3. Risk assessment

3.1 Introduction

This chapter provides an overview of potentially significant environmental risks associated with construction and operation of the EfW Project and how these risks will be managed in accordance with EPA regulatory requirements. The objectives of the Risk Assessment are:

- Identify significant environmental risks to guide the application of Best Practice technology for management of impacts (refer to Chapter 5, Environmental best practice)
- Identify both construction and non-routine operation environmental risks in order to determine appropriate risk management strategies (refer Chapter 12, Environmental Management).

The assessment findings have formed the basis of the overall regulatory compliance assessment for the Project and development of mitigation measures.

The risks outlined in this chapter have been identified through:

- Qualitative environmental risk assessment undertaken prior to completion of the design
- Project, technical and environmental risk assessment workshops with the wider Project team culminating in development of a quantitative Environment Risk Register
- Completion of technical assessments in support of this Works Approval Application (WAA) which provide greater detail on individual risk items (e.g. air quality modelling, engineering processes for the EfW plant and waste management).

Further details on the environmental risks identified for the Project are provided in the Project Environment Risk Register in Appendix C. This lists a broader range of risks, and includes non-routine operational scenarios such as plant maintenance, equipment failure and emergencies. This chapter and the overall WAA places particular emphasis on risks that are designated medium or high risks in the risk assessment. This allows for greater emphasis to be placed on activities that have a greater potential to impact on the environment and community.

The EPA *Works Approval Application Guidelines (June 2017)* do not specifically require proponents to address plant decommissioning risks as part of a WAA. As such, these issues will be addressed during subsequent design and development phases of the project once an EPC contractor has been selected.

Refer to Appendix C for further information to support this chapter, including the full risk assessment.

3.2 EPA assessment guidelines

The *Environment Protection Act 1970* (EP Act) and subordinate legislation (including State Environment Protection Policies – 'SEPPs') require a Proponent to assess any environmental risks that may have a significant impact on the environment. Section 13 of the EPA WAA Guidelines 1307.10 (EPA, 2015) specifically requires the assessment of risks associated with non-routine operations (Section 13.1) and Construction impact management (Section 13.3), both of which are covered by this chapter and in more detail in issue-specific chapters (e.g. air quality, water use and surface water management).

3.3 Risk assessment methodology

The Project Risk Register (also referred to as the Risk Register) was developed in September 2017 and will be updated throughout the life of the Project.

Risks were identified and assessed based on information from the following sources:

- Completion of environmental technical studies outlined in this WAA (noise, air, waste etc.)

- AP's experience in operating the existing Maryvale Pulp and Paper Mill, summarised in existing environment risk registers and gathered in interviews and workshops with AP operations staff
- Design review workshops in the early design phase which identified a range of environmental risks requiring design changes or modifications to the site operational philosophy (e.g. moving grate technology)
- Issues raised during previous and current community and stakeholder engagement (refer Chapter 1.6: Community and stakeholder engagement)
- A project risk workshop held in early September 2017 attended by AP site operators, environment representatives, design managers from the design team as well as Jacobs engineering and environmental specialists
- A dedicated environmental risk workshop held in January 2018 attended by a Jacobs team of project managers, environment representatives, design managers, engineers, waste consultants and air quality specialists
- Review of updated design information, manufacturers' specifications and using similar technology worldwide.

3.4 Stage 1 risk assessment

A high level project risk assessment workshop was conducted in September 2017 and attended by AP staff, technical specialists and environmental personnel. The aim of the workshop was to review the risks associated with the following objectives:

- Deliver a commercially sustainable and environmentally responsible energy from waste business solution at the Maryvale Mill
- Provide electricity and steam supplies to the mill at improved cost and strategic value (relative to business as usual)
- Achieve agreed stakeholder requirements including Community, Federal, State and Local Government, Employees, and waste supplier groups
- Maintain health, safety and environmental standards as an imperative (non-negotiable)
- Attain and maintain a social licence to operate
- Deliver on time and on budget
- Maximise value from appropriate use of funds.

A structured mind mapping process to facilitate and document the outcomes of the workshop was employed. This helped facilitate a rapid review process to maximise the contribution of attendees.

The risks were assessed using a risk prioritisation matrix ranking tool (Table 3.1), which utilises consequence and probability, pre and post controls to determine both the initial and residual risk levels.

Table 3.1 : Risk assessment matrix

Likelihood	Consequence				
	Severe (5)	Major (4)	Moderate (3)	Minor (2)	Insignificant (1)
Highly Likely (5)	H25	H24	H22	M19	M15
Probably (4)	H23	H21	M18	M14	L10
Possible (3)	H20	M17	M13	L9	L6
Unlikely (2)	M16	M12	L8	L5	L3
Highly Unlikely (1)	M11	L7	L4	L2	L1

3.5 Stage 2 risk assessment

A more detailed environmental risk assessment workshop was undertaken following the completion of an initial design concept. This was held in January 2018 and included a multi-disciplinary team of environmental, engineering and construction/project management personnel.

A similar process to the Stage 1 risk assessment was followed to maintain consistency. Appendix C shows the full risk assessment. Table 3.2 gives the significant residual risks after current and future controls were applied.

The scope of the risk assessment included:

- Construction, commissioning and operation of the plant
- Planned ('normal') activities, as well as unplanned or unexpected events, including faults, failures and emergencies that may occur with the potential to cause environmental impact despite best efforts to avoid or mitigate risks.

3.6 Risk assessment outcomes

3.6.1 Stage 1 outcomes

Stage 1 was focussed on the high level aspects that could potentially block the Project's development and impact the Project's viability. The Stage 1 risk assessment identified several medium risks which were:

- That permits and approvals are not granted or conditions are not practically achievable
- That the project is unable to secure a long term feedstock supply
- That the project fails to deliver the commercial business requirements
- That the project is disrupted by unfavourable community action
- That the project is unable to secure funding
- That the project is unable to transport waste.

Although the majority of these findings are commercial in nature, findings of the Stage 1 risk assessment will result in changes to the proposed plant design as it is developed with the selected vendor.

3.6.2 Stage 2 outcomes

Stage 2 was focussed on more detailed technical elements of the Project and associated controls that could mitigate potential negative impacts. These control options include improvements to plant layout, and plant design, many of which are well advanced in the current design process. The residual risk levels (after implementation of future proposed control options), detailed causes, impacts and controls are reported in Appendix C. Further detail regarding the management of these risks is addressed in specific chapters throughout the WAA.

An iterative risk management process will continue to be applied as the project design progresses, to further reduce the overall level of risk to As Low as Reasonably Practical (ALARP).

Significant risk and management strategies to reduce this risk to ALARP are further discussed in the respective impact assessment chapters (Chapters 1.6 and 4 to 12). The framework for managing risks is discussed in Chapter 12 (Environmental Management).

Table 3.2 provides a summary of the significant residual risks (post controls) were identified for this Project during the Stage 2 risk assessment.

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Table 3.2 : Stage 2 environmental risk assessment - significant residual risks

Project phase	Risk description	Causes	Impacts	Residual risk rating	Control Details
Construction and commissioning	General noise emissions during construction	• Earthworks on site • General construction activities • Vehicle movements to and from site (along roads and onsite) • Piling • Planned boiler tripping and safety valve lifting • Planned steam blowing	• Reputational damage • Complaints from community or stakeholders • Complaints from construction workforce • Notice from EPA (pollution abatement notice)	Medium	Chapter 8 and 12
Operation	Noise emissions during non-routine event or emergency	• Unexpected plant shutdown • Emergency scenario: plant failure, cooling plant failure • Existing paper mill trip or failure • Power trip causing black or brown out • Boiler trip event leading to safety valve release (120-130 dBA) - safety valves must be located externally • Turbine trip • Evacuation alarm	• Complaints from community or stakeholders • Non-compliance with the EPA Guideline on Noise from Industry in Regional Victoria (NIRV) • Health impacts to workforce • Notice from EPA (pollution abatement notice)	Medium	Chapter 8 and 12
Construction	General air emissions (dust and non-EfW combustion emissions)	• Earthworks • Vegetation clearance • Site preparation • Mobile plant emissions • Vehicle movements (wheel generated dust) • Temporary diesel generator • Temporary lighting plants	• Complaints from community or stakeholders • Amenity impacts • Health impacts to employees/contractors • Notice from EPA (pollution abatement notice)	Medium	Chapter 6 and 12
Commissioning	General air emissions (Combustion air pollution products)	• Plant start-up • Plant failure • Inadequate design • Operator error	• Complaints from community or stakeholders • Amenity impacts • Health and/or nuisance impacts to employees • Non-compliance with potential EPA operating	Medium	Chapter 6 and 12

Project phase	Risk description	Causes	Impacts	Residual risk rating	Control Details
		• Incomplete fuel (MSW) combustion • Continuous Emission Monitoring System (CEMS) out of calibration • Poor fuel quality/composition	licence conditions (TBD)		
Operation	General air emissions (Combustion air pollution products) during non-routine event or emergency	• Plant start-up • Unexpected plant shutdown/power failure • Operator error • Failure of flue gas treatment system eg. bag filter failure	• Complaints from community or stakeholders • Amenity impacts • Health and/or nuisance impacts to employees • Non-compliance with potential EPA operating licence conditions (TBD) • Notice from EPA (pollution abatement notice)	Medium	Chapter 6 and 12
Construction	Impacts to surface water quality	• Loss of containment of chemicals • Spills and leaks from mobile plant, diesel generators, mobile lighting towers • Erosion and the increased sedimentation (particularly during high rainfall events) • Increase in storm water runoff from plant • Vegetation clearance • Earthworks	• Reduced water quality (primarily sediment load) • Public complaints (environmental damage, social values, recreational usage) • Non-compliance with SEPP Waters of Victoria • Non-compliance of existing EPA licence • Notice from EPA (pollution abatement notice)	Medium	Chapter 8.8 and 12
Construction or Approval	Concern or anxiety from residents, landowners, and special interest groups with regard to the perceived risks and potential impacts on air and water quality, property values and quality of life in the area.	• Poor communication from AP regarding project, it's benefit and any perceived impacts • Lack of involvement from community and stakeholders in Project	• Project delays or deferment • Reputational damage • Anxiety about perceived risks leads to loss of support and confidence in AP and the project • Political controversy and adverse media coverage regarding the risks • Complaints from community or stakeholders	Medium	Chapter 1.6, 6, 11 and 12

The Project Environment Risk Register is a live document and will be updated throughout the project, as the approach to design, construction and operation of the site is refined (along with the understanding of the risks). Process Design is an iterative process and as it matures more detailed risk reviews will be undertaken to ensure the development of appropriate controls. The outcomes of these risk assessments will be incorporated into:

- The Construction Environment Management Plan (CEMP) applicable to construction of new parts of the plant
- The Operational Environmental Management Plan (OEMP) applicable to commissioning and operation phases of the plant.

This includes existing and new risk control measures (currently part of the AP integrated Maryvale Operations Management System (OMS) Environment, and additional controls required to reduce the risk to ALARP.

Any significant changes to the risk profile that are not reflected in the current risk register will be communicated to the EPA if they differ materially to those described in this WAA.

3.7 Future risk assessment studies – HAZOP

A detailed hazard and operability study (HAZOP) will be conducted throughout the detailed design phase (during the EPC contract) and information derived from this will be fed into the ongoing design process. A final report will also be developed prior to commissioning, which will include:

- Scope and aims of the study
- HAZOP team members
- Description of the facility
- EfW Plant operational overview (including safety systems)
- Detailed HAZOP methodology
- Glossary and abbreviations
- Summary of main findings
- Analysis of main findings
- Recommendations
- Actions arising from the HAZOP.

The HAZOP process and report will provide a systematic investigation of the complex planned and existing processes to identify and evaluate issues that could pose a risk to either personnel, the environment or the operating plant. The HAZOP is an iterative process involved numerous workshops (e.g. design initiation HAZID study, basic design stage 1 HAZOP, detailed design stage 2 HAZOP, Value Engineering workshops, etc) at particular points in the EPC contract design phase. The recommendations and actions arising from the HAZOP will be incorporated during the detailed design phase. This report can be provided to EPA as requested.

3.8 References

EPA, 2015. Publication 1307.10 Works Approval Application (Guideline), dated April 2015. *Victorian Environment Protection Act 1970*