



Establishment of Advanced Recycling Waste Plastics Hub in Victoria

RISK MANAGEMENT PLAN



June 2022

Altona Advanced Recycling Project Risk Management Plan

1. Introduction

This Risk Management Plan considers the Project Risks in three ways:

A. General Business Risk that considers:

- a) Strategic, operational and business planning processes, including policy development and project management;
- b) Asset management and resource planning;
- c) Management of ethics, fraud and security issues;
- d) Business interruption and continuity management;
- e) Management of significant change issues – eg: organisational and technological changes;
- f) Public risk and general liability risks;
- g) Workplace health and safety risks;
- h) Environmental management;
- i) Purchasing and contract management;
- j) Financial management and sustainability;
- k) Pandemic and Infection control management.

B. Business Risk For The Altona Advanced Recycling Project that considers:

- a) Schedule
- b) Budget
- c) Financial strategy and structure
- d) Financial viability of applicant and project partner(s)
- e) Environmental, natural and cultural heritage
- f) EPA Amendment Act
- g) OH&S
- h) Technical
- i) Waste inputs
- j) Outputs

C. Site Specific Risk for the Altona Project that considers:

- a) Risk aspects during construction;
- b) Risk aspects during operations.

2. Objectives

The objectives of this Risk Management Plan are to promote an integrated risk management strategy that will:

- Formalise and enhance risk management practices;
- Demonstrate compliance with relevant legislation and regulatory requirements;
- Integrate the management of risk across project functions and areas of responsibility;
- Reduce the cost of risk, including injury, cost of insurance premiums, damage and loss;
- Give the Altona Project a risk register to facilitate the understanding of project risks;
- Demonstrate and promote good corporate governance;
- Achieve a proactive approach to risk management and assist in ensuring the project's financial sustainability.

3. Risk Management Process

The main elements of the risk management process are the following:

3.1 Establish the Context

Establish the strategic, organisational and risk management context in which the rest of the process will take place. Criteria against which risk will be evaluated should be established and the structure of the analysis defined.

3.2 Identify Risks

Identify what, why and how things can arise as the basis for further analysis.

3.3 Analyse Risks

Determine the existing controls and analyse risks in terms of consequence and likelihood in the context of those controls. The analysis should consider the range of potential consequences and how likely those consequences are to occur. Consequence and likelihood are combined to produce an estimated level of risk.

3.4 Evaluate Risks

Compare estimated levels of risk against the pre-established criteria. This enables risks to be ranked so as to identify management priorities. If the levels of risk established are low, then risks may fall into an acceptable category and treatment may not be required.

3.5 Treat Risks

Accept and monitor low-priority risks. For other risks, develop and implement a specific management plan which includes consideration of funding and introduces strategies to ensure new risks are not introduced.

3.6 Monitor and Review

Monitor and review the performance of the risk management system and changes which might affect the performance.

The attached Risk Registers have been undertaken prior to the commencement of site operations. Upon site operations commencing, the Project Manager will undertake a formal review of these risk registers

3.7 Communicate and Consult

Communicate and consult with internal and external stakeholders as appropriate at each stage of the risk management process and on the process as a whole.

4. Roles & Accountabilities

4.1 All Employees Generally

All staff have responsibilities for managing the risks in their activities and workplace and are accountable through their individual work plans and within the Project Management Plan.

It is recognised that all staff are fully involved and best informed as to the risks associated with their designated activities. All employees are required to cooperate and be actively involved in the development and implementation of the risk management program. This collaborative approach will ensure a quality system delivering measurable outcomes.

4.2 Project Manager

The Project Manager is responsible for ensuring that a risk management system is established, implemented and maintained in accordance with this policy, and for the assignment of responsibilities in relation to risk management.

4.4 Site Managers, Coordinators and Supervisors

Site Managers, Coordinators and Supervisors are responsible for the implementation of the Project Risk Management Plan within their respective areas of responsibility. This includes the identification, assessment, recording and reviewing of risks, establishment of controls through systems and processes and the assignment and completion of risk control actions.

5. Risk Registers

Three risk registers have been completed for the project.

Chapter 1 shows the Business Risk Register.

Chapter 2 shows the Business Risk Assessment for the Altona Advanced Recycling Project

Chapter 3 shows the Site Specific Risk Register for construction and operations

CHAPTER 1 – BUSINESS RISK REGISTER

Table 1 – Risk evaluation table

Risk Assessment	How likely is it to be that bad?			
How severely could it hurt someone?	++ Very likely could happen anytime	+ Likely could happen at some time	= Unlikely could happen but very rarely	– Very unlikely may happen but probably wont
Catastrophic / Kill or cause permanent disability or ill health	6	5	4	3
Major/ Long term illness or serious injury	5	4	3	2
Moderate / Medical attention and several days off work	4	3	2	1
Minor / First aid needed	3	2	1	1

Key to the risk rating	
1 and 2	The hazard has a high risk of creating an incident. It requires immediate executive management attention to rectify the hazard. Control action must be immediately implemented before working in the area or carrying out the work process.
3	The hazard has a moderate risk of creating an incident. It requires management attention to prevent or reduce the likelihood and severity of an incident. Longer term Control action required to ensure that the hazard is fully controlled.
4, 5 and 6	The hazard has a low risk of creating an incident. It requires supervisor and employee attention in a reasonable timeframe to prevent or reduce the likelihood and severity of an incident.

Table 2 Indicative Measures of Consequence and Likelihood

Category	Insignificant	Minor	Moderate	Major	Catastrophic
Environment	Minimal environmental impact; isolated release only	Minor environmental impact; on-site release immediately controlled	Significant environmental impact; on-site release contained with assistance	Major environmental impact; release spreading off-site; contained with external assistance	Fatalities occur; extensive release off-site; requires long term remediation
Financial	Negligible financial loss (\$10 000), no impact on program or business operation	Minor financial loss (\$10000-\$50000); minimal impact on program or business operation	Significant financial loss (\$50000- \$200 000); considerable impact on program or business operations	Major financial loss (\$200 000-\$1Million); severe impact on program or business operation	Extensive financial loss (\$1 Million+); loss of program or business operation
WHS	First aid only required	Minor medical treatment with or without potential for lost time	Significant injury involving medical treatment or hospitalisation and lost time	Individual fatality or serious long term injury	Multiple fatalities or extensive long term injury
Professional Indemnity	Only ever occurs under exceptional circumstances	Conceivable but not likely to occur under normal operations; no evidence of previous incidents	Not generally expected to occur but may under specific circumstances	Will probably occur at some stage based on evidence of previous incidents	Event expected to occur most times during normal operations
Public Liability	First aid only required; minimal loss to organisation	Some medical treatment required; medium loss to organisation	Significant injury involving medical treatment or hospitalisation; high loss to organisation	Severe injuries or fatalities to individual; very high loss to organisation	Multiple fatalities or extensive long term injuries; worst case loss to organisation
Property and Infrastructure	Isolated or minimal loss; short term impact; repairable through normal operations	Minor loss with limited downtime; short term impact; mostly repairable through normal operations	Significant loss with temporary disruption of services; medium term impact on organisation	Critical loss or event requiring replacement or property or infrastructure; long term impact on organisation	Disaster with extensive loss and long term consequences; threat to viability of service or operation

Table 2 Indicative Measures of Consequence and Likelihood cont.

Category	Insignificant	Minor	Moderate	Major	Catastrophic
Reputation	Isolated, internal or minimal adverse attention or complaint	Heightened local community concern or criticism	Significant public criticism with or without media attention	Serious public or media outcry, broad media attention	Extensive public outcry, potential national media attention
Natural Hazards	Minimal physical or environmental impact; isolated hazard only; dealt with through normal operations	Minor physical or environmental impact, hazards immediately controlled with local resources	Significant physical or environmental impact; hazards contained with assistance of external resources	Major physical or environmental impact; hazard extending off-site; external services required to manage	Extensive physical or environmental impact extending off-site; managed by external services; long term remediation required
Information Technology	No measurable operational impact to organisation	Minor downtime or outage in single area of organisation; addressed with local management and resources	Significant downtime or outage in multiple areas of organisation; substantial management required and local resources	Loss of critical functions across multiple areas of organisation; long term outage; extensive management required and extensive resources	Extensive and total loss of functions across organisation; disaster management required
Political and Governance	Isolated non-compliance or breach; minimal failure of internal controls managed by normal operations	Contained non-compliance or breach with short term significance; some impact on normal operations	Serious breach involving statutory authorities or investigation; significant failure of internal controls; adverse publicity at local level	Major breach with formal inquiry; critical failure of internal controls; widespread adverse publicity	Extensive breach involving multiple individuals; potential litigation; viability of organisation threatened
Industrial Relations	Isolated, internal or minimal impact on staff morale or performance; minimal loss to organisation	Contained impact on staff morale or performance of short term significance; medium loss to organisation	Significant impact on staff morale or performance of medium term significance; significant loss to organisation	Major impact on staff morale or performance with long term significance; very high loss to organisation	Extensive impact or organisational morale or performance; threat to viability or program or service
Contractual and Legal	Isolated non-compliance or breach; negligible financial impact	Contained non-compliance or breach with short term significance and minor financial impact	Serious breach involving statutory authority or investigation; prosecution possible with significant financial impact	Major breach with fines and litigation; long term significance and major financial impact	Extensive fines and litigation with possible class action; threat to viability of program or service

Table 3

Risk Register For Advanced Recycling Business

	Title	Risk Description	Risk Allocation	Inherent Risk Occurrence	Inherent Risk Impact	Achieved Actions	Actions plan (action + resp. + deadline)	Residual Risk Occurrence	Residual Risk Impact
1	Approvals & Regulatory Risks								
1.1	Development Approvals	Delay in obtaining licenses has an impact on program.	Owner						
1.2	Contractor's Licenses and Permits	Ensuring all Construction Contractors and Builders have correct licenses and approvals to conduct works.	Contractor	2	2	Project Manager Check	Application for relevant Licenses and Permits, in line with Owner's requirements.	2	1
1.3	Compliance	Compliance with: - applicable laws, Australian Standards and International Standards - Building Code of Australia (BCA) Compliance with BCA requires the implementation of Performance Solutions not allowed for at the Concept Design Stage	Contractor	2	3	BCA assessment carried out on Concept Design. Allowances made in direct costs for identified performance solutions.	Designer required to comply with BCA. BCA assessment during detailed design.	1	1
1.4	Change in law		Owner	2	3			1	1
1.5	Force Majeure		Owner	2	3			1	1
2	Technical Risks								
2.1	Owner's documentation	Ambiguities, errors and conflicts in the following Owner's documentation, which lead to a variation.	Owner	2	3	3rd party Review of documentations and peer reviews to ensure intent is correctly formulated.	Identify	1	1
2.2	Compliance with Project Specifications Overdesign	Compliance of the design with BCA and meeting business case specifications	Contractor	2	2	Review of Project Specifications, in collaboration with the Owner. Indication to Owner of what specific specifications are used for the project.	Review of Project Specifications, in collaboration with the Owner. Indication to Owner of what specific specifications are used for the project.	1	1
2.3	Final product	Compliance of the final product with customer specifications and achieving market acceptance	Owner	2	3	Ensure outputs from Advanced Recycling facility meet market in testing phase.		1	1
2.5	Raw product quality and quantity.	Incoming feedstock quality and quantity and obtaining tonnages to support business model .	Owner	2	3	Strategy and marketing plan to obtain feedstock		1	1
2.6	Additional scope by Owner	Additional requirements from the Owner increase the scope of works and lead to variations	Owner	2	3	Final review to ensure all scope changes have been assessed and either accepted or withdrawn.		1	1
2.7	Fire Design	Fire systems to be provided by Contractor and Equipment supplier to be integrated, commissioned and approved	Owner	2	3	Integration of fire systems in early design and allocation of tasks, resource to liaise throughout project with Fire & Rescue services	Action Plan and resource	1	1
2.8	Electrical Installation	Ensuring power supplied on time and is correct for the process requirements	Owner/Contractor	2	3	AUDIT	Audit supply requirements and sign off	1	1
3	Construction Risks								
3.1.	Complaints and community issues	Whilst the Contractor is responsible to manage community impacts, the Owner may be required to issue the Contractor with a direction to take action that change the scope of Works or manner in which the Works is performed (excluding for noise & dust related issues).	Owner	2	3	EQS oversight - building methodology reviews and compliance to DA		1	1
3.2.	Community impacts, noise and dust	Management of community impacts. In particular, noise and dust management: compliance with the regulatory framework and actions taken to mitigate noise and dust issues.	Contractor	2	2	N/A	Environmental Management Plan. Subcontractor management and contractual requirements.	1	1
3.3	Extension of Time	Extension of Time Events occurring. As defined in the Term Sheet: - Act or omission of the Owner (except to the extent caused or contributed to by the Contractor) not explicitly permitted under the Term Sheet - Inclement weather that prevents the Contractor from undertaking the Works - Industrial unrest due to strikes (or similar) not caused by the Contractor or which relate specifically to the Site - Change in scope of work - Change in Law - Force Majeure Event - Events not within the control of the Contractor (or its employees, agents or subcontractors) - Covid Delays	Owner	2	3				

3.4	Damage by Owner to the site during site preparation	Damage to the Works caused by the Owner, its contractors, agents and representatives, and subsequent delays to the Project.		2	3	Delap report at handover and punchlist provided. Damaging party to rectify	Project Engineer to coordinate Delap/Punch list and manage.		
3.5	Site conditions Latent conditions Ground conditions	Site conditions: latent conditions, unknown physical conditions and characteristics of the existing Site impacting the Works. This risk includes subsoil conditions, geotechnical conditions (i.e. ground bearing capacity and water ingress), ground contamination and asbestos.	Owner	2	3	Pre-site inspections	CEMP review and site oversight.	1	1
3.6	Defects	Defects arising during the Defect and Liability Period. Actual defects over budgeted allowance.	Contractor	2	2	N/A	Defects and Liability Period applicable to subcontractors	1	1
3.7	Services	Disruption of services causes rework, repair costs and delays	Contractor	2	2	N/A	Allowance for surveying and services location. Dial Before You Dig.	1	1
3.8	Planned inclement weather	Inclement weather (rain and wind) within the allowance of 24 days per year	Contractor	2	3		Allowance for inclement weather as per BOM data.	1	1
3.9	Inclement weather over and above allowance	Inclement weather over and above the allowance of 24 days per year	Owner	2	3			1	1
3.10	Quality risk	Workmanship, vendor quality, materials not fit for purpose, offsite test failing (tunnel air tightness, leachate pond liner water tightness, concrete strength, concrete performance, steel quality, asphalt quality, mech installation quality...)	Contractor	3	3	Tendering and review of vendors' capability.	Vendor selection process. Vendor contractual requirements.	2	2
3.11	Subcontractor management	Subcontractors performance, interface between subcontractors	Contractor	3	3	Tendering and review of subcontractors' capability.	Procurement strategy. Selection process.	2	2
3.12	Industrial relations	Industrial relations risk. Strikes affecting the project.	Contractor	2	2	N/A	IR Policies Subcontractor selection process and contracts.	1	1
3.13	Damage by the Contractor	Damage to the Works caused by the Contractor, its contractors, agents and representatives, and subsequent delays to the Project.	Contractor	2	2	N/A	Safework Method Statements. Traffic Management Plan.	1	1
3.14	Productivity	Staff and subcontractor productivity management	Contractor	2	3	Productivity assumptions as documented in the Basis of Estimate.	Subcontractor management. Follow-up of the productivity day to day.	1	1
3.15	Safety	Safety management. Safety incidents disturbs the Project. Worksafe investigation leading to site shutdown and delay (time and cost)	Contractor	2	2	N/A	Site inductions, SWMS, JSEA, daily Tool Box daily toolbox meetings, proper supervision and disciplinary processes	1	1
3.16	Environment	Vegetation, waterways and wildlife management. Contamination through spillage.	Contractor	2	2	N/A	Environmental Management Plan.	1	1
3.17	COVID	Delays in construction caused by lock down	Owner/Contractor	2	3		Covid Management Plan	1	1
4	Programme Risks								
4.1.	Owner delays	CAPEX availability and overall Project schedule: - Delay in the Commencement Date leading to increased escalation applied to the Contract Price. - Owner issuing a direction to the Contractor to suspend the Works or to limit the invoicing over a certain period of time which is not compatible with the planned Project schedule and leads to delays and cost overruns.	Owner	2	3			1	1
4.2.	Schedule risk	Contractor delayed for various reasons (delays in design deliverables completion, delays in issuing subcontracts and POs, lack of productivity, subcontractor not performing, poor sequencing...)	Contractor	2	3	Detailed program by PM from D&B team. 6 revisions.	Programme management. Subcontractor management.	1	2
4.3	COVID	Contractor delays due to Covid lock down	Owner/Contractor	2	3		Covid Management Plan	1	1
5	Supply Chain and Procurement Risks								
5.1.	Supply chain risk	Delay in procuring equipment to site.	Owner/Contractor	2	3	N/A	Procurement and supply chain programme. Vendor selection process.	1	1
5.2.	Contracting vendor	Vendor reject T&Cs. Rework of Project Contract, Longer Review prior award.	Contractor	3	2	Term sheet included in RFT.	Early warning and negotiation Define our 'walk away' position	2	2
5.3.	Variations	Scope of Works when tendered not fully detailed, vendor invokes variations. Additional costs in receiving, reviewing, compiling and approving variations. Additional contract management and construction costs.	Contractor	2	3	Scope of works defined in RFT as well as possible.	Active engagement of procurement resources and Pes.	1	2
5.4	COVID	Disruption in production, due to delays in supply or offtake	Owner	2	3		Covid Management Plan	1	1

6	Financial Risks								
6.1	Contract Price accuracy - Market pricing	Market conditions in 2023/24/25 differ from 2022, increasing subcontractor and supplier prices (over and above expected escalation). Underestimation during the Concept Design Phase.	Contractor	3	3	Market coverage of xx% of the direct costs.	Competitive tendering during execution. Costs forecasting.	2	2
6.2	Contract Price accuracy - Quantities & Design Growth	Increase in quantities. Concept design missed details / technical requirements that are added during Detailed Design.	Contractor	3	3	Concept Design as thorough as possible with allowed budget and resources.	Value engineering during detailed design. Challenge the designer.	2	2
6.3	FOREX and hedging movements	Fluctuations in the AUD/EUR exchange rate until the Commencement Date, at which point the EUR portion of the Works and hedging costs will be adjusted.	Owner	2	3			1	1
6.4	FOREX movements	Fluctuations in the AUD/EUR exchange rate after the Commencement Date.	Contractor	2	2		Hedging at Commencement Date	1	1
6.5	Commodity prices movements	Fluctuations in steel prices increases plant and equipment costs	Owner	2	2			1	1
6.6	Insurable events	Payment of deductibles for insurable events.	Contractor	2	1	N/A	Project Management Plans Negotiations of insurance policies T&Cs	2	1
6.7	Insurable events	Payment for events that are lower in value than deductible.	Contractor	2	1	N/A	Project Management Plans Negotiations of insurance policies T&Cs	2	1
6.8	COVID	Placing pressure on sales projections and cost inflation	Owner	2	1				
6.9	Escalation	Cost escalation until the Commencement Date, at which point the Contract Price will be revised to reflect actual escalation since the Concept Design stage.	Owner	2	3			1	1

CHAPTER 2 – BUSINESS RISK ASSESSMENT FOR THE ALTONA ADVANCED RECYCLING PROJECT

Table 1 Consequences

The table below presents risk consequences in terms of financial, project, reputation and people related consequences.

Rating	Descriptor	Financial	Project	People	Reputation
5	Severe	Extreme financial impact on project budget	Major project failure Most project objectives cannot be achieved	Employee death	Significant damage to SV's reputation and / or credibility resulting in embarrassment to the Minister and / or the Government
4	Major	Major financial impact on project budget	Loss of business functionality / capability Some important project objectives cannot be achieved	Extensive injuries to multiple employees	Major damage to SV's reputation and / or credibility with adverse media coverage extending over a number of days
3	Moderate	Some financial impact on project budget	Moderate disruption to project activities Some project objectives affected	Medical treatment required by multiple employees	Moderate damage to SV's reputation and / or credibility with adverse media coverage
2	Minor	Small financial impact on project budget	Minor disruption to day to day activities Minor impact upon project objectives	Medical or first aid treatment required by an employee	N/A
1	Negligible	Insignificant financial impact on project budget	Negligible impact upon project objectives	No injuries	N/A

Table 2 Likelihood

The table below presents risk likelihood ratings. Likelihood is defined in terms of the time period for which the risk is being assessed. For example, in the event of a project, likelihood is assessed in terms of the project's lifecycle.

Rating	Descriptor	Likelihood
5	Almost Certain	Risk expected to occur in most circumstances; and Risk has more than a 75% chance of occurring within the life of the project.
4	Likely	Risk will probably occur in most circumstances; and Risk has a 50% to 75% chance of occurring within the life of the project.
3	Possible	Risk might occur at some time; and Risk has a 25% to 50% chance of occurring within the life of the project.
2	Unlikely	Risk could occur at some time; and Risk has less than a 25% chance of occurring within the life of the project.
1	Rare	Risk may occur only in exceptional circumstances; and Risk is not likely to occur within the life of the project.

Table 3 Risk Evaluation

		Consequences				
		1 Negligible	2 Minor	3 Moderate	4 Major	5 Severe
Likelihood	5 Almost certain	Moderate	High	Extreme	Extreme	Extreme
	4 Likely	Moderate	High	High	Extreme	Extreme
	3 Possible	Low	Moderate	High	High	Extreme
	2 Unlikely	Low	Moderate	Moderate	High	High
	1 Rare	Low	Low	Low	Moderate	Moderate

Table 4 Risk Register for Altona Site Business

Issue	Response	Risk	Consequence rating	Likelihood rating	Risk rating	Mitigation strategy	Risk rating after mitigation
Schedule This refers to anything that will likely lead to delay in the project schedule, and ability to meet agreed milestones							
Delivery of equipment – Delay of Schedule	Delays in delivery of equipment to site can cause significant delays to construction schedules and subsequently project completion.	Equipment delivery delay would impact the construction timeline and project delivery.	3 - Moderate	2 - Unlikely	Moderate	Licella's is undertaking a joint venture project with Renew ELP in the UK that uses the same technology. This project is in a more advanced stage (construction due to commence in 2022) and therefore the lead items and timeframes for procurement have been proven in practice. These delivery times have been factored into the project timeline. Utilise preselected vendors approved for the Renew ELP project in the UK. There is zero scale up between UK and Australian facility. Australian Facility will be a close replica of the UK plant.	Low
Delays in obtaining planning approvals – challenges in bringing a new technology to market	With the Cat-HTR technology being a first of kind in Australia, challenges do exist in bringing a new technology to market.	Delays with Hobsons Bay Council in securing building approvals leading to a delay in the project schedule.	3 - Moderate	3 - Possible	High	The selected site is within 'SUZ 3 or Special Use Zone 3', zoned specifically for petrochemical use. ARV's technology is deemed a Chemical Works producing a petrochemical product and as such meets these zoning requirements. No land rezoning is necessary. Site and building designs and approvals will be handled by engineering and town planning consultants.	Moderate
Obtaining approvals and permits EPA Vic Development licence – known as Works Approval until 1 st of July Challenges include bringing a new technology to market	EPA approvals can cause significant project delays if issues are not addressed.	Development licence delayed or not approved leading to the inability to move forward with the project.	4 - Major	3 - Possible	High	ARV has written the EPA Development Licence Approval after undertaking several studies. Polluting and GHG emissions are minimal. The UK project, using the same technology, has gained the necessary regulatory approvals from the UK Environment Agency. Relevant data will be used to support the current submission.	Moderate

Issue	Response	Risk	Consequence rating	Likelihood rating	Risk rating	Mitigation strategy	Risk rating after mitigation
Community objection	Community objection is commonly seen with new projects in development and in many instances this has caused significant delays to projects.	Community is not aware of the innovative processes and they are fearful of the unknown or impacts on the community. This could cause community objection and cause potential delays and even the inability to proceed with the project.	3 - Moderate	3 Possible	High	ARV team have significant experience in engaging with local communities both in Australia and abroad – UK, Canada projects. ARV has engaged community consultation experts Capire Consulting to assist with identifying community issues and have developed a community engagement plan for project execution. Engagement by Capire Consulting with the local community identified that they were appreciative of early engagement prior to submitting a proposal and supportive of a project to find a solution for soft plastic recycling. Some concerns do exist related to impacts of the plant to air quality and the local environment. Establishing trust and credibility with the community and across environmental groups was considered paramount to successful engagement and Licella will ensure these concerns are addressed throughout our project. Dow Chemicals has an existing relationship with the local Altona Complex Neighbourhood Consultative Group – the ACNCG, a key community stakeholder. The facility is to be located in an existing petrochemical use zone. This area is not new to these processes in the area. ARV will implement the community engagement plan attached to the project submission. Including, holding additional community consultation meetings to discuss any issues with members of the community and engage in meaningful discussion in how Licella are to address their concerns.	Moderate

Budget

This refers to any risk that can result in increased cost

Issue	Response	Risk	Consequence rating	Likelihood rating	Risk rating	Mitigation strategy	Risk rating after mitigation
Escalation in project total cost - Additional costs due to impacts of COVID and worldwide supply chain problems	As with any project there is always a risk of increased project cost. Any further lockdowns globally can affect the ability to deliver equipment. There are ongoing, worldwide supply chain problems.	Total project budget increases above secured finance amount. There are many specialist pieces of equipment that cannot be manufactured in Australia. Requiring international expertise.	4 - Major	3 - Possible	High	Cost estimate has been taken from UK and Korean projects that are at a detailed stage of design with the full scope of equipment and plant costs being considered within this budget. Following recent financial model auditing with Grant Thornton, the project budget has an increased level of contingency to provide additional headroom within the project budget and reduce the likelihood of exceeding the project budget. ARV's current budget and contingency reflect that this is a first of kind facility in Australia. Our budget and timeline already take into account the current, relatively stabilised, Covid-19 situation.	High
Financial This refers to any risks that have arisen or may arise as a result of any volatility and illiquidity in current or future financial markets							
Consider potential market and global financial impacts of the fluctuating price of oil	As our product is a hydrocarbon product, it is typically effected by changes in oil pricing.	Oil and oil product prices dropping leading to loss of revenue	3 - Moderate	3- Possible	High	ARV has benchmarked its pricing with the price of oil over a 10 year period for each of the base products and taken conservative measures in modelling price. There is potential for upside via the environmental benefits associated with the products due to the ability to create recycled polymers. As this cannot currently be benchmarked this price is not included within modelling. ARV is offering a fixed off-take price to the refinery in Australian dollars. This provides them with long term security from fluctuations as well as reducing the need to hedge pricing based on fluctuating currency. This is currently under discussion with potential off-takers	Moderate
Securing Debt financing	Debt financing can be difficult to secure for	That debt financing is	4-Major	3-Possible	High	ARV have been engaged with Commonwealth Bank and other banks regarding supporting	High

Issue	Response	Risk	Consequence rating	Likelihood rating	Risk rating	Mitigation strategy	Risk rating after mitigation
	first of kind projects or can be non-economical.	difficult to close on the project.				the project with a marginal amount of debt financing. Letters of support have been obtained by CBA. Licella have confirmed with Grant Thornton that the debt proportion of the project is well in line with commercial lending in project finance. ARV are also currently researching the possibility to have the project debt secured against existing assets of project partners.	
Interest rate increases	Interest rates are at historic lows.	An increase in interest rates leading to higher debt funding price and reduced project returns.	3-Moderate	2-Unlikely	Moderate	Long-term forecasting of interest rates show medium. Debt financing security may only be required for the project in the short term.	Moderate
Securing equity financing	Being a first of kind project in Australia, there is typically perceived risks for the first facility. This can create difficulty in gaining equity into the project. Equity investors are looking for increased return by being first movers and investing with this risk.	Unable to secure project finance.	4 - Major	3-possible	High	ARV has been awarded a federal government grant for \$12 million. ARV have gained strong in-principle backing from a number of leading Australian companies who have submitted terms of agreement for investment,	Moderate
Financial viability of applicant and project partner(s) This refers to budget risks (both revenue and expenditure), risk of returns (or avoided costs) being lower than anticipated, bankruptcy of technology provider, failure to secure inputs and sell outputs at the expected value, financial risks as a result of interrelated business/entities							
Financial strength of the applicant and project partner(s).	That the applicant will have the ability to fund the project and survive the life of the project	That ARV becomes bankrupt throughout the	5 – Severe	2- Unlikely	High	ARV has been awarded a federal government grant for \$12 million. ARV have gained strong in-principle backing from a number of leading Australian	Moderate

Issue	Response	Risk	Consequence rating	Likelihood rating	Risk rating	Mitigation strategy	Risk rating after mitigation
		life of the project. Project does not successfully raise necessary equity for the project				companies who have submitted terms of agreement for investment, With increased interest in “Clean Tech” and Circular Economy solutions we are confident that, with the backing of the Victorian and Federal Governments, we will be able to raise the matching funding for the project to be able to proceed.	
Identify key risks for the organisation in meeting the obligations under commercial agreement(s) and how it proposes to manage such risks.	Potential breach of product off-take agreement	That the product quality is not to the specification negotiated with off-taker The facility does not reach intended plant capacity	4 – Major	3 – Possible	High	UK project has recently formed a global alliance with Dow Chemicals after extensive due diligence on the product quality. This shows a high degree of confidence in the quality of the product produced from the Licella pilot facility underpinning this investment. Advanced Recycling facilities using Cat-HTR technology will be operational in the UK, Korea and Japan prior to the Altona facility. obligations. Issues regarding product manufacturing quality will be resolved prior to the Altona facility commencing operations.	Moderate
Failure to meet feedstock supply contractual agreements	Potential breach of feedstock supply agreement	That ARV will not be able to accept all the waste it is contracted to receive This could make ARV liable for material disposal costs	4 – Major	2 - Unlikely	High	ARV will enter into feedstock supply contracts that allow for periods when plastic supply cannot be accepted.	Moderate
Identify key risks for the project partner in meeting the obligations under commercial	ARV is developing its first Australian Cat-HTR facility and relies on project partners	Project partners have conflicting priorities.	4 – Major	2 - Unlikely	High	The companies engaged with this project have a key interest in ensuring a positive outcome for this project as it will be mutually beneficial if they become equity providers to the project.	Moderate

Issue	Response	Risk	Consequence rating	Likelihood rating	Risk rating	Mitigation strategy	Risk rating after mitigation
agreement(s) and how it proposes to manage such risks.	committing to this project	Individual project partners do not fulfil their commitments.				The project will have a steering committee which will have the ability to influence the partner creating conflict for the matter to be resolved. Conflicts are unlikely to arise as all partners have a common goal in creating a circular economy in Australia and reduce their environmental impact. So far all project partner communications and interactions have been positive.	
Environment, natural and cultural heritage This refers to any impact on the natural environment and heritage of the environment							
Impacts of new EPA legislation General Environmental Duty (GED) introduction State Environmental Protection Policy (Air Quality Management) (SEPP AQM) replaced with Environmental Reference Standard (ERS)	New EPA legislation has been introduced on the 1 st of July 2021 apply to the Cat-HTR facility.	Difficulty in navigating a new environmental standard. New legislation introducing additional requirements on the facility require the updating of GED.	3 – Moderate	3 – Possible	High	The timing of the new legislation allows ARV to fully incorporate it in our planning and ensure that any necessary changes to our process are incorporated from the outset. Licella has engaged consultant Randell Environmental Consulting to undertake a review of the new legislation and how it would apply to our technology and proposed facility. This review identified the major change of general environmental duty (GED). This project will need to demonstrate that it understands, prevents, and minimises risk and impacts to the environment and human health to meet its GED requirement. This will need to ensure that best practice will be implemented to manage environmental impact. Licella has a history of adherence to environmental regulations at its facility in Somersby, NSW with no breaches to its environmental duty since 2008. ARV will utilise state of the art technology to ensure that best practices measures are implemented to minimise risk and impact to the environment and human health.	Moderate

Issue	Response	Risk	Consequence rating	Likelihood rating	Risk rating	Mitigation strategy	Risk rating after mitigation
New facility creating risk to flora and fauna, air pollution, water pollution, noise and vibration	A new facility requires a good understanding of all the impacts to the environment.	That the Cat-HTR facility may impact existing ecosystem.	3 – Moderate	2– Unlikely	Moderate	The site has already been disturbed and licensed as an industrial site. As the targeted site has been owned by Dow Chemicals for over 50 years and an existing petrochemical facility has operated on that site there are no perceived risks to the environment. The site is zoned SUZ3 which is for petrochemical usage. This zoning would not have been given if the site was of environmental significance. ARV is not aware of any impacts that the facility could have on existing flora or fauna. ARV will review with site owners any known environmental issues, protected species or sensitive areas. Licella since 2008 have been undertaking detailed analysis of its plant effluents in NSW, including air and water. Licella understand the safe management of these effluents.	Low
Existing contaminated land	Areas where existing industrial activity can often contain contaminated land	Land is contaminated and could introduce a liability for the company.	3 – Moderate	3 – Possible	High	It is known that the Dow site has areas of existing ground contamination that is currently being remediated. Dow is currently mandated to clean up all contaminated land are not able to sell the land until the site is remediated. The site remediation is Dow's responsibility and ARV as a site leaseholder is not liable for Dow's site remediation. Dow and ARV's lease addresses site contamination	Moderate
Cultural heritage impact	There may be existing cultural heritage on the site location	Constructing a new facility could impact the existing cultural	3 – Moderate	2 – Unlikely	Moderate	As the targeted site has been owned by Dow Chemicals for over 50 years and an existing petrochemical facility has operated on that site there are no perceived risks to cultural heritage.	Low

Issue	Response	Risk	Consequence rating	Likelihood rating	Risk rating	Mitigation strategy	Risk rating after mitigation
		heritage of the site				The site is zoned SUZ3 which is for petrochemical usage. This zoning would not have been given if the site was of significant cultural heritage. Confirm with site owners that there are is no issue with cultural heritage impact on the site.	
OH&S							
This refers to safety and health risks. The risks and proposed mitigants should consider the risks during the key stages of the project							
Safety of employees and the general public. Exposure to health risks during operation	Hydrocarbon processes have known health risks that could impact employees.	Any release from the site could impact health of employees and the general public.	4 – Major	2 – Unlikely	High	Licella have operated its pilot facility for 12 years. ARV has a good understanding of the potential risks to employees and the general public. A “Human Health Risk Assessment” has been conducted for the project and all risks were deemed to be negligible.	Moderate
Safety risk during construction	Construction activities can create hazards due to heavy equipment, mobile equipment moving on site that could lead to injury	That a fatality or sever injury occurs on site during construction.	5 – Severe	2 – Unlikely	High	Selected construction contractor to have a safe work mentality. As part of selection process, the contractor will have to demonstrate safety measures they take and provide a history of incident free construction. ARVwill scrutinise and rely on the safe work practices of the selected contractor.	Moderate
Personnel risk during commissioning	During the commissioning phase there is potential for equipment to malfunction resulting in potential injury if personnel in the area	That commissioning personnel are severely injured due to a plant failure	4 – Major	2 – Unlikely	High	Commissioning practices of the selected construction contractors will ensure that risk to staff during commissioning is minimised. Experience from Licella's NSW pilot plant will be incorporated into the commissioning procedures.	Moderate
First of kind commercial facility in Australia. Perceived increased operational, maintenance and equipment wear risk.	First of kind technologies are often seen as having increased and unknown risks.	Potential impact to personnel, environment and property due to unknown risks	4 – Major	2 – Unlikely	High	Licella have experience operating and scaling up its pilot facility since 2008 and have significant experience in understanding the risks associated with the process and technology. The UK project will become operational 12 months before the Australian one so it will	Moderate

Issue	Response	Risk	Consequence rating	Likelihood rating	Risk rating	Mitigation strategy	Risk rating after mitigation
						generate full scale operating, maintenance and equipment wear data that will inform the Australian facility. A conservative strategy has been implemented to slowly increase the plant capacity time.	
Fire Risk	Victoria has experienced multiple waste stockpile fires and chemical fires.	Health and Environmental risk to general public and local community	3 – Moderate	2 – Unlikely	Moderate	Feedstock to be stored in dedicated storage bunkers or in shipping containers to prevent risk of fire spread. Stockpiling of feedstock on site will be minimal with a maximum of 4 days of storage or 240t to be stored on site. Extensive fire monitoring systems and fire fighting systems are an integral part of the facility design. Staff will be fully trained in minimising fire risks and eliminating sources of ignition. Regular fire drills and training will be provided.	Low
Technical This refers to any risk associated with the technology / plant infrastructure not performing in accordance with regulatory requirements and / or unable to product outputs meeting specification requirements							
Technology failure Failure of plant to operate Critical issue with key equipment	A key piece of equipment may not operate as designed or there is a failure of the technology.	Facility does not operate as anticipated either by not reaching capacity or critical equipment failure.	4 – Major	3 – Possible	High	Cat-HTR technology has been continuously developed since 2008. Licella have long experience with key equipment items and their necessary specifications. Any failure to operate by the UK, Korean or Japan projects during commissioning will be addressed for the Victorian project to reduce commercial risk of failure to operate. Licella has proven it can process post-consumer feedstocks and, by doing so, has produced products that have been extensively independently tested and verified to be of interest and value to major petrochemical companies and refineries globally. The proposed project is a scaled up of our existing facility and therefore the likelihood of technical issues is relatively small. If any arise, they would be addressable by our staff.	Moderate

Issue	Response	Risk	Consequence rating	Likelihood rating	Risk rating	Mitigation strategy	Risk rating after mitigation
Targeted plant emissions limits exceeded during plant commissioning	Plant effluents are the key concern of environmental agencies.	Operating licence is not approved for the facility until emissions profile is reduced	3 – Moderate	2- Unlikely	Moderate	Prior to facility operation, the Licella UK project will have become operational providing experience with plant effluents of the full-scale, commercial facility. The Victorian plant will use the same equipment as the UK facility. UK data to be provided as a point of comparison for Australian project. Using this experience, Licella is targeting a best practices approach to minimise the emissions of the Victorian facility. Emissions limits are to be confirmed during the development licence approval process ARV has designed and financed the facility so as ensure that emission requirements are met and exceeded..	Low
Waste inputs This refers to any risk associated with the pathway for the waste material							
Feedstock not secured for the facility Insufficient material supply for the facility	Feedstock supply is critical to project viability. Without supply there is no project	Contracts not secured for supply to the project. Inability to gain project financing	5 – Severe	2 – Unlikely	High	There is ample post-consumer waste plastic in Australia. The key issue is securing material of sufficient quality. To that end, ARV is currently engaged with: Veolia and Cleanaway, iQRenew and REDcycle regarding supply of material to the facility. Letters of support have been provided in the main application. A feedstock mapping exercise has been conducted with key waste suppliers in Victoria to quantify and identify the full range of feedstocks suitable for Cat-HTR processing.	Moderate
Feedstock security Outline the extent to which feedstock requirements are sensitive to change, the ability to manage fluctuations in throughput, and be	Feedstock quality can vary over time from suppliers and contaminant levels can increase if contracts are not adhered to.	Out of specification feedstock is delivered to site Feedstock is unable to be	2 – Minor	4 – Likely	High	Cat-HTR technology can process a wide range of mixed plastics. Therefore, feedstock variability would have a limited impact. To secure feedstock,ARV will enter into supply agreements with waste management companies, MRFs and other waste plastic aggregators. Letters of support have been received from Veolia, Cleanaway, iQRenew	Moderate

Issue	Response	Risk	Consequence rating	Likelihood rating	Risk rating	Mitigation strategy	Risk rating after mitigation
compliant with stockpile requirements. If you are recovering glass, please include impact of upcoming container deposit scheme and the introduction of the glass municipal kerbside bin. Applicants should provide evidence as to how this has been considered from a commercial, financial and technical perspective in the project plan and budget.		processed by the facility Increased disposal costs to landfill				and REDcycle who are interested in supplying this initiative. These companies want to see greater value created in the recycling industry. Feedstock to be sampled prior to processing in the plant. This will enable any contamination issues to be raised and any breaches to be dealt with contractually. In the long-term, plastic feedstock is becoming more valuable. This is meaning that greater care is being undertaken to reduce contamination so more feedstock can be recycled. Feedstocks will increase in price over-time however at the same time ARV is investigating methods to achieve higher value for products such as a recycled content premium for the valuable product produced.	
Waste stockpiling	Victoria has experienced storage of waste in warehouses due to no viable end markets for material and to avoid landfill costs.	Increased fire risks for unregulated storage of waste. Unknown tracking of waste quantities on site	3 – Moderate	1 – Rare	Low	ARV intend to store up to 4 days worth of feedstock totalling 240 tonnes. This material is to be stored in segregated containers to reduce risk of fires. This stockpile will only reach the upper levels of our 180 tonnes capacity when approaching public holidays to provide sufficient material to continue operation. Feedstock supply agreements are to be structured in a way to allow for a reduction in supply in the event of plant stoppage.	Low
Waste Export Ban for plastics	Mixed plastic waste is banned for export July 2021, unprocessed single polymer plastic to be banned July 2022.	That there is no local capacity to manage these waste materials	2 – Minor	2 – Unlikely	Moderate	This is a positive for the Cat-HTR technology as it ensures that a primary source of feedstock is not exported and therefore increasing the supply and availability to ARV locally. The ban creates an opportunity for material previously exported to be recycled in Australia. Mechanical recycling where capacity exists will mechanically recover what it can with the Cat-	Low

Issue	Response	Risk	Consequence rating	Likelihood rating	Risk rating	Mitigation strategy	Risk rating after mitigation
						HTR to process residual and mixed plastic waste streams. Insufficient end markets exist for these feedstocks in Australia which works well for the Cat-HTRs nearly limitless off-take market of supply to VIVA with a plant capacity of 5.4 million tonnes per annum. The only limitation will be the capacity of the Cat-HTR facility, not the market.	
Outputs This refers to any risk associated with the pathway for output (i.e. offtake arrangements) and/or secondary waste							
End market security Describe the sensitivity of the market to change, and impact project viability should those end markets not be available. This may include changes in market conditions including external factors (global economic conditions) and government impact (policies), change in input prices, change to commercial agreements and your ability to manage fluctuations in end markets. End markets and offtake agreements not secured	Off-take market for a facility is critical to its viability. These agreements are necessary in order to gain full project financing from an equity and debt perspective.	Project not to proceed if off-take agreements cannot be agreed.	5 – Severe	2 – Unlikely	High	Alternative off-take markets are actively being pursued to reduce the risks associated with a single off-take market. These various off-take strategies are outlined in the product off-take study. This is also used to provide an underlining basis of alternative off-take options to validate the value of the product.	Moderate
Security of supply and demand projections. Closure of the VIVA refinery within the life-	With only one refinery remaining in operation in Victoria, if this refinery closes, this will impact the Cat-HTR	ARV's ability to sell product into the local polymer supply chain	3 – Moderate	3 – Possible	High	ARV has developed multiple off-take pathways to mitigate this risk. See the product off-take study appended to the main application. The baseline assumption within the financial model assumes that the refinery does not exist and	Moderate

Issue	Response	Risk	Consequence rating	Likelihood rating	Risk rating	Mitigation strategy	Risk rating after mitigation
time of the Cat-HTR facility	facility as well as the entire polymer supply chain including; Qenos, LyondellBasell Australia and Taghleef Industries among others who will no longer have a local source of polymers.	will be severely affected. Collapse of local polymer supply chain				that the products can be sold individually to distributors. Demand from brands and polymer producers for food grade recycled polymers globally provides a lucrative opportunity to export product to Asia. Shell for example have outlined they target to source up to 1m tonnes of material in their refineries from post consumer plastics. Fractions of product suitable as a substitute for low sulphur fuel oil meaning that alternative markets exist for the product in the short term if Viva closes.	
Producing outputs to quality specifications for end markets	Feedstock contamination could lead to a variation in the product quality. Chlorinated plastics have been identified as a key contaminant of risk to off-takers.	Feedstock supply issue leading to increased levels of PVC Loss of revenue to facility	3 – Moderate	3 – Possible	High	Risk of chlorinated plastics has impacted our strategy in sourcing feedstocks for the facility and resulted to processes being put in place to reduce risk of contamination with PVC. Feedstock will undergo a mechanical preparation process to reject PVC via optical sorting. Reducing risk of PVC being received at the Cat-HTR facility Feedstock sourced from origins with low PVC content. Feedstock is to be screened as part of quality control prior to processing in the Cat-HTR plant. The quality specifications for downstream users of the refinery in the polymer supply chain has already been assessed via the KitKat prototype where food grade polymers can be produced that have no impact on quality. https://www.licella.com.au/news/the-kitkat-thats-the-sign-of-a-break-in-australias-waste-challenge/ Cat-HTR process is a hydrothermal process and has undertaken testing that shows the presence of water at supercritical conditions with PVC causes chlorine to partition to the	Moderate

Issue	Response	Risk	Consequence rating	Likelihood rating	Risk rating	Mitigation strategy	Risk rating after mitigation
						water phase rather than liquid product, reducing the impact of any present PVC on product quality. Calcium carbonate can be added to the process to improve removal of chlorinated compounds.	
Managing residues Material requiring disposal	Residue of Cat-HTR process contains high molecular weight hydrocarbons and ash.	Potentially High material disposal costs Value attributed to the residue fraction is less than currently forecast.	3 – Moderate	2 – Unlikely	Moderate	ARV have confirmed with specialist bitumen consultant that the heavier fraction is suitable in road applications.. This fraction is considered a viable product for Downer, substituting traditional crude oil residue. The heavy residue fractions are only a 11% of total revenue for the facility. If this price was less, this would not substantially effect the financial viability of the project.	Low

CHAPTER 3 - SITE SPECIFIC RISK REGISTER FOR CONSTRUCTION AND OPERATIONS

RISK ASSESSMENT METHODOLOGY

The risk assessment was conducted utilising the risk assessment methodology in "AS/NZS ISO 31000 Risk Management - Principles and Guidelines".

The first stage of this methodology was in hazard identification. To ensure all potential hazards associated with this proposal for the Altona location were identified, specific environmental and/or community impact issues were determined based on the location of the facility.

The hazard identification process was conducted by reviewing industry publications on the management of end-of-life plastic wastes, international literature on processing the waste and understanding what procedures were covered in the Australian Standards for Fuel Handling & Transportation. The hazards identified were:

- Critical infrastructure failure;
- Feedstock spills;
- Product spills;
- Unpleasant odour;
- Hazardous emissions to atmosphere;
- Storm water contamination;
- Wastewater egressing from the site;
- Soil contamination;
- Plant based fire;
- Plant based explosion;
- Bushfire or neighbouring fire;
- Malicious damage – vandalism or terrorism;
- Noise pollution;
- Light Pollution; and
- Excessive dust creation.

Criteria for assessing identified hazards are given in the following sections, noting that the realistic likelihood and consequences were judged based on the design consideration for the proposed facility. These criteria were measured against the impact (if the potential impact occurred) to the environment.

Table 1 - Evaluating likelihood

Likelihood	Description	Probability	Community attitude
Remote	May occur in exceptional circumstances	<1%	Few people interested
Unlikely	Not expected to occur in most circumstances	1-20%	Some people affected
Possible	May occur	21-49%	Many people affected
Likely	Probably will occur	50-85%	Most people affected
Almost Certain	Expected to occur	>85%	Almost everyone affected

Table 2 – Evaluating consequence

Consequence	Minimal	Minor	Moderate	Major	Catastrophic
Magnitude					
Spatial	Event contained within facility perimeter	Event affects immediate neighbours within industrial zone.	Event impacts nearby residential or other sensitive receptors.	Event impacts regionally but within VIC	Event has impact nationally
Intensity	Very Low	Low	Moderate	High	Very high
Temporal					
Duration	Single	Few events	Several events	Multiple events	Ongoing events
Timing	Once or twice	Occasional	Infrequent	Regular	Permanent
Ecological					
Values	No Value	Value to individuals	Value to Altona.	Value to Victoria	National Value
Sensitivity	Will recover	Some changes to ecosystem functioning	Moderate change to ecosystem functioning	Significant change to ecosystem functioning	Will not recover
Social					
Number of people	Some people indirectly impacted	Some people directly impacted or several indirectly	Several people directly impacted or many indirectly	Large number of people directly impacted	Loss of life
Heritage	Impact on item of minimal significance	Impact on multiple items of low significance	Impact on significant item	Impact on multiple significant items	Major impact on protected item
Political	Single negative press article	Multiple negative press articles	Significant public interest	Leads to an inquiry	Change of government
Economic	Minimal Costs	Several thousand dollars in costs	Half million dollars in costs	One million dollars in costs	Several million dollars in costs

Table 3 Risk Evaluation

Consequence	Minimal	Minor	Moderate	Major	Catastrophic
Likelihood					
Remote	Negligible	Negligible	Very low	Low	Medium
Unlikely	Negligible	Very low	Low	Medium	High
Possible	Very low	Low	Medium	High	Very high
Likely	Low	Medium	High	Very high	Significant
Almost certain	Medium	High	Very high	Significant	Significant

The Risk Assessment table below evaluates risks without any controls in place then again with controls in place. Controls are only introduced if the uncontrolled risk is Medium or a higher level.

Table 4 Risk Register for Altona Advanced Recycling Project

EIS Ref.	Hazard / Risk	Project Phase	Description	Likely Cause	Unmitigated Likelihood	Unmitigated Consequence	Unmitigated Risk Level / Significance	Actions / Studies to be Conducted / Mitigation	Mitigated Likelihood	Mitigated Consequence	Residual Risk Level
1	Spill of plastic feedstock / contamination	Operation	Possibility of feedstock spill during unloading or during transport to site	Motor Vehicle Accident or poor unloading procedures	Remote	Minor	Negligible				
2	Spill of Fuel / contamination	Operation	Fuel spill during loading from tank farm or during transporting from site	Motor Vehicle Accident or connect / disconnect procedures not followed / fuel truck drives away while loading hose is connected	Remote	Major	Low				
3	Spill of Fuel / contamination	Operation	Fuel spill from the tank farm	Rupturing of storage tank, overfilled storage tank or human error	Remote	Catastrophic	Medium	The site design will have Australian Standard for bunded storage	Remote	Minor	Negligible
4	Soil Contamination	Operation	Leakage/Seepage of fuel to soil and groundwater	Fuel spills on site passing through or around the concrete slab	Remote	Major	Low				
5	Soil contamination	Construction	Soil contamination affecting the health of construction and operational workers	Latent soil contamination, leaking oil or fuel from construction vehicles.	Remote	Moderate	Very Low				
6	Odour from feedstock	Operation	Odour from the received-on site feedstock	Failure of the feedstock supplier quality management system / Failure of the feedstock processing equipment	Unlikely	Moderate	Low				
7	Odour from emissions	Operation	Odours emanating from facility through the stack	Failure of the odour capture system	Likely	Major	Very High	Fugitive odour and emissions from exhaust gases will be captured in the flume scrubber. Fugitive odour and emissions from storage tanks will be contained by internal floating rooves	Unlikely	Minor	Very Low
8	Hazardous Emissions	Operation	Emissions from the plant being outside the emission standard	Feed stock is out of specification	Possible	Major	High	Fugitive odour and emissions from exhaust gases will be captured in the flume scrubber. Fugitive odour and emissions from storage tanks will be contained by internal floating rooves	Unlikely	Minor	Very Low
9	Air Quality	Operation	Cumulative impacts of the site emissions with other developments in the air shed	All of the industries in the area exceeding their emissions specification	Remote	Major	Low				

10	Storm and waste water egressing from the site	Operation	Untreated storm or waste water getting into the sewer or catchment systems	Extreme weather event	Possible	Major	High	Water treatment plant will be used to process water prior to release to trade-waste line.	Remote	Minor	Negligible
11	Excessive noise	Construction and Operations	On site noise levels generated are outside the specified level for SUZ3 site and could if unmitigated effect neighbours or residents in and around the region	Truck movements, plant operation feedstock processing	Possible	Moderate	Medium	Noise modelling will be conducted. Building materials will be used to attenuate noise sources.	Unlikely	Moderate	Low
12	Fire on site	Operation	Truck fire on site	Trucks not maintained	Remote	Major	Low				
13	Fire on site	Operation	Fire in plastic store	Local ignition source, fire escalating from adjoining plant, electrical fault	Remote	Major	Low				
14	Flash Fire / explosion	Operation	Hydrocarbon vapour release from the plant during operation potentially causing a flash fire or liquid release leading to pool fire	Corrosion / failure of fittings or flanges	Unlikely	Catastrophic	High	Engineering design will manage the risks associated with on site explosion or fire, with mitigation measures to be installed. Automated plant shut down systems are incorporated in the plant design and have back up systems in place. Staff trained and aware of Emergency / Disaster plan. Carry out a Fire Safety Study to ensure detection and prevention system are designed to meet the relevant standards.	Remote	Moderate	Very Low
15	Pool Fire / explosion	Operation	Damage to storage tanks or associated pipe work leading to liquid spill and potential for a pool fire	Vehicle impact with tank or pipe work, overfilling	Unlikely	Major	Medium	Engineering process controls designed will be used to eliminate tank overfill. Mechanical interlocks will prevent truck movement whilst connected to plasticude loading equipment. All piping will be installed in elevated pipe platforms.	Remote	Minor	Negligible
16	Flash Fire / explosion	Operation	Product gas release to atmosphere leading to flash fire	Vehicle impact with tank or pipe work, overfilling, corrosion, failure of fittings or flanges, electrical fault	Unlikely	Catastrophic	High	All piping will be installed in elevated pipe platforms. Regular maintenance of pipe-lies and valves will be carried out	Remote	Minor	Negligible

17	Fire / explosion	Operation	Fire or explosion: storage tanks or plant damaged by malicious practices	Terrorist or arson attack,	Remote	Catastrophic	Medium	Security measures in place include access control, CCTV and security checks for staff to minimise attacks from within.	Remote	Moderate	Very Low
18	Bushfire or neighbour fire	Construction and Operations	Bushfire or neighbour's fire could pose a threat to the Facility	Bushfire: Arson or weather event. Failure of neighbours' fire safety systems	Possible	Catastrophic	Very High	The site is surrounded by either industrial sites or vacant land with low sparse grass. 24/7 operation will mean the facility is always manned. In the event of either event, the deluge system would be used to mitigate any risk to the facility.	Possible	Minor	Low
19	Loss of Fire Fighting water supply	Operation	Insufficient water supply from tanks and mains for fire suppression in the event of an emergency	Fire-fighting tank leak / damage to the water main / shut off of the water main	Remote	Catastrophic	Medium	Given the volume of water stored in fire-fighting tanks plus access to industrial water should prevent there ever being a shortage of water for fire-fighting	Remote	Moderate	Low
20	Operations effecting aircraft	Operation	Operations from stack flaring effecting aircraft	Visual impact / distraction for pilots	Rare	Minimal	Negligible				
21	Poor quality feedstock impacting on operations	Operation	Feedstock supplier providing out of spec feedstock	Supplier non-compliance with the feedstock agreement	Possible	Major	High	Operations staff will be watching feedstock throughput. In-line equipment will remove contaminant metals. Ongoing auditing of feedstock will be carried out to check feedstock spec.	Unlikely	Moderate	Low
22	Hazardous Emissions	Operation	Contaminated feedstock containing >1% PVC / PET	Feedstock supplier quality inspection failure	Possible	Major	High	Operations staff will be watching feedstock throughput. Ongoing auditing of feedstock will be carried out to check feedstock spec.	Unlikely	Moderate	Low
23	Vermin and pest animals which impact on health	Operation	Facilities and materials storage providing harbour to vermin and pest animals which impact on health and amenity	Failure of pest control measures	Possible	Moderate	Medium	Containerized supply of feedstock will minimize the opportunity for vermin to get established in feedstock	Unlikely	Minor	Very Low
24	Water borne pests hazard to health	Operation	On-site stormwater management facilities providing habitat to water borne pests	Stagnant water on site	Possible	Moderate	Medium	The site already has systems in place that prevent stagnant water from pooling	Remote	Minor	Negligible

25	Visual Impact	Operation	Visual impacts from the storage of materials	Loose feedstock being stored outside storage sheds	Remote	Moderate	Low				
26	Visual Impact	Operation	Visual impacts from the site lighting the facility	Lighting not being installed in accordance with the AS 4282-1997	Remote	Minor	Negligible				
27	Hazardous Emissions	Operation	Emission control technology failure	Failure of a critical process through fire, explosion,	Remote	Catastrophic	Medium	Redundant systems are in place for fail safe systems incorporated in the plant design to ensure that a loss of power would default to shut down mode:	Remote	Minor	Negligible
28	Hazardous Emissions	Operation	Over-pressure of cylinders in Cat-HTR process	Malfunction of over-pressure devices	Remote	Minor	Negligible				
29	Hazardous waste management	Operation	Accumulation of process waste that poses a risk to the environment or human health	Staff not following handling of hazardous waste procedures	Remote	Catastrophic	Medium	Staff training and awareness of waste handling procedures. All process waste generated by the operation of the facility will be disposed of appropriately by a contracted waste disposal company.	Remote	Minor	Negligible
30	Air Quality	Construction	Excessive dust or emissions	Vehicle operations	Possible	Minor	Low				
31	Soil contamination	Construction	Localised soil contamination from construction activities	Spills or leaks, building material residues, contaminated materials from service vehicles.	Possible	Minor	Low				
32	Contaminated soils/waste	Construction	Pre-existing site contamination affecting plant or construction employees	Previous land use, neighbouring industrial operations.	Remote	Moderate	Very low				
33	Stormwater contamination	Construction	Run-off containing hazardous substances or causing land erosion or silt loading.	Poor drainage, extended or severe weather events.	Likely	Moderate	High	The site already has a storm-water systems in place. Construction will only be undertaken in limited areas.	Remote	Minor	Negligible
34	Security Breach	Construction	Fires or damage caused by vandals	Thieves or vandals breaking into the site	Possible	Moderate	Medium	The site has 24/7 site security which is likely to remain until site operations commence	Remote	Minor	Negligible

35	Noise and vibration	Construction	Construction equipment generating unacceptable noise levels or vibration	Plant, vehicle movements, builders' tools etc.	Possible	Moderate	Medium	There is a considerable buffer zone to neighbouring sites and residential zones. Site construction activities are not expected to be louder than normal.	Remote	Minor	Negligible
36	Hazardous Emissions / soil or storm water contamination	Operation	Damage to facility by means of Flooding, Accidents of Vandalism	Random accidents, acts of nature, arson.	Remote	Catastrophic	Medium	The site will have 24/7 operations with constant site monitoring and surveillance cameras	Remote	Minor	Negligible