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Enbloc VOC Emissions Assessment

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Introduction

Achilles Therapeutics Ltd a client of Enbloc Ltd is developing a proposed new manufacturing facility at Unit B Hayes 180, 1-3 Uxbridge Road, Hayes, UB4 0JN.

Planning permission was granted in November 2020 under application ref. 75918/APP/2020/3171 for the following:

“Installation of mezzanines, external plant compounds, external changes to elevations and associated works”.

Since securing planning permission, Achilles have been progressing the detailed design of Unit B and a number of design changes to the extant scheme are required for operational purposes. This includes the provision of ventilation flues to the western elevation.

This Air Quality Assessment has been prepared to determine whether the development will any significant impacts on the surrounding area in terms of Air Quality and to ensure it accords with Policy EM8 of the Hillingdon Local Plan Part 1, Policy DMEI 14 of the Hillingdon Local Plan Part 2 and Policy SI 1 of the London Plan.

The first phase of this project will be to fit out part of the new facility to manufacture Peptides at a kilogram scale.

The manufacturing process will be as contained as is reasonably practical but will lead to the emission of small quantities of volatile organic compounds (VOCs). This report provides details on the environment impact assessment of these emissions.

The assessment detailed in this report indicates the environmental impact of emissions of the VOCs will not be significant.

Assessment Approach

The guidance issued by EPUK and IAQM (Moorcroft and Barrowcliffe et al, 2017) is a comprehensive explanation of the place of air quality in the planning regime.

This guidance states under its section on air quality as a material consideration

“Any air quality issue that relates to land use and its development is capable of being a material planning consideration. The weight, however, given to air quality in making a planning application decision, in addition to the policies in the local plan, will depend on such factors as:

1. the severity of the impacts on air quality;
2. the air quality in the area surrounding the proposed development;
3. the likely use of the development, i.e., the length of time people are likely to be exposed at that location; and
4. the positive benefits provided through other material considerations”.

Recommended Best Practice

The guidance goes into detail on how all development proposals can and should adopt good design principles that reduce emissions and contribute to better air quality management. It states:

“The basic concept is that good practice to reduce emissions and exposure is incorporated into all developments at the outset, at a scale commensurate with the emissions”.

Impact Descriptors and Assessment of Significance

There is no official guidance in the UK in relation to development control on how to describe the nature of air quality impacts, nor how to assess their significance. The approach within the EPUK/IAQM guidance has, therefore, been used in this assessment. This approach involves a two-stage process:

- a qualitative or quantitative description of the impacts on local air quality arising from the development; and
- a judgement on the overall significance of the effects of any impacts.

Impact Descriptors

Impact description involves expressing the magnitude of incremental change as a proportion of a relevant assessment level and then examining this change in the context of the new total concentration and its relationship with the assessment criterion.

Table 1 sets out the method for determining the impact descriptor for annual mean concentrations at individual receptors, having been adapted from the table presented in the guidance document. For the assessment criterion the term Air Quality Assessment Level or AQAL has been adopted, as it covers all pollutants, i.e., those with and without formal standards. Typically, as is the case for this assessment, the AQAL will be the air quality objective value. Note that impacts may be adverse or beneficial, depending on whether the change in concentration is positive or negative.

In this case the Air Quality Assessment Level is based on the Environment Agency’s “Environmental Assessment Level” for the volatile organic compounds that are used in the largest quantities.

Table 1- Air Quality Impact Descriptors for Individual Receptors for All Pollutants ^a

Long-Term Average Concentration at Receptor in Assessment Year ^b	Change in concentration relative to EAL ^c				
	0%	1%	2-5%	6-10%	>10%
75% or less of EAL	Negligible	Negligible	Negligible	Slight	Moderate
76-94% of EAL	Negligible	Negligible	Slight	Moderate	Moderate
95-102% of EAL	Negligible	Slight	Moderate	Moderate	Substantial
103-109% of EAL	Negligible	Moderate	Moderate	Substantial	Substantial

110% or more of EAL	Negligible	Moderate	Substantial	Substantial	Substantial
Notes: - Values are rounded to the nearest whole number. - This is the “Without Scheme” concentration where there is a decrease in pollutant concentration and the “With Scheme” concentration where there is an increase. - Environment Agency ‘Environmental Assessment Level (EAL).					

Assessment of Significance

The guidance recommends that the assessment of significance should be based on professional judgement, with the overall air quality impact of the development described as either ‘significant’ or ‘not significant’. In drawing this conclusion, the following factors should be taken into account:

- the existing and future air quality in the absence of the development;
- the extent of current and future population exposure to the impacts;
- the influence and validity of any assumptions adopted when undertaking the prediction of impacts;
- the potential for cumulative impacts and, in such circumstances, several impacts that are described as ‘slight’ individually could, taken together, be regarded as having a significant effect for the purposes of air quality management in an area, especially where it is proving difficult to reduce concentrations of a pollutant. Conversely, a ‘moderate’ or ‘substantial’ impact may not have a significant effect if it is confined to a very small area and where it is not obviously the cause of harm to human health; and
- the judgement on significance relates to the consequences of the impacts; will they have an effect on human health that could be considered as significant? In the majority of cases, the impacts from an individual development will be insufficiently large to result in measurable changes in health outcomes that could be regarded as significant by health care professionals.

Emissions Assessment

Selection of Assessment VOCs

The proposed facility makes use of a range of VOCs; however, two materials are used in significantly larger quantities than others and they are also two of the more volatile materials. The two materials are therefore the worst-case materials and the impact of the other materials used will be minor.

These two materials are dimethyl-formamide and diethyl ether and they have Environment Agency assigned Environment Assessment Levels (EALs) as shown in Table 2

Table 2- Environmental Assessment Levels

Material	Environmental Assessment Level $\mu\text{g}/\text{m}^3$	
	Hourly	Annual
Dimethyl-formamide	300	6,100
Diethyl ether	12,300	154,000

Calculation of Concentration Release

For operator protection and to protect the products manufactured the materials are used in aspirated flow cabinets. The air from the cabinets is extracted by fans and then exhausted to the atmosphere. The calculations of the concentrations are at the point of release and not at the nearest receptor.

Since the facility has not yet been constructed, these calculations have been based on best current available information and consider what is likely to be the worst case.

These calculations indicate that for both of the materials, both the hourly and annual concentration levels will be significantly less than 75% of the EAL but greater than 10%.

Concentration for Individual Receptors

The concentrations calculated are at the point of release and under most atmospheric conditions the concentration will be reduced further by turbulent mixing before reaching any individual receptors outside the site boundary.

Assessment of Significance

Based on Table 1, the calculated concentration would suggest that it would be appropriate to use the ">10%" column since the change in the EAL for the VOCs is likely to be >10% above the current background level. However, the following additional factors should be taken into consideration.

1. The facility will be operated by well trained highly skilled operatives working to closely controlled standard operating procedures which means the risk of excursions of concentration are unlikely

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2. The process is highly automated using a validated control system
 3. The processes are contained and there is scope for more containment
 4. The long-term average concentration at the nearest receptor will be significantly less than 75%
 5. Worst case assumptions have been used in the calculation of the concentrations

Based on these additional considerations it is reasonable to consider that the likely impact of the new facility on the local environment from volatile organic compounds will be “slight” instead of “moderate” and that the impact can be classified as “not significant”.

Extent of Current and Future Populations

This has not been considered in this report.

Cumulative Impacts

The materials considered in this report will be released at the same time as each other, but since the concentration is significantly lower than 75% of the EAL the cumulative effect of these two materials is not considered to be significant.

The other materials used in the process are used in much lower quantities and/or the VOC is much less volatile and therefore the cumulative impact of the other materials is also not considered significant.

Impact on Human Health

The impact on human health is not considered to be significant since the concentrations calculated are two to three orders of magnitude lower than the workplace exposure limit set by the Health and Safety Executive.

Good Practice to Reduce Emissions

Considerable work has already been carried out to reduce the emissions. The effort to reduce emissions will continue through the detailed design phase of this project.

Conclusion

The environmental impact due to emissions of volatile organic chemicals is not significant.