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Consulting Engineers Limited



**GENT FAIRHEAD & CO
RIVENHALL
CHP MANAGEMENT PLAN FOR
PLUME ABATEMENT**

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| Document Production & Approval Record | | | | |
|--|------------------|------------------|-----------------------------|-------------|
| ISSUE NO. 10 | NAME | SIGNATURE | POSITION | DATE |
| <i>Prepared by:</i> | Rosalind Flavell | | Associate Senior Consultant | 22/06/2017 |
| <i>Checked by:</i> | Stephen Othen | | Technical Director | 22/06/2017 |

| Document Revision Record | | | | |
|---------------------------------|-------------|---|--------------------|-------------------|
| ISSUE NO. | DATE | DETAILS OF REVISIONS | PREPARED BY | CHECKED BY |
| 1 | 29/07/15 | First draft for client review | RSF | SMO |
| 2 | 30/07/15 | Draft for client review | RSF | SMO |
| 3 | 31/07/15 | Final draft | RSF | SMO |
| 4 | 31/07/15 | Final | RSF | SMO |
| 5 | 16/02/16 | Update to include monitoring protocol | RSF | SMO |
| 6 | 10/04/17 | Update for effect of increased stack height and lime abatement system | RSF | SMO |
| 7 | 10/05/17 | Update following client comments | RSF | SMO |
| 8 | 12/05/17 | Final for submission | RSF | SMO |
| 9 | 12/06/17 | Update for 108m AOD stack height | RSF | SMO |
| 10 | 22/06/17 | Final | RSF | SMO |

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1 INTRODUCTION

1.1 Background

Gent Fairhead & Co Limited (GFC) originally received planning permission (ESS/37/08/BTE) for the development of an Integrated Waste Management Facility (IWMF) at Rivenhall Airfield on 2 March 2010 from the Secretary of State following a Public Inquiry (APP/Z1585/V/2104804).

Subsequent amendments have been approved by Essex County Council (ECC) which relate to:

- Additional wording to Condition 2 as permitted by ESS/37/08/BTE/NMA dated 25 October 2012;
- An extension of time of one year to the commencement of development under Condition 1 (ESS/41/14/BTE);
- The removal of Conditions 28 and 30 that restricted the sourcing of the IWMF's solid recovered fuel and waste paper (ESS/55/14/BTE); and
- A variation to the layout of the IWMF which was not substantially different to that previously approved, with no changes to the types of waste to be handled at the IWMF or maximum vehicle numbers (ESS/34/15/BTE).

In parallel with ESS/34/15/BTE, GFC submitted all necessary pre-development details required under conditions. Planning permission ESS/34/15/BTE was granted on the 26 February 2016 and the development has been implemented.

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 of ESS34/15/BTE now states:

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.

The Environment Agency issued a refusal notice against the IWMF's Environmental Permit Application on 21 December 2016, for 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"

Having considered the Environment Agency's detailed decision document, and the consultation responses to local Councillors and members of the public who had expressed concern about the height of the stack, a second (revised) Environmental Permit application has now been made including a higher stack. A Full Planning Application has been prepared to correspond with the revised stack height within the new Environmental Permit. As part of this revised application for an Environmental Permit it has been proposed to change the flue gas treatment system from sodium bicarbonate to lime.

On the 20 June 2017, the Environment Agency confirmed that it was "minded to" permit the second (revised) Environmental Permit application which addresses the original consultation responses raised by local Councilors and members of the public who had expressed concern about the height of the stack.

The operational proposals set out in the approved CHP Management Plan for Plume Abatement and the associated Plume Visibility Analysis Report have been updated to reflect the 23m increase in stack height to 108m AOD (58m above surrounding ground level) and change to a lime based flue gas treatment system.

1.2 Objective

To develop a CHP Management Plan that meets the requirements of Planning Condition No 17 to ensure there is be no visible plume from the stack of the IWMF. This has been produced to update the consented CHP Management Plan for Plume Abatement.

2 MANAGEMENT PLAN

This CHP Management Plan has been developed as a tool for the operator to implement to ensure that there will be no visible plume from the main stack of the IWMF. The equipment needed to implement the procedures is contained in the design for the plant.

The measures proposed have been designed based on dispersion modelling using the ADMS model. Full details of the dispersion modelling results, and justification that the proposed measures will prevent the formation of a visible plume, can be found in the supporting technical report "Visible Plume Analysis".

2.1 Primary Measures

A feedforward mechanism will be used to adjust the temperature of the exhaust air from the pulp plant based on a set of meteorological parameters. A weather station will be installed which will automatically feed into the operating system. The following four operating conditions will be implemented for the emissions from the CHP Plant and the exhaust from the pulp plant:

- (1) June to September – no additional heating – release of the exhaust from the CHP at 140°C and the pulp plant exhaust at 120°C
- (2) October to May – heating of the CHP plant exhaust to 180°C;
- (3) October to May – additional heating of the exhaust from the pulp plant using high pressure steam – release at 210°C when the ambient temperatures is less than 4°C, wind speed is less than 9 m/s and the relative humidity is greater than 70%.
- (4) October to May – additional heating of the exhaust from the pulp plant using high pressure steam – release at 260°C when the ambient temperature is less than -1°C, wind speed is less than 8 m/s and the relative humidity is greater than 83%.

These four operating regimes provide a simplified subdivision of the operating profile of the plume management system. This will be refined during the commissioning of the plant. The following table shows the number of residual plumes predicted to occur following the implementation of the above operating conditions.

| Scenario | Predicted Average number of visible plumes per year | % of year a visible plume |
|---|---|---------------------------|
| Unabated Operations | 309 | 3.53% |
| Additional heating of the CHP Plant to 130°C – October to May – i.e. Normal Operations | 51 | 0.58% |
| Additional heating to of pulp plant exhaust to 210°C – October to May when: Relative Humidity is greater than 77%; Temperature is less than 4°C; and Wind speed is less than 9m/s. | 5 | 0.05% |
| Additional heating of pulp plant exhaust to 260°C – October to May when: Relative Humidity is greater than 83%; Temperature is less than -1°C; and Wind speed is less than 6m/s. | 2 | 0.02% |

2.2 Secondary Measures

Following implementation of the heating regimes listed above there may be a small number of visible plumes predicted to occur under certain particular weather conditions. The following table summarises the ambient conditions (which can be predicted and forecast) in which any residual visible plumes are likely to occur.

| | >0% chance of occurring | >50% chance of occurring |
|--|-----------------------------------|------------------------------------|
| Temp < | -2°C | -11°C |
| Wind speed < | 2 m/s | 2 m/s |
| Relative humidity > | 83% | 83% |
| Number of hours over 5 years these conditions occur | 333 | 12 |
| % of time these conditions occur | 0.9% | 0.03% |
| Number of plume predicted to occur during these conditions | 9 | 6 |

The greatest chance of a visible plume occurring for a set of meteorological conditions is when wind speeds are low and ambient temperatures are very low (sub zero). Following implementation of the heating of the exhaust air there is a greater than 50% chance of a visible plume occurring when temperatures are less than -11°C. However, the conditions only occur for 0.03% of the time and not in all years. Any residual plumes are predicted to occur between the hours of 1am and 10am.

Additional measures have been investigated to further prevent the formation of visible plumes. It is proposed to reduce the loading on one of the CHP lines to 80% when ambient temperatures are below -2°C, wind speeds are less than 3 m/s and the relative humidity is greater than 83%, between the hours of 1am and 10am.

The probability analysis has shown that residual plumes are only predicted to occur when ambient temperatures are below -8°C, wind speeds are less than 2 m/s and the relative humidity is greater than 83%, between the hours of 1am and 10am. Over the months of October to May (inclusive) the operator will analyse the 5 day weather forecast on a daily basis to determine if temperatures are predicted to fall below -11°C between the hours of 1am and 10am. In the event that these conditions are forecast the operator will put in place the measures needed to bring dry fuel into the bunker. This dry fuel will then be fed into the bunker when the forecast predicts ambient temperatures are predicted to fall below -11°C.

2.3 Monitoring Protocol

As part of the site's CCTV system a camera will be focussed on the stack. This will be fed into the control room. This feed will be monitored and in the unlikely event of a visible plume the automatic management system will be manually overridden. A record will be taken of the atmospheric conditions in which the visible plume occurs and the automatic management system modified if necessary. This system will also be used during the commissioning to ensure the temperature and wind speed thresholds identified in the Management Plan are suitable. The continued application of a protocol for visual plume monitoring and action plan to respond and record any occurrence of visible plume during commissioning and operations will support continuous operational improvement of the CHP Management Plan and standard working practices.

2.4 Variation from the Approved CHP Management Plan

The approved CHP Management Plan for Plume Abatement concluded that following the implementation of the proposed heating regimes there was a low chance of residual plumes occurring. The updated analysis which has been completed to reflect the change from sodium bicarbonate to lime based flue gas treatment systems has concluded that the number of residual visible plumes has reduced from that for the currently approved scheme.

The measures in this CHP Management Plan for Plume Abatement have been revised to ensure that they are appropriate for the proposed changes to the stack height (to 58 m above surrounding ground level) and the change to a lime based flue gas treatment system, and the operational controls that will be applied and implemented at the site.



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