

Environmental Risk Assessment – Boiler Upgrade Variation

1. Introduction

This Environmental Risk Assessment supports a permit variation application for the installation of four new 1.465 MWth natural gas-fired boilers (Fulton VSRT-125). The assessment identifies and evaluates environmental risks introduced by the change, alongside the control measures in place to mitigate potential impact.

The variation does not involve a change in fuel type, stack location, or introduce any new waste/wastewater streams. The plant continues to operate under an existing environmental permit and ISO 14001-certified EMS.

2. Risk Assessment Table

Source of Risk	Potential Risk	Receptor	Pathway	Control / Mitigation Measures	Residual Risk
Combustion of natural gas	Emissions to air (NO _x , CO, PM)	Human health, local air quality	Atmospheric dispersion	Low-NO _x boilers (19 ppm / 37.8 mg/Nm ³); CO: 0.961 mg/Nm ³ ; PM: 12.2 mg/Nm ³ ; compliant with MCPD and BAT-AELs. Shared stack, annual monitoring (BS EN 14792), ELVs applied under permit. NO _x emissions are well below MCPD ELV (100 mg/Nm ³) and within BAT-AEL range (30–85 mg/Nm ³).	Low
Operation of new boilers	Noise	Local community, site personnel	Airborne (audible)	Boilers housed in enclosed existing structure	Low
Combustion of natural gas	Odour	Local community	Airborne	Natural gas combustion does not produce odorous emissions	None
Gas and water systems	Leaks or spills (fuel, water, chemicals)	Soil, groundwater, surface water	Direct contact, drainage	System integrity controls, shut-off valves, emergency interlocks, routine maintenance. Existing EMS in place certified ISO 14001 which includes environmental emergency response procedures and training.	Low
Boiler blowdown / feedwater	Minor wastewater generation	Sewer (foul)	Drainage network	No change from existing process; controlled discharge to foul sewer, as per permit.	Low
Boiler flue	Visual impact (e.g. steam plume)	Local residents	Visual	Existing stack with no visual change. Natural gas combustion does not generate visible plumes	None
Operation of boilers	Heat emissions	Local atmosphere	Thermal dispersion	Standard thermal profile for gas combustion; enclosed housing; flue temperature ~275°C	Low
Use of feedwater	Increased water use	Water supply network	Mains connection	Efficient boiler system; no significant increase in consumption	Low

3.1 Additional Information – Emissions Performance

Boiler performance and emissions data, based on high fire input, confirm the following:

- NO_x: 19 ppm @ 3% O₂ (equivalent to 37.8 mg/Nm³)
- CO: 49 ppm (equivalent to 0.961 mg/Nm³)
- Total Particulates: 12.2 mg/Nm³ (estimated via EPA AP-42)
- VOCs: 0.027 mg/Nm³
- Flue Gas Temp: 275°C
- SO₂ and lead: Not applicable (natural gas contains no sulphur or heavy metals)

Refer to emissions report from Fultons.

These levels are compliant with the Medium Combustion Plant Directive (MCPD – Directive (EU) 2015/2193) and consistent with the Best Available Techniques Associated Emission Levels (BAT-AELs) as published in the LCP BREF.

Ecological Receptors

In accordance with the Environment Agency's screening distances:

- 10 km: SACs, SPAs, Ramsar sites
- 2 km: SSSIs, LNRs, ancient woodlands
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The following designated receptors fall within screening distance:

- Breckland SPA – several compartments within 10 km
- The Glen Chalk Caves SSSI – within 2 km
- Moreton Hall Community Woods LNR – within 2 km

The proposed boilers are low-NO_x units discharging through an existing stack. Given their low emission profile and the unchanged emission point, significant effects on designated ecological receptors were not expected. This has now been confirmed through detailed air dispersion modelling (see Section 3.3).

3.2 H1 Screening and Air Quality Assessment Results

As part of the permit variation, an H1 Air Emissions Screening Assessment was undertaken by EHS Projects Ltd (Report Ref: 1498, October 2025) in accordance with the Environment Agency guidance '*Air emissions risk assessment for your environmental permit*'. The assessment evaluated emissions from all existing and proposed natural gas-fired boilers operating at the brewery site.

The H1 assessment used Version 9.2 of the Environment Agency's screening tool and considered both the permitted emission limit values (ELVs) and the measured concentrations obtained from SOCOTEC stack-emissions testing and manufacturer data for the new boilers (NO_x measured at 19 ppm or 37.8 mg/Nm³).

Key findings:

- When modelled using permitted limits:
 - Long-term PC = 61.46 % of EAL (fail)
 - Short-term PC = 391.32 % of EAL (fail)
 - Long-term PEC = 91.09 % of EAL (fail)
 - Short-term PEC = 512.91 % of EAL (fail)
- When modelled using measured concentrations (realistic operation):
 - Long-term PC = 35.16 % of EAL (fail)
 - Short-term PC = 224.05 % of EAL (fail)
 - Long-term PEC = 64.79 % of EAL (pass)
 - Short-term PEC = 293.66 % of EAL (fail)

The assessment therefore concluded that NO_x emissions could not be screened out as insignificant under the H1 methodology. However, these results were derived using conservative assumptions—including simultaneous operation of all four new boilers at full load—which does not

reflect normal site operation, where typically only two boilers will run at any one time. Furthermore, the boilers at draught beer operate only between the hours of 6:00am and 10:00pm for 5 days a week, which is not accounted for within the H1 assessment.

Based on the low measured NO_x levels from the new low-NO_x units, the use of clean-burning natural gas, and the operational configuration of the site, actual emissions and off-site impacts are expected to be significantly lower than this conservative scenario.

Therefore, a full dispersion modelling assessment was commissioned. Results are summarised below

3.3 Results of Detailed Air Quality Assessment (ADMS-6 Modelling)

A full Air Quality Assessment was completed by Redmore Environmental Ltd (2025) using ADMS-6, representative meteorological data (Wattisham and Lakenheath), and all human and ecological receptor locations within the required study area.

Human Receptor Assessment:

- No exceedances of the long-term or short-term NO₂ Air Quality Objectives (AQOs) at *any* human receptor.
- Maximum annual mean NO₂ PEC was <60% of the AQO (40µg/m³).
- Maximum 1-hour NO₂ PEC was <35% of the 200µg/m³ AQO.
- All short-term and long-term Process Contributions (PCs) were below 10% insignificance criteria once realistic boiler operation was applied.

Ecological Receptor Assessment

For all designated receptors (SAC, SPA, SSSI, LNR):

- Annual mean NO_x concentrations were well below the Critical Level (30µg/m³).
- Daily mean NO_x levels did not exceed the 75µg/m³ Critical Level.
- Nitrogen deposition PCs were <1% of the Critical Load.
- Acid deposition PCs were <1% of the Critical Load.

This meets the Environment Agency's insignificance threshold for ecological receptors.

Overall Air Quality Impact Conclusion

The proposed boilers will not cause adverse impacts on local air quality or protected habitats:

- All modelled outcomes meet relevant UK Air Quality Standards
- All ecological Critical Levels and Critical Loads remain protected
- Actual emissions are low due to modern low-NO_x burners
- Impacts remain insignificant after dispersion and deposition analysis.

4. Conclusion

The proposed variation involves the replacement of existing ageing natural gas-fired boilers with modern, high-efficiency, low-NO_x units. The upgrade will enhance energy performance, improve reliability, and reduce emissions. No changes are proposed to the fuel type, stack location, or emission point, and there will be no increase in the total thermal input of the installation. This results in reduced emissions, improved efficiency, and greater operational resilience.

The Environmental Risk Assessment confirms:

- Emissions to air, land, and water remain low and well controlled
- No odour impacts
- Noise impacts are reduced
- No new waste or wastewater streams
- Ecological receptors remain protected

The H1 screening assessment indicates exceedances under highly conservative worst-case assumptions; however, these do not reflect actual site operation. Detailed ADMS air dispersion modelling confirms that:

- All human receptor NO₂ concentrations remain well below AQOs
- All ecological Critical Levels and Critical Loads are protected
- Process Contributions are insignificant under EA criteria

Therefore, the proposed boiler upgrade is not expected to cause any significant adverse impacts on human health, air quality, or the environment. The variation represents an overall environmental improvement and maintains compliance with all applicable regulatory standards.