

REPORT

Peak Power Generator Compound - Havant

Air Quality Assessment

Client: Peak Gen Power Limited

Reference: I&BPB5635-102R001F01

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1 Introduction

This air quality screening assessment was prepared, on behalf of Peak Gen Power Ltd, in relation to planning application APP/16/00439 for a generator compound at the Southern Water Budds Farm Site in Havant.

This screening assessment was required in response to statutory stakeholder comments that air quality impacts should be considered at statutory designated ecological receptors. Natural England, in their response to the planning application on 10th June 2016, identified three statutory designated ecological sites and requested that:

“The interest features of the sites listed above may be sensitive to impacts from aerial pollutants, such as those emitted from this proposed development. The consultation documents provided do not include any assessment of air quality impacts.

Natural England advises that an initial screening for air quality impacts should be completed prior to determination of this application.”

The screening assessment methodology was designed to assess potential impacts at the identified ecological receptors in accordance with the recommendations from Natural England..

1.1 Site Description and Surrounding Area

The planning application seeks permission for operation of a peak power generator compound on brownfield land within Budds Farm Wastewater Treatment Works (WwTW), operated by Southern Water. The development is located at the north-eastern extent of the WwTW site boundary. The site is located in an industrial and commercial area south of the A27.

The development would comprise ten containerised generator units and associated infrastructure (fuel tanks, transformers and switchgear). The site is currently clear of any existing structures or buildings that would need to be removed prior to development. The site location is detailed in **Figure 1**.

2 Approach

2.1 Identification of Ecological Sites

Natural England stated in their planning application response that:

“The application site is within 450m of the following European designated sites (also commonly referred to as Natura 2000 sites) and therefore has the potential to affect the interest features of those sites. European sites are afforded protection under the Conservation of Habitats and Species Regulations 2010, as amended (the ‘Habitats Regulations’). The application site is within the stated distance of the following European sites:

- *Chichester and Langstone Harbours Special Protection Area (SPA)*
- *Solent Maritime Special Area of Conservation (SAC)*

The following site(s) is/are also listed as Ramsar sites:

- *Chichester and Langstone Ramsar Site*

The application site is also within 450m of the following sites which are also notified at a national level as Site of Special Scientific Interest (SSSI).

- *Langstone Harbour SSSI.”*

Evaluation of the Natural England MAGIC mapping service identified that the designated ecological habitats are located approximately 450m to the south west, 600m to the south and 450m to the south east of the proposed generator compound.

2.2 Ecological Assessment Levels

Critical Level Assessment

Critical levels are provided by EU Directives for the protection of vegetation and ecosystems and correspond to the concentration of pollutants in air below which adverse impacts are not anticipated. The critical levels for the pollutants considered in the assessment are detailed in **Table 1**.

Table 1: Critical Levels for Pollutants Considered in the Assessment

Pollutant	Concentration ($\mu\text{g.m}^{-3}$)	Measured As
NO _x	30	Annual Mean
SO ₂	20	Annual Mean

Critical Load Assessment

Critical loads for habitat sites in the UK are published by the Centre for Ecology and Hydrology (CEH) on the Air Pollution Information System (APIS) website¹. These critical loads represent the maximum levels of acid and nutrient nitrogen deposition that can be tolerated without harm to the most sensitive features of the selected habitat sites. The data is presented on the APIS website as a range (minimum to maximum) of critical loads for each ecological habitat. Where a range is provided, this assessment used the minimum value for the assessment level and the maximum deposition rate to provide a conservative approach.

2.3 Proposed Assessment Methodology

2.3.1 Screening Tool Selection

The assessment used the Simple Calculation of Atmospheric Impact Limits (SCAIL) screening tool in order to evaluate potential impacts at ecological receptors. SCAIL is a suite of screening tools, used for the assessment of agricultural and combustion sources. SCAIL was developed by a private consortium but is supported by the Environment Agency, Scottish Environmental Protection Agency and the Northern Ireland Environment Agency.

For this assessment the 'SCAIL Combustion' screening tool was used to estimate the impact of Nitrogen Oxides (NO_x) and Sulphur Dioxide (SO₂) on sensitive habitats. The tool also calculates the nitrogen and acid deposition rates at selected receptor locations.

The model requires representative emission data, stack parameters and location of emission sources to calculate concentrations and deposition rates at defined receptor locations. The model includes consideration of inbuilt local meteorological data. The screening tool was used to predict the airborne concentration or deposition rate from the proposed development. The process contribution (PC) was then combined with relevant pollutant background information in order to calculate a total concentration or deposition rate at each receptor that was comparable to the relevant assessment level.

Havant Borough Council confirmed on 22nd June 2016, by email, that use of the SCAIL screening tool was appropriate for this assessment.

2.3.2 Input data

Process Emissions

The pollutant emission rate, exhaust gas temperature and volumetric flow rate were provided by Peak Gen Power Limited for each proposed stack and were derived from indicative emission limit values provided by the manufacturer. The process emissions were annualised in order to compare results with the relevant annual mean assessment criteria. It is expected that the facility will be operating for approximately 110 hours per year. The emission rates used in the dispersion model are provided in **Table 2**.

¹ Air Pollution Information System (APIS) Website - <http://www.apis.ac.uk/>

Table 2: Process Emissions

Parameter	Input for Dispersion Model	
Number of Engines	10	
Release Height (m)	2m stack protruding above the generator housing (5.7m above ground)	
Stack Diameter (m)	0.4	
Efflux Velocity (m.s ⁻¹)	52.5	
Efflux Temperature (°C)	495	
Exhaust pollutant concentration (mg.Nm ³)*		
NO _x	1,700	
SO ₂	100	
Maximum Emission Rates - Provided by Peak Gen Power Ltd		
	Grams per second (g.s ⁻¹)	Tonnes per year (t.y ⁻¹)
NO _x	2.94	1.164
SO ₂	0.18	0.071

*at reference 5% O₂ conditions

2.3.3 Selected Receptor locations

The assessment considered three discrete receptor locations which were selected to represent the closest positions of the statutory designated ecological receptors to the proposed development. Receptor locations to the south-west, south and south-east were selected to provide coverage for a range of potential meteorological conditions.

The selected receptor locations are detailed in **Table 3** and **Figure 2**.

Table 3: Assessed Ecological Receptor Locations

Receptor Number	Direction from Proposed Facility	Distance (m)	Grid reference		Representative of
			X (m)	Y (m)	
Eco.1	South west	450	470503	105353	Chichester Harbour Langstone Harbour Solent Maritime
Eco.2	South	600	470699	105040	Chichester Harbour Langstone Harbour Solent Maritime
Eco.3	South east	450	471178	105180	Chichester Harbour Langstone Harbour

2.3.4 Background Concentrations

Background concentrations of NO_x and SO₂ were obtained from the air pollutant concentration maps provided by Defra for the grid squares covering the receptor location. The assessment used 2016 as the

assessment year and therefore the most recent background pollutant concentrations provided by Defra for a 1km x 1km grid of the UK were utilised. The background concentrations used in the assessment are detailed in **Table 4**.

Table 4: 2016 Background Pollutant Concentration ($\mu\text{g.m}^{-3}$) - Ranges Within 2km of the Development Site

Assessment Scenario	Background Pollutant Conditions			
	Airborne Concentration NO_x ($\mu\text{g.m}^{-3}$)	Airborne Concentration SO_2 ($\mu\text{g.m}^{-3}$)	Nutrient Nitrogen Background ($\text{kg.ha}^{-1}.\text{y}^{-1}$)	Background Acid Deposition ($\text{kg}_{\text{eq.ha}^{-1}.\text{y}^{-1}}$)
Eco.1	32.63	2.68	19.88	1.42
Eco.2	32.65	2.68	19.88	1.42
Eco.3	32.80	2.94	19.88	1.42

3 Assessment Results

The results of the assessment are detailed below. The assessment utilised the following conservative assumptions:

- The maximum predicted background deposition level;
- The minimum critical load for nitrogen and acid deposition; and
- Assessment of the most sensitive listed habitat.

3.1 Ecological Receptors Locations

Critical Level Assessment

Table 5 details the results of the assessment of NO_x and SO_2 , resulting from emissions from the proposed compound, at identified ecological receptor locations. The predicted result represents the closest location to the development within the boundary of each ecological receptor. As each of the ecological receptors share the same site boundary near to the proposed site, the maximum concentration is used to represent all three ecological receptor locations identified in **Section 4.2.2**.

Table 5: Critical Level Assessment – Airborne NO_x Concentrations at Receptor Locations

Receptor Location	NO_x ($\mu\text{g.m}^{-3}$) – Annual Mean				
	Process Contribution	Background Concentration	Total	Process Contribution / Objective	Total Concentration / Objective
	($\mu\text{g.m}^{-3}$)	($\mu\text{g.m}^{-3}$)	($\mu\text{g.m}^{-3}$)	(%)	(%)
NO_x ($\mu\text{g.m}^{-3}$) – Annual Mean– 30 $\mu\text{g.m}^{-3}$					
Eco.1	0.49	32.63	33.12	1.6	110.4
Eco.2	0.38	32.65	33.03	1.3	110.1
Eco.3	0.46	32.80	33.26	1.5	110.9
SO_2 ($\mu\text{g.m}^{-3}$) – Annual Mean– 20 $\mu\text{g.m}^{-3}$					
Eco.1	0.029	2.68	2.709	0.1	9.0

Receptor Location	NO _x (µg.m ⁻³) – Annual Mean				
	Process Contribution	Background Concentration	Total	Process Contribution / Objective	Total Concentration / Objective
	(µg.m ⁻³)	(µg.m ⁻³)	(µg.m ⁻³)	(%)	(%)
Eco.2	0.023	2.68	2.703	0.1	9.0
Eco.3	0.028	2.94	2.968	0.1	9.9

The results show that:

- Background NO_x concentrations breached the critical level of 30µg.m⁻³ as an annual mean without the contribution from the proposed development;
- The NO_x process contribution was predicted to contribute between 1.3 - 1.6% of the critical level; and
- The annual mean SO₂ assessment level was not predicted to be breached and the process contribution was predicted to comprise 0.1% of the critical level.

Critical Load Assessment

Table 6 details the results of the impact assessment of nutrient nitrogen deposition at ecological receptor locations.

Table 6: Critical Load Values for Nutrient Nitrogen Deposition on Considered Ecological Habitats

Site Designation	Minimum Nutrient Nitrogen CL (kg.ha ⁻¹ .y ⁻¹)	Max Background Nitrogen Deposition (kg.ha ⁻¹ .y ⁻¹)	Max Modelled Process Contribution Nitrogen Deposition Rate (kg.ha ⁻¹ .y ⁻¹)	Total Nitrogen Deposition (kg.ha ⁻¹ .y ⁻¹)	%PC of CL
Eco.1	8	19.88	0.13	20.01	1.6
Eco.2	8	19.88	0.098	19.978	1.2
Eco.3	8	19.88	0.12	20	1.5

The results predicted that for the worst affected ecological habitat:

- Background nutrient nitrogen deposition rates were in exceedence of the minimum critical load value of 8kg.ha⁻¹.y⁻¹ without the contribution from the proposed development; and
- The process contribution was predicted to be between 1.2% and 1.6% of the relevant critical load for nutrient nitrogen deposition.

Table 7 details the results of the impact assessment of acid deposition at ecological receptor locations. The presented value represents the maximum deposition rate at a location within each of the designated ecological receptors.

Table 7: Critical Load Values for Acid Deposition on Considered Ecological Habitats

Site Designation	Acid Deposition Min CL Max*	Background Acid Deposition	PC	PEC	%PC of Min CLMax
	(kg _{eq} .ha ⁻¹ .y ⁻¹)				
Eco.1	2.013	1.42	0.011	1.431	0.5
Eco.2	2.013	1.42	0.0087	1.4287	0.4
Eco.3	0.886	1.42	0.011	1.431	1.2

*MinCLmaxS + MinCLMaxN

The results predicted that for the worst affected ecological habitat:

- Maximum predictions of background acid deposition rates breached the minimum critical load level of 0.886 kg_{eq}.ha⁻¹.y⁻¹ at location Eco.3, without the contribution from the proposed development; and
- The process contribution was predicted to be between 0.5 and 1.2% of the relevant critical load for acid deposition.

4 Discussion

The assessment predicted that the development would lead to an increase in airborne concentrations of NO_x by no more than 0.49 µg.m⁻³ or 1.6% of the critical level at each of the assessed ecological receptor locations. Background concentrations of NO_x are already high at the receptor points considered, with NO_x concentrations already exceeding the NO_x critical level of 30 µg.m⁻³. Emissions of NO_x associated with the development were therefore not predicted to be the cause of an exceedence of the critical level. The assessment predicted a maximum airborne SO₂ concentration of 2.94 µg.m⁻³, which is well below the 20 µg.m⁻³ critical level.

The assessment identified that background levels of nutrient nitrogen and acid deposition exceeded the relevant critical load at the selected ecological receptors. The process contribution from the proposed development was predicted to be between 0.4% and 1.6% of the critical load for the most sensitive habitat within the ecological designations. The predicted process contribution was marginally higher than the Environment Agency screening criterion which considers a predicted process contribution of less than 1% to be insignificant.

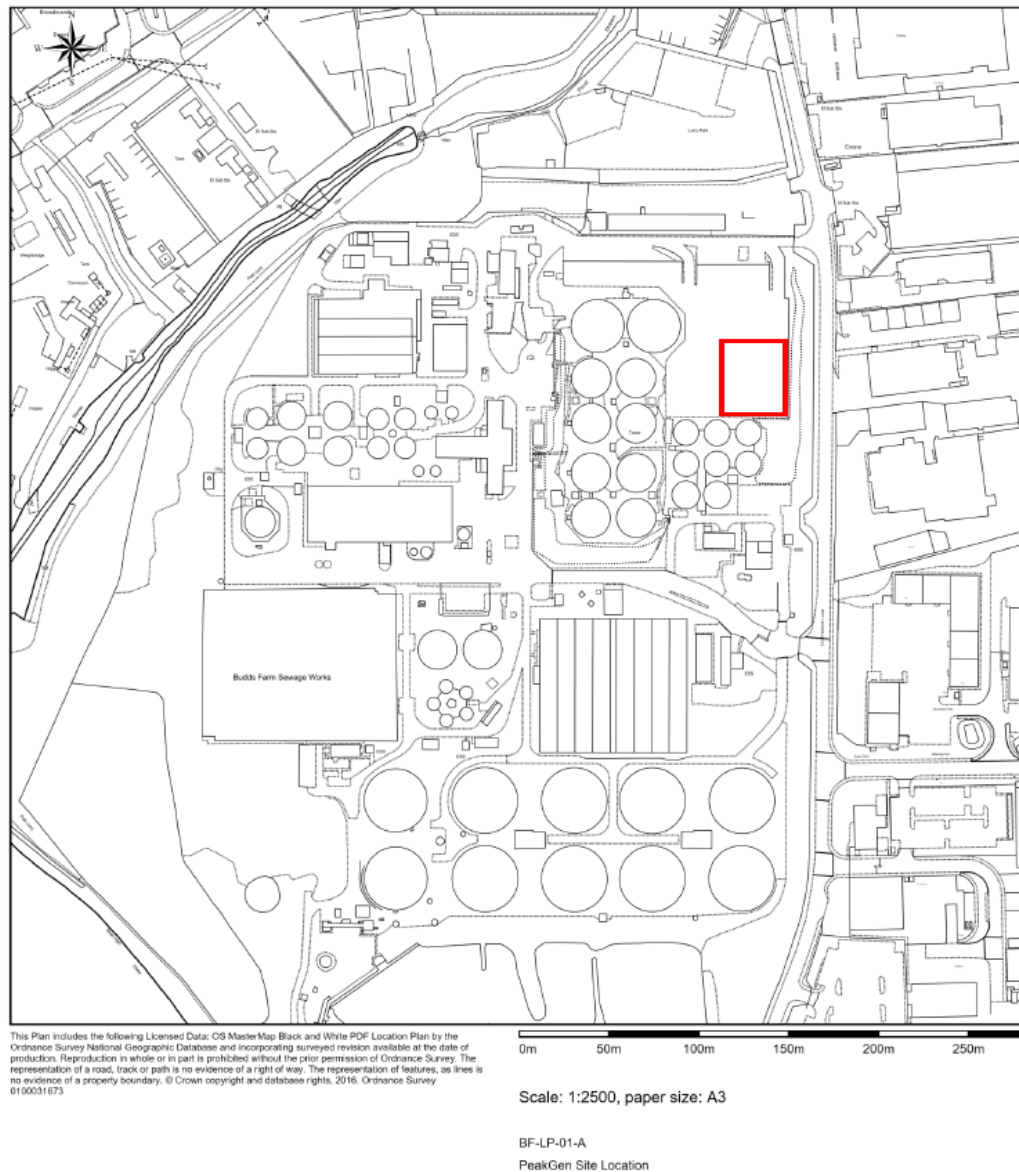
However, the assessment used a number of conservative assessment assumptions which may result in an overestimation of predicted impacts. These conservative assumptions include:

- Assuming that the most sensitive habitats are located at the boundary of the designated ecological site, which may not be the case;
- Use of the minimum critical load for both nitrogen and acid deposition, as opposed to consideration of the range of possible values provided on the APIS website for each habitat;
- Use of maximum predicted background nitrogen and acid deposition rates, as opposed to the minimum and average levels provided on the APIS website; and
- Use of the SCAIL screening tool which uses conservative dispersion and meteorological assumptions to produce conservative assessment results to ensure that impacts are not underestimated.

5 Conclusions

An air quality screening assessment was conducted to determine whether the proposed Peak Power Generation Compound at the Budds Farm site in Havant has the potential to cause significant effects at designated ecological receptors.

The assessment concluded that the impacts of the proposed development are unlikely to be significant at the identified statutory designated ecological receptors. This is based upon the low predicted contribution of the process to pollutant concentrations and deposition levels and consideration of the conservative nature of the screening methodology and assessment assumptions.

Figure 1: Site Plan

Plan provided by Peak Gen Power Limited

Figure 2: Receptor Plan

