Retrospective Voluntary Environmental Statement

Document 1: ES Main Report

Barry Dock Biomass Facility, Woodham Road

Biomass UK No.2 Ltd

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Context: Introduction

This document comprises a retrospective Environmental Statement (ES) and has been prepared by Castellum Consulting on behalf of Biomass UK No.2 Ltd, the developer of the Biomass Power facility at Woodham Road, Barry Docks (the "Site"). Biomass UK No.2 Ltd is the parent company of the original developer of the project, Sunrise Renewables (Barry) Limited which was in place at the time of the applications reviewed within this ES. The principle of development was established by a planning application reference 2008/01203/FUL (the "2010 Permission") which was approved on appeal, and the detail of this development was subsequently amended by permission reference 2015/00031/OUT (the "2015 Permission") following consultation with the Vale of Glamorgan Council ("VoGC").

The application for the 2015 Permission was made to the VoGC who screened the application (see Appendix 2) and concluded that the development fell under Schedule II of the Environmental Impact Assessment (EIA) Regulations (section 11b), but that the environmental issues associated with the revised proposal were not sufficiently different to the impacts considered under the 2010 Permission to warrant a change to their original screening opinion. They therefore confirmed that there was no requirement for further EIA, a decision support by the Welsh Assembly Government ("WAG") (see Appendix 3).

The application was then recommended for approval to the Planning Committee and granted consent in July 2015. A copy of the case officer's report to the planning committee, recommending approval, is included at Appendix 7 of this document.

In summary, the 2015 Permission granted the following changes, relative to the 2010 Permission:

- 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 was chosen as it is more fuel efficient and to improve the average annual power output to 10 MWe compared to 9.0 MWe in the 2010 Permission.
- Layout: accommodation of the proposed technology at the project Site required a different configuration of the buildings housing the various components – the 2010 Permission allowed for a single principal structure while the revised layout broke this up into three separated, but functionally interconnected, buildings. The footprint of these buildings is 7.5% less than under the 2010 Permission.
- Elevations: the revised layout comprised two buildings that were lower than the building height in the 2010 Permission, and one that was 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 application sought a stack height increased to 43m. This was less than the stack height that had been previously approved for the waste-energy plant at Atlantic Way on the opposite (southern) side of the dock.

This ES is part of a package of documents being submitted voluntarily to the WAG. The intent of the submission is to provide a review of environmental information accompanying the previously approved planning application 2015/00031/OUT which sought to alter details of the 2010 Permission in line with detailed technology selection along with associated design and layout requirements of the developer.

Whilst the developer continues to maintain, in accordance with published screening decisions by both VoGC and WAG, that there was, and is, no requirement in law for the undertaking of an EIA, they have voluntarily prepared this statement with a view to demonstrating that the decision made by VoGC to grant consent under application reference 2015/00031/OUT would be unaffected by the presentation of the relevant environmental information in the form of an ES.

This ES aims to provide an objective account of the possible significant environmental effects of the proposed development by setting out the results of the Environmental Studies which were undertaken and submitted in support of the 2015 Permission. It is intended to provide WAG with sufficient information to show that the previous determination of the planning application, having due regard to the protection of the local amenity and the environment as a whole, would have been unaffected by the absence at the time of an ES.

The ES has been prepared in line with the framework provided in the Town and Country Planning (Environmental Impact Assessment) (England and Wales) Regulations 1999, as amended, with regard to the guidance set out in Welsh Office Circular 11/99 “Environmental Impact Assessment”, being the law applicable at the time of the 2015 Permission.

Application Submission Package

This ES comprises the first of four documents. The package comprises:

- Document 1: Environmental Statement (Main document);
- Document 2: Environmental Statement (Appendices);
- Document 3: Waste Policy Assessment; and
- Document 4: A Non-Technical Summary of the ES.

The Waste Policy Assessment included herewith was submitted in support of the planning application and considers the proposal in the context of relevant planning policies and strategies, and other material considerations, including need and sustainability. It is intended that this document provides the information required by Annex B to Technical Advice Note (TAN) 211.

The Non-Technical Summary (NTS) has been produced as a separate document and is a mandatory part of the ES. This provides, in non-technical language, a brief summary of the likely significant effects that it was considered the proposed development could have on the environment.

The Site

The land upon which the Barry Dock Biomass facility (the facility) has been constructed (referred to as the application Site) is located within the Barry Docks area, within the town of Barry, in the Vale of Glamorgan administrative area. Barry lies within the southern part of the Vale of Glamorgan, centrally on the South Wales coastline. The location of the application Site is shown below in detail.

Figure 1 Regional Location. Sourced from Magic.gov.uk

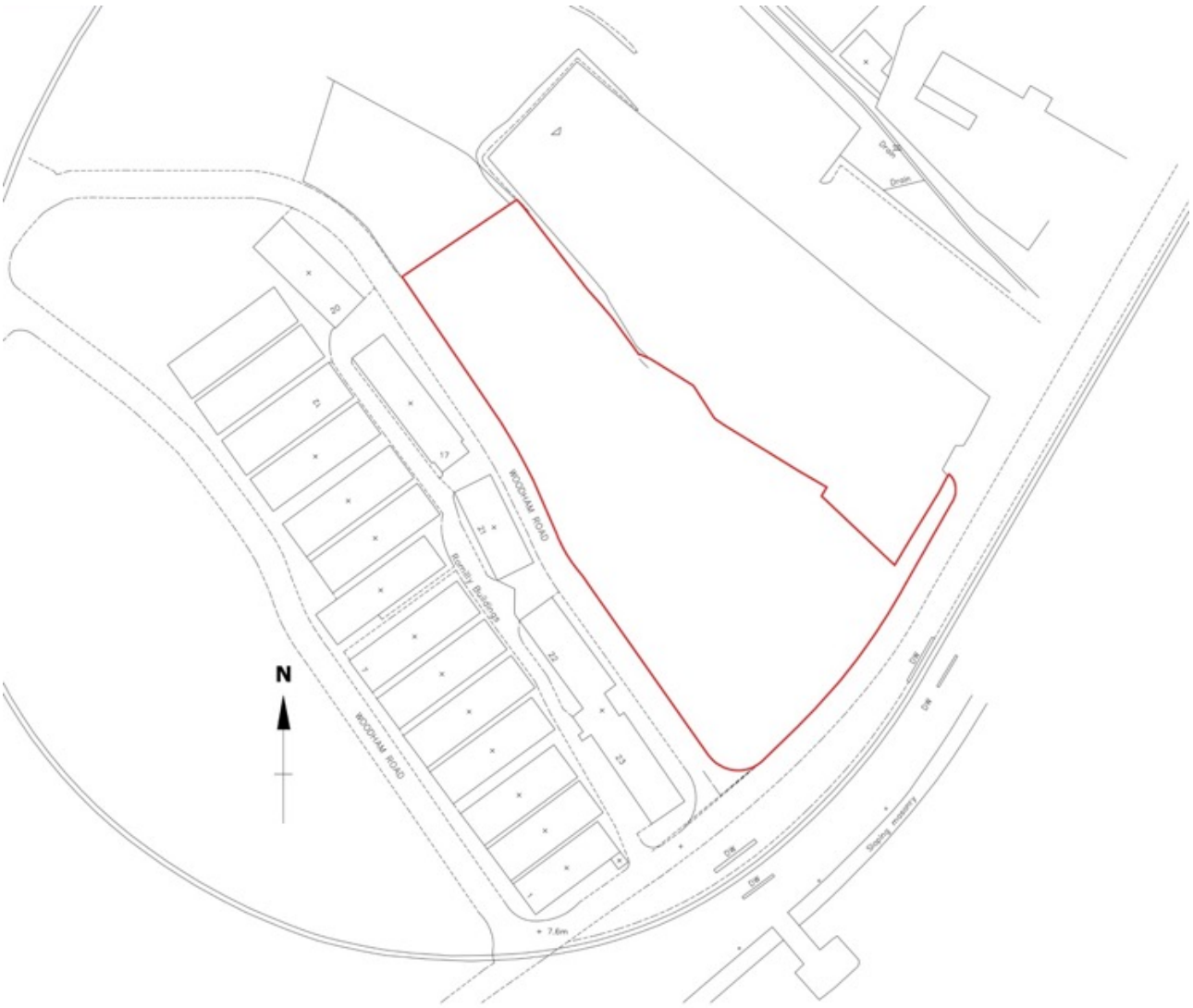

Figure 2 Immediate surroundings and 2015 Application planning boundary

The development Site is located on existing industrial land within the Port of Barry which is an established business and industrial area in the Vale of Glamorgan. The Site location is shown in the above Figures and on Drawing Location Plan (20/03/2015) at Appendix 1(1).

Desktop study information submitted in support of the 2015 application (the "2015 Application") includes plans from the Groundsure Report showing other land uses and sensitive sites within 500 metres of the Site. This is included at Appendix 1(11-12).

At the time of the 2015 Application the Site was substantially vacant, having been previously occupied by a container storage and refurbishment operation, of which part of the refurbishment operation relating to containers remained.

The Site is within an area affected by the potential for flooding and is within what at the time was termed the indicative Zone 3 floodplain. The original risk assessment prepared in support of the 2010

Permission (see Appendix 1(13)) remained relevant for the 2015 Application and is presented and discussed elsewhere in this document.

The Site is not located over a groundwater Source Protection Zone (SPZ).

The Site is considered previously developed land, and at the time of the 2015 Application consisted only of a compacted hard standing surface which was not vegetated.

There were, and are, no sites with sensitive flora or fauna having a statutory or local nature conservation designation within 500 metres of the Site in the Groundsure Report. 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 prior to the current project, but historical maps indicate that the following uses have occurred on the Site:

- 1879: Undeveloped estuarine land and riverbed of Cadoxton River
- 1898 to 1900: Land reclaimed to rail head, coal tip/loading dock
- 1920 to 1973: Railway engineering works/mil head
- 1989: Builder's yard

Chapter 2 within this document provides further information on the application Site and its environs.

Description of the Development

The development proposed in the 2015 Application comprised the following changes to the 2010 Permission:

- **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 was considered more fuel efficient contributing to improved average annual power outputs of 10 MWe compared to 9.0 MWe in the 2010 Permission.
- **Layout**: accommodation the change in technology at the Site required a different configuration of the buildings housing the various components – the 2010 Permission required a single principle structure, while the revised layout broke this up into three separate but functionally interconnected buildings. The footprint of these buildings is given as 7.5% less than under the 2010 Permission.
- **Elevations**: the revised layout comprised two buildings that were lower than the building height in the 2010 Permission and one that was higher. The average building height of the 2010 Permission was 14m while the average building height of the revised layout is 16.3m. In order to meet emissions requirements and based upon an iterative modelling exercise an increase in stack height of 43m was sought. This was less than the stack height that had been approved for the waste-energy plant at Atlantic Way on the opposite side of the dock.

A full description of the proposed development, including the associated processes, is included in Chapter 3 of this document.

The Developer

The 2015 Application was made in the name of Sunrise Renewables (Barry) Limited, described as,

‘a company managed by a group of experienced professionals committed to assisting with the delivery of biomass combined heat and power projects throughout the UK. The directors have a proven track record in the assembly and deliver)' of "turnkey" Renewable Energy projects. The directors and a number of their advisers have spent almost three years developing a number of port site projects with the objective that each Renewable Energy plant will be owned and operated by individual companies.’[1]

In November 2015 Sunrise Renewables (Barry) Limited was acquired by Biomass UK No.2 Limited and it remains a subsidiary of that company. In this ES, “developer” variously refers to Biomass UK

[1] Implementation of the development of the site has subsequently been undertaken by Biomass UK No.2 Ltd

No.2 Limited for the purposes of the present ES and Sunrise Renewables (Barry) Limited for the purposes of the 2010 Permission, the 2015 Application and the 2015 Permission.

Environmental Impact Assessment and Document Status

Environmental Impact Assessment (EIA) is a procedure for seeking to ensure that the likely effects of a development on the environment are fully understood and taken into account in the consenting process.

The term EIA describes a procedure which may be required to be followed for certain types of development before they are given "development consent", which in the UK includes the grant of a planning permission.

The procedure is a means of drawing together, in a systematic way, an assessment of a project's likely significant environmental effects. In this instance, the EIA is being prepared in a retrospective fashion, on a voluntary basis, by agreement with WAG, and draws on the information submitted between 2009 and 2015 in support of the 2010 Permission and the 2015 Permission. It should be noted therefore that in several key ways this ES will differ from a conventionally prepared ES in direct support of a planning application:

- It is a purely voluntary document; the developer does not recognise a statutory requirement for its preparation.
- In the absence of a formal Scoping Process (this ES not forming part of statutory process, none was undertaken), the developer has had to make a decision, informed primarily by both the 2015 planning application and consent process (including screening carried out by VoGC at that time), and by reviewing the available issues and information, on the scope of the matters considered by the ES. In practice this means that the issues considered mirror a combination of those considered by VoGC during the 2015 Application process and those identified during the preparation of the previous voluntary ES submitted at the appeal where the original 2010 Consent was granted. This scoping exercise, like the document itself, has no statutory status.
- As the ES is prepared in 2019, albeit retrospectively, and focused solely on the information available at the time of the 2015 Application, it of course cannot be said to meet the normal standard of being carried out before the project is given "development consent": such consent was given in 2015 in gaining Planning Consent from VoGC, a decision that went unchallenged within the period laid down for judicial review at the time.

These obvious departures from the requirements of the standard approach and purposes of EIA reinforce the point that this is not a document with statutory basis, and can only be used informally in looking back at the matters surrounding the consent process.

Notwithstanding these matters, this ES will be presented, as near as possible, in the normal format, and will follow the usual conventions in considering and presenting the Environmental Information.

Conventional Statutory Background

European Context

The Environmental Impact Assessment Directive[2] (the "EIA Directive") aims to ensure that the authority giving consent for a project makes its decision in the knowledge of any likely significant effects on the environment. The legislative basis of the EIA Directive is as follows:

- EIA Directive (85/337/EEC) 1988.
- Amending Directive (97/11/EC) 1999.
- Amending Directive 2003/35/EC
- Amending Directive 2009/31/EC
- Directive 2011/92/EU[3] 2011.
- In October 2012, the Commission adopted a proposal for a revised Directive[4].

National Context

The EIA Directive has been implemented through the regulations of the Town and Country Planning Act 1990 (the 1990 Act). The current regulations are the Town and Country Planning (Environmental Impact Assessment) (England and Wales) Regulations 1999[5] (the "EIA Regulations") as amended.

The Regulations specify certain types of development for which EIA is mandatory (Schedule 1 projects), and categories of development where an EIA may be required (Schedule 2 projects) dependent upon the likely significance of the impacts.

In connection with the development at Barry Docks, VoGC concluded in their screening of the application that it fell under Schedule II of the EIA regulations (section 11b), but that the environmental issues associated with the revised proposal were not sufficiently different to the impacts considered under the 2010 Permission to warrant a change to their original screening opinion. They therefore confirmed that there was **no requirement** for further EIA.

[2] Council Directive 85/337/EEC on the assessment of the effects of certain public and private projects on the environment, http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:1985:175:0040:0048:EN:PDF
[3] http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2012:026:0001:0021:EN:PDF
[4] http://ec.europa.eu/environment/eia/pdf/COM-2012-628.pdf
[5] SI 1999 No. 293

The Environmental Statement

An ES is a report that sets out the findings of an EIA process. It considers the possible environmental impacts of the proposed development and an assessment of how the severity of any impacts could be reduced.

An ES should include,

'such of the information referred to in Part I of Schedule 4 as is reasonably required to assess the environmental effects of the development and which the applicant can, having regard in particular to current knowledge and methods of assessment, reasonably be required to compile, but that includes at least the information referred to in Part II of Schedule 4.'

Contents

There is no required format or contents for an ES, other than that it must include the information set out by the EIA Regulations.

These requirements are detailed below. All ES's must contain the information set out in Part II.

Part I

Description of the development, including in particular –

- a description of the physical characteristics of the whole development and the land-use requirements during the construction and operational phases;
- a description of the main characteristics of the production processes, for instance, nature and quantity of materials used;
- an estimate, by type and quantity, of expected residues and emissions (water, air and soil pollution, noise, vibration, light, heat radiation, etc.) resulting from the operation of the proposed development.
- An outline of the main alternatives studied by the applicant or appellant and an indication of the main reasons for his choice, taking into account the environmental effects.
- A description of the aspects of the environment likely to be significantly affected by the proposed development, including, in particular, population, fauna, flora, soil water, air, climatic factors, material assets, including the architectural and archaeological heritage, landscape and the inter-relationship between the above factors.
- A description of the likely significant effects of the development on the environment, which should cover the direct effects and any indirect, secondary, cumulative, short, medium and long-term, permanent and temporary, positive and negative effects of the development, resulting from:

  - the existence of the development;
  - the use of natural resources;
  - the emission of pollutants, the creation of nuisances and the elimination of waste, and the description of the measures by the applicant of the forecasting methods used to assess the effects on the environment.
- A description of the measures envisaged to prevent, reduce and where possible offset any significant adverse effects on the environment.
- A non-technical summary of the information provided under paragraphs 1 to 5 of this Part.
- An indication of any difficulties (technical deficiencies or lack of know-how) encountered by the applicant in compiling the required information.

Part II

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

Scoping

As set out above, the EIA Regulations require consideration of the likely significant environmental effects of a development proposal. The EIA Regulations make provision for assessment across a broad range of development types and as such it is not always necessary to address all the areas identified above in the same amount of detail. It is therefore important to clearly identify the main environmental issues, as this allows for more detailed and targeted assessment to be carried out.

As stated previously, there has been no formal scoping exercise undertaken beyond the screening opinion issued by VoGC on 15 June 2015. In this case the scope of assessment has been based upon both the original ES submitted at appeal for the 2010 Application and the content of the 2015 Application.

The scope of the ES has therefore been determined as follows.

- Matters scoped in:
    - Air Quality (and offsite impacts on ecology through dispersion);
    - Noise;
    - Landscape and Visual Impact; and
    - Alternatives.
- Matters scoped out, but considered within the planning statement as submitted with the 2015 Application:
    - Transport;
    - Ecology;
    - Ground Conditions; and
    - Flood risk.
    -

The rationale for deciding whether to include matters in the ES or not rests principally upon the likelihood of the proposed changes having the potential to impact upon the topic area in a significant manner.

In terms of matters scoped in, the following reasoning was applied:

- Air Quality
    - With a change in technology provider and a material change in the built form of the development there was potential for changed impacts from dispersion. An iterative assessment process was used to determine the optimum stack height for the new technology provision and built envelope and a further air quality assessment was

provided to demonstrate the range and degree of the consequent impacts upon sensitive receptors. This is discussed in the relevant ES chapter and the report accompanying the planning application is presented at Appendix 1(9) to this document.

- Noise
    - Again, with a change in technology provider and material changes in the built form of the development there was potential for changed impacts from noise generated by the development. This is discussed in the relevant ES chapter and the report accompanying the 2015 Permission is presented at Appendix 1(2) to this document.
- Landscape and Visual Impact
    - With the changes to the built form (changed building profiles and massing, new stack height) it was considered that the development would have the potential for changes in impacts when compared to the 2010 Permission. These are discussed in the document accompanying the 2015 planning application at Appendix 1(7) to this report and in Chapter 5 of the ES.
- Alternatives
    - Consideration of alternatives are included as although not a statutory requirement there has been consideration of different technology options resulting in the principal reason for the application in 2015 and it is helpful to understanding the context of the 2015 Application to present discussion on these matters.

In terms of matters scoped out, the following reasoning was applied:

- Transport
    - The 2015 Application proposed no material change to the transport details approved in the 2010 Consent and confirmed that the background level of traffic remained comparable. The 2015 Application planning statement (and its supporting Appendix 10, Traffic Assessment) concluded that there were no material changes proposed and no change to the background upon which those changes would have effects.
- Ecology
    - The original ES and 2010 Application considered Ecology, principally in respect of the survey for Althaea hirsuta (Hispid or Rough Marsh-mallow) and found it absent. An updated survey was carried out in 2014 (in agreement with the VoGC's ecology officer) which confirmed that there had been no material change to the condition of the Site and that there continued to be no sign of Althaea hirsuta. Having been in active industrial use for an extended period of time there was no other on-site ecological interest (or indeed in the immediate environs) upon which the development would have the potential

to impact. This remained the case with changes proposed by the 2015 Application. This is detailed in the Planning Statement (and its appendix 8) accompanying the 2015 Application, a copy of both of which are to be found at Appendix 1 and 1(8) to this document respectively.

- Ground Conditions
    - Ground conditions were considered by both the original ES and 2010 Application, supported by Groundsure Environmental Reports. There had been no material change to either the nature of the proposals in terms of their impacts upon Ground Conditions, nor upon the conditions themselves and therefore there is no potential for additional or changed impacts beyond those considered in the approved 2010 Application.
- Flood Risk
    - Flood risk matters were discussed in both the original 2010 Application and ES. The original Flood Risk Assessment is included as Appendix 1(13) to this Statement. There was no significant change to the proposed footprint of development or the area within which it was proposed. There had been no material change to the flood conditions between the original application and the 2015 Application. This is addressed in more detail within the Planning Statement accompanying the 2015 Application, included at Appendix 1. As there was no material change proposed to the area of the development, nor the flood risk context between the original and 2015 Application, there are no material impacts to be considered by this ES.
- Planning Policy
    - It was agreed with officers of the WAG Planning team that planning policy should not be included in this ES, as it had been considered within the 2015 Application.

Assessment Procedures

The ES covers a range of potential environmental issues which vary in timing and duration of effects. The proposed development has a design life in excess of 25 years, with construction and decommissioning before and after the main operational phase respectively.

The development can therefore be described as being in three principal phases:

Phase	Duration
Construction:	Beginning three to four years prior to the operational period, and comprising initial site preparation works, construction activities and landscaping works.
Operational	The normal operational life of the facility
Decommissioning	Should the facility be decommissioned, this could take approx. 2 years

Figure 3 Development Phases

It is considered that the process of decommissioning is directly comparable to that of construction so is not considered separately. Furthermore, the decommissioning of the process is a regulated aspect of the operational environmental (EPR) permit[6] and therefore a regulated activity under the direct control and oversight of NRW.

Identified effects can be temporary or permanent; direct or indirect; and positive or negative.

Temporary/Permanent Effects

In relation to the different time frames identified above, some of the effects would be temporary, for example the construction works, whilst others would be permanent, such as the impact on landscape.

Direct/Indirect Effects

The development could have direct effects upon nearby properties and settlements, together with the environment as a whole in relation to emissions of noise, dust, gaseous emissions, as well as the changing appearance of the Site. Indirect impacts can also occur, largely in relation to the transportation of feedstock to the Site and export of waste materials.

Positive/Negative Effects

The development may generate both positive and negative effects, either by virtue of the proposals themselves or as a result of the mitigation measures proposed. These benefits might include the reduction of volumes of waste that would otherwise be disposed of to landfill or exported, the potential

[6] An Environmental Permit has now been granted by Natural Resources Wales (EPR/AB3790ZB) following extensive public consultation in 2018

to generate energy from waste as opposed to by means of burning fossil fuels; the effective use of otherwise vacant land and the potential socio-economic benefits (such as employment and input into the local economy) of the development.

Cumulative Impact

Cumulative impacts are either the addition of the impacts of the project on the receiving environment, or the combination of those effects with past present or future developments.

This can take the form of;

- The sum of individual impacts;
- The interaction of individual impacts to produce a greater effect than that of each individual element;
- Individual impacts which when added together cancel each other out; and
- Individually insignificant disparate effects which in combination could collectively produce a significant overall impact.

The various impacts assessed within this ES have been considered collectively and it is concluded that no significant cumulative impact would arise.

Depth of Assessment

The developer had a number of discussions with officers of the Welsh Assembly Government to agree the voluntary submission in support of the 2015 Application which agreed that the document should be presented in the form of an Addendum ES.

As noted above, no formal scoping exercise has been undertaken but an informal scoping exercise (as described in the section on Scoping) has been undertaken based on both the scope of the 2015 Application and the original ES. This, together with the developer's and Castellum Consulting's experience of similar projects, has helped define the depth in which the various assessments carried out as part of this EIA have been conducted.

It is important within an ES to examine the baseline conditions, and in this instance these baseline conditions are determined with reference both to the condition of the Site and its surroundings, and also the original permitted development as described in the approved documents which constituted the 2010 Permission.

Finally, if significant environmental impacts are predicted in the EIA process then the ES provides measures which would be employed to eliminate or ameliorate the impact to acceptable levels. Mitigation measures have been formulated based on a hierarchy of avoid, reduce, compensate,

remediate and enhance. As such, mitigation measures can be in the form of changes to operational practice or changes/additions to the design of the facility. Through the incorporation of appropriate mitigation, the EIA forms part of an iterative design process. In the case of the project at Barry Docks, the iterative design process was informed by the supporting information variously reviewed in this ES, notwithstanding that no separate ES was required by VoGC at the time of the 2015 Application.

Consultations Undertaken

Amongst others, the following bodies were consulted during the application for the 2010 Permission:

- Barry Town Council;
- Countryside Council for Wales;
- Environment Agency Wales;[7]
- Dwr Cymru/Welsh Water; and,
- The Vale of Glamorgan Council consultees:
    - Head of Economic Development and Leisure;
    - Director of Legal, Public Protection and Housing Services (Pollution Control);
    - Pollution Control Team;
    - Head of Visible Services (Highway Development & Waste Management);
    - Energy Manager.

The following bodies were consulted during the 2015 Application:

- Cardiff Airport (Safeguarding)
- Glamorgan Gwent Archaeological Trust
- VoGC Policy Section (Planning)
- Local ward members
- Dwr Cymru Welsh Water
- VoGC's Ecology Officer
- VoGC's Waste Management
- VoGC's Finance, ICT and Estates, Energy Manager
- Highways and Engineering
- Natural Resources Wales (previously Environment Agency Wales) and
- The Vale of Glamorgan Council
- Public Health Wales
- Health and Safety Executive
- Associated British Ports

[7] Environment Agency Wales ceased to exist and was incorporated into Natural Resources Wales on the 1 April 2013. NRW is formed from a merger of the Countryside Council for Wales, Environment Agency Wales, and the Forestry Commission Wales, and also assumes some other roles formerly taken by Welsh Government.

In preparation for this voluntary ES the developer consulted;

- The Welsh Assembly Government's planning team.

Technical Difficulties

No technical difficulties were encountered when undertaking the EIA, beyond the limitations described at the section headed, 'Environmental Impact Assessment and Document Status'. In considering the potential impacts of the proposals on nearby properties, it should be noted that observations and measurements were generally made from public areas (such as rights of way and highways). It is considered that this has not prevented the accurate assessment of potential environmental impacts or the identification of appropriate mitigation measures.

The Submission and its Structure

This first section of this ES provides an overview of the submission and the regulatory framework regarding EIA. Subsequent sections of the ES provide a description of the application Site; describe the development proposals; set out the relevant alternatives considered; and then provide an analysis and evaluation of the effects of the development on the human and natural environments on a topic by topic basis.

Where potential environmental impacts are identified, mitigation strategies are put forward and residual impacts are assessed. As such the ES is intended to provide WAG with sufficient information to confirm that had the voluntary ES been required to be submitted alongside the 2015 Planning Application, the planning application determination process would have reached the same conclusion.

This document is presented as follows:

Background Information (Chapters 1 to 2). This Part is descriptive in nature setting out an overview of the application Site and the surrounding area. It describes the development for which planning permission was sought under the 2015 Application, both in terms of the physical appearance and the processes to be undertaken.

Environmental Assessments (Chapters 3 to 6). For each subject area the relevant data and background information is provided, and the potential impacts are considered. Where appropriate mitigation measures are proposed, any residual impacts are considered.

The specific subjects considered are:

- Chapter 3 Air Quality
- Chapter 4 Noise
- Chapter 5 Landscape and Visual Impact
- Chapter 6 Alternatives

Conclusions (Chapter 7).

Non-Technical Summary (NTS). This provides, in non-technical language, a brief summary of the proposed development together with the likely effects that it would have on the environment. The NTS is provided as a stand-alone document in accordance with best practice, for ease of circulation.

Project Team

Castellum Consulting has been appointed by the developer to prepare this ES, within a scope provided by the developer in agreement with the Welsh Assembly Government. Castellum is an Environmental Consultancy with over twelve years' experience in Environmental Planning for waste and energy projects.

In preparing this ES, Castellum has drawn upon the technical expertise of those experts who carried out assessment work for both the 2010 Application and ES, and the 2015 Application, and has benefitted from the professional and technical input of the project's management to ensure factual accuracy in respect of the proposed development as it stood at the time of the 2015 Application.

Publication

Paper copies of this ES can be obtained from the developer at the following address:

Biomass UK No.2 Ltd

Barry Energy Production Facility

Woodham Road, Barry Docks,

Vale of Glamorgan, CF63 4JE

The ES and other accompanying documents are available in either paper (for which a charge of £250 will be made) or electronic format. A free copy of the Non-Technical Summary is available on request.

Chapter 1: Description of Development

1.1 Changes to Elevations and Layout

The development proposed by the 2015 Application was to rearrange the plant approved by the 2010 Permission from its original layout as a single building into three, functionally interconnected buildings, with ancillary external structures and an increased height of stack for the venting of exhaust from the plant.

The 2015 Application proposed that the finishes of the structures were to be as per the original approval,

'steel portal frame construction, to be surfaced with micro profile or box cladding to all external elevations. The colour and specification of the panels were to be agreed with the planning authority prior to construction[8].'

The elevations approved at Appeal for the 2010 Application are below:

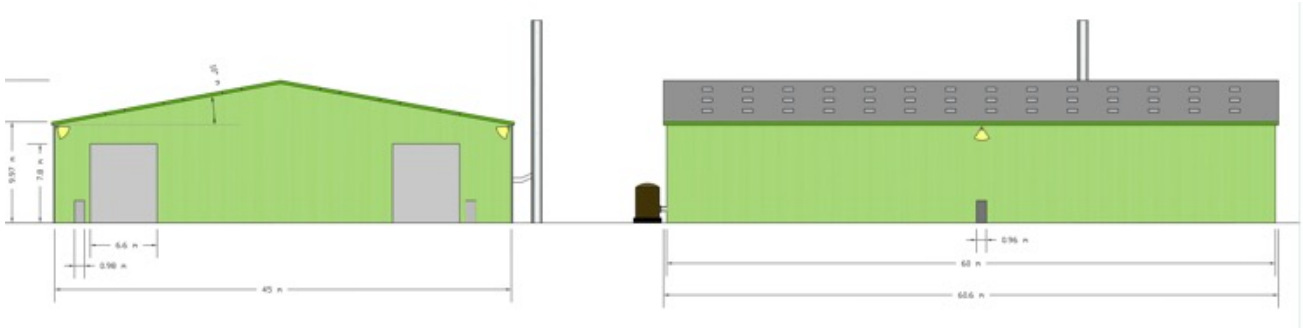

Figure 4 Approved Elevation (2010 Permission)

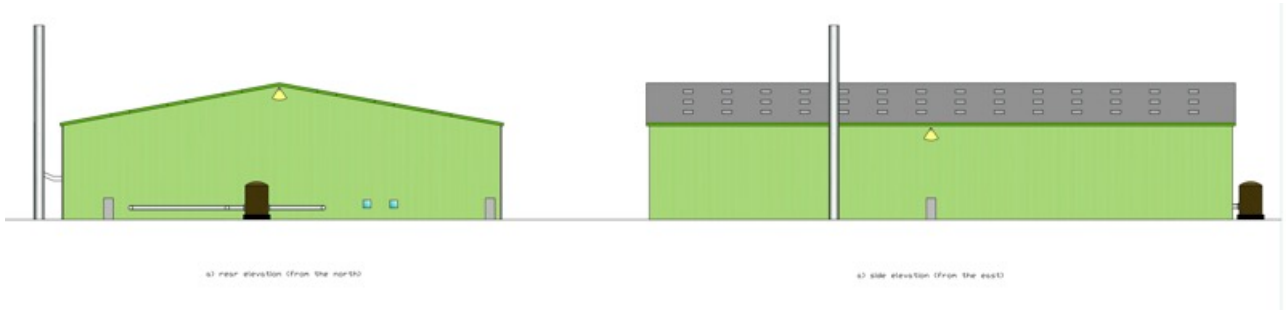

Figure 5 Approved Elevation (2010 Permission)

[8] Colour and specifications were subsequently reviewed and agreed with VoGC in 2016 as part of an application to discharge the applicable planning condition (2015/0031/1/CD)

The proposed elevations of the 2015 Application are shown below:

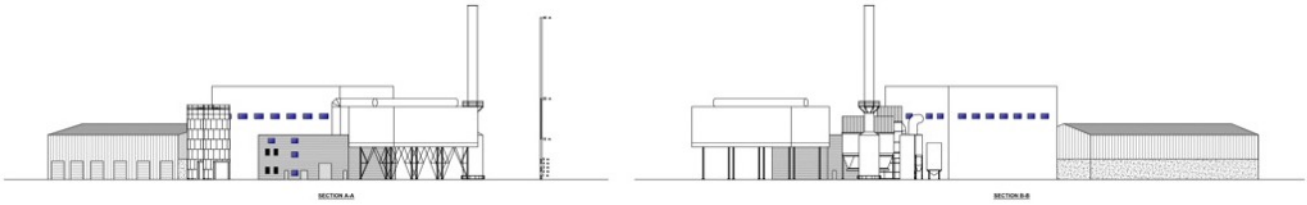

Figure 6 2015 Application Elevations

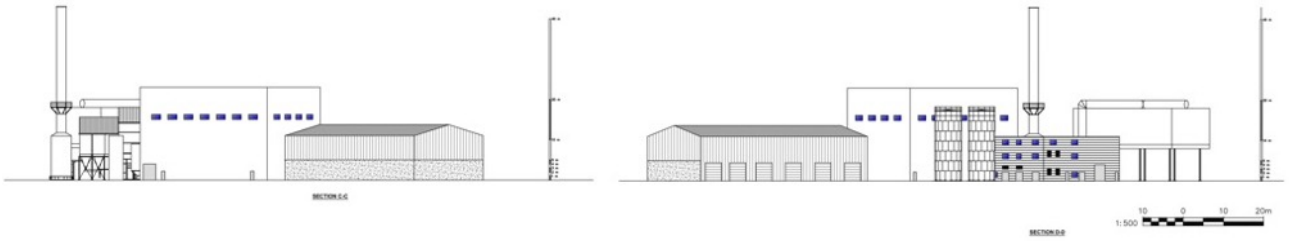

Figure 7 2015 Application Elevations

The revised layout comprises three separate structures, of which two are lower and one higher than the building height in the 2010 Permission. The main details of the proposed changes within the 2015 Application 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 was determined through an iterative air dispersion modelling exercise reflecting the change in proposed technology provider sought in the 2015 Application. The dispersion modelling determined a stack height which would comply with the requirements the Waste Incineration Directive (WID)/Industrial Emissions Directive (IED). This modelling exercise resulted in 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 increased from 1.0m to 2.75m.

Under the 2010 Permission all plant operations were located within a single structure with a total footprint of 2700m^2.

The 2015 Application proposed to separate the power plant functions into separate structures to accommodate the revised plant (total building footprint 2,497m^2). The result of the proposed changes was a net 7.5% reduction in building footprint at the Site. Details of the structures are as follows:

- Fuel Storage and Feed Building: The fuel (process non-hazardous waste wood) storage and feed building (at 52.4 x 21.6 x 13.7m high) remained similar in height to that of the previously approved building (14m).
- Turbine, Welfare & Ancillaries Building: This building (29.1 x 17.9 x 11m high) had a reduced height compared to that of the previously approved building and incorporated switchgear, the main control room and a turbine room (to replace the formerly proposed piston engines).
- Main Process Building: The gasification equipment was to be entirely enclosed within a bespoke structure (41.4 x 20.4 x 23m high). This was to significantly improve containment of the process as a whole. The maximum height of the previous plant was 14m so there would 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 was proposed adjacent to the Turbine, Welfare & Ancillaries Building.
- External Equipment: ash residue from the combustion process was to 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 was also to be external to the buildings.
- Chimney Stack: the chimney stack was to be re-sited some 20m to the south-east relative to the original location and in order to meet emissions requirements, the stack height was to be increased to 43m (which is less than the stack height approved for the waste-energy plant that had been approved for construction at Atlantic Way on the opposite side of the dock).

The internal layout that was proposed by the 2015 Application is shown below.

Figure 8 2015 Application Indicative Internal Layout

1.2 Drainage

As with the 2010 Permission, under the 2015 Application, all internal surfaces were intended to drain to a sealed sump or foul sewer. External surface drainage was to be directed to a sustainable surface water system, to be agreed with the planning authority, and roof water would drain to a soakaway or be reused in the process[9].

1.3 Access

The Site was to be accessed at the same point as approved under the 2010 permission from David Davies Road immediately to the south of the development. The Site, as approved, was to be secured by the installation of new galvanised steel palisade security fencing and gates to a maximum height of 2.4 metres.

Access to the plant itself remained unchanged from the 2010 Permission .

1.4 Plant and Lighting

As with the approved facility, the 2015 Application envisaged the use of mobile plant i.e. a loading shovel or grab as required within the reception hall. A water bowser was to be made available for use on Site, mainly to keep dust to a minimum on all vehicle running surfaces. A vacuum tanker/road sweeper or brush and shovel would be used to dean the Site access road and the highway, although it was not expected to be required beyond the Site construction phase. There was to be sufficient space within the building for the overnight storage of all plant and equipment associated with operations.

As approved under the 2010 Permission, directional floodlights would be used externally after official lighting up times and their location was to be agreed with the local planning authority[10].

[9] The application to discharge the drainage condition is incorporated into the currently undecided application 2017/01080/FUL

[10] The application to discharge the lighting condition is incorporated into the currently undecided application 2017/01080/FUL

1.5 Operational Details and Processes

The operational details of the plant were to be in line with the 2010 Permission, with the exception of the fact that fuel would 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 was presented as a material improvement relative to the 2010 Permission.

The plant would operate and provide electricity to the grid 24 hours per day, with allowances for maintenance and breakdowns. The entrance gates were to be closed upon the cessation of daily operations to ensure no unauthorised access.

The process remained otherwise as described in the 2010 Permission.

As with the 2010 Permission, the revised plant continued to require an Environmental Permit, now from the Environment Agency Wales' successor, Natural Resources Wales.[11]

The table below gives approximate figures for process outputs based on the throughput and operational hours:

Type	Quantity Required or Produced			Notes
	Hourly	Daily	Weekly	
Wood fuel	9 tonnes	216 t	1512 t	Totals assume constant operation
Water feed input requirement	4.5m^3	108m^3	756m^3	26 m^3 initial fill required, additional moisture from wood
Total recirculating cooling water	67m^3			@30 to 40 degrees C
Drainage condensate	0.75 m^3	18m^3	126m^3	
Char/Ash	270kg	6.48 t	45.36 t	3%
Filter residues/abatement residues (particulates)	< 1 t	< 1 t	< 1 t	n/a

Figure 9 Process Outputs

[11] An Environmental Permit has now been granted by Natural Resources Wales (EPR/AB3790ZB) following extensive public consultation. This permit required the full and detailed assessment of all processes, activities and their associated environmental releases and impacts. The permit has been secured on the basis that all impacts have been deemed by the NRW as both being acceptable and meeting the EU Sector definition of 'Best Available Techniques' (BAT).

Chapter 2: The Site and its Environs

2.1 Introduction

Schedule 4 of the EIA Regulations requires that an ES should include a description of the application Site. This section fulfils that requirement.

This chapter describes the existing characteristics of the application Site and the surrounding area. Other sections within the technical chapters of the ES provide further descriptions of the application Site in relation to particular environmental topics.

In this respect, Chapter 3 describes the application Site in relation to noise, whilst Chapter 4 describes the baseline air quality in the vicinity of the application Site. Chapter 5 describes the landscape character and topography of both the application Site and its surroundings.

In other respects, the context of the application is set by the details of the 2010 Permission, which established the principle of the process, structures and activities allowed on Site and against which the 2015 Application sought to make changes.

These existing conditions provide a baseline against which the effects of the proposals may be evaluated.

2.2 Location

The Site location is shown in the Figures below and on Drawing 'Location Plan (20/03/2015)' (Appendix 1(1)). The Site is located within Barry Docks, which are at the heart of the large industrial area which lies on the south-eastern edge of the town. The area lies within the administrative area of the vale of Glamorgan, and the centre of the Site is at National Grid Reference ST12606768. The Site itself lies on the eastern edge of the eastern loop of Woodham Road, and on the northern edge of David Davies Road.

2.3 The Site

At the time of the 2015 Permission the Site was substantially vacant, having been previously occupied by a container storage and refurbishment operation, and a refurbishment operation relating to containers remained.

The Site is roughly rectangular, averaging approximately 60m in width, by 170m in length. The Site is oriented roughly north-west/south-east. The land is flat and prior to development was surfaced with a mixture of hardcore and compacted earth, with some areas of concrete. Having been in regular use for industrial purposes, there was little vegetation on the Site with the majority of the Site having been

in regular vehicular use. There was a security fence around much of the Site boundary, albeit in poor condition. The Site is considered previously developed (i.e. brownfield) land.

The Site is within an area previously affected by flooding and is within what at the time was termed the indicative Zone 3 floodplain. The original risk assessment prepared in support of the 2010 Permission remained relevant for the 2015 Application and is presented as discussed elsewhere in this document.

The Site is not located over a groundwater Source Protection Zone (SPZ).

There are no sites with sensitive flora or fauna or having a statutory or local nature conservation designation within 500 metres of the Site in the Groundsure Report. 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). This covers an area of 29 hectares.

The Site has no clearly defined planning history prior to the current project, 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/mill head
- 1989: Builder's yard

Figure 10 Immediate surroundings of the Site, taken from Google Earth Pro, 18/08/2019 using photography from 08/2016

2.4 Immediate Setting

The development Site is located on existing industrial land within the Port of Barry, which is an established business and industrial area in the Vale of Glamorgan.

Desktop study information included as part of the 2015 Application includes plans from the Groundsure Report showing other land uses and sensitive sites within 500 metres of the application Site.

The Site lies within the north western area of the broader Barry Docks area, which consists of large areas of flat land occupied by various industrial and commercial businesses, centred around the docks themselves. The businesses are a mixture of manufacturing, storage, open storage, light industrial and commercial operations, along with aggregates handling, waste processing, energy generation and other activities.

Along the entirety of the south western boundary of the Site, on the other side of Woodham Road, and oriented parallel to its longer dimension, lies a row of *'Nissen Hut'* style buildings with a series of curved roofs, which at the time of the 2015 Application were occupied by various commercial activities including vehicle repair shops, taxi firms, and a furniture warehouse. To the north east lay an open storage area, a haulage firm, timber products business, and other commercial ventures. To the north west lies an area occupied by railway lines, Ffordd Y Mileniwm Road, then rising ground with Dock View Road above, at some 220m distant. To the South east lies David Davies Road, beyond which is a single rail line, and then the open water of the docks.

Figure 11 Wider surroundings of the Site, taken from Google Earth Pro, 18/08/2019 using photography from 08/2016

2.5 Wider Setting

In terms of the wider area, the Site within the Docks lies to the south east of the centre of Barry. To the north and west lies the bulk of the residential areas of the town, with heavy industry to the east of the docks, and the broader area of Barry Docks to the south/south east, beyond which lies the sea.

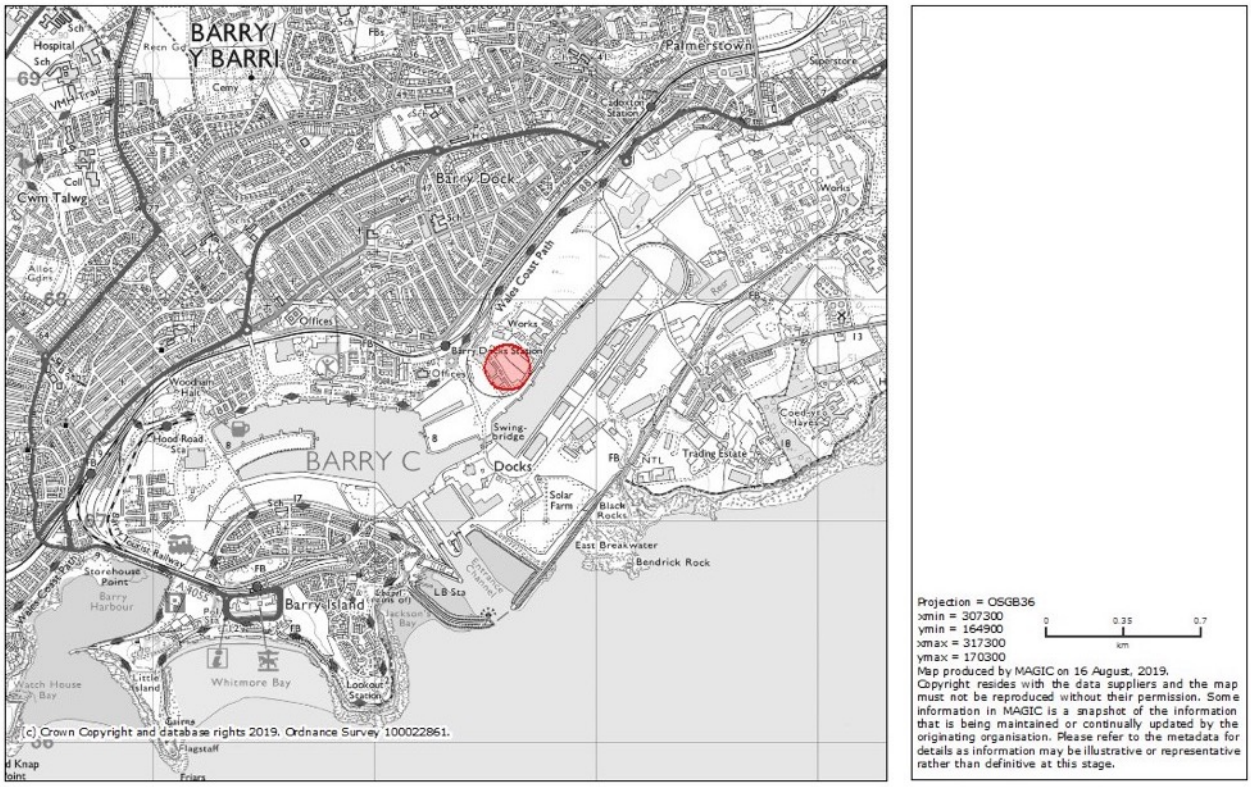

Figure 12 Magic Map showing surrounding area and Site location. Taken from Magic.gov.uk 18/08/2019

2.6 Context: Planning Policy

As agreed with WAG, this ES will not contain a section on planning policy, as this was discussed and reviewed within the 2015 Planning Permission and is not relevant in the context of this retrospective ES.

Chapter 3: Air Quality

3.1 Introduction

This chapter of the ES considers the potential for the revisions made by the 2015 Application, to the 2010 Permission approved scheme, to impact upon air quality in the vicinity of the application Site. The chapter describes;

- the scope of assessments;
- relevant legislation;
- assessment methodology;
- the baseline conditions;
- potentially significant environmental effects;
- mitigation measures; and
- residual impacts.

The 2015 Application was accompanied by two technical reports on air quality to address issues relating to the impacts of the changes proposed by the 2015 Application. These changes were to amend the layout and elevations in order to accommodate a change in technology for the project.

The first study, carried out by Stopford Energy and Environment, was designed primarily to iteratively determine an appropriate height for the stack. The second study, carried out by Entran Ltd, was a full air quality assessment commissioned at the request of VoGC in response to consultation feedback and prior to the 2015 Application being presented to committee.

Following the grant of the 2015 Permission, the air quality assessment formed part of the application for an Environmental Permit, and as such directly addressed the requirements of the regulator. This detailed assessment was comprehensively reviewed by Natural Resources Wales (NRW) during determination of the application for an Environmental Permit, to ensure that the facility would not cause significant pollution to the environment or harm human health. The assessment is provided as a technical report in Appendix 1(2).

3.2 Scope of The Assessment

The air quality assessment is focussed on the following potential air impacts:

- Construction:
  - Dust from traffic movements and construction
- Operations:
  - Pollution from the engines of traffic
  - Pollutants from the exhaust stack
  - Dust from storage and handling of ash.

Decommissioning is considered comparable to the construction phase so is not handled separately. Furthermore, the decommissioning of the process is a regulated aspect of the operational environmental (EPR) permit and therefore a regulated activity under the direct control and oversight of NRW.

Th emissions and impacts associated with Air Quality are regulated within the Environmental Permitting (EP) regime, and the detail (such as combustion pollutants from the stack, for example) can therefore be found in the accompanying technical appendices, particularly the study by Entran, which was designed to support the application for the Environmental Permit and meet the joint requirements of both the Environmental Permitting Regulations and the EU Industrial Emissions Directive.

This requirement is described in paragraph 2.12 of TAN 211.

3.3 2010 Permission Air Quality Assessment

The 2010 Permission, approved on appeal, was accompanied by an assessment of air quality conducted by RSK Environment, Health and Safety Ltd (RSK) and an Air Quality chapter in the voluntary ES submitted at the appeal. These form part of the approved documentation supporting the 2010 Permission and are part of the baseline against which the 2015 Application is measured.

Detailed dispersion modelling of stack emissions from the proposed plant was undertaken. In particular, the potential impact of operational emissions on local residential and ecological receptors, including Sites of Special Scientific Interest (SSSI), was considered.

The following section sets out a summary of the assessment as approved.

3.3.1 Assessment Methodology

The legislative and regulatory framework of the assessment was as follows:

- Environment Act, 1993, Part n7 and specifically Section 80, the National Air Quality Strategy (NAQS). (The latest Air Quality Strategy for England, Scotland, Wales and Northern Ireland - Working Together for Clean Air, published in July 2007)
- The EU Air Quality Framework Directive (1996) established a framework under which the EU could set Limit or target values for specified pollutants.
    - The Directive identified twelve pollutants for which limit or target values have or will be set in subsequent Daughter Directives. The first of these Daughter directives relating to sulphur dioxide (SO_2), fine particles (PM_{10}), oxides of nitrogen (NO_3) and lead (Pb), was formally adopted in April 1999, and was required to be implemented by all Member States by July 2001.
- Relevant regulations applicable in Wales include:
    - The Air Quality Wales) Regulations 2000 (S.I. 2000/1940) (W.138);
    - The Air Quality (Amendment) (Wales) Regulations 2002 (S.I. 2002/3182) (W.298);
    - The Air Quality Limit Values (Wales) Regulations 2001 (S.I. 2001/2683) (W.224);
    - Air Quality Limit Values (Wales) Regulations 2002 (S.I. 2002/3183) (W.299);
    - The Air Quality (Ozone) (Wales) Regulations 2003 (S.I. 2003/1848) (W.198);
    - The Air Quality Limit Values Regulations (2003) (S.I. 2003/2121);
    - The Air Quality Limit Values (Wales) (Amendment) Regulations 2003 (S.I.2005/1157) (W.74); and,
    - The Air Quality Standards (Wales) Regulations (2007) (S.I. 2007/717) (W.63).

- The primary emission components are considered to be nitrogen oxides (NO_x), sulphur dioxide (SO_2), fine particles (PM10) and carbon monoxide (CO). These parameters are subject to the air quality objectives set out in the National Air Quality Strategy (NAQS).
- Environment Agency's Integrated Pollution Prevention and Control Horizontal Guidance Note 1 (IPPC HI, 2003) provides Environmental benchmarks for the protection of human health for hydrogen chloride (HCI), hydrogen fluoride (HF) and mercury (Hg). Both HCI and HF have the potential to contribute to acid deposition effects. No guideline level is available for dioxins.

Dispersion modelling was carried out using AERMOD.

AERMOD includes two data pre-processors for streamlining data input. AERMET, a meteorological pre-processor, computes boundary layer and other necessary parameters for use with AEROMOD and accepts data from both on-site and off-site sources. AERMAP is a terrain pre-processor that simplifies the computation of receptor elevations and effective height scales for numerous types of digital data formats, including USGS 1 Degree and 7.5 minute digital elevation model (DEM) files and U.K. Ordnance Survey digital elevation data.

Breeze AEROMOD GIS Pro v.7.0.21 was used in this study for assessing potential air quality impacts. The model is considered by the Environment Agency to be appropriate for assessments of the nature described in this report.

3.3.2 Emission Source Parameters

Modelled Scenario - In order to characterise potential worst-case air quality impacts resulting from emissions from the power plant stack, it was assumed that the plant was operating continuously throughout the year.

Modelled Domain - Two grid domains (far-field and near-field) were incorporated in the dispersion model to capture the coarse and fine scale variation in predicted pollutant concentrations with distance. Both domains were approximately centred on the proposed power plant Site. The far-field domain covered an area of approximately 20km by 20km, and had a grid resolution/spacing of 230 m. The near-field domain covered an area of approximately 3km by 3km and had a grid resolution/spacing of 30 m.

3.3.3 Mitigation opportunities for general operations.

Site operations were to be carried out to minimise all creation of dust. A permanent constant mains water supply would be available on site in all climatic conditions to ensure that the dust suppression systems can function effectively, and all external water pipes were to be lagged to prevent frost

damage during Winter months. Dust in the hopper and conveyor area was to be controlled using a hand held water hose or vacuum extraction system.

The Site staff were to continuously monitor dust emissions whilst the plant was in operation and take appropriate action when required. In addition, the Site supervisor will visually monitor for dust emissions at the Site perimeter at least twice daily to ensure that no dust blows off the Site. Results of monitoring exercises were to be entered into the Site diary.

Water sprays and/or bowsers would be used to reduce dust levels on all external Site surfaces where necessary. This particularly applies to Site roads, storage, loading and unloading areas. Vehicles carrying potentially dusty loads off site were to be securely sheeted or spayed with water to reduce dust emissions.

Stockpiles were to be located within the proposed building to ensure that vehicles leaving the Site cannot track through the stored material to prevent deposit of debris on the highway. The deposit of material on the highway were to be treated as an emergency and be cleaned with a road sweeper if necessary.

Mud/litter on roads - The deposit of material onto the access road and highway was unlikely, however if it did occur during the construction phase, for example, it would be cleared using a road sweeper or hand-picked in the case of litter.

Visual inspections of the Site surface were to be carried out daily with staff reporting any problems with debris on the Site surface immediately to the Site supervisor. Vehicles were to be visually inspected before exit to check that loads are safe so that no debris would be carried out on the wheels or body of the vehicle.

No material would be accepted which is likely to cause an odour nuisance. Any loads which are malodorous will be rejected and the Environment Agency (now Natural Resources Wales) informed. The plant itself does not produce odorous emissions.

3.3.4 Cumulative Effects

This section describes the potential cumulative effects which could arise from the interaction of the facility and other developments in the study area, specifically a planning application (no. 2009/00021/FUL) submitted by Biogen Power for a gasification facility on the south side of the Docks at Atlantic Way was approved on 17 September 2009[12]. Cumulative Impact Assessments were undertaken by RSK Group plc with regard Air Quality.

[12] This planning application subsequently lapsed on 23 December 2014 without being implemented.

In-combination impacts on air quality when both the proposed biomass plant and the aforementioned gasification facility were in operation were predicted using AERMOD dispersion model. Emission parameters pertaining to the proposed Biogen gasification facility were obtained from the air dispersion modelling report prepared by Parsons Brinkerhoff (Report Reference No: FSE97027C, dated September 2008).

The highest predicted off-site ground level concentrations (including background concentrations) of pollutants when both the proposed plant and Biogen's gasification facility were in simultaneous operation were predicted to meet the air quality objectives. **Pollutant concentrations were predicted to meet the relevant air quality objectives at all sensitive receptor locations**.

The Air Quality Assessment identifies the maximum predicted process contribution from both proposed facilities towards nitrogen deposition at the sites of ecological importance. The process contribution was predicted to be less than 1% of the background nitrogen deposition rate. Where exceedance of critical nitrogen deposition load was identified, such exceedances are due to predominant background deposition rates and the highest process contribution at such locations is less than 1% of the lower critical load. The process related impacts on the ecologically sensitive sites were hence **not considered to be significant**.

The Air Quality Assessment identifies that the process contribution to the acid deposition at the sites designated for their ecological importance was less than 3% of background and less than 1% of the critical load identified for relevant habitat.

Furthermore, the total acid deposition (process contribution + background acid deposition rate) was not predicted to exceed the critical load at the assessed ecological receptors. Hence the cumulative impacts of the proposed biomass plant are **not considered significant**.

It should also be noted that notwithstanding the cumulative effects considered above, by the time that the 2015 Application came to be considered by the VoG Planning Committee the cumulative effects considered were no longer a consideration due to the fact that the Biogen planning consent had lapsed without being implemented. The above conclusions were therefore overly conservative.

3.3.5 Conclusion

Cumulative air quality impacts resulting from operation of the proposed biomass plant along with the nearby gasification facility have also been assessed using AEROMOD.

Though the in-combination impacts are marginally higher than that predicted with independent operation of the proposed biomass plant, **no exceedance of air quality objectives was predicted**.

Environmental Topic		Impact		Description of Mitigation	Residual Impact	
		Description	Significance		Description	Significance
Air Quality	Construction	Dust and vehicle exhaust	Minor	Vehicle maintenance, dust damping and sweeping	No long term effects	Negligible
	Operation	Process and vehicle emissions	Moderate	Stack height, emissions treatment and filtering	No residual effects	Negligible

Figure 13 Impact Summary Table

3.4 2015 Application Air Quality Assessment

The 2015 Application was accompanied by two technical reports on air quality to address issues relating to the impacts of the changes proposed by the 2015 Application. These changes were to amend the layout and elevations in order to accommodate a change in technology for the project.

The first study, carried out by Stopford Energy and Environment, was designed to iteratively determine an appropriate height for the stack.

3.4.1 Methodology, scope and regulatory background

The assessment was completed following industry guidelines that in 2015 were set by the Environment Agency, EPUK and IAQM and in 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 NO_2, 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 NO_2, whereas for short term emissions, a worst case assumption was made whereby 50% of NO_x emissions have been converted to NO_2.

The impact of the 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 '**negligible**'.

3.4.2 Conclusion

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

3.5 Air Quality Assessment - Entran

The second study, carried out by Entran, was commissioned at the request of VoGC following feedback from Natural Resources Wales received during the consultation process. This study was subsequently reviewed by Natural Resources Wales prior to the granting of planning the 2015 Permission and they advised VoGC as follows:

'As the proposed site lies within close proximity to the Severn Estuary (designated as a Special Area of Conservation (SAC), Special Protection Area (SPA) and a RAMSAR site) and is also within close proximity of Hayes Point to Bendrick Rock (a Site of Special Scientific Interest (SSSI)) and Barry Island SSSI, we advised that further assessment of aerial emissions should be undertaken. This was to ensure the principle of development at this location could be acceptable.

We confirm the air quality assessment has adequately assessed the potential impacts upon the above sensitive habitats. Our advice is that the proposed development is not likely to have significant effects on these sensitive habitats. We therefore remove our objection.'

The Entran Air Quality Assessment therefore directly addressed the requirements of the relevant regulator. This report can be found at Appendix 1(2).

3.5.1 Scope and Regulatory Background

The study considered emissions to air from the facility which would be governed by the Industrial Emissions Directive (IED) and requires adherence to emission limits for the following pollutants:

- nitrogen oxides (NO_x as NO_2);
- carbon monoxide;
- total dust (as PM_{10} 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.

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

The study further had regard to;

- The European Directive on Ambient Air and Cleaner Air for Europe

  - European Directive 2008/50/EC of the European Parliament and of the Council of 21st May 2008
- Air Quality Strategy for England, Scotland, Wales & Northern Ireland
  - Air Quality Strategy (AQS) for England, Scotland, Wales and Northern Ireland (AQS) published in July 20072, pursuant to the requirements of Part IV of the Environment Act 1995
- The Air Quality Standards Regulations 2010 have adopted into UK law the limit values required by EU Directive 2008/50/EC and came into force on the 10th June 2010.
- Local Air Quality Management (LAQM)
  - Part IV of the Environment Act 1995
- Industrial Emissions Directive
  - 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 (LDPD), implemented through the Environmental Permitting Regulations (EPR)
  - 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

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.

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

- Consultation with the VoGC Environmental Health Officer;
- 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.

3.5.2 Baseline Conditions

Local Air Quality Management

VoGC 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 NO_2 are close to the annual mean air quality objective, however, to date no AQMAs have been declared.

Nitrogen Dioxide

There are no automatic air quality monitoring stations measuring NO_2 in the vicinity of the proposed facility, however routine monitoring of NO_2 concentrations is undertaken by passive diffusion tube at a number of locations in Barry.

The diffusion tube monitoring data indicate that urban background concentrations of NO_2 in Barry are less than 50% of the air quality objective of 40 µg/m^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/m^3. 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.

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

In the absence of robust local monitoring data background concentrations of CO, PM_{10}, $PM_{2.5}$, SO_2 and benzene have been obtained from the DEFRA UK Background Air Pollution maps for use in the assessment.

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 PM_{10}, $PM_{2.5}$, CO, SO_2 and Benzene ($\mu g/m^3$)

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_8)	0.35	5

Figure 14 Air Quality Data

Hydrogen Chloride

The closest monitoring sites to the proposed facility are at Narbeth in Pembrokeshire and at 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 $\mu g/m^3$. This concentration is assumed to provide a reasonable estimate of the background concentration of HCl at the Site.

Hydrogen Fluoride

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

Trace Metals

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. 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.

Table 8: Average UK Trace Metal Concentrations (ng/m^3)

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

Figure 15 Air Quality Data

Dioxins and Furans

Monitoring of PCDD/Fs is currently carried out by Defra at six locations in the UK. 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/m^3)

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

Figure 16 Air Quality Data

The average concentration measured at the two urban background monitoring sites from 2008 to 2010 is 28.8 fg/m^3 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)

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. The average urban background concentrations measured in the UK between 2010 and 2012 were 0.33 ng/m^3.

This is assumed to provide a reasonable estimate of the background concentration in the vicinity of the Site.

Polychlorinated Biphenyls

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/m^3 and is assumed to be reasonably representative of the baseline PCB concentration at the Site and nearby sensitive receptors.

Summary of Background Concentrations

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_8)	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)

Figure 17 Air Quality Data

3.5.3 Assessment of Impacts on the General Environment

Human Health Impacts - Introduction

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.

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 exceedance.

Nitrogen Dioxide

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 exceedance of the annual mean air quality objective is considered to be **negligible at any off-site location**.

For the short-term predictions, the maximum off-site PC is 11.4 µg/m^3, which is potentially significant at 11.9% of the AQO, however the PC is <20% of the 'headroom' and therefore the risk of an exceedance 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.

Carbon Monoxide (CO)

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

Sulphur Dioxide (SO_2)

The maximum predicted ground level 24-hour and 1-hour mean SO_2 process concentrations are less than 10% of the relevant AQOs and are therefore of **negligible significance**.

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

Particulate Matter (as PM_{10})

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

Particulate Matter (as PM2.5)

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)

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

The maximum off-site annual mean process concentration is 0.056 µg/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 exceedance** of the annual mean air quality objective at any off-site location.

Hydrogen Chloride (HCl)

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**.

The maximum off-site 1-hour mean process concentration is 30.8 µg/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 exceedance** of the 1-hour mean air quality objective at any off-site location.

Hydrogen Fluoride (HF)

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

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)

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)

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

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 guidance.

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).

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

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.

Step 3: Typical Operational Emissions

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 1.3×10^{-4} mg/Nm^3.

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

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_8)	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

Figure 18 Air Quality Data

5.3.4 Assessment of Habitat Impacts

Airborne Concentrations of NOx, SO_2 and HF

There are **no predicted exceedances of the critical levels** for NOx, SO_2 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**.

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 exceedance is considered to be negligible**.

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

Eutrophication

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

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**.

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 exceedance is considered to be negligible**.

5.3.5 Conclusions

An assessment was carried out by Entran to determine the local air quality impacts associated with the operation of the proposed wood gasification facility.

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, and consequently the findings are substantially conservative.

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 Natural Resources Wales H1 guidance.

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. A potentially significant impact occurs at ancient woodland adjacent at Hayes Lane; however, the total predicted acidification rates (including the background) are less than 70% of the CLF, therefore the risk of an exceedance is considered to be negligible.

Based on the above information, it is considered that air quality does not pose a constraint to development of the Site as was proposed in the 2015 Application.

This finding as reconfirmed by NRW in their review of the air quality report in support of the application for the grant of an Environmental Permit, which has now been issued.

5.4 Summary – Air Quality Impacts

The 2010 Permission was granted supported by an assessment of Air Quality by RSK, which concluded that while in-combination impacts are marginally higher than that predicted with independent operation of the proposed biomass plant, no exceedance of air quality objectives was predicted.

A summary of the impacts is presented in the table below.

Environmental Topic		Impact		Description of Mitigation	Residual Impact	
		Description	Significance		Description	Significance
Air Quality	Construction	Dust and vehicle exhaust	Minor	Vehicle maintenance, dust damping and sweeping	No long term effects	Negligible
	Operation	Process and vehicle emissions	Moderate	Stack height, emissions treatment and filtering	No residual effects	Negligible

Figure 19 2010 Permission Impact Summary Table

By the time of the 2014 Application, planning consent for the proposed gasification facility at Atlantic way, on the south side of the Docks, with which the developer's plant was cumulatively assessed, had lapsed and therefore the further contributions from the Atlantic Way plant ceased to be relevant to the 2015 application.

5.4.1 2015 Application Construction Impacts.

The impacts of the construction phase were assessed within the approved RSK Air Quality Study accompanying the 2010 Permission. The 2015 Application makes no material changes to either the baseline against which these were assessed, the impacts which would be caused, the mitigation measures that would be employed, nor the residual impact. Therefore, in respect of the 2015 Application, as with the 2010 Permission, it is anticipated that the impacts associated with construction before mitigation are regarded as Minor, and after mitigation are of Negligible significance.

5.4.2 Operational Impacts.

The 2015 Application sought to amend the layout and elevations as approved by the 2010 Permission, in order to accommodate a change in technology for the project.

In recognition of the changes in building envelope and technology, a study was carried out to determine the optimum height for the process exhaust stack. This was carried out by Stopford Energy and Environment and was designed to iteratively determine an appropriate height for the stack to achieve dispersion of emissions.

The study concluded that in order to meet its target of achieving negligible impacts at all sensitive receptors, the optimum stack height was 43m. Above this height very little benefit accrued in terms of reduced air quality impact. Therefore, 43m was adopted as the proposed stack height.

Using the findings of this study, a further Air Quality Assessment was carried out by Entran for use as the basis of the air quality element of the application to Natural Resources Wales for the Environmental Permit which the facility required in order to operate. This study was also made available to support the 2015 Application planning process.

The study concluded that for a proposed stack height of 43m, predicted maximum off-site process concentrations were 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 followed by Natural Resources Wales.

The findings of this study were confirmed as acceptable by NRW within the process of determining the application for an Environmental Permit for the operation of the site, which has now been granted.

f the Critical Load Factor, and therefore the risk of an exceedance is considered to be negligible. **Environmental Topic**		**Impact**		**Description of Mitigation**	**Residual Impact**	
		Description	Significance		Description	Significance
Air Quality	Construction	Dust and vehicle exhaust	Minor	Vehicle maintenance, dust damping and sweeping	No long term effects	Negligible
	Operation	Process emissions	Negligible	Stack height, emissions treatment and filtering	No residual effects	Negligible

Figure 20 2015 Application Impact Summary Table

Chapter 4: Noise

Introduction

This chapter of the ES considers the potential for the revisions made by the 2015 Application to the approved 2010 Permission scheme to create noise impacts in the vicinity of the application Site. The chapter describes;

- the scope of assessments,
- relevant legislation
- assessment methodology
- the baseline conditions.
- potentially significant environmental effects;
- mitigation measures
- residual impacts.

It is informed by;

- the AB Acoustics Noise Assessment and voluntary ES Noise Chapter accompanying the 2010 Permission which formed part of the baseline and context
- The Hunter Acoustics environmental noise survey, submitted in support of the 2015 Application
- The AB Acoustics update letter, submitted in support of the 2015 Application

Each of these reports is available at Appendix 1(9)

4.1 2010 Noise Assessment and ES Chapter

The 2010 Permission, approved at appeal, was accompanied by an assessment of noise impacts, conducted by AB Acoustics and a Noise chapter in the voluntary ES submitted at the appeal. These form part of the approved documentation supporting the 2010 Permission, and as such part of the baseline against which the 2015 Application is measured. These are summarised below.

4.1.1 Assessment Methodology

Below is a plan of the site, which shows the location of the nearest residential properties at which the existing background noise levels were measured:

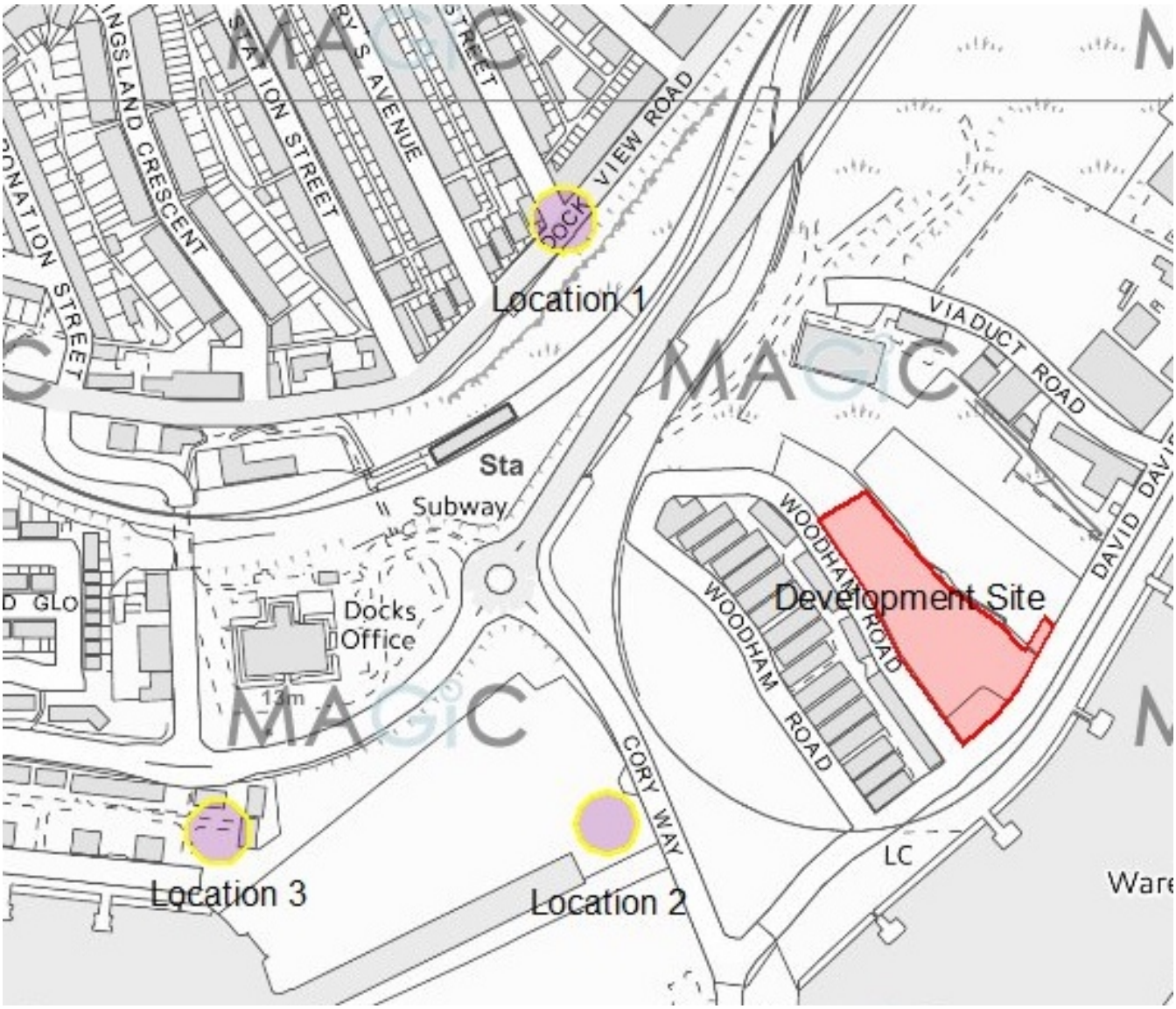

Figure 21 Location of Noise Monitoring Locations. Mapping sourced from Magic.gov.uk 20-08-2019.

- Location 1 was on Dock View Road opposite the junction with Casteland Street.
- Location 2 was at the entrance to the waste ground — which it is proposed to develop at some future date - on Cory Way
- Location 3 was on the residential estate at Cei Dafydd.

The noise level generated by the proposals is predicted for the residential properties at the three locations.

The lowest measured background noise levels were as follows:

- Location 1: 41.6 dBA
- Location 2. 40.1 dBA
- Location 3: 40.1 dBA

The margin by which the noise level due to the specific noise source under investigation exceeds the background noise level enables the likelihood of complaints to be assessed. The greater this distance the greater the likelihood of complaints. A difference of around +10 dB or more indicates that complaints are likely. A difference of around +3 dB is of marginal significance. If the rating level is more than 10 dB below the background level this is a positive indication that complaints arc unlikely.

4.1.2 Assessment of Effects and Significance: Construction Phase

Predicted Impacts

The potential impact of noise that may be generated during the construction phase has been assessed by taking a worst case scenario of no mitigation and all plant running simultaneously. This indicates that the worst case is that noise levels are elevated at Location 1 from a background noise level of 55.6 dB to an estimated 62 dBA. However, when piling operations are taken out of the calculations, and this is reasonable as they will only last for a short period of time, the overall level reduces to 59dBA.

Additional Mitigation Opportunities

The main opportunity for mitigating noise concerns is for the hours of operation of plant and machines' during the construction phase to be restricted to 07:00 — 18:00, and this is not an unreasonable requirement[13].

Residual Impacts

With the proposed mitigation in place, there is only at worst a minor impact from the construction phase, which is temporary in nature.

[13] Such hours were incorporated into the Construction Phase Plan and the Project Environmental Plan submitted to and approved by VoGC in 2016

4.1.3 Assessment of Effects and Significance: Operational Phase

Predicted Impacts

The predicted noise levels were calculated based on the proposed plant having an internal noise level of no greater than 90 dBA and are as follows:

- Location 1: 37 dBA
- Location 2: 40 dBA
- Location 3: 32 dBA

The above predicted levels are compared to the lowest measured background (L_{90}) at the various locations:

Difference to rating level

Location 1	**41.6 dBA**	**00.25 - 00.35**	**- 4.6 dBA**
Location 2	40.1 dBA	00.55 - 01.05	- 0.1 dBA
Location 3	40.1 dBA	00.40 - 00.50	- 8.1 dBA

Figure 22 Noise Impact Table

Therefore, if the specified internal level of 90 dBA is achieved then the external level from the proposed plant at the various locations will be equal to or less than the measured background level - this is an indication that complaints about noise will not be received.

4.2 2015 Permission – Hunter Acoustics Noise Survey

Introduction

In order to confirm the baseline against which the noise assessments were made remained valid at the time of the 2015 Application, Hunter Acoustics was commissioned to carry out an updated background noise survey at the same locations used in the 2010 Permission assessment process.

The 2015 Application states that the proposed changes to the plant would continue to comply with the originally imposed conditions relating to noise in the 2010 Permission, and that the same design standards in terms of designed levels of attenuation would continue to apply, requiring the contractor to design to acceptable noise limits. This was considered within an updated report by AB Acoustics, who used the Hunter noise survey, and provided commentary on the impact of the plant as at the 2015 Application upon those newly measured background levels.

4.2.1 Baseline

The Hunter Acoustics noise survey was carried out to determine existing ambient and background noise levels at three pre-determined locations for comparison with the AB Acoustics noise survey report dated 23/12/2008.

1-hour sample measurements were carried out from 1300hrs to 1630hrs on 04/03/2015 and 15-minute sample measurements were carried out from 0000hrs to 0140hrs on 05/03/2015. Data including LAeq and LA90 were logged. All measurements were taken approximately 1.2m above local ground height.

4.2.2 Results

This section reports the findings of the updated noise survey.

Position 1 Dock View Road

Main noise sources during the day were from road traffic on Dock View Road and Ffordd y Mileniwm with occasional sprinter train activity and freight movements along the railway lines. Main noise sources at night were from the Dow Corning Plant, humming from Barry Docks Railway Station and contributions from water running in a nearby drain. Occasional vehicle pass-bys on Dock View Road and Ffordd y Mileniwm were also recorded.

3679/T2 –Sample Measurements at Position 1

Position	Time	Duration (mins)	L_{Aeq} (dB)	L_{A90} (dB)	Weather conditions
1	13:00	60	64.5	58.8	Dry, northerly wind 2.4-5.7m/s.
1	00:01	15	55.7	39.6	Dry, calm.
1	01:02	15	52.1	40.9	Dry, calm.

Figure 23 Noise Measurement Data

Position 2 Cory Way

Main noise sources during the day were from road traffic on Cory Way and Ffordd y Mileniwm. Regular HGV movements were recorded along Cory Way accessing the industrial estate. Occasional sprinter and freight activity were also noted. Main noise sources during the night were humming from Barry Docks Railway Station and the occasional vehicle pass-by on Ffordd y Mileniwm. There were no HGV movements noted on Cory Way during the night-time monitoring period.

3679/T3 – Sample Measurements at Position 2

Position	Time	Duration (mins)	L_{Aeq} (dB)	L_{A90} (dB)	Weather conditions
2	14:04	60	66.7	53.0	Dry, northwesterly wind 1.7-4.9m/s.
2	00:20	15	48.6	38.5	Dry, calm.
2	01:43	15	48.6	37.6	Dry, calm.

Figure 24 Noise Measurement Data

Position 3 Cei Dafydd

Main noise sources during the day were from road traffic on Ffordd y Mileniwm. At night, an audible hum was noted coming from the west along with occasional vehicle pass-bys on Ffordd y Mileniwm.

3679/T4 – Sample Measurements at Position 3

Position	Time	Duration (mins)	L_{Aeq} (dB)	L_{A90} (dB)	Weather conditions
3	15:20	60	52.7	47.8	Dry, northerly wind 2.0-4.0m/s.
3	00:38	15	42.3	37.3	Dry, westerly wind 0.0-1.0m/s.
3	01:23	15	40.8	35.1	Dry, calm.

Figure 25 Noise Measurement Data

4.2.3 Discussion

Daytime ambient (LA_{eq}) and background (LA_{90}) noise levels measured during our survey appear to be in line with those measured in the AB Acoustics 2008 survey, with the exception of position 2 (Cory Way).

The measured ambient noise level was around 6dB higher due to HGV movements on Cory Way (67dB LA_{eq} compared with 61dB LA_{eq}); however, the daytime background was indicated to be the same (53dB LA_{90}).

Night-time ambient noise levels appear to be higher at positions 1 & 2 during the survey, with position 3 ambient falling in line with the previous 2008 survey result. However, night-time background noise levels appeared to be lower than those measured during the AB Acoustics 2008 survey (35-41dB LA_{90} compared with 40-45dB LA_{90}).

4.3 2015 Application - AB Acoustics Update to Noise Report

AB Acoustics provided a review of the updated Hunter Acoustics noise survey. This review was carried out on the basis that the revisions proposed under the 2015 Application would not affect the noise output of the plant – the design standard set by the developer, requiring that the redesigned plant would comply with the 2010 Permission's conditions.

The purpose of the review was to determine how the calculated noise levels in the 2008 report (and which were to be adhered to under the 2015 Application) now compared to the present measured background levels.

4.3.1 Methodology

AB Acoustics' review highlights the fact that since the original approval was granted the main British Standard used in assessment (BS 4142:1999) has been superseded by BS 4142 : 2014.

The standard sets out a framework for assessing the likelihood of complaints about noise from industrial plant.

This standard describes methods for rating and assessing sound of an industrial / commercial nature. The methods described use outdoor sound levels to assess the likely effects of sound on people who might be inside / outside residential premises.

The significance of sound of an industrial / commercial nature depends upon the margin by which the rating level of the source exceeds the background sound level and the context in which the sound occurs.

The sound level from a source when determined as a discrete entity distinct and free of other influences contributing to the ambient sound is referred to as the 'specific sound level'.

The specific sound level is evaluated at an identified location over the appropriate reference time interval which are: 1 hour during the daytime – 07:00 to 23:00 hrs and 15 minutes during the night-time – 23:00 to 07:00 hrs.

The specific noise may be subject to acoustic feature correction if the noise level at the measurement location is subjectively considered to contain certain acoustic features that may increase the significance of the impact of the noise over the background level.

If these features are present at the measurement location, then the character correction is added to the specific sound level to arrive at the rating level.

The standard requires the assessor to consider the subjective prominence of the character of the specific noise source at the measurement location / noise sensitive receptors and the extent to which the character of the noise will attract attention to itself – such features are taken into account by applying the following corrections:

	Tonality	Impulsivity	Other Characteristics
Just Perceptible	+ 2 dB	+ 3dB	-
Clearly Perceptible	+ 4dB	+ 6 dB	-
Highly Perceptible	+ 6dB	+9 dB	-
Readily Distinctive against Residual Environment			+ 3 dB

Figure 26 Subjective noise character adjustments

If tonal and impulsive characteristics are both present, then two corrections can be made – however if only one is dominant then only one correction needs to be applied. If no corrections are deemed appropriate, then the Rating Level equals the Specific Noise Level.

An initial estimate of the impact of the specific sound is obtained by subtracting the measured background level from the rating level and considering the following:

a) Typically, the greater the difference the greater the impact.

b) A difference of around + 10 dB or more is likely to be an indication of a significant adverse impact – depending on context.

c) A difference of around + 5 dB or more is likely to be an indication of a significant adverse impact – depending on context.

d) The lower the rating level is to the measured background level the less likely it is that the sound source will have an adverse impact or a significant adverse impact. Where the rating level does not exceed the measured background level this is an indication that the sound source will have a low impact depending upon context.

Where the initial estimate of the impact needs to be modified due to the context then all pertinent factors need to be taken into consideration – these include the following:

- The absolute level of the sound.
- The character and level of the residual sound compared to the character and level of the specific sound.
- The sensitivity of the receptor and whether residential dwellings already incorporate design measures that secure good internal and outdoor conditions e.g. facade insulation – ventilation / cooling that reduces the need to open windows – acoustic screening.

The standard recognises that the response to sound can be subjective as well as reflective of the local attitudes to the source of the sound and the character of the neighbourhood.

Also relevant are the World Health Organisation (WHO) Guidelines for Community Noise – these identify that sleep may be disturbed by short term noise events and the level associated with this is 45 dB LA_{max} inside the bedroom – this relates to 60 dB LA_{max} external to the bedroom.

In brief an 'Outdoor Living Area' should be subject to a noise level less than 55 dBA in order to prevent serious annoyance during the daytime and evening - a level less than 50 dBA is desirable to prevent moderate annoyance : reference World Health Organisation.

4.3.2 Mitigation

It was proposed that the same mitigation be applied to the 2015 Application as agreed previously. This meant in summary that:

- Internal sound level should not exceed 90dB(A);
- There should be no roof lights in the structure;

- That the cladding will provide containment and attenuation of noise;
- That construction should take place within the hours 07:00 — 18:00.

4.3.3 Findings.

Noise Levels

The calculated Specific Noise levels at the three locations from the 2008 report are detailed below:

- Location 1.....32 dBA
- Location 2.....35 dBA
- Location 3.....27 dBA

However, in the original report (in line with BS 4142:1999) a +5 dBA correction factor was added to the above calculated Specific Noise Levels to determine the Rating Levels which were:

- Location 1.....37 dBA
- Location 2.....40 dBA
- Location 3.....32 dBA.

The requirement in BS 4142: 2014 is different in that more account is taken for the actual noise character – whether it is tonal or contains impulsive noise and how the level will be perceived by the receptor.

From previous discussions it has been indicated that there could be a tonal element to the noise from the plant but that it is very unlikely that there will be any impulsive noises – particularly between the hours 23.00 and 07.00.

Therefore, adding the required + 2 dB correction then the above Specific Noise Levels are increased to:

- Location 1.....39 dBA
- Location 2.....42 dBA
- Location 3.....34 dBA

The recently measured background noise levels were determined as:

- Location 1 39.6 / 40.9 dBA – which shows that the Rating Level could be 1 or 2 dBA in excess of the measured background level – this shows that the noise from the plant will have a LOW impact depending upon context.
- Location 2 38.5 / 37.6 dBA – which shows that the Rating Level could be 3 or 4 dBA in excess of the measured background level – again indicating that the plant will have a LOW impact depending upon context.
- Location 3 37.6 / 38.5 – which shows that the Rating Level could be 4 or 5 dBA below the measured background level – which shows that the plant will have a LOW impact depending upon context.

4.3.4 Summary and residual impacts

The report concluded that whilst it is important to note that the proposed plant is to be located in an established and existing industrial area, in terms of noise impacts upon the principal sensitive receptors, in this case residential dwellings, even with the window open and assuming an attenuation for an open window of the order of 13 dB (the World Health Organisation actually assumes 15 dB) then the internal levels within the nearby residential properties will be within the requirements of BS 8233: 2014. In reality, the residential properties around the plant are very likely to have double glazed units to their windows which could result in attenuations of the order of 25 dB to the external noise, meaning that the impacts would in fact be substantially lower than assessed.

4.4 Summary: Noise Impacts

The 2010 Permission was supported by an assessment of Noise by AB Acoustics which concluded that if the specified internal level of noise generated by the development 90 dBA is achieved then the external level from the proposed plant at the various receptor locations would be equal to or less than the measured background level - this is an indication that complaints about noise will not be received.

A summary of the impacts is presented in the table below. Noise impact significance criteria are to be found at Appendix 4.

Environmental Topic		Impact		Description of Mitigation	Residual Impact	
		Description	Significance		Description	Significance
Noise	Construction	General vehicle noise, piling.	Moderate	Limitation of construction hours to between 07:00h and 18:00h	No long term effects	Minor
	Operation	General operation of plant	Minor	Limiting internal noise to 90dB, noise attenuation factor of cladding to buildings, no roof lights	No residual effects	No change/ Negligible

Figure 27 2010 Permission Impact Summary Table[14]

[14] Castellum interpretation of the findings of the relevant noise assessments, based on the noise impact significance criteria detailed in Appendix 4

4.5 2015 Application - Construction Impacts

The impacts of the construction phase were assessed within the approved AB Acoustics Noise Study accompanying the 2010 Permission.

The 2015 Application makes no material changes to either the baseline against which these were assessed (construction will be daytime only and the background noise levels measured by Hunter Acoustics remain consistent with those in 2010), the impacts which would be caused (the same pattern and type of construction activity is anticipated), the mitigation measures that would be employed, nor the residual impact.

Therefore, in respect of the 2015 Application, as with the 2010 Permission, it is anticipated that the significance of the impacts[15] associated with construction noise before mitigation are regarded as Moderate, and after mitigation are of Minor significance.

4.6 2015 Application - Operational Impacts

The 2015 Application sought to amend the layout and elevations as approved by the 2010 Permission, in order to accommodate a change in technology for the project.

The developer confirmed that the design standards for the revised development in terms of their noise impact were intended to be the same as those described within the 2010 Permission – and that therefore the sound levels associated with the proposed operation would remain as per the 2010 Permission.

To confirm that there were no changes to impacts, an updated noise survey was conducted at the same locations used in the 2010 Application, to determine whether background noise levels had changed.

The study concluded that the daytime noise levels remained the same, but that the night time noise level at one location (Cei Dafydd) had fallen slightly.

Using the findings of this survey, a further noise report was prepared by AB Acoustic to review the impact of the 2015 Application plant on the re-studied noise levels.

In each of the three locations, the report concluded that the proposed development would have a Low impact, with noise impact significance that conforms to the 'minor' descriptor.[16]

[15] Castellum interpretation of the findings of the relevant noise assessments, based on the noise impact significance criteria detailed in Appendix 4
[16] Castellum interpretation of the findings of the relevant noise assessments, based on the noise impact significance criteria detailed in Appendix 4

The report goes on to note that it is important to consider that these finding should be considered in the context of the plant's setting in an established and existing industrial area.

Furthermore, the residential properties around the plant are very likely to have double glazed units to their windows which could result in attenuations of the order of 25 dB to the external noise. In addition, even with the window open and assuming an attenuation for an open window of the order of 13 dB (the World Health Organisation actually assumes 15 dB) then the internal levels within the nearby residential properties will be within the requirements of BS 8233: 2014.

Environmental Topic		Impact		Description of Mitigation	Residual Impact	
		Description	Significance		Description	Significance
Noise	Construction	General vehicle noise, piling.	Moderate	Limitation of construction hours to between 07:00h and 18:00h	No long term effects	Minor
	Operation	Process noise	Minor	Limiting internal noise to 90dB, noise attenuation factor of cladding to buildings, no roof lights	No residual effects	Minor

Figure 28 2015 Application Impact Summary[17]

[17] Castellum interpretation of the findings of the relevant noise assessments, based on the noise impact significance criteria detailed in Appendix 4

Chapter 5: Landscape and Visual Impact

5.1 Introduction

UK Power Development Partners (UKPDP) were commissioned by Sunrise Renewables (Barry) Limited to prepare a report to address issues relating to the landscape and visual impact of the changes proposed by the 2015 Application. These changes were to amend the layout and elevations in order to accommodate a change in technology for the project. This report addresses the changes through commentary on, and updates to, the previous Landscape and Visual Impact Assessment for the project, prepared for the 2010 Permission, and which was supplemented at the appeal in 2010 by an additional assessment prepared by the Appleton Group.

The project is located within Barry Port at the centre of an industrial and commercial area. 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 eight storey grain store. Immediately to the west is a series of large Nissen Huts which house a range of commercial businesses.

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 former site for the renewable energy plant at Atlantic Way, previously approved under Planning Reference 2009/00021/FUL but which had lapsed by the time of the 2015 Application.

5.2 Context and Baseline

The 2010 Permission established the acceptability of the development of the Biomass facility at Woodham Road in Landscape and Visual Impact terms. This was supported by a Landscape and Visual Impact Assessment carried out by the Appleton Group, which was submitted in support of the voluntary ES submitted at the appeal where consent was granted.

The assessment 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. Proposals for mitigation were made and any residual impacts assessed.

This assessment's description of the baseline conditions remained accurate at the time of the 2015 Application and are set out here:

- 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 inter-visibility between the two as Barry town is set on a ridge and lies between the two areas. The Site does not either fall within or adjacent to a designated urban conservation area.
- 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 sensors geology, history, cultural landscape, and landscape habitat.
- The 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'.
- The Site is open to views from the immediately adjacent road network. Some vegetation adjacent to the eastern boundary gives some low level screening from that direction.
- Distant views are possible from higher ground to the north along Dock View Road. 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. The views 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 on a highpoint obscures views from further west. 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.
- 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. Views of the Site from the east/south east are not possible due to intervening dockside development.
- 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

- **Do nothing scenario.** Had the Site not been developed it is likely to have remained either in its condition at the time of the 2015 Application (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. 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. Had the Site remained unused it would have gradually colonised with maritime scrub vegetation.

Further useful context is provided by the statements made at the appeal by the inspector and VoGC representatives on the appearance and setting of the building as approved under the 2010 Permission. The inspector confirmed that in his view the Site, ‘lies in an industrial area’, adding that, ‘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.’

The council at the same appeal confirmed that they did not object to the appearance of the building.

A further important aspect of the context, in terms of views to the proposed development, is the background against which it would be seen from the primary receptors of visual impact. Approval had previously been granted for the construction of the facility known as the Atlantic Way Power Plant, planning permission reference 2009/00021/FUL. This was for a non-hazardous waste to energy gasification plant, the approved elevations of which are included below, along with a plan showing the position of the approved facility relative to the Barry Biomass Facility discussed herein. At the appeal in 2010, this plant would have provided the backdrop against which the proposed development would have been seen, particularly from Dock View Road, the same location referred to by the inspector in their commentary above.

Figure 29 Extract from Google Earth showing site of approved Atlantic Way Power Plant (purple outline), Barry Biomass site (red outline), and Dock View Road (orange outline)

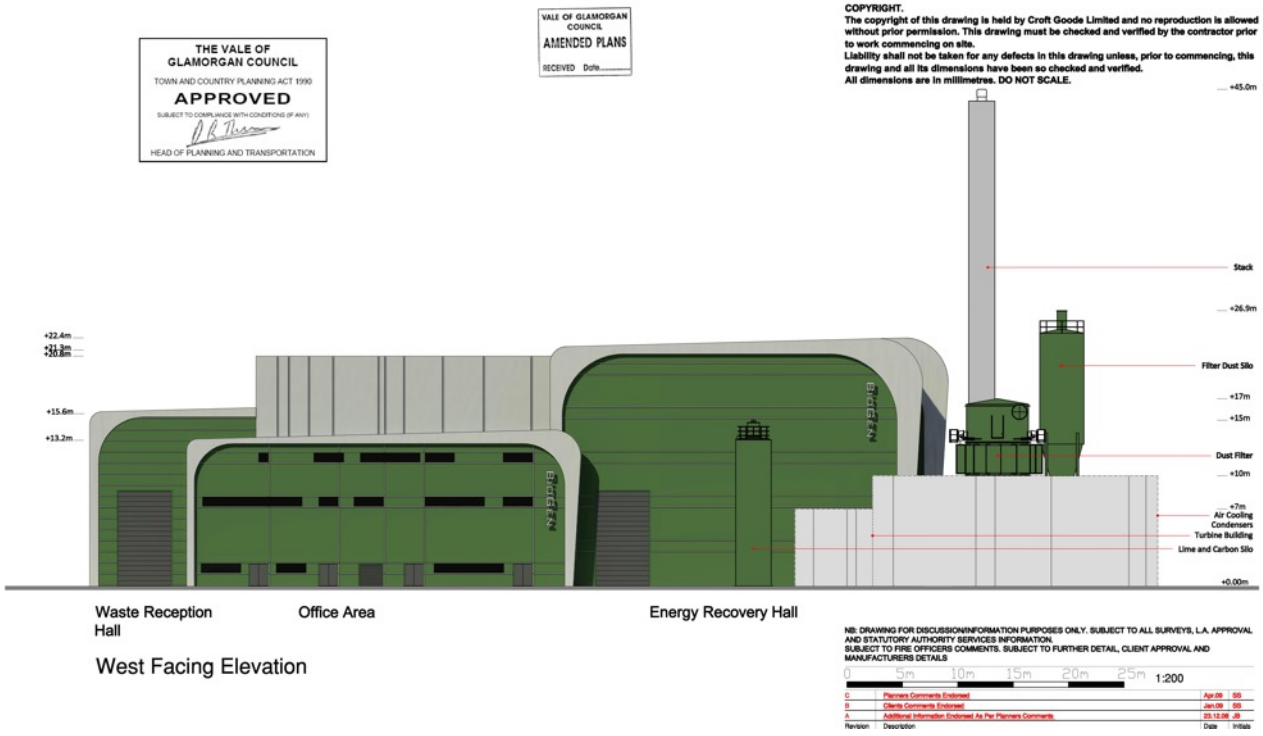

Figure 30 Elevation of Atlantic Way Power Plant as approved

UKPDP noted in their report that the relevance of the Atlantic Way Power Plant is that in 2010 the officers of VoGC considered its visual impact to be acceptable in the context of its location.

Figure 31 Photomontage View of Atlantic Way Power Plant from Dock View Road as submitted with the planning application for that facility. The 2015 Application Site is to the immediate left of the grey roofs of the Nissen Huts.

5.3 Consideration of Significance of Impacts

The Appleton Group Landscape and Visual Impact Assessment accompanying the appeal set out the impacts of the 2010 Permission which are summarised below.

The report initially considered construction impacts:

- 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. There was to be no external storage. The building size was proposed to be 60x45 metres in plan and 14.08 metres to the ridge.
- In landscape terms it was not anticipated that any impacts of significance would arise. This assessment was based upon the lack of any landscape features on the Site worthy of retention, and its derelict appearance.

- In terms of visual impact, views of the construction activity including on-site plant and possibly cranes were expected to 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 would be gained in the context of adjacent industrial and dock activity.

The assessment considered these impacts to be negligible.

The 2015 Application shares the majority of its characteristics with the approved 2010 permission, and the changes in dimensions to the plant did not fundamentally alter the way in which the development would interact with the landscape and the views to which the plant would be subject during the construction phase. The conclusions about the landscape context therefore remained valid, and as such the impacts of the construction phase on Visual Amenity and Landscape Character remained **Negligible**.

The Appleton Group report subsequently considered operational impacts:

- The original Appleton report concluded that there would be no adverse landscape impacts during the operational phase.
- The only significant views would be views from domestic properties located on Dock View Road and Dyfrig Street. 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. Views gained from the properties described would be gained in the context of substantial structures located on the dockside and a major chemical complex with numerous tall and prominent chimneys.
- The overriding element of the view was, however, the sea and the distant coastline of North Somerset. Even without mitigation any visual impact was assessed as negligible (i.e. imperceptible) assuming that the colour of the building and flue stack was appropriate to its surroundings. The flue would not emit any plume of smoke or water vapour and would cause no visual impact as a result.
- The existing character of the Site and its surroundings was that of an industrial dockside landscape. It was described within the Unitary Development Plan as being within the ‘developed coast’. The proposed development was considered to be appropriate within its setting and there would be no adverse impact on landscape character. The Site was not located within the Waterfront Regeneration area located to the west and there was no inter-visibility between the two.

The 2015 Application proposed changes to the elevations, layout, stack position and height. It remained the case that the principal views were available from Dock View Road and Dyfrig Road and that these views would be available in the context of the industrial setting.

The proposed development remained of a scale in keeping with the industrial developments to the east and the previously approved Atlantic Way Power Plant. The rearranged structures in terms of elevation and layout continued to have a comparable impact upon the landscape and available views and from Dock View Road would barely break the skyline, if at all.

The principal changes were considered to be those to the stack which was to be higher in order to ensure satisfactory dispersion of emissions from the plant with the revised technology utilised. This, however, was to be seen in the same context described above; both against the background of the industrial area of the docks from the Dock View Road and as one stack among numerous others, for example at the chemical works to the east.

The UKPDP Visual Assessment goes on to present a visual comparison of the previously approved Atlantic Way Power Plant elevations and the 2015 Application elevations in the context of the sightlines identified within the planning application for the Atlantic Way Power Plant, and presents a superimposed image of the application Site on one of the approved cross section plans.

The assessment found that the proposed elevations of the Woodham Road Site were directly comparable to those previously approved for the Atlantic Way Power Plant in scale and massing and observed that in fact the main building hall at the Woodham Road Site is marginally lower.

The plant was shown to occupy a similar visual envelope and therefore have a similar visual impact upon the views available from Dock View Road to that of the Atlantic Way Power Plant, which was, de facto, viewed as acceptable by VoGC in the context of the available views.

This comparison remained valid notwithstanding that planning consent for the Atlantic Way Power Plant lapsed in December 2014 since it showed that views of the proposed plant against what had previously been considered acceptable.

This contextual view is presented below.

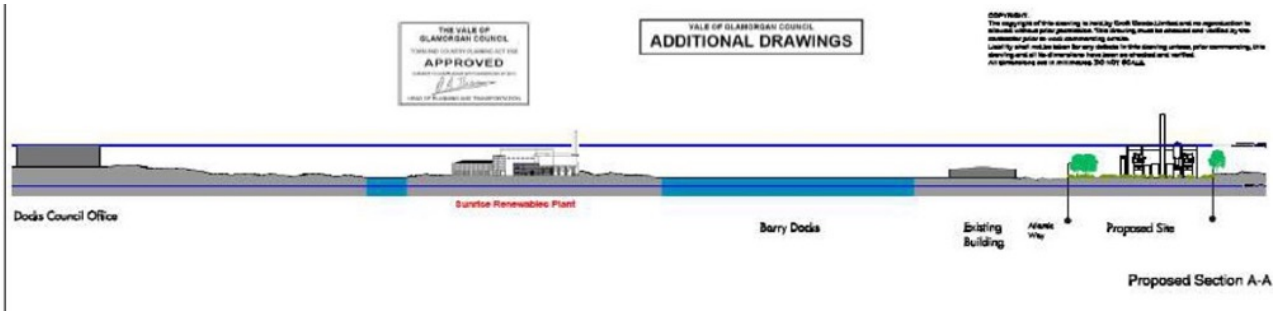

Figure 32 2015 Application Elevation within Approved Atlantic Way Power Plant Cross Section Plan. 2015 Application Site is to the centre left of the section, Atlantic Way Power Plant to the far right.

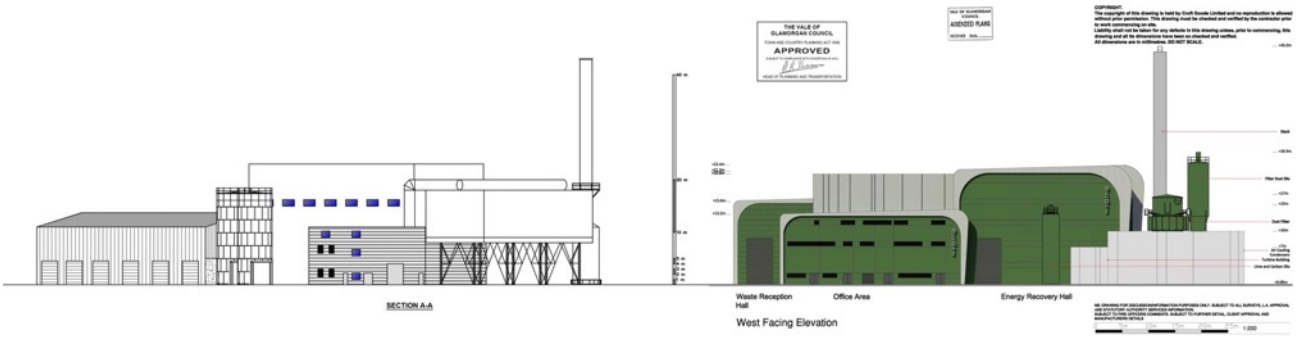

Figure 33 Comparison of approved Atlantic Way Power Plant elevation and equivalent 2015 Application elevations to scale

Mitigation was explored by the Appleton Group report, principally in respect of changing the colouring of the structures to a mid-to-light grey palette, and this remains the case with the 2015 Application. The Appleton Group report did not consider any landscaping to be necessary for screening purposes.

The incorporation of this mitigation meant that the already limited impacts are further reduced.

As discussed previously, the 2015 Application shares the majority of its characteristics with the approved 2010 permission and the changes in dimensions to the plant did not fundamentally alter the way in which the development would interact with the landscape and the views to which the plant would be subject. The conclusions about the landscape context remained valid.

It is considered therefore that these conclusions remained valid notwithstanding the change in elevations, stack and layout associated with the 2015 Application and that as such the impacts of the operational phase on Visual Amenity and Landscape Character would be **Negligible**.

5.4 Impact Summary Table

Environmental Topic		Impact		Description of Mitigation	Residual Impact	
		Description	Significance		Description	Significance
Landscape	Construction	Long views of plant and construction	Negligible	None	None	Negligible
	Operation	Views of revised plant	Negligible	Pale colour palette	Continued industrial development appropriate to context	Negligible

Figure 34 Impact Summary Table

Chapter 6: Alternatives

The need to consider alternatives stems primarily from the requirements of the EIA Regulations. Schedule 4 of the Regulations identifies the information for inclusion in Environmental Statements. Parts 1 (2) and 2 (4) include;

“An outline of the main alternatives studied, and an indication of the main reasons for his choice, taking into account the environmental effects”.

However, Welsh Office Circular 11/99 explains that the EIA Directive and the EIA Regulations “do not expressly require the developer to study alternatives” (paragraph 83). However, it adds *“the nature of certain developments and their location may make the consideration of alternative sites a material consideration”*.

Although alternatives are not a legally required part of the ES, they are nonetheless presented below.

6.1 Choice of Site

In order to select suitable locations for its plant, the developer had a series of assessment criteria, which were used to select the Barry Dock site:

- A dockside location so that wood could be transported by sea as an option;
- Industrial location - the operational processes involved in a power-generating plant are similar to those associated with industrial B2 and B8 uses and the building required is similar in appearance to industrial buildings;
- Within close proximity of existing and proposed energy consuming land uses so that waste heat can be effectively utilised, subject to viability;
- Within close proximity of waste wood processing facilities so that wood need not be transported long distances by road;
- Close to good highway accessibility; and
- Within close proximity of an available connection to the National Grid.

The Site at Barry Dock met all of the above requirements. It was in an industrial dockside location surrounded by potential existing and proposed developments which could be waste heat users. In addition to the surrounding industrial buildings and existing residential properties, the Site was within close proximity to the Barry Waterfront development which was identified as one of WAG'S Zero Carbon Development Masterplan sites 2007-11. The Site was also within 15 miles of waste wood processing facilities and had good highway links. A connection to the national grid had been secured.

It was argued that the requirements are such that the number of sites available as alternatives is severely restricted. This of course is furthered by the importance of ensuring that a power-generating plant has no adverse environmental impacts. This ES demonstrates that the proposed plant had no adverse environmental impacts.

The Site, having gained consent under the 2010 Permission had a proven ability in planning terms to host the proposed development and as such continued to fulfil the developer's requirements for the Site. Granting permission in 2015 for the revised scheme reconfirmed this.

As such no alternative sites were considered.

6.2 Choice of Technology

In seeking to optimise the plant in terms of efficiency and output potential, the developer again reviewed the choice of technology available as time had elapsed between the original application and the beginning of the procurement process.

As a result of that review, it was decided 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 was more efficient and enabled output to be increased from 9MWe to 10MWe.

The Outotec equipment produced syngas through a fluidized-bed process while the Prestige Thermal Equipment produced syngas through a pyrolysis process. Both technologies were forms of 'gasification'. The general sequence of the proposed gasification process was described 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.

The developer considered the revised technology to be better suited to the specific requirements of the Barry scheme, and would maximise operational efficiencies and versatility in addition to being viewed as a more established and therefore 'bankable' technology.

It was therefore decided to pursue the change in technology to improve the efficiency and effectiveness of the plant, along with making the funding of the plant more straightforward.

Finally, consideration was given to the height of the flue stack as detailed in Appendix 1(2). This was to ensure the optimum dispersion of emissions from the stack and an iterative modelling process was used to determine the optimum height, balancing environmental benefit and financial costs. This indicated that a stack height of 43m achieved effective dispersion.

6.3 'Do Nothing' Scenario

In the absence of the development, 72,000 tonnes of timber waste would still need to be managed at an appropriate facility. At the time, there were no comparable energy recovery facilities within the same catchment area having uncommitted capacity to receive waste wood and thus the 72,000 tonnes of timber waste would either be deposited in landfill sites within the region (or indeed further afield), or exported to alternative energy recovery facilities (potentially abroad).

Chapter 7: Conclusions

This Environmental Statement has outlined the findings of the environmental impact assessment of the development proposals as contained within the 2015 Application for the Barry Dock Biomass Power facility. The ES reviews the environmental information provided in the planning application, as it stood at the point of submission.

The environmental impact assessment has considered the likelihood of significant environmental effects occurring from the proposed changes upon the Site itself and its surroundings. The environmental issues addressed as part of the scheme have been identified through a combination of review of existing studies accompanying the original 2010 Permission and its voluntarily submitted ES, studies supporting the 2015 Application, desk based and site survey work, consultation with the Welsh Assembly Government and other organisations.

The ES has not identified any significant effects arising from the proposed development. The overall conclusion is that, with the adoption of the mitigation measures embodied within the project design, or imposed through existing planning conditions, any impacts identified can be maintained within acceptable limits.

There are therefore no reasons to suggest that the conclusions of the determination process carried out by the Vale of Glamorgan Council in respect of the 2015 Permission and endorsed by the Welsh Assembly Government in 2015, would have been altered by the carrying out of any additional Environmental Impact Assessment as part of the 2015 Application. This document confirms that the decision making processes followed were appropriate and came to valid conclusions.