

5. Environmental Risk Assessment

5.1 Introduction

This Section summarises the identified Environmental risks and pays particular attention to those where the residual risks after design and operational mitigation have been designated as medium or greater significance. These risks will require specific management protocols during operations which will be detailed in the Environmental Management Plan for the Project.

The objectives of identifying the significant risks during construction and operation are:

- To guide the implementation of best practice design and management techniques;
- To guide the development of appropriate risk management strategies.

Further details on the environmental risks identified for the Project are found in Appendix 4, Environmental Risk Analysis. This analysis includes an evaluation of a broad range of risks associated with the aspects of air quality, noise, surface water, groundwater and roads and traffic and evaluates these in association with steady state operations and non-routine operations such as equipment failure and emergency shutdown.

The risk assessment has informed the facility design and resulted in appropriate attention being given to mitigation of the risks identified.

5.2 EPA Requirements

The EPA requirements are detailed in the Environment Protection Act (1970)²⁸ and in the Work Approval Application Guidelines (WAA)²⁹ and the Guideline Demonstrating Best Practice³⁰. These require:

“In accordance with EPA’s Works Approval Guidelines (Publication 1307), your application should include an environmental risk assessment. The outcomes of the risk assessment should be used to guide the scope and purpose of your best practice analysis” and the WAA Guideline specifically requires and assessment of risks associated with non-routine operations.

5.3 Risk Assessment Methodology

To understand the potential environmental risks associated with construction and operation of the REA WtE Facility a Conceptual Site Model (CSM) was first developed. The CSM is a representation of the nature, fate and transport of discharges, wastes or contaminants that allows assessment of potential and/or actual exposure to contaminants. It identifies:

- Primary sources of discharges or potential discharges from an industrial activity into the environment;
- How discharges or contaminants at the point of release might move in the environment;
- The different receptors that might come in contact with contaminated media;
- The ways different receptors may come into contact with the discharge or contaminants (e.g. potential exposure pathways through ingestion of contaminated surface or groundwater, ingestion of contaminants in soil or food, direct contact with contaminated soil or water).

²⁸ Victorian Government (1970) *Environment Protection Act* Version 161

²⁹ EPA Victoria (June 2017) *Works Approval Application Guideline*. Publication 1658

³⁰ EPA Victoria (2017) *Guideline: Demonstrating Best Practice*. EPA Publication 1517.1

A Conceptual Site Model was developed to inform the Environmental Risk Assessment and was developed after:

- Several visits to reference plants where operations were evaluated from an environmental impact perspective;
- Review of Eco-Waste design specifications for the Gasifier system and their operating experience;
- Discussions with REA personnel and various specialist consultants regarding the potential environmental impacts of the Proposal;
- Issues raised during community engagement forums and from community comments on the Company Website;
- Discussions with Local Councils, Government Departments and Waste Collection Industry representatives and operators regarding the Project.

5.4 Risk Assessment Approach

The impacts identified in the CSM were assessed to establish their likelihood and consequence to determine the primary risk. The Primary Risk Level (PRL) of the identified potential impact was considered without taking into account any management and mitigation measures that will be employed in the Project. Avoidance, mitigation and/or management measures were then evaluated to reduce the risk of the potential impacts. On the assumption that the proposed management and control measures are effectively implemented, an assessment of the Residual Risk Level (RRL) associated with each of the identified aspects is presented. The RRL was developed by examining the potential consequences (measure of severity of environmental impact) and likelihood that those impacts will occur.

5.4.1 Risk Assessment Criteria

This risk assessment has used assessment tools based on AS NZS ISO 31000-2009 *Risk Management-Principles and Guidelines*. The descriptors used in the assessment are described in Tables 5-1 & 5-2.

| Descriptor | | |
|------------|----------------|--|
| Likelihood | | |
| Level | Rating | Description |
| A | Rare | Conceivable, but only in exceptional circumstances |
| B | Unlikely | Not expected to occur, but could occur in some circumstances |
| C | Possible | Has occurred in similar operations |
| D | Likely | Will probably occur during the lifetime of the operation |
| E | Almost certain | Expected to occur, or occurs frequently |

Table 5-1: Descriptions used to classify Likelihood

| Descriptor |
|------------|
|------------|

| Consequence | | |
|-------------|--------------|---|
| Level | Rating | Description |
| 1 | Negligible | Short term localised impact ecosystem change, negligible temporary pollution. Minor disruption to community amenity, minimal impact on heritage items |
| 2 | Minor | Minor measurable ecosystem change. Small scale/ short term pollution contained. Low level/short term impact on community amenity. Partial salvage of heritage items |
| 3 | Moderate | Moderate short term measurable effect on ecosystem. Small scale residual pollution contained. Moderate impact on community amenity. Salvage of significant heritage items. |
| 4 | Major | Serious medium term effect on ecosystem. Major pollution contained. Major long term impact on community amenity. Damage to significant heritage value. |
| 5 | Catastrophic | Serious long term impairment of significant ecosystem. Large scale uncontained pollution. Permanent loss of major community amenity. Destruction of significant heritage value. |

Table 5-2: Descriptions used to classify Consequence

5.4.2 Determination of Risk Categories

The risk associated with each event was determined by qualitatively evaluating the likelihood and consequence with reference to the risk matrix (Figure 5-1).

5.4.3 Risk Assessment Outcomes

The proposed facility has included a range of design and operation measures to reduce risks to the environment from the Project. Nevertheless, a review of the risks for potential environmental impacts indicates that there will be the potential for moderate impacts on the environment from air emissions, noise and surface water associated with equipment malfunctions or non-routine shutdowns. These risks require management to reduce the overall level of risk to as low as reasonably possible and operational controls will be detailed in the Environmental Management Plan. Further detail regarding the management of these risks is also outlined in the specific relevant chapters of the Works Approval Application (WAA).

The range of risk management strategies utilised to reduce the risks to as low as reasonably possible are further discussed in Sections 6.0 – 14.0 and Section 15 describes the proposed Environmental Management framework.

Table 5-3 summarises those residual risks identified rating above or equal to medium risk.

| REA LAVERTON MSW2E PROJECT - RISK ASSESSMENT MATRIX | | | | | Likelihood | | | | | | | | | | | |
|--|--|--|---|---|---|---------------------------------------|---|---------------------------------------|--|---|--|---|---|---|---|---|
| 1. Estimate the likelihood of the event occurring 2. Estimate the consequence of the event occurring 3. Use the matrix consider the likelihood of the consequence occurring to determine the level of risk Risk can be assessed with no controls in place and with controls in place to determine residual risk Risk = worst realistic consequence X likelihood of worst realistic consequence. □ | | | | | RISK | | Occurrence in Aust. Waste Industry | | | | | | | | | |
| | | | | | EXTREME Unacceptable Alternative required | HIGH Unacceptable Mitigation required | Conceivable but only in exceptional circumstances | Not expected to occur but could occur | Possible, has occurred in similar operations | Will probably occur during project lifetime | Expected to occur or occurs frequently | A | B | C | D | E |
| | | | | | MODERATE Acceptable Management required | LOW Acceptable Management optional | Rare | Unlikely | Possible | Likely | Almost certain | | | | | |
| Consequence | People (health & safety) | Environment | Community | Company | | | | | | | | | | | | |
| ↑ | Fatality or multiple fatalities. | Serious long term impairment of significant ecosystem. Large scale uncontained pollution. | Permanent loss of major community amenity. Destruction of significant heritage value. | Significant legal liability. Threat to economic viability. Irreversible national reputation damage | 5 | Catastrophic | | | | | | | | | | |
| | Major lost time injury or permanent disability to people. | Serious medium term effect on ecosystem. Major pollution contained. | Major long term impact on community amenity. Damage to significant heritage value. | Major project delay. Penalised major breach of licence conditions. Major reputation damage at state/national level. | 4 | Major | | | | | | | | | | |
| | Minor lost time injury to more than 1 person (medical treatment) | Moderate short term measurable effect on ecosystem. Small scale, residual pollution contained. | Moderate impact on community amenity. Salvage of significant heritage items. | Reduction in project activity. Reportable breach of licence conditions with penalty. Short term reputational | 3 | Moderate | | | | | | | | | | |
| | Minor lost time Injury/illness on site treatment. | Minor measurable ecosystem change. Small scale /short term pollution contained. | Low level/short term impact on community amenity. Partial salvage of heritage items. | Minor reduction in activity. Unpenalised breach of licence. Localised reversible | 2 | Minor | | | | | | | | | | |
| ↑ | Slight Injury/illness. First Aid, no lost time. | Short term localised impact ecosystem change. Negligible temporary pollution. | Minor disruption to community amenity. Minimal impact on heritage items. | No reduction in activity. Non-reportable breach of licence. Negligible impact on reputation | 1 | Negligible | | | | | | | | | | |

Figure 5-1: Risk Assessment Matrix

| Action | Event/result | Potential Impact | Design Control Measure | Operational Management Measure | Residual Risk Level | | |
|--|-------------------------------------|--|---|---|---------------------|------------|----------|
| | | | | | Consequence | Likelihood | Risk |
| Aspect: Air quality | | | | | | | |
| <p>Commissioning of the Plant: <i>Incomplete gasification of MSW and incomplete combustion of syngas, operator error, Issues with start-up and shut-down, CEMS out of calibration, Operator error</i></p> | Stack emissions from processing MSW | Decrease in ambient air quality for employees and neighbouring receptors. Potential health impacts for employees | Continuous Emission Monitoring System Installed and Calibrated. Operational Control System and feedback Systems to ensure appropriate temperatures, air supply and gas mixtures. Emission Control Systems including alkali flue gas scrubbing, injection of powdered activated carbon, particulate recovery in filter bag house. | Development and Implementation of Commissioning Start-up Procedure. Continuous mixing of MSW in Bunker. Air quality testing of stack emissions Maintenance schedule for all equipment. Regular calibration of monitoring equipment. Appropriate training of operations staff. Environment Management Plan Implemented. Further Information Section 15.3 | Moderate | Unlikely | Moderate |
| <p>Operation of the Plant: <i>Incomplete gasification of MSW and incomplete combustion of syngas, Operator Error, CEMS out of calibration or not operating</i></p> | Stack emissions from processing MSW | Decrease in ambient air quality for employees and neighbouring receptors. Potential health impacts for employees | Continuous Emission Monitoring System Installed and Calibrated. A backup CEMS will be maintained in a ready condition. Operational Control System and feedback Systems to ensure appropriate temperatures, air supply and gas mixtures. Emission Control Systems including alkali flue gas scrubbing, injection of powdered activated carbon, particulate recovery in filter bag house. | Development and Implementation of Environmental Management Plan. Continuous mixing of MSW in Bunker. Air quality testing of stack emissions Maintenance schedule for all equipment. Regular calibration of monitoring equipment. Appropriate training of operations staff. Further Information Sections 6.3.7, 6.3.8, 6.3.9 | Moderate | Unlikely | Moderate |

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|--|-------------------------------------|--|--|---|----------|----------|----------|
| Operation of the Plant: <i>Emergency Shutdown due to equipment failure (eg, power system shutdown, flue gas treatment failure eg. bag house failure)</i> | Stack emissions from processing MSW | Decrease in ambient air quality for employees and neighbouring receptors. Potential health impacts for employees | Backup power system to provide emergency power. Design Controls detailed in HAZOP Study. Online monitoring and feedback loops. | Emergency Management Plan. Maintenance schedule for all equipment. Regular calibration of monitoring equipment. Appropriate training of operations staff. Further Information Sections 6.3.9, 15.3.1 | Moderate | Unlikely | Moderate |
| Aspect: Air quality | | | | | | | |
| Operation of the Plant: <i>Fire in MSW bunker, fire in plant, failure of pressure relief valves</i> | Explosion/ Fire | Safety-injury/fatality, Release of emissions to air, | Storage of materials compliant with appropriate codes of practice and regulations. Fire control system installed. | Continuous mixing of MSW in Bunker. Appropriate monitoring of operations and procedures Appropriate maintenance of fire fighting equipment Training of operations personnel in fire fighting Smoke free zone Maintenance of fire break around site Safe work practises including hot work permits Further Information Sections 6.3.1, 6.3.2 | Major | rare | Moderate |
| Aspect: Noise | | | | | | | |
| Operation of the Plant: <i>Non-routine plant shutdown- Power Trip, Boiler Trip, Turbine Trip - release of high pressure steam (+120 dBA)</i> | Noise generation from equipment | Disturbance to neighbours. Hearing Impacts on employees. | Enclosure of all major components of system in buildings. Equipment selection to minimise noise. Orientate safety relief valves away from nearest sensitive receptors. | Noise modelling conducted to ensure levels below Guideline at nearest receptors. Development and Implementation of Environmental Management Plan, Noise monitored by site manager. Regular scheduled maintenance for all equipment. Operating Procedures and Emergency Shutdown Procedures. Further Information Sections 11.5, 11.6 | Moderate | Unlikely | Moderate |
| Aspect: Surface Water | | | | | | | |

| | | | | | | | |
|--|--|---|--|--|-------|----------|----------|
| Construction: <i>Site Preparation Earthworks, Factory Construction, Mobile Plant and Vehicle movements, Temporary generators and Lighting Plants</i> | Contamination - uncontrolled release of hydrocarbons, Increased potential for erosion and sedimentation | Adverse impact on surface water quality | Erosion/sedimentation mitigation measures prescribed in construction contracts | Development and Implementation of Construction Environmental Management Plan (CEMP), Monitored by site manager. Installed erosion/sedimentation containment devices. Bunded area for equipment washdown. Fuel and chemical storage bunded in accordance with Australian Standards. Spill Kits available near operations and storage areas. Revegetation/Landscaping/stabilisation completed as soon as practical Further Information Section 12 | Minor | Possible | Moderate |
| Aspect: Surface Water | | | | | | | |
| Operation of the Plant: <i>Runoff from fire Fighting</i> | Fire and/or explosion | Contaminated runoff from fire fighting | Pumps available to pump fire water into tankers for offsite disposal. Storage of materials compliant with appropriate codes of practice and regulations. Fire control system installed. | Continuous mixing of MSW in Bunker. Appropriate monitoring of operations and procedures Appropriate maintenance of fire fighting equipment Training of operations personnel in fire fighting Smoke free zone Maintenance of fire break around site Safe work practises including hot work permits Further Information Section 12 | Minor | Unlikely | Moderate |
| Aspect: Roads and Traffic | | | | | | | |
| Operation of the Plant: <i>Vehicle Collision/Roll-over</i> | Uncontrolled release of hydrocarbons, Fire/explosion. Injury | Adverse impact on surface water quality, impact of aquatic and peripheral terrestrial flora and fauna, land degradation. | Roads designed and constructed to appropriate standards. Site designed to minimise impact of increased traffic. Site traffic management designed to maximise safety. | Traffic Management Plan designed and Implemented Further Information Traffic Assessment Appendix 12 | Minor | Possible | Moderate |

Table 5-2: Significant Residual Risks