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Consulting Engineers Limited

Tees Valley Energy Recovery Facility

Viridor Tees Valley Ltd

Environmental Risk Assessment

ENGINEERING CONSULTING

Document approval

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1 Introduction

Viridor Tees Valley Ltd (Viridor) is applying to the Environment Agency (EA) under the Environmental Permitting Regulations (EPRs) for an Environmental Permit (EP) to operate the Tees Valley Energy Recovery Facility (the 'Facility'). The Facility will be located at the site of a former British Steel works in Grangetown, a large industrial brownfield site in Redcar and Cleveland Borough Council in an area known as Grangetown Prairie.

The aim of this report is to assess the environmental risks associated with the activities proposed to be undertaken at the Facility and demonstrate that the necessary measures will be in place to protect the environment ensuring 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Agency (EA) Guidance Notes H1 Annexes A, C, H and F. While it is acknowledged that these guidance documents have been withdrawn, it is understood that the requirements of the guidance are still applicable under Environment Agency Guidance *'Risk assessments for specific activities: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 (albeit not as prescriptive) guidance in February 2016.

1.1 Risk assessment process

The EA 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 Facility, including:

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

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 Facility, and will identify the:

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

The risks relevant to the activities to be carried out on site 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 will identify the proposed control measures to demonstrate that the risks will be appropriately managed.

1.5 Step 6 – present the assessment

The report 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 EA'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 600 m to the south of the Installation Boundary.	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 will be taken from the reception hall and bunker area, minimising odorous emissions and retaining negative pressure as far as reasonably possible. Waste held within the waste reception area will be removed and the area will be cleaned at the end of each day.	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 600 m to the south of the Installation Boundary.	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. Waste will be run-down prior to periods of planned shutdown. Waste held within the waste reception area will be removed and the area will be cleaned at the end of each day. In the event of an extended unplanned shutdown, waste may be back-loaded from the bunker and transferred off-site to a suitably licensed waste management facility.	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 600 m to the south of the Installation Boundary.	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 Facility will be designed to reduce noise and tonal components. Regular maintenance of plant items will be undertaken. Roads will be maintained in a good condition, minimising noise from the movement of lorries/HGVs/waste delivery vehicles 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.

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 vehicle movements.	Immediate area. The nearest residential receptor to the Facility is located approximately 600 m to the south of the Installation Boundary.	Sound propagation through air and the ground.	Waste will typically be delivered to the Facility by road during daytime hours. This will minimise the impacts of noise associated with the delivery of waste to the Facility.	Minimal.	Annoyance.	Not significant. Refer to Appendix C – Noise Assessment for further information on the impact of 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 and waste reception areas will be held under negative pressure. Fast-acting roller shutter doors or similar will be installed.	Low.	Nuisance, dust on clothing and cars.	Insignificant.
Fugitive emissions during periods of shutdown.	Immediate area – air.	Air, direct contact.	Doors to the waste reception hall will be kept shut. Waste will be run-down prior to periods of planned shutdown to reduce the risk of odour emissions during periods of shutdown. Waste held within the waste reception area will be removed and the area will be cleaned at the end of each day. In the event of an extended unplanned	Low.	Nuisance, annoyance.	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**
			shutdown, waste may be back-loaded from the bunker and transferred off-site to a suitably licensed waste management facility.			
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 areas will have contained drainage with links to the process drainage system to minimise the risk of emissions of contaminated water. Good housekeeping practices will be employed to reduce the build-up of litter at the site.	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**
Dust/litter 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 or litter.	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 an enclosed bottom ash storage area. The use of a quench will minimise the potential of fugitive dust emissions. Ash handling will be undertaken in areas with contained drainage that link to the process water drainage	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**
			system. Therefore, there is minimal risk of bottom ash leachate being discharged to surface water drainage systems. Loading of bottom ash into vehicles will take place within the enclosed IBA building. A wheel wash facility (e.g. a pressure washer) will be available in the bottom ash storage area to reduce the potential for 'tracking' of ash on vehicle tyres. The ash will be transferred off-site in covered vehicles, minimising the risk of fugitive emissions.			
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	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**
			fugitive emissions of dust. APCr unloading activities will be undertaken by trained personnel and in accordance with documented management procedures for the Facility. APCr unloading activities will be supervised by sufficiently trained personnel.			
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. Unloading activities will be supervised by suitably trained personnel.			
Lime leak during injection into APC system.	Immediate area – air.	Air, surface runoff, direct contact.	Systems will be enclosed, and regular inspections and preventative maintenance will be carried out. Lime will be injected via a completely enclosed dosing and conveying system. Process areas will have contained drainage. Control systems will be in place to detect leaks.	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	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**
			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 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.

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**
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 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.	Low.	Hazardous liquid or vapour release.	Insignificant.
Release off-site of litter.	Immediate area – air, land.	Air, direct contact.	Loading/unloading of all waste vehicles will be within an enclosed building under negative pressure. Fast-acting roller shutter doors or similar will ensure an enclosed environment.	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**
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 an enclosed building with contained drainage. A wheel wash facility (e.g. a pressure washer) will be available in the ash storage area to reduce the potential for 'tracking' of ash residues off-site via vehicle wheels. Bottom ash will be transferred off-site in covered road vehicles. The bottom ash will be maintained dust-free by water quenching.	Low.	Nuisance, dust on cars and road.	Insignificant.
Re-suspension of dust from road surface, when site vehicles arrive/leave.	Immediate area – air, land, water.	Air, surface runoff.	Control of vehicle speeds, roads maintained in good condition, personnel taking due care. A good standard of 'housekeeping' will be maintained on the roads.	Low.	Nuisance, dust on cars and road.	Insignificant.

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. Robust systems.	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	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**
			bunker. The bunker will be constructed of reinforced concrete, with integrity checks undertaken during construction. The waste reception area is contained within an enclosed building. Waste will be held within the waste reception area for short duration periods. Waste held within the waste reception area will be removed and the area will be cleaned at the end of each day.			
Control failure leading to combustion control upset.	Local environment – air.	Air - Winds generally blow from a south westerly direction.	Good/robust 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	Unlikely.	Pollution of atmosphere, human health impacts.	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**
			critical equipment or spares on stock.			
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 duty 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 documented management system.	Unlikely.	Pollution of surface water.	Not significant.
Leaks from process water tank	Immediate area – water, land.	Leaching/infiltration	Underground structures will be designed in accordance with the relevant standards and will be impermeable to prevent the release of liquid pollutants into the ground/groundwater. Quality assurance checks will be undertaken during construction to test/inspect the integrity of structures.	Unlikely.	Pollution of ground/groundwater	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**
			Structures will be subject to regular inspection and preventative maintenance. In the event of the integrity of the structure being compromised, remedial maintenance will be undertaken in a timely manner and investigations of any potential contamination will be undertaken (such as water testing). Remediation will be undertaken if required.			
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 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.

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**
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.
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.	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	Unlikely.	Pollution of surface waters.	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**
			with designated drainage systems in areas where residues are stored.			
Fires in FGT bag filter.	Local environment.	Air - Winds generally blow from a south westerly direction.	Temperature measurement and level control in filter hopper, fire-fighting systems.	Low.	Dust, pollution of air.	Not significant.
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 steam boiler.	Immediate area – air.	Direct contact.	In case of over pressure, the pressure will be released through the pressure relief valve, preventing the risk of an explosion within the steam boiler.	Low.	Pollution of air.	Not significant.
Fires in waste reception storage and handling areas.	Immediate area – air.	Direct contact.	Fire detection and suppression systems. Refer to the Fire Prevention Plan (Appendix H of the Supporting Information).	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. Refer to the Fire	Low.	Visual.	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**
			Prevention Plan (Appendix H of the Supporting Information).			
Contaminated fire water.	Immediate area – water, land.	Surface runoff, leaching.	Site drainage for external areas will be fitted with an isolation valve which is interfaced with the fire protection systems. The primary source of firewater containment will be the waste bunker, which is designed as a water-retaining structure. Additional firewater storage will be available from kerbing and roadways.	Low.	Pollution of surface water.	Not significant.
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/ contamination to water/land.	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**
Vandalism	Immediate area.	Land, air, water.	Security fences, controlled entrance to the site.	Low.	Release of substances to any environment.	Not significant.
Significant fugitive release of APCr due to fire at the site.	Immediate area – air, land, water.	Air, land, surface runoff, groundwater infiltration.	Fire detection and suppression systems. Provisions for containment of contaminated firewater. Refer to the Fire Prevention Plan (Appendix H of the Supporting Information). Impervious surfaces in residue handling areas with designated drainage systems in areas where residues are stored. Storage of APCr inside an enclosed building. APCr is not expected to contain any combustible materials which could self-combust from elevated temperatures within the APCr.	Unlikely.	Release of hazardous substances within APCr to the environment.	Not significant due to mitigation and containment measures in place.

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**
			Spillages would be cleaned up in accordance with documented management systems for the Facility.			
Significant fugitive release of fuel oil due to fire at the site.	Immediate area – air, land, water.	Air, land, surface runoff, groundwater infiltration.	Fire detection and suppression systems. Provisions for containment of contaminated firewater. Refer to the Fire Prevention Plan (Appendix H of the Supporting Information). Local fuel oil supply isolation valve will be automatically closed in the case of a fire. Impervious surfaces in fuel oil areas with designated drainage systems in areas where fuel oil is stored. Spillages would be cleaned up in accordance with documented management systems for the Facility.	Unlikely.	Release of hazardous substances within fuel oil to the environment.	Not significant due to mitigation and containment measures in place.

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**
Significant fugitive release of chemicals and reagents due to fire at the site.	Immediate area – air, land, water.	Air, land, surface runoff, groundwater infiltration.	Fire detection and suppression systems. Provisions for containment of contaminated firewater. Refer to the Fire Prevention Plan (Appendix H of the Supporting Information). Impervious surfaces in reagent areas with designated drainage systems in areas where reagents are stored. Spillages would be cleaned up in accordance with documented management systems for the Facility.	Unlikely.	Release of hazardous substances within chemicals and reagents to the environment.	Not significant due to mitigation and containment measures in place.

6 Table A5 – Flood 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**
Emissions to surface waters due to damage of raw material, waste and residue storage facilities as a result of flooding.	Immediate and wider area – water.	Surface runoff.	Monitoring of flood warnings. Site shutdown in the event of severe flood warnings. Site located within Flood Zone 1 and so is at a low risk of flooding. Facility has been designed with a SUDS system to mitigate the risk of off-site flooding and to manage the discharge of surface water from the installation. The SUDS system will be designed to provide sufficient surface water storage for storm / flood events including an allowance for climate change.	Low.	Pollution of surface water with a wide range of contaminants.	Not significant.
Emissions to groundwater due to damage of raw	Immediate and wider area – groundwater.	Infiltration.	Monitoring of flood warnings. Site shutdown in	Low.	Pollution of groundwater with a	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**
material, waste and residue storage facilities as a result of flooding.			the event of severe flood warnings. Site located within Flood Zone 1 and so is at a low risk of flooding. Facility has been designed with a SUDS system to mitigate the risk of off-site flooding and to manage the discharge of surface water from the installation. The SUDS system will be designed to provide sufficient surface water storage for storm / flood events including an allowance for climate change.		wide range of contaminants.	
Emissions to land due to damage of raw material, waste and residue storage facilities as a result of flooding.	Immediate and wider area – land.	Surface runoff and infiltration.	Monitoring of flood warnings. Site shutdown in the event of severe flood warnings. Site located within Flood Zone 1 and so is at a low risk of flooding. Facility has been	Low.	Pollution of land with a wide range of contaminants.	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**
			designed with a SUDS system to mitigate the risk of off-site flooding and to manage the discharge of surface water from the installation. The SUDS system will be designed to provide sufficient surface water storage for storm / flood events including an allowance for climate change.			
Electrical faults and damage to equipment due to flooding.	Immediate area – equipment.	Surface runoff.	Monitoring of flood warnings. Site shutdown in the event of severe flood warnings. Site located within Flood Zone 1 and so is at a low risk of flooding. Facility has been designed with a SUDS system to mitigate the risk of off-site flooding and to manage the discharge of surface water from the installation. The	Low.	Harm to equipment.	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**
			SUDS system will be designed to provide sufficient surface water storage for storm / flood events including an allowance for climate change.			
Risk of harm to staff due to flooding.	Health and safety of staff.	Surface runoff.	Monitoring of flood warnings. Site shutdown in the event of severe flood warnings. Site located within Flood Zone 1 and so is at a low risk of flooding. Facility has been designed with a SUDS system to mitigate the risk of off-site flooding and to manage the discharge of surface water from the installation. The SUDS system will be designed to provide sufficient surface water storage for storm / flood events including an	Low.	Harm to staff.	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**
			allowance for climate change.			
Damage to structure of buildings.	Immediate area – buildings.	Surface runoff.	Monitoring of flood warnings. Site shutdown in the event of severe flood warnings. Site located within Flood Zone 1 and so is at a low risk of flooding. Facility has been designed with a SUDS system to mitigate the risk of off-site flooding and to manage the discharge of surface water from the installation. The SUDS system will be designed to provide sufficient surface water storage for storm / flood events including an allowance for climate change.	Low.	Harm to buildings.	Not significant.

7 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 Air Quality Assessment (refer to Appendix E of the Supporting Information) and a full Noise Assessment (refer to Appendix C of the Supporting Information).

7.1 Emissions to air

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

7.2 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 7-1 have been considered within the Air Quality Assessment:

Table 7-1: Sensitive Ecological Receptors

European designated sites (Ramsar, SPA, SAC) (within 10 km)
Teesmouth and Cleveland Coast
North York Moors
UK designated sites (SSSI, NNR) (within 2 km)
No UK designated sites have been identified within 2km of the Facility
Locally designated sites (LNR, LWS, Ancient Woodland) (within 2 km)
No locally designated sites have been identified within 2km of the Facility

The Air Quality Assessment concludes that the impact on these features as a result of atmospheric emissions is as follows:

- The Process Contribution (PC) is less than 1% of the annual mean Critical Levels and less than 10% of the short-term Critical Levels at all European and UK designated sites with the exception of annual mean oxides of nitrogen and annual mean ammonia at the Teesmouth and Cleveland Coast SPA/Ramsar. For oxides of nitrogen, the only priority habitat present in the area where the PC of oxides of nitrogen exceeds 1% of the Critical Load is mudflats, which is not sensitive to additional loading of oxides of nitrogen. Therefore, there is no potential for a significant effect. For ammonia, the maximum background concentration of ammonia in the area where the PC cannot be screened out is 1.9 µg/m³, or 63.3% of the Critical Level of 3 µg/m³ set for the protection of higher plants. When the PC is included, the predicted environmental concentration (PEC) remains well below 70% of the Critical Level, so the PEC is screened out as 'not significant'.

The Air Quality Assessment concludes that the impact on these features as a result of the deposition of emissions is as follows:

- The PC at each European and UK Designated Site is less than 1% of the Critical Load and can be screened out as 'insignificant', with the exception of nitrogen deposition on coastal sand dune habitats and saltmarsh habitats within the Teesmouth and Cleveland Coast SPA/Ramsar.

- Nitrogen deposition on coastal sand dunes only slightly exceeds 1% of the Critical Load at 1.12% The significance of effect of nitrogen deposition on coastal sand dune habitats within the Teesmouth and Cleveland Coast SPA/Ramsar has been assessed in further detail in the Habitats Regulations Assessment – refer to Appendix E of the Application Pack. This has concluded that the effects of nitrogen deposition will not result in adverse impacts on sand dune habitat.
- Nitrogen deposition on saltmarsh also only slightly exceeds 1% of the Critical Load at 1.32%.

The significance of effect of nitrogen deposition has been assessed by the project ecologists within the Habitats Risk Assessment. This has concluded that the effects of nitrogen deposition will not result in adverse impacts on sand dune habitat. This is provided within Appendix E of the Application Pack.

7.3 Emissions to sewer and water

There are no emissions of process effluents during normal operation of the Facility. In the event that excess process effluents are generated, for example during periods of boiler emptying, it is intended to tanker these off-site for treatment at a suitably licensed waste management facility.

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

Foul water from welfare facilities will be treated in an on-site wastewater treatment plant and then discharged to foul sewer.

7.4 Noise

The impact of noise from the Facility is considered in the noise assessment contained in Appendix C of the Application Pack. The assessment concludes that significant effects are not expected during the construction and operational phases of the Facility.

7.5 Visual impact

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

7.6 Odour

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

7.7 Photochemical ozone creation

Releases of CO, NO_2, SO_2, PAHs and VOCs 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:

a. CO 2.7
b. NO_2.....2.8
c. SO_2 .....4.8

d. Benzene 21.8

The total POCP for the Facility is calculated in the H1 Software Tool as approximately 3,180 tonnes. This assessment is based on the assumption that all NO_x is released as NO_2.

7.8 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 Facility 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.

7.9 Disposal of waste

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

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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