

Natural Resources Wales permitting decisions

Valero Energy Limited – Pembroke Refinery Decision Document

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Substantial Variation

The application number is: EPR/YP3930EX/V005

The operator is: Valero Energy Limited

The Installation is located at: Pembroke Refinery, Pembroke, Pembrokeshire, SA71 5SJ

We have decided to issue the variation for the Pembroke Refinery operated by Valero Energy Limited.

We consider in reaching that decision we have considered all relevant considerations and legal requirements and that the permit will ensure that the appropriate level of environmental protection is provided.

We have consolidated the permit and updated previous permit conditions to those in the new generic permit template as part of permit consolidation. The new conditions have the same meaning as those in the previous permit(s).

Purpose of this document

This decision document:

- explains how the application has been determined
- provides a record of the decision-making process
- shows how all relevant factors have been considered
- justifies the specific conditions in the permit other than those in our generic permit template.

Unless the decision document specifies otherwise we have accepted the applicant's proposals.

Key issues of the decision

Receipt of Application

An application was received from Valero Energy Ltd on the 9th May 2017, the application was to vary their existing environmental permit and add a 49.9MWe cogeneration plant. This plant would provide the refinery with electricity and steam. The application was 'Duly Made' on the 31st May 2017. This means we considered it was in the correct form and contained sufficient information for us to begin our determination, but not that it necessarily contained all the information we would need to complete the determination.

Consultation

The consultation requirements were identified and implemented. The decision was taken in accordance with our Public Participation Statement and our Working Together Agreements.

A copy of the Application and all other documents relevant to our determination are available for the public to view. Anyone wishing to see these documents could arrange for copies to be made.

We sent copies of the Application to the following bodies, which includes those with whom we have "Working Together Agreements":

- Pembrokeshire County Borough Council (Environmental Protection Department)
- Pembrokeshire County Borough Council (Planning Department)
- Health and Safety Executive
- Public Health Wales
- Mid and West Wales Fire Brigade
- The National Grid

These are bodies whose expertise, democratic accountability and/or local knowledge make it appropriate for us to seek their views directly. The consultation started on the 6th June 2017 and ended on the 4th July 2017. An advert was also placed on our website during this time. A summary of consultation comments and our response to the representations we received can be found in Annex 1. We have taken all relevant representations into consideration in reaching our decision.

The facility

The regulated facility is an installation which comprises the following activities listed in Part 2 of Schedule 1 to the Environmental Permitting Regulations and the following directly associated activities.

The variation is for a cogeneration plant generating steam and electricity, this new activity is added to S1.1 A(1)(a) which is already in the installations environmental permit.

- S1.1 A(1)(a) – Burning any fuel in an appliance with a thermal input of 50 megawatts.
- S1.2 A(1)(d) – Refining mineral oils (primary operations)
- S1.2 A(1)(d) – Refining mineral oils (secondary operations – oil movements and blending)
- S1.2 A (1)(e) – The loading, unloading, handling or storage of, or the physical, chemical or thermal treatment of – (i) Crude oil and (ii) Stabilised crude petroleum
- S4.2 A(1)(a)(v) – Producing inorganic chemicals such as non-metals, metal oxides, metal carbonyls, or other inorganic compounds – Sulphur recovery and production
- S5.3 A1 (a) - Disposal of hazardous waste (other than by incineration or landfill) in a facility with a capacity of more than 10 tonnes per day.
- S5.4A (1)(a)(i) – Disposal of non-hazardous waste with a capacity exceeding 50 tonnes per day (or 100 tonnes per day if the only waste treatment activity is anaerobic digestion) involving one or more of the following activities – (i) biological treatment
- S5.4A (1)(a)(i) – Disposal of non-hazardous waste with a capacity exceeding 50 tonnes per day (or 100 tonnes per day if the only waste treatment activity is anaerobic digestion) involving one or more of the following activities – (ii) physico-chemical treatment
- S1.2 Part B (a) – Blending odorant for use with natural gas or liquefied petroleum gas
- S1.2 Part B (b) – The storage of petroleum in stationary storage tanks at a terminal, or the loading or unloading at a terminal of petrol or from road tankers, rail tankers or inland waterway vessels

There are several Directly Associated Activities (DAA's) that are associated with the above listed activities and these include the flaring of gases, cooling water systems, treatment and settlement lagoons, the generation of oxygen or nitrogen, surface water drainage, water treatment, the storage of hazardous wastes and a demineralisation plant.

European Directives

All applicable European directives have been considered in the determination of the application. These include the Industrial Emissions Directive, Large Combustion Plant Directive, Habitats Regulations and the Energy Efficiency Directive.

The site

The site is located on the south shore of the Milford Haven estuary approximately 7 km west of Pembroke, Pembrokeshire. The site is centred at NGR 190800 203000. The installation extends to around 500 acres. A natural north-south watershed divides the application site into two areas, one draining into Angle Bay to the west and the other into Martin's Haven to the East. The purpose of the site is to process crude oil into its component parts to produce fuels for sale into various markets. The processing of crude oil involves a series of inter-linked processes. This variation of the environmental permit seeks to add a cogeneration plant. The cogeneration plant will produce up to 49.9MW_e output from the combustion of natural gas in a Combustion Turbine Generator (CTG). This will also produce superheated steam in a Heat Recovery Steam Generator (HRSG).

The cogeneration plant works by drawing natural gas and air into the CTG where the 2 gases are mixed and injected into the turbine chamber and burnt to produce hot, high pressure flue gases. This high-pressure gas is then passed through a turbine to drive a compressor and electrical generator. The electricity will be used by the installation for day-to-day running. The turbine is equipped with electric starters and housed within an acoustic enclosure to reduce noise. Once the gases have passed through the compressor, the exhausts are equipped with ducting to move the exhaust gases through the HRSG. The HRSG is equipped with a high-pressure superheated steam boiler and all necessary pipework and equipment for optimum performance. The steam produced here will supplement the refineries steam demand and other boilers on-site will be 'turned down' to accommodate the steam produced. This is an environmental benefit and an efficiency improvement as latent heat from the cogeneration plant will be used to generate steam and the existing site boilers will not need to generate the full steam demand. Waste gases will then be routed to the stack for discharge to the environment.

The feed water for the boiler will be supplied by the refineries existing boiler feed water header. All blowdown from the HRSG will discharge into the blowdown drums to recover low pressure steam and discharge any residual water to the refineries existing water treatment system.

There are several ecologically sensitive sites within the screening distance. The location of the installation is material to our determination of the variation application to the extent that it has implication for the following matters: the impacts of emissions on local communities and sensitive receptors, the question of whether the recovery of waste or process heat is a Best Available Technique (BAT) for the installation; and the nature and scale of pollution prevention measures necessary to minimise the risk to the environment and human health. These matters are all addressed in this decision document.

The operator has provided a plan which we consider is satisfactory, showing the extent of the site of the facility. A plan is included in Schedule 7 of the environmental permit.

There are no releases to land or groundwater associated with this variation application. The applicant has identified the hazards associated with the cogeneration plant, which could present a risk to the environment in the event of an accident. The risks have been evaluated in the applications environmental impact document. There are numerous procedures that mitigate these risks. The applicant operates the overall site in accordance with ISO14001, which incorporates staff competence training and an accident management plan. There is a regime of routine inspection and maintenance for key plant items in place. We are satisfied that the pollution risk associated with the cogeneration plant is low based on the use of appropriate surfacing, satisfactory abatement, inspection measures and the operating procedures which are in place as part of the ISO14001 environmental management systems.

Operation of the Installation – General Issues

Administrative Issues

We are satisfied that the applicant is the person who will have control over the operation of the cogeneration plant after issuing the variation; and that the operator will be able to operate the cogeneration plant to comply with the conditions included in the consolidated permit. The decision was taken in accordance with EPR RGN 1 “Understanding the meaning of Operator”. We are satisfied that the applicant’s submitted OPRA profile is accurate. The OPRA score is used as the basis for subsistence and other charging in accordance with our charging scheme.

Management

The operator has an Environmental Management System (EMS) that is certified under ISO14001. We are satisfied that appropriate management systems and management structures are in place for this Installation.

Site Security

We are satisfied that appropriate infrastructure and procedures will be in place to ensure that the site remains secure.

Accident Management

The site is a top tier COMAH site and therefore an accident management plan is of the utmost importance. We are satisfied that the appropriate measures are in place to ensure that accidents that may cause pollution are prevented but that, if they should occur, their consequences are minimised. To ensure that the management system in use by the operator sufficiently manages the residual risks of accidents, permit condition 1.1.1a requires the implementation of a written management system which addresses the pollution risks associated with, amongst other things, accidents.

Off-site conditions

We do not consider that any off-site conditions are necessary.

Operating Techniques

We have specified that the cogeneration plant must be operated in accordance with the techniques set out in Table S1.2 of the consolidated permit. The details referred to in that table describe the techniques that will be used for the operation of the plant that have been assessed by Natural Resources Wales as BAT. They form part of the permit though permit condition 2.3.1.

Energy Efficiency

The cogeneration plant has been designed to be a high efficiency generator of electricity and high pressure steam. The operation of the plant and the need to balance the generation of steam and electricity will be defined by refinery operations. The design has been optimised for the required electrical generation up to 49.9MW_e. The plant is further optimised by the addition of steam recovery by the design of the Heat Recovery Steam Generator (HRSG).

The cogeneration plant is an opportunity to generate electricity in an energy efficient way as advocated by the Energy Savings and Opportunities Scheme (ESOS). The scheme is however exempt from the climate change levy.

Waste Management

The cogeneration plant will not generate any large quantities of waste. As there are no manned areas, there will be no office or sanitary waste. There are no new waste storage areas required for the new plant and waste generation and management are reviewed by the operator every 4 years as required by conditions in the permit. The cogeneration plant areas will be added to this review schedule.

Site condition report

The cogeneration plant will occupy land within the refinery's existing installation boundary. As no new land, has been added, a site condition report is not necessary.

Environmental Risk Assessment

Minimising the Installations environmental impact

Regulated activities can present different types of risk to the environment, these include odour, noise and vibration, accidents, fugitive emissions to air and water; as well as point source releases to air, discharges to ground or groundwater, global warming potential and generation of waste. Consideration may also have to be given to the effect of emissions being subsequently deposited on to land (where there are ecological receptors).

These factors are discussed in this document. For the cogeneration plant, the principal emissions are those to air and fugitive noise emissions, although we also consider those to water and land.

Air Quality Assessment

This section of the decision document deals primarily with the dispersion modelling of emissions to air from the cogeneration plant stack and its impact on local air quality, in terms of human health, and ecological receptors. The cogeneration plant will produce emissions to air primarily of Nitrogen Dioxide (NO_x) and Carbon Monoxide (CO). The plant is run on natural gas which is considered a relatively clean fuel, therefore emissions of particulate matter and Sulphur Dioxide (SO_x) are very small and can be screened out of the assessment. There is no by-pass for the HRSG. If the HRSG is unavailable, the CTG cannot function. Fugitive emissions to air are small and occur primarily during start-up/shut-down and under abnormal operating conditions. There are several potential fugitive emissions that are not considered, this is because they are intermittent vents and will only vent in either emergency situations or during infrequent start/stop operations, the other fugitive emissions will be of air from the unit.

The applicant has assessed the cogeneration plant's potential emissions to air against the relevant air quality standards, and the potential impact upon human health. These assessments predict the potential effects on local air quality from the plant's stack emission point (A24). The air impact assessments and the dispersion modelling has been based on the Installation operating continuously at the relevant long-term or short-term emission limit values, i.e. the maximum permitted emission rate. We agree with this approach. The assumptions underpinning the model have been checked and are reasonably precautionary. The modelling was undertaken using AERMOD which would produce the most realistic set of results and then set the worst-case scenario. Carbon Monoxide was not considered further in the assessment as the concentrations emitted are negligible and considered insignificant.

The operator considered the following parameters in the assessment of impact to human and ecological receptors;

- Oxides of Nitrogen (NO_x) – ecological only
- Nitrogen Dioxide (NO₂) – human health only
- Sulphur Dioxide (SO₂) – ecological only
- Nutrient Nitrogen Deposition – ecological only
- Acid Deposition – ecological only

The operator identified 18 human receptors and considered 2 Air Quality Management Areas (AQMAs) for NO₂ in Haverfordwest and Pembroke. The operator has considered the effects of terrain and building downwash and has used 5 years' worth of hourly sequential meteorological data from the Milford Haven Meteorological Station for the years 2011-2015. Section 6 of the Air Quality Impact Assessment (doc ref; Cogen/DNS/AQIA/B01) in the variation application, shows the results for the modelling when assessed against the relevant human receptors.

Worst Case Annual Mean NO₂

The results show that Process contribution (PC) from the cogeneration plant is less than 1% at most human receptors. Of the 7 receptors that have PC's of more than 1%, the Predicted Environmental Concentration (PEC) is less than 70% in all cases, therefore we are satisfied that the AQO will not be exceeded.

Worst case 1-Hour Mean NO₂ (99.8th Percentile)

The results show that PC from the cogeneration plant is less than 10% at all human receptors and therefore the emissions screen out as insignificant.

Biodiversity, Heritage, Landscape and Nature Conservation

The application is within the relevant distance criteria of a site of heritage, landscape or nature conservation, and/or protected species or habitat. A full assessment of the application and its potential to affect the habitats sites has been carried out as part of the permitting process. We consider that the application will not affect the features of the habitats sites.

As the thermal input of the cogeneration plant is approximately 100MW, the operator has used a screening distance of 15km to assess European and National sites. 25 ecological receptors were incorporated into the model representing European Sites and National sites (SSSIs). 7 Ancient Woodlands were also identified within 2km of the installation. The 8 European Sites were;

1. Pembrokeshire Marine SAC
2. Limestone Coast of South West Wales SAC
3. Castlemartin Coast SPA
4. West Wales Marine cSAC

5. Pembrokeshire Bat sites and Bosherton Lakes SAC
6. Skokholm and Skomer SPA
7. Bristol Channel Approaches cSAC
8. Cleddau River SAC

The 17 SSSI's within 15km of the site are;

1. Milford Haven Waterway SSSI
2. Broomhill Burrows SSSI
3. Castlemartin Corse SSSI
4. Angle Peninsula Coast/Arfordir Penrhyn Angle SSSI
5. Somerton Farm cSSSI
6. Castlemartin Range SSSI
7. Dale and South Marloes Coast SSSI
8. Stackpole SSSI
9. Stackpole Quay and Trewent Point SSSI
10. Hook Wood SSSI
11. De Porth Sain Ffraid/St.Brides Bay South SSSI
12. Arfordir Niwgwyl-Aber Back/Newgale to Little Haven Coast SSSI
13. Freshwater East Cliffs to Skrinkle Haven SSSI
14. Rhosydd Yerberston/Yerbeston Moors SSSI
15. Afon Cleddau Gorllewinol/Western Cleddau River SSSI
16. Marloes Mere SSSI
17. Carew Castle SSSI

Conservation objectives for the above sites European Sites were obtained from the relevant site management plans and information relating to the sensitivity of the habitats to air pollution for the qualifying and interest features have been taken from the APIS website.

European Sites

The 8 sites assessed all screened out for NO_x and SO₂ as either having PCs less than 1% (long-term) and 10% (short-term) or having long term PECs less than 70%. However due to the scale of the project and the sensitivity of the area, any site where the long-term PC exceeded 1% (even where the PEC was less than 70%), an appropriate assessment has been carried out.

Pembrokeshire Marine SAC

Short and Long term NO_x was assessed for all habitat types listed as qualifying features within the core management plan. The annual mean PC exceeded 1% of the Long-term Critical Level and was modelled at 6.4%. The background concentration was considered and the long-term PEC was modelled at 69.6% which is below the 70% threshold. The short-term mean PC exceeded 10% of the Short-term Critical Level and was modelled at 16.4%. The background concentration was considered and for the long-term and an exceedance of an Air Quality standard is unlikely. This was taken through to the appropriate assessment stage. All features within the Pembrokeshire Marine SAC apart from the Shore Dock (in 2 locations: the SE end of Marloe Sands and Watery Bay, near Gateholm Island) are either totally submerged, or inter-tidal features which are partially submerged/subject to regular tidal inundation and not considered sensitive to NO_x. PC levels (long-term) at both locations in the Shore Dock are less than 1% of the Critical Level (0.19% and 0.21%). The PC (short-term) at both locations was less than 10% of the Critical Level (2.3% and 2.4%). This shows that the NO_x emissions are not likely to cause an adverse effect

Sulphur Dioxide (SO₂) was modelled for all habitat features within the SAC and the long-term PC was below the 1% of the Upper Critical Level. We concluded that no further assessment was required. There were no sensitive habitats for acid deposition and therefore this aspect was not considered further in the assessment.

When assessing impact due to Nutrient Nitrogen Deposition, various qualifying features within the SAC were not sensitive to nutrient nitrogen deposition and were not assessed further, however several qualifying features saw exceedances of the screening thresholds;

Estuaries – The PC as a percentage of the Critical Load Max was less than 1% but the PC was greater than 1% when assessed against the Minimum Critical Load. When the background was considered, the PEC was greater than 70%. This cannot be screened as insignificant and therefore needs to be assessed further. This was taken to appropriate assessment and this showed that The PC was less than 1% of the Maximum Critical Load at all locations within the SAC, but the PC was greater than 1% of the Minimum Critical Load in 2 out of 2048 locations. The PC was 1.2% of the Minimum Critical Load at both locations. A map of exceedances was provided with the application. Nutrient nitrogen in estuarine systems is influenced mainly by nutrient loadings from rivers and tidal inputs rather than by aerial deposition. Therefore, the emissions are not likely to cause an adverse effect.

Atlantic Salt Meadows –The PC as a percentage of the Critical Load Max was less than 1% but the PC was greater than 1% when assessed against the Minimum Critical Load. When the background was considered the PEC was greater than 70%. This cannot be screened as insignificant and therefore needs to be assessed further. This was taken to appropriate assessment and this showed that the PC was less than 1% of the Critical Load Max at all locations within the SAC, but the PC was greater than 1% of the Minimum Critical Load in 11 out of 763 locations. The PC was no more than 1.3% at all 11 locations. A map of exceedances was provided with the application. Nutrient nitrogen is influenced mainly by water based nutrient loadings (e.g. tidal inputs, agricultural run-off) rather than aerial deposition. Therefore, the emissions are not likely to cause an adverse effect

Coastal Lagoons –The PC as a percentage of the Critical Load Max was less than 1% but the PC was greater than 1% when assessed against the Minimum Critical Load. When the background was considered the PEC equalled 70%. The appropriate assessment showed that the emission at this location has a PEC equal to the 70% screening threshold, however the PC is greater than 1%. As stated above nutrient nitrogen influences are predominantly water based and not aerial deposition. As the PEC is also equal to the 70% threshold, nutrient nitrogen deposition from the cogeneration plant is unlikely to cause an adverse effect.

Limestone Coast of South West Wales SAC

Short and Long term NO_x was assessed for all habitat types listed as qualifying features within the core management plan. The annual mean PC exceeded 1% of the Long-term Critical Level and was modelled at 1.4%. When the background concentration was considered the PEC modelled at 41.2% which is below the 70% threshold. The 24-hour mean PC exceeded 10% of the Short-term Critical Load and was modelled at 14.4%. This was taken through to the appropriate assessment stage. We concluded that is a low likelihood of an exceedance of the Air Quality standard and therefore this emission is not likely to have an adverse effect on the habitat.

Sulphur Dioxide (SO₂) was modelled for all habitat features and the PC was below 1% of the Upper Critical Level at 0.0063%. For Lichens the PC was 0.0127% of the Lower Critical Level. Due to the very small PC's no further assessment was required.

In relation to Acid Deposition, all habitat types showed that the PC was less than 1% of the Upper Critical Load; in-fact a PC of 0.06% was predicted for the most acid sensitive habitat. Based on this extremely small figure, no further assessment was required.

When the impact of Nutrient Nitrogen Deposition was assessed it was shown that all habitat features within the SAC were either not sensitive or screened out as the PCs were less than 1% of the upper critical load.

Castlemartin Coast SPA

Short and Long term NO_x was assessed for all habitat types listed as qualifying features within the core management plan. The annual mean PC exceeded 1% of the Long-term Critical Level and was modelled at 1.3%. When the background concentration was considered, the PEC modelled at 36.8% which is below the 70% screening threshold.

The 24-hour mean PC exceeded 10% of the Short-term Critical Level and was modelled at 12.3%. The likelihood of an Air Quality standard being exceeded is low.

In relation to Acid Deposition, all habitat types showed that the PC was less than 1% of the Upper Critical Level, a PC of 0.06% was predicted for the most acid sensitive habitat. Based on this extremely small figure, no further assessment was required.

When the impact of Nutrient Nitrogen Deposition was assessed, it was shown that all the habitat features within the SAC were either not sensitive or screened out as the PCs were less than 1% of the Lower Critical Load.

West Wales Marine cSAC

As the above site is purely a marine SAC designated for the Harbour Porpoise, The SAC is not sensitive to the secondary effects from NO_x, SO₂, acid deposition and nutrient nitrogen deposition and therefore no further assessment is required

Pembrokeshire Bat sites and Bosherton Lakes SAC

Short and Long term NO_x was assessed for all habitat types listed as qualifying features within the core management plan. The annual mean PC was below 1% of the Long-term Critical Level and was modelled at 0.7%, therefore no further assessment is required. The 24-hour mean PC was below 10% of the Short-term Critical Level and was modelled at 4.3%. Therefore, no further assessment is required.

Sulphur Dioxide (SO₂) was modelled for all habitat features. The model showed that the PC was below 1% of the Upper Critical Level, no further assessment was required.

In relation to Acid Deposition, all habitat types showed that the PC was less than 1% of the Upper Critical Level, a PC of 0.03% was predicted for lowland mixed deciduous woodland supporting the Greater Horseshoe Bat. Based on this extremely small figure, no further assessment was required.

When the impact of Nutrient Nitrogen Deposition was assessed it was shown that all habitat features within the SAC were either not sensitive or screened out as the PCs were less than 1% of the Lower Critical Load.

The effects of the cogeneration plant development on Greater and Lesser Horseshoe Bats was also assessed by the operator; it was shown that;

- 3 Greater Horseshoe Bats have been moved to a nearby building 120m from the proposed cogeneration plant. The bats were moved from an electrical sub-station on the refinery to the new building. Sound is not expected to affect the bats as the soundscape is not changing (see noise assessment section below).
- The bat population forage over a wide area, with many key areas located outside of the project screening distance.
- The project will not cause any direct habitat loss for foraging.

The nearest foraging habitat is a wooded embankment on the southern boundary of the refinery. This is a low value habitat when compared with other areas. Surveys have only ever recorded low levels of foraging by a small number of Lesser Horseshoe Bats. Noise and light emanating from the operation of the refinery already effect the area and bats continue to use the area. Noise is expected to increase near the embankment but not enough that would discourage the bats from foraging in the area. This is not expected to influence the bat populations within the SAC.

We agree with the conclusions made by the Operator.

Skokholm and Skomer SPA

This site is designated for the protection of numerous bird species. Supralittoral rock which supports breeding populations of Manx Shearwater, European Storm Petrel, Razorbill and Atlantic Puffin are not sensitive to the secondary effects from air pollutants – NO_x, SO₂, acid deposition and nutrient nitrogen deposition, so no further assessment was required.

Bristol Channel Approaches cSAC

As the above site is purely a marine SAC designated for the Harbour Porpoise, The SAC is not sensitive to the secondary effects from NO_x, SO₂, acid deposition and nutrient nitrogen deposition and therefore no further assessment was required.

Cleddau River SAC

Short and Long term NO_x was assessed for all habitat types listed as qualifying features within the core management plan. The annual mean PC was below 1% of the Long-term Critical Level and was modelled at 0.2%, so no further assessment was required. The 24-hour mean PC was below 10% of the Short-term critical level and was modelled at 2.6%, so no further assessment was required.

Sulphur Dioxide (SO₂) was modelled for all habitat features. The model showed that the PC was below 1% of the Upper Critical Level, so no further assessment was required.

In relation to Acid Deposition, all habitat types showed that the PC was less than 1% of the Upper Critical Load in-fact a PC of 0.008% was shown for Active Raised Bogs. Based on this extremely small figure, no further assessment was required.

When the impact of Nutrient Nitrogen Deposition was assessed, it was shown that all habitat features within the SAC were not sensitive.

Based on the assessment carried out, we concluded that the cogeneration project will not cause an adverse effect on any of the European sites within the 15km screening distance. This conclusion was confirmed by NRW who is the conservation body in Wales.

Considering in-combination effects with other projects in the area, the Valero cogeneration plant was looked at in-combination with the Egnedol Sustainable Energy Facility. The Egnedol HRA was re-submitted to the Planning Inspectorate in July 2017 (after our HRA assessment for Valero had been carried out). However, the re-submitted HRA for Egnedol did not look at the effects of NO_x or SO₂ and therefore an in-combination assessment could not be carried out.

National Sites

Milford Haven Waterway SSSI

The short-term and long-term NO_x PCs were greater than 10% and 1% the critical levels of 75 and 30µg.m³ respectively, however the long-term PEC was below the 70% screening threshold. For the short-term emissions, the likelihood of an Air Quality standard being exceeded is low. Whilst this cannot be deemed insignificant, it can be concluded that the impact of NO_x is not likely to damage the special interest features of the SSSI and will not require any further assessment.

When acid deposition was assessed it was shown that all PC's were below 1% of the Upper Critical Level for the most sensitive habitat feature (Coastal Vegetated Shingle) and are insignificant, so did not require any further assessment.

- For nutrient Nitrogen deposition; *Lowland heathland (priority habitat) F.2 dry heaths*, the PC was greater than 1% of the Upper Critical Load (PC/CL_{max} 1.37% - PEC 92%) (PC/CL_{min} 2.74% - PEC 185%) – no critical loads were available for fen, marsh and swamp habitat. For supralittoral sediment and fen, marsh and swamp habitats, nutrient nitrogen inputs for these habitats are influenced predominantly by water based nutrient loadings; from tidal inputs where subject to regular inundation, or from agricultural run-off in drier and more densely vegetated areas, rather than by air emissions. Due to this the aerial emissions are not predicted to damage the special interest features of the SSSI.
- *Supralittoral sediment B1: coastal dunes and sand habitats (type: coastal stable dune habitat)*, the PC was greater than 1% of the upper critical load. No critical loads are available for the assessment of supralittoral rock habitats (maritime cliffs and slopes). Eutrophication is not a key area of risk for this habitat site. Due to this the aerial emissions are not predicted to damage the special interest features of the SSSI.

- *Lowland meadows (priority habitat); calcareous E2.2: low and medium altitude hay meadows*, the PC was greater than 1% of the Upper Critical Load. The PC only slightly exceeds the minimum critical load and is less than 1% for the maximum critical load. The grassland habitats are referred to in the SSSI citation as areas that support foraging for bats. Due to this, it is unlikely that the small increases in nutrient nitrogen deposition from aerial emissions will adversely affect the grassland habitats function for providing foraging areas for bats. Due to this the aerial emissions are not predicted to damage the special interest features of the SSSI.
- *Lowland mixed deciduous woodland (priority habitat)*, the PC was greater than 1% of the Upper Critical Load. With regards to the lowland deciduous woodland, a recent report prepared by the Pembrokeshire Biodiversity Partnership stated that nutrient nitrogen deposition was not identified as an area of concern, key concern for this habitat feature are loss and fragmentation, lack of inappropriate management, loss of genetic integrity, invasive species and climate change. Due to this the aerial emissions are not predicted to damage the special interest features of the SSSI.

Other habitats are also present within the SSSI, which are not sensitive to nutrient nitrogen deposition.

Broomhill Burrows SSSI

The short term and long term NO_x PCs were greater than 10% and 1% the critical levels of 75 and 30µg.m³ respectively however, the long-term PEC was below the 70% screening threshold. For the short-term emissions, the likelihood of an Air Quality standard being exceeded is low. Whilst this cannot be deemed insignificant, it can be concluded that the impact of NO_x is not likely to damage the special interest features of the SSSI and will not require any further assessment.

When assessed for Acid Deposition, all the PC's were below 1% of the Upper Critical Load for the most sensitive habitat feature (Coastal Vegetated Shingle) and are therefore considered to be insignificant and do not require any further assessment.

When Nutrient Nitrogen deposition was assessed, it was shown that habitat features are either not sensitive to nutrient nitrogen or PC's were below 1% of the Lower Critical Load.

Castlemartin Corse SSSI, Somerton Farm cSSSI, Castlemartin Range SSSI, Dale and South Marloes Coast SSSI, Stackpole SSSI, Stackpole Quay and Trewent Point SSSI, Hook Wood SSSI, De Porth Sain Ffraid/St.Brides Bay South SSSI, Arfordir Niwgwyl-Aber Back/Newgale to Little Haven Coast SSSI, Freshwater East Cliffs to Skrinkle Haven SSSI, Rhosydd Yerberston/Yerbeston Moors SSSI, Afon Cleddau Gorllewinol/Western Cleddau River SSSI, Marloes Mere SSSI, Carew Castle SSSI, Angle Peninsula Coast/Arfordir Penrhyn Angle SSSI;

For the above listed SSSI sites, the Short-term and Long-term NO_x PCs were below 10% and 1% of the critical levels of 75 and 30µg.m³ respectively, this is deemed as insignificant and therefore no further assessment is required.

When assessed for Acid Deposition, all the PC's were below 1% of the Upper Critical Load for the most sensitive habitat feature for the relevant SSSI. The emissions are insignificant and do not require any further assessment.

When Nutrient Nitrogen deposition was assessed, it was shown that habitat features are either not sensitive to nutrient nitrogen or PC's were below 1% of the Lower Critical Load.

Based on the results of the detailed modelling, we agree with the operator that the aerial emissions from the proposed cogeneration plant are not likely to damage any of the special interest features in the above SSSIs. NRW as the conservation body in Wales agree with the applicant's conclusion that the project will not likely damage any of the interest features of the SSSIs.

There are no non-statutory sites within 2km of the cogeneration plant and therefore were not considered in the assessments, there are three blocks of ancient semi-natural woodland and four blocks of restored ancient woodland within 2km of the cogeneration plant. For this assessment Sulphur dioxide emissions, NO_x concentrations and acid deposition did not require further assessment as the impact of these emissions was negligible. However, nutrient nitrogen deposition required further assessment for the ancient woodland.

Critical loads for nitrogen deposition were taken from the APIS website and were based on broadleaved woodland (G1), using the upper and lower limit of 10 to 20 KgN/ha/yr. Existing background critical loads were not known for this areas and so loads determined for woodland in the Limestone Coast of South West Wales SAC were used as this woodland is located within 1.5km of the Project.

Background levels of nitrogen deposition were 20.3 KgN/ha/yr. These are conservative estimates. Six of the seven woodland sites had a PC greater than 1% of the Critical Load

As the assumed critical load already exceeded the maximum critical load for the habitat, the PEC, also exceeded the 70% air quality assessment trigger at one or more receptor points. These sites where the existing background was presumed to be more than the critical load for nitrogen deposition, the cogeneration plant will make a further small contribution to the PEC. The AWI does not provide an assessment of current condition, however woodland action plans and recent reports from Pembrokeshire Biodiversity Partnership indicate that oak woodlands are in moderate and improving conditions. Nitrogen deposition is not identified as an impact of concern, with the key concerns being loss and fragmentation, lack of or inappropriate management, loss of genetic integrity, invasive species and climate change. Given the small overall contribution to nitrogen deposition, and the lack of information indicating that this is a significant factor affecting the Ancient Woodlands in proximity of the Project site, no significant residual impact arising from air quality is anticipated for ancient woodlands.

Emission limits

We have decided that emission limits should be set for the parameters listed in the permit. The ELV's that were selected were based on the Industrial Emissions Directive (IED) levels and the levels at which the applicant modelled the discharge. It is considered that the ELVs described in Table 3.1(a) of the permit will ensure that significant pollution of the environment is prevented and a high level of protection for the environment secured. During our determination of the environmental permit, the Bref document for Large Combustion Plant was published. This was acknowledged in the permit variation, and daily and annual ELV's were included for NO_x. In addition, four footnotes were added to Table 3.1(a) which outline the new efficiency requirements of the Bref. A full review of the permit in-line with the Bref will be carried out in the future. An Improvement Condition has also been included in the permit that requires the operator to submit a report for approval by Natural Resources Wales, setting out compliance with the appropriate BAT-AELs and Annex V of IED in relation to the cogeneration plant (A24).

Emissions to Surface Water

Based upon the information in the application we are satisfied that the appropriate measures will be in place to prevent pollution of ground and surface water. There is no surface water discharge associated with the cogeneration plant. All waste water generated by the cogeneration plant will be routed to the refinery's existing water treatment plant. This effluent will typically be around 3.5m³ per hour. Boiler blowdown water will be routed to the existing water treatment plant; however as other site boilers will be turned down there isn't expected to be an increase in volume.

Emissions to Sewer

There will be no emissions to sewer associated with the cogeneration plant.

Emissions to Land

There will be no emissions to land associated with the cogeneration plant.

Odour

We consider that the applicant's proposals represent the appropriate measures to prevent/minimise odour from the permitted activities. Odour is of low risk with a proposal such as this and permit conditions 3.3.1 and 3.3.2 are sufficiently protective.

Noise

The applicant submitted a noise assessment as part of the application. As part of the assessment we noted that the cadnaA modelling files were missing and the noise assessment needed to be updated due to changes in some of the data. A Schedule 5 notice was issued on the 5th June 2017 requesting this information. The applicant responded on the 19th June 2017 and provided the amended noise assessment. The noise modelling files were received subsequently on the 20th June 2017. We assessed the noise assessment and checked the applicants modelling. During the assessment of the noise impact assessment, further information was required, we requested further information from the operator by email on the 12th July 2017.

We asked how the “total sound powers” for the CTG package and HSRG unit stated in Table 4.2 of the noise assessment were derived. The operator responded by email on the 20th July 2017 and stated that: “*Tables 1.2 and 1.3 in Annex B of noise assessment provide details of the individual sound power levels that have been included in the noise model for these packages and are based on vendor noise data. In some cases, where vendor noise data was provided as sound pressure levels at one metre without the inclusion of sound power data, noise source dimensions (based on vendor general arrangement drawings) have been used to calculate sound power levels. The sound power values have been provided by the EPC contractor, who has explored the likely noise levels from equipment with market leading vendors, and include bespoke noise mitigation including upgraded acoustic enclosures for the CTG. Further details regarding noise mitigation are provided in Section 4.4 of the noise assessment and Table 8.1 of the permit variation application. Since a vendor hasn’t been appointed, the details of the potential vendors remain commercially sensitive*”. The values in *Table 4.2* of the main report were derived by summing the sound powers in *Table 1.2* and *Table 1.3*. One of each item of equipment listed in these tables is included in the model. *Table 1.2* lists air coolers, of which there are five. The sound power listed for the air coolers in *Table 1.2* is for all five items.”

We requested clarification for how the sound power levels for the facades of the buildings in the noise modelling files were derived. The operator responded by stating that there are three ‘industrial buildings’ in the noise model which emit noise. They represent the CTG turbine air inlet / filter house, the turbine enclosure and the HRSG boiler unit. A description of the sound power levels applied to each industrial building is provided below;

CTG turbine air inlet / filter house

“Sound power levels from *Table 1.2* for the air intake and filter house are applied to this industrial building. The sound power for the air intake is applied to a single façade (98 dB, L_{WA}). For the purposes of the model, the sound power for the filter house has been distributed around four façades assuming even noise transmission (i.e. the same sound power per metre squared throughout). The filter house façade directly mated to the inlet silencer (to the west) has been omitted as it cannot freely radiate noise. This results in a calculated sound power level of 88.8 dB, L_{WA} for the roof and for the bottom and a sound power level of 87.6 dB, L_{WA} for each of the two sides. The total sound power level for these four façades is therefore equal to the 94 dB(A) listed in *Table 1.2*.”

CTG turbine enclosure

“The sound power level from *Table 1.2* for the turbine enclosure of 100 dB, L_{WA} is applied to this industrial building. For the purposes of the model the noise has been distributed around five facades assuming even noise transmission. The façade facing the ground has been omitted which assumes all noise radiates outwards. This results in a calculated sound power level of 95.7 dB, L_{WA} for the roof, 92.6 dB(A) for each of the two longer sides and 91.9 dB(A) for each of the two shorter sides.”

HRSG boiler unit

“The following noise sources (listed in *Table 1.3*) are located across the boiler unit; Superheater Duct, Evaporator Duct, SCR Spool Duct, Economizer Duct, Expansion Joint 3, Transition Duct 3. The sound power levels for these sources have been summed, resulting in a total sound power of 77 dB, L_{WA} . For the model this sound power level has been distributed around three facades assuming even noise transmission. The façade facing the ground has been omitted which assumes all noise radiates outwards. The northern façade has been omitted as it is directly connected to ‘Transition Duct 2’ and therefore cannot freely radiate noise. Similarly, the southern side has been omitted as it is directly connected to the stack. This results in a calculated sound power level of 70.3 dB, L_{WA} for the roof and 72.4 dB(A) for each of the two sides.”

We requested clarification as to why all facades of the HRSG building in the noise modelling, were not modelled as noise emitting facades. The operator responded by stating that as mentioned above, the façade facing the ground has been omitted which assumes all noise radiates outwards. The northern side has been omitted as it is directly connected to ‘Transition Duct 2’ and therefore cannot freely radiate noise. Similarly, the southern side has been omitted as it is directly connected to the stack. Although most of the southern façade is obscured by the stack, the façade is slightly wider than the stack. Therefore, some sound power could be applied to this façade, however, overall the sound power level of the HRSG boiler unit is very low (i.e. more than 10 dB lower than other noise sources nearby) and the proportion of the sound power radiating from this façade would be minimal and not significant at Nearby Sensitive Receptors (NSRs).

We noted that not all the listed sources in *Tables 1.2* and *1.3* were sources in the noise modelling files. We requested clarification as to whether some of these sources contributed to building noise levels and if so, how was the contribution calculated.

The operator responded by stating that all noise sources listed in *Tables 1.2 and 1.3* have been included in the noise modelling, although where they are in the same building, or otherwise grouped together they have been combined in the model as described below;

“The industrial building representing the CTG air intake / filter house contains the following noise sources listed in *Table 1.2 (of Annex B)*; Air intake, Filter house

The industrial building representing the CTG turbine enclosure contains the ‘Turbine enclosure’ noise source listed in *Table 1.2*.

The industrial building representing the HRSG boiler unit contains the following noise sources listed in *Table 1.3*; Super-heater Duct, Evaporator Duct, SCR Spool Duct, Economizer Duct, Expansion Joint 3, Transition Duct 3

Several other noise sources listed in *Table 1.3* have been combined into two point sources. Details are provided below: The point source ‘20170515 Total inlet duct 1’ sums noise from the following noise sources listed in *Table 1.3*; Silencer Duct, Expansion Joint 1, Elbow Duct, Expansion Joint 2

The point source ‘20170515 Total inlet duct 2’ sums noise from the following noise sources listed in *Table 1.3*; Transition Duct 1, Transition Duct 2

All other noise sources listed in *Table 1.2* and *Table 1.3* are included individually as point sources.”

We further noted that the consultant’s Light Detection and Ranging (LIDAR) data used for the terrain had been adapted to include an embankment. We requested confirmation as to whether this embankment was part of the proposal. The operator responded by stating that the accuracy of the LIDAR data in this area is affected by trees and requires correction by the consultant carrying out the survey. ERM used a spot height survey carried out by Valero where the LIDAR data is interrupted by trees along the embankment and slope on the southern boundary. The heights used in the model therefore more accurately represent ground elevation in this area than the LIDAR data.

In the assessment baseline data was provided. We requested clarification as to the wind direction during the simultaneous background monitoring study in April 2017.

The operator responded by stating and showing the range of wind directions recorded at the refinery weather station during the survey and the proportion of the survey they occurred for. “The results of the comparative monitoring showed a good level of consistency in the variation of background noise levels between the two locations, and a consistent difference in magnitude between the locations, as detailed in *Section 1.3.2 of Annex A.*”

In the noise report the consultant proposed a + 4dB difference in background noise levels between the Village Hall and 4 Pleasant View. We requested justification that 4 Pleasant View is representative of 1 Pleasant View.

The additional information was submitted and considered with the original noise assessment. Our conclusions were based on all the submitted information. The operator used noise modelling software Sound PLAN version 7.4. The Sound PLAN software follows the ISO 9613-2 method of calculation. The operator assessed the predicted noise impact using the assessment methodology BS 4142:2014. BS 4142:2014 assesses the likelihood of significant adverse impact by subtracting the measured background noise level from the rating level:

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

The operator undertook a baseline noise monitoring survey during February and March 2017. Monitoring was undertaken at three locations; Rhoscrowther, Easington Farm and Angle. At Rhoscrowther Village Hall the monitoring study showed representative background LA₉₀ values of 42dB and 41dB for day and night respectively. A further noise monitoring survey was carried out in April 2017. Simultaneous measurements were taken at Rhoscrowther Village Hall and at 4 Pleasant View between the 21st and 24th April 2017. The applicant stated in the noise assessment that “the results show that noise levels at 4 Pleasant View are consistently higher than at the Village Hall.

The (arithmetic) average difference in the measured LA₉₀ levels were 4.2dB.” The operator has corrected the background LA₉₀ value for 1 Pleasant View receptor to 46dB and 45 dB for day and night respectively. The consultant states “The steam plant is the nearest large operational unit to the village and is expected to be a major contributor to the background noise in the village, and this is supported by field observations. The steam plant is situated essentially equidistant (around 200m) from both numbers 1 and 4 Pleasant View, which are only around 30m apart. On this basis, we consider the background noise level at number 4 should be a reasonable basis for assessing noise impact at number 1.” The consultant states that 1 Pleasant View will be the only remaining sensitive receptor in the Rhoscrowther area.

The consultant has used LIDAR data for the terrain heights in their model. It was stated that the LIDAR data is affected by trees and therefore “requires correction”. The operator used “a spot height survey” to correct the embankment between the source and receptor. The operator’s assessment assumes that the plant will be operating continuously throughout the year. It should be noted that the operator lists proposed noise mitigation measures in their report in section 4.4.1. The conclusions and predictions of the noise assessment depends on the implementation of the proposed mitigation measures. In Table S1.2 Operating Techniques in the permit, the noise assessment and all further information submitted via Schedule 5 notice has been included, this means that the applicant will need to adhere to the assessment and carry adhere to what is written in these reports.

BS 4142:2014 states that “Certain acoustic features can increase the significance of impact over that expected from a basic comparison between the specific sound level and the background sound level. Where such features are present at the assessment location, add a character correction to the specific sound level to obtain the rating level.” The operator has not applied a correction stating “A correction has not been applied in this assessment because it is most likely that the need for a correction can be avoided during detailed design and commissioning phases of Project development.”

The operator details their predicted noise levels at sensitive receptors in Table 5.3 of the assessment. The highest impacted receptor is 1 Pleasant View in Rhoscrowther where the operator predicts an impact of +7dB above night-time background values. BS 4142 qualifies this as “likely to be an indication of adverse impact, depending on context.”

The consultant concludes that “Several factors are relevant to the context of noise from the Project in Rhoscrowther.

Each one suggests the significance of noise effects would be lower than the initial estimate set out in *Table 5.3*. Therefore, taken together, the significance of noise effects is expected to be significantly lower. Taking account of the context, noise effects from the Project are not expected to be significant.” In addition, the operator stated “If any audible tonal noise is observed during testing and/or commissioning it will be analysed to identify the cause and corrective measures will be applied. This approach is typical to the ‘commissioning stage’ of developments such as this and again would be secured through the contract with the EPC contractor.” We undertook check modelling using Sound PLAN version 7.4 noise modelling software. In the check modelling, we have included sensitivity analysis to terrain data and the representation of sources. 2m LiDAR data was used within the check modelling. The LiDAR data had no interruptions due to trees and buildings. Using NRW LiDAR data within the model resulted in an increase in predicted noise levels of approximately 2dB for the first-floor receptor at 1 Pleasant View. NRW LiDAR data does not include a modified embankment assumed by the consultant in their model. The operator has confirmed that their LiDAR data is accurate and we agree with their conclusions.

The operator has represented parts of the proposed installation as industrial buildings. We tested sensitivity to representing these noise sources as point sources and our check modelling agrees with the operator’s absolute predicted noise levels, excluding any potential for character correction. We broadly agree with the conclusions drawn by the operator, however there were 2 points that needed to be clarified before we could conclude our assessment. The first issue was surrounding the baseline monitoring study. We noted from the noise assessment that the simultaneous baseline study undertaken in April showed a 4dB difference between LA₉₀ values at the Village Hall and 4 Pleasant View. During this simultaneous monitoring study, at the Village Hall, many LA₉₀ values were above 45dB. During the original February/March monitoring study there were extended periods where the LA₉₀ values were around 40dB at the Village Hall. We required more evidence showing that the 4dB difference between the Village Hall and 4 Pleasant View is expected to occur during periods of low LA₉₀ values, as measured in the original February/March study.

Secondly as per BS 4142:2014 “Where the specific sound features characteristics that are neither tonal nor impulsive, though otherwise are readily distinctive against the residual acoustic environment, a penalty of 3dB can be applied.” We requested that operator provide evidence for not including a 3dB character correction to the +7dB predicted at 1 Pleasant View. This information was requested via Schedule 5 notice on the 2nd August 2017, the operator responded on the 8th August 2017.

In relation to the first point regarding baseline monitoring studies; the operator stated that “the variability in the difference in LA₉₀ measurement during the simultaneous noise study carried out at the 2 locations in April 2017 was small. A variety of noise levels were encountered during the 3-day survey. The main source of noise at both the village hall and 4 Pleasant View is the Valero refinery. This is confirmed by field observations of an ERM acoustic surveyor on-site. Surveys conducted in February/March at more remote locations from the refinery demonstrate background noise levels, of 34dB(A) at Eastington Farm and 29dB(A) at Angle. By comparison in the same period, the background at Rhoscrowther was around 40dB(A). This demonstrates that at Rhoscrowther the refinery dominates the background noise level, even when they background is relatively low. The steam plant is the nearest large plant at the refinery and is likely to be an important specific influence on the noise experienced at these properties.

The observed differences in the background noise at the village hall and 4 Pleasant View are likely to be explained by the differences in the details in the geographic setting of the properties and their distances from refinery noise. As noise levels at the village hall are dominated by noise from the refinery, differences in LA₉₀ noise levels between the village hall and 4 Pleasant View are expected to have a similar level of consistency to the differences in noise levels measured during the April simultaneous noise study. We therefore expect that the 4dB(A) difference between the village hall and 4 Pleasant View will be maintained during periods of low LA₉₀ values, such as were measured in the original February/March study.”

Regarding the second point about correction penalties, the operator responded by stating that; “When considering noise from the project features ‘characteristic that may be readily distinctive against the residual acoustic environment’ it is necessary to consider the character of the residual (i.e. baseline) acoustic environment in Rhoscrowther, and how this compares to the proposed new source of noise. Were Rhoscrowther not situated next to an oil refinery, but instead located in remote countryside or even on the edge of a town, close to a park, a road or a railway, then an industrial plant such as that proposed might introduce different acoustic characteristics, potentially making it distinctive.

The baseline acoustic environment within Rhoscrowther is, however dominated by the noise from the Valero refinery and is therefore industrial in character. The fact of this is readily evident from field observations and demonstrated by the lower measured background noise level at more remote but otherwise similar settings such as Eastington Farm and Angle.

Significant sources of noise within the refinery, which are expected to be important specific influences on the noise environment in Rhoscrowther, include the steam plant where there are 9 steam raising boilers and several compressors. Within 200m of the projects proposed location, there are 21 compressors, 4 fired heaters and approximately 130 pumps all contributing to the background of industrial noise. The expected character of the noise from the project is industrial, originating from an item of heavily insulated rotating equipment, fans, other ancillary equipment and the HRSG which is another steam raising boiler. The residual acoustic environment in Rhoscrowther therefore has a dominant industrial character like that expected from the proposed development. Consequently, it is considered unlikely that noise from the project will be 'readily distinctive' against the existing background. It is therefore considered there is no reasonable basis under BS 4142 for applying a penalty because the project noise is expected to be readily distinctive against the residual acoustic background. By way of context, the operator's consultant has experience of application for similar development to the Cogen project in a variety of different settings including rural and urban, and in none of these applications either developer or regulator found cause to apply any penalty for the presence of 'other sound characteristics' (as described in BS 4142). The consultant has also discussed this with another experienced, specialist noise consultant and they too are not aware of a scheme of this type where such a penalty has been through appropriate."

These responses were considered as part of our wider assessment. With regards to the first point, whilst additional monitoring may provide additional clarification in relation to background noise, we feel that at this stage there is adequate information to assess the impact of noise based on the current background in the area. Based on this fact we didn't ask for this additional information up-front, however a pre-operational condition is included in the site permit that requires the operator to perform additional background monitoring for a more sustained and representative time. This will include monitoring the background in the summer months where conditions are likely to be different. With regards to the second point on correction penalties based on interpretation issues within BS 4142:2014 the operator is not compelled to add the penalty, the operator has put a context argument forward. Based on the issues surrounding interpretation, pre-operational conditions and Improvement conditions have been included in the environmental permit that will require the operator to confirm the predictions made in the noise assessment. Pre-operational Conditions can be found in Annex 2 and Improvement Conditions can be found in Annex 3 of this document. The noise impacts at sensitive receptors Eastington Farm, Angle and a few receptors further away was below the +3dB significance threshold and therefore there is no impact based on noise.

For sensitive receptors in Rhoscrowther, we accept the operator's prediction (without penalty corrections) that the impact is +7dB above the baseline during the night and +6dB during the day. This indicates a potential adverse impact to sensitive receptors when assessed in isolation, however the operator has provided a context argument in-line with BS4142:2014 that concludes that the impact from the plant will in fact not cause a significant impact as follows:

The noise assessment shows that the impact at sensitive receptors in Rhoscrowther are +6dB during the day and +7dB during the night. These figures were obtained during prevailing south-westerly wind conditions, and when measured background sound levels were at their lowest. The operator showed that for 64% (day) and 58% (night) of the survey the background sound level was equal to or more than 47dB(A). This means that the impact is at +5dB or less above the background noise level during these wind conditions. In this instance the threshold in BS4142:2014 is not exceeded, however the assessment does not indicate times at when the 5dB threshold is exceeded. Another point is that the current soundscape is very industrial in nature and that refinery sound is the predominant sound in the area. Therefore, the increase in noise will also be industrial in character and therefore won't be as perceptible. The representative background level occurs mainly when receivers are upwind of the refinery, in part due to the prevailing winds. The noise model assumes that receptors are in fact downwind, this is based on the ISO 9613-2 method. This results in a conservative estimation of likely actual noise impact. These factors are all relevant when considered in-combination and in context with the project.

We generally agree with the context argument put forward by the operator, and that in general when the context argument is considered with the project plans, then impacts from noise are not likely to be significant. However due to the sustained operation of the proposed cogeneration plant and the fact that the plant won't be operational for a few years, pre-operational conditions have been added to the permit to carry out more monitoring. Further to this pre-operational condition, an improvement condition has been included in the permit requiring the operator to confirm the noise modelling. If the impact is considered by NRW to be unacceptable then the operator will be required to install additional mitigation measures to reduce the impact.

Fugitive emissions

The IED specifies that plants must be able to demonstrate that the plant is designed in such a way as to prevent the unauthorised and accidental release of polluting substances into air, soil, surface water and groundwater.

The area surrounding the cogeneration plant will be paved, there is a concrete storm pit at the south corner of the cogeneration plant that will collect any potentially contaminated water by gravity from the paved areas. The pit will be partitioned for skimming of free oil from water. Oil will be removed and reprocessed on-site. Water from this collection pit will be drained and routed to either the sites existing water treatment plant or to a settlement lagoon. The route will be decided by the operator and based on whether the water is contaminated or not. The water collection pit is 17m³ in size and water can be pumped out at 10m³/hour, the pit will be served by a pump and a spare.

Areas around the demineralisation plant will be bunded by paving curbs and slabs. All chemicals will be stored in an appropriate manner incorporating the use of bunding and other measures (such as acid and alkali resistant coatings) to ensure appropriate containment. The potential for accidents and associated environmental impacts is therefore minimised. All storage tanks will be bunded at 110% of the tank capacity in line with guidance and will be placed on concrete hardstanding. These areas and tanks will be subject to a regular maintenance inspection.

Based upon the information in the application we are satisfied that the appropriate measures will be in place to prevent or where that is not practicable to minimise fugitive emissions and to prevent pollution from fugitive emissions. These commitments have also been incorporated into Table S1.2 as operating techniques and are therefore enforceable. Management condition 1.1.1 ensures compliance with written management plans

BAT Assessment

In this section, we explain how we have determined whether the applicants' proposals are the Best Available Techniques (BAT) for this installation. To demonstrate that the cogeneration plant is operating to BAT, a review of BAT as determined by the relevant UK Technical Guidance Notes (TGN) has been carried out.

The operator reviewed the 2006 reference document on BAT for Large Combustion Plant and the TGN for combustion activities (EPR1.01 – 2009). The supporting document – *Cogen/Permit/Supp/A01* shows that BAT is being met. Table 4.1 of that document compares the site proposals and operation against the 2006 Large Combustion Plant BRef and covers the following areas;

- Environmental Management System
- Supply and Handling of gaseous fuels and additives
- Thermal efficiency of gas-fired combustion plants
- Dust and SO₂ emissions from gas-fired combustion plant
- NO_x and CO emissions from gas-fired combustion plants
- Water Pollution
- Combustion Residues

Table 4.2 of the same document compares the site proposals and operation against the 2009 TGN for combustion activities and covers the following areas;

- Energy Efficiency
- Avoidance, Recovery and Disposal of wastes
- Liquid Fuels; Gaseous Fuels
- Point Source Emissions to Water
- Point Source Emissions to Air
- Fugitive Emissions
- Monitoring

We agree with the conclusions reached by the operator and that the proposals to operate a cogeneration plant are BAT and meet the requirements stated by the 2 guidance documents mentioned above. During our determination of the environmental permit, the BRef document for Large Combustion Plant was published. This was acknowledged in the permit variation, and daily and annual ELV's were included for NO_x. In addition, four footnotes were added to Table 3.1(a) which outline the new efficiency requirements of the BRef. A full review of the permit in-line with the BRef will be carried out in the future.

Monitoring

We have decided that monitoring should be carried out for the parameters listed in Schedule 3 of the permit using the methods and to the frequencies specified in those tables. These monitoring requirements have been imposed to demonstrate compliance with emission limit values and to enable correction of measured concentration of substances to the appropriate reference conditions.

For emissions to air, NO_x and CO will be monitored by a Continuous Emissions Monitor (CEMS) in mg/Nm³ @15% O₂ based on a monthly average.

The methods for continuous monitoring are in accordance with the Environment Agency Guidance M2 for the monitoring of stack emissions to air. Based on the information in the application and the requirement set in the conditions of the permit we are satisfied that the applicants techniques, personnel and equipment will have either MCERTS certification or MCERTS accreditation as appropriate.

Reporting

We have specified the reporting requirements in Schedule 4 of the permit to ensure data is reported to enable timely review by Natural Resources Wales to ensure compliance with permit conditions and Emission Limit Values.

ANNEX 1: Consultation Responses

Response received from:
Public Health Wales/University Health Board
Summary of issues raised
<ol style="list-style-type: none"> 1. Noise issues – adverse impact has been predicted by the applicant at 2 of the closest human receptors and baseline monitoring was carried out in the winter when certain cooling systems may be off-line and therefore background is underestimated. 2. Potential odour concerns from the production of SO₂ through combustion activities. It has been suggested that NRW seek clarification on the odour control measures.
Summary of actions taken or show how this has been covered
<ol style="list-style-type: none"> 1. Noise impact have been addressed by NRW and Valero. Pre-operational and Improvement Conditions have been included in the permit to confirm predictions made in the noise modelling and assessment are accurate. NRW has checked the applicant's noise modelling to ensure it is accurate and that adverse impact can be minimised. 2. SO₂ production will be minimal as the cogeneration plant will only run off natural gas, there will be no refinery fuel gas mixed within the combustion unit. As natural gas is low in SO₂ the risk of this is minimal. The site operates an ISO14001 management system and the cogeneration plant will fall under this system, whereby there are robust management systems and an odour management plan in place for the refinery. Permit conditions 3.3.1 and 3.3.2 are considered sufficiently protective.

Response received from:
Health & Safety Executive
Summary of issues raised
No response received
Summary of actions taken or show how this has been covered

Response received from:
Pembrokeshire County Borough Council – Planning Department
Summary of issues raised
No response received
Summary of actions taken or show how this has been covered

Response received from:
Pembrokeshire County Borough Council – Environmental Protection Department
Summary of issues raised
No response received
Summary of actions taken or show how this has been covered

Response received from:
Mid and West Wales Fire Brigade
Summary of issues raised
No response received
Summary of actions taken or show how this has been covered

Response received from:
National Grid
Summary of issues raised
No response received
Summary of actions taken or show how this has been covered

ANNEX 2: Pre-operational conditions

Table S1.4B Pre-operational measures for future development

Reference	Operation	Pre-operational measures
1	Cogeneration Plant	<p>If residential property 1 Pleasant View in Rhoscrowther is occupied, within 1 month of permit issue, the Operator shall submit to Natural Resources Wales for approval, a written proposal for enhancing the background sound measurements included in the original permit application.</p> <p>The background sound measurements ($L_{A90,T}$) and residual sound noise level (including tonality), shall be measured over a time period that is sufficiently long enough to obtain a typical background sound level which is representative of the area in which the installation is located. A typical background sound level shall be obtained for all times when the installation will be operational, in accordance with BS4142:2014 but also include diurnal patterns and seasonal variations.</p>
2	Cogeneration Plant	<p>If residential property 1 Pleasant View in Rhoscrowther is occupied, following Natural Resources Wales approval of the written proposal provided in response to PO1 and at least 1 month prior to the commencement of significant noise producing construction activities, the Operator shall measure the background sound level ($L_{A90,T}$) and residual noise level ($L_{Aeq,T}$) (including tonality), in order to obtain a representative background sound level. The results of this exercise shall be submitted in the form of a written report for approval to Natural Resources Wales.</p>

ANNEX 3: Improvement conditions

Table S1.3 Improvement programme requirements

Reference	Requirement	Date
IC33	<p>If residential property at 1 Pleasant View in Rhoscrowther is occupied at the start of operation, then following successful commissioning and establishment of routine steady operation, the operator shall undertake noise monitoring to confirm the conclusions of the application Noise and Vibration Impact Assessment report B01. This shall include:</p> <ul style="list-style-type: none"> • A full noise monitoring survey and assessment meeting BS4142:2014 standard • Narrow band (FFT) measurements to identify and any tonal elements or low frequency noise • Reference to the World Health Organisation guidelines for community noise and night noise <p>Upon completion of the work, a written report shall be submitted to Natural Resources Wales. The report shall refer to the predictions in the Noise and Vibration Impact Assessment report B01. If rating levels are expected to result in a significant impact in context at sensitive receptors, in an assessment in accordance with BS4142, then the report shall include an assessment of suitable abatement techniques, an estimate of the costs, the expected decibel reduction and a proposed timetable for their installation.</p>	Within 6 months of the completion of commissioning
IC34	The operator shall submit, for approval by Natural Resources Wales, a report setting out compliance with the appropriate BAT-AELs and Annex V of IED in relation to the cogeneration plant (A24).	Within 12 months of the completion of commissioning