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ENERGY AND CLIMATE CHANGE
ENVIRONMENT AND SUSTAINABILITY
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MINING AND MINERAL PROCESSING
MINERAL ESTATES
WASTE RESOURCE MANAGEMENT



ENDLESS ENERGY LIMITED

ENDLESS ENERGY FACILITY

AMENITY AND ACCIDENT RISK ASSESSMENT

SEPTEMBER 2018

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1 INTRODUCTION

- 1.1.1 This application proposes the construction of a Endless Energy Facility that will thermally treat 148,800 tonnes of waste per year. This will be achieved by incineration, with heat recovered from flue gases by means of an integral water tube boiler, which will in turn create steam to drive a turbine to generate power. This report provides the environmental risk assessment and accident management plan for operations at the plant. The report identifies potential risks and describes the mitigation in place to prevent or minimise those risks.
- 1.1.2 The report has been written in accordance with the Environment Agency's H1 guidance, Annex A – Amenity and Accident Risk from Installations and Waste Activities.
- 1.1.3 A H1 spreadsheet has been completed as spent boiler water will be discharged directly to foul sewer (anticipated at 3 yearly intervals). Point source emissions to air have been addressed via in depth modelling and the results are presented in the Air Quality Report and Human Health Risk Assessment which are included with this application.
- 1.1.4 An Odour Management Plan is provided with the application to ensure that odour is controlled at all times during site operations.

2 RISK ASSESSMENT

- 2.1.1 Table 2:1 to Tables 2:7 below identifies the potential risks that may arise on site and identifies the potential receptors and possible pathways by which the receptor may be impacted. The risk assessment shows how the risks are minimised, by preventing the risk at source, or by providing measures to break the pathway and prevent pollution migrating towards receptors.
- 2.1.2 All identified hazards that could cause harm are subject to strict preventative or control measures at the site to ensure that all risks are minimised. These will be implemented via an ISO14001 accredited Environmental Management System that will be developed for the site.

Table 2:1 Odour Risk Management

Hazard	Receptor	Pathway	Risk Management	Probability of exposure	Consequence	What is the overall risk
Odorous materials within waste reception bunker	Workforce, those within vicinity	Airborne	<p>The site will operate in accordance with an agreed Odour Management Plan. Combustion air will be drawn from above the waste pit, so that odours and airborne dust are taken from the tipping hall into the incineration line. A mist spray deodouriser will be applied within the bunker to prevent the production of odour.</p> <p>The waste reception bunker will be regularly inspected and subject to periodic emptying / cleaning and maintenance to prevent build-up of odorous material.</p> <p>Waste will be received in enclosed or covered vehicles and unloaded inside the waste reception hall. Doors will be kept closed as far as possible.</p> <p>In the event of a temporary shutdown lasting a week or more, waste deliveries will stop and containerised carbon filters will be hired and placed at doorways to prevent the escape of odour if required.</p> <p>In the event of a plant shutdown lasting for longer than 3-4 days, the bunker will be emptied to prevent the generation of odour.</p>	Infrequent - measures are in place to remove any odours that occur via the combustion process.	Disturbance to workers. Annoyance, and strong odours may cause people to report feeling sick.	Low

Table 2:2: Pest Risk Management

Hazard	Receptor	Pathway	Risk Management	Probability of exposure	Consequence	What is the overall risk
Wastes on site that attract pests	Workforce local residents or businesses	Airborne, surface	Site will be kept tidy and monitored in order to limit litter. The crane operator will manage waste within the reception bunker to minimise the time between initial receipt of waste and input into the grate. Periodic emptying / cleaning of the waste reception pit will prevent build-up of degraded materials which may attract pests. Daily inspections will be made and the presence of pests will be recorded.	Occasional - wastes left within the reception bunker for too long or litter present on site could attract pests.	Annoyance. Potential spread of disease.	Low

Table 2:3: Dust Risk Management

Hazard	Receptor	Pathway	Risk Management	Probability of exposure	Consequence	What is the overall risk
Dry waste	Workforce local residents or businesses	Airborne	Site roads and working areas will be swept clean when necessary to avoid a build-up of dust. All wastes will be stored within the building and an air extraction system fitted with dust extraction equipment will be employed.	Infrequent – any fugitive emissions of dust could blow around the site and potentially off site. Good management and dust suppression strategies should avoid this.	Fugitive emissions of dry dust could migrate off site, causing disturbance and potential respiratory issues.	Low
Flue Gas Dust	Workforce local residents or businesses	Airborne	A bag filter will be used for the major separation of particle pollutants from the flue gas. Dust collected by the filters will be directed into a silo from where it will be collected for specialist off-site treatment. Regular cleaning of equipment and building will prevent dust build-up within the building.	Infrequent - combustion occurs within a sealed building, and dust management systems are in place to filter and store dust.	Dust releases if filter does not function properly.	Low

Table 2:3: Dust Risk Management

Hazard	Receptor	Pathway	Risk Management	Probability of exposure	Consequence	What is the overall risk
Bottom Ash	Workforce local residents or businesses	Airborne	At the lower end of the grate plates is a discharger, for the collection of hot bottom ash via an ash pit. Quenching and cooling to approximately 80 to 90°C make it possible to safely remove the bottom ash without dust or odour nuisance.	Infrequent - combustion occurs within a sealed building, with ash collected in a pit. Dust is avoided via practices and equipment employed within the combustion process.	Potential dust releases if disturbed during removal.	Low
Storage of raw materials	Workforce local residents or businesses	Airborne	Written procedures are in place for filling and emptying of silos to prevent over filling or other spillage. Deliveries and collections will be supervised by site staff. Dust filters are provided at breathing vents to prevent emissions.	Infrequent with the control measures in place.	Potential dust releases. Releases of dust may cause annoyance when settling on surfaces. Fine particles can cause respiratory irritation of other health risks.	Low

Table 2:4: Control of Fugitive Emissions to Water

Hazard	Receptor	Pathway	Risk Management	Probability of exposure	Consequence	What is the overall risk
Emissions to water	River Aire, groundwater	Infiltration through soils	Concrete surfacing is provided through- out the site with sealed drainage. All process water and wash water is directed to the quench water tank. Secondary containment is provided for fuel tanks and any other liquids stored on site with bunds capable of holding 110% of the contents of the tank. Silos are located over impermeable pavement with sealed drainage. Prompt clean-up of spills is undertaken.	Infrequent due to the control measures in place	Contamination of surface water or groundwater.	Low

Table 2:5: Potential Noise Risks

Hazard	Receptor	Pathway	Risk Management	Probability of exposure	Consequence	What is the overall risk
Machinery / Vehicles	Workforce, local residents	Audible	<p>Most operations are housed within buildings which aid in suppressing noise – the buildings will incorporate cladding and doors will be kept closed as far as is practicable. Where appropriate, external plant elements will be fitted with acoustic cladding.</p> <p>All plant and equipment will be maintained in accordance with the manufacturer’s recommendations with particular attention to fans.</p> <p>External operations will be undertaken, as far as practicable, during daytime hours.</p> <p>Traffic routes will be devised so as to aid smooth traffic flows around site and minimise reversing; consideration will also be given to the selection of reversing alarms on mobile plant.</p> <p>Any complaints received will be lodged at the site and followed up to identify causation and appropriate mitigation.</p> <p>Further information is provided within the Noise Report</p>	Frequent - noise will occur due to the operations at the site, but will be minimised by the design of the facility and controlled by good practice and monitoring.	Noise can be a disturbance for both workers and local residents. Sustained noise can affect the psychological health of those nearby.	Low

Table 2:6: Control of Other General Risks

Hazard	Receptor	Pathway	Risk Management	Probability of exposure	Consequence	What is the overall risk
Litter	Local residents and businesses	Airborne, surface	Waste will be received in covered or enclosed vehicles. Operations are housed within buildings in order to prevent waste products from escaping; all waste deliveries are deposited directly into the waste bunker, situated within an enclosed reception hall, which is fitted with roller shutter doors and under negative pressure to minimise potential for fugitive emissions from the building. Litter will be identified and removed as part of the daily general site inspections.	Infrequent	Complaints may occur if waste is blown away from the site towards receptors. Litter can attract pests such as rats and flies.	Low
Inappropriate storage of wastes and materials	Workforce	Surface, water	Incoming wastes will be stored in the waste reception bunker only. Storage tanks or holdings for consumables will be made of appropriate materials and banded as necessary. Bottom ash will be stored in a storage area inside the building and APCR in a purpose built silo. All storage areas will be subject to regular inspection and maintenance so that they remain fit for purpose.	Infrequent - storage is properly designed and maintained. Inspections will aid in judging if storage is filled.	Fugitive emissions to air, water or land	Low

Table 2:6: Control of Other General Risks

Hazard	Receptor	Pathway	Risk Management	Probability of exposure	Consequence	What is the overall risk
Spillages	Workforce	Surface, water	Fluids will be stored within appropriate containers and banded as necessary. They will be regularly inspected in order to check for weaknesses or leaks. If a spillage occurs, site staff will clean it up as quickly as possible, and identify / fix the source of the leak.	Infrequent - storage is properly designed and maintained. If any spills occur they will be cleaned as soon as possible, and the leak identified. Any filling of materials that have the potential to cause contamination will be supervised to minimise the risk of leaks and ensure they are quickly resolved if they do occur.	If wastes or fluids spill, they may potentially harm soils or groundwater.	Low
Fire	Workforce, local residents	Airborne	The site will operate in accordance with an agreed Fire Prevention Plan. Plant and equipment will be switched off when not in use. A robust fire detection and control system (including sprinklers, a video smoke detection system and a thermal imaging camera system) will be installed. Further information is provided within the Fire Prevention Plan. Plant and fire detection and suppression equipment will be inspected and maintained in accordance with legal requirements and the manufacturer's recommendations. The building will be properly maintained with attention to the electrical installation. Site security will be maintained to prevent arson.	Infrequent - fire action plans provide guidance on procedure during a fire. Proper use of machinery and building design should reduce the risk of fires occurring.	If a fire occurs, large amounts of smoke may be produced. This could affect local residents, as well as any gases that may also be present. Flames and inhaled smoke may present a risk to life.	Low

Table 2:6: Control of Other General Risks

Hazard	Receptor	Pathway	Risk Management	Probability of exposure	Consequence	What is the overall risk
			No smoking will be permitted in buildings or in any waste storage or processing areas.			
Failure to contain fire water	River Aire, groundwater	Infiltration through soils	In the event of a fire, water will remain within the waste bunker / waste reception hall.	Infrequent - the impermeable pavement and sealed drainage will prevent uncontrolled discharge from the site.	Contamination of ground water or surface water	Low
Operator Error	Workforce	Airborne, surface and / or water	All staff will receive training and an induction will be provided for contractors so that they are aware of health and safety and environmental issues. The site will be operated in accordance with written procedures. Audits are carried out to confirm compliance with the EMS.	Infrequent – training provided and audits completed to ensure that the EMS procedures are properly applied.	Operator error can result in the damaging of machinery, fire or harm to other workers. Spillages can occur that affect water and soils.	Low

Table 2:7: Potential Abnormal Operating Scenarios/Accidents

Hazard	Receptor	Pathway	Risk Management	Probability of exposure	Consequence	What is the overall risk
Waste storage failure	Workforce, local residents, local environment	Airborne, surface	All incoming waste to be stored within an impermeable, reinforced concrete bunker to contain wastes. The waste bunker is located within an enclosed reception hall fitted with roller shutter doors and under	Infrequent – design of reception bunker and other waste storage provision combined with waste reception practises ensure a high level of control.	Fugitive emissions of litter and dust can cause nuisance to neighbours. Escape of wastes or liquids from incoming wastes could cause contamination of surrounding land or near-by surface water bodies.	Low

Table 2:7: Potential Abnormal Operating Scenarios/Accidents

Hazard	Receptor	Pathway	Risk Management	Probability of exposure	Consequence	What is the overall risk
			<p>negative pressure to minimise fugitive escape of litter, odours, dust etc.</p> <p>Bottom ash is stored in a dedicated storage area within a building.</p> <p>APCR are stored in a purpose build silo over impermeable pavement.</p> <p>All infrastructure is subject to regular inspections and a planned preventative maintenance programme.</p>			
Waste handling failure	Workforce, local residents, local environment	Airborne, surface	<p>Strict waste acceptance procedures will be in place to ensure that only appropriate wastes are accepted onto site. Vehicles are appropriately sheeted (or otherwise enclosed) to prevent escape or spillages of waste. Wastes are deposited directly into the waste bunker and are only accepted onto site where sufficient storage capacity exists. A duty and stand-by grab are provided allowing waste to be processed in the event of a breakdown of one.</p>	<p>Infrequent – adherence to waste acceptance procedures will ensure that spillages/escapes of waste around site do not occur and that wastes are handled and stored appropriately within the reception hall.</p>	<p>Potential odour, pest issues, spillages or litter.</p>	Low
Waste charging failure	Workforce, local	Airborne	<p>The design of the grate feed system (and overall thermal treatment plant) uses a proven design which</p>	<p>Infrequent – design & maintenance of charging system and inspection of</p>	<p>Failures of the waste charging system could disrupt normal combustion conditions leading to</p>	Low

Table 2:7: Potential Abnormal Operating Scenarios/Accidents

Hazard	Receptor	Pathway	Risk Management	Probability of exposure	Consequence	What is the overall risk
	residents & environment		limits risk of charging failures. Regular maintenance of the plant will also ensure optimum operation of the feed system. Inspection of wastes during loading of feed system will reduce potential for blockages. The feed chute is cooled and there is a cut off flap to isolate the feed from the furnace to prevent fires.	waste in bunker prior to feeding will limit potential for charging issues.	elevated levels of pollutants within flue gases or lead to fires in the loading chute.	
Furnace control failure	Workforce, local residents & environment	Airborne	Stringent waste acceptance procedures will ensure that only suitable materials are combusted. Maintenance will ensure all furnace equipment is operating correctly. Monitoring systems will be installed to enable continuous monitoring of furnace conditions to identify any abnormal situations. The system is designed to operate across a range of waste types and can cope with variations in the feed.	Infrequent – continuous monitoring will enable staff to identify any instances of abnormal conditions within the furnaces and enable mitigation measures (including plant shutdown if required) to be taken. Automated controls are in place but systems can also be controlled manually.	Disruption to normal combustion conditions could lead to incomplete combustion and elevated levels of pollutants in flue gases.	Low
Failure of boiler water or steam system	Workforce	Airborne, surface, water	Flow rate and pressure monitoring will quickly identify any leaks from the heat recovery system, raising an alarm. Remedial measures will be immediately implemented.	Infrequent – maintenance in accordance with manufacturers' requirements along with monitoring systems will ensure low risk and rapid detection.	Potential harm to health from high temperature water or steam. Potential release of boiler water to surrounding environment or steam to atmosphere. Emissions will largely comprise water so once	Low

Table 2:7: Potential Abnormal Operating Scenarios/Accidents

Hazard	Receptor	Pathway	Risk Management	Probability of exposure	Consequence	What is the overall risk
			The temperature within the furnace is monitored and controlled, preventing overheating.		cooled present a low risk though some boiler treatment chemicals may be present.	
Failure of air treatment system	Workforce, local residents, potential impact on SAC	Airborne	Robust and proven systems have been selected to control emissions. The system is designed to minimise the potential for failures (for example by pre-coating the filter bags). Continuous monitoring of emissions will identify any incidents. Monitoring of air pressure within the system is carried out to detect damage to the filter bags. A controlled shutdown will be undertaken where necessary to prevent emissions. Emissions will be controlled in accordance with the requirements of the IED.	Infrequent - The combustion process and air treatment process are closely monitored and will adjust automatically to keep emissions within limits. An alarm will be raised by the system in the event of a failure alerting staff or resolve the issue.	Failure of air treatment systems could lead to releases of untreated flue gases to atmosphere.	Low
Residues handling/ storage failure	Workforce, local environment	Airborne, surface	Residues from the air treatment system will be automatically transferred to a sealed storage silo. Regular inspections and maintenance of the air treatment system, storage silos and associated infrastructure will prevent leaks. The silo is located over	Infrequent – regular inspections and maintenance of the residue storage areas and silos will minimise the potential for failures and escape of materials.	Failure of storage systems or during the collection of residues could lead to releases to air or land.	Low

Table 2:7: Potential Abnormal Operating Scenarios/Accidents

Hazard	Receptor	Pathway	Risk Management	Probability of exposure	Consequence	What is the overall risk
			impermeable pavement so in the event of a spill this can be easily vacuumed or swept up. Written procedures are in place for collection of APCR from the silo to minimise fugitive emissions. Bottom ash will be quenched before being deposited into a residue storage area along with boiler ash. The storage area will be constructed of concrete.			
Failure of main services (e.g. power, water)	Workforce, local residents and local environment should this lead to emissions	Airborne, or via infiltration through soils	In the event of electrical network failure, the plant will be automatically switched to the island mode operation where the generator will produce only the electrical consumption of the plant. The auxiliary diesel generator will only be used to stop the installation safely but it is not designed to start-up the plant without the electrical network connection. Mains water will be used to supply the boiler feed water. The water will be demineralised in a plant on site, which will include a buffer tank, which will provide a short-term supply of water in the event of	Infrequent	No significant impacts are expected as if power or water supply failure was prolonged, the plant would be subject to a controlled shutdown procedure. This can be achieved based on back-up power from the generator.	Low

Table 2:7: Potential Abnormal Operating Scenarios/Accidents

Hazard	Receptor	Pathway	Risk Management	Probability of exposure	Consequence	What is the overall risk
			<p>a water supply failure. Quench water will be recycled on site. Small amounts of spent boiler water will be discharged to foul sewer when required, and at 3 year intervals. Systems will be designed to fail safe and in the event of a failure of power a controlled shut down can be achieved to prevent emissions. If a shutdown lasts for more than 3-4 days, the waste bunker will be emptied.</p>			

3 CONCLUSION

- 3.1.1 A high level of operational control will be achieved through good design, management, staff training and adherence to the written management system.
- 3.1.2 Care will be used when operating plant and equipment on site, with operators following both the company's and manufacturer's guidance.
- 3.1.3 The site will be monitored on a daily basis with formal auditing of compliance taking place annually. This will inform continuous improvement.
- 3.1.4 In the event of an accident, strict procedure will be followed in order to prevent excessive damage to the site, minimise potential effects upon to human health and protect the local environment.

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