at the Inquiry that it had no objection to the appearance of the proposed building. Looking down from Dock View Road the new building would be seen in the context of the development within the Docks and, in my view, would sit comfortably in its industrial surroundings."

While Planning Inspector Thickett was not considering the layouts and elevations which are the subject of the present application his comments, underlined above, apply equally to such proposal. The view he was referring to is that in Photo 2 below.

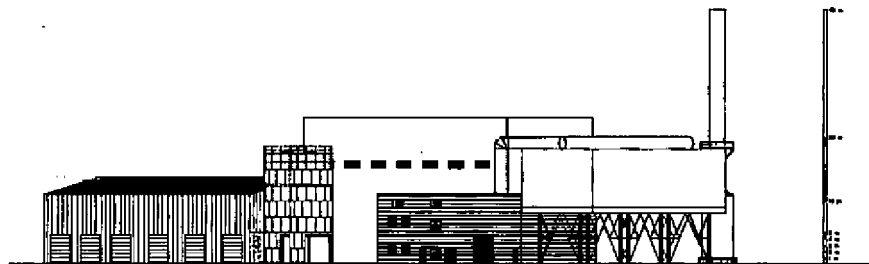


9. The plant in which the proposed chimney stack will be incorporated, located at David Davies Road, is less than 300 metres from the site proposed for the Atlantic Way Plant which was also to form part of the industrial landscape seen by any onlookers in Photo 2.
10. In respect of what is considered by relevant stakeholders including the Vale of Glamorgan Council as being acceptable for a renewable power plant adjacent to the Barry Dockyards, the decisions taken in respect of the Atlantic Way Power plant are determinative and can be seen from the elevations filed

by the developers of that plant, extracted below (Elevation A) and compared to the plant within which the proposed chimney stack will be incorporated (Elevation B).



Elevation A: Atlantic Way Renewable Power Plant



Elevation B: Sunrise Renewables Renewable Power Plant (Proposed Chimney Stack)

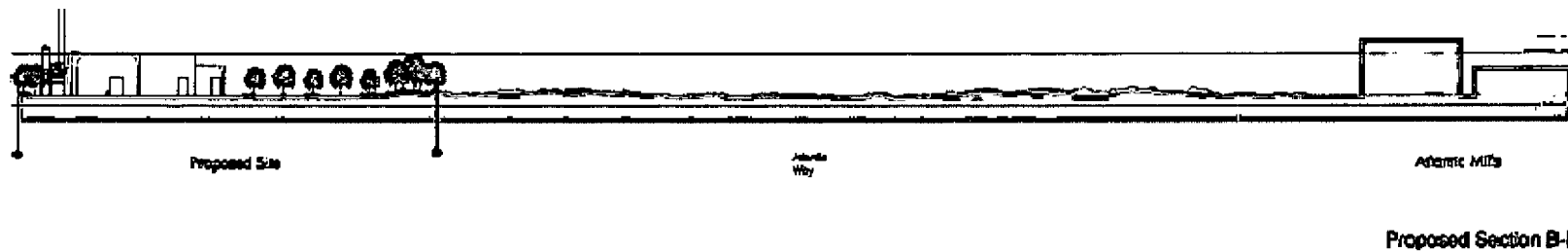
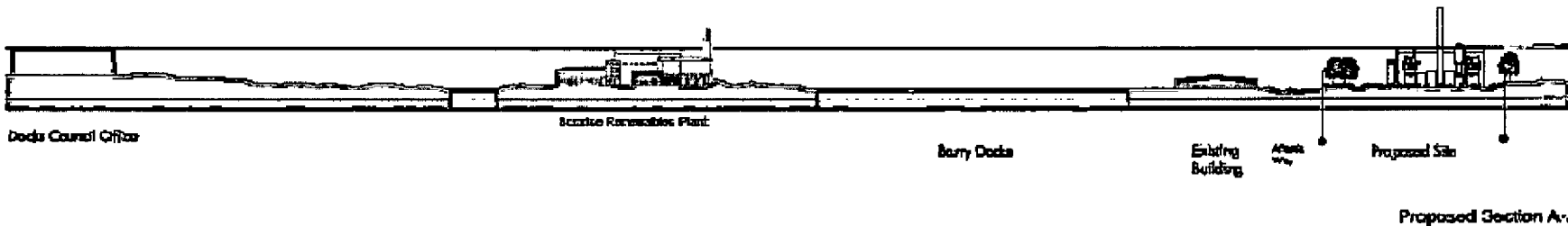
11. The Schematic reproduced on the next page is taken from the submissions under Planning Reference 2009/00021/FUL in support of the approved application for planning consent for the Atlantic Way gasification power plant. Superimposed on this is the Sunrise Renewables Plant since this falls on the same sightline A-A. This shows that in all material respects the Sunrise Renewables plant is within the envelope established by the approved Atlantic Way application including as to sightlines.
12. As is clear from this, the layout, elevations and sightlines for the present outline application are remarkably similar to those which were considered acceptable and approved for the dock-side area in the case of the Atlantic Way Renewable Energy Plant. In particular, it should be noted that the Energy Recovery Hall, at 24 metres, is slightly higher.
13. It is therefore submitted that implementing the Applicant's renewable power plant using a layout and elevations similar to those previously approved for Atlantic Way would have been considered acceptable in the dockside context at the time of the original application and related appeal and that this remains the case.
14. It is therefore reasonable to assume that the Council would have "conceded at the Inquiry that it had no objection to the appearance of the proposed building" had it been presented with the currently proposed layouts and elevations since they are not materially different from those approved separately by the Council for the Atlantic Way project.
15. In conclusion, the visual amenity afforded by the changes now proposed to the project layouts and elevations are consistent with decisions taken and views expressed both during the Appeal relating to the 2010 Permission and the granting of planning permission for the Atlantic Way plant.

5th December 2014

THE VALS OF
GLAUCOGAN COUNCIL
ENVIRONMENTAL PLANNING HQ
APPROVED
[Signature]
HEAD OF TRANSPORT AND TRANSPORTATION

VALS OF GLAUCOGAN COUNCIL
ADDITIONAL DRAWINGS

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reservation by the architect or engineer.



Key Site Plan: 1:5000

NOTE: Levels taken from topographical survey, bearing number: ED48/101/100, and appropriate
heights and sea-pollars taken from physical survey. Subject to future detailed height
information.

THIS DRAWING IS FOR INFORMATION PURPOSES ONLY. SUBJECT TO ALL
RELEVANT LOCAL, NATIONAL AND INTERNATIONAL REGULATORY RELEVANT TO THE
PROJECT AND TO THE APPLICABLE STANDARDS. SUBJECT TO FURTHER DETAIL, CLIENT
APPROVAL AND THE ARCHITECT'S DETAILS.

Design Team
 Design: Peter
 Project Manager: Peter
 Project Co-ordinator: Peter
 Client: Peter
 Date: 2009
 Scale: 1:500
 Project No: 2009/00021/FUL
 Drawing No: 01
 Date: 2009/08/10
 Scale: 1:500
 Project No: 2009/00021/FUL
 Drawing No: 01
 Date: 2009/08/10
 Scale: 1:500

Schematic taken from the submissions under Planning Reference 2009/00021/FUL

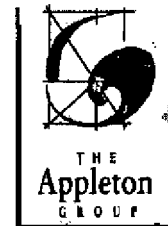
TOWN AND COUNTRY PLANNING ACT 1990

**Appeal by
SUNRISE RENEWABLES LTD**

**PROPOSED RENEWABLE ENERGY PLANT
AT WOODHAM ROAD, BARRY**

**PROOF OF EVIDENCE OF DAVID APPLETON NDH MA MLI
CHARTERED LANDSCAPE ARCHITECT**

APRIL 2010



**17 Chorley Old Road
Bolton BL1 3AD
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Fax: 01204 388792
Email: bolton@appletongroup.co.uk**

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- 2. THE APPEAL SITE , BASELINE ENVIRONMENT**
- 3. THE APPEAL SITE, IMPACT ASSESSMENT AND EVALUATION**
- 4. COMPARISON OF IMPACT, THE APPEAL SITE AND THE BIOGEN PROPOSALS.**
- 5. PLANNING POLICY MATTERS – LANDSCAPE ISSUES**
- 6. SUMMARY AND CONCLUSIONS**

Plans and appendices (In separate bound document)

Appendix 1 Criteria used for determining the significance of impacts

Appendix 2 Extract from 'Design in the Landscape' SPG

Appendix 3 Extract from Officer's report to committee

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TAG 1 Location and Context

TAG 2 Site Characteristics

TAG 3 Photographic Viewpoints and Zone of Visual Influence

Photographs, Sheets 1 and 2

1.0 INTRODUCTION AND TERMS OF REFERENCE

1.1 *Qualifications and Experience*

My name is David Appleton. I am a Chartered Landscape Architect and horticulturist with 34 years professional experience of working in both the public and private sectors. I have gained a college diploma in horticulture from the former Essex Institute of Agriculture (now Writtle College), a National Diploma in Horticulture from the Royal Horticultural Society and a Masters Degree in Landscape Design from the University of Sheffield. I am a Chartered Member of the Landscape Institute, which is the professional body in the UK for landscape design, management and science. I am a Director of a firm known as The Appleton Group, which has offices in England and Northern Ireland.

1.2 I have considerable experience of environmental and landscape assessment, both in relation to industrial developments, housing, leisure and major infrastructure projects including major highway projects. I have recently been involved with the landscape issues relating to a regional energy from waste project in Staffordshire. My firm is a member of The Institute of Environmental Management and Assessment and I have given evidence as an expert witness at numerous public inquiries.

1.3 My company was commissioned by Sunrise Renewables Ltd in October 2009 to prepare a landscape and visual impact assessment of a proposed renewable energy plant to be located at Woodham Road, Barry. The need for the assessment arose from the preparation of a voluntary Environmental Statement of which the assessment formed a part.

1.4 My evidence addresses the landscape and townscape reason for refusal 1 in respect of the alleged 'general adverse impact on the character of the area' of the proposals and the alleged non compliance with related

planning policies, and also the assertion in reason for refusal 2 that 'the siting of the proposed energy plant in its proposed location would represent a retrograde step for the Council's aspirations for the Waterfront, adversely affecting the amenities of the area and the future attraction of the development.' Given that context my evidence is largely based on the findings of the assessment which has already been submitted to the Local Authority. In addition, however, I make reference to a proposed development also located in Barry Docks which is similar in nature, being an energy from waste plant, but of a much greater scale, that was granted full planning permission by The Vale of Glamorgan Council on 23rd of December 2010.

1.5 Methodology

The landscape and visual impact assessment on which much of this evidence is based was prepared in accordance with the Guidelines for Landscape and Visual Impact Assessment prepared jointly with IEMA and The Landscape Institute (2002). The site was visited and an assessment was made of baseline conditions in terms of the landscape quality and character of the site and its surroundings. Potential viewpoints were established and photographs were taken. A desk top review of National and Local Planning policies related to landscape issues was undertaken. An assessment of the potential impact of the development was made of both the construction and operational phases, covering landscape effects, visual impact and landscape character.

1.6 Landscape effects or impacts are those which as the result of the development might alter the vegetation structure, topography, land use or soils. Visual impacts are those perceived by human receptors as the result in a change of appearance of land as the result of development impacts on character refer to the external visual influence of the development on adjacent landscape and land use.

1.7 Proposals for mitigation were made and any residual impacts assessed. The criteria used for evaluating the impact are set out in **Appendix 1** to this document. The predictions and assessments of effects were made in the context of the proposed development as set out on drawing number SRB/03 Revision A and SRB/04 Revision A, prepared by Oaktree Environmental Ltd and dated September 2008. In preparing this evidence I have also referred to the Local Authority committee report which recommended approval for the appeal proposal and various technical documents and the local authority committee report related to the application submitted by BioGen Power. I have also referred to the Barry Development Guidelines which forms supplementary planning guidance to the Vale of Glamorgan Adopted Unitary Development plan.

2.0 THE APPEAL SITE, BASELINE ENVIRONMENT

2.1 Location and Context

The location and context of the site is shown on **Plan TAG 1** appended to this evidence. The site is located within the Barry Dock complex within an area of existing employment uses and disused industrial sites. The town centre is located to the northwest at higher level. The site itself is 8 metres above sea level. Access to the site is gained from a network of industrial estate roads accessed from Millennium Way, a new road to the north of the site serving the docks and new development further west. The Cardiff to Bridgend railway line is located to the north of that road, and between the road and the site is disused and overgrown land and the dock railway spur line. Immediately adjacent to the site to the west of Woodham Road are a row of Nissen type industrial buildings accessed from Woodham Road that are in active use. Woodham Road itself is used for lorry parking (**Photograph 1**). To the immediate east of the site is open, unused land and a number of fairly modern warehouse or industrial buildings, a scrap metal yard and a haulage depot (**Photographs 2 and 3**). To the south of the site beyond David Davies Road, a railway line and a grassed area is located adjacent to the Dock. Across the dock itself is an 8 storey high grain mill building operated by Rank Hovis, other substantial industrial buildings and open storage of containers and pallets (**Photograph 4**). A large chemical works complex is present to the north east, within a distance of 1 km. The nearest residential development is located on Dock View Road to the north and at a distance of 370 metres. The road lies at approximately 30 metres A.O.D at that point, beyond Millennium Way and the railway line.

2.2 Site Characteristics

The site extends in area to 0.77 ha (1.86 acres). It is flat and open with no formal boundary enclosures other than some mounding to prevent vehicular access to the west and south, and steel palisade fencing to the east. There are no buildings present on the site. The characteristics of the site in terms of vegetation and ecology are described in a specialist report prepared by RSK Carter Ecological Ltd. In summary the site consists of either bare ground or ruderal (colonising) grassland, with some scrub vegetation. In landscape terms it is derelict and strewn with litter and fly tipping. **Photograph 1** shows the nature of the site itself and a plan showing the site as existing is attached to the report as **TAG 2**.

2.3 Landscape Policy and Designations

Neither the site nor adjacent land is subject to any National or Local designation in landscape terms. It does not fall within an AONB or an Area of Special Landscape. An Area of Special Landscape is located to the north of Barry (The Dyffryn Basin & Ridge Slopes SLA), but there is no intervisibility between the two as Barry town is set on a ridge and lies between the two areas. The location of the Area of Special Landscape is shown on a plan within the Vale of Glamorgan Unitary Development Plan Supplementary Planning Guidance '*Design in the Landscape*'. An extract from the SPG is attached to my evidence as **Appendix 2**. The site does not either fall within or adjacent to a designated urban conservation area.

2.4 Landscape Character Assessments

The Special Landscape Area described above, together with others within the Vale of Glamorgan was designated as the result of a landscape assessment prepared as part of the UDP process. The assessment was based on data known as 'Landmap', a GIS system developed by the Countryside Council for Wales in conjunction with other partners. The

system covers the whole of Wales and allows a location based evaluation of land in terms of a variety of factors including visual and sensory geology, history, cultural landscape, and landscape habitat.

- 2.5 The Appeal site falls within the 'Barry' landscape area. The Landmap classification for the site and its surroundings for visual and sensory factors is rated as '**Urban**' and the evaluation is '**Low**'.

2.6 Visual Amenity and Prominence

The site is open to view from the immediately adjacent road network (**Photograph 1**). Scrub vegetation adjacent to the eastern boundary gives some low level screening from that direction (**Photograph 2**). Distant views are possible from higher ground to the north along Dock View Road (**Photographs 5, 6, 7 and 8**). These views are all gained in the context of the Dockland as a whole with large buildings and open storage and the chemical works to the south east. For context I have marked the approximate location of the approved BioGen energy recovery plant on relevant photographs. The guide lines on the photographs are indicative of location only and not of comparative scale or massing. The views of the Appeal Site from the north are not constant. Vegetation adjacent to the railway line gives some screening, and progressing along the road to the north east the views become oblique and the site is difficult to identify. Views may be possible from the upper storey of the Dock office, which being a substantial building and located at a higher level obscures views from further west in that direction. Lower level views from the west are obscured by adjacent industrial buildings. Views from Barry Town further north are obscured by the buildings located on Dock View Road itself. Views cannot be gained from the new Millennium Way port access road due to intervening vegetation. Views cannot be gained from the railway or from Barry Dock Railway Station for the same reason (**Photograph 9**). Longer distant views can be gained from a residential road (Dyfrig Street)

located on the eastern edge of Barry Island at a distance of 0.7 km. These views are gained in the context of existing industrial buildings to the west and east of the site, and the chemical works in the distance (**Photograph 10**). Views from this direction will also be gained of the approved BioGen Energy Recovery Plant, seen in the foreground. Views of the site from the east/south east are not possible due to intervening dockside development.

2.7 Zone of Visual influence

Figure TAG 3, attached to this evidence shows the photograph viewpoints described above together with a zone of visual influence (ZVI) within which views of the site may be gained. The map does not imply that views will be possible from all points within the zone due to localised screening, but it sets the outer limits of potential views within a 1 kilometre distance. Longer distance views may be gained from higher ground in the location of Victoria Park to the north east but this is at a distance of nearly 1.5 kilometres and over a foreground dominated with other port uses.

2.8 Sensitivity of Receptors

From the baseline studies the following sensitive receptors are identified.

Landscape

The quality of the site itself in terms of ecology and visual appearance is such that it is not considered to be sensitive in respect of any change that might take place.

Visual Impact

Views from within industrial areas are not considered to be sensitive. Views from dwellings are normally considered to be sensitive though this has to be tempered with the understanding that there is no right to a view in planning law. Views from roads are not normally considered to be sensitive as they are transient in nature. Views from public footpaths are

considered to be sensitive if they are used for recreational purposes or are part of the civic realm.

2.9 Baseline Projection

If the site were not to be developed it is likely to remain either in its present condition (i.e. derelict and unused) or it would be redeveloped for some form of acceptable use within the use classes order. Air photograph coverage for the site shows that it was previously used for the storage of large vehicles and containers. The Unitary Development plan shows the site within an existing employment site and within land designated as 'Developed Coast'. The site does not fall within the area known as The Barry Waterfront which is located to the west of the site at a distance of 0.3 km. The location of this development area is identified on plan **TAG 3**. If the site remains un-used it will gradually colonise with maritime scrub vegetation.

3.0 THE APPEAL SITE, IMPACT ASSESSMENT AND EVALUATION

3.1 Construction Phase

3.1.1 The construction phase of development would involve the clearance of the site of existing vegetation, levelling, the excavation of ground for foundations, and the construction of an industrial building with flue stack and external parking areas. It is understood that there will be no external storage. The building size is proposed to be 60x45 metres in plan and 14.08 metres to the ridge. The flue stack indicated on the application plans is 20 metres high though it is understood that this will be lower. The colour of cladding and means of enclosure of the site are as yet undetermined.

3.1.2 Landscape Impacts

In landscape terms it is not anticipated that any impacts of significance will arise. This assessment is based upon the lack of any landscape features on the site worthy of retention, and its current derelict appearance. During the application process a consultation response from the Economic Development and Leisure Department of Vale of Glamorgan Council drew attention to the potential presence of a protected plant species (Rough Marsh Mallow, *Althea hirsuta*). An ecological survey of the site was undertaken by specialist consultants in January 2009 to establish presence or absence of the species. No specimens were found on site and the consultants considered that the habitat was not in general suitable for the establishment of the species though it was acknowledged that the survey was seasonally constrained. The Countryside Council for Wales having studied the report, were also of the view that the timing of the survey was such that the presence of the species could not be ruled out, but were of the view that the presence of the plant on the site would not prevent the development going ahead. They recommended that the site should be searched at the appropriate season and that if plants were

discovered that they could be relocated to a receptor area within the site. The council's view over the matter was that there was no ecological objection to the proposal and that it could be dealt with by condition.

3.1.3 Visual Impact

In terms of visual impact, views of the construction activity including on site plant and possibly cranes will be present for a period of 12 months. Such activity might be seen from properties located on Dock View Road, but mainly from the upper floors of properties. Longer distance views would be gained from residential properties located on Barry Island. These views will be gained in the context of adjacent industrial and dock activity. My assessment of this impact is that it will be negligible.

3.2 Operational Phase

3.2.1 The operational phase refers to the period after the plant has been commissioned and is actively working.

3.2.2 Landscape Impacts

In my opinion there will be no adverse landscape impacts during the operational phase since there are no natural site assets of significance that will be removed. Should the protected species described in my paragraph 3.1.2 above be discovered on the site during the construction phase it would be relocated within the site and managed appropriately.

3.2.3 Visual Impacts

In my opinion the only significant views of the site will be views from domestic property located on Dock View Road and Dyfrid Street. I do not agree that the site is prominent in views from the Waterfront since screening is afforded from views to the west by the ridge of higher ground on which the Dock office is sited, and also by the Nissen huts on Woodham Road itself. In any event the change in visual impact would

amount to the introduction of a new industrial building into a highly industrialised setting. The scale of the new building would be no greater than industrial units constructed to the east of the site. This observation is endorsed by the opinion of the case officer who in preparing the report to Planning Committee stated that

*:as a consequence, the proposed industrial building, while some 14 metres tall would nevertheless relate to the character of nearby use and buildings and have no adverse visual impact on the amenity of the locality. Indeed the only element of the proposal which distinguishes it from any other large industrial building is the proposed 20m (possibly 16 m) high stack. Within its industrial context, however this would similarly have no adverse impact, appearing neither unacceptably prominent or out of character'. An extract from the officer's report is attached to my evidence as **Appendix 3**.*

- 3.2.4 The flue stack would be a maximum of 20 metres high, which is only 6 metres higher than the building itself. Views gained from the properties described above would be gained in the context of substantial structures located on the dockside (**Photographs 5, 6 and 7**), and a major chemical complex with numerous tall and prominent chimneys (**Photograph 10**). The overriding element of the view is however the sea and on clear days the distant coastline of North Somerset. Even without mitigation I would assess any visual impact as negligible (i.e. imperceptible) assuming that the colour of the building and flue stack is appropriate to its surroundings. The flue will not emit any plume of smoke or water vapour and will cause no visual impact as the result.

3.2.5 Impact on Landscape Character

The existing character of the site and its surroundings is that of an industrial dockside landscape. It is described within the Unitary Development Plan as being within the 'developed coast'. The proposed development is considered therefore to be appropriate within its setting and I consider that there will be no adverse impact on landscape character. The site is not located within the Waterfront Regeneration area which is located to the west, and there is no inter-visibility between the two. In support of my assessment of the impact of the development on local character was the conclusion formed by the planning officer in his report to committee where he states:

'It is thus considered that the physical impact of the use and building would neither appear out of character or (be) unacceptably overbearing to the extent that it would cause demonstrable harm to the amenities of those residential properties living near the area.'

3.3 Mitigation

The planning application drawings show the building elevations to be coloured green though it is understood that the choice was indicative. In my opinion, given the location of the building, a palette of mid to dark grey would be more appropriate and we would recommend that the flue stack colour be graded from dark adjacent to the building to light grey above the roof line. Boundary treatments should be simple and be coloured black. On-site soft landscape is not considered necessary for screening purposes, but if required to satisfy bio-diversity objectives could be achieved by simple blocks of salt tolerant native shrubs located immediately adjacent to the boundaries of the site. This matter could be dealt with a standard planning condition.

3.4 Residual Impact of the Development Proposals.

In my opinion the residual landscape and visual impact of the development assuming appropriate attention to building and flue stack colour would be described as 'major beneficial'. It would bring about the development of what is at present an unused and unattractive parcel of land.

4.0 COMPARISON OF IMPACT, APPEAL PROPOSALS AND BIOGEN PROPOSALS

4.1 In December 2009, Vale of Glamorgan Council approved a planning application for a gasification waste to energy plant to be accessed from Atlantic Way within the Barry Docks complex. The proposal is relevant to this inquiry in as much as it would be a similar land use though at a much larger scale, and the Local Authority's handling of the application covered similar issues to the Appeal Site in terms of analysing potential visual impact and assessing the impact of the proposal on the character of the area and in particular the Barry Waterfront. The BioGen site is located to the south east of the Appeal Site at a distance of approximately 400 metres across the number 2 dock and immediately adjacent to an Associated British Ports building occupied by Scott Timber. The location of that site in relation to the Appeal Site and The Waterfront is indicated on my figure **TAG 1** which is a 1:10,000 scale extract from an Ordnance Survey plan.

4.2 The BioGen site incorporates four main elements consolidated into a structure with a maximum height of 27.6 metres high to the ridge of the energy recovery hall. In addition dust filters and 2 silos for dust and lime/carbon will be constructed with heights varying from 15 to 23.8 metres. Turbine and air cooler condenser units will be located outside the main building in an area 26x17 metres and with a height of approximately 10 metres. There will also be an emissions stack 45 metres high and 2.45 metres in diameter. The main building will be 76 metres long and 52 metres wide and have a footprint (excluding condenser units) of approximately 3952 square metres. By contrast the Appeal proposal will be 9.97 metres to the eaves, 14.08 metres high to its ridge, have a chimney of 20 metres height and 0.96 metres diameter, be 60 metres long and 45 metres wide and have a footprint of 2700 square metres. There will

be no external structures within the site. In summary the Appeal proposal has a volume of 47,522 cubic metres and the BioGen main building has an estimated volume of 84,500 cubic metres.

- 4.3 In reporting the proposal to planning committee the planning officer assessed the impact of the BioGen development on the regeneration of the Waterfront. An extract of the report forms **Appendix 4** to my evidence. The report states that:

"the development is considered to be a clean and high quality development which, while significant in terms of its size and scale, would respect its existing industrial context. Moreover the application is located approx 310m at its closest point from the Waterfront development (East Quay adjacent to Cory Way) and some 650m from 'South Quay' adjacent to the docks entrance with the site viewed against its industrial background in the majority of views from the waterfront development area'.

- 4.4 For comparison the Appeal Site is located 250 metres from East Quay and 440 metres from South Quay, but whereas there will be clear and uninterrupted views of the upper superstructure and chimney of the BioGen plant from these directions, (and from future phases of Waterside development), views of the building on the Appeal Site will be largely screened by the existing industrial units located on Woodham Road. Any views gained of the Appeal Site will also be seen in the context of an adjacent industrial background. The planning officer's reports were supportive in both cases, but given the context of a ground for refusal on the basis of adverse impact on the Barry Waterfront in respect of this Appeal it is surely an unsustainable premise that a building of nearly twice the bulk and greater prominence can be considered to be acceptable whereas the Appeal site proposals cannot.

4.5 The greater visual impact of the BioGen proposals, acknowledged as such by the Council, will be south facing views from higher ground to the north including Dock View Road. From that location the building and chimney will be seen silhouetted against the skyline. This will not be the case with the Appeal proposals, however, with only the roof being visible from certain viewpoints and in the context of adjacent industrial buildings of similar stature. Again the refusal of planning permission for one development on the basis of impact on the amenity of local residents cannot surely be sustained when set against the approval of another development that will cause (albeit acceptable) greater impact.

4.6 Cumulative Impacts of the Appeal Proposal and the BioGen proposal

It might be considered that whereas the development of the BioGen site on its own would be acceptable, the additional development brought forward on the Appeal Site would be such to lead to adverse cumulative impacts in landscape terms. I do not agree with that premise for the following reasons.

4.7 Visual Impact and impact on character in relation to residential development to the north

The views from the north are panoramic and take in a matrix of existing industrial buildings within an area of land allocated for industrial and port related uses. The character of the landscape is that of industrial development, the landscape classification is that of 'Developed Coast'. In planning terms the expectation of residents has to be that any vacant site will at some time be developed for a use compatible with its land use designation. The entire area of land between the dock and Millennium way has an employment allocation. The scale of any other development that could take place is unlikely to be less than proposed for the appeal site. The BioGen and Appeal sites are not, in any event physically related.

They are separated by the dock itself and other existing industrial buildings. The larger BioGen site will be seen in the context of the Atlantic Mills building, which is similar in scale to the that proposal, the Appeal site will be seen in the foreground again related to buildings of a similar and much smaller scale. There is no obvious visual linkage and association between the two sites, both lie within an industrial setting though the BioGen site is, as I have already stated, much larger in scale. It is not feasible therefore that any cumulative impacts could arise.

4.8 Cumulative Impact on perceptions and confidence in the aspirations for the waterfront

The same parameters exist in predicting the cumulative impact on the developments on the 'Waterfront' as on residential development to the north. Both developments sit within a land use framework of industrial and dock related development and adjacent to employment allocations. The Waterfront is identified, however, as a separate discrete allocation on the UDP map. (My **Appendix 5**) and the allocation was presumably made in the expectation that the two separate areas could co-exist in land use planning terms. Within the UDP policy framework the visual impact of new industrial development on its surroundings is a material consideration and in the case of the BioGen site the particular scale of that development on the Waterfront was an issue considered by the Local Authority when approving that development. The Local Authority were content that no such impact would arise and had no reservations in that respect about the Appeal Site until formulating the reason for refusal. Taking the two sites together again, in views from the Waterfront the two developments do not sit side by side and there is no visual linkage between the two. Both will be seen in the context of their immediate adjacent surroundings, not as directly associated development.

It would be possible of course for the Waterfront scheme to take account of its location next to the dock area by the introduction of landscaped buffer zones between the two or indeed by the location of employment uses in that area to act as a transition.

5.0 PLANNING POLICY MATTERS – LANDSCAPE ISSUES

5.1 In their refusal notice The Local Authority refer to various Local Planning Policies with which they consider the Appeal Proposals do not comply. Planning policy matters in general are dealt with in a comprehensive manner in the evidence of my colleague Mr Sedgwick. Several of these policies refer to landscape related issues, however, and I set out below my observations on this alleged non-compliance from the viewpoint of my discipline.

5.2 Reason for Refusal 1 – Adverse Impact on the character of the Area

The Local Authority refer to 6 UDP policies in support of their refusal of which 4 have landscape or character related elements.

5.2.1 WAST 2 – Criteria for assessing waste management facilities

Among the criteria is one (vi) that requires a high standard of layout, landscaping and design. The council did not however identify any shortcoming in this respect in their assessment of the application as presented to the planning committee. The proposed building is similar in design to a unit recently constructed to the north east of the site as identified on my figure TAG 3 and my photograph 3. The colour of the cladding and boundary treatments can all be subject to planning condition. My own opinion is that the context of the site is such that a landscape scheme is unnecessary in a predominantly hard dockside environment but again this could be conditioned if thought appropriate.

5.2.2 ENV 27 Design of New Developments

Within this policy is a requirement (i) that new development complements the local character of buildings and open space. Clearly this would be the case as the site is located within an existing industrial area and indeed the redevelopment of the site would lead to an enhancement of character in

replacing a previous open storage use and removing fly tipping and dereliction. Criterion iv) requires that development should minimise any detrimental impact on adjacent areas. As I have demonstrated in my evidence, in respect of potential visual impact, such impact would be minimal. Criterion v) require new development to ensure that existing soft and hard landscape features are protected and complemented by new planting, surface or boundary features. The only soft landscape feature that may be present is the Mallow. A survey at the appropriate season in advance of development commencing would allow the relocation and protection of any species identified and this could be dealt with by a planning condition. If thought appropriate native species shrub vegetation could be established on the boundaries of the site. There are no hard landscape features worthy of retention, but it is proposed to establish new secure boundaries that would be appropriate to the context of the site.

5.2.3 EMP 2 Proposals for New Business and Industrial Development

This policy sets out the criteria that need to be met for new business and industrial developments to be permitted. Criterion iii) requires the size and relationship of any new building and/or alteration or extension to be in proportion to its size and setting. As discussed earlier in this evidence, however, the proposed building is similar in scale to adjacent industrial buildings. Criterion v) requires adequate landscape to be provided. A suitable planning condition could deal with this issue though as previously noted the need for landscape treatment in this particular location is debateable.

5.2.4 EMP 3 – General Industry

Policy EMP 3 deals with General Industry. Criterion i) requires the proposal to be compatible with existing business/industrial/warehousing uses. In terms of visual impact and design the officer's report to committee states that: *'in terms of its wider context it clearly relates primarily to the*

wider industrialised area of Barry Docks'. And 'the area is indisputably industrialised in character and the addition of a new industrial building would, in this context, not appear out of place.' Criteria iii) requires that the nature and scale of the proposed development should not unacceptably affect surrounding uses. Since the surrounding uses are all industrial, with the exception of disused land and a railway to the north, this criterion does not apply.

5.3 Reason for Refusal 2, - Adverse Impact on the Waterfront Developments

5.3.1 The Council refer to Policies ENV 25, ENV 27 and the Barry Waterfront Development Principles, Supplementary Planning Guidance in this reason for refusal.

5.3.2 Policy ENV 25- Regeneration of Urban Areas

This policy seeks to improve the quality of the urban fabric, particularly within the former dockland of Barry and Penarth. Paragraph 3.9.4 of the reasons and explanation for the policy states that:

'Special attention has been paid to the regeneration of the former dockland at Penarth and Barry for residential, retail, leisure and business use. Schemes for the regeneration of both docklands have commenced and it is envisaged will be completed during the plan period.'

The location of the Barry Waterfront in relation to the Appeal site is shown on my Figure TAG 1 which is included within my appendices. It can be seen that the Appeal Site does not fall within the Barry Waterfront. The Appeal Site is located within an area designated within the adopted Unitary Development Plan as 'Developed Coast', and as an existing Industrial development Site. I attach as **Appendix 5** an extract from the Vale of Glamorgan UDP map annotated to show the Appeal Site Location. It can be seen that the Appeal Site is separated from the Waterfront by

existing industrial units. It is difficult to understand how the Appeal proposal can conflict with this policy. The site was previously used for the storage of containers and this use could be continued without the need for planning permission. The Appeal proposals will lead to enhancement of the site which will benefit the Waterfront rather than detract from it.

5.3.3 ENV 27 Design Of New Developments

The relevant criteria in respect of this policy are discussed in paragraph 5.2.2 above.

5.3.4 The Barry Waterfront Development Principles

I have studied this document which is a design brief for the Waterside itself. It does not refer to the adjacent working docks other than in terms of general context, nor does it even suggest the need for buffer landscape between the two elements, though of course given the large extent of the Waterside development this would be entirely possible. I note also that the current proposals for the Waterfront include areas closer to the existing industrial dock side uses than indicated on the adopted Unitary Development Plan and presumably the selection of the areas concerned was made in the knowledge and understanding that the existing uses would be compatible with those proposed.

6.0 SUMMARY AND CONCLUSIONS

6.1 Location and Context

The location and context of the site is shown on **Plan TAG 1** appended to this evidence. The site is located within the Barry Dock complex. The town centre is located to the northwest at higher level. Adjacent to the site to the west are a row of Nissen type industrial buildings. To the east of the site is open, unused land and a number of fairly modern warehouse or industrial buildings, a scrap metal yard and a haulage depot. To the south of the site is the number 2 dock and beyond the dock is a grain mill, substantial industrial buildings and open storage of containers and pallets. A large chemical works complex is present to the north east, The nearest residential development is located on Dock View Road to the north and at a distance of 370 metres..

6.3 Site Characteristics

The site extends in area to 0.77 ha. It is flat and open with formal boundary enclosure only to the east. There are no buildings present on the site. An ecological survey of the site was undertaken by specialists. In landscape terms it is derelict and strewn with litter and fly tipping. **Photograph 1** shows the nature of the site itself and a plan showing the site as existing is attached to this evidence as **TAG 2**.

6.4 Landscape Policy and Designations

Neither the site nor adjacent land is subject to any National or Local designation in landscape terms. An Area of Special Landscape is located to the north of Barry, but there is no intervisibility between the two. The location of the ASL is shown on **Appendix 2**. The Appeal site falls within the 'Barry' landscape area. The classification for the site and its surroundings for visual and sensory factors is rated as '**Urban**' and the evaluation is '**Low**'.

6.5 Visual Amenity and Prominence

The site is open to view from the immediately adjacent road network. Distant views are possible from higher ground to the north along Dock View Road (**Photographs 5, 6, 7 and 8**). The views of the Appeal Site from the north are not constant, and are in the context of existing industrial buildings. Views from Barry Town further north are obscured by the buildings located on Dock View Road itself. Longer distant views can be gained from a residential road (Dyfrig Street) located on the eastern edge of Barry Island at a distance of 0.7 km. These views are gained in the context of existing industrial buildings to the west and east of the site, and the chemical works in the distance (**Photograph 10**). Views from this direction will also be gained of the approved BioGen Energy Recovery Plant, seen in the foreground. Views of the site from the east/south east are not possible due to intervening dockside development. **Figure TAG 3**, shows the photograph viewpoints described above together with a zone of visual influence within which views of the site may be gained.

- 6.6 If the site were not to be developed it is likely to remain either in its present condition (i.e. derelict and unused) or it would be redeveloped for some form of acceptable use within the use classes order. The Unitary Development plan shows the site within an existing employment site and within land designated as 'Developed Coast'. The site does not fall within the area known as The Barry Waterfront which is located to the west of the site at a distance of 0.3 km.

6.7 Impact Assessment and Evaluation- Construction Phase

- 6.7.1 The construction phase of development would involve the clearance of the site of existing vegetation, levelling, the excavation of ground for foundations, and the construction of an industrial building with flue stack and external parking areas. It is understood that there will be no external storage. The building size is proposed to be 60x45 metres in plan and

14.08 metres to the ridge. The flue stack indicated on the application plans is 20 metres high though it is understood that this will be lower. The colour of cladding and means of enclosure of the site are as yet undetermined.

6.7.2 In landscape terms it is not anticipated that any impacts of significance will arise. This is based upon the lack of any landscape features on the site worthy of retention, and its current derelict appearance. The ecological survey of the site was undertaken to establish presence or absence of a protected species. Neither the Countryside Council for Wales, nor the Council considered that if the species were present that it would prevent the development proceeding.

6.7.3 Visual Impact

Views of the construction activity including on site plant and possibly cranes will be present for a period of 12 months. Such activity might be seen from properties located on Dock View Road, Longer distance views would be gained from residential properties located on Barry Island. These views will be gained in the context of adjacent industrial and dock activity. My assessment of this impact is that it will be negligible.

6.7.4 Operational Phase

In my opinion there will be no adverse landscape impacts during the operational phase since there are no natural site assets of significance that will be removed. In terms of visual impact the only significant views of the site will be views from domestic property located on Dock View Road and Dyfrid Street. My assessment of impact is shared by the Local Authority planning officer who stated in his report to committee that the only element which distinguished it from any other large industrial building was the stack and that within its industrial context there would be no adverse impact. An extract from the officer's report is attached to my

evidence as **Appendix 3**. Even without mitigation I would assess any visual impact as negligible.

6.7.5 Impact on Landscape Character

The existing character of the site and its surroundings is that of an industrial dockside landscape. The proposed development is considered therefore to be appropriate within its setting and I consider that there will be no adverse impact on landscape character.

6.7.6 Mitigation

The planning application drawings show the building elevations to be coloured green. In my opinion, a palette of mid to dark grey would be more appropriate and we would recommend that the flue stack colour be graded from dark adjacent to the building to light grey above the roof line. In my opinion the residual landscape and visual impact of the development would be described as 'major beneficial'. It would bring about the development of what is at present an unused and unattractive parcel of land.

6.8 Comparison of impact, appeal proposals and BioGen proposals

6.8.1 In December 2009, Vale of Glamorgan Council approved a planning application for a waste to energy plant within the Barry Docks complex. The BioGen site is located to the south east of the Appeal Site across the number 2 dock. The BioGen site has a structure with a maximum height of 27.6 metres high, There will also be an emissions stack 45 metres high. By contrast the Appeal proposal will be 14.08 metres high, and have a chimney of 20 metres height. It will have a building footprint and mass much smaller than the BioGen proposal.

6.8.2 In reporting the proposal to planning committee the planning officer considered that the BioGen development would have no adverse impact on the regeneration of the Waterfront. An extract of the report forms **Appendix 4** to my evidence. In comparing the location and scale of the BioGen site with the Appeal site it is my opinion that the Appeal site proposals would also have no adverse impact. In my opinion it is an unsustainable premise that a building of nearly twice the bulk and greater prominence can be considered to be acceptable whereas the Appeal site proposals cannot.

6.8.3 Cumulative Impacts

It might be considered that whereas the BioGen proposal would be acceptable on its own, the Appeal Site proposals would in some way 'tip the balance' and lead to an unacceptable impact, both on the amenity and character of local residential areas and also on the setting and perception of the Waterfront. I have addressed both issues in my evidence and I conclude that such cumulative impact will not arise, in particular because the two developments will not be viewed in any associative way, but as separate developments in an industrial context. I attach a relevant abstract from the UDP map on **Appendix 5**.

6.9 Planning Policy Matters- Landscape Issues

6.9.1 In their refusal notice The Local Authority refer to various Local Planning Policies with which they consider the Appeal Proposals do not comply. Several of these policies refer to landscape related issues, however, and I set out in my evidence my observations on this alleged non-compliance. It is my opinion that none of the 4 landscape related UDP policies cited by the Local Authority in support of their reason for refusal 1 are actually breached. All the issues raised can be dealt with by planning condition if necessary. In terms of Reason for refusal 2, the Local Authority refer to

Policies ENV 25, ENV 27 and the Barry Waterfront Development Principles.. Again I set out in my evidence an analysis of those policies in relation to the Appeal site and conclude that no breach of policy would occur. In particular I highlight the lack of inter-visibility between the Appeal Site and the Waterfront development.

6.10 Conclusion

In conclusion I consider that there will be no adverse visual or landscape character impacts on either the adjacent residential areas or the Waterfront development arising from the Appeal site proposals and a refusal of planning permission on those grounds cannot be sustained.

TOWN AND COUNTRY PLANNING ACT 1990

**Appeal by
SUNRISE RENEWABLES LTD**

**PROPOSED RENEWABLE ENERGY PLANT
AT WOODHAM ROAD, BARRY**

**APPENDICES TO PROOF OF EVIDENCE
OF
DAVID APPLETON NDH MA MLI
CHARTERED LANDSCAPE ARCHITECT**

APRIL 2010



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Photographs, Sheets 1 and 2

APPENDIX 1

Criteria used for determining the significance of impacts

Significance of Impacts

Landscape Criteria

The following criteria were used to determine the impacts on the landscape:

1. The quality and value of existing features.
2. The ability of the landscape to absorb new features.
3. The scale and degree of change.

The significance of landscape impacts is defined as follows:

Major (positive) The proposed scheme would improve the quality of the landscape through the removal of damage caused by existing land-use and the introduction of new appropriate landscape features. It would strengthen the landscape character.

Moderate (positive) The proposed scheme would improve the quality and character and fit in well with the scale, land-form and pattern of the landscape. It would enable the restoration of valued characteristics partially lost through current and previous land uses.

Minor (positive) The proposed scheme would improve the quality of the landscape through removal of damage caused by current and previous land-use. It would fit well with the landscape character.

Negligible An imperceptible change in landscape character the proposed scheme would be absorbed into the wider landscape type and the existing landscape quality would be maintained.

- Minor (adverse)** The loss of only a limited amount of valuable natural features. Changes in character of very local significance. The proposed scheme would not be easily absorbed into the land-form and the scale of the landscape impacts could be fully mitigated.
- Moderate (adverse)** The loss of vegetation/natural features considered to be over mature or lacking visual diversity. The proposed scheme would be out of scale and not fit into local landscape patterns and land-forms. Mitigation possible.
- Major (adverse)** The loss of valuable mature vegetation with a life span or other natural features that cannot be replaced within a time-scale of 25 years. Proposals would be a complete variance with the land-form, scale and pattern of landscape. They would permanently degrade, diminish or destroy the integrity of valued, characteristic features, elements and/or their setting. Impacts would cause a very high quality landscape to be permanently changed and its quality diminished. The proposed scheme could not be fully mitigated and may cumulatively amount to a severe effect.

Visual Amenity Criteria

An assessment was made in terms of the significance of perceived impact by the following criteria:

1. The receptor's sensitivity and activity type. Receptors that have a greater awareness of the view such as residential occupiers and walkers will notice the introduction of new features more than those who are not absorbing the view.
2. The distance of the viewpoint from the proposed site. The greater the distance of the viewpoint from the feature the less detail is observable and it becomes more difficult to distinguish the feature from the background.
3. The duration of the perceived impact. The number of potential receptors will increase as the duration of the impact increases.
4. The scale and degree of the proposed scheme. The greater the proportion of the view that is taken up by the proposed feature the greater the impact.
5. The elevation of the proposed feature from the viewpoint. If the proposed feature is viewed against the sky then the impact will be greater than if the feature is viewed against a background.

The significance of the visual amenity impacts is defined as follows:

Major (positive) Improving visual amenity of highly sensitive receptors. Improvement of a view from recognised and important viewpoints, several public views and at close quarters.

Moderate (positive) Improvement of visual amenity of sensitive receptors at some distance.

Minor (positive) Improvement of visual amenity to a limited number of receptors or inconsequential viewpoints. A view that would be transient in nature or the proposed

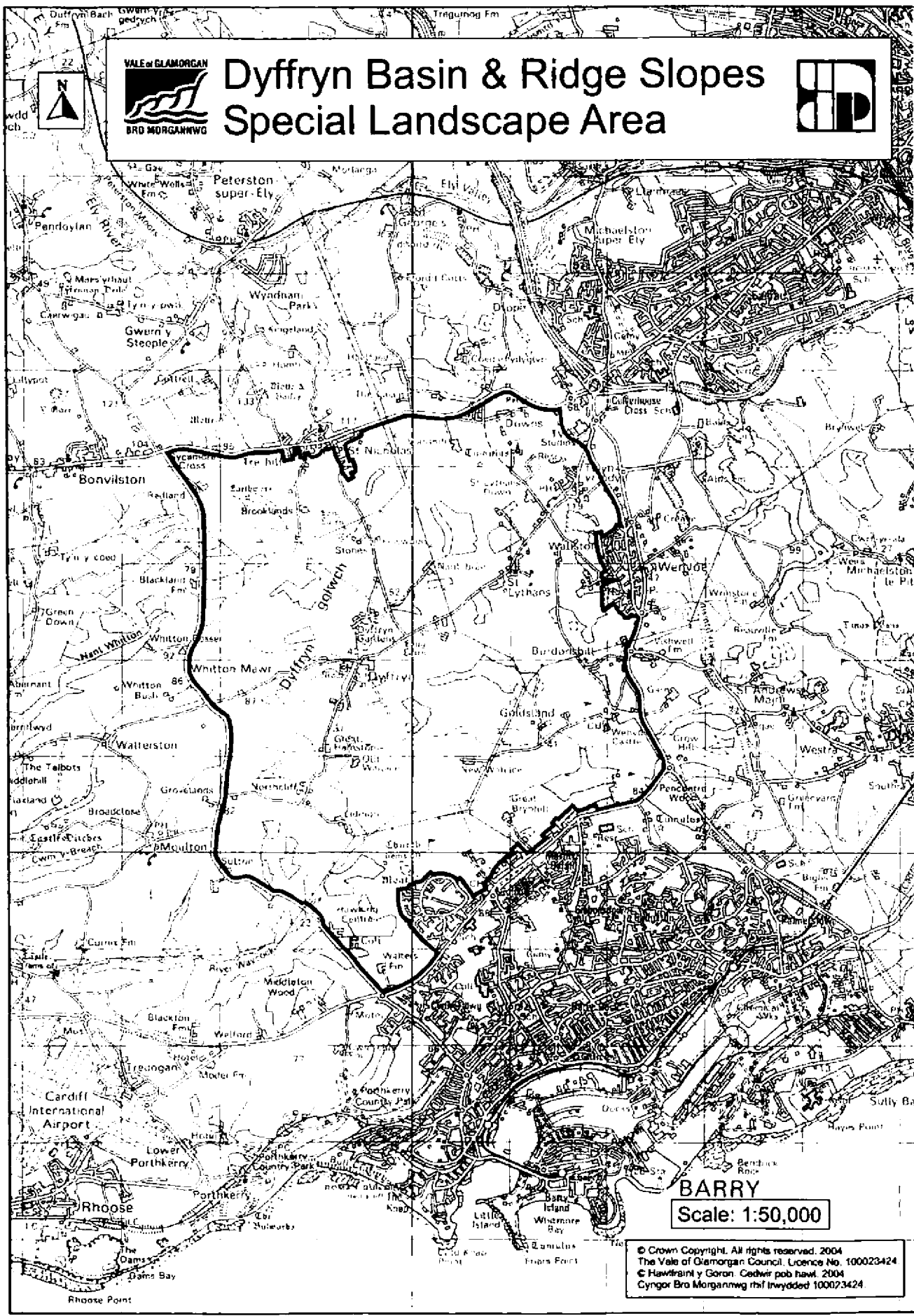
- scheme would only be partially seen from viewpoints.
- Negligible** Only a very small part of the proposed scheme would be discernable and/or at such distance that it would scarcely be appreciated.
- Minor (adverse)** The proposed scheme constitutes only a minor component of the wider view, which might be missed by the receptor. Awareness of the proposed scheme would not have a marked effect on the overall quality of the view.
- Moderate (adverse)** Proposals may form a visible and recognisable new intrusive element within the overall scene and be readily noticed by receptor. Deterioration of the visual amenity to a limited number of receptors, or inconsequential viewpoints. View that would be transient in nature or only partly seen from viewpoints.
- Major (adverse)** The proposed scheme would form an intrusive and immediately apparent part of the scene which changes and affects the entire view. Significant deterioration of visual amenity of highly sensitive receptors or deterioration to views from recognised and important viewpoints.

APPENDIX 2

Extract from 'Design in the Landscape' SPG



Dyffryn Basin & Ridge Slopes Special Landscape Area



BARRY
Scale: 1:50,000

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 Cyngor Bro Morgannwg rhif Inwydded 100023424.

APPENDIX 3

Extract from Officer's Report to Committee

4. Visual Impact / Design.

The application site is located to the immediate east of the industrial/ commercial units within the old Nissen huts on Woodham Road; and has most recently been occupied by an industrial use with storage containers etc. (such use having recently been cleared).

The site is clearly visible from Fford y Milleniwm and higher ground (Dock View Road etc) to the north, and (up close and at a distance) from Barry Island and the Waterfront in general to the west, as well as generally from the Docks. Nevertheless, in terms of its wider context, it clearly relates primarily to the wider industrialised area of Barry Docks.

As a consequence, the proposed industrial building, while some 14 metres tall, would nevertheless relate to the character of nearby use and buildings, and have no adverse visual impact on the amenity of the locality. Indeed, the only element of the proposal which distinguishes it from any other large industrial building is the proposed 20m (possibly, 16m) high stack. Within its industrial context, however, this would similarly have no adverse impact, appearing neither unacceptably prominent or out of character.

While it is appreciated that the Docks are overlooked by houses from an elevated height in and around Dock View Road – with the visual impact of the proposal on residential amenity having been raised in local representations, including matters relating to the impact on or loss of view - the area is indisputably industrialised in character and the addition of a new industrial building would, within this context, not appear out of place.

In addition, the industrial process would take place entirely within the building, other than the delivery/ off loading of timber (which would be to the southern side of the building, and therefore primarily screened from views from the north) and the majority of the site would be open/ landscaped.

Conditions would be required on matters including materials, landscaping, no open storage, and external lighting (of site and building).

For those reasons discussed in greater detail above, it is thus considered that the physical impact of the use and building would neither appear out of character or unacceptably overbearing to the extent that it would cause demonstrable harm to the amenities of those residential properties living near the area. Accordingly, it is concluded that the proposal would not have any unacceptable visual impact, and would accord with the objectives of the policies listed in the policy section above, including WAST2, ENV27, COMM8, EMP2 and EMP3.

5. Traffic Management / Access.

The application has been accompanied by a Transport Assessment and a Green Travel Plan (GTP), with the Transport assessment (and accompanying Planning Statement) advising as follows:

APPENDIX 4

BioGen Energy Recovery Proposals

In response to the above concerns, the overall heights of the building have been reduced, and a more 'curved' solution offered to the fins on the building, which have somewhat softened the impact of the building, if not providing a wholly new or outstanding example of industrial architecture. Nevertheless, although the building's design is not dramatically contemporary or unique, it is considered to satisfactorily respect its prominent location and relationship between the light/heavy industrials areas and the predominantly residential areas nearby (including the waterfront development area).

In considering the physical impact of the development, on request, the applicants have also provided figures and cross-sections demonstrating the height of the buildings compared to local landmarks, in order to contribute to an assessment of such landscape impact. In this respect it is notable that the ridge height to the proposed Energy Recovery Hall is 27.6m AOD, compared to 29.2m to the ridge of the Council's Dock Office, and 34.9m to the ridge of the Atlantic Mills building. This is considered to demonstrate that the building will undoubtedly become a landmark insofar as it would exceed all but the Dock Office and Atlantic Mills buildings in the immediate area, while its 45m stack would clearly exceed all but the stacks on the chemical works to the east. This in itself, however, does not make the development unacceptable.

Impact on Regeneration of Waterfront

A number of representations have raised concerns about the impact of allowing such substantial (and in their eyes harmful) development so close to the waterfront redevelopment area, considering that this would have an adverse effect on its regeneration and general visual amenity.

These views are acknowledged, and clearly the impact of such a substantial new development in the area upon the waterfront is a material consideration.

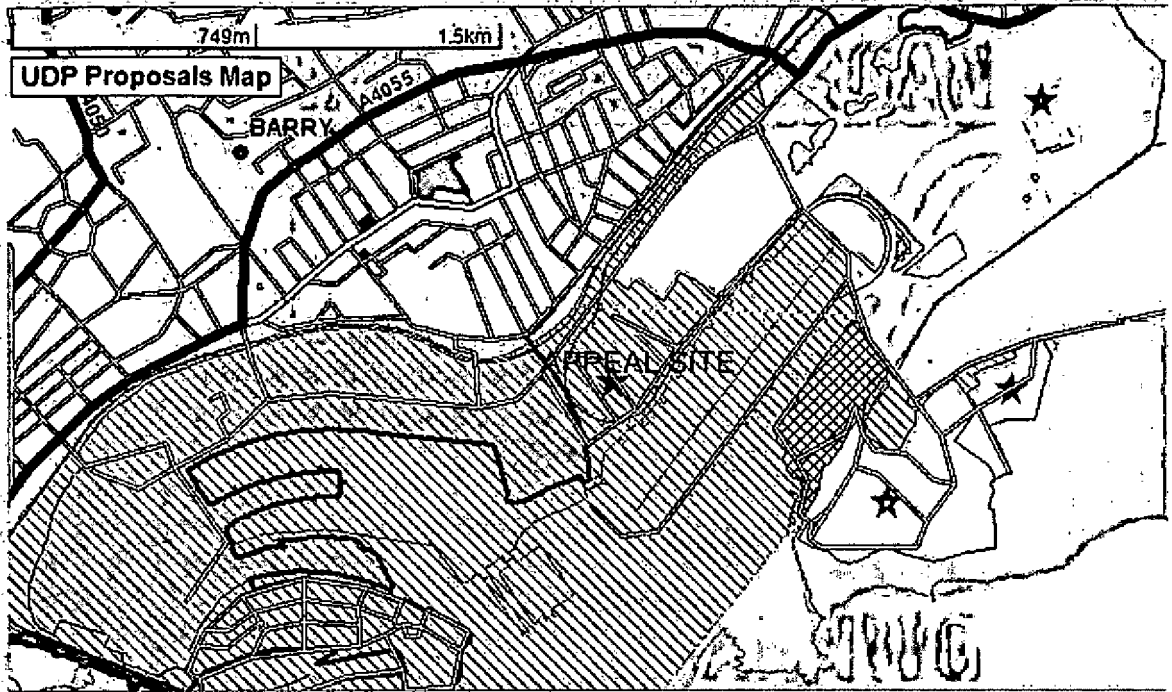
Nevertheless, for the reasons given above, the development is considered to be a clean and high quality development which, while significant in terms of its size and scale, would respect its existing industrial context. Moreover, the application site is located approx 310m at its closest point from the Waterfront development (East Quay adjacent to Cory Way) and some 650m from 'South Quay' adjacent to the docks entrance, with the site viewed against its industrial background in the majority of views from the waterfront development area.

Accordingly, although the proposed development would undoubtedly stand out in local views, it is considered that the relationship of the site and development to the Waterfront as a whole is such that it would not unacceptably detract from either the prospects of such regeneration going ahead (an application for outline consent for mixed use is due to be submitted shortly), nor would it detract from the high quality mixed use development the Council will be actively requiring through such submissions. In this respect, it is also noted that the applicant has submitted a letter of support from the consortium developing the Waterfront

Furthermore, the development has the potential to make a positive contribution to the regeneration of Atlantic Way and the Atlantic Trading Estate as a whole, given the investment in a high quality, visually-appealing development, which may also attract other higher quality developments to the locale.

APPENDIX 5

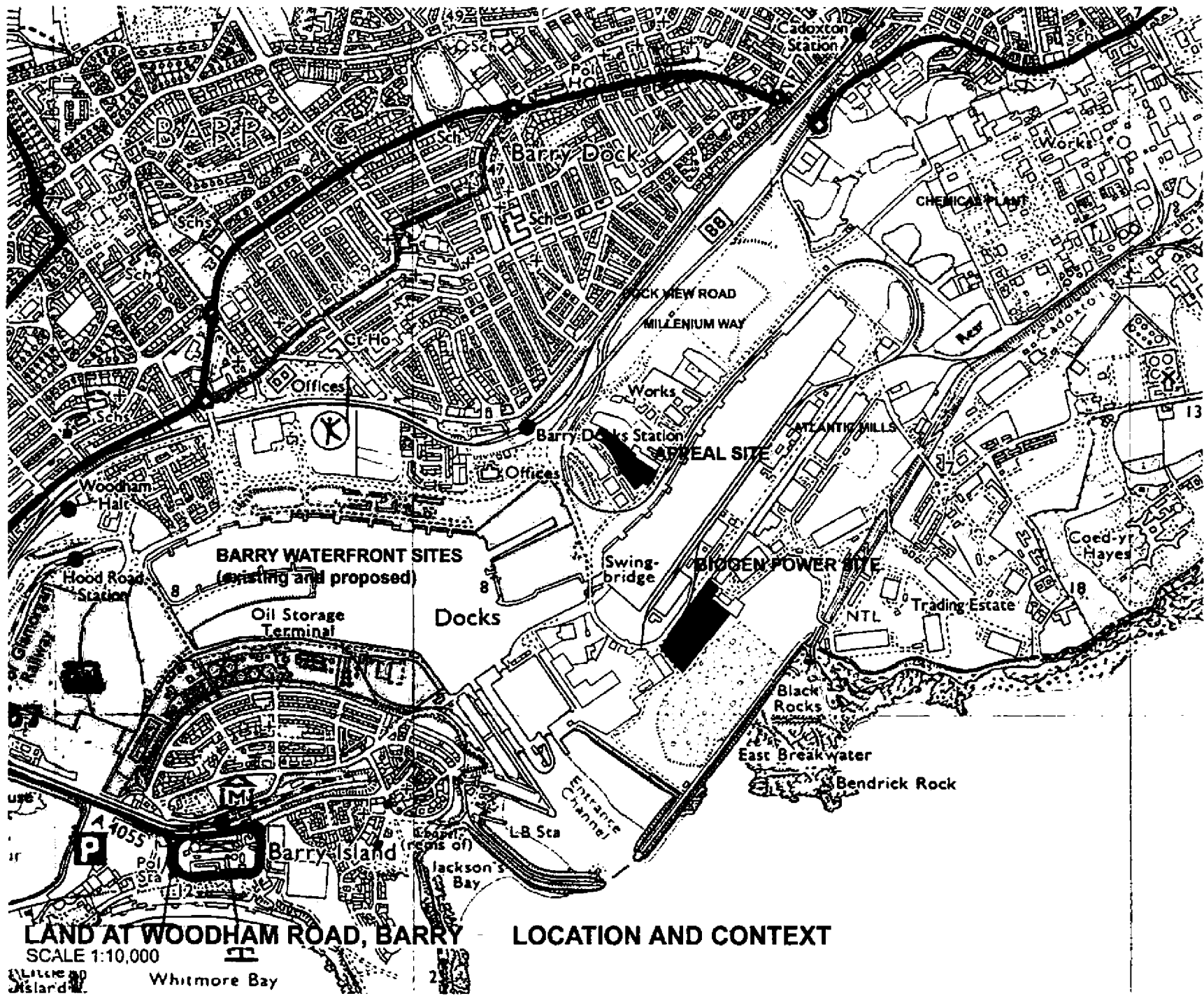
Extract from Vale of Glamorgan UDP



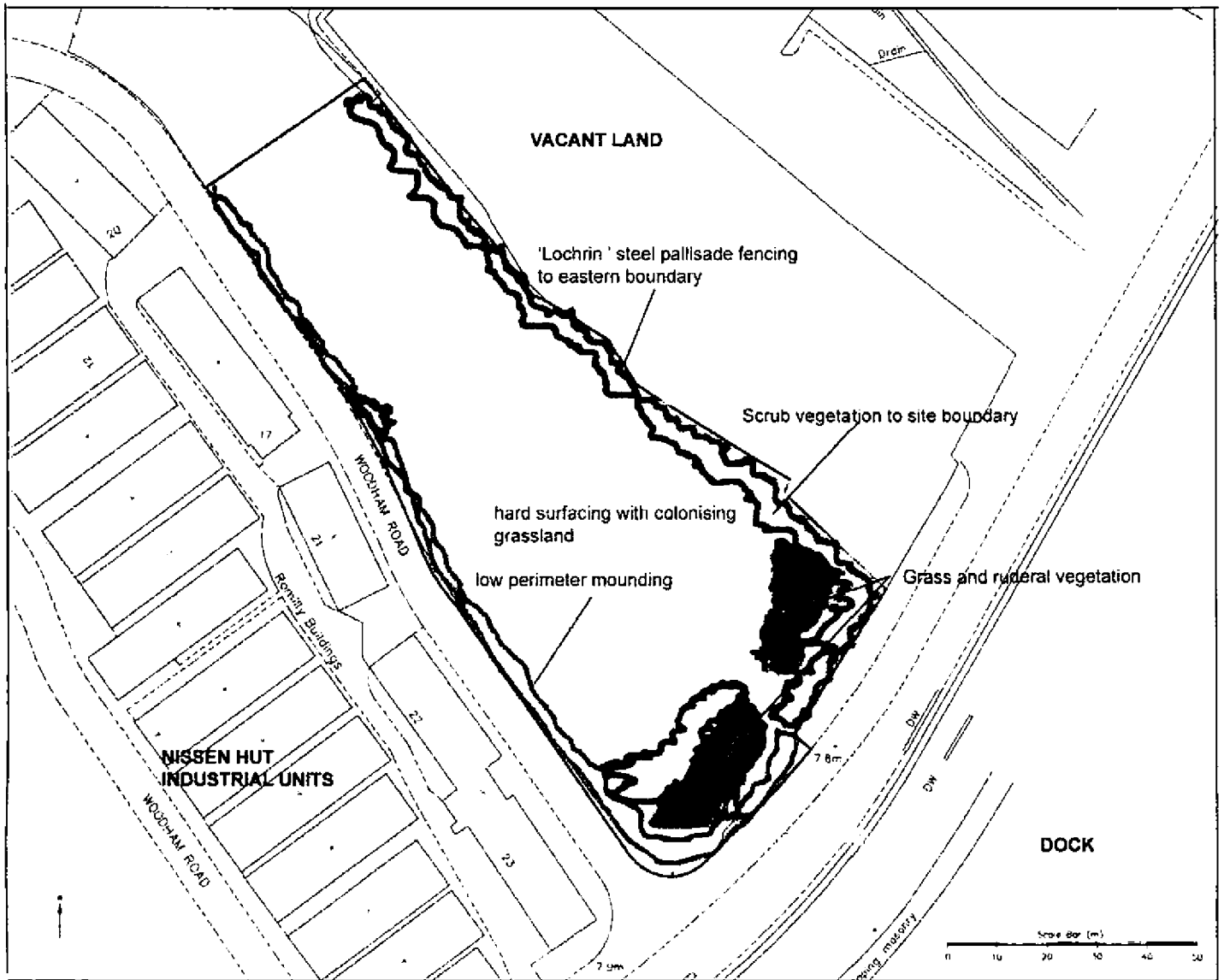
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[-] Environment		
<input checked="" type="checkbox"/>	▨	Developed Coast
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[-] General		
<input checked="" type="checkbox"/>	□	Comprehensive Redevelopment Area
[-] Housing		
<input checked="" type="checkbox"/>	▨	Residential Allocation
<input checked="" type="checkbox"/>	□	Residential Settlement Boundary

KEY

WOODHAM ROAD, BARRY
EXTRACT FROM UDP MAP

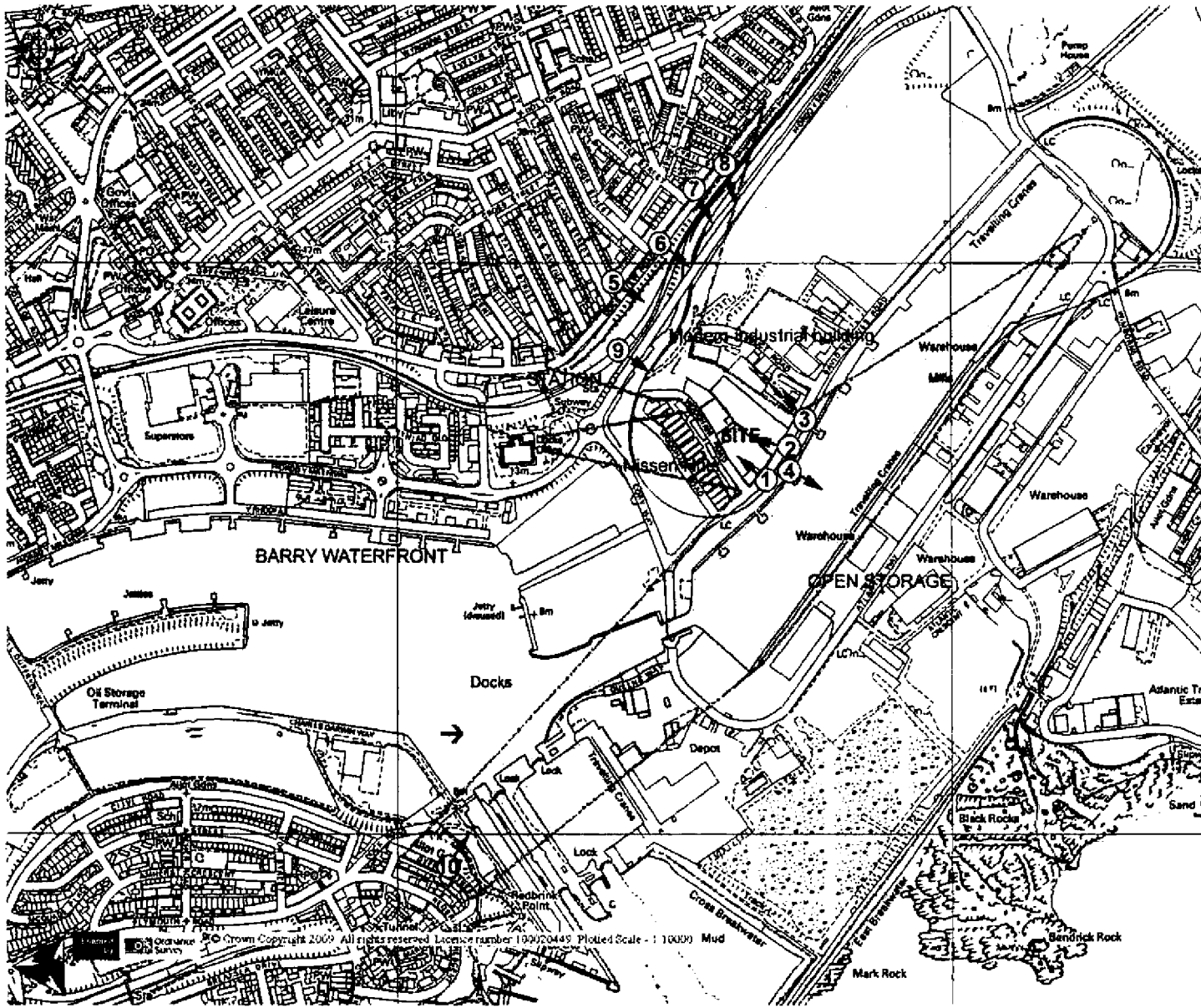


TAG 1



Land at Woodham Road, Barry

Site character



NOT TO SCALE

1 KILOMETRE

Land at Woodham Road, Barry Photograph location



Photograph 1, Panorama of site from southern boundary

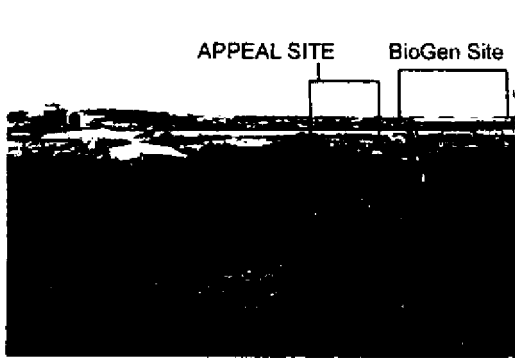


Photograph 2, Looking towards eastern boundary from adjacent site Photograph 3, Adjacent site to east and new industrial building

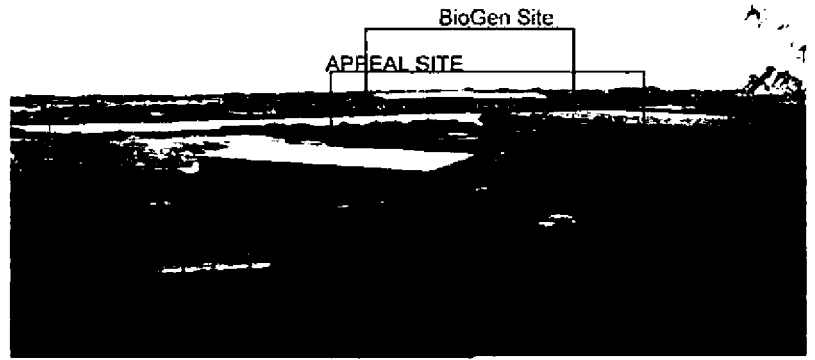


Photograph 4, Panorama of dockside south of site

Land at Woodham Road, Barry Photographs showing



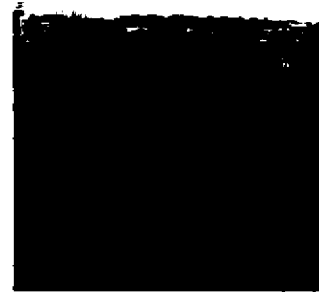
Photograph 5, View of site from Dock View Road/ Castleland Street Junction



Photograph 6, View from Dock View Road near Sea View Labour Club.

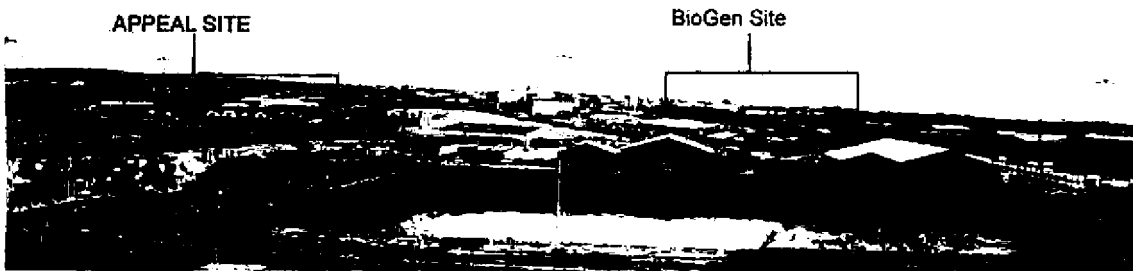


Photograph 8 View from Dock View Road, Opposite no 162



Photograph 9 View from Dock View Road

Photograph 10 View from outside number 14, Dyfrid Street, Barry Island
Appeal site is to rear of nissen huts



NOTE: SITE
AND NOT C

Land at Woodham Road Barry Photographs sheet

15 00 03 1 OUT

Power Consulting Midlands Ltd

**Renewable Energy Plant at Woodham Rd. Barry
Ecological Assessment Prepared for
Sunrise Renewables (Barry) Ltd**

November 2014

1. Introduction

- 1.1 The Applicant, Sunrise Renewables (Barry) Limited, is developing a renewable energy plant based on an advanced conversion technology (ACT) at Woodham Road, Barry, CF63 4JE within the Port of Barry (the "Project").
- 1.2 The principle of establishing a wood fuelled power plant at the Project site was established by planning permission reference 2008/01203/FUL, as approved by appeal reference APP/Z6950/A/09/2114605 on 2nd July 2010 (the "2010 Permission").
- 1.3 Power Consulting Midlands Ltd (PCML) has been commissioned by the Applicant to review the ecological considerations pertaining to the site and consider the applicability of the RSK Carter Ecological Survey for *Althaea Hirsuta* (Rough Marsh Mallow) submitted in support of the 2010 Permission in the context of their re-application for a similar plant to be submitted in November 2014.
- 1.4 The RSK Carter Ecological Survey dated from 2009 (the "2009 Report") is attached to the present report.
- 1.5 PCML considers that this review must address two fundamental issues :-
 - (1) Have conditions at the site changed materially in a way that would alter the ecology and consequently invalidate the conclusions in the 2009 Report?
 - (2) Is there currently any evidence of the presence of *Althaea Hirsuta* at the site.

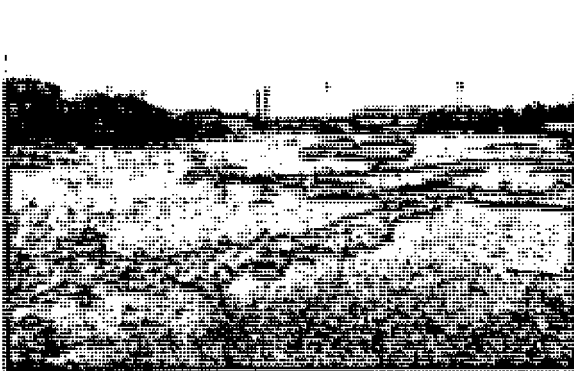
2. Original Report Conclusions

- 2.1 The survey issued by RSK Carter dated 23rd January 2009 considers the suitability of the site as a habitat for a legally protected plant species, viz. *Althaea hirsuta* (Rough Marsh-mallow), which has been recorded in the ten-kilometre grid-square. It provides background information on the species (hereafter generally referred to as *Althaea*), describes the site and its vegetation, and evaluates the likelihood of *Althaea* being present.
- 2.2 Prior to the site visit, a brief desk-based data-search of published sources was carried out to obtain information on *Althaea hirsuta* (Rough Marsh-mallow).
- 2.3 The site was thoroughly searched for evidence of *Althaea* and the habitat and vegetation types were described.
- 2.4 The report concludes that the absence of *Althaea* cannot absolutely be ruled out from a January survey, and it is always possible that there might be dormant seeds that could germinate in the future. However, the failure to find *Althaea* or similar malvaceous species, considered together with the strongly ruderal character of the site and the lack of previous records, make it very unlikely that *Althaea hirsuta* (Rough Marsh-mallow) is present.

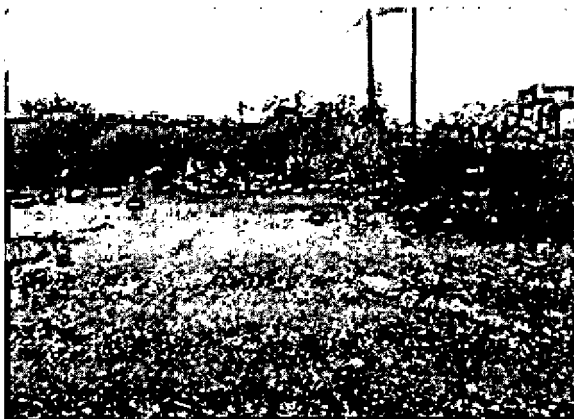
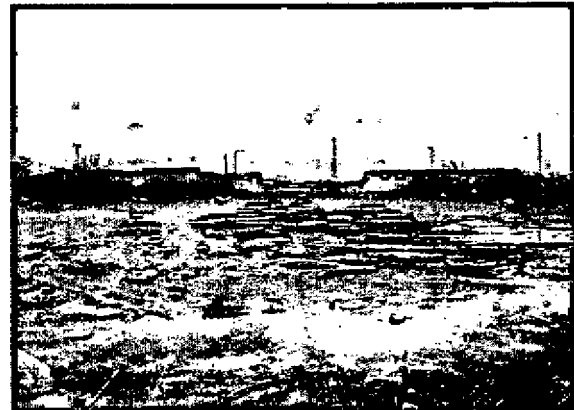
3. 2014 Site Visit and Further Search for Evidence of *Althaea*

3.1 Below two photographs taken during the 2008 survey are set out alongside recent photographs taken from approximately the same position during the site visit on 21st Nov 2014.

2014



2008



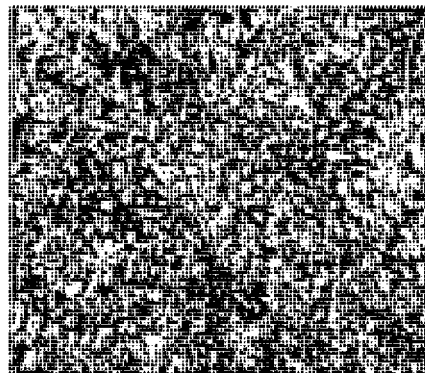
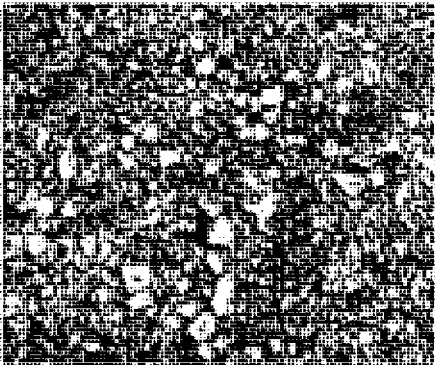
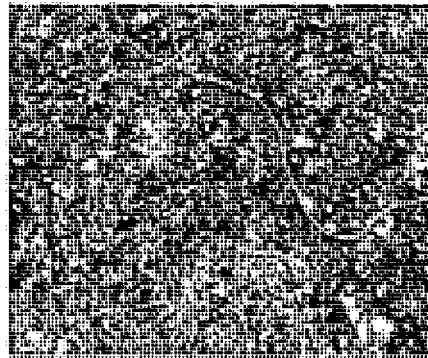
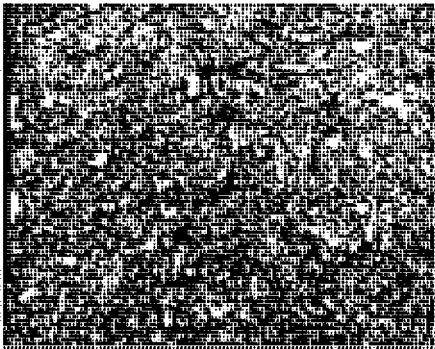
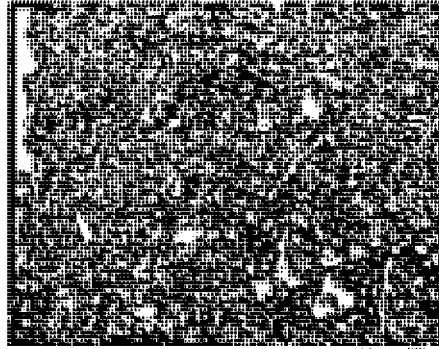
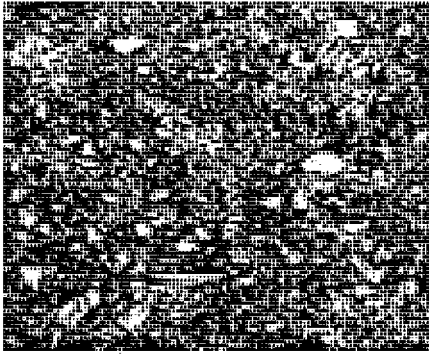
3.2 It can be seen that no material changes have taken place to the topography of the site and that the current ecology is visually consistent with that which existed at the site in 2008.

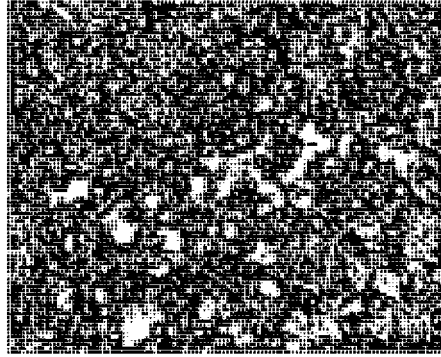
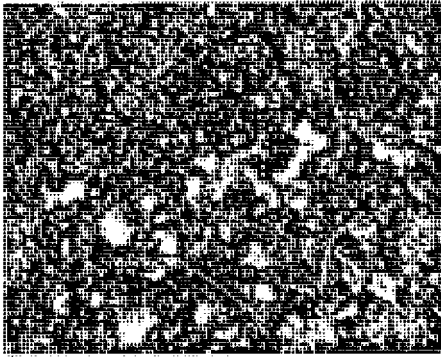
3.3 A thorough and systematic search of the site on 21st November 2014 was carried out and, consistent with the 2008 result, no evidence of the existence of *Althaea Hirsuta* was found. The search also revealed that the various species currently present at the site are consistent with those species recorded during the 2008 survey.

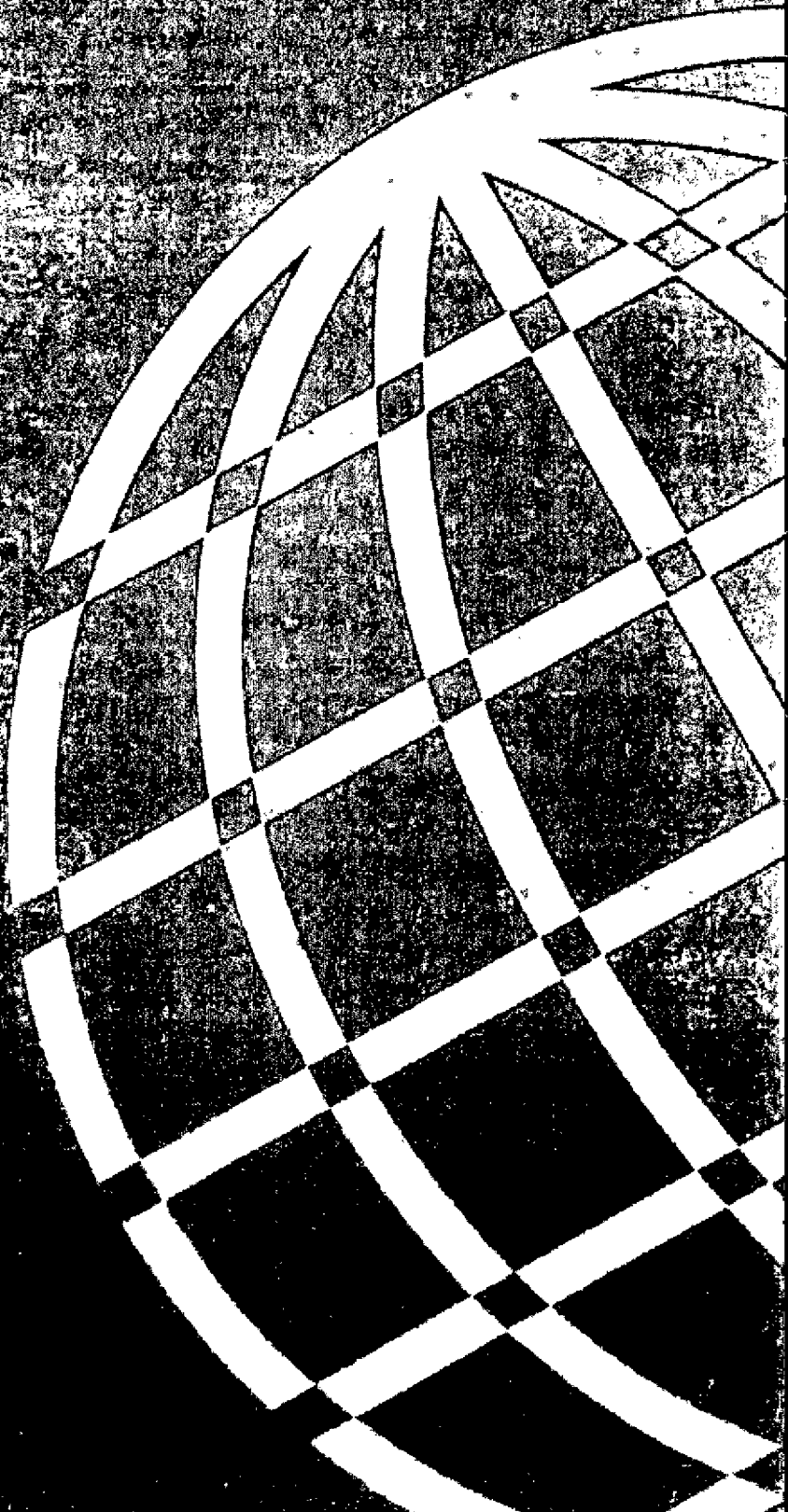
3.4 PCML can therefore confirm the findings of the 2009 report ie. that the failure to find *Althaea* or similar malvaceous species, considered together with the strongly ruderal character of the site and the lack of previous records, make it very unlikely that *Althaea hirsuta* (Rough Marsh-mallow) is present.

24 November 20

4. Photographs taken during the Survey on 21st November







**PROPOSED BIOMASS
POWER PLANT,
BARRY, SOUTH
WALES**

**SURVEY FOR
ALTHAEA HIRSUTA
(ROUGH MARSH-
MALLOW)**

**Prepared for Sunrise
Renewables**

January 2009

RSK GENERAL NOTES

Project No: P660003

Title: Proposed Biomass Power Plant, Barry, South Wales
Survey for *Althaea Hirsuta* (Rough Marsh-mallow)

Client: Sunrise Renewables

Issue Date: 23rd January 2009

Issuing Office: Manchester

Authorised by: Rob Domeney Project Manager Date: 23/12/08

Authorised by: Sarah Harmer Project QA Rep Date: 23/12/08

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Where field investigations have been carried out, these have been restricted to a level of detail required to achieve the stated objectives of the work.

This work has been undertaken in accordance with the Quality Management System of RSK Environment Ltd.

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This report has been prepared by RSK Carter Ecological Limited, with all reasonable skill, care and diligence within the terms of the Contract with the client.

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1**INTRODUCTION****1.1 Purpose of the Report**

This report details a survey of a land-parcel at Barry Docks (OS Grid Reference ST 126 676) to assess its suitability for a legally protected plant species, viz. *Althaea hirsuta* (Rough Marsh-mallow), which has been recorded in the ten-kilometre grid-square. It provides background information on the species (hereafter generally referred to as *Althaea*), describes the site and its vegetation, and evaluates the likelihood of *Althaea* being present.

The survey was commissioned by Sunrise Renewables Ltd and carried out by a botanist from RSK Carter Ecological Ltd on 12th January 2009.

1.2 Site Context

The site comprises a roughly rectangular parcel of derelict land on the north side of Barry Docks bordered by Woodham Road and David Davies Road to the west and south, and areas of derelict land to the east and north (containing hard standing and rough grassland with scattered scrub). A strip of grassland and a railway line separate the site from the wet dock to the south and there is a row of commercial buildings to the west. The wider landscape features a mixture of industrial and post-industrial habitats including a large expanse of newly colonising grassland on derelict land to the west.

1.3 Contents of the Report

This report is set out as follows:

- *Section 1* provides introductory material;
- *Section 2* describes the desk-study and survey methods;
- *Section 3* presents and discusses the results;
- *Section 4* gives references;
- *Section 5 (Appendix A)* gives a plant species list; and
- *Section 6 (Appendix B)* contains plates.

Plant nomenclature in this report follows Stace (1997). Plant names in the text are given with scientific names first, followed by the English name in brackets. Doubtful identifications are preceded by 'cf.' placed before the specific epithet where the plant is very probably the species indicated, but it is impossible to distinguish it from similar members of the genus with certainty.

2

METHODS**2.1 Background Data Search and Site Visit**

Prior to the site visit, a brief desk-based data-search of published sources was carried out to obtain information on *Althaea hirsuta* (Rough Marsh-mallow).

The site was thoroughly searched for evidence of *Althaea* and the habitat and vegetation types were described. Vascular plant species were listed (*Appendix A*). Subjective estimates of their relative abundance were added using a modified DAFOR scale, which ranks species according to their relative abundance in a given parcel of land as follows: d – dominant, a – abundant, f – frequent, o – occasional, r – rare. In addition, the following prefixes are used: l – locally, v – very. The terms ‘abundant’ and ‘rare’ are used by convention, and apply only to relative-abundance within the recorded area. It does not mean that species are ‘rare’ in the general sense.

January is a poor time of year for most botanical recording purposes. Some species are minimally in evidence as leaves only, and some can be identified from the previous year’s dead remains. But - leaving aside trees, shrubs and large winter-green perennials - many species are not in evidence at all, and whether leaves and dead remains adequate for identification are to be found at a given location is for many species a matter of serendipity. Where these signs are to be found, the presence of a species can often be confirmed, but absence is generally impossible to prove. In January 2009 all this was to some extent exacerbated by cold and frosty weather in the preceding six weeks (as it hastens deterioration of remains and delays development of leaves).

This means that the species list (*Appendix A*) cannot be regarded as exhaustive; many more species would be found in a summer survey. It does, however, adequately indicate the character of the vegetation. The *Althaea* itself normally behaves as a summer- or autumn-germinating winter-annual (*Section 3*), and it is therefore reasonable to expect that leaves would be in evidence in mid-winter. A January survey cannot absolutely prove absence of the *Althaea*, but the likelihood is that if it were present then it could in fact be found.

RESULTS AND EVALUATION

3.1 *Background information on Althaea hirsuta (Rough Marsh-mallow)*

Althaea hirsuta (Rough Marsh-mallow) is listed on *Schedule 8* of the *Wildlife and Countryside Act 1981* giving it legal protection in England and Wales against intentional picking, uprooting and destruction. It was listed as 'Endangered' in Wigginton (1999), but it is not listed as threatened in the most recent IUCN Red List (Cheffings & Farrell 2005).

Althaea is an annual, or rarely biennial, herb with erect to decumbent stems up to 60 cm; it is coarsely hairy (hispid) and has shallowly lobed (palmate) lower leaves, and deeply divided upper leaves, all with 3-5 lobes (Stace 1997). The flowers are lilac in colour and have five petals 12 to 16 mm in length. In general appearance, it resembles other British species of the Malvaceae such as *Malva moschata* (Musk Mallow).

Althaea behaves mainly as a winter annual in Britain (rarely as a summer annual in wet seasons), flowering from May to early July and setting seed in July and August (Wigginton 1999). It is a poor competitor and requires bare soil for germination and seedling establishment. If conditions are right, germination may follow shortly after seed-set so that identifiable plants are likely to be in evidence by January.

Althaea is considered by many to be an introduced species in Britain, e.g. Stace (1997), Pearman *et al* (2002). However, in Oxfordshire, Somerset and especially in Kent (where it has been known since 1792) it occurs in open, semi-natural vegetation on dry calcareous soils (especially on south-facing slopes), which suggests that it may be native there. From Wigginton (1999) it seems that it usually occurs with at least some distinctly calcicolous associates, either grassland plants or arable weeds, and not with species typical of strongly ruderal or brown-field sites. However, this author does not really discuss the more casual occurrences of *Althaea*.

It also occurs as a casual on waste ground, and as such has been recorded from scattered localities, mostly in southern England and Wales. The most recent county Flora for Glamorgan (Wade *et al.* 1994) listed no recent records, but it has since been recorded from the 10 km square covering Barry Docks (Pearman *et al* 2002).

3.2

Field Survey Results

No evidence of *Althaea hirsuta* (Rough Marsh-mallow) was recorded. Species recorded from the site are listed in *Table 1* in *Appendix A*.

The site largely comprises bare soil or concrete without vegetation. Much of the ground is heavily rutted by vehicles and there is an abundance of fly-tipped rubbish throughout (*Plate 1* in *Appendix B*). Vegetation is confined to scattered, semi-ruderal scrub and grassland along the boundary fences, in the north-east corner, and more particularly at the southern end of the site.

The scattered scrub along the boundary fences mainly consists of *Buddleja davidii* (Butterfly-bush), although there are smaller amounts of *Rosa* species (a Rose) and *Rubus fruticosus* agg. (Bramble). There are small patches of rough grassland with a more or less closed sward alongside scrub in the north-eastern corner of the site and on the verge of David Davies Road. These are dominated by coarse grasses such as *Elytrigia repens* (Common Couch) and also feature the tall umbellifer *Pastinaca sativa* (Wild Parsnip).

The only substantial area of vegetation is at the southern end of the site, where it consists of open, semi-ruderal grassland colonising a substrate of spoil, gravel and concrete (*Plate 2* in *Appendix B*). The sparse sward includes the grasses *Agrostis stolonifera* (Creeping Bent) and *Festuca rubra* (Red Fescue) together with a range of herbs typical of disturbed sites such as *Daucus carota* (Wild Carrot), *Medicago lupulina* (Black Medick), *Senecio erucifolius* (Hoary Ragwort) and *Tripleurospermum inodorum* (Scentless Mayweed). Tall ruderals and garden escapes are also frequent, especially on piles of spoil, and include *Conyza* species (a Fleabane), *Hirschfeldia incana* (Hoary Mustard) and a species of *Salvia* or *Teucrium*.

3.3

Discussion

The strongly ruderal character of this site makes it an unlikely place for *Althaea hirsuta* (Rough Marsh-mallow). If it were present then it could only be so as a passing casual. It is generally accepted that little nature conservation value attaches to such casual occurrences of rare species in atypically ruderal sites (as compared to that attaching to them in semi-natural sites). However, to the best of our understanding, that does not derogate from the legal protection attaching to *Althaea*, which would be just as protected as a casual in this site as it would be as a permanent denizen in a semi-natural site, except in so far as mitigation for development, e.g. transplantation, might be much easier to agree with planning authorities and Countryside Council for Wales.

The species list for the site is typical for a disturbed, more-or-less eutrophic, and neutral to perhaps marginally calcareous ruderal site. Though the substrates contain some calcareous materials, e.g. concrete, mortar from building rubble, this is not very distinctly reflected in the species list, there being no strong calcicoles except for the woody climber *Clematis vitalba* (Traveller's Joy). Species such as *Centranthus ruber* (Red Valerian), *Daucus carota* ssp. *carota* (Wild Carrot), *Foeniculum vulgare* (Fennel), *Fragaria vesca* (Wild Strawberry) and *Pastinaca sativa* (Wild Parsnip) are suggestive of very mildly calcicolous tendencies in the flora, but the great majority of the species listed are widespread on normal ruderal sites across lowland Britain. For vegetation suitable for *Althaea* the species list is not encouraging, but neither is it prohibitive; the species named above could just be congeners of *Althaea*.

The greater part of the site has been so disturbed by vehicles (or by some other previous use) that it supports no vegetation at all, while the rather limited areas of scrub and rough grassland can be discounted as potential habitat for *Althaea* because it would not persist amongst the closed vegetation.

By contrast, the area at the southern end of the site appears to provide good conditions for the germination and establishment of *Althaea*. The vegetation is open and the substrate is free-draining, relatively infertile and perhaps mildly calcareous. Furthermore, similar early-successional grassland not surveyed in surrounding sites could perhaps support *Althaea*, and in that case might act as a seed-source for *Althaea*.

Althaea mainly behaves as a winter annual, and on the balance of probabilities it ought to be in evidence in January, though spring germination (and thence summer annual behaviour) is not unknown in Britain. No *Althaea* or superficially similar species of the Malvaceae were recorded in this survey. Because of the limited area of suitable habitat, it is very unlikely that even poorly-developed specimens would have been missed if they were present.

For the reasons explained above, the absence of *Althaea* cannot absolutely be ruled out from a January survey, and it is always possible that there might be dormant seeds that could germinate in the future. But the failure to find *Althaea* or similar malvaceous species, considered together with the strongly ruderal character of the site and the lack of previous records, make it very unlikely that *Althaea hirsuta* (Rough Marsh-mallow) is present.

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APPENDIX A – SPECIES LIST

Table 1. Vascular plant species recorded from the site on 12/01/2009.

a) Shrubs and woody climbers	
<i>Buddleja davidii</i> (Butterfly-bush)	f
<i>Clematis vitalba</i> (Traveller's-joy)	r
<i>Rosa</i> species (a Rose)	r
<i>Rubus fruticosus</i> agg. (Bramble)	lf
<i>Salix cinerea</i> (Grey Willow)	vr
<i>Sambucus nigra</i> (Elder)	vr
b) Herbaceous species	
<i>Agrostis stolonifera</i> (Creeping Bent)	la
<i>Anagallis arvensis</i> (Scarlet Pimpernel)	vr
<i>Arrhenatherum elatius</i> (False Oat-grass)	r
<i>Artemisia vulgaris</i> (Mugwort)	r
<i>Bromus hordeaceus</i> (Soft-brome)	r
<i>Cardamine hirsuta</i> (Hairy Bitter-cress)	r
<i>Centranthus ruber</i> (Red Valerian)	r
<i>Chamerion angustifolium</i> (Rosebay Willowherb)	vr
<i>Cirsium arvense</i> (Creeping Thistle)	r
<i>Cirsium vulgare</i> (Spear Thistle)	vr
<i>Conyza</i> species (a Fleabane)	o
<i>Dactylis glomerata</i> (Cock's-foot)	vr
<i>Daucus carota</i> (Wild Carrot)	o
<i>Dipsacus fullonum</i> (Teasel)	vr
<i>Dryopteris filix-mas</i> (Male-fern)	vr
<i>Elytrigia repens</i> (Common Couch)	la
<i>Epilobium ciliatum</i> (American Willowherb)	r
<i>Epilobium parviflorum</i> (Hoary Willowherb)	vr
<i>Eupatorium cannabinum</i> (Hemp-agrimony)	r
<i>Festuca rubra</i> (Red Fescue)	o
<i>Foeniculum vulgare</i> (Fennel)	vr
<i>Fragaria vesca</i> (Wild Strawberry)	vr
<i>Galium aparine</i> (Cleavers)	vr
<i>Galium mollugo</i> (Hedge Bedstraw)	r
<i>Geranium dissectum</i> (Cut-leaved Crane's-bill)	vr
<i>Geranium lucidum</i> (Shining Crane's-bill)	vr
<i>Geranium robertianum</i> (Herb-Robert)	r
<i>Geranium rotundifolium</i> (Round-leaved Crane's-bill)	r
<i>Hirschfeldia incana</i> (Hoary Mustard)	f
<i>Hypericum humifusum</i> (Trailing St John's-wort)	r
<i>Leucanthemum vulgare</i> (Oxeye Daisy)	r
<i>Linaria vulgaris</i> (Common Toadflax)	r
<i>Lotus corniculatus</i> (Common Bird's-foot-trefoil)	r
<i>Medicago lupulina</i> (Black Medick)	o
<i>Melilotus</i> species (a Melilot)	r
<i>Myosotis sylvatica</i> (Wood Forget-me-not)	vr
<i>Oenothera</i> species (an Evening-primrose)	r

<i>Pastinaca sativa</i> (Wild Parsnip)	vlf
<i>Picris echioides</i> (Bristly Oxtongue)	r
<i>Picris hieracioides</i> (Hawkweed Oxtongue)	r
<i>Plantago lanceolata</i> (Ribwort Plantain)	r
<i>Poa annua</i> (Annual Meadow-grass)	r
<i>Potentilla reptans</i> (Creeping Cinquefoil)	vr
<i>Prunella vulgaris</i> (Selfheal)	vr
<i>Pulicaria dysenterica</i> (Common Fleabane)	vr
<i>Ranunculus repens</i> (Creeping Buttercup)	vlf
<i>Reseda luteola</i> (Weld)	r
<i>Rumex crispus</i> (Curled Dock)	r
<i>Rumex obtusifolius</i> (Broad-leaved Dock)	r
<i>Salvia</i> or <i>Teucrium</i> species (a Clary or Sage)	lf
<i>Senecio erucifolius</i> (Hoary Ragwort)	o
<i>Senecio jacobaea</i> (Common Ragwort)	r
<i>Senecio vulgaris</i> (Groundsel)	vr
<i>Sonchus oleraceus</i> (Smooth Sow-thistle)	vr
<i>Sisymbrium officinale</i> (Hedge Mustard)	r
<i>Taraxacum</i> sect. <i>Ruderalia</i> (Common Dandelion)	r
<i>Trifolium medium</i> (Zigzag Clover)	vr
<i>Trifolium pratense</i> (Red Clover)	vr
<i>Trifolium repens</i> (White Clover)	r
<i>Tripleurospermum inodorum</i> (Scentless Mayweed)	o
<i>Vicia sativa</i> (Common Vetch)	r

APPENDIX B – PHOTOGRAPHS

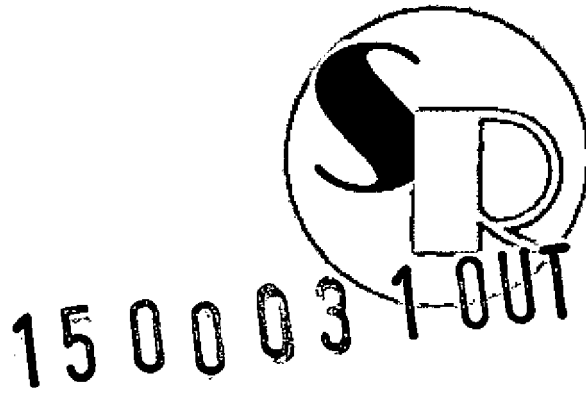


Plate 1. Looking from west to east across the site.



Plate 2. Open semi-ruderal grassland colonising the southern corner of the site.

2015/00031/OUT



Planning Statement

incorporating a

Design & Access Statement

in support of an application for
Outline Planning
by

Sunrise Renewables (Barry) Limited

under

the Town and Country Planning Act 1990

3rd February 2015

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PLANNING STATEMENT

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Appendices referred to in this Planning Statement

1	Location Plan (2014)
2	Air Emissions Assessment (2014)
3	Layout (2014)
4	Elevations for the Project (2014)
5	Traffic Movement Plan (2014)
6	Policy Review (2014)
7	Visual Impact Analysis (2015)
8	Ecology Report (2014)
9	Noise Assessment (2014)
10	Transport Statement (2014)
11	Geology and stability report (2009)
12	Environmental data report (2009)
13	Flood risk assessment (2009)

1. INTRODUCTION

- 1.1 The Applicant, Sunrise Renewables (Barry) Limited, is developing a renewable energy plant based on an advanced conversion technology (ACT) at Woodham Road, Barry, CF63 4JE within the Port of Barry (the "Project") - refer to the Location Plan at Appendix 1 for the Project site.
- 1.2 The principle of establishing a wood fuelled power plant at the Project site was established by planning permission reference 2008/01203/FUL, as approved by appeal reference APP/Z6950/A/09/2114605 on 2nd July 2010 (the "2010 Permission"). The current Applicant is an affiliate of the original applicant for the 2010 Permission, Sunrise Renewables Limited.
- 1.3 The Applicant is now finalizing the detailed technology selection and design layouts for the Project, as described in this Planning Statement. This requires the amendment of certain features of the 2010 Permission and in this connection the Applicant has been advised by the Planning Authority Officers that it is necessary to re-submit the changes to the Project for planning approval. The Applicant has determined to do so by submitting an Application for Outline Planning.
- 1.4 In summary, the changes, relative to the 2010 Permission, are as follows:
 - 1.4.1 **Technology:** a change in the manufacturer of the advanced conversion technology (ACT) from gasification based on pyrolysis to one based on a fluidised-bed. The proposed technology is more fuel efficient and will improve the average annual power output to 10 MWe compared to 9.0 MWe in the 2010 Permission.
 - 1.4.2 **Layout:** accommodation of the proposed technology at the Project site requires a different configuration of the buildings housing the various components – the 2010 Permission contemplated a single connected structure while the revised layout breaks this up into three separate but functionally interconnected buildings. The footprint of these buildings is 7.5% less than under the 2010 Permission.
 - 1.4.3 **Elevations:** the revised layout comprises two buildings that are lower than the building height in the 2010 Permission and one that is higher. The average building height of the 2010 Permission is 14m while the average building height of the revised layout is 16.3m. In order to meet emissions requirements, the stack height will be increased to 43m. This is less than the stack height approved for the waste-energy plant already approved for construction at Atlantic Way on the opposite side of the dock.
- 1.5 The Applicant's lifecycle analysis for the Project indicates it will generate approximately £21.4 million for Barry/Glamorgan, comprising some £9.0 million for jobs, £5.0 million in business and rent for Barry Port and £7.4 million in business rates paid to the council over the life of the Project.
- 1.6 Except as discussed in this Planning Statement, the Project remains as described in the 2010 Permission and the supporting documents.
- 1.7 This Planning Statement has also been prepared with a view to meeting Design and Access Statement (DAS) recommended by Welsh Government guidelines and the Policy Review (Appendix 6).

2. TECHNOLOGY APPROVAL

- 2.1 It is proposed to replace the system detailed in the 2010 Permission manufactured by Prestige Thermal Equipment (which produced a 9 MW average net output) with an alternative system made by the globally established manufacturer Outotec (www.outotec.com). The Outotec technology is more efficient and will result in the average net output increasing to 10MW for the same amount of fuel input.



Photo 1 - Example of operational Outotec gasification plant in USA

- 2.2 The Outotec equipment produces syngas through a fluidized-bed process while the Prestige Thermal Equipment produces syngas through a pyrolysis process. Both technologies are forms of 'gasification'. The general sequence of the proposed gasification process is as follows:
- 2.2.1 Wood-waste feedstock is chipped off-site and delivered to the plant prior to being gasified. At the time of delivery, feedstock has a variable moisture content, the water having a function as a reformation agent in the gasification process.
 - 2.2.2 The wood fuel is fed into the gasifier system where it is converted into a raw natural gas ('syngas') which is reformed and used as the primary fuel in the gasification boiler to generate steam to power the steam turbine. The Outotec gasifier will process up to 72,000 dry tonnes of wood waste per year to produce an average net output of up to 10 MW (compared to 9 MW with the Prestige system) and is more flexible with respect to moisture content.
 - 2.2.3 The steam turbine uses the steam to produce electricity and the plant transfers electricity to the grid via an alternator, transformer and on-site substation. The turbine is enclosed in an acoustically attenuated extension to the electricity switchroom, to reduce noise to a minimum. The process is regulated from a computerised control room. The buildings will be lit internally using electricity generated from the process.
 - 2.2.4 The Outotec equipment utilises a single turbine-alternator which replaces the previously proposed system of multiple reciprocating piston engines.
 - 2.2.5 Burning of the refined syngas in the gasifier to produce energy combined with various plant and equipment used to reduce emissions results in cleaned exhaust emissions from the facility.

The Applicant considers the proposed new plant to be better suited to the specific requirements of the Barry scheme and will maximise operational efficiencies and versatility in addition to being a more established and therefore 'bankable' technology.

2.3 Concerning other site infrastructure:

- 2.3.1 There will be no change to the mobile plant deployed at the site. This will include a loading shovel and / or grab, a water bowser to control dust as necessary in vehicle circulation areas and a road sweeper to maintain the site access road and the highway in a clean condition, primarily for use during the construction phase.
- 2.3.2 The proposed buildings will continue to be of steel portal frame construction. The colour and specification of external cladding will be agreed with the planning authority prior to construction. The floor slab of the building will be surfaced with reinforced concrete to a specification approved by Natural Resources Wales.
- 2.3.3 The amended plant design will continue to require an Environmental Permit from Natural Resources Wales. The Applicant consulted extensively with Natural Resources Wales' predecessor agency at the time of the original application and is consulting again in connection with the present application.
- 2.3.4 Internal surfaces will continue to drain to a sealed sump or foul sewer. External surfaces including roof water will drain to a sustainable surface water system.
- 2.3.5 Internal parking provision remain as under the 2010 Permission allows for at least 5 spaces plus 1 disabled space and 4 cycle parking spaces (two locations have been proposed). Details will be agreed with the Planning Authority.
- 2.3.6 The site will be enclosed by new galvanised steel palisade security fencing with entrance gates with a maximum height not greater than 2.6 metres, as under the 2010 Permission.
- 2.3.7 The access into the site remains essentially as in the 2010 Permission, from the southern end of the property from David Davies Road.
- 2.3.8 The details of plant operation for the revised scheme will remain the same as for the 2010 Permission. The plant will operate continuously in order to generate electricity with the exception of routine maintenance and other downtime. The following time limits will continue to apply for the receipt of fuel and general access:

Weekdays 07 00 - 19 00;
Saturdays 07 00 - 19 00;
Sundays and Bank/Public holidays 08 00 - 16 00.

The entrance gates will be closed outside of these hours to prevent unauthorised access.

- 2.4 Concerning the decision to change the manufacturer of the advanced conversion technology (ACT) for the plant: at a technical level what is being proposed is a change from gasification using pyrolysis to gasification using a fluidised bed. However, the ACT remains one based on gasification. Inspector Thickett references this in his appeal decision to (in respect of the 2010 Permission):

"32. The South East Wales Waste Group, Regional Waste Plan 1st Review, 2008, identifies residual waste managed by high levels of pyrolysis as the best practicable environmental option (BPEO).....The appellant submits a site specific BPEO analysis which concludes that pyrolysis and direct combustion both represent the best practicable environmental option for waste wood. Having considered the appellant's analysis, I concur with its conclusion that pyrolysis should be preferred as it has a greater potential for electricity generation."

- 2.5 It should be noted that Ofgem do not distinguish between pyrolysis and fluidised-bed based gasification for the purposes of renewable power generation and support (extracted from Ofgem Guideline for Generators):

"Gasification and pyrolysis are examples of advanced conversion technologies (ACTs). These technologies use waste and biomass feedstocks to produce either a synthesis gas (syngas) and / or liquid fuels (bio-oils) which can be used to generate electricity"

- 2.6 Both are considered advanced conversion technologies (also called advanced thermal treatment (ATT) technologies) providing the most efficient form of biomass conversion. This was recognised in The South East Wales Waste Group, Regional Waste Plan 1st Review, 2008 report itself:

6.6.8 Advanced Thermal Treatment (ATT) technologies are primarily those that employ pyrolysis and/or gasification to process MSW. Pyrolysis and Gasification are considered to be multistage processes and require additional facilities to prepare the material to a suitable standard. The gasification and pyrolysis of solid materials is not a new concept. It has been extensively used to produce fuels such as charcoal, coke and town gas. It is only in recent years that pyrolysis and gasification has been commercially applied to the treatment of MSW.

6.6.12 There are a variety of features promoted to differentiate ATT from conventional incineration technologies. These include:

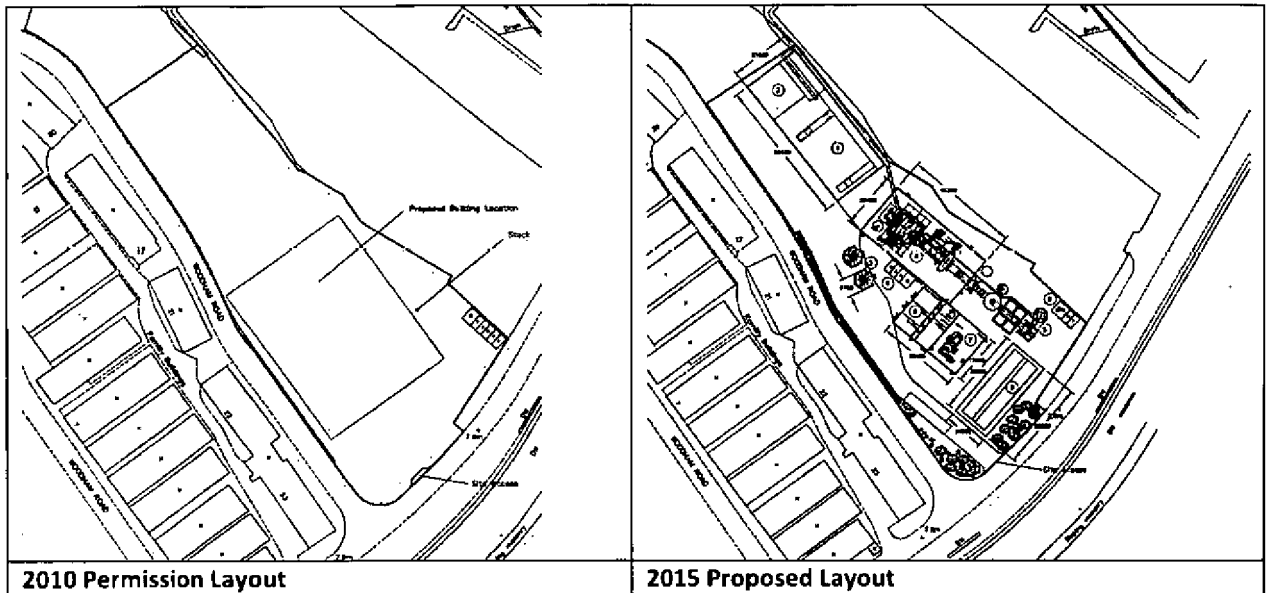
- *The potential smaller scale of ATT processes in comparison to incineration, which may facilitate local use of the output heat and electricity;*
- *Reduced emissions from ATT processes may mean that abatement costs are reduced (although all the processes must meet the same emissions standards); and*
- *The potential to use the syngas.*

- 2.7 Pyrolysis and gasification using a fluidised-bed can properly be considered to be interchangeable for the purposes of selecting an advanced conversion technology to function within the power plant.

- 2.8 The selection of the technology discussed above also results in an increase in the average annual generating capacity to 10 MWe compared to 9.0 MWe for the 2010 Permission as a result of improved efficiency. Such increased efficiency means there will be no surplus heat generated (ie it is not a Combined Heat and Power (CHP) plant). Such increased output has no visual or technical impact and will be limited by the capacity of the transmission network to transmit the power (which is separately regulated). From a technical standpoint the change is neutral.

3. LAYOUT APPROVAL

- 3.1 For convenience, the revised plant layout (see Appendix 3) is shown below in comparison to the layout for the 2010 Permission:

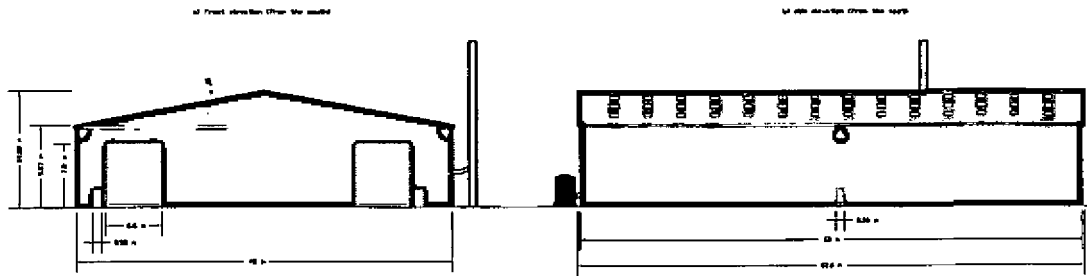


3.2 Originally all plant operations were located within a single structure with a total footprint of 2700 sqm. Under the revised arrangements it is proposed to separate the power plant functions into separate structures to accommodate the revised plant (total building footprint 2,497 sqm). The result will therefore be a net 7.5% reduction in building footprint at the site. Details of the structures are as follows:

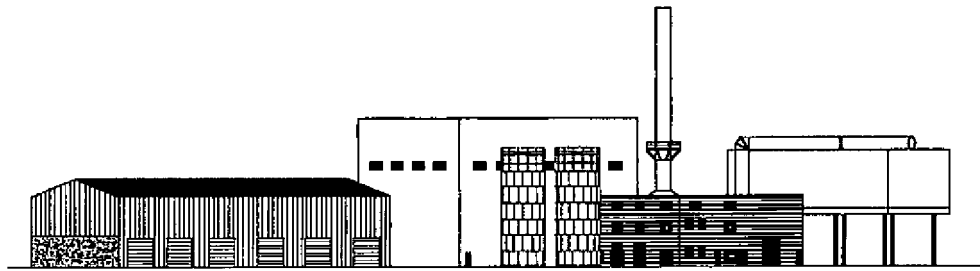
- 3.2.1 **Wood Storage and Feed Building:** The wood storage and feed building (at 52.4 x 21.6 x 13.7m high) remains similar in height to that of the previously approved building (14m). The submitted Traffic Movement plan (in Appendix 5) prepared by the project contractor confirms there is adequate space for articulated vehicles to access the building.
- 3.2.2 **Turbine, Welfare & Ancillaries Building:** This building (29.1 x 17.9 x 11m high) has a reduced height compared to that of the previously approved building and incorporates switchgear, the main control room and a turbine room (to replace the formerly proposed piston engines).
- 3.2.3 **Main Process Building:** The gasification equipment will be entirely enclosed within a bespoke structure (41.4 x 20.4 x 23m high). This will significantly improve containment of the process as a whole. The maximum height of the previous plant was 14m so there will be a net increase in height of 9m for this element.
- 3.2.4 **ACC Unit:** An external air cooled condenser (ACC) unit (32m x 14.5m x 20m high) mounted on steel stilts is now proposed adjacent to the Turbine, Welfare & Ancillaries Building.
- 3.2.5 **External Equipment:** ash residue from the combustion process will be stored in two externally located silos (18.4m high x 6.7m diameter) allowing ease of access (see Traffic Movement Plan included in Appendix 5). Flue Gas treatment (FGT), exhausting to the chimney stack will also be external to the buildings.
- 3.2.6 **Chimney Stack:** the chimney stack being re-sited some 20m to the south-east relative to the original location and in order to meet emissions requirements, the stack height will be increased to 43m (which is less than the stack height approved for the waste-energy plant approved for construction at Atlantic Way on the opposite side of the dock).

4. ELEVATIONS APPROVAL

- 4.1 Appendix 4 contains the elevations for the revised layout; however, for convenience Elevations A and B, below illustrate the differences between the elevations for the 2010 Permission and the current application.
- 4.2 The revised layout comprises two buildings that are lower and one that is higher than the building height in the 2010 Permission, as more particularly detailed in Section 3.2 above, and Appendix 4. Main points to note are:
 - 4.2.1 The average building height of the 2010 Permission is 14m while the average building height in the revised layout is 16.3m.



Elevation A: Elevations for the 2010 Permission



Elevation B: Elevations for the revised layout

4.2.2 The change in chimney stack height has been determined in order to comply with the requirements of the Waste Incineration Directive (WID)/Industrial Emissions Directive (IED). This will result in the chimney stack increasing in height from 20m to 43m with adjustments to the diameter to allow for the increase in height – the diameter will increase from 1.0m to 2.75m.

4.3 The visual impact of the proposed changes to the elevations and layout is discussed in Appendix 7; however, the Applicant does not believe them to be material given the industrial context of the plant, as was recognised during the appeal hearing in respect of the 2010 Permission.

5. OPERATIONS APPROVAL

5.1 Deliveries

5.1.1 As under the 2010 Permission, the Applicant intends to maintain flexibility as to where best to source wood products for energy conversion by the plant and how best to transport them to site, be it by road, rail or sea.

5.1.2 In so far as the Applicant arranges such transportation by road, the maximum number of annual deliveries will remain unchanged from the 2010 Permission, being 4015 per year (or 77 per week).

5.1.3 The comments of the Director of Environmental and Economic Regeneration to the Planning Committee relating to the 2010 Permission, dated 21 May 2009, are recalled:

“Since the trip generation in the scale of things for Barry Docks is minimal, and the highway network is already designed to take such large HGVs, the Highways Authority has no objection to the proposals.”

5.1.4 Wood fuel will normally be delivered to the site during a 12 hour day between 07:00 and 19:00 hours on weekdays (in contrast to the 2010 Permission which also allowed for deliveries on Saturdays and Sundays). Weekend deliveries would be restricted to emergency deliveries only (where required to avoid an interruption in the operation). This is considered a material improvement relative to the 2010 Permission.

5.2 Site Access

- 5.2.1 Access to the plant itself will remain unchanged from the 2010 Permission being from David Davies Road immediately to the south of the development and across the land leased by the applicant and covered by the 2010 Permission. Access and traffic movements to and from the plant can be seen in Appendix S (Traffic Movement Plan).
- 5.2.2 Provision for parking, including disabled parking and provision for bicycle/motorbikes remain as provided for under the 2010 Permission.

5.3 Emissions

- 5.3.1 In order to operate, the Project will require an Environmental Permit and this will only be given provided the plant continues to be WID/IED compliant, as was the case for the 2010 Permission. This includes a need to agree the proposed abatement technology to minimise air emissions before the site can operate and confirmation that the Best Available Technology (BAT) has been employed. Therefore, local air quality will not be adversely affected by the proposals. In this respect there is therefore no material change from the 2010 Permission.
- 5.3.2 The Applicant has commissioned an Air Emissions Assessment for the present application (see attached at Appendix 2). This exercise was pre-scoped in conjunction with the local officers of Natural Resources Wales with the agreed objective of determining the increase in stack height necessary to achieve a negligible change of environmental impact relative to the previously improved scheme.

6. **NOISE ASSESSMENT**

- 6.1 Best practicable means will be used during site operations to ensure that noise does not exceed agreed levels. The Applicant has selected a leading national contractor to carry out such work and it is well versed in compliance procedures in this regard. The enclosure of the operating process within structures and/or buildings will ensure that noise levels are not significant.
- 6.2 The plant has been designed to meet the BAT (Best Available Technology) requirements of the Environmental Permitting regime which include noise emissions controls. The steam turbine produces the most noise, but is enclosed within an acoustically attenuated compound within the Turbine, Welfare & Ancillaries building.
- 6.3 The plant as a whole is designed to be fully compliant with applicable dBA requirements. The roller shutter doors will generally be closed except to receive deliveries in order to provide additional acoustic attenuation.
- 6.4 The Applicant has consulted extensively with the main contractor selected for the project to ensure that the plant is fully compliant and obligations have been imposed on them to ensure that the design, procurement, construction and operation comply with all applicable law and guidelines. These include the following:
- Welsh Statutory Instrument 2006 No. 2629 (W.225)
 - The Environmental Noise (Wales) Regulations 2006 (as amended by the Environmental Noise (Wales) (Amendment) Regulations 2009 (SI2009/47)).
 - Welsh Statutory Instrument 2007 No. 3519 (W.311) The Environmental Noise (identification of Noise Sources) (Wales) Regulations 2007
 - Technical Advice Note (Wales) 11, 'Noise',
 - Welsh Statutory Instrument 2006 No. 2629 (W.225) The Environmental Noise (Wales) Regulations 2006. See also Welsh Statutory Instrument 2007 No. 3519 (W.311)
 - The Environmental Noise (identification of Noise Sources) (Wales) Regulations 2007
 - <http://wales.gov.uk/docs/desh/publications/140731planning-policy-wales-edition-7-en.pdf>
 - <http://wales.gov.uk/docs/desh/publications/131217noise-action-plan-for-wales-en.pdf>

- 6.5 The contractors are carrying out their work taking these points into account and also the findings from the Noise Study for the Project which has been updated by PCML for the purposes of the present application (refer to Appendix 9).
- 6.6 Verification that noise levels continue to comply with such legislation and guidelines will take place during commissioning of the plant in accordance with a background noise measurement scheme to be agreed with the Local Authority prior to commencement of construction. In this regard the Applicant has no objection to inclusion of the following condition from the 2010 Permission:

"16) No development shall take place until details of a scheme to measure background noise levels in the following locations has been submitted to and approved in writing by the local planning authority: i. 57 Dock View Road ii. Cory Way iii. Estrella House, Cei Dafydd The survey shall be implemented as approved and the results submitted to and agreed in writing with the local planning authority before the development hereby permitted is brought into use. At no time shall noise attributing from the site exceed the agreed background noise levels."

7. TRANSPORT ASSESSMENT

- 7.1 For the purposes of the present application, the Applicant has retained UKPDP to prepare an update of the Project's Traffic Assessment and this is included at Appendix 10.
- 7.2 The principal findings of the updated Traffic Assessment are that:
- 7.2.1 traffic levels in the area of Barry Docks and the approach/feeder roads are not materially different from the levels referred to in 2009 and referenced in the Transport Assessment for the 2010 Permission;
- 7.2.2 annual traffic movements for the Project do not exceed those contemplated in the original Traffic Assessment.
- 7.3 A suite of planning conditions covering highway and access matters was imposed under the 2010 Permission. This includes amongst other matters:

"15) No development shall take place until there has been submitted to and approved in writing by the local planning authority details of secure parking on site for bicycles. The bicycle parking spaces shall remain available for their designated use for as long as the development hereby permitted remains in existence.

19) The measures incorporated into the Green Travel Plan accompanying the application shall be implemented when the development is brought into use and thereafter monitored and reviewed in accordance with the Green Travel Plan.

20) Deliveries to the site, and all other external operations, shall not take place outside the hours of 07.00 to 19.00 Monday to Saturday and 08.00 to 16.00 on Sundays, Bank and Public Holidays."

If permission is granted for the current proposals it is therefore assumed and accepted that these conditions would be imposed.

8. ENVIRONMENTAL CONTROL

- 8.1 **Air emissions:** As the site exceeds the 3MW threshold it requires an Environmental Permit from Natural Resources Wales and the gasification process must meet strict limits on air emissions set out in the Environmental Permit. This includes a need to agree the proposed abatement technology to minimise air emissions before the site can operate and confirmation that the Best Available Technology (BAT) has been employed. Therefore, local air quality will not be adversely affected by the proposals.
- 8.2 **Dust:** There is no material change to the proposed environmental control measures. Site operations will be carried out to minimise the creation of dust. A mains water supply will be available and all external water pipes are to be lagged to prevent frost damage. Water sprays and/or bowsers will be used as necessary to reduce dust levels in external circulation areas. Staff will monitor dust emissions continuously whilst the plant is in operation and will take appropriate action when required. Regular visual inspection will take place with recording of results in a diary.

- 8.3 **Mud / detritus:** Measures will be put in place to prevent any deposit of debris on the highway. There will be regular visual inspection and a road sweeper will be deployed as necessary, including during the construction phase
- 8.4 **Odour:** No material will be accepted which is likely to cause an odour nuisance. The biomass plant itself does not produce odorous emissions.
- 8.5 **Pests / vermin:** The proposed fuel type will ensure that the site will not suffer from a vermin infestation. However, the site will be inspected daily given the presence of nearby water bodies and a pest control contractor will be hired if necessary.

9. ENVIRONMENTAL IMPACT

The Project's environmental and geology studies, prepared by Groundsure, continue to be applicable to the Project and are reproduced at Appendix 11 and Appendix 12). The main conclusions were that:

- 9.1 the site is partially vacant and occupied by a container storage and refurbishment operation;
- 9.2 the site is within an area affected by flooding and is within the indicative Zone 3 floodplain;
- 9.3 the site is not located over a groundwater Source Protection Zone (SPZ). In any event the site will not impact upon groundwater as any potentially polluting outputs will be discharged to foul sewer in accordance with the requirements of a trade effluent consent or removed from the site by vehicle;
- 9.4 an ecological survey is not required [although one was carried out] as the site is previously developed and consists only of a compacted hard standing surface which is not vegetated. There are no sites with sensitive flora or fauna having a statutory or local nature conservation designation within 500 metres of the site. The nearest designated site is the SSSI named "Hayes Point to Bendrick Rock" at a distance of 616 metres from the site (SSSI 510 administered by the Countryside Council for Wales) and covering an area of 29 hectares;
- 9.5 the site has no clearly defined planning history but historical maps indicate that the following uses have occurred on the site:
 - 1879: Undeveloped estuarine land and river bed of Cadoxton River
 - 1898 to 1900: Land reclaimed to rail head, coal tip/loading dock
 - 1920 to 1973: Railway engineering works/rail head
 - 1989: Builder's yard

These conclusions remain unchanged for the purposes of the present application.

10. FLOOD RISK ASSESSMENT

- 10.1 The Project's Flood Risk Assessment from RSK Group continues to be applicable to the Project and is reproduced at Appendix 13. The conclusions were that:

10.1.1 the proposed development is located within Zone B but outside Zone C2, as identified by Technical Advice Note 15: Development & Flood Risk (July 2004) (TAN15). Zone B can be defined as "*areas known to have been flooded in the past evidenced by sedimentary deposits*" and Zone C2 as "*areas of floodplain without significant flood defence infrastructure*". Any development within Zone C would require a full Flood Consequences Assessment (FCA);

10.1.2 the proposed development is also located outside the Environment Agency Wales (EAW) extreme (0.1%) Flood Map, which would normally underlay Zone B;

A topographic survey of the site (prepared on a precautionary basis, in line with EAW recommendations) produced three cross sections from north of the site through to the direction of the dock to confirm that the development is above the adjacent extreme flood outline and corresponding Zone C2;

Following submission of this information to the EAW, the Development Control Officer of the EAW confirmed that the site was not at risk of flooding and the cross sections were acceptable.

Policy changes within the EAW at the time meant that applications in Zone B were taken on a risk-based approach and since the zone is outside the Q1000 Flood Map, there is no perceived risk to the development.

10.2 The current proposals relate to the same area as the previously approved site. A comparison of the approved site layout plan with the current proposals confirms that there would be a very limited change in the overall footprint of the buildings within the site. As with the currently approved scheme sustainable drainage techniques (SUDs) would be used to attenuate site run-off to agreed rates.

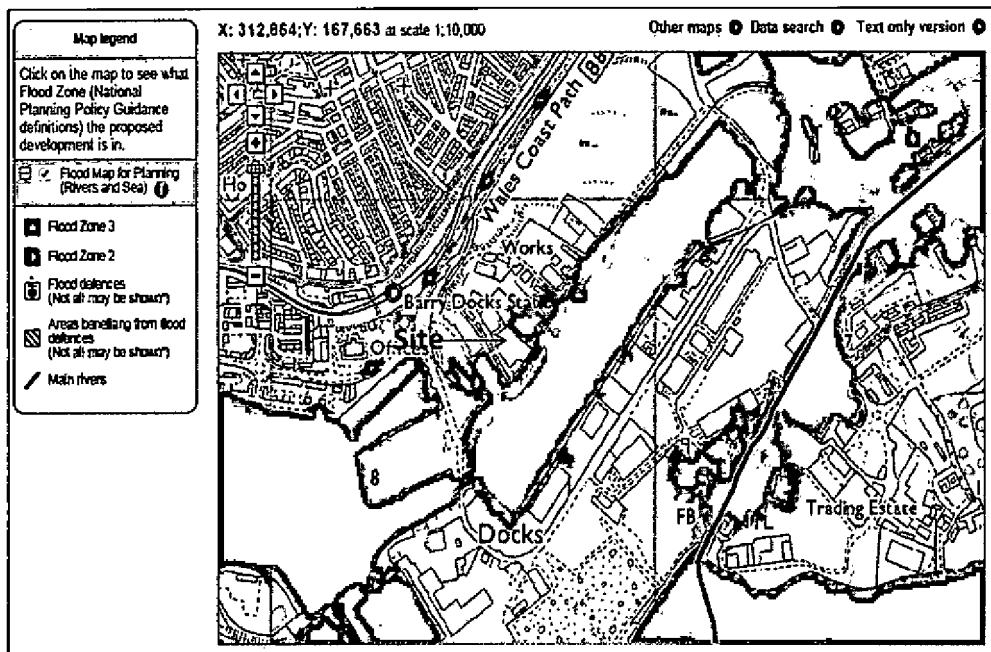
10.3 Conditions requiring details of surface drainage measures (Conditions 10 and 11) were imposed on the 2010 Permission:

“10) The building hereby permitted shall not be occupied until surface water drainage works have been implemented in accordance with details that have been submitted to and approved in writing by the local planning authority. Before these details are submitted an assessment shall be carried out of the potential for disposing of surface water by means of a sustainable drainage system and the results of the assessment provided to the local planning authority. Where a sustainable drainage scheme is to be provided, the submitted details shall: i) provide information about the design storm period and intensity, the method employed to delay and control the surface water discharged from the site and the measures taken to prevent pollution of the receiving groundwater and/or surface waters; ii) include a timetable for its implementation; and provide a management and maintenance plan for the lifetime of the development which shall include the arrangements for adoption by any public authority or statutory undertaker and any other arrangements to secure the operation of the scheme throughout its lifetime.

11) The building hereby permitted shall not be occupied until the sustainable drainage scheme for the site has been completed in accordance with the submitted details. The sustainable drainage scheme shall be managed and maintained thereafter in accordance with the agreed management and maintenance plan.”

Imposing in respect of the present application would cover the points made in the Flood Risk Assessment.

10.4 At the date of the present application the Environment Agency’s Flood Map for the Project site is as shown below. The Project is not located in either Zone 2 or Zone 3 (under the present regime for categorising flood risk):



11. ECOLOGY

11.1 **Ecology – the application site:** The site comprises a roughly rectangular parcel of derelict land on the north side of Barry Docks bordered by Woodham Road and David Davies Road to the west and south, and areas of derelict land to the east and north (containing hard standing and rough grassland with scattered scrub). There are no designated wildlife sites within 500m of the site.

A strip of grassland and a railway line separate the site from the wet dock to the south and there is a row of commercial buildings to the west. The wider landscape features a mixture of industrial and post-industrial habitats including an expanse of colonising grassland on derelict land to the west.

An ecological survey of the site was conducted in December 2008 by RSK Carter Ecological Limited in support of the original planning application. This was updated for the purposes of the present application in November 2014 by PCML (refer to Appendix 8) following informal discussions with the Planning Authority's ecology officer. The current proposals do not affect any land outside the development footprint of the previous permission.

Photographs of the site were taken in December 2008 for the 2009 Ecological Report (Plates 1 and 2). More recent photographs taken in July 2014 (Plates 3 and 4) are also shown below for comparison. There is little change except that summer growth of vegetation can be seen in the 2014 pictures.



Plate 1. Looking from west to east across the site.



Plate 2. Open semi-ruderal grassland colonising the southern corner of the site.

Site Photos from 2009 Ecological Report



Plate 3: looking west across the central area of the site



Plate 4: looking north from the south area of the site

Site Photos from July 2014

- 11.2 **Landscaping Scheme:** A landscaping scheme (a reserved matter under the present application) will be required and this will have the potential to increase the quality of new habitats overall within the site. The technical changes proposed under the present application will not have an impact on the conclusions from the Ecology Report.
- 11.3 **Ecology – air emissions:** The Applicant has commissioned an updated Air Emissions Assessment (including a dispersion analysis) to take account of the proposed change in technology and feedstock consumption levels described in this application and this is attached as Appendix 3.

Natural Resources Wales is the appropriate technical body for determining air quality with respect to plant regulated under the Waste Incineration Directive/Industrial Emissions Directive. Air emissions from the site will therefore be tightly regulated under this agency's environmental permitting system. Comprehensive emission abatement will be imposed as part of this process. The stack height will be increased by up to 43m to ensure

adequate dispersion of emissions for the proposed facility is compliant with the Waste Incineration Directive/Industrial Emissions Directive.

12. CONCLUSIONS

12.1 The benefits from the Project remain essentially the same as for the 2010 Permission, namely:

12.1.1 **Renewable electricity:** Utilising established biomass energy technology in order to contribute to national targets for renewable energy provision. The facility will supply electricity via the electricity grid which is equivalent to the annual energy usage of approximately 23,600 households (increased from the previous level of 22,000) based on an average UK household consumption of 3,300kWh.

12.1.2 **Climate change:** Contributing to creating “A resilient and sustainable economy for Wales that is able to develop whilst reducing its use of natural resources and reducing its contribution to climate change.” (Planning Policy Wales Edition 7, Para 4.1.5).

12.1.3 **Reduced landfilling:** Reducing the need to dispose of wood to landfill, thereby conserving finite landfill capacity and facilitating a more sustainable end use for waste wood as a renewable energy resource in accordance with the waste hierarchy (Planning Policy Statement 10). There remains an over-supply of waste wood in the UK and consequently, large volumes of wood continue to be directed to landfill or other less sustainable uses.

12.1.4 **Assisting wood recycling:** Providing an additional outlet for recycled wood to enhance the commercial viability of wood recycling, both locally and nationally.

12.1.5 **Traffic:** Achieving a reduction in the number of vehicle movements carrying waste wood to local and national landfill sites.

12.1.6 **Economy/employment:** Utilising a vacant industrial plot in order to provide skilled employment opportunities and investment in local goods and services. Up to 12 full-time equivalent jobs based at the site plus 2 office staff will be provided.

12.2 To summarise the Applicant’s views in respect of the present application compared to the 2010 Permission:

Change	Comment
Technology	<ul style="list-style-type: none"> Gasification by pyrolysis and fluidised-bed are inter-changeable as advanced conversion technologies
Plant Output	<ul style="list-style-type: none"> 11% “invisible” increase = increased contribution to renewable policy targets
Layout	<ul style="list-style-type: none"> 7.5% Reduction in total Building Footprint
Building Height	<ul style="list-style-type: none"> Non-material (2m) average increase in height
Stack Height	<ul style="list-style-type: none"> Below that approved for the neighbouring plant sited at Atlantic Way
Emissions	<ul style="list-style-type: none"> WID/IED compliant
Traffic	<ul style="list-style-type: none"> No change in weekly traffic movements by road

12.3 The Applicant therefore requests the Planning Authority to approve the present application under the TCPA 1990.

Town and Country Planning (Development Management Procedure) (England) Order 2010 NOTICE UNDER ARTICLE 11 OF APPLICATION FOR PLANNING PERMISSION

(Notice 1: This notice is to be printed and served on individuals if Certificate B or C is completed)

Proposed development at:

Name or flat number	<input type="text"/>
Property number or name	<input type="text" value="land at Woodham Road"/>
Street	<input type="text" value="David Davies Road"/>
Locality	<input type="text" value="Port of Barry"/>
Town	<input type="text" value="Barry"/>
County	<input type="text" value="Glamorgan"/>
Postal town	<input type="text"/>
Postcode	<input type="text" value="CF63 4JE"/>

Take notice that application is being made by:

Organisation name	<input type="text" value="Sunrise Renewables (Barry) Limited"/>		
Applicant name	Title	Forename	Surname
	<input type="text" value="Mr"/>	<input type="text" value="Howard"/>	<input type="text" value="Davies"/>

For planning permission to:

Description of proposed development

Application for Outline Planning Permission relating to amended project layouts, elevations and technology for a wood-fired renewable power plant at David Davies Road, Barry

Local Planning Authority to whom the application is being submitted:

Local Planning Authority address:

Any owner of the land or tenant who wishes to make representations about this application, should write to the council within 21 days of the date of this notice.

Signatory:

Signatory	Title	Forename	Surname
	<input type="text" value="Mr"/>	<input type="text" value="Howard"/>	<input type="text" value="Davies"/>

Signature

Date (dd-mm-yyyy)

Statement of owners' rights: The grant of planning permission does not affect owners' rights to retain or dispose of their property, unless there is some provision to the contrary in an agreement or lease.

Statement of agricultural tenants' rights: The grant of planning permission for non-agricultural development may affect agricultural tenants' security of tenure.

'Owner' means a person having a freehold interest or a leasehold interest the unexpired term of which is not less than seven years.

'Tenant' means a tenant of an agricultural holding any part of which is comprised in the land.

Once completed this form needs to be served on the owner(s) or tenant(s)



RSK Environment Ltd
West Nash Road
Nash
Newport
NP18 2BZ

Telephone: +44 (0) 1633 272339

www.rsk.co.uk

Document
SRB-J

15 0003 1 OUT

30 June 2008

Marco Muia
Oaktree Environmental Ltd

Our Ref: RSK/MA/P660003/01/01

Dear Marco,

RE: FLOOD RISK, BARRY SUNRISE CHP PLANT, BARRY DOCKS

As a part of the planning application for the Barry site, RSK Environment Ltd has been commissioned to provide an assessment of flood risk. The following paragraphs explain the work undertaken.

The proposed development is located within Zone B but outside Zone C2, as identified by Technical Advice Note 15: Development & Flood Risk (July 2004) (TAN15). Zone B can be defined as "areas known to have been flooded in the past evidenced by sedimentary deposits" and Zone C2 as "areas of floodplain without significant flood defence infrastructure". Any development within Zone C would require a full Flood Consequences Assessment (FCA).

The proposed development is also located outside the Environment Agency Wales (EAW) extreme (0.1%) Flood Map, which would normally underlay Zone B. Although a full FCA is not required, the EAW promote a precautionary approach where site levels should be compared against the adjacent extreme outline to determine if the site is at risk of flooding.

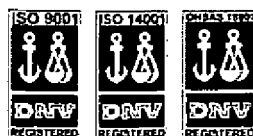
We therefore undertook a topographic survey of the site and produced three cross sections from north of the site through to the direction of the dock to confirm that the development is above the adjacent extreme flood outline and corresponding Zone C2. These are attached as Annex A. When flood level data was requested from the EAW, we were notified that the only available data was over 10 years old and not for the location requested. The data would have to be extrapolated from levels in Cardiff and Porthcawl.

This information was submitted via email to the EAW as a pre-planning enquiry on the 25 June 2008 (E-mail to EA attached as Annex B together with previous correspondence). In a subsequent conversation with Matthew Parry, Development Control Officer (and Acting Team Leader) of the EAW on the 26 June 2008, he confirmed that the site was not at risk of flooding and the cross sections were acceptable. A recent policy change within the EAW meant that applications in Zone B were taken on a risk-based approach and if the zone is outside the Q1000 Flood Map, then there is no perceived risk to the development.

A formal response from the Planning Liaison to the pre-planning enquiry is awaited, although Matthew has indicated that there is no objection to the proposed development from the information submitted.

I trust this information is sufficient for the purposes of the planning application and please do not hesitate to contact me should you have any further questions or queries.

We will submit the expected further correspondence from the EA to you when available.



INVESTOR IN PEOPLE

RSK Environment Ltd
Registered office
34 Albyn Place · Aberdeen · Aberdeenshire · AB10 1FW · UK
Registered in Scotland No. 115530
www.rsk.co.uk

Yours Sincerely,

Catherine Anderson MSc
Environmental Consultant
RSK Environment Ltd
Part of the RSK Group plc
<mailto:canderson@rsk.co.uk>
Direct Line: 01454 227575

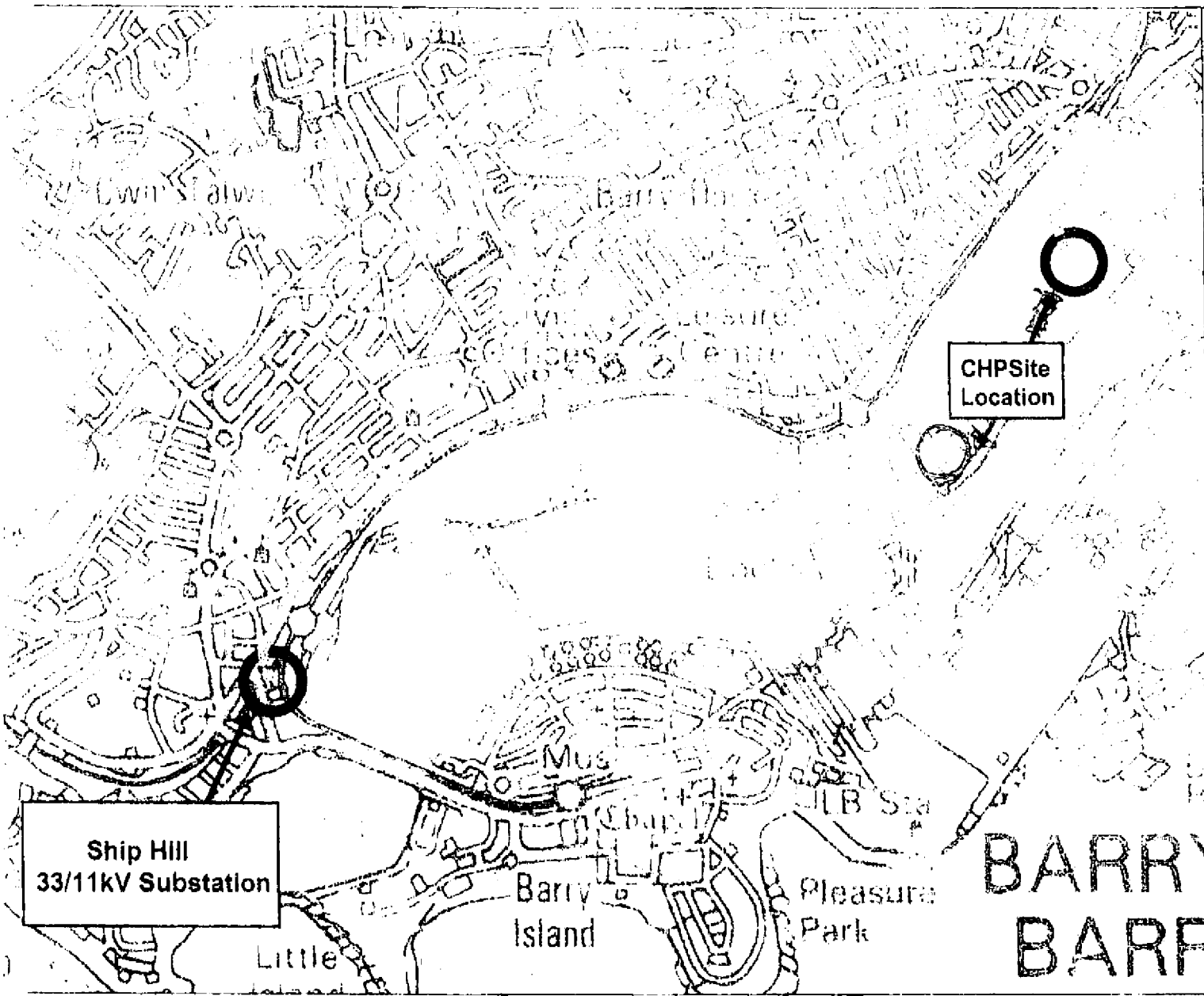
Enc.

Annex A: Topographic Survey and Cross Sections

Annex B: EA Correspondence, including EAW Flood Data and Welsh Assembly Government Development Advice Map (DAM) of TAN15 zones



INVESTOR IN PEOPLE



**Ship Hill
33/11kV Substation**

**CHPSite
Location**



Scale: not to scale
 Drawn: J Davies Date: 06/01/08
 Drawing No.: 2007-271107-03

Cell Site number: -

Title:
**PROPOSED
 CABLE ROUTE**

Site Name and Address:
**Barry
 South Wales**



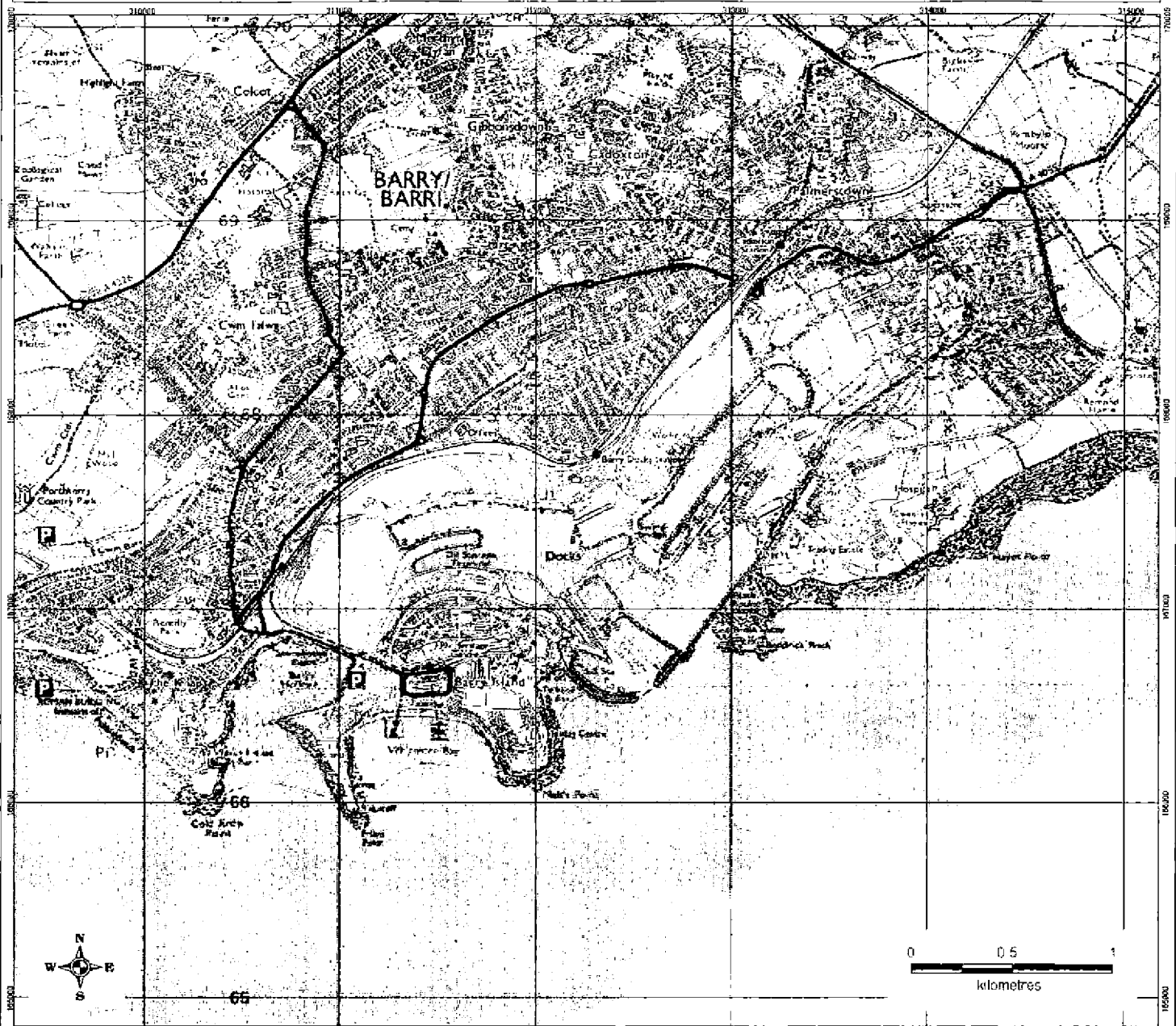
**DNO
 CONSULTING
 LTD**





2 Charnwood Court
 Newport Street
 Swindon
 tel: 0870 770 7720

LEGEND:

..... UNDERGROUND CABLE ROUTE

TAN15 Development and Flood Risk: Development Advice Map ST16NW



-  Zone A: Considered to be at little or no risk of fluvial or tidal/coastal flooding
 -  Zone B: Areas known to have been flooded in the past
 -  Zone C1: Served by significant infrastructure, including flood defences
 -  Zone C2: Without significant flood defence infrastructure
- Zones C1 & C2 based on Environment Agency's Extreme Flood Outline (>= 0.1% - River, Tidal or Coastal)

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 Mae atgynhyrchu heb ganiatâd yn torri hawlfraint y Goron a gall hyn arwain at edyriad neu achos sifil. Cynulliad Cenedlaethol Cymru - Rhif trwydded 100017916

[REDACTED]

From: Catherine Anderson

Sent: 24 June 2008 10:30

To: Parry, Matthew; [REDACTED]

Subject: Barry Sunrise CHP Plant

Attachments: EA response.pdf; P1580.dwg; P1580_Sections.dwg; barry location.pdf; Barry_ST16NW.jpg

Matthew/Mike

Please find attached the following:

- * Location plan
- * DAM map;
- * Topographic survey and cross sections; and
- * EAW flood level data.

The application is for a CHP plant in Barry Docks and from the DAM is located within a zone B. However from the EAW flood map there is no underlying Q200 or Q1000. In addition, a letter from Kayna we found on the planning register states that there has been no history of flooding to an adjacent development and the EAW had no objection to the development in relation to flood risk.

We have undertaken a topographic survey of the area which shows levels to be 7.83m AOD nearest the dock rising to 9.4m AOD to the north of the site. Looking at the EAW level data, it is stated that no levels are available for the Barry area, but extrapolating the levels from the Cardiff and Porthcawl data provided would put the Q200 at approximately 7.55m AOD and Q1000 at 7.85m AOD. However this data is now over 10 years old.

This is not an exact science and I would appreciate your view on this especially when other adjacent sites have been identified as being not at risk from flooding. The intention is to raise the site approximately 300-600m to make it more level with the north of the site anyway so would this is adequate mitigation for a site in zone B?

Your comments would be most beneficial to this project so that we can progress the site appraisal.

Kind Regards
Catherine

Catherine Anderson
Environmental Consultant

RSK Environment Ltd
West Nash Road, Nash, Newport, NP18 2BZ.

A member of the RSK Group plc

Office: 01633 276051. Mobile: [REDACTED]

<http://www.rsk.co.uk>

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Registered number: 115530

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