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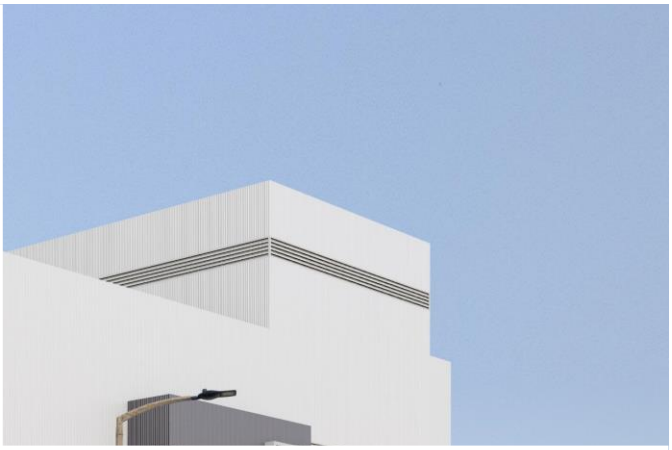

Doncaster Energy Recovery Facility

BH EnergyGap (Doncaster) Ltd

Environmental Risk Assessment

ENGINEERING CONSULTING

Document approval

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Contents

1 Introduction

BH EnergyGap (Doncaster) Limited (BHEG) is developing the Doncaster Energy Recovery Facility (the 'Facility') located at Sandall Stones Road, Kirk Sandall, Doncaster.

The aim of this report is to assess the environmental risks associated with the activities undertaken at the Facility and demonstrate that the necessary measures are in place to protect the environment and ensure, that the operation of the Facility, throughout its life, will not pose an unacceptable risk to the environment.

This report will:

a. identify potential risks that the activity may present to the environment;
b. screen out those that are insignificant and don't require detailed assessment;
c. identify potentially significant risks, where appropriate;
d. choose the right control measures, where appropriate; and
e. report the findings of the assessment.

This document has been developed to consider the requirements of Environment Agency Guidance Notes H1 Annexes A, C, H and F. While it is acknowledged that these guidance documents have been withdrawn, it is understood that the requirements of the guidance are still applicable under Environment Agency Guidance *'Risk assessments for specific activities: environmental permits'*, which replaced H1 and H2 with alternate guidance in February 2016.

1.1 Risk assessment process

This assessment has been developed in accordance with the Environment Agency guidance '*Risk assessments for your environmental permit*' and the previous H1 Guidance Note. The guidance promotes the following key steps:

1. identify and consider risks from your site/the activity and the sources of those risks;
2. identify the receptors at risk from your site;
3. identify the possible pathways from the sources of the risks to the receptors;
4. assess the risks relevant to your specific activity and check they are acceptable/can be screened out;
5. justify appropriate measures to control the risks if they are high; and
6. submit/present the assessment with the permit application.

1.2 Step 1 – identify risks

The following report will identify the activities that present different types of risk to the environment associated with the operation of the Installation, including:

a. odour;
b. noise;
c. fugitive emissions; and
d. accidents.

1.3 Step 2 – Step 4: Assessment of receptors, pathways and risks

The report will include an assessment of risks associated with the operation of the Installation, and will identify the:

a. hazard;
b. receptor; and
c. pathway.

The risks will be assessed relevant to the activities to be carried out on site and will be checked to see if they are acceptable/can be screened out.

1.4 Step 5 – justify appropriate measures

This report will demonstrate that the risks associated with the operation of the Facility have been considered, and identify the control measures which will be in place to demonstrate that the risks are being appropriately managed.

1.5 Step 6 – present the assessment

The assessment will conclude by presenting the following:

a. possibility of exposure;
b. consequence; and
c. the overall risk.

The report will present the overall risk applying the Environment Agency's previous H1 criteria, defined as:

a. insignificant;
b. not significant; and
c. significant.

2 Table A1 – Odour risk assessment and management

What do you do that can harm and what could be harmed?			Managing the risk	Assessing the risk		
Hazard	**Receptor**	**Pathway**	**Risk management**	**Possibility of exposure**	**Consequence**	**What is the overall risk?**
What has the potential to cause harm?	**What is at risk? What do I wish to protect?**	**How can the hazard get to the receptor?**	**What measures will you take to reduce the risk? If it occurs who is responsible for what?**	**How likely is this contact?**	**What is the harm that can be caused?**	**What is the risk that remains? The balance and probability and consequence.**
Odorous emissions may occur during the delivery of waste, reception of waste and the storage and handling of waste prior to processing within the Facility.	Immediate area. The nearest residential receptor to the Facility is located approximately 220 m from the Installation Boundary off Clay Lane West.	Air – winds generally blow from a south-westerly direction.	All wastes received at the Facility will be unloaded inside an enclosed waste reception hall. The waste bunker area will be retained at negative pressure. Air from waste bunker area will be combusted within the Facility, as detailed in the supporting information. Replacement air to the bunker area will be taken from the reception hall to minimize the odorous emissions and to retain negative pressure as far as reasonably possible.	Minimal.	Odour annoyance. This will have more impact in the summer, when temperatures are higher and people are outdoors.	Not significant if managed well.

What do you do that can harm and what could be harmed?			Managing the risk	Assessing the risk		
Hazard	**Receptor**	**Pathway**	**Risk management**	**Possibility of exposure**	**Consequence**	**What is the overall risk?**
What has the potential to cause harm?	**What is at risk? What do I wish to protect?**	**How can the hazard get to the receptor?**	**What measures will you take to reduce the risk? If it occurs who is responsible for what?**	**How likely is this contact?**	**What is the harm that can be caused?**	**What is the risk that remains? The balance and probability and consequence.**
Odorous emissions may occur during periods of shutdown	Immediate area. The nearest residential receptor to the Facility is located approximately 220 m from the Installation Boundary off Clay Lane West.	Air – winds generally blow from a south-westerly direction.	Measures will be in place to minimise odorous emissions during periods of shutdown, as part of the Environmental Management System (EMS) for the Facility. Doors to the waste reception hall will be kept shut. Regular olfactory checks will be undertaken. An odour abatement system will be used to extract potentially odorous air from waste storage areas when required (e.g. during periods of shutdown).	Minimal	Odour annoyance, which will have greater impact in the summer when temperatures are higher and people are outdoors and more likely to be exposed to odour.	Not significant due to management systems in place.

3 Table A2 – Noise and vibration risk assessment and management plan

What do you do that can harm and what could be harmed?			Managing the risk	Assessing the risk		
Hazard	**Receptor**	**Pathway**	**Risk management**	**Possibility of exposure**	**Consequence**	**What is the overall risk?**
What has the potential to cause harm?	**What is at risk? What do I wish to protect?**	**How can the hazard get to the receptor?**	**What measures will you take to reduce the risk? If it occurs who is responsible for what?**	**How likely is this contact?**	**What is the harm that can be caused?**	**What is the risk that remains? The balance and probability and consequence**
Noise from plant items such as the waste treatment processes, heat recovery boiler, exhaust air fans, stack exhaust, steam turbine, cooling condensers and noise radiation from the building envelope itself, etc.	Immediate area. The nearest residential receptor to the Facility is located approximately 220 m from the Installation Boundary off Clay Lane West.	Sound propagation through air and the ground.	Noisy plant items, where practicable, will be installed inside buildings rather than outside and, where appropriate, they will be installed with appropriate noise attenuation measures. The installation will be designed to reduce noise and tonal components. Regular maintenance of plant items will be undertaken. Roads will be maintained to minimise rattle of loads during transport of materials within the installation boundary.	Minimal.	Annoyance.	Not significant. Refer to Appendix C – Noise Assessment for further information on the impact of noise from the operation of the Facility.
Noise from vehicle movements.	Immediate area. The nearest residential receptor to the Facility is located approximately 220 m	Sound propagation through air and the ground.	The waste will be delivered to the Facility by road during set delivery hours. This will minimise the impacts of noise	Minimal.	Annoyance.	Not significant. Refer to Appendix C – Noise Assessment for further information on the impact of

What do you do that can harm and what could be harmed?			Managing the risk	Assessing the risk		
Hazard	**Receptor**	**Pathway**	**Risk management**	**Possibility of exposure**	**Consequence**	**What is the overall risk?**
What has the potential to cause harm?	**What is at risk? What do I wish to protect?**	**How can the hazard get to the receptor?**	**What measures will you take to reduce the risk? If it occurs who is responsible for what?**	**How likely is this contact?**	**What is the harm that can be caused?**	**What is the risk that remains? The balance and probability and consequence**
	from the Installation Boundary off Clay Lane West.		associated with the delivery of waste to the Facility.			noise from the operation of the Facility.

4 Table A3 – Fugitive emissions risk assessment and management plan

What do you do that can harm and what could be harmed?			Managing the risk	Assessing the risk		
Hazard	**Receptor**	**Pathway**	**Risk management**	**Possibility of exposure**	**Consequence**	**What is the overall risk?**
What has the potential to cause harm?	**What is at risk? What do I wish to protect?**	**How can the hazard get to the receptor?**	**What measures will you take to reduce the risk? If it occurs who is responsible for what?**	**How likely is this contact?**	**What is the harm that can be caused?**	**What is the risk that remains? The balance and probability and consequence**
Emission releases from the main building when opening and closing doors.	Immediate area – air.	Air, surface runoff, direct contact.	All waste handling activities will be undertaken within enclosed buildings. The waste bunker area will be held under negative pressure.	Low.	Nuisance, dust on clothing and cars.	Insignificant.
Fugitive emissions during periods of shutdown.	Immediate area – air.	Air, direct contact.	Should odourous emissions arise during periods of shutdown, the odour abatement system will be employed.	Low.	Nuisance, annoyance.	Insignificant.
Spillage of waste during delivery and offloading.	Immediate area – air, land, water.	Air, surface runoff.	All waste unloading activities will be undertaken within enclosed buildings. The waste bunker area will be held under negative pressure. Spillages would be cleaned up in accordance with documented management systems for the Facility. Waste unloading	Low.	Nuisance and dust.	Insignificant.

What do you do that can harm and what could be harmed?			Managing the risk	Assessing the risk		
Hazard	**Receptor**	**Pathway**	**Risk management**	**Possibility of exposure**	**Consequence**	**What is the overall risk?**
What has the potential to cause harm?	**What is at risk? What do I wish to protect?**	**How can the hazard get to the receptor?**	**What measures will you take to reduce the risk? If it occurs who is responsible for what?**	**How likely is this contact?**	**What is the harm that can be caused?**	**What is the risk that remains? The balance and probability and consequence**
			areas will have contained drainage to minimise the risk of emissions of contaminated water.			
Dust from waste deliveries being blown off-site.	Immediate area – air, land.	Air, surface runoff.	All waste unloading activities will be undertaken within enclosed buildings. The waste bunker area will be held under negative pressure. Good housekeeping will be employed to minimise the build-up of dust.	Low.	Nuisance and dust.	Insignificant.
Bottom ash discharge from the Facility.	Immediate area – air.	Air, surface runoff, direct contact.	Once removed from the combustion chamber by the bottom ash extractors, the bottom ash is then discharged to an ash quench system, prior to storage in a bottom ash storage area. The use of a quench will minimise the potential of fugitive dust emissions. Ash handling will be undertaken	Low.	Nuisance.	Insignificant.

What do you do that can harm and what could be harmed?			Managing the risk	Assessing the risk		
Hazard	**Receptor**	**Pathway**	**Risk management**	**Possibility of exposure**	**Consequence**	**What is the overall risk?**
What has the potential to cause harm?	**What is at risk? What do I wish to protect?**	**How can the hazard get to the receptor?**	**What measures will you take to reduce the risk? If it occurs who is responsible for what?**	**How likely is this contact?**	**What is the harm that can be caused?**	**What is the risk that remains? The balance and probability and consequence**
			in areas with contained drainage.			
Discharge of Air Pollution Control residues (APCr) when emptying the APCr silo.	Immediate area – air, land.	Air, surface runoff, direct contact.	When unloading the APCr silo, the displaced air from the tanker will be recirculated into the silo to prevent releases into the atmosphere. A fabric filter will minimise the risk of fugitive emissions of dust.	Low.	Nuisance, release of hazardous dust.	Insignificant.
Reagent and chemical discharges when filling silos.	Immediate area – air.	Air, surface runoff, direct contact.	Reagents will be delivered in sealed tankers and off-loaded via a standard hose connection. Air displaced from the silo will be discharged through fabric filters on the top of the silo in the case of solid reagents. Regular inspections and maintenance will be undertaken of abatement equipment.	Low.	Nuisance.	Insignificant.

What do you do that can harm and what could be harmed?			Managing the risk	Assessing the risk		
Hazard	**Receptor**	**Pathway**	**Risk management**	**Possibility of exposure**	**Consequence**	**What is the overall risk?**
What has the potential to cause harm?	**What is at risk? What do I wish to protect?**	**How can the hazard get to the receptor?**	**What measures will you take to reduce the risk? If it occurs who is responsible for what?**	**How likely is this contact?**	**What is the harm that can be caused?**	**What is the risk that remains? The balance and probability and consequence**
			Unloading activities will only be undertaken in areas of hardstanding with contained drainage.			
Lime leak during injection into APC system.	Immediate area – air.	Air, surface runoff, direct contact.	Systems will be enclosed, and regular inspections and maintenance will be carried out. Lime will be injected via a completely enclosed dosing and conveying system. Process areas will have contained drainage.	Low.	Nuisance.	Insignificant.
Spillage of air pollution control reagents when capping or changing filter bags.	Immediate area – air, land.	Air, surface runoff, direct contact.	Enclosed system located inside building. Kept under suction by the ID fan. The fabric filter will have a number of cells. When capping or changing bags, the relevant cell will be shut down for a sufficient time to enable the dust to settle. This allows any faulty or damaged cells to be isolated	Low.	Nuisance, release of hazardous dust.	Insignificant.

What do you do that can harm and what could be harmed?			Managing the risk	Assessing the risk		
Hazard	**Receptor**	**Pathway**	**Risk management**	**Possibility of exposure**	**Consequence**	**What is the overall risk?**
What has the potential to cause harm?	**What is at risk? What do I wish to protect?**	**How can the hazard get to the receptor?**	**What measures will you take to reduce the risk? If it occurs who is responsible for what?**	**How likely is this contact?**	**What is the harm that can be caused?**	**What is the risk that remains? The balance and probability and consequence**
			easily. Process areas will have contained drainage.			
Spillage/leak of liquid chemicals when tanker off-loading.	Immediate area – air, land.	Air, direct contact.	Deliveries will be from sealed tankers and off-loaded via a hose. Spillage will be prevented by good operating procedures, high tank level alarm/trips etc. Tanks will be located within suitably designed secondary containment. Unloading of liquid chemicals will be undertaken on areas of contained drainage in order to prevent the release of contaminated effluent off-site through any spillages.	Low.	Liquid or vapour release.	Insignificant.
Spillage/leak when unloading from delivery vehicles and chemical containers (IBCs, FIBCs, drums etc).	Immediate area – air, land.	Air, direct contact.	Deliveries will be from road vehicles and off-loaded via mobile plant. Potential leaks/spills will be prevented by experienced mobile equipment operators undertaking unloading	Low.	Hazardous liquid or vapour release.	Insignificant.

What do you do that can harm and what could be harmed?			Managing the risk	Assessing the risk		
Hazard	**Receptor**	**Pathway**	**Risk management**	**Possibility of exposure**	**Consequence**	**What is the overall risk?**
What has the potential to cause harm?	**What is at risk? What do I wish to protect?**	**How can the hazard get to the receptor?**	**What measures will you take to reduce the risk? If it occurs who is responsible for what?**	**How likely is this contact?**	**What is the harm that can be caused?**	**What is the risk that remains? The balance and probability and consequence**
			activities. Unloading activities will only be undertaken in areas of hard standing with contained drainage. Chemical containers will be stored within suitably designed secondary containment.			
Release off-site of litter.	Immediate area – air, land.	Air, direct contact.	Loading/unloading of all waste vehicles will be within enclosed building.	Low.	Nuisance, dust on cars and road.	Insignificant.
Release of dusts from the transfer off-site of bottom ash.	Immediate area – air, land.	Air, direct contact.	Loading of bottom ash into vehicles will be undertaken within enclosed building. Bottom ash will be transferred off-site in covered road vehicles. The bottom ash will be maintained dust-free by quenching.	Low.	Nuisance, dust on cars and road.	Insignificant.
Re-suspension of dust from road	Immediate area – air, land, water.	Air, surface runoff.	Control speeds, maintain the condition of the road, and take due care. A good	Low.	Nuisance, dust on cars and road.	Insignificant.

What do you do that can harm and what could be harmed?			Managing the risk	Assessing the risk		
Hazard	**Receptor**	**Pathway**	**Risk management**	**Possibility of exposure**	**Consequence**	**What is the overall risk?**
What has the potential to cause harm?	**What is at risk? What do I wish to protect?**	**How can the hazard get to the receptor?**	**What measures will you take to reduce the risk? If it occurs who is responsible for what?**	**How likely is this contact?**	**What is the harm that can be caused?**	**What is the risk that remains? The balance and probability and consequence**
surface, when site vehicles arrive/leave.			standard of housekeeping will be maintained on the roads.			

5 Table A4 – Accidents risk assessment and management plan

What do you do that can harm and what could be harmed?			Managing the risk	Assessing the risk		
Hazard	**Receptor**	**Pathway**	**Risk management**	**Possibility of exposure**	**Consequence**	**What is the overall risk?**
What has the potential to cause harm?	**What is at risk? What do I wish to protect?**	**How can the hazard get to the receptor?**	**What measures will you take to reduce the risk? If it occurs who is responsible for what?**	**How likely is this contact?**	**What is the harm that can be caused?**	**What is the risk that remains? The balance and probability and consequence**
Spill during unloading of chemicals.	Immediate area – air, land, water.	Direct contact.	Training in unloading practices. Under manual control, continual observation. Impervious surfaces outdoors. Containment of drainage from chemical handling areas. Management procedures in place to deal with spillages.	Unlikely.	Low.	Not significant.
Overfilling of vessels.	Local environment air, land, water.	Surface runoff, wind.	Training in unloading practices. Under manual control, continual observation. Impervious surfaces outdoors. High level alarms. Secondary containment for storage vessels. Management procedures in place to deal with spillages.	Unlikely.	Low.	Not significant.

What do you do that can harm and what could be harmed?			Managing the risk	Assessing the risk		
Hazard	**Receptor**	**Pathway**	**Risk management**	**Possibility of exposure**	**Consequence**	**What is the overall risk?**
What has the potential to cause harm?	**What is at risk? What do I wish to protect?**	**How can the hazard get to the receptor?**	**What measures will you take to reduce the risk? If it occurs who is responsible for what?**	**How likely is this contact?**	**What is the harm that can be caused?**	**What is the risk that remains? The balance and probability and consequence**
Leak of water from treatment plant, and leak of boiler water treatment chemicals.	Immediate area – water.	Surface runoff	Secondary containment for storage of water treatment chemicals such as bunding. Routine inspection and maintenance. Impervious surface indoors, separate drains for process water. Regular preventative maintenance of storage vessels to confirm the integrity of the storage vessel.	Unlikely.	Pollution of surface water.	Not significant.
Flue gas leak.	Local environment – air.	Air.	Design standards. Inspection and maintenance programme. Controls and alarms for pressure. Most of the systems are retained at negative pressure. Emissions monitoring systems to detect exceedances.	Very unlikely.	Pollution of atmosphere, health impacts.	Not significant.
Fuel storage failure.	Immediate area – litter.	Direct contact.	Storage of waste in a dedicated waste storage bunker. The bunker will be	Unlikely.	Litter.	Insignificant.

What do you do that can harm and what could be harmed?			Managing the risk	Assessing the risk		
Hazard	**Receptor**	**Pathway**	**Risk management**	**Possibility of exposure**	**Consequence**	**What is the overall risk?**
What has the potential to cause harm?	**What is at risk? What do I wish to protect?**	**How can the hazard get to the receptor?**	**What measures will you take to reduce the risk? If it occurs who is responsible for what?**	**How likely is this contact?**	**What is the harm that can be caused?**	**What is the risk that remains? The balance and probability and consequence**
			constructed of reinforced concrete, with integrity checks undertaken during construction.			
Control failure leading to combustion control upset.	Local environment – air.	Air - Winds generally blow from a south westerly direction.	Good design of control system. Monitoring of combustion conditions. Maintenance of combustion air systems.	Unlikely,	Pollution of atmosphere (short term), human health impacts.	Not significant.
Failure of emission abatement equipment.	Local environment – air.	Air - Winds generally blow from a south westerly direction.	Regular maintenance, inspections. Redundancy of critical equipment or spares on stock.	Unlikely.	Pollution of atmosphere, human health impacts.	Not significant.
Failure of emission monitoring systems.	Immediate area – air.	Air - Winds generally blow from a south westerly direction.	Regular maintenance, inspections. A back-up CEMS system will be available in the event of a failure of the CEMS.	Unlikely.	Lack of data, public concern.	Not significant.
Failure of containment (e.g. bund).	Immediate area – water, land.	Surface runoff, wind, leaching.	Regular inspections of bunds. Preventative maintenance will be employed through a	Unlikely.	Pollution of surface water.	Not significant.

What do you do that can harm and what could be harmed?			Managing the risk	Assessing the risk		
Hazard	**Receptor**	**Pathway**	**Risk management**	**Possibility of exposure**	**Consequence**	**What is the overall risk?**
What has the potential to cause harm?	**What is at risk? What do I wish to protect?**	**How can the hazard get to the receptor?**	**What measures will you take to reduce the risk? If it occurs who is responsible for what?**	**How likely is this contact?**	**What is the harm that can be caused?**	**What is the risk that remains? The balance and probability and consequence**
			documented management system.			
Making the wrong connections to drains.	Local environment – water.	Direct contact, leaching.	Detailed site drainage plan, which will be available to all staff. Drains will be labelled accordingly.	Low.	Pollution of surface water.	Not significant.
Incompatible substances from coming into contact.	Immediate area.	Surface runoff, wind, direct contact.	Due care and attention. Retention of Material Safety Data Sheets (MSDS) to identify hazards of substances to be used on site.	Low.	Pollution of surface water, human health impacts.	Not significant.
Unwanted reactions.	Immediate area.	Surface runoff, wind, direct contact.	Due care and attention. Retention of MSDS to identify hazards of substances to be used on site.	Unlikely.	Low.	Not significant.
Loss of power.	None.	N/A	A back-up generation system to provide safe shutdown of the Facility in the event of loss of power.	Low.	None.	Not significant.

What do you do that can harm and what could be harmed?			Managing the risk	Assessing the risk		
Hazard	**Receptor**	**Pathway**	**Risk management**	**Possibility of exposure**	**Consequence**	**What is the overall risk?**
What has the potential to cause harm?	**What is at risk? What do I wish to protect?**	**How can the hazard get to the receptor?**	**What measures will you take to reduce the risk? If it occurs who is responsible for what?**	**How likely is this contact?**	**What is the harm that can be caused?**	**What is the risk that remains? The balance and probability and consequence**
Loss of compressed air.	None.	N/A	Multiple compressors.	Low.	None.	Not significant.
Loss of boiler water.	None.	N/A	Automatic shutdown of the Facility, back-up diesel pump to provide feedwater to the boiler.	Low.	None.	Not significant.
Steam leak to plant building/atmosphere.	Noise, visual impact.	Air	Statutory design, fabrication and inspection standards for steam systems. Controls and alarms for pressure. Routine operator checks.	Low.	Nuisance from noise and visual impact.	Not significant.
Residues handling failure.	Immediate area – air, land, water.	Direct contact.	Training in residue handling practices. Contained transfer systems. Impervious surfaces in residue handling areas with designated drainage systems in areas where residues are stored.	Unlikely.	Pollution of surface waters.	Not significant.
Fires in FGT bag filter.	Local environment.	Air - Winds generally blow from a south westerly direction.	Temperature measurement and level control in filter hopper, inert gas fire-fighting systems.	Low.	Dust, pollution of air.	Not significant.

What do you do that can harm and what could be harmed?			Managing the risk	Assessing the risk		
Hazard	**Receptor**	**Pathway**	**Risk management**	**Possibility of exposure**	**Consequence**	**What is the overall risk?**
What has the potential to cause harm?	**What is at risk? What do I wish to protect?**	**How can the hazard get to the receptor?**	**What measures will you take to reduce the risk? If it occurs who is responsible for what?**	**How likely is this contact?**	**What is the harm that can be caused?**	**What is the risk that remains? The balance and probability and consequence**
Fire in furnace feed system.	Immediate area – air.	Air.	Furnace charging procedures / training. Level indicator in chute. Fire-fighting system.	Low.	Pollution of air.	Not significant.
Over pressurisation of the boiler.	Immediate area – air.	Direct contact.	In case of over pressure, the pressure will be released through waste hopper and ash quench preventing the risk of an explosion within the boiler.	Low.	Pollution of air.	Not significant.
Fires in all waste reception storage and handling areas.	Immediate area – air.	Direct contact.	Fire detection and suppression systems.	Low.	Visual impact, pollution of air.	Not significant.
Fire from ignition of lube oil leak.	Immediate area – air.	Wind, direct contact.	Fire detection and protection systems.	Low.	Visual.	Not significant.
Contaminated fire water.	Immediate area – water, land.	Surface runoff, leaching.	Site drainage for external areas will be fitted with an isolation valve which is activated by the fire detection systems. Additional storage will be available from kerbing and roadways. The primary source of firewater	Low.	Pollution of surface water.	Not significant.

What do you do that can harm and what could be harmed?			Managing the risk	Assessing the risk		
Hazard	**Receptor**	**Pathway**	**Risk management**	**Possibility of exposure**	**Consequence**	**What is the overall risk?**
What has the potential to cause harm?	**What is at risk? What do I wish to protect?**	**How can the hazard get to the receptor?**	**What measures will you take to reduce the risk? If it occurs who is responsible for what?**	**How likely is this contact?**	**What is the harm that can be caused?**	**What is the risk that remains? The balance and probability and consequence**
			containment will be the waste bunker, which is designed as a water-retaining structure.			
Failure to contain firewater.	Land.	Land, water, groundwater.	Maintenance of the shut-off valve and/or pumping system within the drainage system. Inspection and maintenance of roadways and areas of hardstanding.	Unlikely.	Release of chemicals to water.	Not significant.
Vandalism.	Immediate area.	Land, air, water.	Security fences, controlled entrance to the site.	Low.	Release of substances to any environment.	Not significant.

6 Detailed assessment

The environmental impact of the Facility has been evaluated using the H1 software tool as described in Part 2 of Technical Guidance Note EPR-H1, presented in Appendix A. This assessment has been expanded by a more comprehensive Dispersion Modelling Assessment (refer to Appendix E of the Supporting Information) and a full Noise Assessment (refer to Appendix C of the Supporting Information).

6.1 Emissions to air

The assessment, using the Environment Agency's H1 tool, is presented in Appendix A of this report. The detailed Dispersion Modelling Assessment is presented in Appendix E of the Application.

6.2 Habitats assessment

There are a number of habitat sites present within the appropriate screening distances from the stack. The following habitat features presented in Table 6-1 have been considered within the air quality assessment:

Table 6-1: Sensitive Ecological Receptors

European designated sites (Ramsar, SPA, SAC) (within 10 km)
Hatfield Moor (SAC/SPA)
UK designated sites (SSSI, NNR) (within 2 km)
Sandall Beat (SSSI/LNR)[1]
Locally designated sites (LNR, LWS, Ancient Woodland) (within 2 km)
Long Plantation, Edenthorpe (LWS)
Bentley Ings (LWS)
Arksey Ings (LWS)
Wheatley Park and Old Don Oxbows (LWS)
Pilkington's Burgy Banks (LWS)
Bentley Bank (LWS)
Fox Covert (LWS)
Long Sandall Ings (LWS)
Marsh Lane (LWS)
Wheatley Golf Course (LWS)
Shaw Lane Hedgerows (LWS)
Old River Don Oxbow (LWS)
Shaw Lane Pond (LWS)
Barnby Dun Borrow Pits (LWS)
Barnby Dun Borrow Old Don Oxbow (LWS)

[1] The Sandall Beat SSSI/LNR lies more than 2 km from the Facility, however has been included within the scope of the assessment – refer to Appendix E (Air Quality Assessment) for justification.

European designated sites (Ramsar, SPA, SAC) (within 10 km)
Hagg Wood (LWS)
The Grove, Kirk Sandall (LWS)
Croft Ings (LWS)
Shaw Wood (LWS/AW)
Dodge Dike Pond (LWS)
Barnby Dun Station Wood (LWS)
Bentley Tilts and Course of Old Ea Beck (LWS)
Bentley Common (LWS)

The dispersion modelling assessment concludes that the impact on these features can be described as follows:

1. The process contribution at all sites is less than 1% of the relevant Critical Loads at the European Designated Site and less than 100% of the Critical Load at all local nature sites and can be screened out as 'insignificant', with the exception of the following:
    a. At Hatfield Moor SAC/SPA the acid deposition process contribution exceeds 1% of the Critical Load in three of the five years of meteorological data. The average process contribution over the five years of meteorological data is 1.08% of the Critical Load. Whilst this is only just over the screening criterion, it is considered necessary to assess the potential significance of an approximately 1% process contribution at this European Designated Site. This has been considered in the Ecological Interpretation of AQA submitted to support the planning application – refer to Appendix I. This has concluded that there will be no adverse effect resulting from emissions from the Facility, and therefore the impact is 'not significant'.

6.3 Emissions to sewer and water

There are no emissions of process effluents to water from the Facility.

Uncontaminated surface water will be discharged, via the surface water drainage system and SUDS attenuation, to a nearby surface water sewer.

In the event that excess process effluents are generated, for example during periods of boiler emptying, it is intended to discharge these to sewer in accordance with a trade effluent consent. If a trade effluent consent cannot be obtained, these may be tankered off-site for treatment at a suitably licensed waste management facility.

Foul water from welfare facilities will be discharged to foul sewer.

6.4 Noise

The impact of noise from the Installation is considered in the noise assessment contained in Appendix C of the Application.

6.5 Visual impact

The visual impact of the Installation has not been considered in the EP application, since this is primarily a matter for the planning authorities.

6.6 Odour

The measures for the containment, prevention and mitigation odour are detailed in section 2.4.7 the Supporting Information.

6.7 Photochemical ozone creation

Releases of CO, NO_2, SO_2 and benzene contribute to the generation of excess tropospheric ozone, while releases of NO remove ozone from the atmosphere. The annual releases of these substances can be ascribed a photochemical ozone creation potential (POCP). Values for the POCP are stated in Annex (f) of Horizontal Guidance Note EPR-H1, for the pollutants included within the air quality assessment, as:

b. CO 2.7
c. NO2 ..... 2.8
d. SO2 ..... 4.8
e. 1,3-Butadiene 85.1

The total POCP for the Installation is calculated in the H1 Software Tool as 4,177 tonnes. This assessment is based on the assumption that all NO_x is released as NO_2.

6.8 Global warming

The assessment of the contribution of the Facility to global warming is complex. On the one hand, the Facility releases carbon dioxide to the atmosphere by the combustion of waste and auxiliary fuel. On the other hand, the Facility generates electricity, which displaces other electricity generation, which would release carbon dioxide from the combustion of fossil fuels.

In accordance with the Environment Agency requirements a Greenhouse Gas Assessment, which considers the direct and indirect emissions from the incineration of waste within the Installation and compares this with the emissions produced if the electricity were produced by conventional fossil fuel power station, has been produced. This is presented in Appendix E of the Supporting Information.

6.9 Disposal of waste

Methods for reducing the impact from waste disposal are considered in Section 2.9 of the Supporting Information.

7 Assessment of Dioxins and Dioxin-like PCBs

7.1 Introduction

A Human Health Risk Assessment (HHRA) has been undertaken for the Facility – refer to Appendix E of the Application. The information presented within this section should be read in conjunction with the HHRA.

The HHRA assessed the intake of dioxins and dioxin-like PCBs against the Tolerable Daily Intake (TDI) of 2 pg WHO-TEQ/kg bw/day. It is understood that the EA require an assessment is undertaken against a Tolerable Weekly Intake (TWI) of 2 pg WHO-TEQ/kg bw/week, which is equivalent to 0.286 pg WHO-TEQ/kg bw/day.

7.2 Background

The HHRA was undertaken against a TDI for dioxins and dioxin-like PCBs of 2 pg WHO-TEQ/kg bw/day. This value was set by the Committee on Toxicity (CoT) and has been taken from the 2009 EA Science Report "Human health toxicological assessment of contaminants in soil[2]". The TDI of 2 pg WHO-TEQ/kg bw/day has subsequently been used as the assessment criteria in HHRAs in the UK.

7.2.1 Derivation of new TWI

The European Food Standards Agency (EFSA)'s expert panel on Contaminants in the Food Chain (CONTAM) carried out a review of the risk to human and animal health from dioxins and furans in food and feed, publishing a Scientific Opinion in June 2018 which was published in the European Journal on 18 November 2018. CONTAM recommended a tolerable weekly intake of 2 pg TEQ/kg bw/week.

The justification for the new TWI is that this is protective against effects on semen quality, based on a single scientific study – the Russian Children's Study[3]. This study enrolled 516 boys aged 8-9 years. Ten years later, when the participants were aged 18-19, semen samples were obtained and analysed. A total of 133 of the 516 boys originally enrolled completed the study. The study concluded that *"Higher peripubertal serum TCDD concentrations and PCDD TEQs were associated with poorer semen parameters"*, but that *"Serum PCBs, furans, and total TEQs were not associated with semen parameters."* Based on the study, the EFSA concluded that exposure to dioxins at the levels found in the study can affect reproductive development. The EFSA derived the new TWI from the critical level in this study by modelling the build-up and decline of dioxins in children through their life, assuming (amongst other assumptions) 12 months of breastfeeding and an intake of 800 ml per day of breast milk.

7.2.2 Applicability of new TWI

The Scientific Opinion recommending the new TWI was discussed at an Information Session on 13 November 2018. UK representatives participated in this session and submitted comments in

[2] Human health toxicological assessment of contaminants in soil - dioxins, Science Report - Final SC050021/SR2, Environment Agency, 2009

[3] A Longitudinal Study of Peripubertal Serum Organochlorine Concentrations and Semen Parameters in Young Men: The Russian Children's Study, Minguez-Alarcon et al, 2017, Environmental Health Perspectives

advance which had been prepared by the CoT following a meeting on 23 October 2018. The CoT made a number of criticisms of the EFSA approach, including:

- the study did not contain a discussion on the possible explanation for the observed effect;
- while human data should be used to establish an HBGV (health-based guidance value), the CoT was unable to conclude that basing the HBGV on a single study was robust; and
- the applicability of the TWI to the whole population was questioned by the CoT.

Furthermore, the commentary on the Russian Children's Study from German representatives at the Information Session stated that the study was undertaken *"in the vicinity of a chemical manufacturing plant which has led to an extensive contamination of the environment with special pattern of dioxins, but also with organochlorine pesticides, lead and probably other compounds with shorter half-lives not detected in the study."* This has implications for the validity of applying the results of the study to the wider population.

The CoT discussed the Opinion again in its meeting on 17 September 2019. The discussion paper for the meeting stated *"A significant reduction in the TWI for dioxins and dioxin-like PCBs would mean that a significant portion of the population would exceed the safe exposure levels and some may therefore be experiencing adverse effects related to these compounds. Significant efforts would be required in order to reduce current exposures."* The CoT was asked *"Do the Committee agree that the TWI established by EFSA is justified given the available data?"* The minutes of the meeting state that the Committee neither endorsed nor dismissed the Opinion.

The EFSA's statement on the Opinion concludes *"The European Commission and EU Member States will discuss risk management measures following EFSA's scientific advice to ensure a high level of consumer protection."* Fichtner is not aware of any records which confirm that these discussions have taken place. Furthermore, the UK government has not published guidance on whether this standard should be applied.

Based on the above, the new TWI remains a recommendation by the EFSA's CONTAM and has not been adopted as an assessment criterion for the protection of human health by either the EU or the UK government. As such, the most recent published guidance on the tolerable intake of dioxins and dioxin-like PCBs remains the EA Science Report published in 2009.

However, an assessment of the impact of the Facility against the new TWI has been undertaken.

7.3 Assessment against TWI

7.3.1 Assessment methodology

As the TWI is the same as the current TDI, assessing the results of the HHRA against the TWI will increase the predicted impacts sevenfold as a percentage of the assessment criterion.

The HHRA considered the impact of emissions from the Facility at 10 sensitive receptor locations which were categorised as either 'residential', 'agricultural' or 'allotment' Residential receptors represent a known place of residence that is occupied within the study area. Agricultural receptors represent a farm holding or area land of horticultural interest. Allotment receptors represents land designated for non-commercial growing of food plants. In addition, a receptor has been assessed at the point of maximum impact to assess the theoretical maximum impact of the Facility. This point is located in an industrial area and is uninhabited and not located on cultivated or pastoral land

As a conservative assessment, it has been assumed that agricultural receptors ingest dioxins and dioxin-like PCBs from home-grown produce, eggs, poultry, pork, beef, and milk, regardless of whether the farm is arable, pastoral or mixed.

The assessment has added the contribution from the Facility to the Mean Daily Intake (MDI). If the overall intake is below the TDI or TWI (as appliable), then no significant health effects are expected and the impact of emissions from the Facility can be described as not significant.

7.3.2 Results – at the point of maximum impact

The results of the assessment at the point of maximum impact using the TDI and the TWI are presented in Table 7-1. Any exceedances of the TDI/TWI are highlighted.

Table 7-1: Intake of Dioxins and Dioxin-like PCBs - Point of maximum impact

Receptor Type	MDI		Process Contribution		Overall	
	% of TDI	% of TWI	% of TDI	% of TWI	% of TDI	% of TWI
Adult						
Agricultural	35.00%	**245.00%**	1.86%	13.01%	36.86%	**265.52%**
Allotment	35.00%	**245.00%**	0.06%	0.42%	35.06%	**245.78%**
Residential	35.00%	**245.00%**	0.04%	0.30%	35.04%	**245.57%**
Child						
Agricultural	90.65%	**634.55%**	2.62%	18.36%	93.27%	**662.97%**
Allotment	90.65%	**634.55%**	0.16%	1.15%	90.81%	**637.01%**
Residential	90.65%	**634.55%**	0.13%	0.92%	90.78%	**636.68%**

As shown, the MDI (i.e. existing intake) is significantly in excess of the TWI for both adult and child receptors. In all cases, the contribution from the Facility is well below the TWI, so the exceedance of the TWI is due to the existing intake of dioxins and dioxin-like PCBs in typical diets.

In addition to the above, the ingestion of dioxins and dioxin-like PCBs by an infant resulting from emissions from the Facility, considering the breast milk pathway and based on an adult agricultural receptor at the point of maximum impact of emissions from the Facility feeding an infant, is 0.315 pg TEQ/kg bw/day which is 15.76% of the TDI and 110.4% of the TWI.

As shown, the intake by an infant resulting from emissions from the Facility is less than the TDI but greater than the TWI, based on an adult agricultural receptor at the point of maximum impact feeding an infant. This is a very worst-case assessment. However, for completeness, further assessment of the likely impact of emissions from the Facility has also been given to the maximum impact at an identified receptor location.

7.3.3 Results – maximum impact at a receptor

The following table outlines the impact of emissions from the Facility at the most affected receptor (i.e. the receptor with the greatest impact from ingestion and inhalation of emissions from the Facility) (HR6 – Common Farm). This receptor has been classified as an agricultural receptor, which is conservative as it assumes that a significant proportion of the diet of the receptor is sourced from the receptor point assessed, including meat and milk products. In reality, people in the UK tend to source their diet from a wide geographical area.

Table 7-2: Intake of dioxins and dioxin-like PCBs - Maximum Impacted Receptor

Receptor Type	MDI		Process Contribution		Overall	
	% of TDI	% of TWI	% of TDI	% of TWI	% of TDI	% of TWI
Adult						
Agricultural	35.00%	**245.00%**	0.58%	4.09%	35.58%	**249.09%**
Child						
Agricultural	90.65%	**634.55%**	0.83%	5.78%	91.48%	**640.33%**

As shown, the contribution from the Facility at the maximum impacted Facility is lower than at the theoretical maximum impacted receptor for an agricultural receptor presented in Section 7.3.2. In addition, the intake resulting from emissions from the Facility is a small percentage of the existing intake.

The ingestion of dioxins and dioxin-like PCBs, by an infant, resulting from emissions from the Facility, considering the breast milk pathway and based on an adult agricultural receptor at the maximum impacted receptor feeding an infant, is 0.099 pg TEQ/kg bw/day which is 4.96% of the TDI and 34.72% of the TWI. Therefore, as the process contribution is less than the TDI and TWI, it is considered that the Facility will not increase the health risks from the accumulation of dioxins in infants significantly.

7.3.4 Summary

Following review of the background and applicability of the new TWI it is considered that the evidence underpinning the TWI is not conclusive, and neither the EU nor the UK government has adopted the TWI as an assessment criterion. Nonetheless, an assessment of the likely maximum impact of emissions of dioxins and dioxin-like PCBs from the Facility against the new TWI has been undertaken. This has shown that, at the maximum impacted receptor, the contribution from the Facility to the intake of dioxins and dioxin-like PCBs is small for child and adult receptors, at 4.09% and 5.78% of the TWI respectively. The reported exceedance of the TWI is due to the existing intake exceeding the TWI.

The contribution from the Facility to the intake of dioxins by an infant being fed by an adult at the maximum impacted receptor (agricultural receptor) is 34.72% of the TWI.

In conclusion, the results of the assessment against the new TWI shows that the Facility will not have a significant effect on human health due to the intake of dioxins and dioxin-like PCBs.

8 Conclusions

As presented in this report, the Facility is considered to contain appropriate control measures and management systems to ensure that the Facility does not have any significant impacts upon the local environment.

Appendices

A H1 Assessment Tool

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