

Attachment 6.1

Appendix 8.9 PFAS Modelling Assessment

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APPENDIX 8.9 PFAS Air Modelling Assessment

8.9.1 Introduction

At the EU level, in terms of ambient air, there is currently no recognised ambient air quality standard for PFAS as a group nor for individual compounds such as PFOA or PFOS.

Worldwide, the Minnesota Department of Health, USA have derived a range of inhalation health guidelines for six PFAS compounds including PFOA and PFOS. These range from 0.91 ng/m³ for PFOA to 3.5 ng/m³ for PFOS (MDH, 2022).

In Europe, a temporary assessment framework has been proposed (VITO, 2021) which proposes a value between 0.44 and 2.2 ng/m³ for the sum of 4 EFSA-PFSA compounds (PFNA, PFOA, PFHxS and PFOS) with the range based on body weight and inhalation volume among other factors. As this assessment threshold level is the most onerous available it has been used in the assessment. Although it has been framed to address only the 4 EFSA-PFAS compounds outlined above, in the assessment below it has been used to assess emissions of Total PFAS and thus this approach will be inherently conservative.

8.9.2 Background Concentrations

In relation to existing background levels of PFAS in the ambient air environment, a study by Song et al (2025), found that levels of PFOA in Europe ranged from around 1 pg/m³ in Italy to 0.1 pg/m³ in Finland whilst levels of PFOS ranged from 0.8 pg/m³ in Italy to 0.02 pg/m³ in Finland.

Vito (2023) found overall levels of Total PFAS in the region of Antwerp peaking at around 100 pg/m³ with maximum values of PFOA and PFOS peaking at 9 pg/m³ and 6 pg/m³ respectively. The average value for Total PFAS at the four measurement sites in the study area was 64 pg/m³ with average values of PFOA and PFOS of 7 pg/m³ and 4 pg/m³ respectively. The Vito (2023) study also found overall levels of EFSA-PFAS in the region of Antwerp peaking at around 15 pg/m³ with an average value of around 12 pg/m³.

8.9.3 Emission Rates from Municipal Waste Incinerators

In terms of emission rate of PFAS compounds from municipal waste incinerators, a recent study in Sweden (Bjorklund et al (2023)), found that a typical annual emission rate would be in the region of 5 ng/Nm³ for Σ targeted polar PFAS as measured by OTM-45 / XP X43-126 / comparable modified EN 1948-1 stack method. Other research data indicates that annual average emission data varies typically between 0.3–10 ng/Nm³ with an upper level of 40 ng/Nm³ (IVL (2025)) which can occur over short periods of time but would not be representative of an annual average value.

8.9.4 Modelling Scenario

Modelling has been undertaken using the AERMOD air dispersion model based on the assessment approach and methodology as outlined in **Appendix 8.1** of **Chapter 8** of the EIS using Cork Airport meteorological data from 2021-2025 and onsite data for 2007.

For the worst-case modelling scenario, Total PFAS was modelled based on a background concentration of 100 pg/m³ based on worst-case data from Vito (2023), an emission concentration of 40 ng/Nm³ based on the upper range of data from a municipal incinerator in Sweden (Bjorklund et al, 2023) and was compared to the lowest available ambient air assessment criteria of 0.44 ng/m³ on an annual basis. It should be pointed out that this air assessment criteria strictly applies to only EFSA-PFSA compounds (PFNA, PFOA, PFHxS and PFOS) but for the purposes of this assessment has been applied to Total PFAS as a worst-case approach.

As shown in Table.1, the worst-case results over a six year period show that at the worst-case location anywhere offsite, the process contribution (PC) concentration peaks at less than 0.33 pg/m³ for Total PFAS which is less than 0.075% of the ambient air assessment criteria whilst the Total PFAS predicted environmental concentration (PEC), including background, peaks at 22.8% of the ambient air assessment criteria. As shown in , the maximum concentration peaks at the boundary of the facility and decreases rapidly away from this maximum location.

Table.1 Dispersion Model Results – Total PFAS

Pollutant / Year	Averaging Period	Worst Case Receptor		Concentrations (pg/m ³)					PEC as % of Limit
		Type	X,Y (UTM Zone 29 N)	PC	PC as % of Limit	Back-ground	PEC	Guideline Value	
PFAS / Onsite 2007	Annual Mean	Boundary	547850, 5742125	0.234	0.053%	100.0	100.234	440	22.78%
PFAS / 2021	Annual Mean	Boundary	548425, 5741675	0.297	0.067%	100.0	100.297	440	22.79%
PFAS / 2022	Annual Mean	Boundary	548450, 5741700	0.269	0.061%	100.0	100.269	440	22.79%
PFAS / 2023	Annual Mean	Boundary	548450, 5741700	0.247	0.056%	100.0	100.247	440	22.78%
PFAS / 2024	Annual Mean	Boundary	548425, 5741675	0.326	0.074%	100.0	100.326	440	22.80%
PFAS / 2025	Annual Mean	Boundary	547150, 5742650	0.275	0.063%	100.0	100.275	440	22.79%

As shown in Table.1, a worst-case Total PFAS emission concentration has been used in addition to an overly conservative background concentration which still results in a very low PC compared to the inherently conservative guideline value. In reality, the PC and PEC are likely to be considerably lower than the values outlined in Table.1 if the mid-range of emission concentrations for Total PFAS from the Bjorkland et al (2023) study was used in the assessment (which is around eight times lower than the worst-case level) in addition to a more realistic and much lower background concentration that is likely to be representative of Ireland.

8.9.5 References

Minnesota Department of Health (2022) Air Guideline Values
 Song et al (2025) Linking Analysis to Atmospheric PFAS: An Integrated Framework for Exposure Assessment, Health Risks, and Future Management Strategies, Applied Sciences
 Vito (2023) Studie Naar PFAS In De Omgevingslucht En Deposities In De Omgeving Van Indaver En Stabroek
 Bjorklund et al (2023) Emission of Per- and Polyfluoroalkyl Substances from a Waste-to-Energy Plant—Occurrence in Ashes, Treated Process Water, and First Observation in Flue Gas Environ Sci Technol. 2023 Jun 15;57(27):10089–10095.
 IVL (2025) Assessing PFAS flue gas sampling standards in operation A comparison of EN 1948:1, OTM-45, and insights from OTM-50

Figure A8.1 Maximum Operation: Predicted PFAS Annual Average Concentration

