Calderdale Borough Council

Air Quality Assessment Peer Review

Belmont Industrial Estate Calder Valley Skip Hire

March 2024

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BUREAU VERITAS

Document Control Sheet

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Table of Contents

1 Introduction

Bureau Veritas has been appointed by Calderdale Borough Council to peer review the air quality information submitted in support of the Environmental Permit (EP) Application by Calder Valley Skip Hire Ltd (CVSH). CVSH propose to operate a new small waste incineration plant (SWIP) at their waste transfer station (WTS) site in Sowerby Bridge, West Yorkshire.

The EP application (Ref. S13/006) included supporting air quality evidence which considers: the impact of the Application on sensitive receptors, the impact of the construction phase on sensitive receptors and the suitability of the site for the proposed end use and management measures for the operation of the application.

The primary purpose of this report is to ensure that the air quality evidence submitted by the applicant follows an appropriate methodology and makes reference to, and utilises as far as possible, the practice guidance that is available locally and nationally for such an assessment.

The air quality evidence has thus been peer reviewed in order to inform the Council around issues that may constitute the need for:

- any further clarification: namely those issues for which further detail would provide for additional transparency and/or a clearer understanding on;

or

- an omission: those issues deemed within the peer review to be lacking within the assessment, which may prevent the authority from making an informed decision related to the impacts of the proposed permitted activities.

This review is based on the following documents as they relate to impact of the application with regards to air quality:

- ES Addendum to 2017 ES Chapter 7 Air Quality Assessment, RPS, July 2019
- ES Addendum Additional Air Quality Assessment, RPS, July 2019
- Response to Review of Air Quality Consultants Review of Air Quality Assessment, RPS, March 2022
- Memo Report Air Quality Including Additional Sensitivity Tests, RPS, January 2024
- Calder Valley Small Waste Incineration Plant: Review and Provision of Independent Advice, CERC, November 2023

Other relevant documents, such as the technical information for the proposed incinerator and appeal decisions, are considered within the context of the above specifically reviewed documents.

1.1 Development History Summary with regards to Air Quality

We seek to set out our understanding of the development's application processes and history to date with regards to the air quality information submitted to provide context.

Planning application – an original planning application was submitted for the SWIP with an accompanying Environmental Statement, including a chapter on Air Quality prepared by RPS. This application was refused on the basis of air quality.

Planning appeal – The applicant appealed against this decision on the grounds that air quality information had been submitted as part of the application, which determined that the development would not have a significant effect on air quality. During the course of the appeal, the applicant's methodology for completing the air quality assessment was interrogated and additional information produced including further sensitivity testing, due to questions around inherent model uncertainty. The appeal was upheld, and planning permission granted.

First Permit application – Further to the planning permission and due to the scale of the development, the process was required to submit an environmental permit application for operation to the Local Authority. While this is a separate process to the planning application, the EP is required for lawful operation of the permitted activities and requires the submission of air quality evidence to demonstrate that the development can operate in such a way that there would be no significant environmental effects. The grant of the permit was subject to an application for judicial review, which subsequently led to a judicial review.

Permit Judicial Review – the inspector cited the treatment of trees within the air quality modelling insufficient to give confidence that there would be no significant effects from the development and the appeal was dismissed.

Second Permit Application – This is the application with which this review is primarily concerned. As part of this second application, additional evidence has been provided around the effect of trees on modelling from the developers of the air quality dispersion model used, CERC. This review is not limited to the previous reason for refusal around the treatment of trees and has considered all evidence related to air quality submitted as part of the permit application.

2 Methodology

A number of methodologies can be applied to the peer review of air quality assessments. In brief, the assessment should comply with:

- the need to clearly set the defined existing conditions at the Site;
- the extent to which the application is likely to impact on the environment; and
- an assessment of the significance of such impacts as benchmarked against relevant and available criteria.

The whole assessment should be made against prevailing environmental policies set by Government, local and regional bodies and relevant best practice guidance.

The methodology applied for the current peer review is to benchmark the air quality assessment against the following criteria, considering, where relevant, both the construction and operational phases:

- Identification and quantification of relevant pollutant emissions to air;
- Justification for 'scoping out' of certain pollutants/impacts;
- Identification and recognition of different types of impact (e.g. health or nuisance, chronic or acute, local, regional or global, direct or secondary, adverse or beneficial, combined);
- Use of best practice in quantifying the baseline air quality, over the correct timescales/averaging periods, and correct forecasts for future years;
- Reference to the correct and up-to-date air quality standards, objectives and guidelines for the protection of both human health and vegetation;
- Adherence to current best practice in assessment methodology;
- Identification of sensitive receptors and the appropriate banding/categorisation;
- Correct predictions of impacts, with and without proposed mitigation;
- Effects of proposed mitigation measures;
- Correct quantification of effects of mitigation measures;
- Consultation with the correct statutory and non-statutory bodies;
- Justification of conclusions; and
- Discussion of gaps in knowledge/uncertainties in the results and/or conclusions, and the reasons for these.

This peer review has adopted the following structure for the conclusions of the critique:

- Are the findings of assessment robust, appropriate and defensible?
- Are there any deficiencies, errors or areas of improvement?
- Potential changes in the results or conclusions.

3 Peer Review Findings

3.1 ES Addendum to 2017 ES Chapter 7 Air Quality Assessment

3.1.1 Summary of the document in context of the Wider Application

This document is an updated ES chapter to a previously submitted Air Quality Assessment, which was submitted as part of the original planning application in 2017. This was updating following consultation as part of the Appeal process which highlighted that, due to the sensitivity of the site, a greater level of detail in the modelling would be beneficial to aid in decision making and to reduce uncertainty.

The document is the first air quality assessment submitted chronologically as part of this permit application.

This document sets out the overall methodology and original findings of the air quality assessment work completed to determine the effect of the application on local air pollutant concentrations.

3.1.2 Legislative and Policy Context

This chapter covers all the prevailing legislation and relevant policy context in sufficient detail. It discusses the air quality legislation sourced at the European level and how this legislation has historically been carried through into UK law. There is reference to the Air Quality Standards (Amendment) Regulations (2010), which have been superseded since the production of this document.

The chapter identifies the following pollutants of concern:

- Nitrogen dioxide (NO_2) ;
- Particulate Matter (PM_{10} and $PM_{2.5}$ fractions);
- Hydrogen Chloride (HCl);
- Hydrogen Fluoride (HF);
- Sulphur Dioxide(SO_2);
- Carbon Monoxide (CO);
- Heavy Metals;
- Dioxins and Furans;
- Ammonia (NH_3);
- Polychlorinated Biphenyls (PCBs); and
- Polycyclic Aromatic Hydrocarbons (PAHs).

Reference is made to the necessary statutory drivers and legislation which gives rise to the focus on these pollutants and need for the air quality assessment overall.

The emissions limits for NH_3, PCBs and PAHs are sourced from the IRRP BAT reference document for Waste Incineration (August 2006). Since the publication of this document, there is a more recent version of the BAT reference document, published December 2019. The applicant should confirm that this later version of the document does not change any of the assumptions they have used for model inputs. Additionally, it is not clear where within the BAT reference document they have sourced their

emissions inputs for these three pollutant types and whether any other potential sources of information were considered when deciding on the model inputs for these pollutants. It is noted that the later guidance is acknowledged in the response to the AQC review (Section 3.3.2 below).

The relevant annual objective for $PM_{2.5}$ has changed since publication of this report from 25µg/m³ to 20µg/m³. Based on the predicted maximum change of +0.3µg/m³, this change in limit value would not change the significance of effect of the application with regards to the IAQM impact descriptors.

There is reference made to the Technical Guidance 'LAQM TG(16)'. Since the production of this chapter there has been a later version published (LAQMTG(22)). However, the changes within the later guidance are not considered likely to alter the methodology or outcomes of the assessment.

3.1.3 Baseline Conditions

A baseline year for NO_2 concentrations has been used based on a 2019 modelling assessment. From an initial review, concentrations within the Sowerby Bridge AQMA, located approximately 500m north of the application site. Have declined since 2018, though this is potentially due to the change in traffic as a result of Covid-19 in 2020 and 2021. It is noted that monitored concentrations at 'SB23', the closest monitoring location to the site along Rochdale Road and close to the site entrance , are generally below the relevant objective for NO_2 and this monitoring has commenced since the publication of the 2019 report.

The assessment is inclusive of high-resolution terrain data to a resolution of 2m immediately around the site and is inclusive of road traffic emissions based on a baseline year of 2017 modelling. It is considered that this is an appropriate representation of the baseline and likely to be representative of a conservative approach with regards to baseline NO_2 concentrations.

Two separate meteorological stations were used in this original assessment, Leeds Bradford and Bingley, with data from 2013 to 2017 inclusive considered. While use of the different meteorological stations is useful to test the sensitivity of the model with specific regards to inter-year variability and spatial variability for variance in local wind patterns, there are challenges with sourcing data which is fully representative of the micro-climate around the application site within the valley. This could potentially be captured by completing meteorological measurements at the application site to more accurately model the baseline meteorological conditions and compare with that which has been used to make model predictions. It is recognised that this approach is not standard practice for dispersion modelling. An alternative option would be exploring use of Numerical Weather Prediction (NWP) for the site, though it should be recognised that this would be calculated data rather than observed.

3.1.4 Assessment Methodology

ADMS 5 has been used for the purpose of the modelling which was the latest available at the time of the report. There is now a more recent version available (ADMS 6). The key change in the latest version of the software which may be relevant to this application is highlighted below:

> *Several enhancements to the modelling of buildings, including the ability to automatically determine a main building, easier plotting of effective building and changes to the effect of buildings are modelled, particularly for upwind sources.*

As part of CERC's testing (discussed below), trees were modelled as buildings as a sensitivity test to determine the potential effect on dispersion. It should be acknowledged that it is considered that there are significant limitations with this approach as tree canopies are porous (i.e. an emissions' plume can disperse through/around the leaves and branches) and so do not influence dispersion in the same way as solid buildings and similar structures.

It should be noted that the EPUK/IAQM 'impact descriptor' significance criteria used in the assessment is specifically relevant for planning applications rather than permit applications, but is not considered inappropriate to use as an indicator of effect.

3.1.5 Results and Impact Assessment

The results from the modelled impact of NO_2 are not significant based on the input parameters as described as presented within the assessment inclusive of bother road contributions and process contributions.

Of the other pollutants assessed, the following process contributions (PC) had the potential to be significant for human health:

- Hydrogen Chloride (HCl) (1 hour);
- Sulphur Dioxide (SO_2) (15 minute, 1 hour (99.73th percentile), 24 hour, 1 hour (annual mean))
- Cadmium (Cd);
- Arsenic (As);
- Cobalt (Co) (1 hour maximum & 1 hour annual mean);
- Lead (Pb) (1 hour annual mean);
- Manganese (Mn) (1 hour annual mean);
- Nickel (Ni) (1 hour annual mean);
- Vanadium (V) (1 hour maximum); and
- Polycyclic Aromatic Hydrocarbons (PAHs) (1 hour annual mean).

Of these, Arsenic has been identified as the Predicted Environmental Concentration (PEC) being significant. This is based on a conservative approach assuming that all of the 'group 3 metals' modelled are arsenic. The report goes on to state that it is anticipated that only 11% of the emissions would be Arsenic, and with this level of emission in place, the PEC would not be significant based on typical breakdown of Arsenic from other incinerators. While it is accepted that the original conclusion of significance is a conservative approach, this risk should be highlighted and additional mitigation for appropriately controlling arsenic emissions from the application should be sought. This may involve controlling the waste inputs or exploring other abatement methods.

3.2 ES Addendum Additional Air Quality Assessment, RPS, July 2019

3.2.1 Summary of the document in context of the Wider Application

This document forms an appendix to the previous ES document which contains more technical information and gives greater detail as to how the conclusions of the Air Quality Assessment have been reached but the findings do not change and comments from the above review are relevant for this document.

3.2.2 Legislative and Policy Context

This aligns with the legislative and policy context set out within the ES Chapter 7 addendum reviewed above and the comments for this section are the same as those set out in 3.1.2 above.

3.2.3 Baseline Conditions

There is additional information on the baseline contained within this document. This is largely contained within an appendix detailing the baseline conditions and roads modelling assessment.

ADMS-Roads modelling shows that monitored concentrations are within 25% of the modelled concentrations, in line with best practice technical guidance, LAQM TG(22). This is considered appropriate.

3.2.4 Assessment Methodology

The effect of trees has been assessed through varying surface roughness for sensitivity testing. This is a fairly simplistic means for assessment but is considered the industry standard approach for testing the potential sensitivity around trees.

In addition to the standard ADMS model runs, as an additional sensitivity test the applicant has also utilised the AERMOD kernel within the ADMS model interface. This gives generally similar results, but it should be noted that the process contribution at Spring Bank Industrial Estate are over double the Process Contribution from ADMS. This receptor is the closest to the point source of emissions. It is accepted that neither model is necessarily better but shows the potential uncertainty in modelling approaches.

3.2.5 Results and Impact Assessment

Conclusions are the same as that considered in the above document and are those set out in Section 3.1.5.

3.3 Response to Review of Air Quality Consultants Review of Air Quality Assessment, RPS, March 2022

3.3.1 Summary of the document in context of the Wider Application

This has been prepared in response to another consultancy (Air Quality Consultants) review of the Air Quality Assessment.

These comments are summarised within the response document. Specific additional assessment contained within this document includes:

- Additional discussion of the Benzo(a)pyrene assessment;
- Assessment of additional Ecological receptors;
- Additional Carbon Monoxide (CO) assessment; and
- Additional assessment of Total Organic Compounds (TOCs).

3.3.2 Issue 2- Benzo(a)Pyrene

The AQC review highlights the changes in regard to the assessment of Benzo(a)pyrene (B(a)P) with the changes in the Waste Incineration BAT reference documents from the 2006 version used in the assessment to the 2019 latest available version. The applicant has updated this accordingly.

R7, Spring Bank Industrial Estate is the worst affected receptor in the updated assessment of B(a)P. The report states that the effect is not significant as the Environmental Assessment Level do not apply at workspaces.

No updates for ammonia or PCDs have been considered based on the 2019 guidance.

3.3.3 Assessment of Additional Ecological receptors

Additional assessment work has been completed to assess the effect on additional ecological sites. It is accepted that this modelling has been completed appropriately and the findings that there are no significant additional concerns are considered robust for the effect on ecological sites.

3.3.4 Additional Carbon Monoxide Assessment

It is accepted that this additional assessment gives confidence that the effect of Carbon Monoxide are not significant from the application.

3.3.5 Additional Assessment of Total Organic Compounds (TOCs)

An assessment has been completed as a result of an assessment limit from the Environment Agency being agreed following the 2019 submissions of the application.

This assessment has used an Ambient Concentration of Benzene, but has not specified where this is from. It is assumed that this data has come from the 2001 background maps available on UK-Air but this should be confirmed by the applicant. For clarity, this is the background component of Benzene which is separate and additional to the process contribution from the site operation.

3.4 Memo Report Air Quality Including Additional Sensitivity Tests, RPS, January 2024

3.4.1 Summary of the document in context of the Wider Application

CVSH applied for an Environmental Permit to operate the Schedule 13 SWIP. An appeal was made by CVSH against the deemed refusal of the Environmental Permit application. The appeal was dismissed by an Appeal Decision dated 5th July 2023. The main reason for refusal was the potential effect of nearby trees on dispersion of emissions from the SWIP relative to the discharge height of the stack.

The inspector's decision related to the refusal is primarily based on uncertainty of the effects of trees on dispersion around the stack.

This document includes additional air quality modelling sensitivity tests.

3.4.2 Baseline Conditions

The baseline conditions used within the assessment are the same as those used in documents reviewed under Sections 3.1, 3.2 and 3.4 for the purpose of baseline. It is noted that there is additional monitoring of NO_2 completed by the Local Authority closer to the application site, which would give a better understanding of local conditions. However, this monitoring does not show that there are likely to be additional exceedances closer to the application site.

As such, it is considered that using the 2019 baseline is a conservative approach with regards to NO_2, but is not necessarily reflective of the latest available information.

3.4.3 Assessment Methodology

Additional sensitivity tests have been completed, namely:

- Use of Numerical Weather Prediction (NWP) meteorological data; and
- Consideration of concentrations in column of air above modelled receptors.

The additional assessment has only completed sensitivity test modelling using NWP for NO_2 concentrations, though the previous assessment work has identified risks from multiple different pollutants. It is noted that the NWP assessment gives rise to generally lower pollutant concentrations compared to the predictions from the previous sensitivity tests using the two different synoptic meteorological stations across a 5-year period.

The consideration of concentrations in the column of air above the modelled receptors shows the average concentration of modelled height above the stack in 1m increments up to 30m. While this gives some indication of the potential for maximum emissions in air above the stack, it would also be useful to show how the model falls off with height above the stack, this could be shown by the concentration modelled at each height in graph form.

3.4.4 Results and Impact Assessment

The findings of these additional sensitivity tests show that there is not predicted to be any significant effect at the assessed receptors as a result of the application with regards to NO_2. Only results for NO_2 are presented as part of the assessment work and there is no consideration of these tests on other pollutants of concern.

3.5 Calder Valley Small Waste Incineration Plant: Review and Provision of Independent Advice, CERC, November 2023

3.5.1 Summary of the document in context of the Wider Application

This is appended to the Memo and is a separate study completed by Cambridge Environmental Researchers UK, developers of the ADMS software used for the Air Quality assessments.

3.5.2 Baseline Conditions

There are photographs of the stack included within the CERC report. It appears that the diameter of the stack is less than the 0.4m assessed within the modelling report from these photographs. It is accepted that this is difficult to determine based only on photographs, but it also appears to be smaller than this on ‘Drawing 2 – Layout Plan’. The installed stack diameter should be confirmed.

Any changes in the installed stack diameter compared to that which has been modelled would result in changes to modelled concentrations.

3.5.3 Assessment Methodology

As with the above memo, the CERC review has focused on the dispersion of NO_2 from the application as opposed to other pollutants of concern. The approach using varying surface roughness is considered robust. It is agreed that trees should not generally be modelled as buildings, and limited weight should be given to the results from this model run.

3.5.4 Results and Impact Assessment

The results differ slightly between RPS and CERC's approaches. This shows the inherent uncertainty in the input assumptions required to undertake dispersion modelling, which ultimately can lead to subtle variations when air quality modellers are making decisions based on the available information.

The effect of the building at Spring Bank Industrial estate is apparent on all the modelled contour plots. No contour plot is provided for the trees being modelled as buildings.

3.6 Are there any deficiencies, errors or areas of improvement?

The application has focussed on exceedances of the annual mean NO_2 Air Quality Objective, which is relevant with regards to the proximity of the Air Quality Management Area declared for exceedances of the objective for this pollutant.

Of these, Arsenic has been identified as the Predicted Environmental Concentration (PEC) being significant. This is based on a conservative approach assuming that all the 'group 3 metals' modelled are arsenic. The report goes on to state that it is anticipated that only 11% of the emissions would be Arsenic, and with this level of emission in place, the PEC would not be significant. It would take around 20% of emissions of Arsenic to result in an exceedance of the PEC and a potentially significant effect. While it is accepted that the original conclusion of significance is a conservative approach, this risk should be highlighted and additional mitigation for appropriately controlling arsenic emissions from the application should be sought. This may involve controlling the waste inputs or exploring other abatement methods.

3.7 Potential Changes in the Results or Conclusions

The emissions limits for NH_3, PCBs and PAHs are sourced from the IRRP BAT reference document for Waste Incineration (August 2006). Since the publication of this document, there is a more recent version of the BAT reference document, published December 2019. The applicant should confirm that this later version of the document does not change any of the assumptions they have used for model inputs. Additionally, it is not clear where within the BAT reference document they have sourced their emissions inputs for these three pollutant types and whether any other potential sources of information, such as the EMEP/EEA guidebook, were considered when deciding on the model inputs for these pollutants.

There are photographs of the stack included within the CERC report. It appears that the diameter of the stack is less than the 0.4m assessed within the modelling report from these photographs. It is accepted that this is difficult to determine based only on photographs, but it also appears to be smaller than this on 'Drawing 2 – Layout Plan'. The installed stack diameter should be confirmed.

4 Conclusions and Recommendations

The air quality information submitted as part of the application is thorough and details a large number of sensitivity testing to determine the accuracy of modelling. Ultimately, this does show that there is inherent uncertainty in any modelling approach, but it is considered that this is the best method for determining the likely air quality impacts where an installation is not already operational in-situ.

The effect of trees on dispersion have been considered in the modelling to the extent possible with the inherent limitations of the dispersion modelling software, but ultimately the software is not designed to account for such effects and the best way to understand the effect of the trees would be to complete monitoring with the SWIP in operation.

Confirmation should be sought that the modelled dimensions match the installed stack for height and diameter to give confidence that the modelled outputs reflect the actual installation.

Additional information on the inputs for NH_3 and PCDs should be clarified as to whether the later version of the BAT reference document would lead to any changes in assumptions around modelling in the applicant's air quality consultant's opinion.

The applicant has not completed sensitivity tests using NWP for any other pollutants besides NO_2. This additional information would give greater confidence that there are not predicted to be significant effects from any pollutant of concern from the application site.