PET CREMATORIUM, STRAWBRIDGES GARDEN CENTRE AND FARM SHOP

Air Quality Assessment

On Behalf of Strawbridges Garden Centre and Farm Shop
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Prepared by	Harley Parfitt	Air Quality Consultant	26/07/2023
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1 Introduction

1.1 Greenavon Ltd was commissioned by Strawbridges Garden Centre and Farm Shop to provide an Air Quality Assessment to support an application for the proposed installation of a pet cremator at Strawbridges Garden Centre and Farm Shop, Doncaster Road, Darfield, Barnsley S71 5EZ.

1.2 The local planning authority, Barnsley Metropolitan Borough Council (BMBC), have requested that an air quality assessment be undertaken to support the application.

1.3 The proposed cremator (The Addfield 'Mini-AB') has a maximum throughput of 50 kg an hour. As such, it is understood to require neither a 'Part A' Environmental Permit from the Environment Agency (EA), or a 'Part B' Permit from BMBC under the Local Air Pollution and Prevention and Control (LAPPC) regime. The proposed cremator would use red diesel as fuel and the expected emissions data, and specification sheets are included in Appendix A, for reference.

1.4 The proposed development is located within 100 m of residential use and within 30 m of a café associated with the Strawbridges Garden Centre and Farm shop complex. These uses are considered to have high and medium respective sensitivity to air quality. The application site is not located within an Air Quality Management Area (AQMA), with the closest AQMA located over 5.5km to the west.

1.5 The main source of local air pollution in the vicinity of the application site are vehicles travelling on the local road network. There are no major combustion sources located in the vicinity.

1.6 This report assesses the proposed cremator's impact on local air quality in line with best practice EA and Joint Environmental Protection UK and Institute of Air Quality Management (IAQM) guidance, recommending mitigation where necessary.

1.7 The assessment focuses on the pollutants referenced in Defra's *Process Guidance Note 5/03(13) Statutory guidance for animal carcase incineration* for which emissions data was provided (HCl, CO, PM and VOC). Emissions of oxides of nitrogen (NO_X) were also modelled as the air quality standards (AQS) for nitrogen dioxide (NO_2) are the most commonly exceeded across the UK.

2 Policy Context

Air Quality Standards Regulations and Air Quality Strategy

2.1 The Air Quality Standards (AQS) Regulations 2010[1] and subsequent amendments, regulate the concentrations of major pollutants in outdoor air in the UK, including particulate matter (PM_{10} & $PM_{2.5}$), nitrogen dioxide (NO_2), sulphur dioxide (SO_2), ozone (O_3), carbon monoxide (CO) and lead (Pb). These regulations seek to minimise the public's exposure to air pollution by requiring ambient concentrations to be within legally binding limit values, as well as target values.

2.2 The AQSs of relevance to this assessment are summarised in Table 2.1 below.

Table 2.1: Air Quality Standards for England

Pollutant	Averaging Period	Objective ($\mu g.m^{-3}$)	Date to be achieved by
Nitrogen dioxide (NO_2)	1-hour mean not to be exceeded more than 18 times per year.	200	1 January 2005
	Annual Mean	40	1 January 2005
Particulate Matter (PM_{10})	24-Hour Mean not to be exceeded more than 35 times per year	50	1 January 2005
	Annual Mean	40	1 January 2005
Particulate Matter ($PM_{2.5}$)	Annual Mean	20	1 January 2020
Sulphur dioxide (SO_2)	15-minite mean objective not to be exceeded more than 35 times a year	266	1 January 2005
	1 hour mean objective not to be exceeded more than 24 times a year	350	1 January 2005
	125 µg/m3 not to be exceeded more than 3 times a yea	125	1 January 2005
Carbon monoxide (CO)	Maximum daily running 8 hour mean	10,000	1 January 2005
Benzene	Annual Mean	5	1 January 2010

2.3 The Environment Act 1995 requires the Government and devolved administrations to produce a National Air Quality Strategy for the UK. The last major update to the National Air Quality Strategy (NAQS) was published in 2007[2], with minor updates occurring in 2011 and in 2023. Under the Environment Act 2021[3], the Secretary of State must review the NAQS every five years. The most recent review in April 2023, included a $PM_{2.5}$ annual mean target of 10 $\mu g.m^{-3}$, to be achieved by 2040.

[1] Air Quality Standards Regulations 2010 (as amended) S.I 2008/30.
[2] Defra (2007) The Air Quality Strategy for England, Scotland, Wales, and Northern Ireland.
[3] *Environment* Act 2021 SI No. 1274 (C. 72).

2.4 Part IV of the Environment Act 1995 and Part II of the Environment (Northern Ireland) Order 2002 sets out that it is the responsibility of every local authority to review the air quality within its area and designate AQMAs where air quality limit values are not being achieved. An Air Quality Action Plan (AQAP) setting out the measures to reduce pollution in that area must then be put in place.

2.5 BMBC have adopted an AQAP[4] which contains details of the measures they are taking to improve air quality in their AQMAs and across the borough. The proposed development is located at least 5.5km from any BMBC AQMA. As such, any impacts on the AQMAs are likely to be negligible.

Environmental Assessment Levels

2.6 The EA has provided Environmental Assessment Levels (EALs) for many pollutants not considered in the Air Quality Standards Regulations. Like AQSs, EALs represent a concentration of a specific pollutant that should not be exceeded. The EALs of pollutants not covered by the AQS regulations, and assessed in this report, are set out in Table 2.2 below.

Table 2.2: Environmental Assessment Levels

Pollutant	Averaging Period	Objective (µg.m^{-3})
Hydrogen chloride (HCl)	1 hour mean	750

National Planning Policy Framework

2.7 The revised National Planning Policy Framework (NPPF)[5], updated in July 2021, sets out government's planning policies for England and how these are expected to be applied. A key aim of the NPPF is to promote sustainable development and regarding conserving the natural environment, paragraph 174 states:

> *"Planning policies and decisions should contribute to and enhance the natural and local environment by: […]*
>
> *e) preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability. Development should, wherever possible, help to improve local environmental conditions such as air and water quality, taking into account relevant information such as river basin management plans".*

2.8 Paragraph 186 relates to compliance with legal limit values and how planning decisions should be consistent with local air quality policy and action plans. It states:

> *"Planning policies and decisions should sustain and contribute towards compliance with relevant limit values or national objectives for pollutants, taking into account the presence of Air Quality Management Areas and Clean Air*

[4] BMBC (2019) Barnsley MBC Air Quality Action Plan
[5] Ministry of Housing, Communities & Local Government (2019a) National Planning Policy Framework.

Zones, and the cumulative impacts from individual sites in local areas. Opportunities to improve air quality or mitigate impacts should be identified, such as through traffic and travel management, and green infrastructure provision and enhancement. So far as possible these opportunities should be considered at the plan-making stage, to ensure a strategic approach and limit the need for issues to be reconsidered when determining individual applications. Planning decisions should ensure that any new development in Air Quality Management Areas and Clean Air Zones is consistent with the local air quality action plan".

2.9 Paragraph 185 relates to the appropriate siting of development and the assessment of cumulative effects, it states:

"Planning policies and decisions should also ensure that new development is appropriate for its location taking into account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the site or the wider area to impacts that could arise from the development."

2.10 Whilst principally relating to sustainable transport, Paragraph 105 is indirectly related to air quality and states:

"The planning system should actively manage patterns of growth in support of these objectives. Significant development should be focused on locations which are or can be made sustainable, through limiting the need to travel and offering a genuine choice of transport modes. This can help to reduce congestion and emissions and improve air quality and public health. However, opportunities to maximise sustainable transport solutions will vary between urban and rural areas, and this should be taken into account in both plan-making and decision-making.

Planning Practice Guidance

2.11 Planning Practice Guidance (PPG)[6] provides advice on how the planning process can take account of the impact of new development on air quality. It sets out what should be included in an air quality assessment and provides detail of when air quality is likely to be relevant to a planning decision:

"Whether air quality is relevant to a planning decision will depend on the proposed development and its location. Concerns could arise if the development is likely to have an adverse effect on air quality in areas where it is already known to be poor, particularly if it could affect the implementation of air quality strategies and action plans and/or breach legal obligations (including those relating to the conservation of habitats and species). Air quality may also be a material consideration if the proposed development would be particularly sensitive to poor air quality in its vicinity.

When deciding the relevance of air quality, the PPG suggests this as important.

- *Lead to changes (including any potential reductions) in vehicle-related emissions in the immediate vicinity of the proposed development or*

6 Department for Communities and Local Government (2019) Planning Practice Guidance Air Quality

further afield. This could be through the provision of electric vehicle charging infrastructure; altering the level of traffic congestion; significantly changing traffic volumes, vehicle speeds or both; or significantly altering the traffic composition on local roads. Other matters to consider include whether the proposal involves the development of a bus station, coach or lorry park; could add to turnover in a large car park; or involve construction sites that would generate large Heavy Goods Vehicle flows over a period of a year or more;

- *Introduce new point sources of air pollution. This could include furnaces which require prior notification to local authorities; biomass boilers or biomass-fuelled Combined Heat and Power plant; centralised boilers or plant burning other fuels within or close to an air quality management area or introduce relevant combustion within a Smoke Control Area; or extraction systems (including chimneys) which require approval or permits under pollution control legislation;*
- *Expose people to harmful concentrations of air pollutants, including dust. This could be by building new homes, schools, workplaces or other development in places with poor air quality;*
- *Give rise to potentially unacceptable impacts (such as dust) during construction for nearby sensitive locations;*
- *Have a potential adverse effect on biodiversity, especially where it would affect sites designated for their biodiversity value".*

Local Planning Policy

2.12 BMBC Local Plan[7] is used by the Council to help determine planning applications in the borough. It contains policy of relevance to this assessment and air quality, including:

"Policy Poll1 Pollution Control and Protection

Development will be expected to demonstrate that it is not likely to result, directly or indirectly, in an increase in air, surface water and groundwater, noise, smell, dust, vibration, light or other pollution which would unacceptably affect or cause a nuisance to the natural and built environment or to people. We will not allow development of new housing or other environmentally sensitive development where existing air pollution, noise, smell, dust, vibration, light or other pollution levels are unacceptable and there is no reasonable prospect that these can be mitigated against. Developers will be expected to minimise the effects of any possible pollution and provide mitigation measures where appropriate."

2.13 BMBC have also adopted an Air Quality Planning Guidance[8], which provides a template for integrating air quality considerations into land-use planning and development management policies that can influence the reduction of road transport emissions. As

[7] BMBC (2019) Local Plan: https://www.barnsley.gov.uk/LocalPlan
[8] BMBC (2021) Barnsley MBC Air Quality and Emissions Good Practice Planning Guidance .

the proposed development does not generate significant traffic, this guidance is of limited relevance to this assessment.

Air Quality Guidance

2.14 This assessment has been undertaken with reference to the following national and local guidance:

- The EA's Air emissions risk assessment for your environmental permit (2023)[9]
- Defra's *Process Guidance Note 5/03(13) Statutory guidance for animal carcase incineration* (2013)[10]
- Defra, Local Air Quality Management Technical Guidance (LAQM.TG (22)) (2022)[11];
- IAQM and Environmental Protection UK (EPUK), *Land-Use Planning and Development Control: Planning for Air Quality* (2017)[12]; and
- IAQM, *A guide to the assessment of air quality impacts on designated nature conservation sites* (2019)[13].

[9] EA (2023) Air emissions risk assessment for your environmental permit: https://www.gov.uk/guidance/air-emissions-risk-assessment-for-your-environmental-permit

[10] Defra (2013) Process Guidance Note 5/03(13) Statutory guidance for animal carcase incineration: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/611479/process-guidance-note-animal_carcase-incineration.pdf

[11] Defra (2022) Part IV of the Environment Act 1995, Environment (Northern Ireland) Order 2002 Part III, Local Air Quality Management, Technical Guidance LAQM. TG(22).

[12] EPUK & IAQM. (2017). Land-Use Planning & Development Control: Planning for Air Quality.

[13] EPUK & IAQM. (2020). A guide to the assessment of air quality impacts on designated nature conservation sites: https://iaqm.co.uk/text/guidance/air-quality-impacts-on-nature-sites-2019.pdf

3 Methodology

Consultation

3.1 The proposed scope of work was sent via email, to BMBC's Environmental Health Team in July, asking for commentary on the proposed scope of work. As of yet, no response has been received.

Operational Phase Assessment

Screening Assessment

3.2 Minor development, on their own, are highly unlikely to cause significant increases in local air pollution concentrations. EPUK & IAQM guidance, therefore, advocates a two-stage screening approach. EPUK & IAQM guidance states that the impact of a proposal on air quality cannot be screened out, based on size alone, if there are:

- 10 or more residential units or a site area of more than 0.5ha; or
- 1,000 m2 of floor space for all other uses or a site area greater than 1ha.

3.3 Coupled with any of the following:

- the development has more than 10 parking spaces;
- the development will have a centralised energy facility; or
- other centralised combustion process.

3.4 At the second screening stage, EPUK & IAQM guidance provides indicative criteria which can be used to screen out the potential for significant impacts caused by a proposed development. It was not possible to screen out potential impacts associated with the proposed development and as such, a detailed dispersion modelling assessment was undertaken.

Dispersion Modelling Assessment

3.5 ADMS-Roads (Version.5.0.1.3) is a commercially available dispersion model, developed by CERC, that is routinely used for local air quality management by both the private and public sectors, across the UK. ADMS-Roads can provide predictions of pollutant concentrations, at key receptor locations or across a wider area, by using emission factors, in combination with meteorological data and approximations of the surface characteristics.

3.6 ADMS-Roads was used to assess the proposed development's impact on, and sensitivity to, local air quality.

Meteorological Inputs and Surface Characteristics

3.7 Three years (2019-2021) of hourly sequential meteorological data from Emley Moor meteorological station, the closest station to the application site, was used in the assessment. Data capture for wind speed and wind direction was sufficient (>95%) for the assessment; however, missing cloud cover data was provided from Bingley

meteorological station, with any further missing cloud cover data imputed using the forward filling process.

3.8 The roughness of the model domain was assigned a value of 0.3m, which is representative of an agricultural area. The roughness of the meteorological site was chosen to be 0.2m, also reflective of a rural area.

3.9 Cities tend to have higher levels of atmospheric mixing resulting from the presence of buildings and the urban heat island effect and the atmosphere is, therefore, more unstable. The stability of the atmosphere in ADMS-Roads was represented by the Monin-Obukhov parameter, and a figure of 10m was chosen to reflect the rural nature of the model domain and meteorological sites.

Building Effects and Terrain

3.10 Buildings can have a significant effect on pollution concentrations in their vicinity. The main effect relates to the effect whereby pollutants can become entrained in the cavity region on the leeward side and be brought down to ground level rapidly. The inclusion of buildings in ADMS tend to increase concentrations close to the source and decrease them further away[14].

3.11 The proposed development is not located within, or adjacent to, a large building and the most sensitive uses are located at some distance from the plant. As such, buildings were not explicitly modelled in the assessment. An effective stack height of 0 m was however assumed, as opposed to the actual height of 3.77m, to ensure a conservative approach.

3.12 As the terrain surrounding the application site is mostly flat, terrain was not incorporated into the model.

Emissions

3.13 The inputs used in the dispersion model are set out in Table 3.1 below. The inputs are largely based on information provided by Addfield, which is reproduced in Appendix A.

Table 3.1: Inputs for the ADMS Model

Input	Value	Justification / Source
Stack Location (X, Y)	440545.9, 405221.1	Approximate location of proposed stack
Stack Height (m)	0	As the proposed stack height is not 2.5 times greater than the height of the building, nor greater than 1m above the ridge of the building, an 'effective stack height' of 0 m has been used.
Internal Stack Diameter (m)	0.35	Email correspondence with Addfield
Exhaust velocity (m/s)	11.5	Calculated based on email correspondence with Addfield.
Exhaust Temperature (℃)	850	Specification sheet for the Mini-AB
Volumetric Flow Rate (Am^3/s)	1.1	Calculated based on email correspondence with Addfield.
NO_X emission rate (mg/s)	48.6	Calculated based on information supplied by Addfield.
PM_{10} emission rate (mg/s)	4.3	Calculated based on information supplied by Addfield.

[14] CERC (2023) ADMS 6 User Guide (Version 6.0)

$PM_{2.5}$ emission rate (mg/s)	4.3	Calculated based on information supplied by Addfield.
SO_2 emission rate (mg/s)	16.8	Calculated based on information supplied by Addfield.
HCl emissions rate (mg/s)	0.3	Calculated based on information supplied by Addfield.
CO emission rate (mg/s)	11.3	Calculated based on information supplied by Addfield.
VOC/ Benzene emission rate (mg/s)	0.2	Calculated based on information supplied by Addfield.
Hours of operation	8760	Worst case assumption assuming constant operation. However, the cremator will only be used between the hours of 8 am and 5 pm, and not constantly. As such, real hours of operation will be at most 2,555 hours per year.

3.14 In the absence of detailed emissions data for volatile organic compounds, it has been assumed, in line with the recommendations set out in EA guidance, that 100% of VOC emissions are benzene.

3.15 Furthermore, to allow comparison to their respective AQSs and in the absence of separate emissions data for $PM_{2.5}$ and PM_{10}, 100% of the particulate matter emissions were assumed to be $PM_{2.5}$ (and therefore PM_{10}). This is a worst-case assumption.

Background Concentrations

3.16 The dispersion model estimates the proposed cremator's contribution to local pollutant concentrations. However, to compare against air quality objectives, it is necessary to derive an estimate of the total concentration, by adding the modelled contribution to background concentrations.

3.17 When estimating the total concentration, it is important that the estimates of background pollution represent all sources that are not being explicitly modelled and that they do not include the contribution from the source that is being modelled, to avoid double counting.

3.18 Background concentrations for use in this assessment were derived from the UK-AIR estimates, with concentrations at discrete locations representative of the estimates from that grid square, for the assessment scenario year.

3.19 In line with EA guidance, short term background concentrations were estimated to be twice the long-term background concentration for each pollutant.

Advanced Input Parameters

3.20 Where there is a continuous line of buildings along both sides of a road, a "street canyon" can be created. Street canyons can result in increased pollutant concentrations due to the recirculation and reduced dispersion of emissions. The application site and model domain are not located in an area of complex urban topography and as such, the dispersion model does not include street canyons or an urban canopy flow file.

Receptors

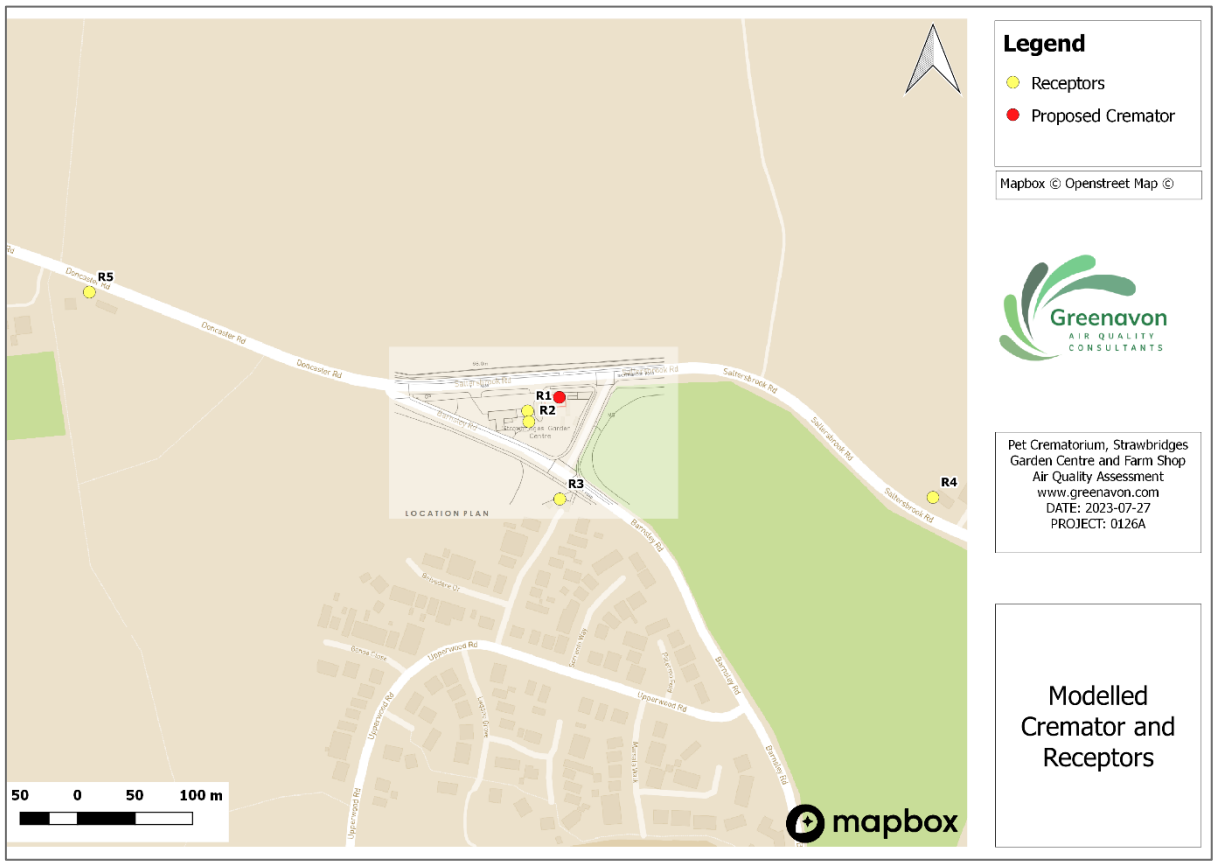
3.21 Table 3.2 and Figure 3.1, below sets out details of the receptors explicitly modelled in the assessment. These receptors were chosen as they are the closest locations of 'relevant exposure' for the AQSs and EALs in all directions. All receptors were modelled at 1.5m height which is, by convention, "breathing height".

Table 3.2: Modelled Receptors

ID	Description	Receptor Sensitivity	X	Y
R1	Outdoor Café at Strawbridges Garden Centre	Medium	440518.3	405209.2
R2	Outdoor Café at Strawbridges Garden Centre	Medium	440519.3	405199.9
R3	Nearest dwelling to the south	High	440546.3	405132.6
R4	Nearest dwelling to the east	High	440870.9	405134
R5	Nearest dwelling to the west	High	440137.1	405312.6

3.22 A contour representing the dispersion pattern of NO_X/NO_2 associated emissions from the proposed development has been produced. The results were output to a 400m-by-400m grid, with a receptor resolution of 5 m. This grid resolution is finer than the recommended minimum gridded resolution of 1.5 times the stack height.

Figure 3:1: Modelled Cremator and Receptors



Post-processing and NO_X to NO_2 conversion

3.23 In line with the EA's screening methodology guidance, worst-case NO_X/ NO_2 conversion factors have been considered in the assessment. The assessment assumes that:

- 100% of NO_X converts to NO_2 for comparison with the long-term standards (i.e. annual averaging period)
- 50% of NO_X converts to NO_2 for comparison with the shorter-term standards (i.e. 1-hour mean, 24-hour mean).

3.24 It should be noted that for *detailed air quality modelling*, the EA advocates that 70% and 35% conversion factors should be applied to long and short-term contributions,

respectively[15]. As such, the use of the 100% and 50% conversion factors are conservative.

Judgement of Significance

3.25 The screening of air quality impacts, in the EA's air emission risk assessment, follows a two-stage approach, where the process contribution (PC) and then the predicted environmental concentration (PEC) are assessed. The PC refers to the environmental concentration of each substance that an installation releases into the air, whilst the PEC refers to the PC plus the concentration of the substance already present in the environment.

3.26 Stage 1 of the risk assessment involves comparing the predicted PC to the pollutant's EAL. The guidance states that impacts can be considered insignificant if the following criteria are met:

- Changes in the long-term PC are less than 1% of long term the EAL.
- Changes in the short-term PC are less than 10% of the short-term EAL.

3.27 In the scenario where either of these initial screening stages are exceeded, a second screening stage is considered. At the 2nd screening stage, impacts can be considered insignificant if:

- The long-term PEC is less than 70% of the relevant long-term EAL.
- The short-term PC is less than 20% of the relevant short term EAL minus twice the long-term background concentration.

3.28 In the event both screening stages are exceeded, detailed air quality modelling would be required. In detailed air quality modelling assessments, additional criteria and professional judgement are used to assess the likelihood of significant effects.

Ecological Receptors

3.29 Air quality assessments must also consider the impact of operational emissions on designated ecological sites, considering the sensitivity of the receptor and the predicted change in pollution concentrations. As there are no designated sites in proximity, a detailed assessment of operational impacts on statutory ecological sites has been scoped out.

[15] Environment Agency (undated) Conversion Ratios for NOx and NO_2

4 Baseline Conditions

4.1 A baseline assessment has been undertaken to provide a summary of the existing air quality environment in the local area.

Local Air Quality Management

4.2 There are seven Air Quality Management Area (AQMA) in the borough. All the AQMAs are declared for exceedances of the annual mean AQS for NO_2, with AQMA 6 also declared for exceedances of the 1-hour mean standard for NO_2.

4.3 The application site is not located within, or adjacent to any AQMA. The closest AQMA is found at its closest, 5,500m to the west of the site. As such the application site is not located in an area of known poor air quality.

Industrial Sources

4.4 A review of The UK Pollutant Release and Transfer Register[16] identified no industrial or waste facilities in proximity that have the potential to significantly impact the proposed development.

4.5 The closest installation is an intensive poultry farm, which is located over 1.2km to the north-west.

DEFRA / UK-AIR

4.6 Defra provides predictions of annual mean concentrations of background NO_2, PM_{10} and $PM_{2.5}$, at 1km^2 resolution across the UK[17]. A summary of the predictions for the grid square containing the application site (440500,405500) for the years 2018-2025 are set out in Table 4.1 below.

Table 4.1: UK-AIR predicted background concentrations for the application site

Pollutant	Annual Mean Concentration (µg.m^{-3})							
	2018	2019	2020	2021	2022	2023	2024	2025
NO_2	10.2	9.8	9.3	9.0	8.7	8.4	8.1	7.8
PM_{10}	13.3	13.0	12.8	12.7	12.6	12.5	12.4	12.3
$PM_{2.5}$	7.7	7.6	7.4	7.3	7.2	7.1	7.0	7.0

4.7 The data in Table 4.1 show that background annual mean concentrations of NO_2, PM_{10} and $PM_{2.5}$ are predicted to be well below their respective AQS across the application site, between 2018 and 2025.

4.8 A summary of the predictions for the grid square containing the application site, for CO, SO_2, Benzene and HCl, for the most recent years are set out in Table 4.2 below.

[16] Defra (2021) UK Pollutant Release and Transfer Register. Available at: https://prtr.defra.gov.uk/pollutant-releases
[17] Defra (2020) 2018-based background maps for NOx, NO2, PM10 and $PM_{2.5}$:https://uk-air.defra.gov.uk/data/laqm-background-maps?year=2018

Table 4.2: UK-AIR predicted background concentrations for the application site (2001, 2005 and 2010)

Pollutant	Annual Mean Concentration (µg.m^{-3})		
	2001	2005	2010
CO	375	NA	NA
SO_2	6.4	NA	NA
Benzene	0.6	0.6	0.5
HCl	NA	NA	NA

4.9 The data in Table 4.2 show that background annual mean concentrations of CO, SO_2, benzene were likely to be well below their respective long and short-term AQS across the application site between 2001 and 2010. Due to national and international policies to reduce emissions from all sectors, background concentrations of CO, SO_2, Benzene and HCl have likely fallen since 2010.

4.10 There was no publicly available background monitoring data for HCl. In the UK, the burning of coal[18] is the primary source of HCl and as there are no coal power stations in the vicinity, it is considered likely that background levels of HCl are also low.

Local Authority Monitoring

4.11 BMBC manages a network of non-automatic monitors (diffusion tubes) and automatic monitors in its administrative boundary, monitoring NO_2, PM_{10} and $PM_{2.5}$. BMBC's latest available monitoring data was published in 2021[19]. There are no monitors located in the vicinity of the application site. The closest monitor is located over 3km from the application site.

4.12 Defra also carries out additional air quality monitoring across the UK. Data from the Automatic Urban and Rural Network (AURN) and the UK Urban NO_2 network can also provide relevant monitoring data, for the establishment of baseline conditions. The are no AURN monitors or additional NO_2 diffusion tubes in the vicinity of the application site.

[18] National Atmospheric Emissions Inventory (undated) Pollution Information: Hydrogen Chloride: https://naei.beis.gov.uk/overview/pollutants?pollutant_id=14
[19] BMBC (2021) 2021 Air Quality Annual Status Report (ASR)

5 Operational Phase Assessment

Dispersion Modelling Assessment

5.1 The predicted impact of the proposed development on the annual mean EAL's is summarised in Table 5.1, below. Figure 5.1 shows the pattern of dispersion of NO_2, the pollutant which has the greatest impact relative to its EAL.

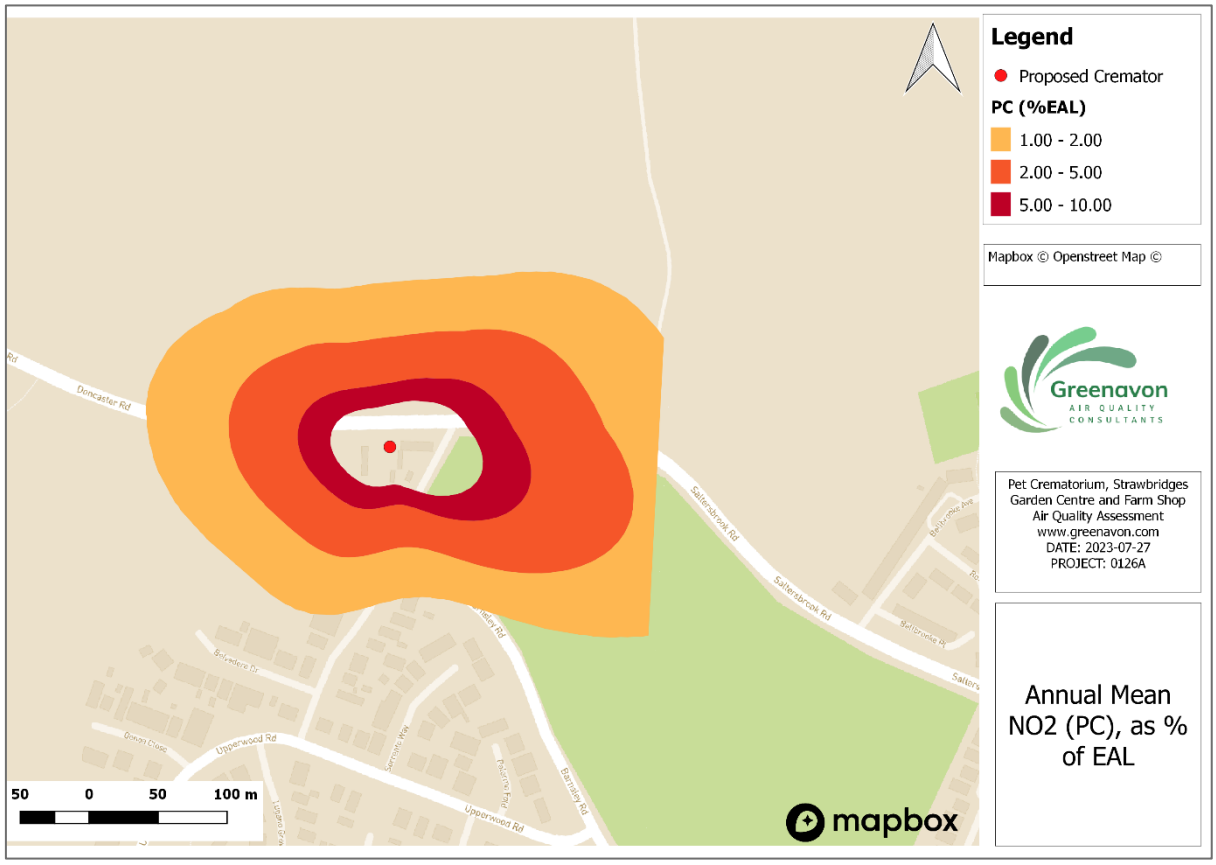
Table 5.1: Impact of the Proposed Development on Annual Mean Concentrations

Receptor	Annual Mean Concentration (µg.m^{-3})				Potentially significant
	PC	PC % of AQS	PEC	PEC % of AQS	
NO_2 (40 µgm^{-3} AQS)					
R1	3.9	9.7%	12.3	30.7%	No
R2	2.9	7.3%	11.3	28.3%	No
R3	0.4	1.0%	8.8	22.0%	No
R4	0.2	0.6%	8.6	21.6%	No
R5	0.1	0.2%	8.5	21.2%	No
PM_{10} (40 µgm^{-3} AQS)					
R1	0.3	0.9%	12.8	32.1%	No
R2	0.3	0.6%	12.8	31.9%	No
R3	0.0	0.1%	12.5	31.3%	No
R4	0.0	0.1%	12.5	31.3%	No
R5	0.0	0.0%	12.5	31.3%	No
$PM_{2.5}$ (20 µgm^{-3} AQS)					
R1	0.3	1.7%	7.4	37.2%	No
R2	0.3	1.3%	7.4	36.8%	No
R3	0.0	0.2%	7.1	35.7%	No
R4	0.0	0.1%	7.1	35.6%	No
R5	0.0	0.0%	7.1	35.5%	No
Benzene (5 µgm^{-3} AQS)					
R1	0.0	0.3%	0.5	10.3%	No
R2	0.0	0.2%	0.5	10.2%	No
R3	0.0	0.0%	0.5	10.0%	No
R4	0.0	0.0%	0.5	10.0%	No
R5	0.0	0.0%	0.5	10.0%	No

5.2 The data in Table 5.1 show that changes annual mean concentrations of all pollutants can be considered insignificant as the either the change in the long-term PC was predicted to be less than 1% of the EAL, or the total PEC was predicted to be less than 70% of the EAL.

5.3 It is also worth noting that the long term EALs do not apply at Receptors R1 and R2, the locations of greatest impact.

Figure 5:1: Annual Mean NO_2 (PC), as percentage of EAL



5.5 The predicted impact of the proposed development on the short-term EAL's is summarised in Table 5.2, below. Figure 5.1 shows the pattern of dispersion of 1-hour mean NO_2, the pollutant which has the greatest impact relative to its short-term EAL.

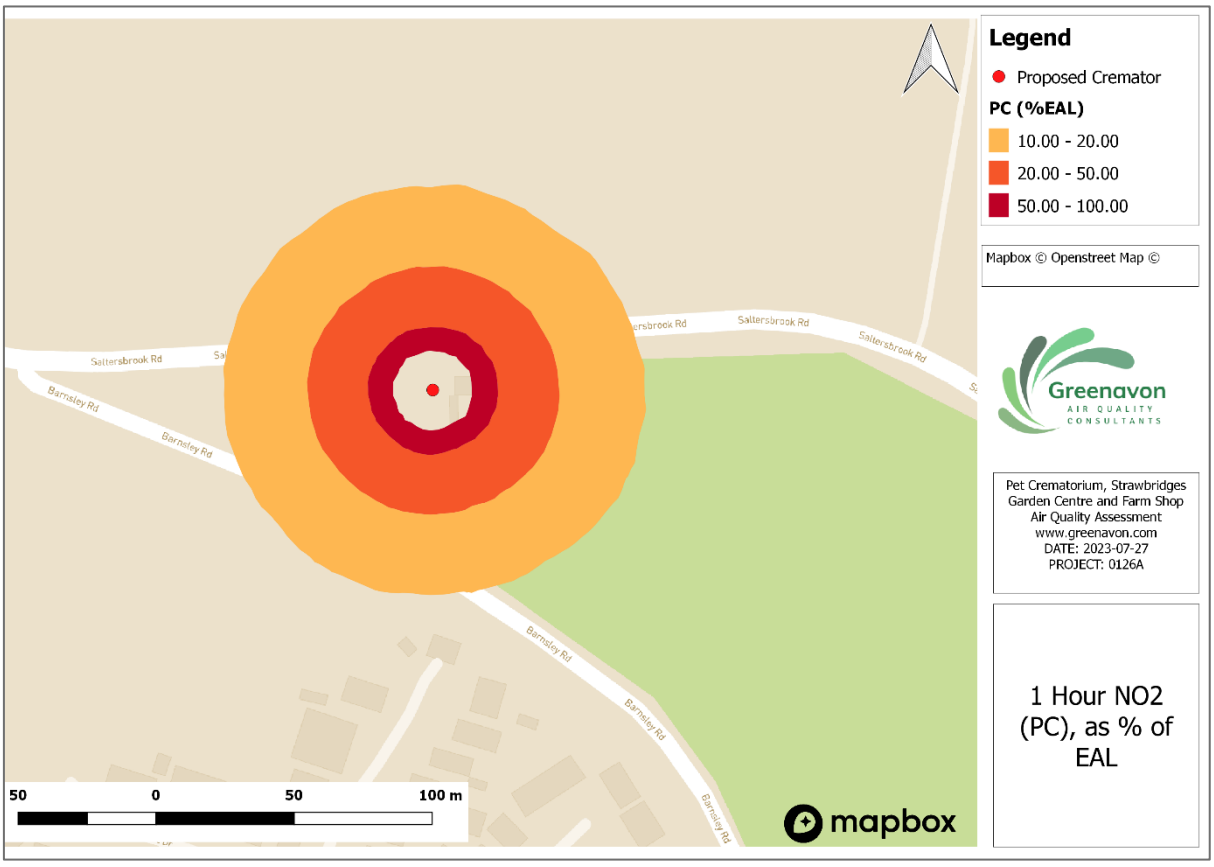
Table 5.2: Impact of the Proposed Development on Short Term Concentrations

Receptor	Concentration ($\mu g.m^{-3}$) PC	PC % of AQS	PEC	PC % of EAL minus 2*background	Potentially significant
1-hour NO_2 (99.79th percentile) (200 μgm^{-3} AQO)					
R1	24.9	12.5%	41.7	13.6%	No
R2	20.8	10.4%	37.6	11.3%	No
R3	5.5	2.8%	22.3	3.0%	No
R4	1.1	0.6%	17.9	0.6%	No
R5	0.8	0.4%	17.6	0.4%	No
24 Hour PM_{10} (90.1st percentile) (50 μgm^{-3} AQO)					
R1	1.6	3.2%	26.6	6.3%	No
R2	1.1	2.1%	26.1	4.3%	No
R3	0.1	0.3%	25.1	0.5%	No
R4	0.1	0.1%	25.1	0.3%	No
R5	0.0	0.0%	25.0	0.1%	No
8-Hour Rolling CO (10,000 μgm^{-3} AQS)					
R1	0.011	0.1%	0.386	0.1%	No
R2	0.009	0.1%	0.384	0.1%	No
R3	0.003	0.0%	0.378	0.0%	No
R4	0.000	0.0%	0.375	0.0%	No
R5	0.000	0.0%	0.375	0.0%	No
1 Hour HCl (750 μgm^{-3} EAL)					
R1	0.3	0.0%	NA	NA	No
R2	0.2	0.0%	NA	NA	No
R3	0.1	0.0%	NA	NA	No
R4	0.0	0.0%	NA	NA	No
R5	0.0	0.0%	NA	NA	No
15-minute SO_2 (99.9st percentile) (266 μgm^{-3} AQO)					
R1	17.7	6.6%	30.5	7.0%	No
R2	15.0	5.6%	27.8	5.9%	No
R3	4.1	1.5%	16.9	1.6%	No
R4	1.0	0.4%	13.8	0.4%	No
R5	0.8	0.3%	13.6	0.3%	No
1 Hour SO_2 (99.73rd percentile) (350 μgm^{-3} AQO)					
R1	17.1	4.9%	29.9	5.1%	No
R2	14.3	4.1%	27.1	4.2%	No
R3	3.7	1.1%	16.5	1.1%	No
R4	0.7	0.2%	13.5	0.2%	No
R5	0.5	0.1%	13.3	0.2%	No
24-hour SO_2 (99.18st percentile) (125 μgm^{-3} AQO)					
R1	14.0	11.2%	26.8	12.5%	No
R2	11.0	8.8%	23.8	9.8%	No
R3	2.2	1.7%	15.0	1.9%	No
R4	0.4	0.3%	13.2	0.3%	No
R5	0.2	0.2%	13.0	0.2%	No

5.6 The data in Table 5.2 show that changes in short-term concentrations of all pollutants can be considered insignificant as the either the change in the short-term PC was predicted to be less than 10% of the EAL, or the PC is predicted to be less than 20% of the EAL minus twice the background concentration.

5.7 It is also worth noting that the 24-hour and the 8-hour rolling mean standards would not apply at Receptors R1 and R2, the locations of greatest impact, as you would not reasonably expect a member of the public to spend more than 8 hours at this location, at any one time.

Figure 5:2: 1-Hour mean NO_2 (PC), relative to its EAL.



6 Discussion

6.1 Local and National Air Quality Policy seeks to sustain compliance with national objectives and limit values, and to prevent new development from contributing to, or being put at unacceptable risk, from unacceptable levels of air pollution. Furthermore, a key theme of the NPPF requires development to identify opportunities to improve air quality.

6.2 A review of the baseline air quality conditions was undertaken, referring to data provided by Defra/UK-AIR and BMBC. Background concentrations of NO_2, PM_{10}, $PM_{2.5}$, Benzene, CO and SO_2 were predicted to be below their relevant annual mean AQSs across the application site, in recent years. Background annual mean concentrations of all pollutants were well below the relevant AQSs and less than half of the short-term AQSs, suggesting that the short terms AQSs would have also been met at the site. There was no local monitoring available for HCl; however, a review of the UK Pollutant Release and Transfer Register could not identify any major local industrial emission sources, which could contribute to elevated HCl concentrations.

6.3 A dispersion modelling assessment was undertaken to predict the impact of the proposal on local air quality. Several conservative inputs, including the assumption that operation would be 24/7, 365 days a year, were incorporated into the model. Furthermore, it was assumed pollutants would emit at ground level.

6.4 Nevertheless, predicted changes in PM_{10}, $PM_{2.5}$, CO and HCl concentrations were screened out based on the proposal's PC, and the EA's first screening stage. Predicted long and short-term changes in NO_2 and 24-hour mean changes in SO_2 exceeded the EA's first screening criteria at some receptors; however, as background levels of pollution in the vicinity of the application site are very low, all increases in pollutants could be screened out, in accordance with the EA's second screening stage.

6.5 Considering the above, the proposed development is considered compliant with BMBC planning policy as it would not *"would unacceptably affect or cause a nuisance to the natural and built environment or to people".* Furthermore, the proposed cremator includes an afterburner which minimises emissions of some pollutants and therefore the developers *"minimise the effects of any possible pollution and provide mitigation measures where appropriate"*.

7 Conclusions

7.1 Greenavon Ltd was commissioned by Strawbridges Garden Centre and Farm Shop to provide an Air Quality Assessment to support an application for the proposed installation of a pet cremator at Strawbridges Garden Centre and Farm Shop, Doncaster Road, Darfield, Barnsley S71 5EZ.

7.2 An Air Quality Assessment was required to assess the potential impact on the pet cremator on local sensitive receptors.

7.3 The impact of the proposed development on local air quality was screened out using the methodology outlined in the EA's Air Emissions Risk Assessment for your environmental permit. As such, air emissions associated with the proposed development do not have the potential to significantly nearby receptors. Air quality should not, therefore, present any significant obstacles to the planning process.

Appendix A: Expected Emissions Data

MINI AB 250Kg Animal Waste Low capacity Incinerator

The agricultural range is designed as a two stage incinerator unit comprising of a primary loading chamber and a secondary after burner chamber. This afterburner system draws the hot gases from the primary chamber, this ensures a clean (and compliant) burn at temperatures of 850-1150°C.

The Addfield range of incinerators are CE Certified to BS EN 746-2 :1997, a recent emissions testing concluded the following results based on two second residue time within the secondary chamber, results are well below the EC limits.

Expected Emissions*	% by Volume
Carbon Dioxide (C02)	7.4%
Water (H20)	22%
Oxygen (02)	6%
Nitrogen (N2)	64.5%
Smoke	0%
(Not detectable under standard operating conditions)	
Odour	0%
(Not detectable under standard operating conditions)	
Volume of ash	1-3%
(Dependent on waste stream)	

*These emissions are based on minimum waste calorific values 45.7MJ/kg (animal carcase). With no other waste streams present other than general packaging containers that do not make up more than 1.5% of the total load weight.

Composition of fuel being used:

Fuel Analysis	Diesel	Composition %
Carbon	C	86%
Hydrogen	H_1	13.2%
Nitrogen	N_2	0.70%
Oxygen	O_2	0.00%

Machine Specifications: MINI AB	
External Length (mm)	2690
External Width (mm)	2200
External Height/Less Flue(mm)	3860/2660
Primary Chamber Sizes:	
Internal Length (mm)	1000
Internal Width (mm)	670
Internal Height (mm)	655
Chamber Volume (m^3)	0.45
Weight (Approx. Tonnes)	2
CE Certified	YES
EU Regulations Compliant	YES
Max Load Capacity (kg)	250
Nominal Burn Rate UK*(kg/hr)	<50
Burn Rate (Export Only)* (kg/hr)	50-75
Thermal Capacity (kw/hr)	190
Power Supply 50/60hz	210/230v

Fuel Options:	
Diesel	Yes
LPG	Yes
N-Gas	Yes

† Based on general municipal waste streams
* Depending on the type waste stream being loaded and excludes heat up time.

We reserve the right to change the specification, dimensions and quality of materials from time to time, so long as the alteration is minor or an improvement to the said products.

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t: (0)1543 571280 | f: +44 (0)1543 571173
e: sales@addfield.co.uk | w: www.addfield.co.uk
Addfield Environmental Systems Limited
Hollies Park | Cannock | Staffordshire | WS11 1DB | UK

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Expected Emmision Data

Brand: Addfield
Equipment: MINI AB Incinerator

Below are the expected emissions from the Addfield MINI AB machines. Operating at a nominal throughput of <50kg/hr, with a secondary after chamber in place with a minimum temperature of 850 deg.C

Parameter (EN)	**Addfield**
Particulate Matter	16 mg/Nm3
NOx	180/Nm3
SOx	62mg/Nm3
CO	42mg/Nm3
Total VOC (As carbon)	0.6mg/Nm3
Heavy Metals	0.05mg/Nm3
HCl	1.04mg/Nm3
HF	0.07mg/Nm3

4000m3/hour
The stack diameter is 350mm internally.

James Grant
Operations Director

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t: +44 (0)1543 571 280 ext: 202 m: +44 (0) 7805 668 815
e: jamesg@addfield.com w: www.addfield.com

Stay Connected

Addfield Environmental Systems Limited
Unit 9 | Zone 4 | Burntwood Business Park | Staffordshire | WS7 3XD | UK

Greenavon Ltd

Experts in Air Quality and Odour Assessment

Registered Office Address: 128 City Road, London,
United Kingdom, EC1V 2NX

Company Number: 14788658

www.greenavon.com