

# CHAPTERS 11 AND 15

## UPDATED AIR QUALITY IMPACT ASSESSMENT AND HUMAN HEALTH RISK ASSESSMENT

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## 11.0 CHAPTERS 11 AND 15 AIR QUALITY IMPACT ASSESSMENT AND HUMAN HEALTH RISK ASSESSMENT

### 11.1 Introduction

On 20 December 2016, the Environment Agency gave GFC notice that its application for an environmental permit in respect of the IWMF was refused, giving the following reason:

*“Based on the information that has been provided to us, we are not satisfied that you [Gent Fairhead & Co Limited (the Applicant)] have demonstrated that the proposals reduce emissions and their impact on the environment through the use of Best Available Techniques (BAT) and in particular that the proposed stack height is BAT”*

Within the Environmental Permit Application, GFC proposed a daily NO<sub>2</sub> emission limit of 150 mg/Nm<sup>3</sup> which would have been the most stringent emission limit in the UK at a conventional Energy from Waste plant, and the associated air quality impact on the local environment using the latest 2016 guidance and screening criteria would have been “insignificant”. The approach of limiting NO<sub>2</sub> emissions at source, rather than increasing the height of the stack within the local landscape, aimed to deliver the preferred solution to abatement and emissions as reported by the Planning Inspector at the time of the public inquiry (paragraph 13.89):

*‘... a dilute and disperse approach by using a taller stack is one of the least preferred methods for controlling the impact of industrial emissions. Preference is given to abatement and the reduction of emissions at source. The applicants submit that the CHP plant could operate at substantially more stringent emission limits, thereby providing an alternative option for reducing the impact of the plant on local air quality.’*

In its assessment of GFC's first Environmental Permit Application (duly made 15 November 2015 and refused 20 December 2016), the Environment Agency's Air Quality Modelling & Assessment Unit (AQMAU) considered the impacts associated with emissions from the IWMF stack at a height of 35 m above surrounding ground level (85 mAOD) on air quality, habitats and human health and concluded:

- We [AQMAU] agree that the facility [IWMF] is unlikely to contribute to exceedances of air quality Environmental Quality standard (EQS) for human health
- We [AQMAU] agree with Fichtner's [GFC's] conclusions on ecological impacts
- With respect to their HHRA, we agree with Fichtner's [GFC's] conclusion that the facility would not result in any exceedance of the COT-TDI (Committee on Toxicity of Chemicals in Food, Consumer Products and the Environment – Tolerable Daily Intake).

Notwithstanding the above, having considered the Environment Agency's detailed decision report, and its consultation responses to local Councillors and members of the public who had expressed concern about the height of the stack, it is proposed to change the height of the IWMF stack by 23 m to a revised maximum height of 58 m above surrounding ground level (108 mAOD).

On the 3 March 2017 a second (revised) Environmental Permit application was submitted to the Environment Agency on GFC's behalf by Fichtner Consulting Engineers Limited. On the 20 June 2017, the Environment Agency confirmed that it was “minded to” permit the final details of the Environmental Permit Application by GFC for its proposed IWMF at Rivenhall Airfield.

This second (revised) Environmental Permit addresses the original consultation responses raised by local Councillors and members of the public who had expressed concern about the height of the stack.

The proposed change in stack height is consistent with the details of the Draft Environmental Permit that the Environment Agency issued for public consultation with its "minded to" decision.

## **11.2 Site Setting**

There has been no change in the number or location of residential properties within 1 km of the Integrated Waste Management Facility (IWMF) site. The closest receptor downwind of the IWMF (south-westerly prevailing winds) is Woodhouse Farm – which will be redeveloped and brought into beneficial use to provide offices and an education centre for the IWMF site. The closest public footpath lies approximately 150 m to the east of the proposed stack location (Footpath No. 8).

There are three County Wildlife Sites located within a 3 km radius around the IWMF site and nine statutory nature conservation areas located within 10 km.

## **11.3 Addendum Air Quality Assessment 2017**

A review of baseline air quality conditions has been undertaken by Fichtner Consulting Engineers Limited to support the Section 73 application. An Addendum Air Quality Assessment (Significance of Air Quality Effects) and Air Dispersion Modelling Assessment to reflect the change in stack height are contained within Appendices 11A and 11B.

The Addendum Air Quality Assessment, has been updated to fully comply with the design details in the Draft Environmental Permit No EPR/FP3335YU issued by the Environment Agency on 20 June 2017, i.e. taking account of the revised stack height of 58 metres above surrounding ground level or 108 m AOD. The following conclusions have been drawn from the "Dispersion Modelling" report that was submitted by GFC's consultants Fichtner, as part of the final Draft Environmental Permit package issued by the Environment Agency (i.e. its results and conclusions have been effectively reviewed and validated).

The impact of air quality on ecosystems of the revised stack height has been assessed using a standard industry recognised approach.

- a. The Environment Agency has stated that, if the contribution within an entire protected site is less than 1% of the long-term and less than 10% of the short term benchmark, the emissions are not significant and it can be concluded no likely significant effect either alone and in-combination with other sources of pollutants, irrespective of background levels.
- b. If the process contribution at European and UK designated sites is greater than 1% of the relevant long-term, or 10% of the short term benchmark, but the total predicted concentration including background levels is less than 70% of the relevant benchmark, the Environment Agency has stated that the emissions are not likely to have a significant effect.
- c. If the process contribution at locally designated sites is less than the relevant benchmark, the Environment Agency has stated that the emissions are not likely to have a significant effect.

The impact of the deposition of nitrogen and acid gases on sensitive habitats has been assessed using a standard approach.

- a. It has been assumed that all items of plant operate at the emission limits for the entire year whereas actual operational emission concentrations will be lower and the plant will be offline for maintenance purposes.
- b. It has been assumed that all habitats are present at the point of greatest impact.
- c. The impact has been calculated based on the maximum predicted concentration over a 5-year period at each ecological site and applying conservative deposition assumptions from the Environment Agency.
- d. The results have been compared to habitat specific Critical Loads.

No European or UK designated site were identified as requiring consideration within the air quality assessment.

A number of non-statutory designated sites have been identified within 2km of the IWMF. An assessment, based on broad habitat types, has concluded that the impact of emissions on these sites is not significant. This conclusion has been drawn because the Process Contribution is less than 100% of the Critical Level or Load.

The comprehensive assessment of the impact of the proposed IWMF on the air quality environment has shown that the proposed increase in the IWMF's stack height would not have a significant impact on local air quality, the general population or the local community.

The assessment considered the total impact of the IWMF proposals i.e. emissions from a stack constructed to a height of 58 m above surrounding ground level (108 mAOD) on the local environment rather than the change from the approved and implemented planning permission, in accordance with the Institute of Air Quality Management (2017) methodology.

The proposed change in the flue gas treatment system from sodium bicarbonate to lime, and the increase in stack height from 35 m above surrounding natural ground level (85 mAOD) to 58 m above surrounding natural ground level (108 mAOD), provides additional dispersion for the pollutants, reducing the ground level air quality impacts.

At an elevation of 108 mAOD, the proposed 23 m increase in stack height reduces the environmental impact of the IWMF's emissions on local air quality to a lower level than that originally reviewed and approved in the extant planning permission.

A detailed sensitivity analysis has been undertaken using more recent data from Stansted and Andrewsfield Meteorological Office weather stations. The sensitivity analysis demonstrates that the data and weather station location have a negligible change to the conclusions of the Dispersion Modelling Assessment. Fundamentally, the effect of increasing the stack height to 58m above surrounding ground level reduces the impact of emissions from the IWMF further.

The assessment demonstrated that the use of the Andrewsfield or Stansted weather data will not change the magnitude of change predicted as part of the Significance of Air Quality Effects report, or the conclusions of the Dispersion Modelling Assessment. The predicted distribution of emissions does not change significantly using the updated Andrewsfield and Stansted data, nor does the impact of the IWMF's emissions at sensitive receptors. The conclusions of the air quality assessment remain unchanged, namely:

At an elevation of 108 mAOD, the proposed 23 m increase in stack height reduces the environmental impact of the IWMF's emissions on local air quality to a lower level than that originally reviewed and approved for the extant implemented planning permission.

#### 11.4 Addendum Human Health Risk Assessment 2017

A review of baseline human health conditions has been undertaken by Fichtner Consulting Engineers Limited to support the Section 73 application. An Addendum Human Health Risk Assessment is contained within Appendix 11C.

The following conclusions have been drawn from this Addendum Human Health Risk Assessment Report that also forms part of the final Draft Environmental Permit No EPR/FP3335YU package issued by the Environment Agency (i.e. its results and conclusions have been effectively reviewed and validated).

The impact of air quality on human health has been assessed using a standard industry recognised approach.

- a. The Environment Agency has stated that the contribution to air quality can be screened out as 'insignificant' if the short term contribution is less than 10% of the AQAL and the long term contribution is less than 1% of the AQAL. These screening criteria have been applied initially.
- b. For those pollutants which are not screened out, the background concentration has been reviewed to see if there is any potential for any exceedances of an assessment level.

The assessment confirms that the proposals to increase the height of the CHP stack by 23 m would result in the impact of many pollutants on human health being screened out as 'insignificant'. For those which cannot be screened out, the background concentrations are low and there is little chance of significant pollution.

The Environment Agency approach to assessing the impact of metals has been used which considers the risk of exceeding the AQAL based on the existing background levels and contribution from the Facility. Using this approach there is no risk of exceeding the AQAL.

The comprehensive assessment of the impact of the proposed IWMF on human health has shown that the proposed increase in the IWMF's stack height would not have a significant impact on local air quality, the general population or the local community.

Of all the pollutants considered with a Tolerable Daily Intake (TDI), nickel is the pollutant that results in the highest level of existing exposure (MDI). The combined impact of nickel from existing background sources and contributions from the IWMF at the point of maximum impact is 177.14% of the ingestion TDI for children. However, the process contribution from the IWMF for nickel is exceptionally small, being only 0.24% of the TDI at the point of maximum impact, and 0.20% or less at receptors. This is based on the worst-case assumption that emissions of nickel are 44% of the group Emission Limit Value (ELV). The analysis by the Environment Agency states that this is an outlier, the monitoring data shows that this was for a single facility, the third highest concentration was 11% of the ELV. If it is assumed that emissions of nickel are 11% of the group ELV the impact is less than 1% of the TDI for ingestion at the point of maximum impact for an agricultural child receptor. On this basis, the IWMF would not increase the health risks from nickel for children significantly. Similarly, the ingestion of cadmium and chromium from existing background sources and contributions from the IWMF also exceeds the ingestion TDI for children. However, the process contribution from the proposed IWMF for cadmium is again exceptionally small, being only 0.19% of the TDI at the point of maximum impact for an agricultural receptor, and 0.16% or less at actual receptors. The process contribution for chromium is again exceptionally small, being only 0.34% of the TDI at the point of maximum impact, and 0.27% or less at receptors.

The TDI is set at a level "that can be ingested daily over a lifetime without appreciable health risk". The ingestion of cadmium and chromium by children as a result of background sources

is already above the TDI. On the basis that the process contribution of these substances is exceptionally small, the IWMF would not increase the health risks from this pollutant significantly. For all other pollutants, the combined impact from the IWMF plus the existing MDI is below the TDI, so there would not be an appreciable health risk based on the emission of these pollutants.

Although the MDI exceeds the cadmium TDI for children, the Environment Agency explains that chronic exposure to levels in excess of the TDI might be associated with an increase in kidney disease in a proportion of those exposed, but (small) exceedances lasting for shorter periods are of less consequence. Therefore, assessing a lifetime exposure is appropriate. If we assess the exposure over the lifetime (i.e. a period as a child and adult) the overall impact of the IWMF is well below the TDI, so there would not be an appreciable health risk based on the emission of cadmium.

Again, the TDI for chromium for children is predicted to be exceeded due to existing dietary intake. Toxicological opinion is that chromium III is of low oral toxicity and is needed as part of a healthy diet. The UK Committee on Medical Aspects of Food Policy recommend a minimum safe and adequate intake, but do not restrict an upper limit. The World Health Organisation (WHO) have analysed human intake for chromium through food and conclude that existing levels do not represent a toxicity problem. The TDI is based on the USEPA's Reference Dose for chromium IV. Assessing the total dietary intake of chromium against this TDI is highly conservative. Therefore, it is concluded that as the process contribution is so small and the TDI is set at a highly conservative level there would not be an appreciable health risk based on the emission of chromium.

For pollutants which do not have a TDI, a comparison has been made against an Index Dose (ID). The ID is a threshold below which there are considered to be negligible risks to human health. The greatest contribution from the IWMF is from chromium (VI), which is only 11.48% of the Index Dose for children at the point of maximum impact. Therefore, emissions from the IWMF of chromium (VI) and all other pollutants are considered to have a negligible impact on human health.

In conclusion, the IWMF will not result in appreciable health risks resulting from its operation. This is the same conclusion reached in the original human health risk assessment(s) completed by Golder Associates (UK) Ltd. This confirms that the design modifications that have been made to the IWMF since then have not changed the overall health risks resulting from its operation.

The comprehensive assessment of the impact of the proposed IWMF on human health has shown that the proposed increase in the IWMF's stack height would not have a significant impact on local air quality, the general population or the local community.

### 11.5 ESS/34/15/BTE CHP Management Plan "No Visible Plume"

Under the existing planning permission ESS/34/15/BTE, the submission of details against Condition 17 approved a management plan for the CHP plant to ensure there is no visible plume from the stack:

**Condition 17:** *The development hereby permitted shall be implemented in accordance with the details submitted with respect to the management plan for the CHP plant to ensure there is no visible plume from the stack. The approved details include: the application for approval of details reserved by condition dated 4 August 2015 and documents referenced*

- *S1552-0700-0008RSF entitled "CHP Management Plan for Plume Abatement" Issue no. 5 dated 16/02/16 by Fichtner*

- S1552-0700-0013RSF entitled "Plume Visibility Analysis" both by Fichtner.

*The development shall be implemented in accordance with the approved details.*

In assessing the change in the IWMF's stack height a change has been to the proposed flue gas treatment materials and techniques used within the plant, namely, a change from bicarbonate to lime based treatment technologies.

The updated operational proposals associated with the CHP Management Plan and its associated Plume Visibility Analysis have been updated to reflect the change to lime within the flue gas abatement system and are submitted to vary Condition 17 to ensure there is no visible plume from the stack.

The updated operational proposals associated with the CHP Management Plan and its associated Plume Visibility Analysis are presented in Appendices 11D and 11E respectively.

### **11.6 Draft Environmental Permit EPR/FP3335YU/A001**

On the 3 March 2017 a second (revised) Environmental Permit application was submitted to the Environment Agency on GFC's behalf by Fichtner Consulting Engineers Limited for the Rivenhall Integrated Waste Management Facility. This second (revised) Environmental Permit application addressed the original consultation responses raised by local Councillors and members of the public who had expressed concern about the height of the stack.

On the 20 June 2017, the Environment Agency confirmed that it was "minded to" permit the application and issued for public consultation a single Draft Environmental Permit combining all waste management operations within the IWMF (Draft Environmental Permit Number is EPR/FP3335YU/A001).

The final approved details of the Environmental Permit submissions demonstrate that the IWMF embodies Best Available Techniques (BAT) to prevent, and where this is not practicable, to reduce emissions and the impact on the environment as a whole to acceptable standards. The submitted design and the air quality impact modelling and other associated assessments all relate to a revised stack height of 58 metres above surrounding ground level (108mAOD).

Stakeholder engagement events for the Environmental Permit Application were held by the Environment Agency on the 20 and 31 March 2017 at Silver End and Coggeshall; and, a further stakeholder event is planned for the 30 June 2017 at Coggeshall, following the Environment Agency's "minded to" permit decision. The public consultation on the Draft Environmental Permit will run from 20 June to 18 July 2017 after which the Environment Agency will issue its final decision, and if appropriate, the approved Environmental Permit.

## APPENDIX 11A

Addendum Air Quality Assessment (Significance of Air Quality Effects) 2017

## APPENDIX 11B

Air Dispersion Modelling Assessment

## APPENDIX 11C

Addendum Human Health Risk Assessment

## APPENDIX 11D

CHP Management Plan

# APPENDIX 11E

Plume Visibility Analysis