

# REPORT

## **Boston Alternative Energy Facility**

Comparison of Predicted Critical Load and Level Results Using Maximum Permissible Emissions Limits and Realistic Emission Scenarios

Client: Alternative Use Boston Projects Ltd

Planning Inspectorate  
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## Technical Note

**HaskoningDHV UK Ltd.  
Industry & Buildings**

To: National Infrastructure Planning  
From: Alternative Use Boston Projects Limited  
Date: 08 February 2022  
Our reference: PB6934-RHD-ZZ-XX-NT-Z-4100  
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Checked by: BDB Pitmans  
Approved by: Paul Salmon

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## 1 Introduction

1.1.1 An air quality assessment was undertaken as part of the Environmental Statement for the proposed Boston Alternative Energy Facility (BAEF) to predict impacts of air emissions on human and ecological receptor locations, as presented in the updated Chapter 14 Air Quality (document reference 6.2.14 REP1-006). An Air Quality Deposition Monitoring Plan was also produced (document reference 9.51 REP4-016) which included the following statements, shown in black text. Appendix D3 to Natural England's Deadline 5 submission (REP5-014) raised queries in relation to these statements. Natural England's queries are shown below in blue text.

1.1.2 The assessment of the impacts of emissions from the Facility upon nitrogen deposition at saltmarsh habitats along The Haven was conducted on a worst-case basis, with the assumption that emissions of nitrogen oxides (NO<sub>x</sub>) and ammonia (NH<sub>3</sub>) would be emitted at 100% of their permitted levels.

*Natural England requests that the Applicant provides further clarification on what is meant by 'permitted levels'.*

1.1.3 In reality, as is demonstrated by the emissions monitoring results of all other EfW plants in the UK, typical emissions of NO<sub>x</sub> are at approximately 80% of the permitted level and emissions of NH<sub>3</sub> are at around 20% of the permitted level.

*Natural England would welcome the inclusion of modelling outputs in this section to support text.*

1.1.4 Actual nitrogen deposition levels would, therefore, be lower than those assessed in the updated Environmental Statement Chapter 14 Air Quality (document reference 6.2.14, REP1-006), Table 14.35, page 68. The Environment Agency, in regulating the operation of the future facility through the Environmental Permit, would be most likely to set emission limits that ensure protection of the environment.

*Natural England queries if the Applicant has up to date modelling of the 'realistic' scenario to reflected likely emissions? This should be included within the HRA AA.*

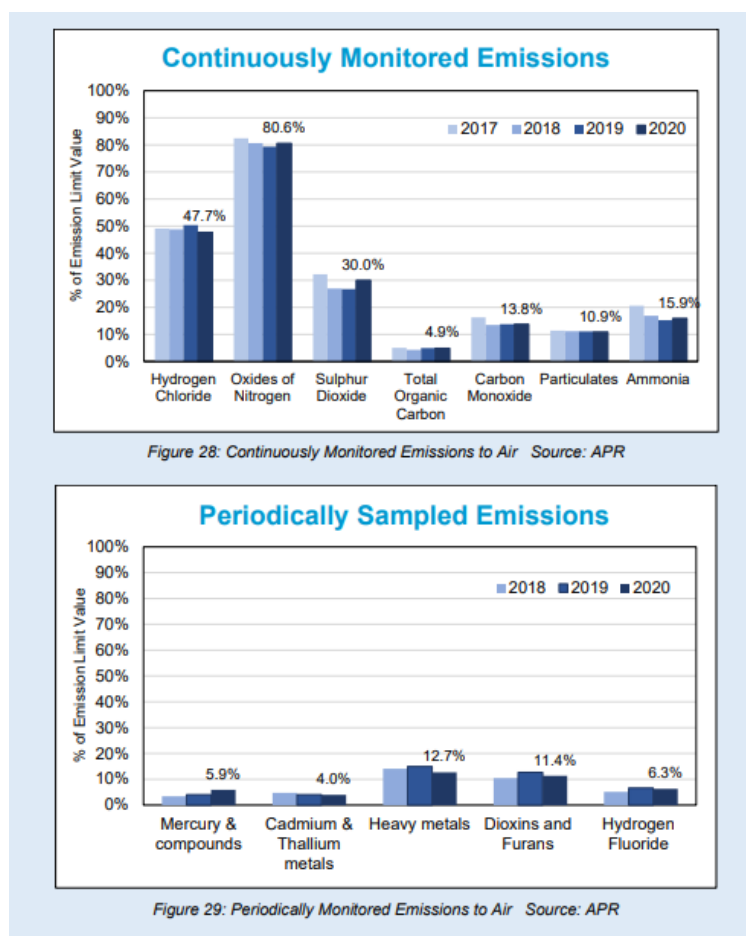
1.1.5 These queries are addressed in the following sections.

## 2 Permitted Levels

2.1.1 The term “permitted levels” refers to the Best Available Techniques-Associated Emission Levels (BAT-AELs) which specify the maximum allowable emission concentrations of contaminants in flue gases emitted from energy from waste (EfW) plants. These were set in 2019 and are more stringent than the previous Emission Limit Values set out in the Industrial Emissions Directive (IED). For NO<sub>x</sub> and ammonia, specifically mentioned in the text, these emission concentrations are 120 mg Nm<sup>-3</sup> and 10 mg Nm<sup>-3</sup>, respectively. It is not expected that the BAEF would operate at these emission limits during all hours of operation, as such, consideration can be given to more realistic operational conditions as described below.

## 3 Realistic Emissions

3.1.1 Energy from Waste plants must meet emission limits to ensure compliance with their Environmental Permit. Data provided in the 2020 Tolvik report<sup>1</sup>, which provides operating and compliance statistics on EfW plants throughout the UK, compares actual emissions from EfW plants with the emission limits, as shown in **Plate 1**.



**Plate 1. Comparison of monitored emissions with the emission limit values from EfW plants in the UK**

<sup>1</sup> Tolvik Consulting (2021) UK Energy from Waste Statistics 2020

3.1.2 As noted in **Plate 1**, emissions of NO<sub>x</sub> and ammonia are typically 80.6% and 15.9% of the emission limits respectively. As such, further analysis has been undertaken to determine the more realistic impact of the BAEF upon designated sites, as presented in **Section 4**.

## 4 Realistic Emissions and Impacts Upon Designated Sites

4.1.1 Emissions of NO<sub>x</sub> and ammonia from the BAEF were adjusted using the realistic percentages of the emission limits as shown in **Section 3**. A summary of the nutrient nitrogen impacts presented in the ES using the emission limits, and the realistic emission levels is shown in **Table 1**. The detailed results for all pollutants are presented in **Table 2** to **Table 4**.

**Table 1 Comparison of Predicted Nitrogen Deposition Using Emission Limits and Realistic Emission Scenarios**

| Designated Site                       | In-Combination Process Contribution (PC) of nutrient nitrogen as % of Critical Load (kgN/ha/yr) |           | In-Combination Predicted Environmental Concentration (PEC) of nutrient nitrogen (including background) as % of Critical Load |           |
|---------------------------------------|---|-----------|--|-----------|
|                                       | Emission Limits   | Realistic | Emission Limits  | Realistic |
|                                       | The Wash SAC, SPA, SSSI and Ramsar  | 2.1%      | 0.7%   | 63%       |
| Havenside LNR                         | 14.7%   | 4.8%      | 101%   | 91%       |
| Slippery Gowt Sea Bank LWS            | -*  | -         | -  | -         |
| South Forty Foot Drain LWS            | -   | -         | -  | -         |
| Habitat Mitigation Area               | 7.9%  | 2.9%      | 94%  | 89%       |
| Other areas of saltmarsh in The Haven | 6.8%  | 2.6%      | 93%  | 89%       |

\* No Critical Loads set for these habitats in APIS.

4.1.2 As shown in **Table 1**, the use of the realistic emission levels would result in in-combination PCs of nutrient nitrogen of less than 1% of the Critical Load at The Wash; as such, these impacts can be considered to be insignificant. The in-combination PC at all other sites is significantly reduced using the realistic emissions, largely due to the reduction in ammonia which contributes much more significantly to nutrient nitrogen deposition than NO<sub>x</sub>.

4.1.3 The realistic emission scenario would result in PECs for nutrient nitrogen at all sites being below the relevant lower Critical Load ranges, and therefore it is not expected that any significant impacts would occur on saltmarsh habitats.

4.1.4 As shown in **Table 2** and **Table 3**, in-combination NO<sub>x</sub> and ammonia concentrations remain above 1% of the respective Critical Levels at all sites; however, the total PEC values are well below (i.e., less than 75% of) the Critical Levels, and therefore it is considered unlikely that significant effects would occur.

## 5 Conclusions

- 5.1.1 This technical note provides a response to Natural England's queries in its Deadline 5 submission to the BAEF examination (REP5-014). Additional detail has been provided on the more realistic level of impact which would be experienced at designated ecological sites and areas of saltmarsh in comparison to the values reported in the Environmental Statement, which were based on emissions being at their maximum permitted respective limits.
- 5.1.2 The additional information shows that the in-combination PC at The Wash would be less than 1% of the Critical Load and, therefore, impacts at this location can be considered to be insignificant. Other locations were predicted to experience in-combination PCs above 1%, with total PECs below the lower Critical Load range. NO<sub>x</sub> and ammonia concentrations were also still predicted to be above 1% at all locations; however, total PECs would be well below the Critical Levels. As such, significant impacts are not expected to occur.
- 5.1.3 Given the above, it is not considered that further mitigation measures are required for the emissions of BAEF. The HRA AA concluded that the Facility would not result in a significant impact on designated ecological sites when operating at the BAT-AEL emission limits. As such, consideration of the more realistic emission scenario, which results in a reduction in pollutant concentrations and nitrogen deposition at all sites, does not affect the conclusions of the HRA AA and therefore it is considered that no update is required.

**Table 2 Comparison of Predicted NO<sub>x</sub> Concentrations Using Emission Limits and Realistic Emission Scenarios**

| Designated Site                       | Annual Mean NO <sub>x</sub> (µg/m <sup>3</sup> ) |                           |                             |                                |                           |                                  |                           |                                |                           |                                |                           |
|---------------------------------------|--|---------------------------|-----------------------------|--------------------------------|---------------------------|----------------------------------|---------------------------|--------------------------------|---------------------------|--------------------------------|---------------------------|
|                                       | BAEF PC  |                           | In-Combination Contribution | Total In-Combination PC        |                           | In-Combination PC/Critical Level |                           | PEC (including background)     |                           | PEC/Critical Level             |                           |
|                                       | Emission Limit NO <sub>x</sub>                   | Realistic NO <sub>x</sub> | IC NO <sub>x</sub>          | Emission Limit NO <sub>x</sub> | Realistic NO <sub>x</sub> | Emission Limit NO <sub>x</sub>   | Realistic NO <sub>x</sub> | Emission Limit NO <sub>x</sub> | Realistic NO <sub>x</sub> | Emission Limit NO <sub>x</sub> | Realistic NO <sub>x</sub> |
| The Wash SAC, SPA, SSSI and Ramsar    | 0.78   | 0.63                      | 0.059                       | 0.84                           | 0.69                      | 2.8%                             | 2.3%                      | 8.78                           | 8.63                      | 29%                            | 29%                       |
| Havenside LNR                         | 5.21   | 4.20                      | 1.76                        | 6.97                           | 5.96                      | 23.2%                            | 19.9%                     | 19.23                          | 18.22                     | 64%                            | 61%                       |
| Slippery Gowt Sea Bank LWS            | 2.63   | 2.12                      | 0.66                        | 3.29                           | 2.78                      | 11.0%                            | 9.3%                      | 13.83                          | 13.32                     | 46%                            | 44%                       |
| South Forty Foot Drain LWS            | 0.67   | 0.54                      | 0.1                         | 0.77                           | 0.64                      | 2.6%                             | 2.1%                      | 19.94                          | 19.81                     | 66%                            | 66%                       |
| Habitat Mitigation Area               | 2.63   | 2.12                      | 0.66                        | 3.29                           | 2.78                      | 11.0%                            | 9.3%                      | 13.79                          | 13.28                     | 46%                            | 44%                       |
| Other areas of saltmarsh in The Haven | 2.34   | 1.89                      | 0.66                        | 3.00                           | 2.55                      | 10.0%                            | 8.5%                      | 17.80                          | 17.35                     | 59%                            | 58%                       |

**Table 3 Comparison of Predicted NH<sub>3</sub> Concentrations Using Emission Limits and Realistic Emission Scenarios**

| Designated Site                    | Annual Mean NH <sub>3</sub> (µg/m <sup>3</sup> ) |                           |                             |                                |                           |                                  |                           |                                |                           |                                |                           |
|------------------------------------|--|---------------------------|-----------------------------|--------------------------------|---------------------------|----------------------------------|---------------------------|--------------------------------|---------------------------|--------------------------------|---------------------------|
|                                    | BAEF PC  |                           | In-Combination Contribution | Total In-Combination PC        |                           | In-Combination PC/Critical Level |                           | PEC (including background)     |                           | PEC/Critical Level             |                           |
|                                    | Emission Limit NH <sub>3</sub>                   | Realistic NH <sub>3</sub> | IC NH <sub>3</sub>          | Emission Limit NH <sub>3</sub> | Realistic NH <sub>3</sub> | Emission Limit NH <sub>3</sub>   | Realistic NH <sub>3</sub> | Emission Limit NH <sub>3</sub> | Realistic NH <sub>3</sub> | Emission Limit NH <sub>3</sub> | Realistic NH <sub>3</sub> |
| The Wash SAC, SPA, SSSI and Ramsar | 0.06   | 0.01                      | 0.0015                      | 0.07                           | 0.01                      | 2.2%                             | 0.4%                      | 0.92                           | 0.86                      | 31%                            | 29%                       |
| Havenside LNR                      | 0.43   | 0.07                      | 0.017                       | 0.45                           | 0.09                      | 14.9%                            | 2.8%                      | 2.29                           | 1.93                      | 76%                            | 64%                       |
| Slippery Gowt Sea Bank LWS         | 0.22   | 0.03                      | 0.017                       | 0.23                           | 0.05                      | 7.8%                             | 1.7%                      | 1.08                           | 0.90                      | 36%                            | 30%                       |
| South Forty Foot Drain LWS         | 0.06   | 0.01                      | 0.0024                      | 0.06                           | 0.01                      | 1.9%                             | 0.4%                      | 1.90                           | 1.85                      | 63%                            | 62%                       |
| Habitat Mitigation Area            | 0.22   | 0.03                      | 0.017                       | 0.23                           | 0.05                      | 7.8%                             | 1.7%                      | 2.07                           | 1.89                      | 69%                            | 63%                       |

| Designated Site                       | Annual Mean NH <sub>3</sub> (µg/m <sup>3</sup> ) |                           |                             |                                |                           |                                  |                           |                                |                           |                                |                           |
|---------------------------------------|--|---------------------------|-----------------------------|--------------------------------|---------------------------|----------------------------------|---------------------------|--------------------------------|---------------------------|--------------------------------|---------------------------|
|                                       | BAEF PC  |                           | In-Combination Contribution | Total In-Combination PC        |                           | In-Combination PC/Critical Level |                           | PEC (including background)     |                           | PEC/Critical Level             |                           |
|                                       | Emission Limit NH <sub>3</sub>                   | Realistic NH <sub>3</sub> | IC NH <sub>3</sub>          | Emission Limit NH <sub>3</sub> | Realistic NH <sub>3</sub> | Emission Limit NH <sub>3</sub>   | Realistic NH <sub>3</sub> | Emission Limit NH <sub>3</sub> | Realistic NH <sub>3</sub> | Emission Limit NH <sub>3</sub> | Realistic NH <sub>3</sub> |
| Other areas of saltmarsh in The Haven | 0.18   | 0.03                      | 0.017                       | 0.20                           | 0.05                      | 6.6%                             | 1.5%                      | 2.04                           | 1.89                      | 68%                            | 63%                       |

**Table 4 Comparison of Predicted Nutrient Nitrogen Concentrations Using Emission Limits and Realistic Emission Scenarios**

| Designated Site                       | Annual Mean Nutrient Nitrogen (NN) (kgN/ha/yr) |              |                             |                         |              |                                  |              |                            |              |                    |              |
|---------------------------------------|--|--------------|-----------------------------|-------------------------|--------------|----------------------------------|--------------|----------------------------|--------------|--------------------|--------------|
|                                       | BAEF PC  |              | In-Combination Contribution | Total In-Combination PC |              | In-Combination PC/Critical Level |              | PEC (including background) |              | PEC/Critical Level |              |
|                                       | Emission Limit NN                              | Realistic NN | IC NN                       | Emission Limit NN       | Realistic NN | Emission Limit NN                | Realistic NN | Emission Limit NN          | Realistic NN | Emission Limit NN  | Realistic NN |
| The Wash SAC, SPA, SSSI and Ramsar    | 0.41   | 0.12         | 0.016                       | 0.43                    | 0.13         | 2.1%                             | 0.7%         | 12.61                      | 12.31        | 63%                | 62%          |
| Havenside LNR                         | 2.76   | 0.78         | 0.18                        | 2.94                    | 0.96         | 14.7%                            | 4.8%         | 20.16                      | 18.18        | 101%               | 91%          |
| Slippery Gowt Sea Bank LWS            | 1.39   | 0.39         | 0.18                        | 1.57                    | 0.57         | -                                | -            | 13.75                      | 12.75        | -                  | -            |
| South Forty Foot Drain LWS            | 0.35   | 0.10         | 0.026                       | 0.38                    | 0.13         | -                                | -            | 18.04                      | 17.79        | -                  | -            |
| Habitat Mitigation Area               | 1.39   | 0.39         | 0.18                        | 1.57                    | 0.57         | 7.9%                             | 2.9%         | 18.77                      | 17.77        | 94%                | 89%          |
| Other areas of saltmarsh in The Haven | 1.17   | 0.34         | 0.18                        | 1.35                    | 0.52         | 6.8%                             | 2.6%         | 18.57                      | 17.74        | 93%                | 89%          |