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1.0 INTRODUCTION

SLR Consulting Limited (SLR) has been instructed by Viridor to prepare an Environmental Permit (EP) application to operate a non hazardous Resource Recovery Centre (RRC) at New England Quarry, Devon.

The RRC will include an Energy from Waste (EfW) facility and non hazardous landfill. The proposed EfW facility will incorporate modern reliable and well understood technologies and will be designed in accordance with the requirements of the Waste Incineration Directive 89/76/EEC (WID) and will employ Best Available Techniques (BAT). The landfill will be fully engineered and contained in accordance with the Landfill Directive and Environmental Permitting (England and Wales) Regulations, 2007, which implements the Directive.

The site is a disused stone quarry, approximately 20ha in area, with an existing access located to the southeast of the main quarry off New England Hill, an unclassified rural lane.

The site is located approximately 1km to the south of Lee Mill and approximately 3km to the south west of Ivybridge.

Viridor recognises the importance of the prevention of accidents that may have environmental consequences and that it is important to limit the occurrence of accidents and the consequences of them. As such, Viridor has requested an Accident Management Plan for the site, looking at foreseeable hazards for both the Landfill installation and EfW facility, respectively.

The Accident Management Plan has been produced in accordance with EA guidance EPR5.01 the Incineration of Waste, EPR5.02 Landfill and Getting the Basics Right.

An Accident Management Plan will be implemented and maintained at the site as part of Viridor's BMS to ensure the site and site staff are fully prepared for such incidents. The Accident Management Plan will be reviewed at least every four years or as soon as practicable after an incident, with changes made accordingly to minimise the risk of occurrence.

2.0 RISK MAGNITUDE ESTIMATIONS

The Accident Management Plan (Table 2-2) has adopted a risk assessment approach to each potential hazard by combining the probability and magnitude of the potential risk to give an estimation of the risk prior to any mitigation measures. The risk management measures, which are designed to reduce the likelihood of occurrence, are then detailed followed by an estimation of the actual risk post-mitigation (Residual Risk Rating).

The Defra guide to risk assessment¹ indicates the approach of subjectively classifying the magnitude of potential consequences into four categories depending upon the degree of the impact that the potential risk could have and the context in which the risk is being assessed. The classification is used as a guide in this Risk Assessment. The four categories are as follows:

- **Severe** possible irreparable damage to environmental resources;
- **Moderate** possible damage to environmental resources which are limited within a regional context;
- **Mild** possible effects might be transient damage to environmental resources which are commonplace on a regional basis and alternative sources are readily available;
- **Negligible** the effects are negligible or might cause very slight temporary deterioration in the current environmental resource quality.

The matrix shown below considers the probability of the potential risk against the magnitude of the potential impact, thereby giving an estimation of the resulting likelihood of the risk occurring.

Table 2-1 Risk Estimation Matrix

Probability of potential risk	Magnitude of the Potential Impact			
	Severe	Moderate	Mild	Negligible
High	High	High	Medium / Low	Near Zero
Medium	High	Medium	Low	Near Zero
Low	Medium	Medium	Low	Near Zero
Negligible	Medium	Medium / Low	Low	Near Zero

¹ A Guide to Risk Assessment and the Risk Management for Environmental Protection, 1995.

The qualitative risk assessment for the Accident Management Plan has been based on the matrix outlined above.

The final stage of the risk assessment is the judgement of the severity of the remaining risk following implementation of the mitigation measures.

Table 2-2 Accident Management Plan

Accident Scenario	Probability of accident occurring	Magnitude of Potential Impact	Risk rating before mitigation	Risk Management	Residual Risk Rating (following mitigation)
Hazards common to both Landfill Installation and EfW Facility					
1) Spills and Leaks / Loss of containment / transfer of Substances / Overfilling of Vessels	Medium	<p>Moderate to Severe</p> <p>Spillage and leakage could occur during refuelling of vehicles, fuel deliveries, vehicle servicing, vehicle breakdowns/accidents and or damage to tanks or bunds;</p> <p>Loss of containment could result in potentially polluting liquids, including liquids containing oil, being discharged to groundwater or surface water;</p> <p>During the filling or emptying of tanks with potentially polluting substances such as fuel oil, there is potential risk of spillage and leaks from the transfer from one tank to another and the overfilling of vessels.</p>	Medium / High	<ul style="list-style-type: none"> • A sealed drainage and containment system for tanks containing potentially polluting liquids will be constructed so that any leaks / spills will be contained within a bund; • A sealed drainage and containment system will be provided for areas such as the IBA treatment area which typically will incorporate use of kerbs, appropriate falls and drains. If required, effluent may be routed to a sealed tank / pit and discharged off site via tanker or sewer. • Storage vessels will be constructed to the appropriate British Standard; • Tanks will be inspected visually on a daily basis by site staff to ensure continued integrity of tanks, and identify any necessary remedial action; • Minor spills to be cleaned up immediately, using sand or proprietary absorbent. Resultant materials to be placed in container for off-site disposal to appropriate facility, if necessary; • Immediate action to be taken in event of major spill which is likely to cause polluting emissions to the 	Low

Accident Scenario	Probability of accident occurring	Magnitude of Potential Impact	Risk rating before mitigation	Risk Management	Residual Risk Rating (following mitigation)
				environment to prevent liquid from entering surface water drains and unsurfaced ground. Spillage to be cleared immediately and placed in containers for off-site disposal. EA to be informed.	
2) Vandalism	Medium	Moderate	Medium	On-site security measures: <ul style="list-style-type: none"> • Security lighting 24 hours a day; • Out of hours security staff will be employed by Viridor; • Security cameras may be installed at key areas of the site; • Security fencing will extend around the site perimeter – 2m palisade or equivalent; • Lockable gates will be located at the site entrance. Gates will be locked whenever the site is closed; • Gates and fencing will be inspected daily by operations staff to identify deterioration and damage and the need for repair; • Fencing and gates will be maintained and repaired to ensure their continued integrity. If damage is sustained, repair will be made within the same working day. If this is not possible, suitable measures will be taken to prevent unauthorised access to the site and permanent repairs will be affected as soon as is 	Low

Accident Scenario	Probability of accident occurring	Magnitude of Potential Impact	Risk rating before mitigation	Risk Management	Residual Risk Rating (following mitigation)
				practicable; <ul style="list-style-type: none"> All visitors to the site will be required to register in the visitor's book and sign out again on exit, thereby minimising the risk of unauthorised visitors on the site; Operational procedures, including regular inspections, ensure continual monitoring of security provision at the site. 	
3) Flooding	Medium / High	Moderate / Severe	Medium / High	In order to reduce the risk and minimise the potential impact of flooding, the following measures will be implemented: <ul style="list-style-type: none"> If the landfill is in imminent danger of flooding, or a flood alert has been issued, all electrical supplies in the area will be isolated; If possible all stocks of chemicals and fuel will be removed from the at risk area; All leachate collection systems at risk will be isolated and sealed off; All plant will be removed from the area at risk; Personnel will not attempt to enter a flooded area until a risk assessment has been undertaken or the flood has subsided; Personnel will follow instructions issued by supervisors, managers or other competent persons. 	Low

Accident Scenario	Probability of accident occurring	Magnitude of Potential Impact	Risk rating before mitigation	Risk Management	Residual Risk Rating (following mitigation)
				<ul style="list-style-type: none"> The EfW facility will undergo a HAZOP to ensure that as far as is practicable any accidents that will have the potential to cause damage to the environment or human health are reduced or eliminated through appropriate measures being taken in the design of the facility; Viridor's BMS incorporates a system for recording all incidents, complaints and near misses at the facility and any results following the investigation. The system is designed to prevent the re-occurrence of any incident through the implementation of improved systems; <p>Records of incidents of flooding will be kept on site together with a summary of remedial actions taken.</p>	
4) Land fill fire hazard: Fire in waste Landfill gas management system Plant malfunction	Low	Severe	Medium / high	<ul style="list-style-type: none"> Fire extinguishers will be provided at designated locations; Smoking will not be permitted in the operations areas of the site; The operators working practices will ensure assessment of fire hazards and training of employees in fire prevention e.g. the use of fire extinguishers and emergency procedures; The EA will be advised of all incidents of fire as soon as practicable; 	Low

Accident Scenario	Probability of accident occurring	Magnitude of Potential Impact	Risk rating before mitigation	Risk Management	Residual Risk Rating (following mitigation)	
5)	EfW fire hazard:	Medium	Moderate / Severe	Medium / High	<ul style="list-style-type: none"> • Prevention of air ingress to gas system / waste mass; • Prevent 'hot' loads from being accepted ; • No wastes shall be burned on site and any fire at the site will be treated as an emergency. <p>In the event of a fire, the following actions will be taken:</p> <ul style="list-style-type: none"> • the fire brigade will be notified immediately and the EA as soon as practicable; • the burning area will be isolated and attempts will be made to extinguish the fire utilising the on site fire extinguishers if safe to do so, contaminated site drainage will be prevented, if possible, from entering any unsurfaced ground; • the site will be evacuated if the fire is not containable. <p>Records of fire incidences will be kept on site together with a summary of remedial action taken.</p>	Low
	Wastes igniting in the waste bunker; Electrical equipment that could provide an ignition source; Electrical appliances and other				<ul style="list-style-type: none"> • To prevent and minimise the potential impact of fire within the proposed EfW facility, the following action will be taken; • use of non-combustible construction materials; • fire compartments separated from each other by fire barriers, spatial separation, or other approved means 	

Accident Scenario	Probability of accident occurring	Magnitude of Potential Impact	Risk rating before mitigation	Risk Management	Residual Risk Rating (following mitigation)
<p>sources of ignition in the switch room together with materials that may burn; Waste oil that may support combustion; Maintenance activities on plant and equipment that may represent a potential fire risk if necessary precautions are not taken</p>				<p>according to NFPA 850 or similar;</p> <ul style="list-style-type: none"> • incompatible materials will be stored apart; • size of stockpiles of combustible materials will be limited; • plant inspection schedule will include checks of electrical equipment within the site to ensure that any faults are identified and repaired; • automatic fire protection supplied in all electrical rooms and technical rooms with relevant fire risk; • fire extinguishers will be provided at designated locations; • smoking will not be permitted in the operational areas of the site; • operators working practices will ensure assessment of fire hazards and training of employees in fire prevention, e.g. the use of fire extinguishers and emergency procedures; • EA will be advised of all incidents of fire as soon as practicable; <p>In the event of fire, the following action will be taken:</p> <ul style="list-style-type: none"> • the fire brigade will be notified immediately and the EA as soon as practicable; 	

Accident Scenario	Probability of accident occurring	Magnitude of Potential Impact	Risk rating before mitigation	Risk Management	Residual Risk Rating (following mitigation)
Landfill Specific Hazards					
6) Major Breach of Liner: A major breach of the installation liner could be caused by instability of the substrata, or of the engineered lining system. The stability of both these elements has been assessed in a quantitative manner in the Stability Risk Assessment (Ref: 407-036-463/SRA) submitted in support of this application, and all necessary precautions incorporated within the design of the installation to ensure that the risk of a breach in the lining	Low	Moderate / Severe	Medium	<ul style="list-style-type: none"> burning area will be isolated and attempts will be made to extinguish the fire utilising the on site fire extinguishers if safe to do so; contaminated site drainage will be prevented, if possible, from entering any unsurfaced ground; and site will be evacuated if the fire is not containable. Records of incidences of fire will be kept on site together with a summary of remedial action taken.	Low
Topographical surveys are carried out at annual intervals to					

Accident Scenario	Probability of accident occurring	Magnitude of Potential Impact	Risk rating before mitigation	Risk Management	Residual Risk Rating (following mitigation)
<p>system as a result of instability in the substrata or the engineered lining system is low.</p> <p>Breach of the liner system could also be caused by placement of waste during the initial lift.</p>				<p>monitor the following aspects: -</p> <ul style="list-style-type: none"> • settlement of the waste mass (to monitor settlement against design assumptions); and • stability of temporary and permanent slopes (to identify any requirements for remedial action and/or revisions to design for future phases). <p>In the event that stability or settlement problems are discovered, appropriate remedial action should be taken as follows:</p> <p><i>Liner Breach:</i></p> <ul style="list-style-type: none"> • Leachate will be pumped from the affected cell to minimise heads; • In the event of liner heave, the cell would be dewatered and waste emplaced; • The liner will be inspected by an independent engineer to assess the need for any remedial action, which will be agreed with the Environment Agency; and • Revisions to the liner design to provide additional resistance to slippage or damage will be considered and agreed with the Environment Agency. <p><i>Instability of Waste Mass:</i></p>	

Accident Scenario	Probability of accident occurring	Magnitude of Potential Impact	Risk rating before mitigation	Risk Management	Residual Risk Rating (following mitigation)
				<ul style="list-style-type: none"> If there is visual evidence of movement within the waste mass, or evidence from the regular topographical surveys, an independent engineer will review the situation, and appropriate remedial action will be taken in agreement with the Environment Agency. 	Low
7) Instability of Waste Mass	Low	Moderate / Severe	Medium	<ul style="list-style-type: none"> The action taken will depend upon the severity of the movement, the timescales over which the unstable mass will remain unsupported and the consequences of failure. <p>Action taken may include one or more of the following: -</p> <ul style="list-style-type: none"> The situation will continue to be monitored through regular visual inspections and topographical surveys; Prohibit operations at the base of the slope, which may place operatives at potential risk; Adjustment to phasing of landfill operations to provide additional support to the waste mass as soon as possible; Engineering work to reduce the gradient of the slope and reduce the risk of failure; and Revised design for future phases to reduce slope gradients and/or height of slopes and reduce time 	Low

Accident Scenario	Probability of accident occurring	Magnitude of Potential Impact	Risk rating before mitigation	Risk Management	Residual Risk Rating (following mitigation)
				<p>period over which temporary slopes remain unprotected.</p> <p><i>Differential Settlement:</i></p> <p>Remedial action taken will depend upon the severity of the differential settlement and whether it has affected the integrity of the cap, and may include some or all of the following actions: -</p> <ul style="list-style-type: none"> • Surcharging affected areas with additional restoration soils to produce a landform with appropriate falls; • Localised removal of capping layers, surcharging with waste or soils, and replacement of cap under appropriate CQA procedures; • Replacement of drainage channels to ensure continued integrity of surface water drainage; and • Review of design to accommodate predicted differential settlement by locally strengthening cap, providing additional thickness of capping materials, or incorporating irregular edges and boundaries to compensate for predicted settlement differentials. • In order to prevent breach of the liner through placement of waste, the following measures will be implemented: • Only selected waste (comprising municipal solid waste or similar), which excludes large, bulky or sharp items 	

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				<p>are used to form the initial lift of waste in each future cell immediately above the liner system.</p> <ul style="list-style-type: none"> • Vehicles delivering selected waste are required to deposit their load at least 5 metres from the edge of the tipping face. • The selected waste is subject to a minimal amount of compaction and a tracked machine will be used for this purpose. The selected waste is used to form a 'buffer' layer no less than 2 metres in depth. • Waste is deposited from the access road in front of the mobile landfilling plant to create an operating surface. The leading edge of the tipping face will not be compacted or ramped down, but left in a near vertical state. • Mobile plant operates only on the waste surface. Under no circumstances are mobile plant permitted to operate on the basal containment system and leachate drainage system. • Daily cover for the top of the first layer of waste is kept to a minimum and comprises fine soils, so as not to hinder vehicle movements on the operational area. The face and flanks of the initial layer of waste is not covered to avoid fouling and clogging of the leachate drainage blanket. 	
				<p>Selection and placement of the first layer of waste will be carried out under the supervision of a suitably trained and</p>	

Accident Scenario	Probability of accident occurring	Magnitude of Potential Impact	Risk rating before mitigation	Risk Management	Residual Risk Rating (following mitigation)
				qualified member of staff, whose role it is to: - <ul style="list-style-type: none"> • Visually inspect all waste used in the initial layer immediately following discharge; • Identify any unsuitable materials, which may comprise large bulky or sharp items and ensure that such items are segregated and not placed in the initial waste lift; • Observe the compaction and spreading activities to ensure that there is no damage to the lining system; • Advise the Unit Manager in the event of damage being observed; and • Ensure that waste deposit operations cease immediately in the event of any damage occurring. The Unit Manager will be responsible for investigating any damage, and for liaising with the independent Construction Quality Assurance engineer and the Environment Agency to ensure that appropriate remedial action is taken.	
EiW Specific Hazards					
8)	Incompatible Substances/ Unwanted Reactions: Some of the raw materials and waste inputs at the site could	Medium	Moderate	Medium	The following methods will be implemented to ensure that incompatible substances or unwanted reactions do not take place:

Accident Scenario	Probability of accident occurring	Magnitude of Potential Impact	Risk rating before mitigation	Risk Management	Residual Risk Rating (following mitigation)
have the potential to have unwanted reactions.				<ul style="list-style-type: none"> raw materials will be delivered to the site in separate delivery vehicles by suitably qualified employees; waste will be inspected when in the waste bunker with any non conforming waste being removed prior to being loaded into the waste feed hopper(s); all tanks and storage containers will be clearly and appropriately labelled with UN Placard Hazard / Flammable signs; containment system: tanks containing potentially polluting liquids will be constructed so that any leaks/spillages will be contained. Tanks will be surrounded by a leakage containment bund capable of containing at least 110% of the volume of the largest tank within the bund; storage vessels: storage tanks will be constructed to the appropriate British Standard. <p>Records of incidents involving unwanted reactions will be kept on site together with a summary of the remedial action taken.</p>	
9) Failure of Mains Services: Failure in the mains services, water or electricity.	Medium	Moderate	Medium	<p>In the event that mains services of water and electricity supplied to the site are unavailable, the following measures are proposed;</p> <ul style="list-style-type: none"> In the event of sudden disconnection of the grid the plant shall be capable of maintaining the steam turbine and generation set on-line with one or two streams 	Low

Accident Scenario	Probability of accident occurring	Magnitude of Potential Impact	Risk rating before mitigation	Risk Management	Residual Risk Rating (following mitigation)
				<p>operational, with plant operating in island mode.</p> <ul style="list-style-type: none"> Should mains water services become disrupted, the site will have an estimated 1-2 days storage in tanks at any given time, which will serve the mains water requirements for the site. Records of mains services failures will be kept on site together with a summary of remedial action taken. 	
<p>10) Operator Error / Failure of Equipment: The unexpected breakdown of any part of the EfW plant could result in short term build up of waste in the refuse bunker or the incomplete treatment of waste and/or a release of odour emissions. The result of operator error could result in various parts of the facility not functioning efficiently or a risk of fugitive emissions to air, water or land.</p>	Medium	Moderate / Severe	Medium / High	<p>The EfW facility will be designed with a number of fail safe and automatic shutdown systems, where appropriate. The design of the facility will include for at least three days waste storage without stacking and five days storage with stacking. This will allow waste to be received while equipment repairs are affected. All equipment will be subject to a Planned and Preventative Maintenance Programme (PPM), to minimise unplanned failures. A HAZOP study will be undertaken at the detailed design stage to identify the key processes needed to ensure the safe ongoing operation of the facility. The facility will also have in place a number of Controlled and Emergency Shutdown Procedures, as noted below:</p> <ul style="list-style-type: none"> Should the turbo-generator set fail for any reason the stand-by diesel generator will start automatically to provide essential power supply to priority systems/circuits to facilitate a controlled and safe shut down of the plant. In case of boiler break down the waste water pit is sized to accommodate more than one boiler volume, this water would either be recycled in to the process or removed by tanker; 	Low

Accident Scenario	Probability of accident occurring	Magnitude of Potential Impact	Risk rating before mitigation	Risk Management	Residual Risk Rating (following mitigation)
				<ul style="list-style-type: none"> • Failure of export/import electrical supply: If the export/import supply fails the plant will shut down in a controlled and safe manner using the standby diesel generator; • Failure of the filtration system: In the unlikely event of multiple bag failures the operator will isolate the failed bags; if the isolation proves ineffective, a Controlled Shutdown is initiated within two hours. The combustion conditions and emissions will comply with the Permit; and • Failure of equipment: In the event of failure of the bottom ash and APC residue conveyors on one line, diverter chutes and bypasses will send residues to the other conveyor line, avoiding a plant shutdown. In the event of a failure of the grate waste feed rams and combustion air fans, the Operator initiates Controlled Shutdown. The combustion conditions and emissions will comply with the Permit. • Records of operator failure or failure of equipment will be kept on site together with a summary of remedial action taken. 	

3.0 CLOSURE

This report has been prepared by SLR Consulting Limited with all reasonable skill, care and diligence, and taking account of the manpower and resources devoted to it by agreement with the client. Information reported herein is based on the interpretation of data collected and has been accepted in good faith as being accurate and valid.

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