


Appendix 4 – Environmental Risk Analysis Assessment

A vertical decorative strip on the left side of the page, divided into three sections: a green leaf pattern at the top, a yellow and white industrial machine at the middle, and a blue water splash at the bottom.

Recovered Energy Australia Laverton Municipal Waste to Energy Project

Environmental Risk Analysis

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1.0 Introduction

To understand the potential environmental risks associated with construction and operation of the Recovered Energy Australia Municipal Waste to Energy Project (MSW2E) a Conceptual Site Model (CMS) was first developed. The CMS 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:

- 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).

2.0 Conceptual Site Model

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

- Several visits to reference plants in China 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 the technology provider and EPC contractor;
- Discussions with REA personnel and various specialists regarding the potential environmental impacts of the Proposal;
- Issues raised during community engagement forums and from comments on the Company Website;
- Discussions with Local Councils, Government Departments and Waste Collection Services regarding the Project.

The Conceptual Model is detailed in Table 1.

Potential impacts on the environment from the Municipal Waste to Energy Project once operational include risks of generating atmospheric emissions, contamination through spills and leaks and management of the additional traffic. The proposed facility has included design features to mitigate the potential for occurrence of such risks and a strict adherence to operational procedures and management oversight will further alleviate potential for environmental impacts. Operational procedures are being developed to meet industry best practise and to ensure that the facility is managed and operated in accordance with legislative requirements and community expectations.

Source/Action	Event/Result	Potential Impact		Pathway (Potential or Actual)	Exposure Route (Potential or Actual)	Receptor (Potential or Actual)
Construction: <i>Site Preparation Earthworks (clearing, excavation for foundations, material stockpiles), Mobile Plant and Vehicle movements</i>	Dust emission	Reduced visibility and public nuisance. Human health impacts to employees/public, in particular respiratory system irritation.		Wind/Air	Inhalation	Employees of REA and Contractors, Employees in surrounding factories, Residents, Passing Traffic
Construction: <i>Site Preparation Earthworks, Factory Construction, Mobile Plant and Vehicle movements, Temporary generators and Lighting Plants</i>	Greenhouse gas emission - fuel, combustion products	Contribution to Greenhouse effect			Inhalation	Population of Laverton North and Greater Melbourne
Construction: <i>Site Preparation Earthworks, Factory Construction, Mobile Plant and Vehicle movements, Temporary generators and Lighting Plants</i>	Noise generation from equipment and trucks	Disturbance to neighbours. Hearing Impacts on employees.			Hearing	Employees of REA and Contractors, Employees in surrounding factories, Residents
Commissioning of the MWS2E Plant: <i>MSW waste tipping area ventilation system failure, Transport of MSW to site, Incomplete gasification of MSW and incomplete combustion of syngas, operator</i>	Odour emission from processing MSW	Decrease in ambient air quality for employees and neighbouring receptors. Potential health impacts for employees			Inhalation	Employees of REA and Contractors, Employees in surrounding factories, Residents, Passing Traffic
Commissioning of the MWS2E 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>	Stack emissions from processing MSW	Decrease in ambient air quality for employees and neighbouring receptors. Potential health impacts for employees			Inhalation	Employees of REA and Contractors, Employees in surrounding factories, Residents
Operation of the MWS2E Plant: <i>Vehicle movements (transport of MSW to site, transport waste residue from site, Reagent Delivery)</i>	Dust emission	Reduced visibility and public nuisance. Human health impacts to employees/public, in particular respiratory system irritation.			Inhalation	Employees of REA and Contractors, Employees in surrounding factories, Residents, Passing Traffic
Operation of the MWS2E Plant: <i>General Operations- Transport of MSW to site and waste residue from site, induced draft fans, compressed air plant, air cooled chiller condenser</i>	Noise generation from equipment	Disturbance to neighbours. Hearing Impacts on employees.			Hearing	Employees of REA and Contractors, Employees in surrounding factories, Residents
Operation of the MWS2E 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.			Hearing	Employees of REA and Contractors, Employees in surrounding factories, Residents
Operation of the MWS2E Plant: <i>MSW waste tipping area ventilation system failure, Transport of MSW to site, Incomplete gasification of MSW and incomplete combustion of syngas.</i>	Odour emission from processing MSW	Decrease in ambient air quality for employees and neighbouring receptors. Potential health impacts for employees			Inhalation	Employees of REA and Contractors, Employees in surrounding factories, Residents, Passing Traffic
Operation of the MWS2E Plant: <i>Incomplete gasification of MSW and incomplete combustion of syngas, Operator Error, CEMS out of calibration</i>	Stack emissions from processing MSW	Decrease in ambient air quality for employees and neighbouring receptors. Potential health impacts for employees			Inhalation	Employees of REA and Contractors, Employees in surrounding factories, Residents

Table 1: Conceptual Site Model

Source/Action	Event/Result	Potential Impact		Pathway (Potential or Actual)	Exposure Route (Potential or Actual)	Receptor (Potential or Actual)
Operation of the MWS2E 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			Inhalation	Employees of REA and Contractors, Employees in surrounding factories, Residents
Operation of the MWS2E 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,			Inhalation	Employees of REA and Contractors, Employees in surrounding factories, Residents, Passing Traffic
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		Surface Water	ingestion, dermal, absorption	Aquatic Ecosystem, Sedimentation of storm water collection system
Operation of the MWS2E Plant: <i>Overflow or leakage of Bunds to storm water, Chemical spill outside bunded areas</i>	Contaminants enter storm water discharge	Adverse impact on surface water quality, Health and/or nuisance impacts on neighbours			ingestion, dermal, absorption	Aquatic Ecosystem, near neighbours
Operation of the MWS2E Plant: <i>Increased Runoff from hardstand and Plant Buildings</i>	Flood peak increase	Adverse impact on storm water infrastructure			Direct Impact	Council, Water Authority, near neighbours
Operation of the MWS2E Plant: <i>Runoff from fire Fighting</i>	Fire and/or explosion	Contaminated runoff from fire fighting			ingestion, dermal, absorption	Aquatic Ecosystem, near neighbours
Operation of the MWS2E Plant: <i>Overflow or leakage of Bunds to ground water, Chemical spill outside bunded areas leakage to groundwater</i>	Contamination - uncontrolled release of hydrocarbons and/or hazardous waste	Contaminate ground water system		Ground Water	ingestion, dermal, absorption	Aquatic Ecosystem, near neighbours
Operation of the MWS2E Plant: <i>Transport of MSW to Site, Service vehicles, employee vehicles</i>	Increased road use	Reduced public safety, slower travel times		Roads & Traffic	Direct Impact, Collision	General Public,
Operation of the MWS2E Plant: <i>Transport of MSW to Site, Service vehicles</i>	Increased road use	Accelerated deterioration of roads due to heavy vehicles,			Direct Impact	General Public, Local Council
Operation of the MWS2E Plant: <i>Vehicle Collision/Roll-over</i>	Uncontrolled release of hydrocarbons, Fire/explosion. Injury	Adverse impact on surface water quality, impact of aquatic and periferal terrestrial flora and fauna, land degradation.			ingestion, dermal, absorption	Aquatic Ecosystem, Emergency Personnel, General Public

Table 1: Conceptual Site Model Continued

2.0 Environmental Risk Assessment

2.1 Risk Assessment Approach

The Conceptual Site Model has been used to identify the aspects and the potential impacts of these aspects that may occur as a result of project activities. These impacts were then 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 developed, that can be used to reduce the risk of the potential impacts. With an 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.

2.2 Risk Assessment Criteria

This preliminary 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 2 & 3.

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

Table2: 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 3: Descriptions used to classify Consequence

2.3 Risk Determination and Categories

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

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		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
					EXTREME Unacceptable Alternative required	HIGH Unacceptable Mitigation required	A	B	C	D	E		
					MODERATE Acceptable Management required	LOW Acceptable Management optional	Rare	Unlikely	Possible	Likely	Almost certain		
Consequence	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 1: Risk Analysis Matrix

2.4 Control and Management Measures

The REA Laverton Project includes both Design Control Measures and Operational Management Measures. Design control measures are the primary control measures designed to ameliorate the impact prior to it occurring, encompassing aspects of the project such as infrastructure design and placement. Secondary measures are those that involve management activities during operations e.g. standard operating procedures etc.). These have been categorised as Design Control Measures (measures that can be incorporated into the design of the Laverton MSW2E Project and associated infrastructure) and Operational Management Measures (management approaches and plans to be implemented both during and following operations).

2.5 Risk Assessment Register

In identifying potential environmental aspects and impacts associated with the project, a risk assessment register has been completed (Table 4). Associated avoidance, mitigation or management measures have also been described.

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 shut downs. These risks require management to reduce the overall level of risk to as low as reasonably possible.

The provision of a Municipal Waste to Energy facility will have an overall positive effect on the management of MSW in Melbourne offering a safe and responsible disposal option, generating electricity to the grid and reducing the overall impact of MSW entering landfills.

Action	Event/result	Potential Impact	Primary Risk Level				Design Control Measure	Operational Management Measure	Residual Risk Level			
			Consequence	value (column ref)	Likelihood	Risk			Consequence	Value	Likelihood	Risk
Aspect: Air quality												
Construction: <i>Site Preparation Earthworks (clearing, excavation for foundations, material stockpiles), Mobile Plant and Vehicle movements</i>	Dust emission	Reduced visibility and public nuisance. Human health impacts to employees/public, in particular respiratory system irritation.	Negligible	2	Possible	Moderate	Disturbed areas minimised. Trafficable and working areas sealed bituminised tarmac or concrete Water sprays used to wet surface in new excavation areas if dust an issue	Development and Implementation of Construction Environmental Management Plan (CEMP), Dust monitored by site manager. Dust suppression measures instituted if required (wet down with water truck and/or hoses) Operational vehicles kept to work zones and 5km/h speed limits imposed compliant with Traffic Management Plan. Revegetation/Landscaping/stabilisation completed as soon as practical	Negligible	1	Unlikely	Low
Construction: <i>Site Preparation Earthworks, Factory Construction, Mobile Plant and Vehicle movements, Temporary generators and Lighting Plants</i>	Greenhouse gas emission - fuel, combustion products	Substantial Contribution to Greenhouse effect	Negligible	1	Possible	Moderate	Fuel combustion engines meet Australian Design emission standards.	Equipment chosen and maintained to ensure efficient operation to minimise exhaust emissions Vehicle speed and movements minimised. CEMP implemented.	Negligible	1	Unlikely	Low
Commissioning of the MWS2E Plant: <i>MSW waste tipping area ventilation system failure, Transport of MSW to site, Incomplete gasification of MSW and incomplete combustion of syngas, operator</i>	Odour emission from processing MSW	Decrease in ambient air quality for employees and neighbouring receptors. Potential health impacts for employees	Minor	2	Possible	Moderate	MSW bunker and Leachate Pool designed to operate under negative pressure. Vehicle entry through automated doors, Odours air directed to gasifier All Operational Equipment enclosed in buildings. All MSW arrives in sealed trucks. All solid waste removed in sealed trucks. Operators wear appropriate PPE. Odour monitoring outside building if required	Equipment chosen and maintained to ensure efficient operation. Appropriate training of operations staff Environmental Management Plan (air quality) implemented.	Negligible	1	Unlikely	Low

Table 4: Risk Assessment Register

Action	Event/result	Potential Impact	Primary Risk Level				Design Control Measure	Operational Management Measure	Residual Risk Level			
			Consequence	value (column ref)	Likelihood	Risk			Consequence	Value	Likelihood	Risk
Aspect: Air quality												
Commissioning of the MWS2E 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>	Stack emissions from processing MSW	Decrease in ambient air quality for employees and neighbouring receptors. Potential health impacts for employees	Moderate	3	Possible	High	Continuous Emission Monitoring System Installed and Calibrated. Emissions control system started before operations and run after any operation cease; 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. Can shut down individual gasifiers or process lines should out of specification conditions persist.	Development and Implementation of Commissioning Startup 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.	Moderate	2	Unlikely	Moderate
Operation of the MWS2E Plant: <i>Vehicle movements (transport of MSW to site, transport waste residue from site, Reagent Delivery)</i>	Dust emission	Reduced visibility and public nuisance. Human health impacts to employees/public, in particular respiratory system irritation.	Negligible	1	Possible	Moderate	Trafficable and working areas sealed bitumenised tarmac or concrete	Environment Management Plan Implemented. All MSW arrives in sealed trucks. All solid waste removed in sealed trucks.	Negligible	1	Unlikely	Low
Operation of the MWS2E Plant: <i>MSW waste tipping area ventilation system failure, Transport of MSW to site, Incomplete gasification of MSW and incomplete combustion of syngas.</i>	Odour emission from processing MSW	Decrease in ambient air quality for employees and neighbouring receptors. Potential health impacts for employees	Minor	2	Unlikely	Moderate	MSW bunker and Leachate Pool designed to operate under negative pressure. Vehicle entry through automated doors, Odours air directed to gasifier All Operational Equipment enclosed in buildings. All MSW arrives in sealed trucks. All solid waste removed in sealed trucks. Operators wear appropriate PPE. Odour monitoring outside building if required	Equipment chosen and maintained to ensure efficient operation. Appropriate training of operations staff Environmental Management Plan (air quality) implemented.	Negligible	1	Unlikely	Low

Table 4: Risk Assessment Register Continued

Action	Event/result	Potential Impact	Primary Risk Level				Design Control Measure	Operational Management Measure	Residual Risk Level			
			Consequence	value (column ref)	Likelihood	Risk			Consequence	Value	Likelihood	Risk
Aspect: Air quality												
Operation of the MWS2E Plant: <i>Incomplete gasification of MSW and incomplete combustion of syngas, Operator Error, CEMS out of calibration</i>	Stack emissions from processing MSW	Decrease in ambient air quality for employees and neighbouring receptors. Potential health impacts for employees	Moderate	3	Possible	High	Continuous Emission Monitoring System Installed and Calibrated. Emissions control system started before operations and run after any operation cease; 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. Can shut down individual gasifiers or process lines should out of specification conditions persist.	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.	Moderate	2	Unlikely	Moderate
Operation of the MWS2E Plant: <i>Steady State Operation of the Plant</i>	Stack emissions from processing MSW	Substantial Contribution to Greenhouse effect	Negligible	1	Rare	Low	GHG Assessment shows abatement in comparison to landfill. Operational control systems and Emission Control systems ensure complete combustion of hydrocarbons.	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.	Negligible	1	Unlikely	Low
Operation of the MWS2E 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	Moderate	3	Possible	High	Backup power system to provide emergency power. Design Controls detailed in HAZOP Study. Online monitoring and feedback loops. Can shut individual process lines while keeping remainder of facility operating;	Emergency Management Plan. Maintenance schedule for all equipment. Regular calibration of monitoring equipment. Appropriate training of operations staff.	Moderate	2	Unlikely	Moderate

Table 4: Risk Assessment Register Continued

Action	Event/result	Potential Impact	Primary Risk Level				Design Control Measure	Operational Management Measure	Residual Risk Level				
			Consequence	value (column ref)	Likelihood	Risk			Consequence	Value	Likelihood	Risk	
Aspect: Air quality													
Operation of the MWS2E 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,	Major	4	Unlikely	High	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.	Major	4	rare	Moderate	
Aspect: Noise													
Construction: <i>Site Preparation Earthworks, Factory Construction, Mobile Plant and Vehicle movements, Temporary generators and Lighting Plants</i>	Noise generation from equipment and trucks	Disturbance to neighbours. Hearing Impacts on employees.	Minor	2	Possible	Moderate	Noise mitigation measures prescribed in construction contracts	Development and Implementation of Construction Environmental Management Plan (CEMP), Noise monitored by site manager. Maintenance Program for all equipment. Operational vehicles kept to work zones and 5km/h speed limits imposed compliant with Traffic Management Plan. High noise activities limited to hours 7am - 6pm	Negligible	1	Unlikely	Low	
Operation of the MWS2E Plant: <i>General Operations- Transport of MSW to site and waste residue from site, induced draft fans, compressed air plant, air cooled chiller condenser</i>	Noise generation from equipment and trucks	Disturbance to neighbours. Hearing Impacts on employees.	Moderate	3	Unlikely	Moderate	Enclosure of all major components of MSW2E system in buildings. Equipment selection to minimise noise.	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	Negligible	1	Unlikely	Low	

Table 4: Risk Assessment Register Continued

Action	Event/result	Potential Impact	Primary Risk Level				Design Control Measure	Operational Management Measure	Residual Risk Level			
			Consequence	value (column ref)	Likelihood	Risk			Consequence	Value	Likelihood	Risk
Aspect: Noise												
Operation of the MWS2E Plant: Non-routine plant shutdown- Power Trip, Boiler Trip, Turbine Trip - release of high pressure steam (+120 dBA)	Noise generation from equipment	Disturbance to neighbours. Hearing Impacts on employees.	Moderate	3	Possible	High	Enclosure of all major components of MSW2E 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.	Moderate	3	Unlikely	Moderate
Aspect: Surface Water												
Construction: Site Preparation Earthworks, Factory Construction, Mobile Plant and Vehicle movements, Temporary generators and Lighting Plants	Contamination - uncontrolled release of hydrocarbons, Increased potential for erosion and sedimentation	Adverse impact on surface water quality	Minor	2	Possible	Moderate	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. Lined 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	Minor	2	Possible	Moderate
Operation of the MWS2E Plant: Overflow or leakage of Bunds to storm water, Chemical spill outside bunded areas	Contaminants enter storm water discharge	Adverse impact on surface water quality, Health and/or nuisance impacts on neighbours	Minor	2	Possible	Moderate	MSW Bunker and Leachate Collection system designed to be impermeable. Fuel and chemical storage bunded in accordance with Australian Standards.	Development and Implementation of Environmental Management Plan, Monitored by site manager. Regular audits of bunded areas Installed erosion/sedimentation containment devices. Spill Kits available near operations and storage areas. Revegetation/Landscaping/stabilisation completed as soon as practical	Minor	2	rare	Low

Table 4: Risk Assessment Register Continued

Action	Event/result	Potential Impact	Primary Risk Level				Design Control Measure	Operational Management Measure	Residual Risk Level			
			Consequence	value (column ref)	Likelihood	Risk			Consequence	Value	Likelihood	Risk
Aspect: Surface Water												
Operation of the MWS2E Plant: <i>Increased Runoff from hardstand and Plant Buildings</i>	Flood peak increase	Adverse impact on storm water infrastructure	Negligible	1	Possible	Moderate	Stormwater system designed to accommodate 1:100 year 24 hour rainfall event.	Regular Inspection of stormwater system to evaluate issues should they develop.	Minor	2	Rare	Low
Operation of the MWS2E Plant: <i>Runoff from fire Fighting</i>	Fire and/or explosion	Contaminated runoff from fire fighting	Minor	2	Possible	Moderate	Pumps available to pump fire water into into tankers for off site 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	Minor	2	Unlikely	Moderate
Aspect: Ground Water												
Operation of the MWS2E Plant: <i>Overflow or leakage of Bunds to ground water, Chemical spill outside bunded areas leakage to groundwater</i>	Contamination - uncontrolled release of hydrocarbons and/or hazardous waste	Contaminate ground water system	Minor	2	Possible	Moderate	MSW Bunker and Leachate Collection system designed to be impermeable. Fuel and chemical storage bunded in accordance with Australian Standards.	Development and Implementation of Environmental Management Plan, Monitored by site manager. Regular audits of bunded areas Installed erosion/sedimentation containment devices. Spill Kits available near operations and storage areas. Groundwater monitoring program developed and implemented to monitor potential impacts from groundwater.	Negligible	1	Unlikely	Low

Table 4: Risk Assessment Register Continued

Action	Event/result	Potential Impact	Primary Risk Level				Design Control Measure	Operational Management Measure	Residual Risk Level			
			Consequence	Value (column 1)	Likelihood	Risk			Consequence	Value	Likelihood	Risk
Aspect: Roads and Traffic												
Operation of the MWS2E Plant: <i>Transport of MSW to Site, Service vehicles, employee vehicles</i>	Increased road use	Reduced public safety, slower travel times	Negligible	1	Unlikely	Low	Traffic Study completed shows minimal impact. Access designed for large truck to minimise standstill. Site designed to minimise impact of increased traffic. Site traffic management designed to maximise safety.	Traffic Management Plan designed and Implemented	Negligible	1	Unlikely	Low
Operation of the MWS2E Plant: <i>Transport of MSW to Site, Service vehicles</i>	Increased road use	Accelerated deterioration of roads due to heavy vehicles,	Negligible	1	Unlikely	Low	Traffic Study completed shows minimal impact	Traffic Management Plan designed and Implemented	Negligible	1	Rare	Low
Operation of the MWS2E Plant: <i>Vehicle Collision/Roll-over</i>	Uncontrolled release of hydrocarbons, Fire/explosion. Injury	Adverse impact on surface water quality, impact of aquatic and periferal terrestrial flora and fauna, land degradation.	Minor	2	Possible	Moderate	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	Minor	2	Possible	Moderate

Table 4: Risk Assessment Register Continued