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Consulting Engineers Limited

Redcar Energy Centre

Redcar Holdings Limited

Environmental Risk Assessment

ENGINEERING CONSULTING

Document approval

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Contents

1 Introduction

Redcar Holdings Limited (Redcar Ltd) is applying to the Environment Agency (EA) under the Environmental Permitting Regulations (EPRs) for an Environmental Permit (EP) to operate the Redcar Energy Centre (REC).

REC will comprise the following waste treatment activities:

- A fuel preparation facility;
- Energy Recovery Facility (ERF) to incinerate incoming non-hazardous waste; and
- IBA treatment/processing facility (IBA facility).

REC will be located at the Redcar Bulk Terminal, approximately 4.5 km west of Redcar town centre and 8.5km northeast of Middlesbrough city centre.

The aim of this report is to assess the environmental risks associated with the activities proposed to be undertaken at REC and demonstrate that the necessary measures will be in place to protect the environment ensuring that the operation of REC, 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Agency (EA) Guidance Notes H1 Annexes A, C, H and F. While it is acknowledged that these guidance documents have been withdrawn, it is understood that the requirements of the guidance are still applicable under Environment Agency Guidance *'Risk assessments for specific activities: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 REC, 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 REC, and will identify the:

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

The risks relevant to the activities to be carried out at REC 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 REC 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.**
Fuel preparation facility						
Odorous emissions may occur during the delivery, storage, processing and handling of waste at the fuel preparation facility.	Immediate area. The nearest residential receptor is located approximately 2.3 km to the southwest of the Installation Boundary.	Air – winds generally blow from a south-westerly direction.	Waste will be received in covered/enclosed vehicles. Waste will be unloaded, processed and stored within an enclosed building. Waste pre-acceptance/ acceptance checks will minimise the risk of particularly odorous waste being accepted at the fuel preparation facility. The operation of the fuel preparation facility will be undertaken in accordance with the Odour Management Plan (refer to Appendix J of the Supporting Information).	Unlikely	Odour annoyance. This will have more impact in the summer, when temperatures are higher and people are outdoors.	Not significant if managed well.
Odorous emissions may occur as a result of waste stored at	Immediate area. The nearest residential receptor	Air – winds generally blow from a south-westerly direction.	Measures will be in place to minimise odorous emissions during periods of shutdown,	Unlikely	Odour annoyance. This will have more impact in the	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.**
the fuel preparation facility during periods of shutdown	is located approximately 2.3 km to the southwest of the Installation Boundary.		as part of the Environmental Management System (EMS). Except for during waste deliveries, the doors to the fuel preparation facility building will be kept closed. During periods of shutdown, the frequency of olfactory checks will be increased. Prior to periods of planned shutdown, the quantities of waste stored in the fuel preparation facility will be run-down to minimise potential fugitive odour emissions. In the event of an extended unplanned shutdown, waste may be transferred from the fuel preparation facility and to a suitably licensed waste management facility.		summer, when temperatures are higher and people are outdoors.	
ERF						

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 ERF.	Immediate area. The nearest residential receptor is located approximately 2.3 km to the southwest of the Installation Boundary.	Air – winds generally blow from a south-westerly direction.	All wastes received at the ERF will be unloaded inside an enclosed tipping hall. The waste bunker area will be retained at negative pressure. Air from waste bunker area will be combusted within the ERF, as detailed in the supporting information. Potentially odorous air extracted from waste handling and storage areas (namely the Tipping Hall and waste bunker area), maintaining these areas at negative pressure and minimising potential fugitive emissions of odour.	Unlikely	Odour annoyance. This will have more impact in the summer, when temperatures are higher and people are outdoors.	Not significant if managed well.
Odorous emissions may occur as a result of waste present in the bunker during	Immediate area. The nearest residential receptor is located approximately 2.3 km	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).	Unlikely	Odour annoyance, which will have greater impact in the summer when temperatures are higher and people	Not significant due to management systems 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.**
periods of shutdown of the ERF	to the southwest of the Installation Boundary.		Doors to the tipping hall will be kept shut. Regular olfactory checks will be undertaken during periods of shutdown. Prior to periods of planned shutdown, the quantities of waste stored in the ERF will be run-down to minimise potential fugitive odour emissions. In the event of an extended unplanned shutdown requiring waste to be removed from the bunker, facilities will be provided to enable the waste to be back-loaded from the bunker and transferred off-site to a suitably licensed waste management facility.		are outdoors and more likely to be exposed to odour.	

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**
REC						
Noise from vehicle movements at REC.	Immediate area. The nearest residential receptor is located approximately 2.3 km to the southwest of the Installation Boundary.	Sound propagation through air and the ground.	Waste and other materials will typically be delivered to REC by road during daytime hours. This will minimise the impacts of noise associated with delivery vehicles at REC. Roads will be maintained in a good condition, minimising noise from the movement of lorries/HGVs/waste delivery vehicles within the Installation Boundary.	Unlikely (due to the industrial location of the site and distance to receptors).	Annoyance.	Not significant. Refer to Appendix C of the Supporting Information (Noise Assessment) for further information on the impact of noise from the operation of REC.
Fuel preparation facility						
Noise from plant items such as the waste processing equipment, and mobile plant at the site.	Immediate area. The nearest residential receptor is located approximately 2.3 km to the southwest of	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	Unlikely (due to the industrial location of the site and	Annoyance.	Not significant. Refer to Appendix C of the Supporting Information (Noise Assessment) for further information

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**
	the Installation Boundary.		noise attenuation measures. The fuel preparation facility will be designed to reduce noise and tonal components. Regular maintenance of plant items will be undertaken in accordance with documented maintenance procedures.	distance to receptors).		on the impact of noise from the operation of the fuel preparation facility.
ERF						
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 is located approximately 2.3 km to the southwest of the Installation Boundary.	Sound propagation through air and the ground.	Noisy plant items, where practicable, will be installed within process buildings rather than outside and, where appropriate, they will be installed with appropriate noise attenuation measures. The ERF will be designed to reduce noise and tonal components. Regular maintenance of plant items will be undertaken in accordance with documented maintenance procedures.	Unlikely (due to the industrial location of the site and distance to receptors).	Annoyance.	Not significant. Refer to Appendix C of the Supporting Information (Noise Assessment) for further information on the impact of noise from the operation of the ERF.

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**
IBA facility						
Noise from plant items such as the IBA processing equipment, including mobile plant.	Immediate area. The nearest residential receptor is located approximately 2.3 km to the southwest 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. Regular maintenance of process equipment will be undertaken in accordance with documented maintenance procedures. The IBA facility will be designed to reduce noise and tonal components. A 5m high wall will be erected along the north-eastern boundary of the site. This will act to attenuate noise levels at nearby sensitive receptors. The IBA processing building is located on the western	Unlikely (due to the industrial location of the site and distance to receptors).	Annoyance.	Not significant. Refer to Appendix C of the Supporting Information (Noise Assessment) for further information on the impact of noise from the operation of the IBA 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**
			boundary of the IBA facility to increase the distance between the processing building and nearby ecological receptors.			

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**
REC						
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.	Not likely.	Nuisance, dust on cars and road.	Not significant due to mitigation measures in place.
'Unacceptable' material/waste being accepted at the site.	Immediate area – air, land, water.	Air, surface runoff, direct contact.	Robust waste pre acceptance and acceptance procedures will be in place to minimise the risk of 'unacceptable' wastes being accepted at REC. Dedicated quarantine areas will be available for the temporary storage of 'unacceptable' wastes after unloading, prior to transfer off-site.	Unlikely.	Contact with hazardous wastes, dust, fugitive emissions of contaminants.	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**
Fuel preparation facility						
Emission releases from the fuel preparation facility building when opening and closing doors.	Immediate area – air.	Air, surface runoff, direct contact.	All waste handling activities will be undertaken within the enclosed fuel preparation facility building. Fast-acting roller shutter doors (or equivalent) will be installed for the ingress/egress of waste delivery vehicles to the fuel preparation facility.	Unlikely.	Nuisance, dust on clothing and cars.	Insignificant.
Dust/litter from waste deliveries being blown off-site.	Immediate area – air, land.	Air, surface runoff.	Waste will be delivered in enclosed vehicles. All waste unloading activities will be undertaken within the enclosed fuel preparation facility building. Good housekeeping will be employed to minimise the build-up of dust or litter. Waste deliveries will be supervised by suitably trained staff.	Unlikely.	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**
Fugitive emissions during periods of shutdown.	Immediate area – air.	Air, direct contact.	Doors to the main fuel preparation facility building will be kept shut during periods of shutdown unless a vehicle needs to access the building. Prior to periods of planned shutdown, the quantities of waste stored within the fuel preparation facility will be run-down, with incoming waste deliveries halted. In the event of an extended unplanned shutdown requiring waste to be removed from the fuel preparation facility, facilities will be provided to enable the waste to be transferred from the fuel preparation facility to a suitably licensed waste management facility.	Unlikely.	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**
ERF						
Emission releases from the tipping hall 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. Fast-acting roller shutter doors (or equivalent) will be installed at the ingress/egress to the tipping hall.	Unlikely.	Nuisance, dust on clothing and cars.	Insignificant.
Dust/litter from waste deliveries being blown off-site.	Immediate area – air, land.	Air, surface runoff.	Waste will be delivered in enclosed vehicles. All waste unloading activities will be undertaken within the enclosed tipping hall. The waste bunker area will be held under negative pressure. Housekeeping procedures will be employed to minimise the build-up of dust or litter.	Unlikely.	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**
Fugitive emissions during periods of shutdown.	Immediate area – air.	Air, direct contact.	Doors to the tipping hall will be kept shut. Prior to periods of planned shutdown, the quantities of waste store within the waste bunker will be run-down, with incoming waste deliveries halted. In the event of an extended unplanned shutdown requiring waste to be removed from the bunker, it will be back-loaded from the bunker and transferred off-site to a suitably licensed waste management facility.	Unlikely.	Nuisance, annoyance.	Insignificant.
Spillage of waste and materials during delivery and offloading.	Immediate area – air, land, water.	Air, surface runoff.	Waste unloading activities will be undertaken within an enclosed building. The waste bunker area will be held under negative pressure. Spillages would be cleaned up in accordance with	Unlikely.	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**
			documented management systems. Waste unloading areas will have contained drainage systems which discharge into the process drainage system to minimise the risk of emissions of contaminated water. Housekeeping procedures will be employed to reduce the build-up of litter at the site.			
Bottom ash discharge at the ERF.	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 transfer to the adjacent IBA facility by enclosed conveyor. An ash quench will minimise the potential of fugitive dust emissions. Ash handling	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**
			within the ERF will be undertaken in an area with contained drainage which discharges into the process water drainage system. Therefore, there is minimal risk of bottom ash leachate being discharged to surface water drainage systems.			
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. APCr unloading activities will be undertaken by trained personnel and in accordance with documented management procedures.	Unlikely.	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**
			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. For solid reagents, air displaced from the silo will be discharged through fabric filters. Regular inspections and maintenance will be undertaken of abatement equipment. Unloading activities will only be undertaken in areas of hardstanding with contained drainage. Unloading activities will be supervised by suitably trained personnel.	Unlikely.	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**
Lime leak during injection into APC system.	Immediate area – air.	Air, surface runoff, direct contact.	Lime handling 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. Automated control systems will be in place to detect leaks from lime handing and dosing systems.	Unlikely.	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	Unlikely.	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 of liquid chemicals will be from sealed tankers and off-loaded via dedicated hoses. Spillages 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 to prevent the release of contaminated effluent off-site through any spillages.	Unlikely.	Liquid or vapour release.	Insignificant.
Spillage/leak when unloading from delivery vehicles and chemical containers	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	Unlikely.	Hazardous liquid or vapour release.	Insignificant.

What do you do that can harm and what could be harmed?			Managing the risk	Assessing the risk		
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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**
(IBCs, FIBCs, drums etc).			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.			
IBA facility						
Dust from IBA deliveries being blown off-site.	Immediate area – air, land.	Air, direct contact.	The ash will be transferred off-site in covered vehicles, minimising the risk of fugitive emissions. Visual checks on vehicles arriving to/leaving the site will be undertaken by trained operatives.	Unlikely.	Nuisance, dust on cars and road.	Insignificant.
Tracking of IBA from vehicle wheels on roads.	Immediate area – air, land.	Air, direct contact.	A wheel wash facility (e.g. a pressure washer) will be provided at the IBA facility before vehicles leave the site, to reduce the potential	Not likely.	Nuisance, dust on cars and road.	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**
			for 'tracking' of ash on vehicle tyres. Road sweepers and/or regular washdown will be implemented on roads where dust build-up has been identified, as part of good housekeeping procedures. During extended dry periods, site roads may be 'damped down'.			
Transfer of IBA from the ERF to the bottom ash reception bunker.	Immediate area – air, land, water.	Air, direct contact, surface runoff.	Conveyors for the transfer of IBA will be enclosed, with their integrity regularly inspected as part of documented procedures.	Unlikely.	Nuisance, dust on cars and road, contamination of surface water.	Insignificant.
Transfer of IBA from the bottom ash reception bunker to the process building.	Immediate area – air, land, water.	Air, direct contact, surface runoff.	Conveyors for the transfer of IBA will be enclosed, with their integrity regularly inspected as part of documented procedures.	Unlikely.	Nuisance, dust on cars and road, contamination of surface water.	Insignificant.
Emissions from IBA processing stages	Immediate area – air, land, water.	Air, direct contact, surface runoff.	IBA will be maintained wet from quenching to reduce the generation of dust. The	Unlikely.	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**
(crushing, size separation etc).			main processing building will be enclosed, with doors only opened for access/egress purposes. The site layout will take into account the location of sensitive receptors. Certain processing equipment may be fitted with dust suppression such as misting/water/barrier techniques. Good housekeeping and regular washdown will be employed. Drop heights (e.g. from conveyors) will be minimised where possible.		contamination of surface water.	
Fugitive emissions during IBA storage in external areas.	Immediate area – air, land, water.	Air, direct contact, surface runoff.	Profiling and shielding of piles from wind whipping (using walls/shields). IBA maintained wet from quenching. Where practicable, the external storage of piles of IBA will be	Not likely.	Nuisance, dust on cars and road, contamination 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**
			located away from receptors.			
Fugitive emissions during IBA/IBAA movement in external areas (including loading/unloading of IBAA/IBA onto/from vehicles in external areas).	Immediate area – air, land, water.	Air, direct contact, surface runoff.	The drainage from the external storage yard will be collected in a sealed drainage system and re-used in the process. Excess effluents would be directed to the ERF wastewater pit.. Manual handling will be minimised where possible. IBA will be maintained wet from quenching. Good housekeeping and regular washdown of IBA and IBAA storage areas will be undertaken.	Not likely.	Nuisance, dust on cars and road, contamination of surface water.	Not significant.
Spillage during IBA/IBAA movement in external areas (e.g. using bucket loaders).	Immediate area – air, land, water.	Air, direct contact, surface runoff.	Contained drainage in external loading/unloading areas. Manual handling will be minimised where possible. Spill kits will be available at easily accessible locations. Mobile plant will	Not likely.	Nuisance, dust on cars and road, contamination 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**
			be operated by trained operatives.			
Emissions of combustion products from the operation of mobile plant (such as bucket loaders).	Immediate area – air, land.	Air, direct contact, surface runoff.	Regulatory controls and best-practice measures to minimise source strength – vehicles will comply with relevant emissions standards. A no-idling policy will be in place for mobile plant when not in use.	Not likely.	Nuisance, dust on cars and road, contamination of surface water.	Not significant.
Emissions as a result of maintenance and cleaning operations.	Immediate area – air, land, water.	Air, direct contact, surface runoff.	Operators will be trained in using road sweepers, and site roads will be damped down in periods of dry weather. Process waters resulting from washdown would be contained within the process drainage system.	Not likely.	Nuisance, dust on cars and road, contamination of surface water.	Not significant.

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**
REC						
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.	Unlikely.	Pollution of surface water.	Insignificant.
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.	Unlikely.	Pollution of surface water, human health impacts.	Insignificant.
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.	Insignificant.
Fires in waste reception storage and handling areas (at the fuel	Immediate area – air.	Direct contact.	Fire detection and suppression systems. Refer to the Fire Prevention Plan,	Unlikely.	Visual impact, pollution of air, harm to staff, damage to infrastructure.	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**
preparation facility and ERF).			refer to 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 the attenuation pond, process water tank/pit, site kerbing and roadways.	Unlikely.	Pollution of surface water.	Insignificant.
Failure to contain firewater.	Land.	Land, water, groundwater.	Maintenance of the shut-off valve and/or pumping system within the drainage system.	Unlikely.	Release of chemicals/ contamination to water/land.	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**
			Inspection and maintenance of roadways and areas of hardstanding.			
Vandalism	Immediate area.	Land, air, water.	Security fences, controlled entrance to the site, security personnel, CCTV.	Unlikely.	Release of substances to any environment.	Insignificant.
Fuel preparation facility						
Spillage during unloading of waste	Immediate area – air, land, water.	Direct contact, wind, surface runoff.	Waste deliveries will be supervised by trained staff. Waste will be unloaded within the fuel preparation facility building which will have contained process drainage. Doors to the building will be kept closed unless waste deliveries are occurring. Management procedures will be in place to deal with spillages, with spill kits readily available at the fuel preparation facility.	Unlikely.	Release of substances present in waste to the wider environment, litter, nuisance.	Insignificant.
Exceeding capacity of waste storage bays	Immediate area – air, land, water.	Direct contact, wind, surface runoff.	The storage of waste will be regularly monitored against	Unlikely.	Release of substances present in	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**
			the capacity of waste storage bays through visual inspections. It is expected that markings will be presented on the walls of bays to indicate maximum pile heights. Waste storage will be in areas with links to the process drainage system, and spill kits will be available on site, with procedures in place to deal with spillages.		waste to the wider environment, litter, nuisance.	
Integrity failure of waste storage bays	Immediate area – air, land, water.	Direct contact, wind, surface runoff.	Waste storage bays will be constructed of reinforced concrete, with integrity checks undertaken during construction. Regular preventative maintenance and visual inspections will be undertaken of waste storage areas throughout the lifetime of the fuel preparation facility.	Unlikely.	Release of substances present in waste to the wider environment, litter, 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**
Leaks in process drainage system	Immediate area – water, land.	Leaching/infiltration.	Underground structures (such as process drainage tanks/pits) 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. 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.	Unlikely.	Pollution of ground/ groundwater.	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**
Failure of waste processing equipment	Immediate area – air, land, water.	Direct contact, wind, surface runoff.	Integrity checks would be undertaken during the construction phase, and regular preventative maintenance of equipment would be undertaken throughout its lifetime. Equipment would be operated by trained staff, with visual monitoring of the waste processing stages. Safe shutdown procedures will be in place to prevent continued operation of equipment under abnormal operation. Redundancy of critical equipment or spares on stock.	Unlikely.	Release of substances present in waste to the wider environment, litter, nuisance.	Insignificant.
Blockages in waste processing stages (e.g. shredding)	Immediate area – air, land, water.	Direct contact, wind, surface runoff.	Process equipment will be operated by trained staff, with visual monitoring of the waste processing stages. Safe shutdown procedures will be in place to prevent	Unlikely.	Release of substances present in waste to the wider environment, litter, 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**
			continued operation of equipment in the event of a blockage.			
ERF						
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 (links to the process drainage system and/or bunds). Documented procedures will be developed identifying actions in the event of spills. Spill kits will be readily available at the ERF.	Unlikely.	Release of hazardous substances to the environment.	Insignificant.
Overfilling of vessels.	Local environment air, land, water.	Surface runoff, wind.	Training in unloading practices. Under manual control, continual observation. Impervious	Unlikely.	Release of hazardous substances to the environment.	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**
			surfaces outdoors. High level alarms. Secondary containment for storage vessels. Documented procedures will be developed identifying actions in the event of spills. Spill kits will be readily available at the ERF.			
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.	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**
Flue gas leak.	Local environment – air.	Air.	Design standards. Inspection and maintenance programme. Controls and alarms for pressure. Combustion systems will be retained at negative pressure. Emissions monitoring systems will detect exceedances of ELVs. Robust design of control systems.	Very unlikely.	Pollution of atmosphere, health impacts.	Insignificant.
Fuel storage failure.	Immediate area – litter.	Direct contact.	Storage of waste in a dedicated waste storage bunker. The bunker will be constructed of reinforced concrete. Construction quality assurance checks will be undertaken during construction to ensure the integrity of the infrastructure. Regular preventative maintenance and visual inspections 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**
			undertaken on the bunker throughout its lifetime.			
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.	Insignificant.
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.	Insignificant.
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.	Insignificant.
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.	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**
Leaks from process water tank/pit.	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. 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	Unlikely.	Pollution of ground/ groundwater.	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**
			testing). Remediation will be undertaken if required.			
Loss of power.	None.	N/A	A back-up generation system to provide safe shutdown of the ERF in the event of loss of power.	Not likely.	None.	Not significant.
Loss of compressed air.	None.	N/A	Multiple compressors.	Unlikely.	None.	Insignificant.
Loss of boiler water.	None.	N/A	Automatic shutdown of the ERF.	Unlikely.	None.	Insignificant.
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.	Unlikely.	Nuisance from noise and visual impact.	Insignificant.
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.	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**
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.	Unlikely.	Dust, pollution of air.	Insignificant.
Fire in furnace feed system.	Immediate area – air.	Air.	Furnace charging procedures / training. Level indicator in chute. Fire-fighting system.	Unlikely.	Pollution of air.	Insignificant.
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.	Unlikely.	Pollution of air.	Insignificant.
Fire from ignition of lube oil leak.	Immediate area – air.	Wind, direct contact.	Fire detection and protection systems. Refer to the Fire Prevention Plan, refer to Appendix H of the Supporting Information.	Unlikely.	Visual.	Insignificant.
Significant fugitive release of APCr.	Immediate area – air, land, water.	Air, land, surface runoff, groundwater infiltration.	Impervious surfaces in residue handling areas with designated drainage systems in areas where residues are stored.	Unlikely.	Release of hazardous substances within APCr to the environment.	Insignificant 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**
			Storage of APCr inside an enclosed silo which will be subject to regular inspections/preventative maintenance. Spillages would be cleaned up in accordance with documented management systems for the ERF.			
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, refer to 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.	Unlikely.	Release of hazardous substances within fuel oil to the environment.	Insignificant 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.			
IBA facility						
Spillage during unloading/loading of IBA/IBAA.	Immediate area – air, land, water.	Direct contact, wind, surface runoff.	Deliveries of IBA from off-site sources will be supervised by trained staff. The material would be unloaded in the main reception bunker which will be an enclosed building. Internal and external areas at the IBA facility will be fitted with contained process drainage. Doors to the building will be kept closed unless deliveries are occurring. Management procedures will be in place to deal with spillages, with spill kits available at the site.	Unlikely.	Release of substances to the wider environment, litter, 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**
Exceeding the capacity of storage facilities.	Immediate area – air, land, water.	Direct contact, wind, surface runoff.	Storage will be regularly monitored against maximum capacities through visual inspections. For external stockpiles, it is expected that lines will be present on the side of walls/shields to indicate maximum pile heights. Storage will be in areas with links to the process drainage system. Spill kits will be readily available at the IBA facility.	Unlikely.	Release of substances to the wider environment, litter, nuisance.	Insignificant.
Integrity failure of storage areas.	Immediate area – air, land, water.	Direct contact, wind, surface runoff.	The main reception bunker will be constructed of reinforced concrete, and external stockpiles will be stored on concrete hardstanding. Integrity checks will be undertaken during construction. Regular preventative maintenance and visual	Unlikely.	Release of substances to the wider environment, litter, 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**
			inspections will be undertaken of storage areas throughout the lifetime of the IBA facility.			
Leaks in process drainage system	Immediate area – water, land.	Leaching/infiltration.	Underground structures (such as process drainage tanks/pits) 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. 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	Unlikely.	Pollution of ground/groundwater	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**
			undertaken in a timely manner and investigations of any potential contamination will be undertaken (such as water testing).			
Failure of IBA processing equipment	Immediate area – air, land, water.	Direct contact, wind, surface runoff.	Integrity checks would be undertaken during the construction phase, and regular preventative maintenance of equipment would be undertaken throughout its lifetime. Equipment would be operated by trained staff, with visual monitoring of the waste processing stages. Safe shutdown procedures will be in place to prevent continued operation of equipment under abnormal operation. Redundancy of critical equipment or spares on stock.	Unlikely.	Release of substances to the wider environment, litter, 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**
Blockages in processing equipment	Immediate area – air, land, water.	Direct contact, wind, surface runoff.	Equipment would be operated by trained staff, with visual monitoring of the processing stages. Safe shutdown procedures will be in place to prevent continued operation of equipment under abnormal circumstances such as a blockage.	Unlikely.	Release of substances to the wider environment, litter, nuisance.	Insignificant.

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**
REC						
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. REC is located within Flood Zone 1; therefore is at a low risk of flooding. REC has been designed with a SUDS system to mitigate the risk of off-site flooding and to manage the discharge of surface water. The SUDS system is designed to provide sufficient surface water storage for storm / flood events including an allowance for climate change.	Unlikely.	Pollution of surface water with a wide range of contaminants.	Insignificant.
Emissions to groundwater due to	Immediate and wider area – groundwater.	Infiltration.	Monitoring of flood warnings. Site shutdown in	Unlikely.	Pollution of groundwater with a	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**
damage of raw material, waste and residue storage facilities as a result of flooding.			the event of severe flood warnings. REC is located within Flood Zone 1; therefore, is at a low risk of flooding. REC 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 is 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.	Unlikely.	Pollution of land with a wide range of contaminants.	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**
			REC is located within Flood Zone 1; therefore, is at a low risk of flooding. REC 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 is 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. REC is located within Flood Zone 1; therefore, is at a low risk of flooding.	Unlikely.	Harm to equipment.	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**
			REC 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 is 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. REC is located within Flood Zone 1; therefore, is at a low risk of flooding. REC has been designed with a SUDS system to mitigate the risk of off-site flooding and to manage the discharge	Unlikely.	Harm to staff.	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**
			of surface water from the installation. The SUDS system is designed to provide sufficient surface water storage for storm / flood events including an allowance for climate change.			
Damage to structure of buildings.	Immediate area – buildings.	Surface runoff.	REC is located within Flood Zone 1; therefore, is at a low risk of flooding. Monitoring of flood warnings. Site shutdown in the event of severe flood warnings. REC 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 is designed to provide sufficient surface	Unlikely.	Harm to buildings.	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**
			water storage for storm / flood events including an allowance for climate change.			

7 Detailed assessment

The environmental impact of REC (specifically, the ERF) 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 for the ERF (refer to Appendix E of the Supporting Information) and a full Noise Assessment for REC (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 Supporting Information.

7.2 Habitats assessment

There are a number of habitat sites present within the appropriate screening distances from the ERF 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 and UK designated sites (Ramsar, SPA, SAC, SSSI)
Teesmouth and Cleveland Coast (Ramsar/SPA/SSSI)
Local nature sites (NNR, LNR, LWS, Ancient Woodland)
Teesmouth (NNR)

The Air Quality Assessment concludes that, as a result of emissions from the ERF, the impact on the sensitive ecological features "*can be screened out as 'insignificant' except for nitrogen deposition at coastal sand dune habitats in the Teesmouth and Cleveland Coast SPA/Ramsar*".

The Air Quality Assessment then goes on to explain that "*The significance of effect has been considered in the ES submitted with the planning application for the Facility, which concludes that the effect of the operation of the Facility is 'not significant', either alone or in-combination with other plans and projects*".

Therefore, it is concluded that the operation of the ERF will not result in unacceptable impacts on sensitive ecological receptors.

7.3 Emissions to sewer and water

There are no emissions of process effluents during normal operation of REC.

Process effluents will be stored within an intermediate vessel prior to reuse in the process at the fuel preparation facility and ERF. In the event that excess process effluents are generated, for example during periods of boiler emptying at the ERF, it is intended to discharge these to sewer in accordance with a Trade Effluent Consent. If a consent cannot be obtained, then it is proposed to tanker the excess effluents for disposal offsite.

At the IBA facility, process effluents would be stored in an intermediate settlement lagoon before being reused in the process. Any excess process effluents at the IBA facility would be tankered off-site.

Uncontaminated surface water will be discharged, via the site surface water drainage system, to the on-site SUDS attenuation pond. The pond will have a subsequent discharge to the River Tees.

It is expected that foul water systems (domestic effluent from welfare facilities) will discharge separately to foul sewer.

7.4 Noise

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

7.5 Visual impact

The visual impact of REC 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 2.4.6 and section 3.4.5 of the Supporting Information for the fuel preparation facility and ERF respectively. An Odour Management Plan has also been developed for the fuel preparation facility – refer to Appendix J of the Supporting Information.

The operation of the IBA facility is considered to give rise to negligible odour impacts, due to the nature of the material that is being handled.

7.7 Photochemical ozone creation

Releases of CO, NO_2, SO_2, PAHs and VOCs from the ERF 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. 1,3-Butadiene 85.1
e. Benzene 21.8
f. Benzo-a-pyrene.....323

The total POCP for the ERF is calculated in the H1 Software Tool as approximately 6,695 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 REC to global warming is complex. On the one hand, the ERF releases carbon dioxide to the atmosphere by the combustion of waste and auxiliary fuel. On the other hand, the ERF generates electricity, which displaces other electricity generation, which would release carbon dioxide from the combustion of fossil fuels.

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

Greenhouse gas emissions resulting from the operation of the fuel preparation facility and the IBA facility are expected to make up only a small proportion of the total greenhouse gas emissions from REC, and the recovery of materials from these waste treatment processes will result in reductions in greenhouse gas emissions off-site, through the displacement of virgin materials. Overall, the operation of the fuel preparation facility and IBA facility are expected to result in savings of greenhouse gas emissions off-site from the displacement of virgin materials.

7.9 Disposal of waste

Methods for reducing the impact from waste disposal are considered in sections 2.8, 3.9 and 4.9 of the Supporting Information.

8 Conclusions

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

Appendices

A H1 Assessment Tool

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