

Appendix 17 Waste Management and Minimisation Strategy



Waste Management and Minimisation Strategy

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1 Introduction

This Waste Management and Minimisation Strategy (WM&M Strategy) has been prepared to accompany Renascor's Environment Impact Statement (EIS) for the Battery Anode Material (BAM) Facility in the Bolivar area of Adelaide's northern suburbs as part of the Siviour Battery Anode Material Project (Siviour BAM Project).

The purpose of the WM&M Strategy is to describe the principles and procedures for the management of the waste generated by the BAM Facility and outline measures to manage and mitigate waste generation and resource consumption during construction and operation. This includes addressing sources of waste from construction and operation of the BAM Facility and the measures to be implemented to manage, reuse, recycle and safely dispose of the identified waste.

The WM&M Strategy will be updated prior to construction and supporting plans and procedures developed where required.



2 Legislative Requirements

The *Environment Protection Act 1993* (EP Act) sets out the general environmental duty to take all reasonable and practical steps to prevent or minimise environmental harm. This requirement includes the management of waste. The EP Act prescribes the waste management hierarchy (refer Figure 2-1).



Most preferable

Figure 2-1 Waste management hierarchy

The EP Act also provides for listed wastes which have specific management and disposal requirements due to their potentially contaminating nature.

The *Environment Protection (Waste to Resources) Policy 2010* (Waste to Resources EPP) prescribes general waste management obligations. The primary objective of the Waste to Resources EPP is to achieve sustainable waste management by applying the waste management hierarchy consistently with the principles of ecologically sustainable development. To meet the Waste to Resources EPP waste management objective, waste management should:

- Promote best practice and accountable waste management,
- Include effective recording, monitoring and reporting systems for the treatment, transportation and disposal of waste and other matter,
- Promote environmental responsibility and involvement in waste avoidance, waste minimisation and waste management within the community.

The *Environment Protection (Water Quality) Policy 2015* (Water Quality EPP) aims to achieve the sustainable management of waters, by protecting or enhancing water quality while allowing economic and social development.



The current SA Waste Strategy 2020-2025 supports maximising the reuse, recycling and recovery of materials. Its mission is to support the development of a circular economy within South Australia by focusing on five priority areas including; transitioning to a circular economy, market development for secondary products, infrastructure capability and capacity, reducing food waste and reducing plastics and packaging.

Other relevant legislation, standards and guidelines for waste management include:

- National Environment Protection (Assessment of Site Contamination) Measure 1999 (as amended 2013) (NEPM)
- The South Australian Public Health (Wastewater) Regulations 2013 (SA)
- Work Health and Safety Regulations 2012 (SA)
- EPA SA Guidelines (EPA 080/016): Bunding and spill management
- Australian Standard AS 1940 The storage and handling of flammable combustible liquids.



3 Project Description

The proposed Project involves the construction and operation of a Battery Anode Material (BAM) Facility in the Bolivar area of Adelaide's northern suburbs as part of the Siviour Battery Anode Material Project (Siviour BAM Project). The BAM Facility includes:

- Graphite milling machinery comprising mechanical micronisation / spheronisation circuits, associated feed hoppers, dust mitigation, collection and conveyance structures, including collection of by-products
- Caustic roast kiln including reagent mixing, cooling equipment, lump-breaking and re-pulping equipment
- Leach tanks (caustic and acid), filtration structures and repulp tanks
- Chemical storage equipment for solid and liquid reagents including appropriate bunding / hardstand areas
- Product bagging plant equipment
- Mechanical, hydraulic and pneumatic conveyance, feed structures and hoppers for moving graphite, reagents and wastes around the plant
- Truck loading and unloading facilities, access and egress
- Product storage silos
- Water treatments (reverse osmosis, demineralisation, process water treatment plant)
- Solid waste product isolation, drying and containment.
- Process monitoring equipment
- Kiln and associated equipment
- Supporting buildings including administration, security ablutions, laboratory and maintenance.

3.1 Key Project activities

The key construction activities include:

- Vegetation clearance and earthworks for BAM Facility, access and laydown areas.
- Temporary stockpiling of topsoil and subsoil
- Transport of materials and equipment to construction locations
- Pouring of concrete footings
- Installation and commissioning of equipment
- Installation of permanent security fencing and gates
- Rehabilitation of temporary areas of disturbance (including clean up of waste materials).

Key operation and maintenance activities to be undertaken include:

- Transport of materials and workers to and from the site
- Mechanical milling and spheronizing of graphite including collection of by-products (graphite fines)
- Chemical refinement of graphite (using caustic and acid processes)
- Bagging and export of product
- Treatment of raw water feed and process water.



4 Waste Management Hierarchy

Waste management for the Project will be undertaken in accordance with the waste management hierarchy (refer Figure 2-1), which underpins the objectives of the Waste to Resources EPP and in line with the South Australian Waste Strategy (EPA SA, 2020). The waste management hierarchy demonstrates the preferred approaches to waste management in the order of priority as follows:

- A) Avoidance of the production of waste
- B) Minimisation of the production of waste
- C) Reuse of waste
- D) Recycling of waste
- E) Recovery of energy and other resources from waste
- F) Treatment of waste to reduce potentially degrading impacts
- G) Disposal of waste in an environmentally sound manner.

Options for waste management for priority is listed in Table 4-1, the approach to these priorities is included below.

4.1 Avoidance and Minimisation of Waste

The Project will avoid waste generation and endeavour to reuse waste material where practicable. Waste will be avoided through strategic selection of materials during design and purchasing which take into account options which may reduce waste generation for the Project. Careful planning for procurement of the specific types and quantities of materials required for construction activities will further minimise waste generation.

Measures to achieve avoidance and reduction of waste may include:

- Development of a procurement policy which considers waste avoidance measures such as:
 - Ordering site specific or prefabricated items where practicable to minimise surplus material
 - Consideration of packaging material provided by suppliers during purchasing and reduce this requirement where possible, or consider returnable packaging
 - o Consideration of recycled items when selecting materials
- Refinement of waste stream estimates to ensure adequate on-site storage and waste segregation to facilitate recycling
- Refinement of estimated volumes of materials for construction
- Bulk supply of processing inputs and onsite storage in appropriate tanks rather than delivery in Intermediate Bulk Containers
- Minimisation of disturbance footprint to reduce the vegetative waste produced.

4.2 Reuse and recycling

Measures to separate waste streams will be implemented to maximise opportunities for reuse of waste materials onsite. This includes segregation of wastes into appropriate dedicated bins or areas onsite, or transportation to a designated recycling facility. The Project will reuse or recycle waste material where possible including concrete, timber, plastic, metals and solid waste output from process.



Measures to achieve reuse and recycling of waste may include:

- Reuse of process water and caustic recovered from treatment process
- Investigation of alternative markets for waste products
- Stockpiling and mulching of vegetative waste (including untreated timber pallets (if unable to be re-used)) for reuse in landscaping and rehabilitation of site
- Reuse of excavated materials for clean fill onsite, where appropriate
- Reuse of excess construction materials at another site.

4.3 Treatment and Disposal

If waste materials cannot be reused onsite, they will be collected by appropriately licensed contractors for offsite reuse, reprocessing, recycling or final disposal. Final disposal of wastes will be to a suitably licensed waste facility that is suitable for the type and quantity of waste. Waste tracking forms will be provided to the waste facility upon arrival where required.

Measures to manage the treatment and disposal of waste materials during construction and operations may include:

- Ensuring wastes which cannot be reused or recycled and require disposal are clearly segregated from those which have the potential to be reused
- Providing segregated bins for subcontractors to dispose of construction waste (i.e., metal, plastics and cardboard)
- Inducting contractors and staff into site waste management practices
- Disposing of hazardous materials in accordance with the handling and disposal requirements of the *Work Health and Safety Regulations 2012*
- Disposing of general wastes in accordance with local council requirements
- Ensuring onsite ablutions facilities are installed in accordance with the on-site Wastewater Systems Code and the *South Australian Public Health (Wastewater) Regulations 2013*.

Only appropriately licenced transport contractors will be engaged to transport waste material offsite. The contractors appointed to transport waste will be required to demonstrate and ensure that:

- They are licensed to transport the type of waste they are contracted to receive / handle
- Waste is transported to a licensed facility capable of receiving the type and quantity of waste
- All waste is adequately covered during transport
- Waste tracking forms are provided to the waste facility upon arrival.



5 Potential Waste Sources and Management

The construction of the Project requires a range of materials including steel, electrical components, concrete, plastics and timber. Waste may be generated from these sources. Waste generated during operation will include solid waste outputs from the process as well as industrial wastes from servicing of facility components and domestic waste from onsite offices and crib rooms. Decommissioning will include demolition waste from removal of plant and processing buildings onsite, buildings and concrete footings.

Potential sources of waste generated during construction and operation are described in Table 5-1. Storage of waste (prior to treatment or disposal) will be at dry waste storage shown on site plan (Figure 5-1).

Waste Stream	Project Phase	Management (hierarchy step)	
Processing water & brine	Operations	Treat (RO plant) & Dispose (discharge to channel)	
Graphite Dust	Operations	Recover – consider potential markets for graphite fines	
Demolition of buildings	Decommissioning	Reuse – disassemble plant and reuse, sell for reuse or recycle of material components.	
 Solid Processing Wastes: Mixed silica aluminate & sodium silicate Mixed calcium and magnesium carbonate Calcium sulphate (gypsum) 	Operations	Recover (investigating potential beneficial uses for third party industrial processes subject to testing and classification to identify a market). If markets are identified, appropriate testing in accordance with EPA requirements for reuse will be undertaken. Disposal (base case option is to dispose offsite – chemically neutral)	
Boiler blowdown and cleaning chemicals	Operations	Disposal as trade waste	
 General construction: Infrastructure and services Laydown areas Temporary offices 	Construction	Reuse – temporary offices and other equipment or reusable construction materials to be transported to another site for use. Disposal – material to be disposed of at the appropriate facility (was separated into recyclable material and that destined for landfill).	
Clean fill and spoil from excavated materials (including PASS)	Construction	Reuse – use for areas requiring fill or spread over rehabilitation areas before placement of topsoil.	
Vegetation and organic materials from land clearance	Construction	Reduce – minimize clearance area Recycle – mulch or compost organic matter to provide material for screening vegetation and reestablishing construction laydowns etc. Mulched and composed material will be stockpiled onsite during construction, excess material not required for landscaping or revegetation will be disposed of to landfill.	
Waste concrete	Construction	Reuse – transport to another site for use. Where not possible, waste concrete will be collected in washout bays, solidified and transported to a licensed facility for reuse or disposal.	
Steel and metal	Construction	Reuse - sell excess for other developments or used metal for scrap.	

Table 5-1 Predicted waste streams generated by the Project



Domestic waste	Construction, operations and decommissioning	Recycle – separate waste streams at source (recycling, food waste and landfill) to reduce unavoidable landfill
Timber	Construction and operations	Recycle – mulch or compost organic matter to provide material for screening vegetation and reestablishing construction laydowns etc.
Excess hazardous materials and chemicals or spill clean up materials.	Operations	Treat & Dispose – ensure all waste is appropriately disposed of in accordance with the relevant legislation. Onsite storage, while awaiting disposal, will be in bunded areas and spills cleaned up in accordance with the SA EPA guidelines.
Fragments of asbestos material identified in PSI (fragments are spread over a 25 by 50 m area)	Construction	Dispose – prior to construction commencing the identified asbestos on the site will be removed by a licenced contractor and disposed of in accordance with legislative requirements.
Septic wastewater	Construction and operations	Septic wastewater will be collected in an onsite septic wastewater services subject to a Wastewater Works Approval under the Public Health Act 2011 and subsidiary legislation. Wastewater will be collected in a tank with a contractor pumping it and transporting to a licenced facility.





Figure 5-1 Location of dry waste storage



6 Implementation

6.1 Roles and Responsibilities

Renascor has the primary responsibility for the management and minimisation of waste, and ensuring that all legislative and regulatory requirements are met. This will include ensuring all employees and contractors are aware of and abide by the requirements of this strategy, any supporting plans and procedures, legislative and regulatory requirements. Requirements for managing waste will be set out specifically in the Project's CEMP and OEMP.

During the construction phase, a construction contractor will be responsible for undertaking waste management and minimisation in accordance with this strategy, Renascor specifications and legislative and regulatory requirements. The construction contractor will be responsible for implementing obligations outlined in the CEMP.

Licenced waste transport contractors will be employed during construction and operation (as required) and will be responsible for undertaking waste transport and disposal activities in accordance with this strategy, Renascor specifications, legislative and regulatory requirements and licence conditions.

6.2 Awareness and training

Renascor will develop and implement an awareness and training program that will be delivered to all employees and contractors involved in waste generation or management. The training will include:

- The application of the waste management hierarchy
- Common waste sources and waste streams generated from the Project
- Dangerous goods segregation and hazard classification codes
- Spill response
- Community impacts of poor waste management.

6.3 Monitoring

Regular inspections and monitoring will be undertaken for the Project during construction and operation to ensure the measures put in place to manage waste (e.g. collection and storage areas, licensed contractors) are implemented, maintained, reviewed and updated as required.

Monitoring will include the following:

- Records of the type, quantity and locations of waste generated
- Regular (timing to be determined) inspection of waste storage containers to ensure that they are maintained in a condition appropriate for their use and containment of the specific waste
- Regular (timing to be determined) inspection of skips and / or bins to ensure that cross contamination does not occur
- Records of all waste removed from site including products for reuse.



6.3.1 Reporting and compliance

Workers will report all incidents related to waste management (including any notice received from a government agency) to the Renascor Site Management within one hour of the incident occurring, or if not reasonably practicable, as soon as possible. The relevant notification entry will be made into the Renascor Incident Management System (IMS) within 24 hours.

Renascor will also regularly report on waste related matters (frequency to be determined and in accordance with regulatory requirements) including the following:

- Results of inspections and formal environmental audits
- Report of compliance with approval and licencing conditions
- Summary of complaints received during the Project construction and operation.

Non-compliances will be reported to the Renascor Site Management and appropriate corrective actions undertaken in line with Renascor's ESMS.

6.3.2 Review

This Strategy will be formally reviewed annually by the Siviour BAM Facility Senior Management.

Review will include a process of adaptive management, whereby the effectiveness and performance of current controls and mitigation measures are assessed and improved to ensure robust environmental performance.