# Appendix E – Air Quality Impact Assessment

**Kimberly-Clark**

# Kimberly-Clark Barrow Paper Mill

Air Quality Assessment

Report No.: 446562-02 (03)

**APRIL 2026**

## RSK GENERAL NOTES

**Report No.:** 446562-02 (03)

**Title:** Kimberly-Clark Barrow Paper Mill

**Client:** Kimberly-Clark

**Date:** 13th April 2026

**Status:** Final

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|---|---|---|---|
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| Date: | 13th April 2026 | Date: | 13th April 2026 |



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## Abbreviations

| | |
|---|---|
| AER | Air Emissions Risk |
| AQO | Air Quality Objective |
| AQS | Air Quality Standard |
| AQMA | Air Quality Management Area |
| BAT | Best Available Technique |
| CLe | Critical Level |
| CLo | Critical Load |
| CO | Carbon monoxide |
| Defra | Department for Environment, Food and Rural Affairs |
| EA | Environment Agency |
| EAL | Environment Assessment Level |
| EC | European Commission |
| EIP | Environmental Improvement Plan |
| ELV | Emission Limit Value |
| EPR | Environmental Permitting Regulations |
| EPUK | Environmental Protection United Kingdom |
| EU | European Union |
| IAQM | Institute of Air Quality Management |
| KC | Kimberly-Clark |
| LAQM | Local Air Quality Management |
| LWS | Local Wildlife Site |
| MCPD | Medium Combustion Plant Directive |
| NNR | National Nature Reserve |
| $NO_2$ | Nitrogen dioxide |
| NOx | Oxides of nitrogen |
| NPPF | National Planning Policy Framework |
| PC | Process Contribution |
| PEC | Predicted Environmental Concentration |
| SAC | Special Areas of Conservation |
| SSSI | Sites of Special Scientific Interest |
| SPA | Special Protection Area |
| WFC | Westmorland and Furness Council |

## Contents

# 1 INTRODUCTION

RSK Environment Ltd (RSK) has been commissioned to undertake an air quality assessment to support the permit variation application for three new dual-fuelled boilers (natural gas and hydrogen) at Kimberly-Clark's (KC) paper mill in Barrow-in-Furness. The operator, KC, currently releases emissions to air from a number of combustion and process emission sources associated with various activities contained within their Environmental Permit (EPR/BJ7611IY), issued under the Environmental Permitting (England and Wales) Regulations 2016, as amended (EPR).

The facility produces tissue products and operates two tissue machines, with a total capacity of 120,000 air dry tonnes (ADT) per year. The facility's current heat and steam requirements are met by two of three onsite natural gas-fuelled boilers, configured in a duty/duty/standby setup. The variation proposes that the three natural gas-fuelled boilers and associated stacks are replaced with three new dual-fuelled boilers and three new stacks, also configured in a duty/duty/standby setup.

The following report presents the findings of an assessment of the impacts of emissions of nitrogen dioxide ($NO_2$) and carbon monoxide (CO) on nearby human receptors, as well as the impacts of oxides of nitrogen (NOx), and subsequent impacts of nutrient nitrogen and acid deposition on nearby sensitive ecological receptors. As referenced within the Environment Agency's hydrogen combustion guidance[1], only emissions of NOx (or $NO_2$) and CO need to be considered from hydrogen gas-fuelled plant. This assessment has considered both the long- and short-term air quality impacts of the proposed boilers by considering the existing and proposed situations.

The site, as presented in **Figure 1.1**, lies within the jurisdiction of Westmorland and Furness Council (WFC), which contains one Air Quality Management Area (AQMA), declared by the abolished South Lakeland District Council.

[1] https://www.gov.uk/guidance/hydrogen-combustion-comply-with-emission-limit-values

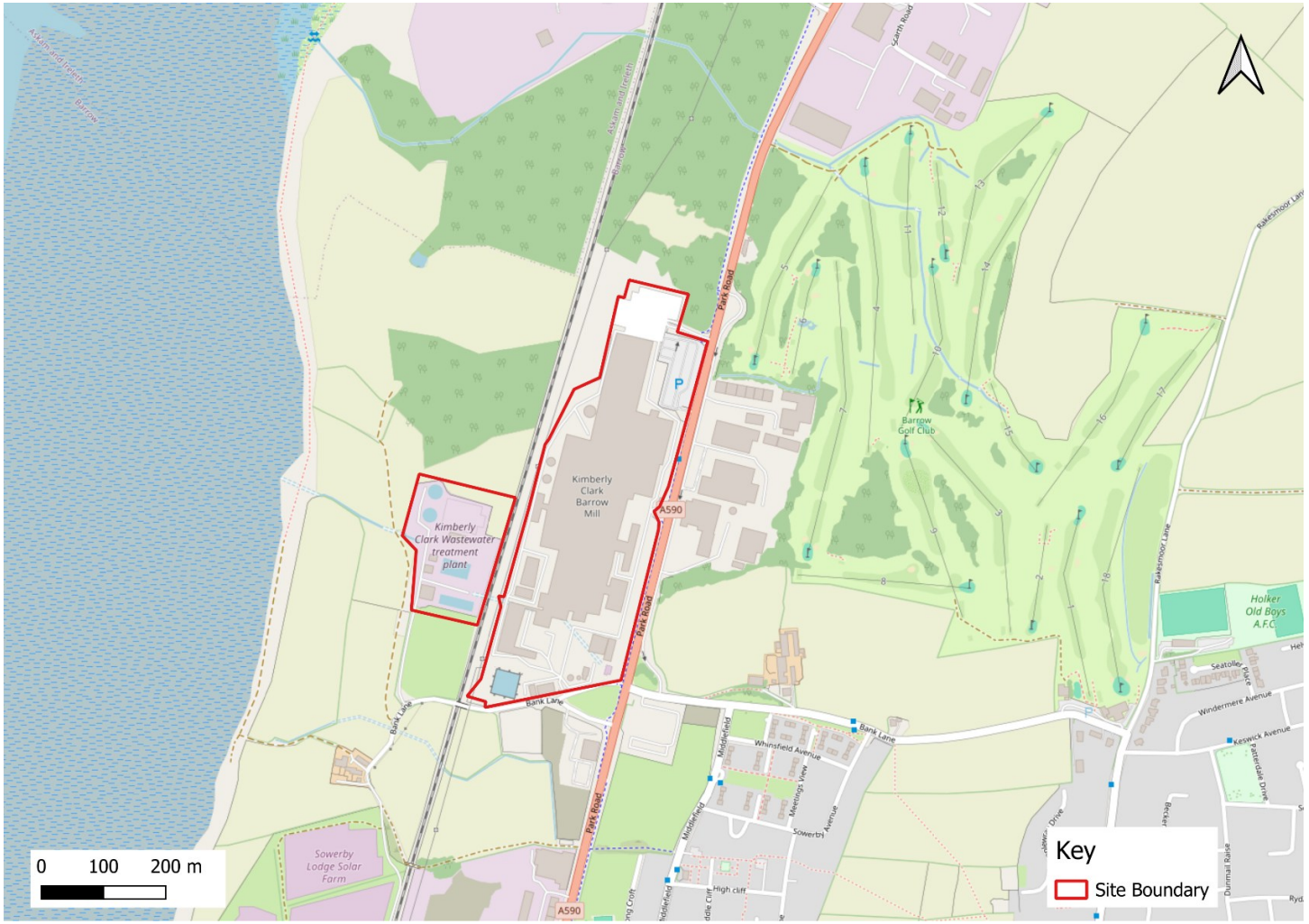


**Figure 1.1: Site boundary of the Kimberly-Clark Barrow Paper Mill**

# 2 SITE DESCRIPTION

## 2.1 Existing Operations

The KC facility is a commercial producer of tissue products, and is permitted to operate under EPR - Schedule 1, Section 6.1 Part A (1) (a) *Producing, in industrial plant, pulp from timber or other fibrous materials* and Schedule 1, Section 1.1 Part A (1) (a) *Burning any fuel in an appliance with a rated thermal input of 50 megawatts or more*. It also has a number of directly associated activities, including the treatment of sludge.

The tissue products are made from a combination of virgin and recycled fibre, processed by two tissue machines at the site, which have a total annual capacity of 120,000 ADT. The tissue machine dryers' heat and steam requirements and other site requirements are met by two of three on-site 13.3 MWth natural gas-fuelled boilers, configured in a duty/duty/standby setup.

The above activities result in a number of point source emissions to air, including emissions from the three natural gas-fuelled boilers, exhausted via a 45m stack discharging through a common windshield. As already stated, these operate in a duty/duty/standby setup, with the site's steam requirements (a maximum of 21 tonnes per hour (tph)) far below the maximum output of all three boilers (54tph). Other combustion sources on-site are two 6.6 MWth natural gas burners for each of the two dryers (emission points A13 and A14 within the environmental permit).

Emission limit values (ELVs) have been set for the main boilers fuelled on both natural gas and gas oil. However, KC have informed RSK that the boiler oil feed system has been decommissioned and has not been operational for over 5 years. Furthermore, an additional standby boiler (emission point AB6) has been confirmed as decommissioned.

Other sources of emissions relate to emissions of particulate matter from process operations; however, due to the proposed variation being the change from natural gas to dual-fuelled boilers, no changes to the emissions of particulate matter are anticipated, and they have not been considered further.

## 2.2 Proposed Operations

The proposed variation involves decommissioning the existing natural gas-fuelled boilers (emission points AB1, AB2, and AB3) and replacing them with three new dual-fuelled boilers (fuelled on either hydrogen or natural gas), each with a capacity of 10.2 MWth. These boilers can each produce 16 tph of steam, resulting in a total capacity of 48 tph from the three boilers. This capacity significantly exceeds the site's requirements, which, as already stated, is a maximum demand of 21 tph.

As with current operations, the three boilers are proposed to function in a duty/duty/standby configuration, usually operating at 50% to 75% load, reflecting a

typical steam requirement of 17 tph. The new boilers will be located in the refurbished low-pressure boiler house (which currently contains the decommissioned standby boilers), with their emissions being exhausted through three separate 20-meter-tall stacks.

During the first year of operation, the new boilers will require commissioning, which will be undertaken one boiler at a time on natural gas, and then hydrogen when available. Commissioning of each boiler is not anticipated to take longer than two months, with the load of the existing boilers reduced to prevent the requirement to dump surplus steam.

All other combustion operations are proposed to stay as the current operation.

# 3 LEGISLATION & GUIDANCE

## 3.1 Key Legislation and Policy

### 3.1.1 Air Quality Regulations

The air quality standards (AQSs) and air quality objectives (AQOs) in the United Kingdom are derived from EC directives and are adopted into English law via the Air Quality (England) Regulations 2000 and Air Quality (England) Amendment Regulations 2002. Directive 2008/50/EC set limits values, and was translated into UK law in 2010 via the Air Quality Standards Regulations 2010. The European Union (Withdrawal) Act retains existing EU environmental provisions in the UK.

### 3.1.2 Environmental Permitting Regulations (EPR)

Certain industrial processes are regulated under the Environmental Permitting Regulations (EPR), which require specific industrial and waste management operations to obtain an environmental permit before they can operate. The Environment Agency (EA), which is the regulatory authority in England, enforces these regulations to protect the environment.

Regarding emissions to air, operators must minimise their emissions and adhere to permit conditions that set limits on these emissions. They are also required to conduct monitoring and follow best available techniques (BAT) to ensure compliance.

The latest UK Environmental Permitting (England and Wales) Regulations 2018 bring the Medium Combustion Plant Directive (MCPD) (2015/2193/EC) into force in England and Wales.

Furthermore, as part of their regulatory position, the EA have produced environmental assessment levels (EALs) to regulate hazardous pollutants produced by industry that are not captured within the Air Quality Regulations. These are non-statutory guideline values and are contained within their Air Emissions Risk (AER) guidance[2]. Typically, a site will not need to go beyond Best Available Technique (BAT) to achieve these EALs.

## 3.2 Guidance

### 3.2.1 Air emissions risk assessment for your environmental permit guidance

This guidance[2], which was adopted in 2016 (and updated in 2025) by the Department for Environment, Food and Rural Affairs (Defra) and the EA, outlines a procedure which can be used to determine when detailed dispersion modelling is required and provides a list of air quality standards applicable to industrial installations.

[2] https://www.gov.uk/guidance/air-emissions-risk-assessment-for-your-environmental-permit

### 3.2.2 Local Air Quality Management Review and Assessment Technical Guidance

The Department for Environment, Food and Rural Affairs (Defra) has published technical guidance for use by local authorities in their air quality review and assessment work. This 2022 guidance referred to in this document as LAQM.TG (22), has been used to identify locations where exposure can be considered 'relevant'.

### 3.2.3 AQTAG06: Technical Guidance on Detailed Modelling Approach for an Appropriate Assessment for Emissions to Air

The 2014 AQTAG06 guidance provides technical guidance on how to approach detailed modelling of emissions to air when considering impacts on ecological receptors. It includes a method which can be used to assess the potential impacts of nitrogen and acid deposition on local ecosystems.

### 3.2.4 Hydrogen combustion: comply with emission limit values

Current legislation (Industrial Emissions Directive (IED) or MCPD) does not include ELVs for hydrogen combustion. Therefore, UK regulators have issued interim expectations[3] for operators of hydrogen-fuelled combustion plant. The guidance contains interim ELVs and a method for calculating bespoke NOx and CO ELVs for mixed blends until formal BAT-AELs are set.

[3] https://www.gov.uk/guidance/hydrogen-combustion-comply-with-emission-limit-values

# 4 ASSESSMENT CRITERIA

Based on the current regulations, the air quality standards for the pollutants proposed for assessment are presented in **Table 4.1**. This includes the Environment Agency's and Defra's environmental assessment levels (EALs), as referenced in **Section 3.1.2**

**Table 4.1: Air Quality Standards Relevant to the Assessment**

| Pollutant | Averaging period | Exceedances allowed per year | Ground level concentration limit (μg/m$^3$) | Designation |
|---|---|---|---|---|
| Nitrogen dioxide ($NO_2$) | 1-hour mean | 18 | 200 | AQO[1] |
| | calendar year mean | - | 40 | AQO[1] |
| CO | 1-hour mean | - | 30,000 | EAL |
| | 8-hour mean | - | 10,000 | AQO[1] |

Note 1 The limit value is the same as the Air Quality Objective.

In addition, the United Nations Economic Commission for Europe (UNECE) has set environmental criteria known as critical levels (CLe) for the protection of vegetation from direct effects and critical loads (CLo) to protect against the indirect effects of the deposition of pollutants. The applicable critical levels, derived from EC directive 2008/50/EC and translated into UK law via the Air Quality Standards Regulations 2010, are provided in **Table 4.2.** Critical loads for the protection of vegetation are site-specific, and as such, they have been detailed further in **Table 5.4**.

**Table 4.2: Critical Levels Relevant to the Assessment**

| Pollutant | Averaging period | Exceedances allowed per year | Ground level concentration limit (μg/m$^3$) | Designation |
|---|---|---|---|---|
| NOx | 24-hour mean | - | 75 or 200[1] | CLe[2] |
| | calendar year mean | - | 30 | AQO[3]/CLe |

Note 1 The critical level is generally considered to be 75 μg/m$^3$, but this only applies where ozone is below the AOT40 critical level, and sulphur dioxide is below the lower critical level of 10 μg/m$^3$.

Note 2 Defined by the World Health Organisation and is not an Air Quality Objective.

Note 3 Only the critical level applies at locations within 20 km from agglomerations (250,000 people) or within 5 km away from other built-up areas, industrial installations (PART A) or motorways or major roads with traffic counts of more than 50,000 vehicles per day.

# 5 ASSESSMENT METHODOLOGY

## 5.1 Assessment Scope

The scope of the impact assessment is based on the requirements of the Environment Agency, as detailed within their various guidance documents (see **Section 5.2**) and the changes proposed as part of the variation (see **Section 2).**

Based on the above, dispersion modelling of emissions will be conducted to predict the local impacts of the site's operations, both as they currently operate and as they will operate under their proposed variation (in this case, the change to new hydrogen and natural gas dual-fuelled boilers). This assessment will determine the site's total future impacts and allow for a comparison with the existing baseline.

While the boilers are dual-fuelled, it is proposed to be fuelled primarily on gaseous hydrogen, produced by the nearby Barrow Green Hydrogen project (when available). Therefore, the remainder of the assessment considers the new boilers fuelled on hydrogen only. However, as there may be times when hydrogen supply is restricted, and the boilers may be fuelled by natural gas, sensitivity to this scenario has also been undertaken (see **Section 5.4).** While it is possible the new boilers can operate on a hydrogen or natural gas blend, this is understood not to be a preferred option, and this assessment has only considered the boilers fuelled on either hydrogen or natural gas.

As discussed in **Section 2**, as with current operations, the three boilers are proposed to function in a duty/duty/standby configuration. Therefore, the emissions from only two of the proposed boilers in operation have been considered in the assessment.

Impacts have been compared against the annual and 1-hour mean $NO_2$ AQO, the 1-hour and 8-hour CO AQO/EAL for human receptors, and the annual mean and 24-hour NOx critical levels and nitrogen and acid deposition critical loads in relation to ecological receptors. These are pollutants of most concern related to the change of boiler fuel from natural gas to hydrogen.

## 5.2 Dispersion Modelling Methodology

The approach taken for assessing the potential air quality impacts of the permit variation may be summarised as follows:

- Determination of emission rates and modelling parameters;
- Identification of sensitive receptors (both human and ecological);
- Baseline characterisation;
- Dispersion modelling to predict both short-term and long-term concentrations to air;

- Calculation of nutrient nitrogen and acid deposition fluxes; and
- Comparison of results against relevant AQO and critical levels and loads.

The dispersion modelling for this assessment has been undertaken in line with the following EA guidance documents:

- Hydrogen combustion: comply with emission limit values (2024)[5];
- Medium combustion plant: apply for an environmental permit (2026)[6];
- Air emissions risk assessment for your environmental permit (2025)[7]; and
- Environmental permitting: air dispersion modelling reports (2024)[8].

### 5.2.1 Modelling Software

The model used in this study is the Lakes AERMOD (V13) dispersion model, running the US EPA executable 24142. AERMOD is a steady-state Gaussian plume atmospheric dispersion model; it characterises the atmospheric boundary layer properties using the friction velocity and Monin-Obukhov length rather than the Pasquill-Gifford stability classes.

The AERMOD model can include the treatment of both surface and elevated sources, terrain, buildings and chemistry effects. The model calculates downwind pollutant concentrations in the surrounding area for each hour of the day and night. Statistics on the frequency and concentration of pollutants at the receptor sites are based on hourly calculations.

Along with the ADMS dispersion model, AERMOD is commonly used within the UK for regulatory purposes and is judged fit for purpose for this assessment.

### 5.2.2 Modelling Scenarios

Based on the site's proposed operations (**Section 2)** and aims of the assessment, detailed in **Section 5.1**, the following modelling scenarios have been considered:

- **Existing -** Modelling of the site's existing operations, including two natural gas-fuelled steam boilers and two tissue machine drying hoods (TM3 and TM5); and
- **Proposed -** Modelling of the site's proposed operations, including two hydrogen-fuelled steam boilers and two tissue machine drying hoods (TM3 and TM5).

If the hydrogen supply is restricted, the new boilers are capable of running on natural gas; therefore, the results of modelling sensitivity to the new boilers running

[5] https://www.gov.uk/guidance/hydrogen-combustion-comply-with-emission-limit-values

[6] https://www.gov.uk/guidance/medium-combustion-plant-apply-for-an-environmental-permit

[7] https://www.gov.uk/guidance/air-emissions-risk-assessment-for-your-environmental-permit

[8] https://www.gov.uk/guidance/environmental-permitting-air-dispersion-modelling-reports

on natural gas have been provided in **Appendix A**. This is discussed further in **Section 5.4.**

Furthermore, during the new boiler commissioning period, they will operate (one commissioned at a time), with the load of the existing boilers reduced to prevent the requirement to dump surplus steam. However, the exact operation during commissioning has not been confirmed; therefore, sensitivity to the following worst-case commissioning scenario (see **Section 5.4**) has been undertaken, with results presented in **Appendix A**:

- **Commissioning -** Modelling of the site's existing operations (including two natural gas-fuelled steam boilers and two tissue machine drying hoods (TM3 and TM5), plus one new natural gas steam boiler.

All other emissions to air sources on-site are mothballed and planned for removal (standby boilers, etc.) or do not emit NOx or CO and have not been included within the assessment.

### 5.2.3 Emission Sources

All physical stack parameters (stack heights and diameters, etc.) have been provided by the Kimberly-Clark Barrow site team. All efflux parameters for the existing operations have been taken from available stack monitoring data (from between 2022 – 2024) and emission limit values (ELVs) contained within the site's environmental permit (EPR/BJ7611IY). All efflux parameters for the proposed boilers have been calculated based on design data provided by stack designers Cannon and ELVs contained within the EA's hydrogen combustion guidance[9]. As design data specific to hydrogen and natural gas combustion has been provided, exhaust flows have not been modified based on the ETN Position Paper[10].

The emissions from the two new hydrogen-fuelled boilers have been modelled assuming they are running at 60% maximum continuous rating (MCR). This equates to 19.2 tph of steam, which is similar to the site's typical steam requirements (17 tph).

All emission rates and stack parameters entered into the model have been presented in **Table 4.1**.

[9] https://www.gov.uk/guidance/hydrogen-combustion-comply-with-emission-limit-values

[10] https://etn.global/wp-content/uploads/2023/03/ETN-Proposed-NOx-emissions-reporting-for-hydrogen-containing-fuels-Position-paper-March2023.pdf

**Table 5.1: Stack Parameters Used Within the Dispersion Model**

| Parameter | Existing Boiler 1 | Existing Boiler 2 | Proposed Boilers 1[1] | Proposed Boilers 2[1] | TM3 Drying Hood | TM5 Drying Hood |
|---|---|---|---|---|---|---|
| Stack Location (X, Y) | 319559, 472495 | 319560, 472495 | 319579, 472502 | 319582, 472512 | 319529, 472618 | 319557,472568 |
| Stack Height (m) | 45 | 45 | 20 | 20 | 25 | 21.7 |
| Stack Diameter (m) | 0.8 | 0.8 | 0.7 | 0.7 | 1.176[2] | 1.1 |
| Exhaust Temperature (°C) | 127[5] | 110[5] | 96/79 | 96/79 | 221[5] | 168[5] |
| Exit Velocity (m/s) | 14.7 | 13.3 | 5.84/7.01 | 5.84/7.01 | 17.8[2] | 12.9 |
| Oxygen, dry exhaust (%) | n/a[5] | n/a[5] | 3.82/3.81 | 3.82/3.81 | n/a[5] | n/a[5] |
| Moisture Content (%) | n/a[5] | n/a[5] | 31.34/17.18 | 31.34/17.18 | n/a[5] | n/a[5] |
| Actual Flow ($m^3/s$) | 7.42[5] | 6.68[5] | 2.24/2.70 | 2.24/2.70 | 19.3[5] | 12.2[5] |
| Normalised flow ($Nm^3/s$) | 3.48[3] | 3.47[3] | 1.09[3]/1.65[3] | 1.09[3]/1.65[3] | 10.4[4] | 8.1[4] |
| NOx Concentration ($mg/Nm^3$) | 200[3] | 200[3] | 137[3]/100[3] | 137[3]/100[3] | 25.2[4,5] | 51.7[4,5] |
| CO Concentration ($mg/Nm^3$) | 100[3] | 100[3] | 68.5[3,6]/50[3,6] | 68.5[3,6]/50[3,6] | 368[4,5] | 3.64[4,5] |
| NOx Emission Rate (g/s) | 0.69 | 0.69 | 0.149/0.164 | 0.149/0.164 | 0.264 | 0.418 |
| CO Emission Rate (g/s) | 0.34 | 0.34 | 0.07/0.08 | 0.07/0.08 | 3.86 | 0.029 |

Note 1 Hydrogen/natural gas-fuelled.
Note 2 Square capped stack – velocity entered, with the capped stack module in AERMOD.
Note 3 Reference Conditions (REF) are: 273K, 101.3kPa, dry gas, 3% oxygen.
Note 4 Reference Conditions (REF) are: 273K, 101.3kPa, without correction for water vapour content.
Note 5 n/a – Maximum flow rates from within the site's 2022, 2023 and 2024 stack monitoring reports have been used within the model and emission calculations. Average data has been used for temperature.
Note 6 Based on manufacturer specifications and uplifted by 37% based on EA guidance.

### 5.2.4 Meteorological Data

Hourly sequential meteorological data from the Walney Island meteorological station for 2022 - 2024 have been used within the model. The Walney Island station is the nearest suitable meteorological station to the site; both the meteorological station and the proposed development are located within coastal areas, and the meteorological station is 2.5 km southwest of the KC Barrow site. Furthermore, the data capture is above 85%.

Each year has been modelled separately, with the worst-case prediction presented at each receptor. The wind rose diagram for the entire modelled period (2022 – 2024) is presented in **Figure 5.1**.

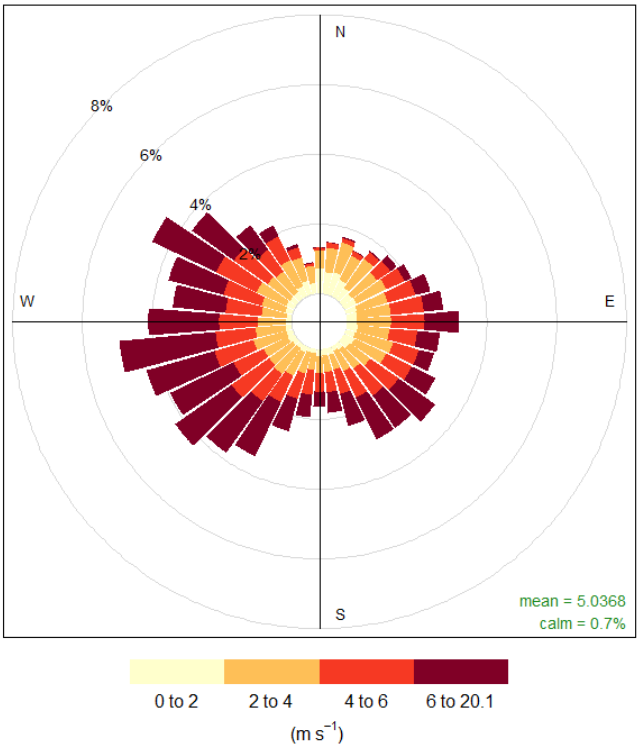


**Figure 5.1: Wind Rose for the Walney Island Meteorological Station (2022 - 2024)**

### 5.2.5 Terrain and Land Use

The topographical features surrounding the site will have an influence on the dispersion of pollution within the area. Terrain effects have been accounted for using 50 m resolution OS terrain data. The above Met data was obtained in ADMS format and processed for use in AERMOD using AERMET considering the land use parameters contained in **Table 5.2**.

**Table 5.2: Land use parameters used within AERMET**

| Sector | Albedo | Bowen Ratio | Surface Roughness (m) |
|---|---|---|---|
| 45-225 | 0.2 | 1.0 | 0.2 |
| 225-45 | 0.2 | 1.0 | 0.3 |

### 5.2.6 Buildings

Buildings have the potential to disrupt atmospheric flow. In the case of emissions from a stack, they can entrain pollutants into the leeward side of the building (known as a cavity region). This cavity region is highly turbulent, often bringing pollutants rapidly towards ground level, increasing their concentrations. These concentrations will then reduce with diminishing turbulent wake. AERMOD has the capability to model the impacts of stack pollutants being entrained into the cavity region through its BPIPPRM module. To capture the potential influence of buildings/structures on the dispersion profile of emissions (e.g. building 'downwash' effects), five nearby onsite buildings have been included. The parameters of the modelled buildings and structures are summarised in **Table 5.3** and illustrated in **Figure 5.2.**

**Table 5.3: Buildings Included in the Model**

| Building ID | X (m) | Y (m) | Height (m) | Width (m) | Length (m) |
|---|---|---|---|---|---|
| Main Building[1] | 319663 | 319663 | 8 | 157 | 262 |
| TM3 Building | 319505 | 472652 | 21 | 36 | 66 |
| TM5 Building | 319562 | 472636 | 19 | 36 | 66 |
| Existing Boiler House (HPBH) | 319559 | 472519 | 11 | 17 | 27 |
| Proposed Boiler House (refurbished LPBH) | 319579 | 472513 | 7 | 18 | 32 |

Note [1] Entered in the model as a polygon building


**Figure 5.2: Buildings and Emission Points included in the Model**

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### 5.2.7 Model Output Grid

A nested Cartesian receptor grid covering 10 km × 10 km, centred on the emission sources, was used to resolve concentration fields. The grid employed progressively finer resolution near the stack:

- 20 m spacing within 200 m;
- 50 m spacing within 500 m;
- 100 m spacing within 1,000 m;
- 200 m spacing within 2,000 m and
- 500 m spacing within 5,000 m.

All receptors were assigned a height of 1.5 m above ground level to represent typical human breathing height.

### 5.2.8 Human Receptors

The modelled discrete human receptors were chosen based on where people may be located and judged in terms of the likely duration of their exposure to pollutants and proximity to the site, following the guidance given in **Section 3.2.2** (LAQM TG22). **Figure 5.3** details the discrete human receptors included within the model, with the full list contained in **Table B1** in **Appendix B**.

### 5.2.9 Ecological Receptors

The modelled ecological receptors have been determined using distance-based screening criteria from the nature and heritage conservation screening report for the site provided by the Environment Agency (See **Appendix D**). All ecological sites within this distance have been considered for assessment.

The ecological sites included within this assessment and their associated critical loads (taken from APIS[11]) are presented in **Table 5.4**, with the full list contained in **Table B1** in **Appendix B** and shown in **Figure 5.4**

**Table 5.4: Ecological Sites Considered in the Model**

| Receptor Description | Nutrient Nitrogen Dep Critical Load (kgN/ha/yr) | Acid Dep Critical Load (Keq/ha/yr) [1] | Modelled Receptors |
|---|---|---|---|
| Duddon Estuary Ramsar | 5[2] | 4.856[2] | R17 – R27 |
| Morecambe Bay Ramsar | 5[2] | 0.886[2] | R28, R30 – R32, R36 |
| Duddon Estuary SSSI | 5 | 4.856 | R17 – R27 |
| Morecambe Bay SAC | 5 | 0.886 | R17 – R28, R29, R31– R32, R36 |
| Morecambe Bay and Duddon Estuary SPA | 5 | 4.856 | R17 – R28, R29, R31– R32, R36 |
| Ancient Woodland (four sites) | 10[3] | 1.675[4] | R33 – R34, R45 – R47 |
| North Walney NNR | 5[2] | 0.886[2] | R37 – R42 |
| Sandscale Haws NNR | 5[2] | 0.886[2] | R43, R44 |
| Local Wildlife Sites (including Sowerby Wood, Park Road Woods, Lower Ormsgill Reservoir, and Cocken Pool) | 10[3] | 1.675[4] | R29, R33 – R35, R48 – R68 |

Note [1] Represents the MinCLMaxN
Note [2] No data is available, so the corresponding value from the SAC/SPA/SSSI covering the same area has been used.
Note [3] No data is available, so a typical value for broadleaved deciduous forest[12] from APIS has been used, or a suitable conservative value.
Note [4] Taken from APIS's acid critical load screening tool

[11] https://www.apis.ac.uk/

[12] https://www.umweltbundesamt.de/sites/default/files/medien/1410/publikationen/2022-10-12_texte_110-2022_review_revision_empirical_critical_loads.pdf


**Figure 5.3: Location of Modelled Human Receptors**

Contains Imagery @2026 Airbus, Infoterra Ltd & Bluesky, Landsat / Copernicus, Maxar Technologies, Map data @2026

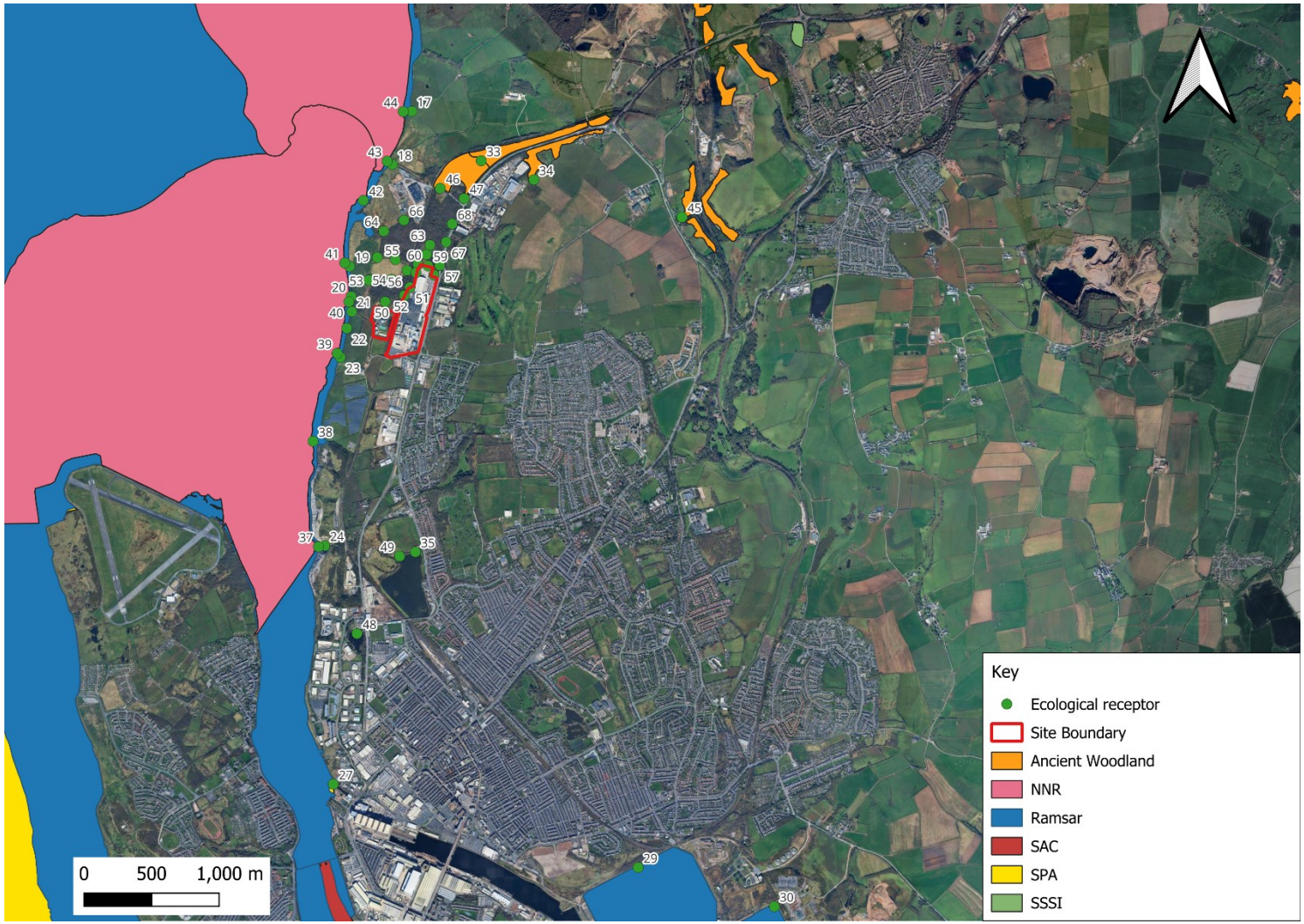


**Figure 5.4: Location of Modelled Ecological Receptors[1]**

Contains Imagery @2026 Airbus, Infoterra Ltd & Bluesky, Landsat / Copernicus, Maxar Technologies, Map data @2026

Note [1] Receptors R25, R26, R28, R31, R32, and R36 are not presented due to their distance from the site.

### 5.2.10 Baseline Air Quality

*Local Authority Data*

According to the latest 2023 Air Quality Annual Status Report (ASR) released by WFC[13], there are currently no automatic monitoring stations operating within the district. However, seven diffusion tubes were monitoring $NO_2$ in 2022. Three of these diffusion tubes were located in the vicinity of the proposed KC Barrow site. The monitoring data from these three diffusion tube sites are presented in **Table 5.5**. The data from these tubes show that there were no exceedances of annual average $NO_2$ concentrations between the years 2018 - 2022. This was also the case at all seven diffusion tubes where data were reported. The locations of the three diffusion tubes in relation to the KC Barrow site are presented in **Figure 5.5**.

The highest monitoring result from 2022 (in bold in **Table 5.5)** has been assumed to be representative of all receptors and has been used as the background concentration within **Section 6.**

**Table 5.5: Annual Mean $NO_2$ Selected Local Monitoring (2018-2022)**

| Site ID | Location | Site type | Approximate Distance from Site (km) | Annual Mean $NO_2$ Concentrations (µg/m³) | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | 2018 | 2019 | 2020 | 2021 | 2022 |
| FURN1 | Furness Academy | Kerbside | 3.3 | - | - | 11.5 | 11.7 | 12.1 |
| PIUS1 | St Pius School | Kerbside | 1.4 | - | - | 11.1 | 11.0 | 13.5 |
| CLIVE2 | Clive Street | Roadside | 3.3 | - | - | - | - | **14.7** |

*Defra Background Maps*

In addition to the local monitoring data, estimated background air quality data is available from the Local Air Quality Management (LAQM) website operated by Defra. This website provides estimated annual average background concentrations of $NO_2$ and CO on a 1 $km_2$ grid basis. **Table 5.6** presents the highest estimated annual average background concentrations for the grid square containing any modelled receptor for the year 2025.

**Table 5.6: Estimated Background Annual Average $NO_2$ and CO Concentrations at the Proposed Development Site (from the 2021 base maps)**

| Assessment Year | Annual Average $NO_2$ (µg/m³) | Annual Average CO (µg/m³) |
|---|---|---|
| **2025** | 6.24 | 185[2] |
| **Air Quality Objective** | **40** | - |

Note [1]: Presented concentrations for the 1 $km^2$ grid centred on 319500,472500.

[13] Released by Barrow-in-Furness Council prior to being abolished in 2023.

*Ecological Background*

Background NOx concentrations and nitrogen and acid deposition fluxes have been taken from the APIS website, which provides three-year average background concentrations and fluxes on a 1 $km^2$ grid basis. The latest three-year average available is for 2021 (2020 - 2022). The background values in **Table 5.7** represent the worst-case predicted concentration across any of the habitat sites assessed.

**Table 5.7: Estimated Background Annual Average NOx Concentrations and Nitrogen and Acid Deposition Fluxes in the Area Surrounding the KC Barrow Site**

| | Annual Average $NO_x$ ($\mu g/m^3$) | Nitrogen Deposition (kgN/hayr) | Acid Deposition (keq/ha/yr) |
|---|---|---|---|
| **2021** | 8.6 | 14.8/24.9[1] | 1.1/1.8[1] |
| **Air Quality Objective** | **30** | **-** | **-** |

Note 1: Grassland/Forest Deposition

*Cumulative Schemes*

A search of Defra's Pollutant Transfer Register[14] demonstrates that there are no installations that release emissions to air in close proximity to the KC site; therefore, suitably accounted for within the background concentrations used within this assessment (the nearest installation to the KC site being Barrow Shipyards (EPR/SP3836SP), 4.5 km south of the site). Furthermore, a search of WFC's planning portal shows no proposed nearby developments that will emit pollutants at a magnitude (large-scale industrial sites, etc.) or locations likely to combine with the emissions from the KC to have a significant impact on nearby receptors. As such, the modelling of other nearby off-site activities is not judged to be required.

[14] https://prtr.defra.gov.uk/map-search

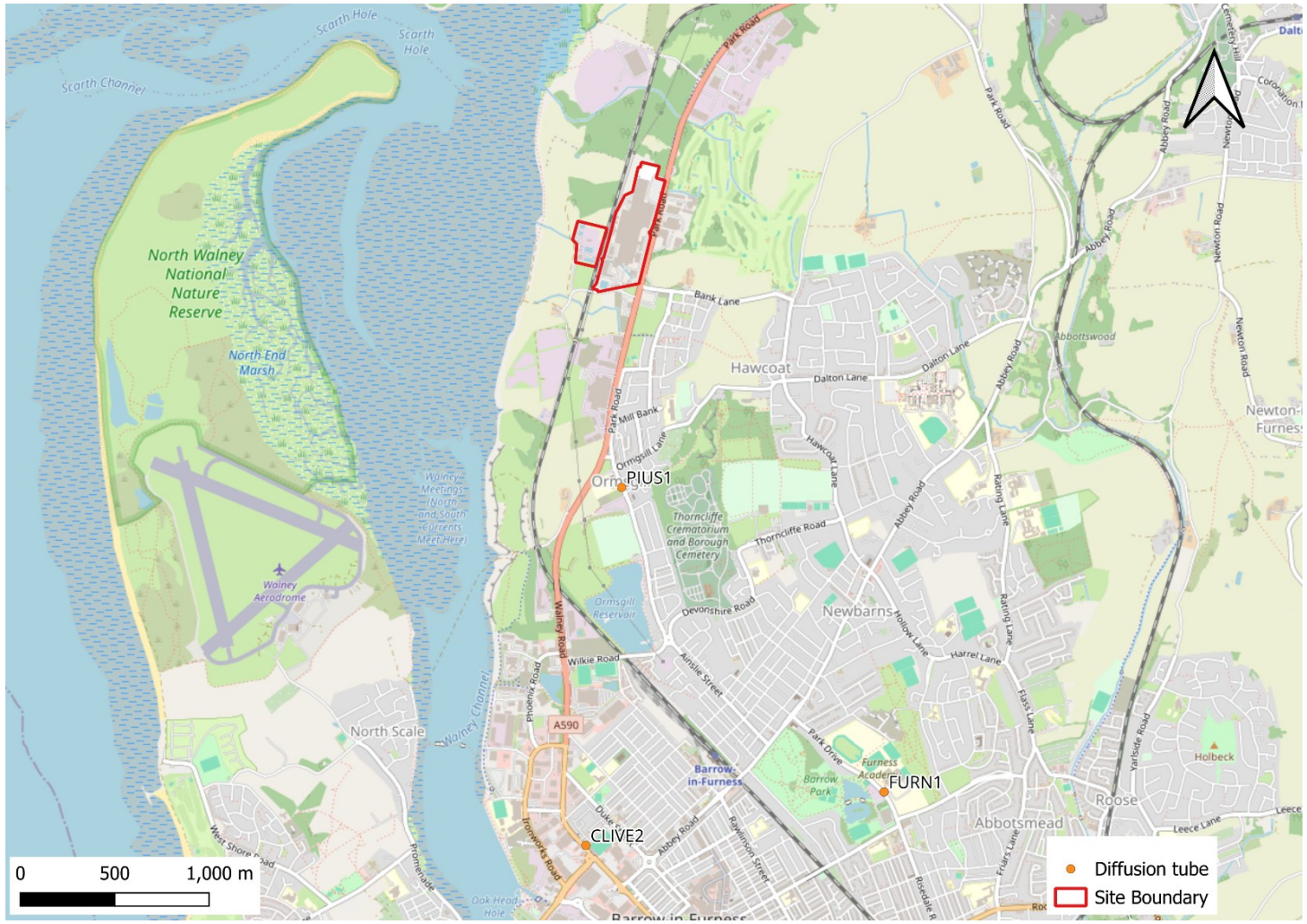


**Figure 5.5: Location of nearby diffusion tubes**

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### 5.2.11 Conversion of NO to $NO_2$ and Results Processing

NOx emitted to the atmosphere as a result of combustion will consist largely of nitric oxide (NO). Once released into the atmosphere, NO is oxidised to $NO_2$, which is of concern with respect to health and other impacts. The proportion of NO converted to $NO_2$ depends on a number of factors, including wind speed, distance from the source, solar irradiation and the availability of oxidants, such as ozone ($O_3$). The dispersion modelling exercise predicts concentrations of NOx, which subsequently require conversion to $NO_2$ for comparison with objectives for human health.

Based on Environment Agency recommendations[14], NOx Process Contributions (PCs) have been converted to the respective $NO_2$ concentrations using 70% for long-term emissions and 35% for short-term emissions based on 'worst case' conversion criteria.

### 5.2.12 Calculation of Contribution to Critical Loads

Deposition rates were calculated using empirical methods recommended by the EA AQTAG06[15]. Dry deposition flux was calculated using the following equation:

*Dry deposition flux (µg/m$^2$/s) = ground level concentration (µg/m$^3$) x deposition velocity (m/s)*

Wet deposition occurs via the incorporation of the pollutant into water droplets, which are then removed in rain or snow and $NO_2$ wet deposition is not considered significant over short distances compared with dry deposition. Therefore, for the purposes of this assessment (in accordance with AQTAG06), wet deposition has not been considered.

The applied deposition velocities for the relevant chemical species are shown in **Table 5.8.**

**Table 5.8: Applied Deposition Velocities**

| Pollutant | Deposition Velocity (m s$^{-1}$) |
|---|---|
| | Grassland/Forest |
| NOx | 0.0015/0.003 |

For the purposes of this assessment, dry deposition rates of nitrogen and acidic equivalents at the identified ecological receptors have been calculated by applying the appropriate grassland or forest deposition velocities to the modelled annual mean concentrations of $NO_2$.

The critical loads for nitrogen (N) are recorded in units of kgN/ha/yr. The deposition PC is converted from µg/m$^2$/s to units of kgN/ha/year by multiplying the dry

[14] https://www.gov.uk/guidance/specified-generators-dispersion-modelling-assessment

[15] AQTAG06 – Technical Guidance on detailed modelling approach for an appropriate assessment for emissions to air. Environment Agency, March 2014 version.

deposition flux by the standard conversion factor of 95.9.

The acid critical loads are provided in units of equivalents (keq/ha/year), which is a measure of how acidifying the chemical species can be. The deposition PC is converted from $\mu g/m^2/s$ to units of keq/ha/year by a standard conversion factor for N of 6.84.

### 5.2.13 Results Processing

The site operates year-round, except during scheduled maintenance periods. The model, however, assumes that the site runs continuously for 8,760 hours each year. As a result, no post-processing of the results has been performed, except for the conversions of NOx to $NO_2$ and the calculations of deposition mentioned earlier.

### 5.2.14 Interpretation of Modelled Results

*Human Receptors*

EA guidance[16] states that where impacts are below the following criteria, they can be classed as insignificant:

- if the short-term PC is less than 10% of the short-term environmental standard, then a PC can be considered insignificant; and
- if the long-term PC is less than 1% of the long-term environmental standard, then a PC can be considered insignificant.

However, at the detailed modelling stage, there is no EA criterion to decide whether PCs are significant. Therefore, a judgement on significance has been made based on the magnitude of the PCs (including whether they are insignificant or not) in the context of the predicted environmental concentration (PEC), the existing baseline, modelling uncertainty and site-specific circumstances, such as compliance with Best Available Techniques (BAT).

*Ecological Receptors*

Where emissions affect nature sites, the EA have similar insignificance screening criteria for the impacts (PCs) on internationally (SAC, SPA, Ramsar) or nationally (SSSI's) designated sites. Where the above screening criteria are not exceeded, the impacts at ecological sites can be classed as insignificant. Impacts on locally designated sites can be considered insignificant where the PCs are less than 100% of the objective (for both long and short-term impacts).

Again, where the insignificance screening criteria are exceeded, significance has been judged based on PCs in the context of the predicted environmental concentration (PEC), the existing information and site-specific circumstances, such as compliance with Best Available Techniques (BAT).

[16] https://www.gov.uk/guidance/environmental-permitting-air-dispersion-modelling-reports

## 5.3 Uncertainties and Assumptions

The following uncertainties and assumptions have been made in the air quality assessment:

- There will be uncertainties introduced because the modelling has simplified real-world processes into a series of algorithms. For example, it has been assumed that wind conditions measured at Walney Island meteorological monitoring station for the years 2022 to 2024 were representative of wind conditions at the site; and
- The combustion process emissions modelled in this assessment will, in reality, vary over time. It is assumed that the data from the 3 years of stack monitoring used for the existing sources and design information used for the proposed boiler sources are representative of actual emissions.
- There is an element of uncertainty in all measured and modelled data. All values presented within the report are the best possible estimates.

## 5.4 Sensitivity

In line with best practice requirements, modelling sensitivity has been undertaken in order to understand the likely uncertainty with the modelling parameters chosen. In addition to running the model for three meteorological years, the following sensitivity tests have been undertaken:

- sensitivity to the model not accounting for building effects;
- sensitivity to the model not accounting for terrain effects;
- sensitivity to the use of natural gas within the proposed hydrogen-fuelled boilers; and
- sensitivity to a scenario where the dual-fuelled boilers are being commissioned on natural gas, which will occur one at a time while the existing operations are occurring.

The results of the sensitivity testing are reported in **Appendix A**. The results indicate that realistic changes in modelling parameters or operational changes are not likely to affect the outcome of this modelling assessment.

# 6 ASSESSMENT OF IMPACTS

This section sets out the results of the dispersion modelling, which was undertaken in line with the methodology described in **Section 5**. The results have been compared against the ambient air quality objectives and critical loads and levels, as well as the EA's insignificance criteria. The results presented in this section represent the worst-case impacts across the three years of meteorological data.

## 6.1 Impacts on Human Receptors

### 6.1.1 $NO_2$ Annual Mean

**Table 6.1** shows the comparison of annual mean $NO_2$ PCs for the Existing and the Proposed scenarios at the assessed receptor locations. Furthermore, the percentage change between the scenarios and the future PEC (background, as described in **Section 5.2.10** + proposed operations) are also presented.

**Table 6.1: Predicted Annual Mean $NO_2$ Impacts at Discrete Receptors**

| Receptor ID | Existing (µg/m$^3$) | Proposed (µg/m$^3$) | % PC of AQO | PC Change % of AQO | Proposed PEC (µg/m$^3$)[1] | % Proposed PEC of AQO |
|---|---|---|---|---|---|---|
| R1 | 0.74 | 1.33 | 3.3% | 1% | 16.03 | 40% |
| R2 | 0.76 | 1.01 | 2.5% | 1% | 15.71 | 39% |
| R3 | 0.50 | 0.73 | 1.8% | 1% | 15.43 | 39% |
| R4 | 0.21 | 0.33 | 0.8% | 0% | 15.03 | 38% |
| R5 | 0.17 | 0.23 | 0.6% | 0% | 14.93 | 37% |
| R6 | 0.10 | 0.13 | 0.3% | 0% | 14.83 | 37% |
| R7 | 0.07 | 0.09 | 0.2% | 0% | 14.79 | 37% |
| R8 | 0.66 | 0.60 | 1.5% | 0% | 15.30 | 38% |
| R9 | 0.46 | 0.46 | 1.1% | 0% | 15.16 | 38% |
| R10 | 0.29 | 0.35 | 0.9% | 0% | 15.05 | 38% |
| R11 | 0.31 | 0.33 | 0.8% | 0% | 15.03 | 38% |
| R12 | 0.15 | 0.19 | 0.5% | 0% | 14.89 | 37% |
| R13 | 0.44 | 0.25 | 0.6% | 0% | 14.95 | 37% |
| R14 | 0.39 | 0.22 | 0.6% | 0% | 14.92 | 37% |
| R15 | 0.25 | 0.15 | 0.4% | 0% | 14.85 | 37% |
| R16 | 0.27 | 0.17 | 0.4% | 0% | 14.87 | 37% |
| R69 | 0.32 | 0.24 | 0.6% | 0% | 14.94 | 37% |
| R70 | 0.43 | 0.38 | 1.0% | 0% | 15.08 | 38% |
| R71 | 0.13 | 0.08 | 0.2% | 0% | 14.78 | 37% |
| R72 | 0.14 | 0.18 | 0.4% | 0% | 14.88 | 37% |

| Receptor ID | Existing (µg/m$^3$) | Proposed (µg/m$^3$) | % PC of AQO | PC Change % of AQO | Proposed PEC (µg/m$^3$)[1] | % Proposed PEC of AQO |
|---|---|---|---|---|---|---|
| R73 | 0.37 | 0.50 | 1.2% | 0% | 15.20 | 38% |
| R74 | 0.11 | 0.07 | 0.2% | 0% | 14.77 | 37% |
| R75 | 0.36 | 0.20 | 0.5% | 0% | 14.90 | 37% |
| R76 | 0.47 | 0.24 | 0.6% | -1% | 14.94 | 37% |
| R77 | 0.24 | 0.36 | 0.9% | 0% | 15.06 | 38% |
| R78 | 0.11 | 0.06 | 0.2% | 0% | 14.76 | 37% |
| **AQO** | | | **40 µg/m$^3$** | | | |

Note 1 The highest nearby monitored $NO_2$ concentration in 2022 has been used for all receptors (see **Section 5.2.10**)

In the case of long-term $NO_2$, the model predicts that the highest site-wide PC following the variation would be 1.33 µg/m$^3$ (or 3.3% of the AQO) at receptor R1. This results in an increase of 0.59 µg/m$^3$, or 1% of the AQO. The site-wide impacts, therefore, cannot be considered insignificant with regard to EA guidance; however, this is the case for both the existing and proposed operations.

While there is a proposed increase at some receptor locations as a result of the variation, there is also the potential for reduced impacts at others, as demonstrated in **Table 6.1** and **Figure 6.1**.

Furthermore, while there is predicted to be an increase at some locations as a result of the variation, the predicted PECs continue to be well below the annual $NO_2$ objective. **Figure 6.1** presents the maximum 3-year predicted site-wide PC concentrations under the existing and proposed operations.

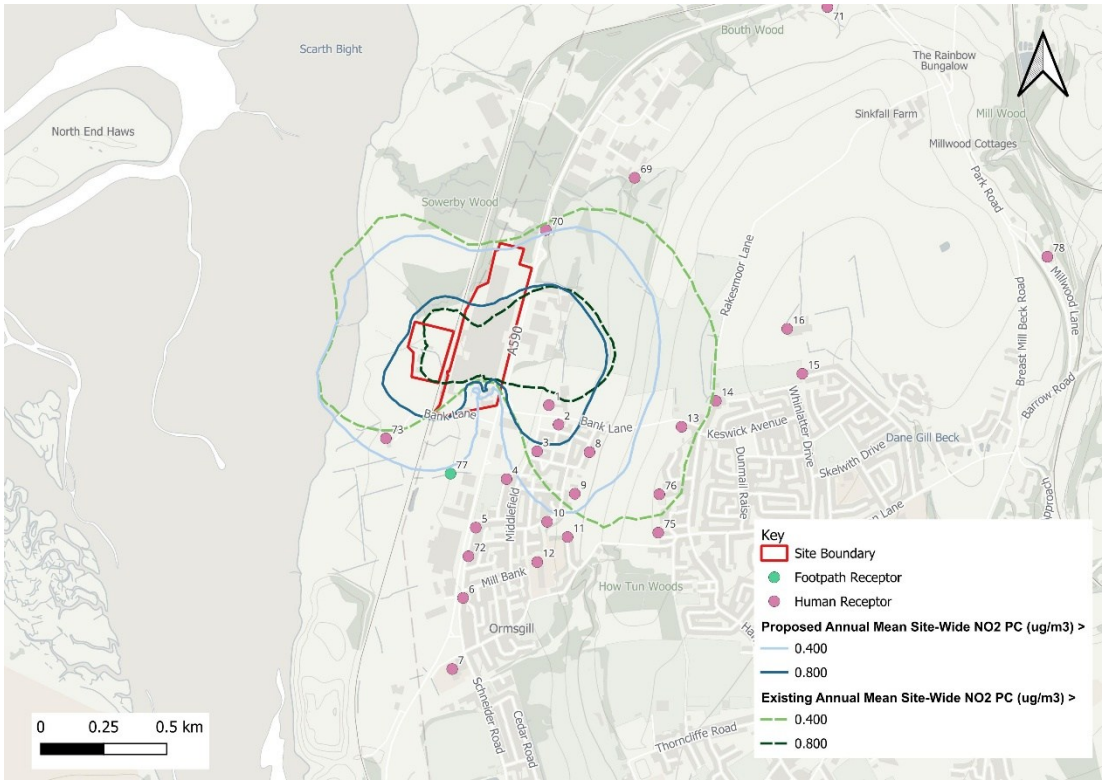


**Figure 6.1: Site-wide Existing and Proposed Annual Mean $NO_2$ PC Contour (maximum of 3 years)**

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### 6.1.2 $NO_2$ 1-hour Mean

**Table 6.2** shows the comparison of the 99.79$^{th}$ percentile 1-hour mean $NO_2$ PCs for the Existing and Proposed scenarios at the assessed receptor locations. Furthermore, the percentage change between the scenarios and the future PEC (background, as described in **Section 5.2.10** + proposed operations) are also presented.

**Table 6.2: Predicted 99.79$^{th}$ Hourly Mean $NO_2$ Impacts at Discrete Receptors**

| Receptor ID | Existing (µg/m$^3$) | Proposed (µg/m$^3$) | % PC of AQO | PC Change % of AQO | Proposed PEC (µg/m$^3$)$^{1,2}$ | % Proposed PEC of AQO |
|---|---|---|---|---|---|---|
| R1 | 4.16 | 7.86 | 4% | 2% | 37.26 | **19%** |
| R2 | 4.39 | 9.09 | 5% | 2% | 38.49 | **19%** |
| R3 | 5.08 | 10.76 | 5% | 3% | 40.16 | **20%** |
| R4 | 4.79 | 9.67 | 5% | 2% | 39.07 | **20%** |
| R5 | 4.08 | 5.44 | 3% | 1% | 34.84 | **17%** |
| R6 | 2.96 | 3.57 | 2% | 0% | 32.97 | **16%** |

| Receptor ID | Existing (µg/m$^3$) | Proposed (µg/m$^3$) | % PC of AQO | PC Change % of AQO | Proposed PEC (µg/m$^3$)[1,2] | % Proposed PEC of AQO |
|---|---|---|---|---|---|---|
| R7 | 2.25 | 2.67 | 1% | 0% | 32.07 | **16%** |
| R8 | 4.23 | 8.85 | 4% | 2% | 38.25 | **19%** |
| R9 | 5.56 | 9.73 | 5% | 2% | 39.13 | **20%** |
| R10 | 4.73 | 9.55 | 5% | 2% | 38.95 | **19%** |
| R11 | 4.66 | 8.03 | 4% | 2% | 37.43 | **19%** |
| R12 | 3.63 | 7.07 | 4% | 2% | 36.47 | **18%** |
| R13 | 6.37 | 3.37 | 2% | -1% | 32.77 | **16%** |
| R14 | 5.94 | 3.25 | 2% | -1% | 32.65 | **16%** |
| R15 | 2.69 | 2.01 | 1% | 0% | 31.41 | **16%** |
| R16 | 2.67 | 2.09 | 1% | 0% | 31.49 | **16%** |
| R69 | 2.79 | 3.08 | 2% | 0% | 32.48 | **16%** |
| R70 | 3.96 | 4.62 | 2% | 0% | 34.02 | **17%** |
| R71 | 1.56 | 1.15 | 1% | 0% | 30.55 | **15%** |
| R72 | 3.57 | 4.37 | 2% | 0% | 33.77 | **17%** |
| R73 | 4.67 | 5.51 | 3% | 0% | 34.91 | **17%** |
| R74 | 1.57 | 1.08 | 1% | 0% | 30.48 | **15%** |
| R75 | 7.57 | 4.58 | 2% | -1% | 33.98 | **17%** |
| R76 | 7.60 | 4.06 | 2% | -2% | 33.46 | **17%** |
| R77 | 4.71 | 5.26 | 3% | 0% | 34.66 | **17%** |
| R78 | 1.43 | 0.92 | 0% | 0% | 30.32 | **15%** |
| **AQO** | | **200 µg/m$^3$** | | | | |

Note 1 The highest nearby monitored $NO_2$ concentration in 2022 has been used for all receptors (see **Section 5.2.10**)

Note 2 2 x the annual mean background inline with EA guidance

In the case of the 1-hour $NO_2$ objective, the model predicts that the highest site-wide PC following the variation would be 10.76 µg/m$^3$ (or 5% of the AQO) at receptor R3. This results in an increase of 5.68 µg/m$^3$, or 3% of the AQO. The site-wide impacts, therefore, can be considered insignificant with regard to EA guidance (being below 10% of the objective[17]). This is the case for both the existing and proposed operations.

As a result of the predicted site-wide PCs being insignificant, no contours have been presented. Furthermore, while there is predicted to be an increase at some locations as a result of the variation, the predicted PECs continue to be well below the 1-hour mean $NO_2$ objective.

[17] see **Section 5.2.14**

### 6.1.3 CO 8-hour Mean

**Table 6.3** shows the comparison of the 100th percentile 8-hour mean CO PCs for the Existing and Proposed scenarios at the assessed receptor locations. Furthermore, the percentage change between the scenarios and the future PEC (background, as described in **Section 5.2.10** + proposed operations) are also presented.

**Table 6.3: Predicted 100th 8-hour Mean CO Impacts at Discrete Receptors**

| Receptor ID | Existing (µg/m³) | Proposed (µg/m³) | % PC of AQO | PC Change % of AQO | Proposed PEC (µg/m³)[1,2] | % Proposed PEC of AQO |
|---|---|---|---|---|---|---|
| 1 | 52.63 | 53.93 | 1% | 0% | 423.93 | **4.2%** |
| 2 | 38.20 | 39.53 | 0% | 0% | 409.53 | **4.1%** |
| 3 | 48.06 | 53.96 | 1% | 0% | 423.96 | **4.2%** |
| 4 | 35.98 | 37.94 | 0% | 0% | 407.94 | **4.1%** |
| 5 | 31.72 | 32.64 | 0% | 0% | 402.64 | **4.0%** |
| 6 | 22.12 | 22.53 | 0% | 0% | 392.53 | **3.9%** |
| 7 | 16.85 | 16.96 | 0% | 0% | 386.96 | **3.9%** |
| 8 | 33.06 | 33.85 | 0% | 0% | 403.85 | **4.0%** |
| 9 | 34.15 | 36.06 | 0% | 0% | 406.06 | **4.1%** |
| 10 | 44.09 | 47.77 | 0% | 0% | 417.77 | **4.2%** |
| 11 | 31.09 | 33.28 | 0% | 0% | 403.28 | **4.0%** |
| 12 | 22.67 | 24.59 | 0% | 0% | 394.59 | **3.9%** |
| 13 | 28.66 | 26.99 | 0% | 0% | 396.99 | **4.0%** |
| 14 | 19.69 | 17.67 | 0% | 0% | 387.67 | **3.9%** |
| 15 | 21.65 | 21.46 | 0% | 0% | 391.46 | **3.9%** |
| 16 | 30.75 | 30.77 | 0% | 0% | 400.77 | **4.0%** |
| 69 | 15.85 | 15.60 | 0% | 0% | 385.60 | **3.9%** |
| 70 | 31.27 | 30.33 | 0% | 0% | 400.33 | **4.0%** |
| 71 | 6.58 | 5.97 | 0% | 0% | 375.97 | **3.8%** |
| 72 | 28.61 | 29.12 | 0% | 0% | 399.12 | **4.0%** |
| 73 | 50.93 | 51.34 | 1% | 0% | 421.34 | **4.2%** |
| 74 | 5.63 | 5.13 | 0% | 0% | 375.13 | **3.8%** |
| 75 | 19.94 | 18.47 | 0% | 0% | 388.47 | **3.9%** |
| 76 | 33.42 | 32.01 | 0% | 0% | 402.01 | **4.0%** |
| 77 | 67.72 | 68.08 | 1% | 0% | 438.08 | **4.4%** |
| 78 | 5.27 | 5.26 | 0% | 0% | 375.26 | **3.8%** |
| **AQO** | | **10,000 µg/m³** | | | | |

Note 1 The 2001 DEFRA Background Concentration has been used for all receptors.

Note 2 2 x the annual mean background inline with EA guidance

In the case of the 8-hour CO objective, the model predicts that the highest site-wide PC following the variation would be 53.96 µg/m$^3$ (or 1% of the AQO) at receptor R3. The site-wide impacts, therefore, can be considered insignificant with regard to EA guidance (being below 10% of the objective[18]). This is the case for both the existing and proposed operations.

As a result of the predicted site-wide PCs being insignificant, no contours have been presented. Furthermore, while there is predicted to be an increase at some locations as a result of the variation, the predicted PECs continue to be well below the 8-hour mean CO objective.

### 6.1.4 CO 1-hour Mean

**Table 6.4** shows the comparison of the 100$^{th}$ percentile 1-hour mean CO PCs for the Existing and Proposed scenarios at the assessed receptor locations. Furthermore, the percentage change between the scenarios and the future PEC (background, as described in **Section 5.2.10,** + proposed operations) are also presented.

**Table 6.4: Predicted 100$^{th}$ 1-hour Mean CO Impacts at Discrete Receptors**

| Receptor ID | Existing (µg/m$^3$) | Proposed (µg/m$^3$) | % PC of EAL | PC Change % of EAL | Proposed PEC (µg/m$^3$)[1,2] | % Proposed PEC of EAL |
|---|---|---|---|---|---|---|
| 1 | 103.92 | 103.97 | 0% | 0% | 473.97 | **1.6%** |
| 2 | 115.09 | 115.20 | 0% | 0% | 485.20 | **1.6%** |
| 3 | 112.71 | 120.22 | 0% | 0% | 490.22 | **1.6%** |
| 4 | 116.26 | 123.70 | 0% | 0% | 493.70 | **1.6%** |
| 5 | 108.52 | 109.58 | 0% | 0% | 479.58 | **1.6%** |
| 6 | 88.62 | 89.70 | 0% | 0% | 459.70 | **1.5%** |
| 7 | 69.72 | 70.51 | 0% | 0% | 440.51 | **1.5%** |
| 8 | 119.74 | 123.32 | 0% | 0% | 493.32 | **1.6%** |
| 9 | 102.89 | 113.55 | 0% | 0% | 483.55 | **1.6%** |
| 10 | 103.72 | 113.31 | 0% | 0% | 483.31 | **1.6%** |
| 11 | 98.70 | 108.80 | 0% | 0% | 478.80 | **1.6%** |
| 12 | 93.94 | 100.75 | 0% | 0% | 470.75 | **1.6%** |
| 13 | 102.14 | 101.63 | 0% | 0% | 471.63 | **1.6%** |
| 14 | 93.06 | 92.89 | 0% | 0% | 462.89 | **1.5%** |
| 15 | 79.16 | 80.02 | 0% | 0% | 450.02 | **1.5%** |
| 16 | 75.59 | 75.53 | 0% | 0% | 445.53 | **1.5%** |
| 69 | 78.69 | 52.39 | 0% | 0% | 422.39 | **1.4%** |

[18] see Section **5.2.14**

| Receptor ID | Existing (µg/m$^3$) | Proposed (µg/m$^3$) | % PC of EAL | PC Change % of EAL | Proposed PEC (µg/m$^3$)[1,2] | % Proposed PEC of EAL |
|---|---|---|---|---|---|---|
| 70 | 88.03 | 55.02 | 0% | 0% | 425.02 | **1.4%** |
| 71 | 39.20 | 102.74 | 0% | 0% | 472.74 | **1.6%** |
| 72 | 101.45 | 108.62 | 0% | 0% | 478.62 | **1.6%** |
| 73 | 113.67 | 119.13 | 0% | 0% | 489.13 | **1.6%** |
| 74 | 36.53 | 119.34 | 0% | 0% | 489.34 | **1.6%** |
| 75 | 98.69 | 110.55 | 0% | 0% | 480.55 | **1.6%** |
| 76 | 103.72 | 35.91 | 0% | 0% | 405.91 | **1.4%** |
| 77 | 126.00 | 21.26 | 0% | 0% | 391.26 | **1.3%** |
| 78 | 32.43 | 23.26 | 0% | 0% | 393.26 | **1.3%** |
| **EAL** | | **30,000 µg/m$^3$** | | | | |

Note 1 The DEFRA 2001 Background Concentration has been used for all receptors.

Note 2 2 x the annual mean background inline with EA guidance

In the case of the 1-hour CO EAL, the model predicts that the highest site-wide PC following the variation would be 123.7 µg/m$^3$ (or 0% of the AQO) at receptor R4. The site-wide impacts, therefore, can be considered insignificant with regard to EA guidance (being below 10% of the objective[19]). This is the case for both the existing and proposed operations.

As a result of the predicted site-wide PCs being insignificant, no contours have been presented. Furthermore, while there is predicted to be an increase at some locations as a result of the variation, the predicted PECs continue to be well below the 1-hour mean CO objective.

### 6.1.5 Significance of Effects

The assessment has demonstrated that the proposed site-wide impacts against all air quality standards are below the EA's 1% and 10% insignificance thresholds for long- and short-term impacts, respectively. This is the case for both the existing and proposed operations. The exception to the above is for the $NO_2$ annual mean impacts, where impacts exceed the 1% insignificance threshold. Again, this is the case at both the existing and proposed operations.

While there is a proposed increase at some receptor locations as a result of the variation, including at locations where the 1% insignificance threshold is already exceeded, there is also the potential for reduced impacts at others. When considering that the majority of impacts are below insignificance thresholds and all proposed total concentrations (background + proposed operational emissions) following the changes are well below all AQS, the impacts on human health due to the proposed changes are judged to be not significant and reasonable and

[19] see Section **5.2.14**

foreseeable changes associated with the uncertainties and sensitivities discussed in **Sections 5.3 and 5.4** are not likely to change this conclusion.

## 6.2 Site-wide Impacts on Ecological Receptors

### 6.2.1 NOx Impacts

**Table C1** and **Table C2** within **Appendix C** detail the results of the NOx assessment at nearby ecology sites, with an assessment against the annual mean (30 µg/m$^3$) and 100$^{th}$ percentile 24-hour mean CLe (75 µg/m$^3$) undertaken.

The site-wide impacts following the changes to the new boiler and stack configuration result in a predicted impact greater than the 1%[20] or 10% insignificance thresholds for both long- and short-term impacts, respectively. These impacts are predicted at a small number of locations along the Duddon Estuary/Morecambe Bay Ramsar/SSSI/SAC/SPA, with the majority of impacts below the insignificance thresholds. This is the case for both the existing and proposed operations.

However, the results presented demonstrate no exceedances of the annual mean or 24-hour mean NOx critical level as a result of the proposed operation's PEC (background + proposed operations impact).

### 6.2.2 Critical Loads for Nutrient Nitrogen and Acidity

**Table C3** and **Table C4** within **Appendix C** present the results for total nutrient nitrogen and acid deposition fluxes at each ecological receptor. The PCs are assessed against the minimum CLo for each site.

The site-wide impacts following the changes to the new boiler and stack configuration result in a predicted nitrogen deposition flux impact greater than the 1%[20] insignificance threshold. This impact is located at a small number of locations along the Duddon Estuary/Morecambe Bay Ramsar/SSSI/SAC/SPA, with the majority of impacts below the insignificance threshold. This is the case for both the existing and proposed operations.

The site-wide impacts following the changes to the new boiler and stack configuration result in a maximum predicted acid deposition flux impact less than the 1%[20] insignificance threshold. This is also the case for both the existing and proposed operations.

In addition, exceedances of both the nutrient nitrogen and acid deposition Clo's at multiple ecological sites are predicted. This is due to the existing background concentrations, of which the site is currently contributing. However, with the removal of the whole site's contribution, impacts would still exceed the Clo's at the nearby habitat sites.

[20] The screening threshold of 100% has been used for non-statutory ecology sites such as local wildlife sites, as per EA guidance, and no exceedances of this threshold have been predicted.

The spatial extent of where the predicted impacts exceed 1% of the nutrient nitrogen deposition critical load (or 0.05 kgN/ha/yr, based on a critical load of 5 kgN/ha/yr) for the existing and proposed scenarios is shown in **Figure 6.2**. Furthermore, the predicted extent and magnitude of any increase in flux deposition change due to the permit variation can be seen within the modelled receptor results presented in **Table C3.**

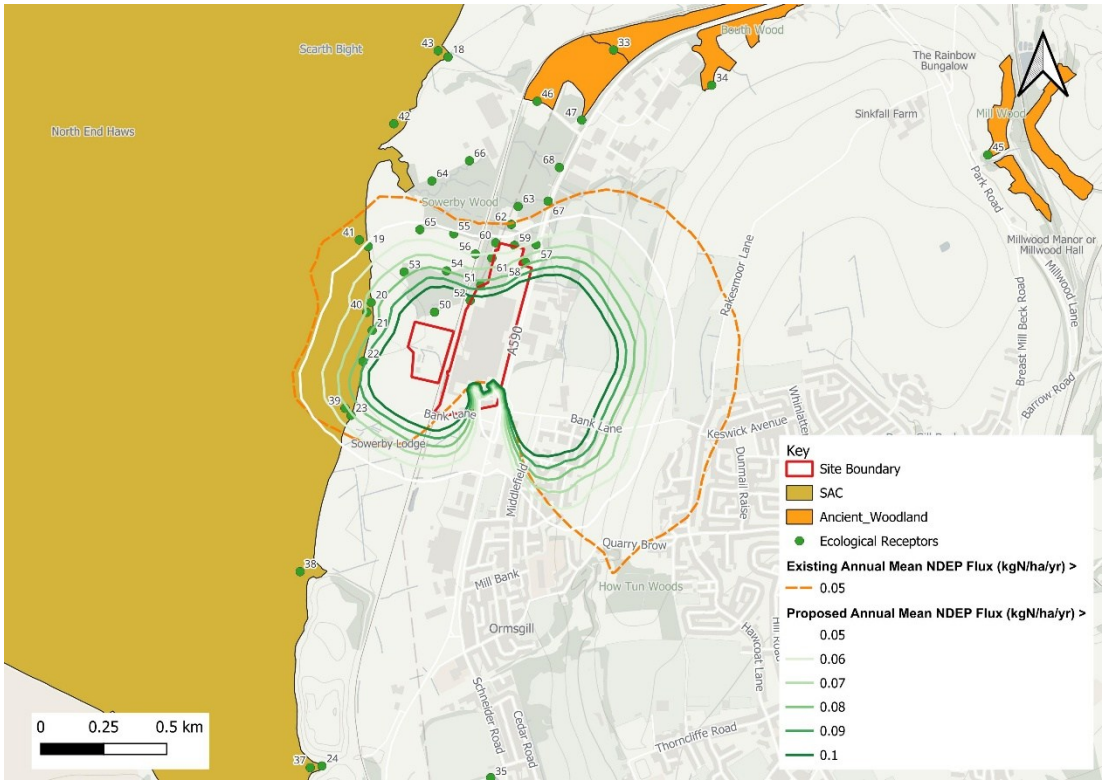



**Figure 6.2: Site-wide Proposed Annual Mean Nitrogen Deposition Flux Contour (maximum of 3 years). Assuming Grassland deposition velocity.**



### 6.2.3 Significance of Effects

With the exception of the nitrogen deposition flux impacts at the Duddon Estuary/Morecambe Bay Ramsar/SSSI/SAC/SPA, the proposed site-wide impacts on nearby habitat sites are not expected to exceed the relevant insignificance thresholds where the PEC is exceeded (background + proposed operations impact).

At the Duddon Estuary/Morecambe Bay Ramsar/SSSI/SAC/SPA, the spatial extent where the site-wide nitrogen deposition insignificance threshold is exceeded will reduce as part of the development; however, total flux impact may increase at small locations due to the change in stack configurations.

When considering the following, the risk of significant impacts from the changes to the KC operations is judged to be low and is considered not significant:

- the majority of the predicted impacts at nearby habitat sites are below the

insignificance thresholds or their critical levels;

- The extent of the area where the proposed impacts exceed the insignificance threshold is small, and the reduction in area when compared to the existing situation;
- the small variations in magnitude and spatial extent between the existing and proposed operations at locations where the impacts are above insignificance thresholds; and
- the general conservatism of the modelling undertaken and the comparison against the most conservative critical loads.

Furthermore, reasonable and foreseeable changes associated with the uncertainties and sensitivities discussed in **Sections 5.3 and 5.4** are not likely to change the conclusions.

# 7 CONCLUSIONS

An air quality assessment to support a permit variation application for the replacement of three natural-gas fuelled boilers with three new dual-fuelled boilers (natural gas and hydrogen) and associated stacks has been prepared with reference to existing air quality in the area, relevant air quality legislation, policy and guidance and appropriate conservatisms.

Ground level concentrations of oxides of nitrogen, nitrogen dioxide and carbon monoxide associated with the emissions from the new flues were predicted at nearby relevant human and ecological receptor locations using dispersion modelling. This included consideration of all site-wide combustion sources.

The assessment has demonstrated that the proposed site-wide impacts against all air quality standards are below the EA's 1% and 10% insignificance thresholds for long- and short-term impacts, respectively. The exception to the above is for the $NO_2$ annual mean impacts, where impacts exceed the 1% insignificance threshold at some locations. This is the case at both the existing and proposed operations. When considering that the majority of impacts are below insignificance thresholds and all proposed total concentrations (background + proposed operational emissions) following the changes are well below all AQS, the impacts on human health due to the proposed changes have been judged to be not significant.

Apart from the nitrogen deposition impacts at the Duddon Estuary/Morecambe Bay Ramsar/SSSI/SAC/SPA, the proposed site-wide impacts on nearby habitat sites are not expected to exceed the EA's insignificance thresholds where the PEC (background + proposed operations impact) is exceeded.

With regard to the nitrogen deposition impacts at the Duddon Estuary/Morecambe Bay Ramsar/SSSI/SAC/SPA, while the PEC exceeds due to the background fluxes, when considering the spatial extent of the area where the impacts are predicted to exceed the insignificance thresholds and the overalls changes when compared to the current operations, the risk of significant impacts from the changes to the KC operations is judged to be low and is considered not significant.

Furthermore, reasonable and foreseeable changes associated with the uncertainties and sensitivities discussed in **Sections 5.3 and 5.4** are not likely to change the conclusions of this assessment.

Overall, the air quality effects of the proposed permit variation are judged to be not significant.

# APPENDIX A – MODEL SENSITIVITY ANALYSIS

**Table A1** presents the results of the model sensitivity testing described in **Section 5.** The results presented are the PCs for Receptor R1 (the worst-case modelled receptor against the annual mean $NO_2$ AQO) for the meteorological year 2022. As can be seen from the results, the model is not overly sensitive to changes in the fuel used within the proposed boilers, and the impacts during commissioning are likely to be less than future operation (at the worst-case receptor). Furthermore, the results presented within the report are near worst-case in terms of building and terrain effects but are within normal modelling uncertainty. Based on the impacts predicted in the main body of the report, the sensitivity testing does not impact the conclusions of the assessment.

**Table A1: Results of the Sensitivity Testing**

| Model description | Annual mean $NO_2$ ($\mu g/m^3$) | 99.79$^{th}$ %ile 1-hour Mean $NO_2$ ($\mu g/m^3$) |
|---|---|---|
| **Core Model – Assuming proposed boilers are fuelled on Hydrogen** | 1.33 | 7.86 |
| **Model 1 – Core Model with no building** | 0.88 | 4.40 |
| **Model 2 – Core Model with no terrain** | 1.35 | 6.95 |
| **Model 3 – Core Model assuming proposed new boilers are fuelled on natural gas** | 1.39 | 8.13 |
| **Model 4 – Core Model assuming a scenario where one dual-fuelled boilers are being commissioned on natural gas, which will occur while two of the existing natural gas boilers and other site impacts are in operation** | 1.15 | 5.64 |

# APPENDIX B – RECEPTORS

**Table B1** presents the discrete human and ecological receptors included in the dispersion model.

**Table B1: Discrete Human and Ecological Receptors Included in the Model**

| Receptor ID | Receptor Type | X (m) | Y (m) | Height (m) |
|---|---|---|---|---|
| 1 | Residential | 319808 | 472447 | 1.5 |
| 2 | Residential | 319845 | 472369 | 1.5 |
| 3 | Residential | 319758 | 472265 | 1.5 |
| 4 | Residential | 319635 | 472157 | 1.5 |
| 5 | Residential | 319509 | 471967 | 1.5 |
| 6 | Residential | 319454 | 471689 | 1.5 |
| 7 | Residential | 319406 | 471408 | 1.5 |
| 8 | Residential | 319966 | 472258 | 1.5 |
| 9 | Residential | 319905 | 472094 | 1.5 |
| 10 | Residential | 319793 | 471985 | 1.5 |
| 11 | Residential | 319873 | 471923 | 1.5 |
| 12 | Residential | 319751 | 471826 | 1.5 |
| 13 | Residential | 320333 | 472352 | 1.5 |
| 14 | Residential | 320471 | 472452 | 1.5 |
| 15 | Residential | 320816 | 472554 | 1.5 |
| 16 | Residential | 320759 | 472733 | 1.5 |
| 17 | Ecological | 319582 | 474223 | 1.5 |
| 18 | Ecological | 319432 | 473833 | 1.5 |
| 19 | Ecological | 319102 | 473088 | 1.5 |
| 20 | Ecological | 319110 | 472866 | 1.5 |
| 21 | Ecological | 319112 | 472755 | 1.5 |
| 22 | Ecological | 319073 | 472633 | 1.5 |
| 23 | Ecological | 319022 | 472420 | 1.5 |
| 24 | Ecological | 318882 | 471033 | 1.5 |
| 25 | Ecological | 320980 | 475916 | 1.5 |
| 26 | Ecological | 321673 | 478919 | 1.5 |

| Receptor ID | Receptor Type | X (m) | Y (m) | Height (m) |
|---|---|---|---|---|
| 27 | Ecological | 318915 | 469274 | 1.5 |
| 28 | Ecological | 319430 | 467935 | 1.5 |
| 29 | Ecological | 321160 | 468621 | 1.5 |
| 30 | Ecological | 322164 | 468315 | 1.5 |
| 31 | Ecological | 326216 | 468287 | 1.5 |
| 32 | Ecological | 328183 | 470799 | 1.5 |
| 33 | Ecological | 320089 | 473849 | 1.5 |
| 34 | Ecological | 320476 | 473703 | 1.5 |
| 35 | Ecological | 319552 | 470975 | 1.5 |
| 36 | Ecological | 329574 | 473231 | 1.5 |
| 37 | Ecological | 318835 | 471027 | 1.5 |
| 38 | Ecological | 318809 | 471805 | 1.5 |
| 39 | Ecological | 318999 | 472449 | 1.5 |
| 40 | Ecological | 319092 | 472827 | 1.5 |
| 41 | Ecological | 319067 | 473114 | 1.5 |
| 42 | Ecological | 319212 | 473572 | 1.5 |
| 43 | Ecological | 319393 | 473859 | 1.5 |
| 44 | Ecological | 319518 | 474222 | 1.5 |
| 45 | Ecological | 321567 | 473408 | 1.5 |
| 46 | Ecological | 319782 | 473651 | 1.5 |
| 47 | Ecological | 319958 | 473574 | 1.5 |
| 48 | Ecological | 319109 | 470381 | 1.5 |
| 49 | Ecological | 319435 | 470946 | 1.5 |
| 50 | Ecological | 319361 | 472823 | 1.5 |
| 51 | Ecological | 319546 | 472927 | 1.5 |
| 52 | Ecological | 319503 | 472867 | 1.5 |
| 53 | Ecological | 319243 | 472984 | 1.5 |
| 54 | Ecological | 319411 | 472986 | 1.5 |
| 55 | Ecological | 319442 | 473132 | 1.5 |
| 56 | Ecological | 319527 | 473051 | 1.5 |
| 57 | Ecological | 319769 | 473084 | 1.5 |

| Receptor ID | Receptor Type | X (m) | Y (m) | Height (m) |
|---|---|---|---|---|
| 58 | Ecological | 319724 | 473015 | 1.5 |
| 59 | Ecological | 319682 | 473082 | 1.5 |
| 60 | Ecological | 319608 | 473094 | 1.5 |
| 61 | Ecological | 319592 | 473033 | 1.5 |
| 62 | Ecological | 319672 | 473165 | 1.5 |
| 63 | Ecological | 319700 | 473236 | 1.5 |
| 64 | Ecological | 319359 | 473343 | 1.5 |
| 65 | Ecological | 319308 | 473151 | 1.5 |
| 66 | Ecological | 319509 | 473421 | 1.5 |
| 67 | Ecological | 319819 | 473255 | 1.5 |
| 68 | Ecological | 319866 | 473388 | 1.5 |
| 69 | Residential | 320164 | 473342 | 1.5 |
| 70 | Residential | 319808 | 473141 | 1.5 |
| 71 | Residential | 320940 | 474005 | 1.5 |
| 72 | Residential | 319478 | 471854 | 1.5 |
| 73 | Residential | 319159 | 472327 | 1.5 |
| 74 | Residential | 320407 | 474328 | 1.5 |
| 75 | Residential | 320233 | 471934 | 1.5 |
| 76 | Residential | 320240 | 472086 | 1.5 |
| 77 | Footpath | 319413 | 472182 | 1.5 |
| 78 | Residential | 321796 | 473001 | 1.5 |

# APPENDIX C – ECOLOGICAL RECEPTOR RESULTS

**Table C1: Predicted Annual Mean $NO_x$ Impacts at Discrete Ecological Receptors**

| Receptor ID | Existing PC (µg/m$^3$) | Proposed PC (µg/m$^3$) | % PC of CIe | PC Change % of CIe | PEC µg/m$^3$ | % PEC of CLe |
|---|---|---|---|---|---|---|
| R17 Ramsar/SSSI/SAC/ SPA | 0.14 | 0.09 | 0.3% | -0.16% | 8.69 | 29% |
| R18 Ramsar/SSSI/SAC/ SPA | 0.19 | 0.13 | 0.4% | -0.20% | 8.73 | 29% |
| R19 Ramsar/SSSI/SAC/ SPA | 0.63 | 0.52 | 1.7% | -0.39% | 9.12 | 30% |
| R20 Ramsar/SSSI/SAC/ SPA | 0.77 | 0.73 | 2.4% | -0.12% | 9.33 | 31% |
| R21 Ramsar/SSSI/SAC/ SPA | 0.73 | 0.80 | 2.7% | 0.23% | 9.40 | 31% |
| R22 Ramsar/SSSI/SAC/ SPA) | 0.77 | 0.86 | 2.9% | 0.28% | 9.46 | 32% |
| R23 Ramsar/SSSI/SAC/ SPA | 0.60 | 0.68 | 2.3% | 0.25% | 9.28 | 31% |
| R24 Ramsar/SSSI/SAC/ SPA | 0.07 | 0.07 | 0.2% | -0.01% | 8.67 | 29% |
| R25 Ramsar/SSSI/SAC/ SPA/Ancient Woodland | 0.06 | 0.04 | 0.1% | -0.08% | 8.64 | 29% |
| R26 Ramsar/SSSI/SAC/ SPA | 0.02 | 0.01 | 0.0% | -0.03% | 8.61 | 29% |
| R27 Ramsar/SSSI/SAC/ SPA | 0.03 | 0.03 | 0.1% | -0.01% | 8.63 | 29% |
| R28 Ramsar/SSSI/SAC/ SPA | 0.02 | 0.02 | 0.1% | 0.00% | 8.62 | 29% |
| R29 Ramsar/SSSI/SPA | 0.04 | 0.03 | 0.1% | -0.05% | 8.63 | 29% |
| R30 Ramsar/SSSI/SAC/ SPA | 0.04 | 0.03 | 0.1% | -0.05% | 8.63 | 29% |
| R31 Ramsar/SSSI/SAC/ SPA | 0.02 | 0.01 | 0.0% | -0.03% | 8.61 | 29% |
| R32 Ramsar/SSSI/SAC/ SPA | 0.02 | 0.01 | 0.0% | -0.03% | 8.61 | 29% |
| R33 Ancient Woodland/LWS | 0.22 | 0.15 | 0.5% | -0.23% | 8.75 | 29% |
| R34 Ancient Woodland/LWS | 0.27 | 0.18 | 0.6% | -0.30% | 8.78 | 29% |
| R35 LWS | 0.07 | 0.09 | 0.3% | 0.05% | 8.69 | 29% |
| R36 Ramsar/SSSI/SAC/ SPA | 0.02 | 0.01 | 0.0% | -0.02% | 8.61 | 29% |
| R37 Ramsar/SSSI/SAC/ SPA/NNR | 0.07 | 0.07 | 0.2% | -0.01% | 8.67 | 29% |
| R38 Ramsar/SSSI/SAC/ SPA/NNR | 0.17 | 0.17 | 0.6% | 0.01% | 8.77 | 29% |
| R39 Ramsar/SSSI/SAC/ SPA/NNR | 0.61 | 0.67 | 2.2% | 0.20% | 9.27 | 31% |
| R40 Ramsar/SSSI/SAC/ SPA/NNR | 0.72 | 0.70 | 2.3% | -0.05% | 9.30 | 31% |
| R41 Ramsar/SSSI/SAC/ SPA/NNR | 0.57 | 0.45 | 1.5% | -0.38% | 9.05 | 30% |
| R42 Ramsar/SSSI/SAC/ SPA/NNR | 0.29 | 0.22 | 0.7% | -0.26% | 8.82 | 29% |
| R43 Ramsar/SSSI/SAC/ SPA/NNR | 0.18 | 0.13 | 0.4% | -0.19% | 8.73 | 29% |

| Receptor ID | Existing PC (µg/m$^3$) | Proposed PC (µg/m$^3$) | % PC of CIe | PC Change % of CIe | PEC µg/m$^3$ | % PEC of CLe |
|---|---|---|---|---|---|---|
| R44 Ramsar/SSSI/SAC/ SPA/NNR | 0.13 | 0.09 | 0.3% | -0.16% | 8.69 | 29% |
| R45 Ancient Woodland | 0.16 | 0.09 | 0.3% | -0.22% | 8.69 | 29% |
| R46 Ancient Woodland | 0.24 | 0.16 | 0.5% | -0.24% | 8.76 | 29% |
| R47 Ancient Woodland | 0.29 | 0.21 | 0.7% | -0.25% | 8.81 | 29% |
| R48 LWS | 0.05 | 0.05 | 0.2% | -0.01% | 8.65 | 29% |
| R49 LWS | 0.07 | 0.08 | 0.3% | 0.03% | 8.68 | 29% |
| R50 LWS | 1.16 | 1.35 | 4.5% | 0.61% | 9.95 | 33% |
| R51 LWS | 0.75 | 0.84 | 2.8% | 0.29% | 9.44 | 31% |
| R52 LWS | 0.86 | 1.07 | 3.6% | 0.71% | 9.67 | 32% |
| R53 LWS | 0.83 | 0.76 | 2.5% | -0.24% | 9.36 | 31% |
| R54 LWS | 0.78 | 0.79 | 2.6% | 0.05% | 9.39 | 31% |
| R55 LWS | 0.56 | 0.51 | 1.7% | -0.16% | 9.11 | 30% |
| R56 LWS | 0.61 | 0.59 | 2.0% | -0.06% | 9.19 | 31% |
| R57 LWS | 0.67 | 0.63 | 2.1% | -0.15% | 9.23 | 31% |
| R58 LWS | 0.77 | 0.76 | 2.5% | -0.02% | 9.36 | 31% |
| R59 LWS | 0.60 | 0.55 | 1.8% | -0.16% | 9.15 | 31% |
| R60 LWS | 0.58 | 0.53 | 1.8% | -0.15% | 9.13 | 30% |
| R61 LWS | 0.65 | 0.63 | 2.1% | -0.06% | 9.23 | 31% |
| R62 LWS | 0.50 | 0.43 | 1.4% | -0.24% | 9.03 | 30% |
| R63 LWS | 0.44 | 0.36 | 1.2% | -0.27% | 8.96 | 30% |
| R64 LWS | 0.41 | 0.33 | 1.1% | -0.26% | 8.93 | 30% |
| R65 LWS | 0.63 | 0.54 | 1.8% | -0.30% | 9.14 | 30% |
| R66 LWS | 0.33 | 0.25 | 0.8% | -0.25% | 8.85 | 30% |
| R67 LWS | 0.47 | 0.39 | 1.3% | -0.24% | 8.99 | 30% |
| R68 LWS | 0.37 | 0.29 | 1.0% | -0.25% | 8.89 | 30% |
| **CLe** | | | **30** | | | |

**Table C2: Predicted 24-hour Mean $NO_x$ Impacts at Discrete Ecological Receptors**

| Receptor ID | Existing PC (µg/m$^3$) | Proposed PC (µg/m$^3$) | Proposed % of Objective | Change % of Objective | PEC µg/m$^3$ | % PEC of CLe |
|---|---|---|---|---|---|---|
| R17 Ramsar/SSSI/SAC/ SPA | 1.39 | 1.03 | 1.4% | -0.48% | 18.23 | 24% |
| R18 Ramsar/SSSI/SAC/ SPA | 2.61 | 1.56 | 2.1% | -1.40% | 18.76 | 25% |
| R19 Ramsar/SSSI/SAC/ SPA | 6.04 | 5.35 | 7.1% | -0.92% | 22.55 | 30% |
| R20 Ramsar/SSSI/SAC/ SPA | 8.29 | 9.01 | 12.0% | 0.95% | 26.21 | 35% |
| R21 Ramsar/SSSI/SAC/ SPA | 7.08 | 8.38 | 11.2% | 1.73% | 25.58 | 34% |
| R22 Ramsar/SSSI/SAC/ SPA) | 5.73 | 7.08 | 9.4% | 1.80% | 24.28 | 32% |
| R23 Ramsar/SSSI/SAC/ SPA | 6.00 | 5.93 | 7.9% | -0.09% | 23.13 | 31% |
| R24 Ramsar/SSSI/SAC/ SPA | 1.69 | 0.99 | 1.3% | -0.94% | 18.19 | 24% |
| R25 Ramsar/SSSI/SAC/ SPA/Ancient Woodland | 1.06 | 0.72 | 1.0% | -0.46% | 17.92 | 24% |
| R26 Ramsar/SSSI/SAC/ SPA | 0.44 | 0.27 | 0.4% | -0.23% | 17.47 | 23% |
| R27 Ramsar/SSSI/SAC/ SPA | 1.05 | 0.60 | 0.8% | -0.60% | 17.80 | 24% |
| R28 Ramsar/SSSI/SAC/ SPA | 0.44 | 0.31 | 0.4% | -0.18% | 17.51 | 23% |
| R29 Ramsar/SSSI/SPA | 0.59 | 0.44 | 0.6% | -0.20% | 17.64 | 24% |
| R30 Ramsar/SSSI/SAC/ SPA | 0.56 | 0.34 | 0.5% | -0.29% | 17.54 | 23% |
| R31 Ramsar/SSSI/SAC/ SPA | 0.30 | 0.21 | 0.3% | -0.11% | 17.41 | 23% |
| R32 Ramsar/SSSI/SAC/ SPA | 0.30 | 0.14 | 0.2% | -0.21% | 17.34 | 23% |
| R33 Ancient Woodland/LWS | 2.36 | 1.80 | 2.4% | -0.74% | 19.00 | 25% |
| R34 Ancient Woodland/LWS | 2.45 | 1.76 | 2.4% | -0.92% | 18.96 | 25% |
| R35 LWS | 1.22 | 0.99 | 1.3% | -0.32% | 18.19 | 24% |
| R36 Ramsar/SSSI/SAC/ SPA | 0.22 | 0.22 | 0.3% | -0.01% | 17.42 | 23% |
| R37 Ramsar/SSSI/SAC/ SPA/NNR | 1.71 | 0.98 | 1.3% | -0.98% | 18.18 | 24% |
| R38 Ramsar/SSSI/SAC/ SPA/NNR | 2.68 | 2.59 | 3.5% | -0.11% | 19.79 | 26% |
| R39 Ramsar/SSSI/SAC/ SPA/NNR | 5.76 | 5.63 | 7.5% | -0.17% | 22.83 | 30% |
| R40 Ramsar/SSSI/SAC/ SPA/NNR | 7.21 | 7.53 | 10.0% | 0.43% | 24.73 | 33% |
| R41 Ramsar/SSSI/SAC/ SPA/NNR | 5.48 | 4.65 | 6.2% | -1.11% | 21.85 | 29% |
| R42 Ramsar/SSSI/SAC/ SPA/NNR | 3.22 | 2.40 | 3.2% | -1.10% | 19.60 | 26% |
| R43 Ramsar/SSSI/SAC/ SPA/NNR | 2.65 | 1.57 | 2.1% | -1.44% | 18.77 | 25% |
| R44 Ramsar/SSSI/SAC/ SPA/NNR | 1.52 | 0.92 | 1.2% | -0.79% | 18.12 | 24% |
| R45 Ancient Woodland | 1.46 | 0.99 | 1.3% | -0.63% | 18.19 | 24% |
| R46 Ancient Woodland | 2.36 | 1.36 | 1.8% | -1.34% | 18.56 | 25% |
| R47 Ancient Woodland | 3.12 | 2.27 | 3.0% | -1.13% | 19.47 | 26% |
| R48 LWS | 1.43 | 0.99 | 1.3% | -0.58% | 18.19 | 24% |

| Receptor ID | Existing PC (µg/m$^3$) | Proposed PC (µg/m$^3$) | Proposed % of Objective | Change % of Objective | PEC µg/m$^3$ | % PEC of CLe |
|---|---|---|---|---|---|---|
| R49 LWS | 1.50 | 1.08 | 1.4% | -0.55% | 18.28 | 24% |
| R50 LWS | 9.66 | 12.18 | 16.2% | 3.35% | 29.38 | 39% |
| R51 LWS | 7.72 | 8.24 | 11.0% | 0.70% | 25.44 | 34% |
| R52 LWS | 9.38 | 12.51 | 16.7% | 4.17% | 29.71 | 40% |
| R53 LWS | 6.99 | 8.05 | 10.7% | 1.42% | 25.25 | 34% |
| R54 LWS | 7.74 | 8.85 | 11.8% | 1.48% | 26.05 | 35% |
| R55 LWS | 7.08 | 6.20 | 8.3% | -1.17% | 23.40 | 31% |
| R56 LWS | 6.92 | 6.09 | 8.1% | -1.10% | 23.29 | 31% |
| R57 LWS | 7.52 | 6.28 | 8.4% | -1.65% | 23.48 | 31% |
| R58 LWS | 7.88 | 7.03 | 9.4% | -1.14% | 24.23 | 32% |
| R59 LWS | 6.46 | 5.14 | 6.9% | -1.76% | 22.34 | 30% |
| R60 LWS | 6.20 | 5.06 | 6.7% | -1.53% | 22.26 | 30% |
| R61 LWS | 6.98 | 6.18 | 8.2% | -1.06% | 23.38 | 31% |
| R62 LWS | 5.22 | 3.83 | 5.1% | -1.86% | 21.03 | 28% |
| R63 LWS | 4.62 | 3.26 | 4.3% | -1.82% | 20.46 | 27% |
| R64 LWS | 5.37 | 3.85 | 5.1% | -2.02% | 21.05 | 28% |
| R65 LWS | 5.84 | 6.52 | 8.7% | 0.90% | 23.72 | 32% |
| R66 LWS | 3.84 | 2.69 | 3.6% | -1.54% | 19.89 | 27% |
| R67 LWS | 4.94 | 3.83 | 5.1% | -1.47% | 21.03 | 28% |
| R68 LWS | 3.93 | 2.88 | 3.8% | -1.39% | 20.08 | 27% |
| **CLe** | | | **75** | | | |

**Table C3: Predicted Annual Mean Nutrient Nitrogen Deposition Impacts at Discrete Ecological Receptors**

| Receptor ID | Existing PC (kgN/ha/yr) | Proposed PC (kgN/ha/yr) | Proposed % of Objective | Change % of Objective | PEC (kgN/ha/yr) | % PEC of CLo | Critical Load (kgN/ha/yr) |
|---|---|---|---|---|---|---|---|
| R17 Ramsar/SSSI/SAC/ SPA | 0.01 | 0.01 | 0.2% | -0.1% | 14.81 | 296% | 5 |
| R18 Ramsar/SSSI/SAC/ SPA | 0.02 | 0.01 | 0.3% | -0.1% | 14.81 | 296% | 5 |
| R19 Ramsar/SSSI/SAC/ SPA | 0.06 | 0.05 | 1.0% | -0.2% | 14.85 | 297% | 5 |
| R20 Ramsar/SSSI/SAC/ SPA | 0.08 | 0.07 | 1.5% | -0.1% | 14.87 | 297% | 5 |
| R21 Ramsar/SSSI/SAC/ SPA | 0.07 | 0.08 | 1.6% | 0.1% | 14.88 | 298% | 5 |
| R22 Ramsar/SSSI/SAC/ SPA) | 0.08 | 0.09 | 1.7% | 0.2% | 14.89 | 298% | 5 |
| R23 Ramsar/SSSI/SAC/ SPA | 0.06 | 0.07 | 1.4% | 0.2% | 14.87 | 297% | 5 |
| R24 Ramsar/SSSI/SAC/ SPA | 0.01 | 0.01 | 0.1% | 0.0% | 14.81 | 296% | 5 |
| R25 Ramsar/SSSI/SAC/ SPA/Ancient Woodland | 0.01 | 0.00 | 0.1% | 0.0% | 14.80 | 296% | 5 |
| R26 Ramsar/SSSI/SAC/ SPA | 0.00 | 0.00 | 0.0% | 0.0% | 14.80 | 296% | 5 |
| R27 Ramsar/SSSI/SAC/ SPA | 0.00 | 0.00 | 0.1% | 0.0% | 14.80 | 296% | 5 |
| R28 Ramsar/SSSI/SAC/ SPA | 0.00 | 0.00 | 0.0% | 0.0% | 14.80 | 296% | 5 |
| R29 Ramsar/SSSI/SPA | 0.00 | 0.00 | 0.0% | 0.0% | 14.80 | 148% | 10 |
| R30 Ramsar/SSSI/SAC/ SPA | 0.00 | 0.00 | 0.1% | 0.0% | 14.80 | 296% | 5 |
| R31 Ramsar/SSSI/SAC/ SPA | 0.00 | 0.00 | 0.0% | 0.0% | 14.80 | 296% | 5 |
| R32 Ramsar/SSSI/SAC/ SPA | 0.00 | 0.00 | 0.0% | 0.0% | 14.80 | 296% | 5 |
| R33 Ancient Woodland/LWS | 0.04 | 0.03 | 0.3% | -0.1% | 24.93[1] | 249% | 10 |
| R34 Ancient Woodland/LWS | 0.05 | 0.04 | 0.4% | -0.2% | 24.94[1] | 249% | 10 |
| R35 LWS | 0.01 | 0.01 | 0.1% | 0.0% | 14.81 | 148% | 10 |
| R36 Ramsar/SSSI/SAC/ SPA | 0.00 | 0.00 | 0.0% | 0.0% | 14.80 | 296% | 5 |
| R37 Ramsar/SSSI/SAC/ SPA/NNR | 0.01 | 0.01 | 0.1% | 0.0% | 14.81 | 296% | 5 |
| R38 Ramsar/SSSI/SAC/ SPA/NNR | 0.02 | 0.02 | 0.3% | 0.0% | 14.82 | 296% | 5 |
| R39 Ramsar/SSSI/SAC/ SPA/NNR | 0.06 | 0.07 | 1.4% | 0.1% | 14.87 | 297% | 5 |
| R40 Ramsar/SSSI/SAC/ SPA/NNR | 0.07 | 0.07 | 1.4% | 0.0% | 14.87 | 297% | 5 |

| Receptor ID | Existing PC (kgN/ha/yr) | Proposed PC (kgN/ha/yr) | Proposed % of Objective | Change % of Objective | PEC (kgN/ha/yr) | % PEC of CLo | Critical Load (kgN/ha/yr) |
|---|---|---|---|---|---|---|---|
| R41 Ramsar/SSSI/SAC/SPA/NNR | 0.06 | 0.05 | 0.9% | -0.2% | 14.85 | 297% | 5 |
| R42 Ramsar/SSSI/SAC/SPA/NNR | 0.03 | 0.02 | 0.4% | -0.2% | 14.82 | 296% | 5 |
| R43 Ramsar/SSSI/SAC/SPA/NNR | 0.02 | 0.01 | 0.3% | -0.1% | 14.81 | 296% | 5 |
| R44 Ramsar/SSSI/SAC/SPA/NNR | 0.01 | 0.01 | 0.2% | -0.1% | 14.81 | 296% | 5 |
| R45 Ancient Woodland | 0.03 | 0.02 | 0.2% | -0.1% | 24.92[1] | 249% | 10 |
| R46 Ancient Woodland | 0.05 | 0.03 | 0.3% | -0.1% | 24.93[1] | 249% | 10 |
| R47 Ancient Woodland | 0.06 | 0.04 | 0.4% | -0.2% | 24.94[1] | 249% | 10 |
| R48 LWS | 0.00 | 0.00 | 0.0% | 0.0% | 14.80 | 148% | 10 |
| R49 LWS | 0.01 | 0.01 | 0.1% | 0.0% | 14.81 | 148% | 10 |
| R50 LWS | 0.23 | 0.27 | 2.7% | 0.4% | 25.17[1] | 252% | 10 |
| R51 LWS | 0.15 | 0.17 | 1.7% | 0.2% | 25.07[1] | 251% | 10 |
| R52 LWS | 0.17 | 0.22 | 2.2% | 0.4% | 25.12[1] | 251% | 10 |
| R53 LWS | 0.17 | 0.15 | 1.5% | -0.1% | 25.05[1] | 251% | 10 |
| R54 LWS | 0.16 | 0.16 | 1.6% | 0.0% | 25.06[1] | 251% | 10 |
| R55 LWS | 0.11 | 0.10 | 1.0% | -0.1% | 25.00[1] | 250% | 10 |
| R56 LWS | 0.12 | 0.12 | 1.2% | 0.0% | 25.02[1] | 250% | 10 |
| R57 LWS | 0.14 | 0.13 | 1.3% | -0.1% | 25.03[1] | 250% | 10 |
| R58 LWS | 0.15 | 0.15 | 1.5% | 0.0% | 25.05[1] | 251% | 10 |
| R59 LWS | 0.12 | 0.11 | 1.1% | -0.1% | 25.01[1] | 250% | 10 |
| R60 LWS | 0.12 | 0.11 | 1.1% | -0.1% | 25.01[1] | 250% | 10 |
| R61 LWS | 0.13 | 0.13 | 1.3% | 0.0% | 25.03[1] | 250% | 10 |
| R62 LWS | 0.10 | 0.09 | 0.9% | -0.1% | 24.99[1] | 250% | 10 |
| R63 LWS | 0.09 | 0.07 | 0.7% | -0.2% | 24.97[1] | 250% | 10 |
| R64 LWS | 0.08 | 0.07 | 0.7% | -0.2% | 24.97[1] | 250% | 10 |
| R65 LWS | 0.13 | 0.11 | 1.1% | -0.2% | 25.01[1] | 250% | 10 |
| R66 LWS | 0.07 | 0.05 | 0.5% | -0.1% | 24.95[1] | 250% | 10 |
| R67 LWS | 0.09 | 0.08 | 0.8% | -0.1% | 24.98[1] | 250% | 10 |
| R68 LWS | 0.07 | 0.06 | 0.6% | -0.1% | 24.96[1] | 250% | 10 |

Note 1 – Forest values applied

**Table C4: Predicted Annual Mean Acid Deposition Impacts at Discrete Ecological Receptors**

| Receptor ID | Existing PC (Keq/ha/yr) | Proposed PC (Keq/ha/yr) | Proposed % of CLo | % PC of CLo | PEC Keq/ha/yr | % PEC of CLo | Critical Load (Keq/ha/yr) |
|---|---|---|---|---|---|---|---|
| R17 Ramsar/SSSI/SAC/SPA | 0.0010 | 0.00064 | 0.0% | -0.01% | 1.10 | 23% | 4.856 |
| R18 Ramsar/SSSI/SAC/SPA | 0.0013 | 0.00092 | 0.0% | -0.01% | 1.10 | 23% | 4.856 |
| R19 Ramsar/SSSI/SAC/SPA | 0.0045 | 0.00371 | 0.1% | -0.02% | 1.10 | 23% | 4.856 |
| R20 Ramsar/SSSI/SAC/SPA | 0.0055 | 0.00526 | 0.1% | -0.01% | 1.11 | 23% | 4.856 |
| R21 Ramsar/SSSI/SAC/SPA | 0.0052 | 0.00574 | 0.1% | 0.01% | 1.11 | 23% | 4.856 |
| R22 Ramsar/SSSI/SAC/SPA) | 0.0056 | 0.00617 | 0.1% | 0.01% | 1.11 | 23% | 4.856 |
| R23 Ramsar/SSSI/SAC/SPA | 0.0043 | 0.00487 | 0.1% | 0.01% | 1.10 | 23% | 4.856 |
| R24 Ramsar/SSSI/SAC/SPA | 0.0005 | 0.00049 | 0.0% | 0.00% | 1.10 | 23% | 4.856 |
| R25 Ramsar/SSSI/SAC/SPA | 0.0004 | 0.00025 | 0.0% | 0.00% | 1.10 | 23% | 4.856 |
| R26 Ramsar/SSSI/SAC/SPA | 0.0002 | 0.00010 | 0.0% | 0.00% | 1.10 | 23% | 4.856 |
| R27 Ramsar/SSSI/SAC/SPA | 0.0002 | 0.00022 | 0.0% | 0.00% | 1.10 | 23% | 4.856 |
| R28 Ramsar/ /SAC/SPA | 0.0002 | 0.00015 | 0.0% | 0.00% | 1.10 | 124% | 0.886 |
| R29 Ramsar/ /SAC/SPA | 0.0003 | 0.00020 | 0.0% | -0.01% | 1.10 | 66% | 1.675 |
| R30 Ramsar/ /SAC/SPA | 0.0003 | 0.00018 | 0.0% | -0.01% | 1.10 | 124% | 0.886 |
| R31 Ramsar/ /SAC/SPA | 0.0002 | 0.00009 | 0.0% | -0.01% | 1.10 | 124% | 0.886 |
| R32 Ramsar/ /SAC/SPA | 0.0001 | 0.00007 | 0.0% | -0.01% | 1.10 | 124% | 0.886 |
| R33 Ancient Woodland/LWS | 0.0031 | 0.00214 | 0.1% | -0.06% | 1.80[1] | 108% | 1.675 |
| R34 Ancient Woodland/LWS | 0.0039 | 0.00258 | 0.2% | -0.08% | 1.80[1] | 108% | 1.675 |
| R35 LWS | 0.0005 | 0.00062 | 0.0% | 0.01% | 1.10 | 66% | 1.675 |
| R36 Ramsar/SAC/ SPA | 0.0001 | 0.00007 | 0.0% | -0.01% | 1.10 | 124% | 0.886 |
| R37 Ramsar/SSSI/SAC/SPA/NNR | 0.0005 | 0.00050 | 0.1% | 0.00% | 1.10 | 124% | 0.886 |
| R38 Ramsar/SSSI/SAC/SPA/NNR | 0.0012 | 0.00123 | 0.1% | 0.00% | 1.10 | 124% | 0.886 |
| R39 Ramsar/SSSI/SAC/SPA/NNR | 0.0044 | 0.00483 | 0.5% | 0.05% | 1.10 | 125% | 0.886 |
| R40 Ramsar/SSSI/SAC/SPA/NNR | 0.0052 | 0.00504 | 0.6% | -0.01% | 1.11 | 125% | 0.886 |
| R41 Ramsar/SSSI/SAC/SPA/NNR | 0.0041 | 0.00326 | 0.4% | -0.09% | 1.10 | 125% | 0.886 |

| Receptor ID | Existing PC (Keq/ha/yr) | Proposed PC (Keq/ha/yr) | Proposed % of CLo | % PC of CLo | PEC Keq/ha/yr | % PEC of CLo | Critical Load (Keq/ha/yr) |
|---|---|---|---|---|---|---|---|
| R42 Ramsar/SSSI/SAC/SPA/NNR | 0.0021 | 0.00155 | 0.2% | -0.06% | 1.10 | 124% | 0.886 |
| R43 Ramsar/SSSI/SAC/SPA/NNR | 0.0013 | 0.00090 | 0.1% | -0.05% | 1.10 | 124% | 0.886 |
| R44 Ramsar/SSSI/SAC/SPA/NNR | 0.0010 | 0.00063 | 0.1% | -0.04% | 1.10 | 124% | 0.886 |
| R45 Ancient Woodland | 0.0023 | 0.00131 | 0.1% | -0.06% | 1.80[1] | 108% | 1.675 |
| R46 Ancient Woodland | 0.0034 | 0.00234 | 0.1% | -0.06% | 1.80[1] | 108% | 1.675 |
| R47 Ancient Woodland | 0.0041 | 0.00305 | 0.2% | -0.06% | 1.80[1] | 108% | 1.675 |
| R48 LWS | 0.0007 | 0.00068 | 0.0% | 0.00% | 1.80[1] | 108% | 1.675 |
| R49 LWS | 0.0010 | 0.00117 | 0.1% | 0.01% | 1.80[1] | 108% | 1.675 |
| R50 LWS | 0.0167 | 0.01935 | 1.2% | 0.16% | 1.82[1] | 109% | 1.675 |
| R51 LWS | 0.0108 | 0.01205 | 0.7% | 0.07% | 1.81[1] | 108% | 1.675 |
| R52 LWS | 0.0123 | 0.01535 | 0.9% | 0.18% | 1.82[1] | 108% | 1.675 |
| R53 LWS | 0.0120 | 0.01094 | 0.7% | -0.06% | 1.81[1] | 108% | 1.675 |
| R54 LWS | 0.0112 | 0.01141 | 0.7% | 0.01% | 1.81[1] | 108% | 1.675 |
| R55 LWS | 0.0081 | 0.00737 | 0.4% | -0.04% | 1.81[1] | 108% | 1.675 |
| R56 LWS | 0.0087 | 0.00847 | 0.5% | -0.02% | 1.81[1] | 108% | 1.675 |
| R57 LWS | 0.0097 | 0.00904 | 0.5% | -0.04% | 1.81[1] | 108% | 1.675 |
| R58 LWS | 0.0110 | 0.01091 | 0.7% | -0.01% | 1.81[1] | 108% | 1.675 |
| R59 LWS | 0.0087 | 0.00795 | 0.5% | -0.04% | 1.81[1] | 108% | 1.675 |
| R60 LWS | 0.0083 | 0.00761 | 0.5% | -0.04% | 1.81[1] | 108% | 1.675 |
| R61 LWS | 0.0094 | 0.00912 | 0.5% | -0.02% | 1.81[1] | 108% | 1.675 |
| R62 LWS | 0.0072 | 0.00618 | 0.4% | -0.06% | 1.81[1] | 108% | 1.675 |
| R63 LWS | 0.0063 | 0.00518 | 0.3% | -0.07% | 1.81[1] | 108% | 1.675 |
| R64 LWS | 0.0059 | 0.00481 | 0.3% | -0.07% | 1.80[1] | 108% | 1.675 |
| R65 LWS | 0.0090 | 0.00773 | 0.5% | -0.08% | 1.81[1] | 108% | 1.675 |
| R66 LWS | 0.0047 | 0.00364 | 0.2% | -0.06% | 1.80[1] | 108% | 1.675 |
| R67 LWS | 0.0067 | 0.00566 | 0.3% | -0.06% | 1.81[1] | 108% | 1.675 |
| R68 LWS | 0.0053 | 0.00423 | 0.3% | -0.06% | 1.80[1] | 108% | 1.675 |

Note 1 – Forest values applied

# APPENDIX D – PRE-APPLICATION BASIC SCREENING REPORT

# Nature and Heritage Conservation

Screening Report: Bespoke installation

| | |
|---|---|
| Reference | **EPR/BJ7611IY/P001** |
| NGR | **SD19577272** |
| Buffer (m) | **0** |
| Date report produced | **21/10/2025** |
| Number of maps enclosed | **1** |

## This nature and heritage conservation report

The nature and heritage conservation sites, protected species and habitats, and other features identified in the table below **must be considered in your application**.

In the further information column, there are links which give more information about the site or feature type and indicate where you are able to self-serve to get the most accurate site boundaries or feature locations.

Most designated site boundaries are available on Magic map. Using Magic map allows you to zoom in and see the site boundary or feature location in detail, Magic map also allows you to measure the distance from these sites and features to your proposed boundary. Help videos are available on Magic map to guide you through.

Where information is not publicly available, or is only available to those with GIS access, we have provided a map at the end of this report.

| Sites and Features within screening distance | Screening distance (km) | Further Information |
|---|---|---|
| Special Areas of Conservation (cSAC or SAC)<br>**Morecambe Bay** | 10 | Joint Nature Conservation Committee and Magic map |
| Special Protection Area (pSPA or SPA)<br>**Morecambe Bay and Duddon Estuary** | 10 | Joint Nature Conservation Committee and Magic map |
| Ramsar<br>**Duddon Estuary**<br>**Morecambe Bay** | 10 | Joint Nature Conservation Committee and Magic map |

| | | |
|---|---|---|
| Sites of Special Scientific Interest (SSSI)<br>**Duddon Estuary** | 2 | Natural England and Magic map |
| National Nature Reserve (NNR)<br>**North Walney**<br>**Sandscale Haws** | 2 | Natural England and Magic map |
| Local Wildlife Sites (LWS) (see map below)<br>**Sowerby Wood**<br>**Park Road Woods**<br>**Lower Ormsgill Reservoir and Cocken Pool** | 2 | Appropriate Local Record Centre (LRC)<br>Appropriate Wildlife Trust |
| Ancient Woodland | 2 | Woodland Trust<br>Forestry Commission<br>Natural England<br>and Magic map |

Where protected species are present, a licence may be required from Natural England to handle the species or undertake the proposed works.

The relevant Local Records Centre must be contacted for information on the features within local wildlife sites. A small administration charge may also be incurred for this service.

**The following nature and heritage conservation sites, protected species and habitats, and other features have been checked for, where they are relevant for the permit type requested, but have not been found within screening distance of your site unless included in the list above.**

Special Areas of Conservation (cSAC or SAC), Special Protection Area (pSPA or SPA), Marine Conservation Zone (MCZ), Ramsar, Sites of Special Scientific Interest (SSSI), National Nature Reserve (NNR), Local Nature Reserve (LNR), Local Wildlife Sites (LWS), Ancient Woodland, relevant species and habitats.

**Please note** we have screened this application for features for which we have information. It is however your responsibility to comply with all environmental and planning legislation, this information does not imply that no other checks or permissions will be required.

The nature and heritage screening we have conducted as part of this report is subject to change as it is based on data we hold at the time it is generated. We cannot guarantee there will be no changes to our screening data between the date of this report and the submission of the permit application, which could result in the return of an application or requesting further information

Environment Agency

Local Wildlife Sites

Local Wildlife Sites

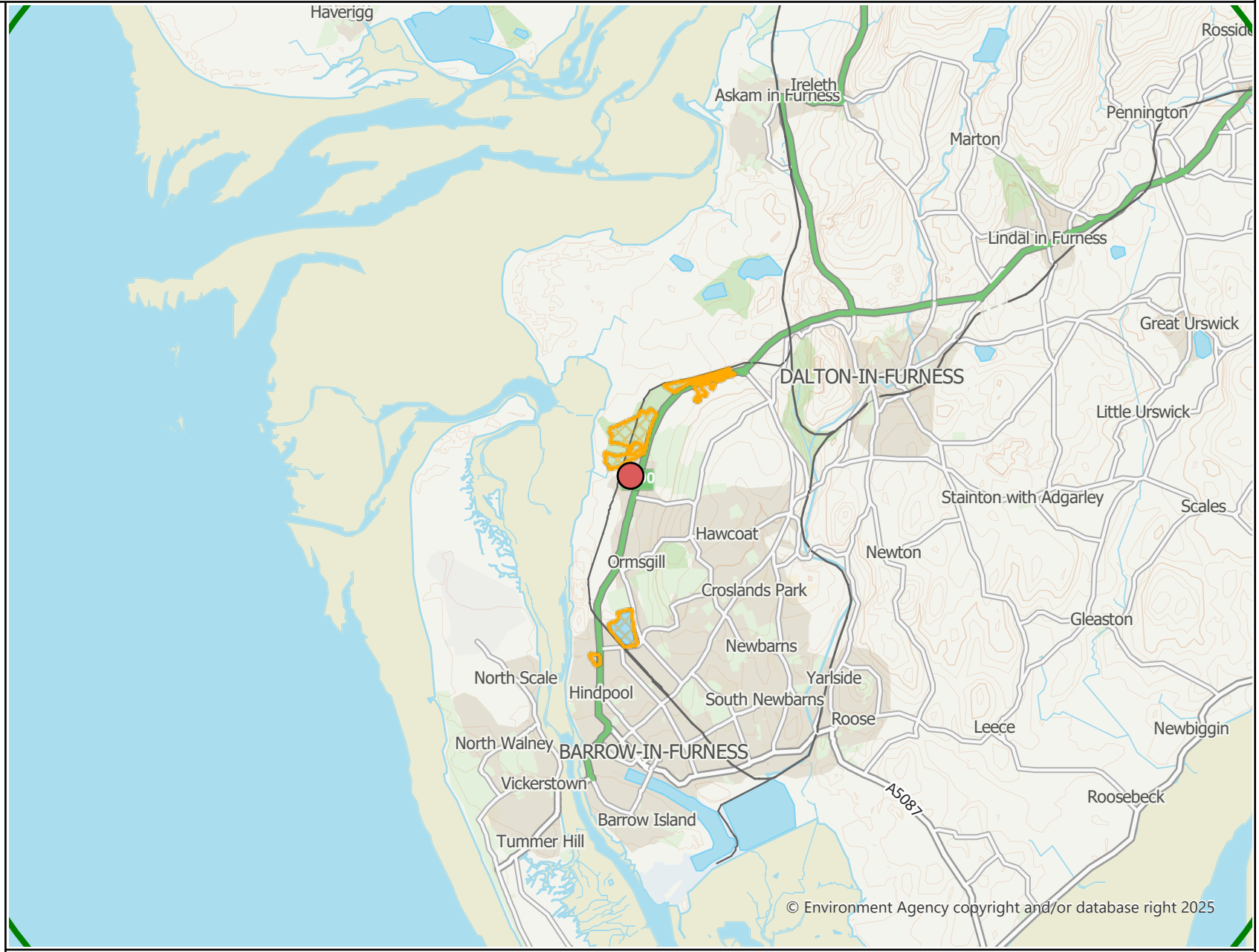
Markup

Override 1

Override 2

Override 1

Override 1




Scale: 1:73,425

0 0.6 1.2 1.8 2.4 3 km

N