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Consulting Engineers Limited

# GENT FAIRHEAD & CO LTD
# RIVENHALL IWMF
# SITE CONDITION REPORT

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# SITE CONDITION REPORT

| Document Production & Approval Record | | | | |
|---|---|---|---|---|
| **ISSUE NO. 4** | **NAME** | **SIGNATURE** | **POSITION** | **DATE** |
| *Prepared by:* | James Sturman |  | Consultant | 02/03/2017 |
| *Checked by:* | Stephen Othen |  | Technical Director | 02/03/2017 |

| Document Revision Record | | | | |
|---|---|---|---|---|
| **ISSUE NO.** | **DATE** | **DETAILS OF REVISIONS** | **PREPARED BY** | **CHECKED BY** |
| 1 | 17/09/2015 | For issue | JRS | SMO |
| 2 | 22/02/2017 | For issue | JRS | SMO |
| 3 | 02/03/2017 | For issue | JRS | SMO |
| 4 | 02/03/2017 | For issue | JRS | SMO |
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# 1 INTRODUCTION

Gent Fairhead & Co Limited (GFC) is developing an Integrated Waste Management Facility (IWMF), the Rivenhall IWMF (the Installation). The Installation will comprise the following treatment processes:

- A Materials Recycling Facility (MRF);
- An anaerobic digestion (AD) facility;
- A Mechanical Biological Treatment (MBT) facility;
- A De-inked Paper Pulp Production Facility (Pulp plant);
- Combined Heat and Power (CHP) Plant; and
- Water treatment plant.

A detailed description of the Installation Activities is included within the Supporting Information document.

## 1.1 Site

The Installation is located on the southeastern edge of a World War II airfield known as Rivenhall Airfield between the villages of Bradwell (northwest 2.6 km), Silver End (southwest 1.1 km), Rivenhall (south 2.3 km), Coggeshall (northeast 2.8 km) and Kelvedon (southeast 3.4 km).

Access to the site will be provided via a private access road from the existing A120.

The former airfield and its immediate surroundings are on a plateau above the River Blackwater. This plateau is currently being excavated and, therefore, under the current planning permission, half of the old airfield will become a restored 'bowl' for continued agricultural use. The airfield was open and exposed and had been used predominantly for agricultural purposes, although extensive sand and gravel extraction and restoration has been undertaken at the site.

The nearest residential properties within 1 km of the Site are: The Lodge, Allshotts Farm, Bumby Hall, Sheepcotes Farm, Green Pastures Bungalow, Goslings Cottage, Goslings Barn, Goslings Farm, Deeks Cottage, Heron's Farm, Deeks Cottage, Haywards and Park Gate Farm Cottages.

## 1.2 Report Objectives

The primary objective of this report is to provide details of the existing ground conditions for the land within the installation boundary.

This report uses various sources of background information which are provided as Appendices:

- Addendum Environmental Statement 2017 – Chapters 5 (Appendix A), Honace Limited;
- Addendum Environmental Statement 2017 – Chapters 6 (Appendix B), Honace Limited;
- 2009 Ground Investigation at Rivenhall Airfield, Essex, February 2010 (Appendix C), Golder Associates; and
- 2014 CC Ground Investigations Ltd (CCGI) - Factual Report – Rivenhall Airfield IWMF (Appendix D).

This report study considers:

(1) Geology;
(2) Hydrogeology;
(3) Hydrology and Flooding;
(4) Historical and present land use; and
(5) Existing ground conditions.

This report:

(1) considers the proposed activities to be carried out on the application site;

(2) identifies any land contamination risk the activities pose that may be linked to previous pollution events; and

(3) provides a baseline for the existing ground conditions.

Drawings can be found in Annex 1 of the supporting information for the Application, including:

(1) Site location plan;

(2) Installation boundary;

(3) Emission points drawing; and

(4) Process schematic.

# 2 DESK STUDY INFORMATION

## 2.1 Geology

### 2.1.1 Regional Geology

The published geological maps for the region, sheet 223 covering the Braintree area (IGS, 1982) and sheet 241 covering the Chelmsford area (IGS, 1976), show that the installation is underlain by Boulder Clay quaternary drift deposits overlying the London Clay.

The Boulder Clay (the Lowestoft Till) consists of a generally pale brown to buff sandy clay with chalk fragments. The basal beds have shown banding and crude laminations. Below the Boulder Clay a continuous or almost continuous sheet of Sands and Gravels is present. This is identified as the Kesgrave Sands and Gravels, which are a sequence of fluvial glacial gravels laid down in a braided river system and containing flint, vein quartz, quartzite, sandstone and occasional igneous and metamorphic rock gravel clasts. The deposit is worked extensively for aggregate and building sand. Across the majority of the IWMF's footprint the underlying sand and gravel has been worked and excavated as part of the wider quarrying operations across the site.

The tertiary London Clay underlies the drift deposits.

This is a stiff blue grey silty clay, with the upper surface often weathered exhibiting a colour change to brown grey. Up to 69 m of London Clay is indicated on the geological map in the area and it is exposed in the river valleys to the north and the south where the drift deposits have been eroded. Below the London Clay, the formations of the Thanet Sand and Lambeth Group can be recognised in borehole logs above the Upper Chalk. The surface of the Upper Chalk lies at approximately -40 m OD (approximately 90 m depth) beneath the current Site elevation, dipping to the south.

### 2.1.2 Local Geology

As reported in the planning application for the Riverhall IWMF, the local drift geology in the area has been investigated by RMC Group (now CEMEX) to provide information regarding the reserves of Sands and Gravels, and by Golder to provide information critical to establishing the hydrogeological environment of the area. The findings of the site investigations carried out in 1990 and 1991 are summarised below.

The investigations covered the whole of Rivenhall Airfield area, with only a limited number of boreholes being located within the installation boundary.

The quaternary Boulder Clay deposit is described in the site investigation borehole logs as consisting of layers of firm to stiff orange or brown grey chalky mainly silty or gravelly clay with occasional sandy clay. The reported thickness of the Boulder Clay deposit varies between 1.6 m and 17 m. However, the CCGI Factual Report, reports a thickness of up to 7m across the Site.

Below the Boulder Clay unit, Sands and Gravels deposits are reported in most boreholes. The deposits are described as consisting of loose to medium dense yellow or orange brown or grey brown Sands and Gravels or sandy Gravels with some chalk or flint in upper layers and some small cobbles or occasional clay nodules in lower layers. The Sands and Gravels layers are sometimes reported as being interspersed with thin sandy clay layers. The reported thickness of the Sands and Gravels deposit varies between 0 m and 11.2 m. However, the CGI Factual Report reports a thickness of approximately 6 to 7m across the Site.

The London Clay is reported below the Sands and Gravels in all boreholes.

This is described as consisting of stiff to very stiff brown or grey clay. The upper surface of the London Clay is often weathered; the upper layers of the clay are often described as silty clay and often contain some gravel. The upper surface of the London Clay is reported on Site between 33 m AOD and 36 m AOD.

## 2.2 Hydrogeology

The groundwater vulnerability maps for this area (Environment Agency, 1994 and Environment Agency, 1995) classify the Boulder Clay deposits that the Site is located on as a non-aquifer. A non-aquifer is a formation that is generally regarded as yielding insignificant quantities of groundwater. The Kesgrave Sands and Gravels beneath the Boulder Clay are classified as a Minor aquifer that can be used locally as a source of water and is important in supplying base flow to rivers (Figure 6-3B).

From all available information (and experience from quarrying operations in and around the IWMF site), the Kesgrave Formation sand and gravel deposits beneath the Site contain minor amounts of water, with the pattern of groundwater flow in and around the Site being influenced to some degree by the River Blackwater, and also by the topography of the surface of the underlying London Clay. Hollows in the underlying London Clay surface typically contain groundwater. The cohesive and relative impermeable nature of the Lowestoft Formation overburden typically restricts the recharge to the Kesgrave Formation.

The London Clay is classified as a non-aquifer, with the Upper Chalk below, classified as a Major Aquifer that is developed for industrial, public and general agricultural use. The hydrogeological map of the area (BGS, 1981) indicates that in 1976 the piezometric surface of the Chalk Aquifer was at around +10 m AOD, approximately 50 m below the current ground level. The Site is therefore separated from the Major Chalk Aquifer by approximately 40 m of the low permeability London Clay.

According to data maps located on the Environment Agency website, the Site is not located within any source protection zones (SPZ). The closest SPZ is located approximately 9 km to the north of the Site.

Information supplied by the Environment Agency has revealed that there are 6 licensed groundwater abstractions within a 5 km radius of the site. The Environmental Services Department of Braintree District Council have confirmed that they have no records of private water abstractions within 5 km of the Site.

## 2.3 Hydrology and Surface Waters

The Environment Agency (which includes the former National River Authority) has produced a series of maps, covering England and Wales, which identify the vulnerability of groundwater to contamination. It uses geological information to define Major Aquifers, Minor Aquifers and non-aquifers, and information on soils to determine the protection afforded to the underlying geology and therefore its overall vulnerability.

## 2.4 Pollution History

### 2.4.1 Historical Land Use within the Installation Boundary

Prior to World War II, historic on-Site activities were dominated by agricultural land use.

During the War, Rivenhall was developed into a base for the United States Air Force (USAF) and the Royal Air Force (RAF). Construction of the airfield started in the early months of 1943, and was operational until shortly after the end of the War in 1946. Presented in the table below is a summary of the historical development of the site, which has been informed by information from the landowner, as presented in the Environmental Statement, and the published information for the land within the installation boundary:

| Table 2-1: Site History | |
|---|---|
| Date | Description |
| Pre – 1943 | The site was undeveloped and was used for agriculture. |
| Late 1943 | Rivenhall Airfield was constructed. |
| 1943 – 1946 | Rivenhall was an operational base for both USAF and RAF. |
| 1956 – 2002 | Rivenhall Airfield runways and buildings let to Marconi and used for testing radar systems. |
| 1946 – present | Land around runways at Rivenhall Airfield returned to agricultural use. |
| 1999 – present | Quarrying operations across Bradwell Quarry dominate the area surrounding the site. |

### 2.4.2 Historical Incidents

The contaminated land regime set out in Part IIA of the Environmental Protection Act 1990 provides a risk based approach to the identification and remediation of land. Part IIA is aimed at addressing land which has been historically contaminated and which poses unacceptable risks to human health or the environment.

Braintree District Council is currently in the process of compiling a database of contaminated land within the District boundary. Braintree District Council confirmed that there are no known contaminated land sites at or in the vicinity of Rivenhall Airfield. There are no sites on the database apart from a few small unknown in-fills which may have been highlighted when transferring information from old Ordnance Survey maps and may merely relate to a change in the topography of the land rather than any proven concerns.

It is unlikely that any of the current or historic land uses at the Site will have significantly contaminated the land beneath the proposed IWMF. Potential areas of concern such as the Bomb Dump and Shooting-in Butts associated with the airfield operations have been removed from the Site. Some localised areas of contamination as a result of the historic Generator Site or current scrap vehicle breaking, printing, and disposal and workshops are possible but these are located beyond the Site.

### 2.4.3 Permits & Consents

#### 2.4.3.1 Groundwater Abstractions

There are six licensed groundwater abstractions within a 5km radius of the installation, as presented below:

(1) A&B Hayes Farms (NGR – TL798236) – groundwater well;

(2) Blackwater Aggregates (NGR – TL81792172) – groundwater catchpit;

(3) JR Pearce (NGR – TL81792172) – groundwater well points;

(4) PT Tyrie (NGR – TL828187) – groundwater borehole;

(5) Total Butler (NGR – TL860185) – groundwater borehole; and

(6) Stacey Farms (NGR – TL809179) – groundwater well.

As can be seen from the information presented above, none of the abstractions are within the installation boundary.

### 2.4.3.2 Surface Water Abstractions and Discharges

There are sixteen licensed surface water abstractions and discharges within a 5km radius of the installation, as presented below:

(1) S&K Butler (NGR – TL786229, TL798232) – surface water abstraction;
(2) G&S Coode-Adams (NGR – TL853215, TL865211) – River Blackwater abstraction;
(3) R&D Bunting (NGR – TL850169, TL854211) – River Blackwater abstraction;
(4) A&B Hayes (NGR – TL850169, TL854211) – River Blackwater and Pond abstraction;
(5) R Goodwin & Sons (NGR – TL855173) – River Blackwater;
(6) Braintree Golf Club – (NGR – TL797243) – River Blackwater;
(7) RA Brice & Partners – (NGR – TL797243) – River Blackwater;
(8) G&S Coode-Adams – (NGR – TL864209, TL863195) – River Blackwater;
(9) G&S Coode-Adams – (NGR – TL864196, TL861214) – River Blackwater;
(10) G&S Coode-Adams – (NGR – TL864196, TL861214) – River Blackwater;
(11) G&S Coode-Adams – (NGR – TL864196, TL861214) – River Blackwater;
(12) Gent Fairhead & Co Limited (NGR – TL834222) – River Blackwater;
(13) G&S Coode-Adams – (NGR – TL860215, TL863195) – River Blackwater;
(14) Ferringbury Holdings – (NGR – TL801215) – River Blackwater;
(15) Strutt & Parker (Farms) Ltd – (NGR – TL801173, TL807163 & TL784188) – River Brain; and
(16) Strutt & Parker (Farms) Ltd – (NGR – TL794179, TL811161) – River Brain.

None of these abstraction and discharge licences are within the installation boundary.

### 2.4.3.3 Waste Management Licences

A review of the information presented on the Environment Agency 'What is in Your Backyard' (http://maps.environment-agency.gov.uk/wiyby/) it is indicated that there are three waste management licences for facilities within a 2km radius of the installation.

- Coggeshall Quarry - Waste land recovery;
- Braintree Quarry - Mining Waste; and
- Land / Premises at Woodhouse Lane - Waste treatment.

### 2.4.3.4 Quarrying Operations within the Installation Boundary

The IWMF site lies within the permitted areas of the Bradwell Quarry where current sand and gravel extraction with low level restoration to agriculture/biodiversity/water and woodland is anticipated to be completed by 2021; however, further 'preferred' and 'reserved' sites are allocated in the adopted 2014 Minerals Local Plan that would extend the life of the quarry, subject to detailed submission and approval to Essex County Council.

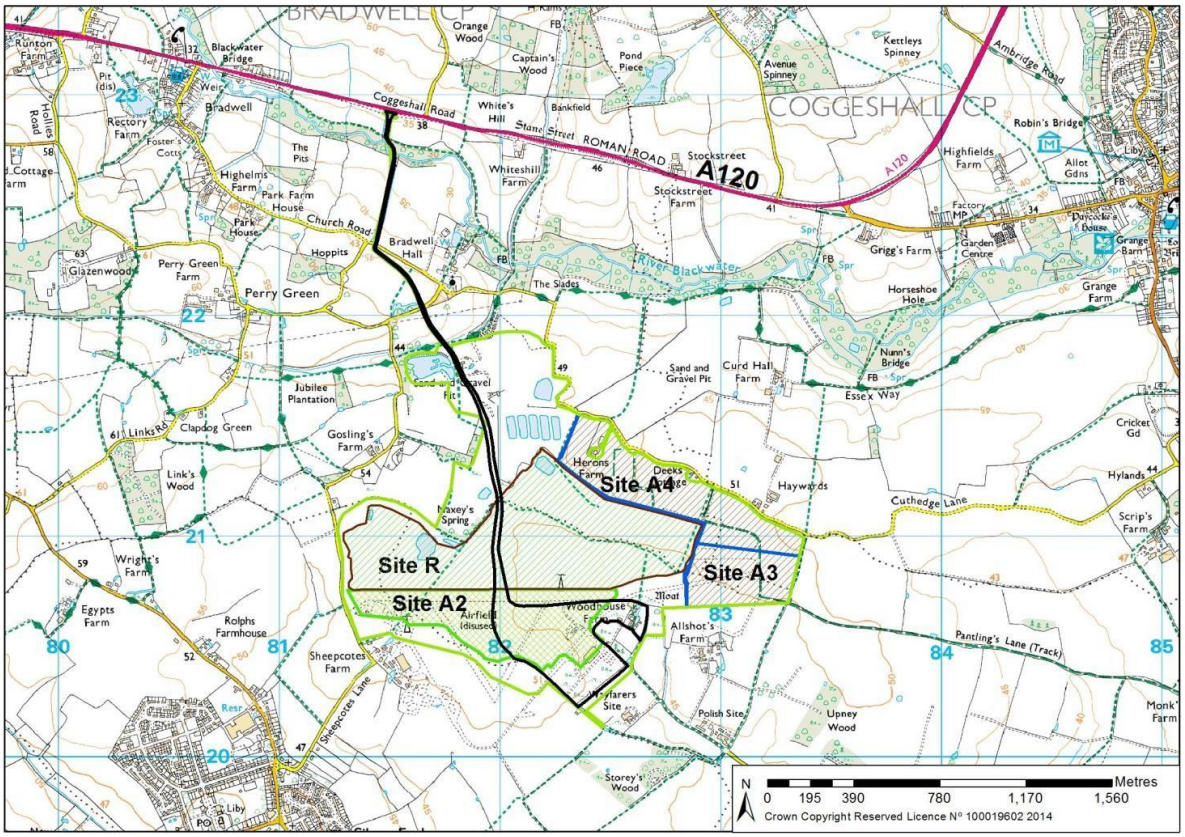


**Figure 1 -** *Base Plan extracted from ECC Committee Report DR/07/15*

The above location plan indicates the extent of previous and current mineral extraction areas: Site R permitted in 2001, Site A2 permitted in 2011 which included extraction in part of the site for the IWMF; and, Site A3 and A4 permitted in 2014. The most recent mineral planning application area for Site A3 and A4, indicated by the green boundary on the plan above, encompassed all previous extraction areas, namely Site R, Site A2, the IWMF site and the minerals processing area to the north.

Across the footprint of the IWMF, quarrying and restoration operations within the Site A2 have resulted in the excavation and removal of the former airfield runway(s), an aircraft Hangar, airfield buildings, and agricultural fields that were originally present at the site. No contaminated land has been encountered within the Installation boundary from previous (and extensive) sand and gravel quarrying operations within the site.

# 3 PREVIOUS CONTAMINATION AND SITE INVESTIGATIONS

As required by Environment Agency guidance note H5: Site Condition Report – Guidance and Templates, 'where a facility involves the use, production or release of RHS' a baseline report must be submitted as part of the application SCR.

At the time of submitting this application, there are two reports which provide detail on the extent of the existing ground conditions within the installation boundary. The reports are titled as follows:

(1) 2009 Ground Investigation at Rivenhall Airfield, Essex (Appendix B);

(2) CC Ground Investigations Ltd (CCGI) - Factual Report – Rivenhall Airfield IWMF (Appendix C).

Whilst no contaminated land has been encountered within the site (through extensive sand and gravel quarrying operations), the implementation of planning permission ESS/34/15/BTE resulted in the removal of remnants of former airfield buildings within the Installation boundary (brick built foundations and concrete bases within the former TPO woodland); during these works an isolated pile of broken asbestos sheeting (bonded roof tiles and wall panels) from the former airfield buildings was found. In accordance with Planning Condition 25, a method statement and risk assessment was prepared and approved by the Waste Planning Authority to allow the materials to be handpicked, collected and removed from site for disposal by an accredited company. This work was completed during January 2017.

The potential risk of encountering historic site contamination within the Installation boundary is negligible. Future excavation operations will either result in the removal of virgin ground (i.e. Boulder Clay overburden, sands and gravels and inter burden, and London Clay) or indigenous site materials (clean quarry backfill comprising previously excavated Boulder Clay overburden).

## 3.1 Site Investigations

### 3.1.1 2009 Ground Investigation at Rivenhall Airfield, Essex

The site investigation was commissioned by Golder Associates (UK) Ltd and undertaken between 8 and 16 June 2009.

The site investigation was commissioned to provide an initial characterisation of the geotechnical and geological ground conditions for the initial design of foundations and retaining walls. The results of the soil and groundwater analysis are presented within this report.

### 3.1.2 2014 CC Ground Investigations Ltd (CCGI) - Factual Report – Rivenhall Airfield IWMF

The purpose of the ground investigation was to provide information to assist in the design of IWMF.

Twenty exploratory holes were carried out between 21st July and 22nd August 2014. The boreholes used percussive sampling techniques to produce continuous disturbed samples ranging between 112mm and 98mm diameter. Gas/water monitoring standpipes were installed in four of the boreholes. Vibrating Wire Piezometers were installed in two of the boreholes.

The results of the soil and groundwater analysis are presented within this report.

### 3.1.3 Soil Contamination Monitoring & Results

All available results from soil testing data are presented within Table 3-1. Where pollutants were below the limit of detection, these have not been presented within this report.

| Table 3-1: Soil Contaminants | | |
|---|---|---|
| **Pollutant** | **Min Value (mg/kg) unless stated** | **Max Value (mg/kg) unless stated** |
| Magnesium aqueous extract | < 10 | 68 |
| pH | 7.3 | 8.8 |
| Chloride aqueous extract | 4.8 | 58 |
| Nitrate aqueous extract (as NO3) | < 1.0 | 1.9 |
| Sulphate aqueous extract (as SO4) | 1.0 | 2100 |
| Total Sulphur as S | < 0.01 % | 1.5 % |
| Total Sulphate as SO4 | 0.02 % | 0.31 % |
| Water soluble nitrate | - | < 1.0 |
| Water soluble chloride | - | <50 |
| Water soluble sulphate | 0.01 | 50 |
| Total (Acid-soluble) as SO4 | < 0.010 | 0.12 |

### 3.1.4 Groundwater and Ground Gas Monitoring & Results

Groundwater monitoring was undertaken across the site in August 2013 by Golder Associates Ltd. Two of the boreholes (BH11 and H19) which were used for groundwater monitoring are located within the installation boundary. The results of contaminants presented within the groundwater are presented in Table 3-2. Where pollutants were below the limit of detection, these have been presented within this report.

| Table 3-2: Groundwater Contaminants | | |
|---|---|---|
| **Pollutant** | **Min Value (ug/l) unless stated** | **Max Value (ug/l) unless stated** |
| Dichlorodifluoromethane | - | <2 |
| Methyl Tertiary Butyl Ether | - | <0.1 |
| Chloromethane | - | <3 |
| Vinyl Chloride | - | <0.1 |
| Bromomethane | - | <1 |
| Chloroethane | - | <3 |
| Trichlorofluoromethane | - | <3 |
| 1,1-Dichloroethene (1,1 DCE) | - | <3 |
| Dichloromethane (DCM) | - | <3 |
| trans-1-2-Dichloroethene | - | <3 |

| Table 3-2: Groundwater Contaminants | | |
|---|---|---|
| **Pollutant** | **Min Value (ug/l) unless stated** | **Max Value (ug/l) unless stated** |
| 1,1-Dichloroethane | - | <3 |
| cis-1-2-Dichloroethene | - | <3 |
| 2,2-Dichloropropane | - | <1 |
| Bromochloromethane | - | <2 |
| Chloroform | - | <2 |
| 1,1,1-Trichloroethane | - | <2 |
| 1,1-Dichloropropene | - | <3 |
| Carbon tetrachloride | - | <2 |
| 1,2-Dichloroethane | - | <2 |
| Benzene | - | <0.5 |
| Trichloroethene (TCE) | - | <3 |
| 1,2-Dichloropropane | - | <2 |
| Dibromomethane | - | <3 |
| Bromodichloromethane | - | <2 |
| cis-1-3-Dichloropropene | - | <2 |
| Toluene | - | <0.5 |
| trans-1-3-Dichloropropene | - | <2 |
| 1,1,2-Trichloroethane | - | <2 |
| Tetrachloroethene (PCE) | - | <3 |
| 1,3-Dichloropropane | - | <2 |
| Dibromochloromethane | - | <2 |
| 1,2-Dibromoethane | - | <2 |
| Chlorobenzene | - | <2 |
| 1,1,1,2-Tetrachloroethane | - | <2 |
| Ethylbenzene | - | <0.5 |
| p/m-Xylene | - | <1 |
| o-Xylene | - | <0.5 |
| Styrene | - | <2 |
| Bromoform | - | <2 |
| Isopropylbenzene | - | <3 |
| 1,1,2,2-Tetrachloroethane | - | <4 |
| Bromobenzene | - | <2 |
| 1,2,3-Trichloropropane | - | <3 |
| Propylbenzene | - | <3 |

| Table 3-2: Groundwater Contaminants | | |
|---|---|---|
| **Pollutant** | **Min Value (ug/l) unless stated** | **Max Value (ug/l) unless stated** |
| 2-Chlorotoluene | - | <3 |
| 1,3,5-Trimethylbenzene | - | <3 |
| 4-Chlorotoluene | - | <3 |
| tert-Butylbenzene | - | <3 |
| 1,2,4-Trimethylbenzene | - | <3 |
| sec-Butylbenzene | - | <3 |
| 4-Isopropyltoluene | - | <3 |
| 1,3-Dichlorobenzene | - | <3 |
| 1,4-Dichlorobenzene | - | <3 |
| n-Butylbenzene | - | <3 |
| 1,2-Dichlorobenzene | - | <3 |
| 1,2-Dibromo-3-chloropropane | - | <2 |
| 1,2,4-Trichlorobenzene | - | <3 |
| Hexachlorobutadiene | - | <3 |
| Naphthalene | - | <2 |
| 1,2,3-Trichlorobenzene | - | <3 |
| Surrogate Recovery Toluene D8 | - | 102 |
| Surrogate Recovery 4-Bromofluorobenzene | - | 114 |
| Dissolved Arsenic | - | <2.5 |
| Dissolved Boron | - | <12 |
| Dissolved Cadmium | - | <0.5 |
| Dissolved Calcium | 140.6 | 155.7 |
| Total Dissolved Chromium | - | <1.5 |
| Dissolved Copper | - | <7 |
| Total Dissolved Iron | - | <20 |
| Dissolved Lead | - | <5 |
| Dissolved Magnesium | 3 | 8.8 |
| Dissolved Manganese | - | <2 |
| Dissolved Mercury | - | <1 |
| Dissolved Nickel | - | <2 |
| Dissolved Potassium | 0.4 | 9.7 |
| Dissolved Selenium | - | <3 |

| Table 3-2: Groundwater Contaminants | | |
|---|---|---|
| **Pollutant** | **Min Value (ug/l) unless stated** | **Max Value (ug/l) unless stated** |
| Dissolved Sodium | 12.4 | 107.5 |
| Dissolved Zinc | 5 | 10 |
| EPH (C8-C40) | - | <10 |
| GRO (>C4-C8) | - | <10 |
| GRO (>C8-C12) | - | <10 |
| GRO (>C4-C12) | - | <10 |
| Sulphate | 77.87 | 261.99 |
| Chloride | 17.8 | 43.9 |
| Nitrate as NO3 | 63 | 73.8 |
| Nitrite as NO2 | - | <0.02 |
| Ammoniacal Nitrogen as N | 0.03 | 0.04 |
| Total Alkalinity as CaC03 | 304 | 354 |
| Carbonate Alkalinity as CaC03 | - | <1 |
| Bicarbonate Alkalinity as CaC03 | 304 | 354 |
| BOD (Settled) | - | <1 |
| COD (Settled) | 7 | 9 |
| pH | 7.61 | 7.8 |
| Total Organic Carbon | - | <2 |

At the time of submitting the EP application there are no records available for ground gas monitoring for the site.

## 3.2 Baseline Reference Data

The limited data available on any existing ground contamination is presented in section 3.1. Section 3.1 presents the range of concentrations recorded in the site investigation for a limited number of determinants.

As stated within Article 22 (2) of the IED:

> *Where the activity involves the use, production or release of relevant hazardous substances and having regard to the possibility of soil and groundwater contamination at the site of the installation, the operator shall prepare and submit to the competent authority a baseline report before starting operation of an installation or before a permit for an installation is updated for the first time after 7 January 2013.*

No contaminated land has been encountered within the Installation boundary from previous (and extensive) sand and gravel quarrying operations across the site. The potential risk of encountering historic site contamination is negligible. Future excavation operations will either result in the removal of virgin ground (i.e. Boulder Clay overburden, sands and gravels and inter burden, and London Clay) or indigenous site materials (clean quarry backfill comprising previously excavated Boulder Clay overburden).

There are two approved planning conditions within the existing planning permission (condition 24 and condition 25), which relate to a scheme for ground water monitoring and contaminated soil (including remediation and mitigation measures should contamination be identified).

Under condition 24, a scheme of works to undertake ground water monitoring at the site has been approved to the Local Planning Authority and will be fully implemented and the results of the monitoring will be made available to the Environment Agency. It is proposed by GFC that the implemented scheme is used to report on the baseline ground conditions at the installation.

In addition, as required by condition 25, whilst there is no existing evidence of ground contamination arising as a consequence of historical activities a 'watching brief' will be maintained during excavation works to determine the presence of previously unidentified zones of soils or groundwater contamination.

In the extremely unlikely event that a potential source of historic contamination is identified during excavation works, steps will be taken to isolate the source of contamination pending further investigation.

The assessment of suspected contamination may include but not be limited to, the testing and characterisation, excavation and temporary storage of the materials into a quarantine area and disposal. Any suspected contamination will be appropriately assessed, primarily through sampling and laboratory analysis, and any requirement for remedial works will be identified.

During construction of the installation concrete surfacing, site drainage, raw material and residue storage facilities will be constructed to provide protection of the underlying ground and groundwater.

# 4 PERMITTED ACTIVITIES

## 4.1 Permitted Activities

The permitted activity will consist of a combination of Schedule 1 installation activities (as defined in the Environmental Permitting Regulations) and directly associated activities:

**Table 4-1: Environmental Permit Activities**

| Type of Activity | Schedule 1 Activity | | Description of Activity |
|---|---|---|---|
| Installation | Section 5.1 Part A1, b) | CHP Facility (Line 1) | Incineration of non-hazardous waste with a capacity of greater than 3 tonnes per hour |
| Installation | Section 5.1 Part A1, b) | CHP Facility (Line 2) | Incineration of non-hazardous waste with a capacity of greater than 3 tonnes per hour |
| Installation | Section 6.1 Part A1, a) | Pulp plant | Processing of waste paper to produce a recycled paper pulp and a sludge which is suitable to be applied to land as a soil conditioner. |
| Waste operation | | AD facility | The anaerobic digestion of organic waste to produce a biogas which is subsequently combusted in a biogas engine, and a digestate which is suitable to be applied to land as a soil conditioner. |
| **Directly Associated Activities** | | | |
| Directly Associated Activities | | MRF | Processing of residual waste to recover recyclates and produce a fuel which is suitable for combustion within the CHP Plant; and the processing of treated materials from the MBT to recover recyclates and refine the fuel which is suitable for combustion within the CHP Plant |
| Directly Associated Activities | | MBT | The biodrying of incoming waste to reduce the moisture content of the waste to produce a fuel which is suitable for combustion within the CHP Plant. Material which has been treated within the MBT will enter the MRF for the recovery of recyclates and final refinement prior to transfer to the CHP. |
| Directly Associated Activities | | Wastewater Treatment | The treatment and storage of process effluents from the installation prior to re-use within the installation (effluent from the Pulp plant). |

## 4.2 On-site Fuel and Chemical Storage Facilities

As identified in the supporting information document, the activities undertaken on site will utilise a number of fuels and chemicals. The primary, secondary and tertiary containment systems associated with the storage of these materials are presented in Table 4-2.

**Table 4-2: Chemical and Fuel Containment Facilities**

| Activity | Material | Storage/Tank capacity | Bund construction |
|---|---|---|---|
| Pulp Plant | Hydrogen Peroxide (50%) | 80m³ | Concrete<br>Coated<br>Volume of containment min. 110% of tank volume |
| | Sodium Hydroxide | 50m³ | Concrete<br>Coated<br>Volume of containment min. 110% of tank volume |
| | Sodium Silicate | 50m³ | Concrete<br>Coated<br>Volume of containment min. 110% of tank volume |
| | Soap | IBC Container station 1m³ +1,2m³ | Concrete<br>Coated<br>Volume of containment min. 110% of tank volume |
| | Tenside | IBC Container station 1m³ +1,2m³ | Concrete<br>Coated<br>Volume of containment min. 110% of tank volume |
| | Calcium chloride | IBC Container station 1m³ +1,2m³ | Concrete<br>Coated<br>Volume of containment min. 110% of tank volume |
| | FAS Hydrosulphite | Metal Container 1m³ Dry product | No containment for Dry product |
| | Powder Activated Carbon<br>PAC = Polyaluminiumchlorid | IBC Container station 1m³ +1,2m³ | Concrete<br>Coated<br>Volume of containment min. 110% of tank volume |
| | Flocculant 1 +2 | Floculant 1:5m³ Dissolving tank + 10m³ Storage tank<br>Floculant 2:8m³ Dissolving tank + 16m³ Storage tank | Concrete<br>Coated<br>Volume of containment min. 110% of tank volume |
| | Sulphuric Acid | IBC Container (1m³) | Commercial IBC containment units |
| | Sodium hypochlorite | IBC Container (1m³) | Commercial IBC containment units |
| CHP Plant | Ammonia solution (24.5% solution) | 40m³ | Double-Wall Stainless Steel 1.4301 |
| | Activated carbon | 80m³ | Silo |
| | Lime | 300m³ (2 x 150m³) | Silo |

| Table 4-2: Chemical and Fuel Containment Facilities | | | |
|---|---|---|---|
| **Activity** | **Material** | **Storage/Tank capacity** | **Bund construction** |
| | Light fuel oil – auxiliary firing | 130m$^3$ (2x 65m$^3$) | Steel tank concrete bund<br>Volume of containment min. 110% of tank volume |
| | Light fuel oil – vehicle refuelling | 2.5m$^3$ | Steel tank concrete bund<br>Volume of containment min. 110% of tank volume |
| | Hydrochloride Acid | 3m$^3$ | GRP tank<br>Concrete bund<br>Volume of containment min. 110% of tank volume |
| | Sodium Hydroxide Solution | 3m$^3$ | GRP tank<br>Concrete bund<br>Volume of containment min. 110% of tank volume |
| | Boiler Water Treatment Chemicals (Sodium Triphosphate) | IBC Container (1m$^3$) | Commercial IBC containment units |
| WwTW | Ferric Chloride (40%) | 18-22 tonne | Bund<br>Volume of containment min. 110% of tank volume |
| | Poly Aluminium Chloride (PACl) (10%) | 18-22 tonne | Bund<br>Volume of containment min. 110% of tank volume |
| | Hydrochloric Acid (25%) | 18-22 tonne | Bund<br>Volume of containment min. 110% of tank volume |
| | Sodium Hydroxide (Caustic Soda) | 18-22 tonne | Concrete<br>Coated<br>Volume of containment min. 110% of tank volume |
| | Sodium Hypochlorite (10.3% w/w as Cl) | Minibulk Tank | Bund<br>Volume of containment min. 110% of tank volume |
| | Citric Acid (50%) | IBC Container station 1m$^3$ +1,2m$^3$ | Concrete<br>Coated<br>Volume of containment min. 110% of tank volume |
| | Sodium Bisulphite (38%) | IBC Container station 1m$^3$ +1,2m$^3$ | Bund<br>Volume of containment min. 110% of tank volume |
| | Polymers (A,B,C,D,E,F & G) | Bagged Powder polypropylene tanks, storage and preparation | Kerbed Area Containment |
| | Magnesium Chloride Flakes (46%) | Bagged Powder polypropylene tanks, storage and preparation | Volume of containment min. 110% of tank volume |

| Table 4-2: Chemical and Fuel Containment Facilities | | | |
|---|---|---|---|
| **Activity** | **Material** | **Storage/Tank capacity** | **Bund construction** |
| | Calcium Hydroxide (Lime) Hydrated | 22 Tonnes | Silo |
| | Sodium Carbonate Powder (Soda Ash) (97%) | 22 Tonnes | Silo |
| | Powder Activated Carbon | 22 Tonnes | Silo |
| | Sodium Chloride Granules | Bagged Granules Pallet-ised | Volume of containment min. 110% of tank volume |
| | Sodium Aluminate (95%) | Bagged Powder poly-propylene tanks, stor-age and preparation | Bund<br>Volume of containment min. 110% of tank volume |
| | Macro Micro Nutrients | Bagged Powder poly-propylene tanks, stor-age and preparation | Kerbed Area Containment |
| | Acetic Acid | $20m^3$ | Bund<br>Volume of containment min. 110% of tank volume |

## 4.3 Environmental Risk Assessment

An Environmental Risk Assessment has been carried out following the Environment Agency Horizontal Guidance Note H1. This is included within Annex 4 of the Environmental Permit Application. The assessment considers all potential sources of ground and surface water pollution that could occur due to fugitive emissions from the IWMF or from accidents occurring at the IWMF. The risk assessment also details any mitigation measures that will be employed to reduce the frequency or impact of these events.

The land use and pollution history of the site has been considered in this desk study.

The Environmental Risk Assessment identifies that the development will require the storage of various chemicals, which could pose a risk to the ground and groundwater during normal operation. All process areas, loading/unloading areas, materials handling areas and roadways will be covered in concrete and/or tarmac hardstanding. It is therefore not regarded that there will be any risk of ground/groundwater contamination during normal operation of the installation.

The Environmental Risk Assessment concluded that for land, groundwater and surface water, the residual impacts of the IWMF would be insignificant provided the recommended mitigation measures are employed.

It is therefore concluded that the installation will pose little risk of pollution. However, periodic soil and groundwater samples will be undertaken to fulfil the requirements of Articles 14(1)(b), 14(1)(e) and 16(2) of the IED.

## 4.4 Conclusion

For the reasons stated within this report, it anticipated that there will be little risk of pollution associated with the installation and its directly associated activities.

During the Operational phase of the installation, as required by the permit, any records which demonstrate how the land and groundwater have been protected will be maintained. This information will include inspection records of site infrastructure, pollution/incident reports, records of any ground investigations undertaken, and any monitoring records of soil, gas and/or water during the life of the permit. Where it is identified that pollution has occurred records will be maintained to demonstrate any pollution incidents that may have affected the land or groundwater. These records will be retained to be used at Permit Surrender.

Appendix A - Addendum Environmental Statement 2017 – Chapter 5

## Appendix B - Addendum Environmental Statement 2017 – Chapter 6

## Appendix C - 2009 Ground Investigation at Rivenhall Airfield, Essex, February 2010

## Appendix D - CC Ground Investigations Ltd (CCGI) - Factual Report – Rivenhall Airfield IWMF

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