



SEATA

Deconstructing the world's problems
into profitable carbon-negative solutions

Waste Management Plan

*SEATA Clean Energy & Carbon Sequestration
Research & Development Centre*

“SEATA R&D Centre”

SEATA Group

December 2021 (Version 1.0)

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Glossary

EPA	Environmental Protection Agency (NSW, unless otherwise specified)
ERA	Environmental Risk Assessment
ENM	Excavated Natural Material
ESCP	Erosion Sediment Control Plan
GISC	Glen Innes Severn Council
RDSM	Research and Development Scale Model
R&D	Research and Development
SEATA	Sustainable Energy and Agricultural Technologies Australasia (SEATA Holdings Pty Ltd)
VENM	Virgin Excavated Natural Material
WMP	Waste Management Plan (This Plan)

1 Introduction

1.1 Context

This Waste Management Plan (WMP or Plan) has been prepared for the **SEATA Clean Energy & Carbon Sequestration Research & Development Centre**, or “**SEATA R&D Centre**”. A WMP is required by Glen Innes Severn Council (GISC) for relevant Development Applications as applicable to this project. The WMP is a supporting plan complementary to the Statement of Environmental Effects (SEE) and the project Environmental Risk Assessment (ERA).

The WMP has been prepared accordingly to address the requirements of the Glen Innes Shire Council (GISC) Waste Management Plan template and Development Application process.

1.2 Project Location and Background

SEATA Holdings Pty Ltd, trading as SEATA Group (“SEATA”), is a proudly Australian company developing a new thermal treatment technology to deconstruct wasted biomass and other carbonaceous resources into valuable commodities in an environmentally friendly manner, with significant carbon sequestration.

SEATA is proposing to undertake pilot scale trials of the technology using a **Research & Development Scale Model (RDSM)** as part of the proposed establishment of the SEATA R&D Centre at Glen Innes NSW.

The project is located on a rural property owned by SEATA Director John Winter on 448 West Furracabad Road, about 14km from Glen Innes in NSW. The rural location is not serviced by routine domestic waste collection services provided by GISC.

The project has been specifically designed to avoid or minimise environmental impacts as detailed in the SEE and its supporting ERA.

As detailed in **Sections 2 and 4**, the project will involve:

- **Site Preparation** (primarily to establish shed pads and slabs, active testing area/workpad, and light vehicle parking area);
- **Construction** (primarily sheds and associated pads), and
- **Operational R&D testing activities.**

For clarity, **no existing buildings will be demolished** as part of the project.

Only clean and uncontaminated feedstocks have been proposed for the project (refer SEE for details) and R&D testing is proposed to be undertaken in a staged approach for each feedstock on a campaign basis. During active campaign testing the site will operate on a 24/7 basis.

1.3 Applicant Details

Name: SEATA Holdings Pty Ltd (Trading as “SEATA Group”).

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1.4 Details of Site

Refer **Sections 3** and **4** of the project Statement of Environmental Effects (SEE) for details.

2 Purpose, Scope & Objectives

2.1 Document Purpose

- To document the management of general solid and liquid wastes expected to be generated during construction and operational phases of the SEATA R&D Centre, within the scope of this plan outlined further below.

2.2 Key Objectives

The key objective of the WMP is to ensure that waste is minimised, particularly for disposal.

To achieve this primary objective, the following supporting objectives apply to this plan:

- Manage waste following the general **principles of the waste hierarchy** to optimise efficient use and recovery of resources where practicable. This includes consideration of measures to **avoid, reduce, re-use, recycle** or (where no other practicable option) dispose of waste.
- Ensure that waste and recyclable material is adequately separated and managed to maximise opportunities for reuse and recycling of waste particularly during construction and operations.
- Ensure that relevant legislation and other requirements are complied with.
- Provide staff with appropriate training and awareness of waste and resource management issues.
- Provide guidance for waste management, records and reporting requirements.

2.3 Scope of Works

The scope of this WMP covers the management of **general solid and liquid wastes** expected to be generated during **site preparation, construction and operation** of the SEATA R&D Centre (Project Area), as summarised below. Further details of construction and operations activities are provided in the *Statement of Environmental Effects*, and associated waste generation and management was considered in the *Environmental Risk Assessment*.

The **Project Area** and layout of the site (including the builders waste area where skip bins will be located during construction) are illustrated on the **Site Plan** provided with the DA, as represented below in **Figure 2.1** and **Figure 2.2**.

The following aspects of the project are **beyond the scope** of this WMP and are addressed elsewhere:

- **Feedstocks** processed and **biochar** produced by the RDSM during operational R&D testing as they are key focal points of dedicated management through the Development Consent, EPL and (in particular) conditional staged *Resource Recovery Orders* and *Exemptions* for each feedstock tested (refer Section 3 below and further details in Section 5 of the SEE).
- **Air emissions** from the project are a separate focal point of the SEE and a detailed emissions testing program to be developed in consultation with regulators;
- **Septic waste (sewage)** from the existing onsite system is addressed in the SEE and managed under a separate Section 68 approval under the Local Government Act sought from GISC.
- **Stormwater runoff** (including sediment) is addressed in the SEE and on the supporting Erosion and Sediment Control Plan (ESCP).

2.4 Project Period

This WMP will apply to the entire project approval period, which comprises an **initial three (3) year trial** (the project is targeted at initial R&D demonstration). The site is owned by SEATA Director John Winter and will be leased to SEATA for proposed operations during the period of management under this WMP.

Figure 2.1 Site Plan for the SEATA R&D Centre at Glen Innes, NSW



Figure 2.2. ESCP for the SEATA R&D Centre at Glen Innes, NSW. The sediment sump drained from the Active Testing Area will be tested to ensure suitable for conventional management as expected, or otherwise transferred to the adjacent slurry tank for disposal.



3 Regulatory / Environmental Requirements

3.1 Relevant Legislation and Guidelines

The relevant legislation and guidelines and its application regarding waste management at the site is detailed in Section 5 of the *Statement of Environmental Effects (SEE)*. The following provides a summary list of relevant legislation, standards and guidelines.

3.1.1 Legislation

- *Environmental Planning & Assessment (EP&A) Act 1979, as amended*
 - *Including Development Consent (conditional approval) sought from GISC.*
- *EP&A Regulations (2000) as amended, including Clause 32.*
- *Protection of the Environment and Operations (POEO) Act 1997, as amended*
 - *Including Environmental Protection Licence (EPL) sought for the project*
- *Protection of the Environment Operations (Waste Regulation) 2014, as amended*
- *Waste Avoidance and Resource Recovery Act 2001 (WaRR Act), as amended*

3.1.2 Guidelines and Standards

- *Environmental Guidelines: Use and Disposal of Biosolids Products (NSW EPA, 2000)*
- *NSW Resource Recovery Orders (RRO) and Exemptions*
 - *NSW Excavated Natural Material (ENM) Order & Exemption (NSW EPA, 2014)*
 - *Project-specific RRO & Exemptions have also been sought as staged secondary approvals from NSW EPA. Any relevant conditions from these associated with waste management will be considered in triggered updates of this WMP.*
- *NSW Waste Classification Guidelines (for disposal) (EPA, Nov 2014)*
- *NSW Waste and Sustainable Materials Strategy 2041 (EPA, 2021)*

Refer Section 4.2.1 for further discussion on context of POEO Act and the NSW ENM RRO & Exemption 2014.

3.1.3 Statement of Key Commitments

SEATA has made key commitments to a range of aspects for the project within the SEE. Aspects relating to waste management within the scope of this WMP are identified in

Table 3.1 below.

Table 3.1. Statement of Commitments regarding Waste Management

Key Aspect	Commitment to minimisation, mitigation and control	Further Details
Management of Solid Outputs and Waste	<ul style="list-style-type: none"> Scrubber Waste characterized in accordance with detailed testing program developed in consultation with EPA. Scrubber waste volumes minimal (<20kL/yr) and designed to produce inert salts (potential valuable product or will be disposed of appropriately in accordance with EPA Waste Classification requirements). All solid waste to be managed in accordance with a Waste Management Plan to be established for the project. General municipal solid waste generated by personnel collected, recycled where possible, and residual disposed of appropriately to the GISC landfill as appropriate. 	Sections 4, 5, 6, Appendices 5, 9, Annexure 10 of the SEE.

4 Waste Management

4.1 Identification of Waste Materials

Potential solid and liquid waste generation has been identified through the ERA, SEE and experience of the project team. It is noted that air emissions from the project / RDSM are managed elsewhere under the SEE/ERA and are beyond the scope of this WMP.

The following key materials have been considered in the preparation of the WMP.

4.1.1 Solid Waste/Materials Generated

- Stripped Topsoil (for reuse)
- Excess concrete/cuttings (primarily from slab construction for sheds)
- Metals (from shed construction, e.g. steel, aluminium)
- Timber / pallets (from bulk material deliveries of RDSM consumables)
- Packaging from process consumables (e.g. drums/IBCs)
- Imported VENM/ENM (for shed pads, all weather access, active testing area/workpad)
- Excess materials, unused products
- General municipal solid waste (general unrecyclable rubbish).

4.1.2 Liquid Waste

- Wet Scrubber waste (slurry tank from RDSM emissions control equipment)
- Sump water/sediment (Diverted sediment runoff from Active Testing Area) –tested to confirm suitable for conventional ESC management as expected/designed, otherwise transferred to slurry tank for disposal.

Note: Liquid consumables for the RDSM / Wet scrubber emissions control will be fully expended, only their containers generated as waste as addressed in s4.1.1 above. Sewage and associated liquid waste from amenities are managed separately via the existing septic system under a Section 68 approval and is beyond the scope of this WMP.

4.1.3 Garden and Other Organic Waste

- Minor vegetation clearance (small number of non-native trees during construction only)
- Slashed grass within the Project Area
- Weeds, leaf litter or pruning from grounds maintenance (including trees/shrubs etc)
- Food scraps (from staff/kitchenette)

4.2 Site Preparation and Construction

The project site is located on existing cleared rural farmland (5th generation) owned by SEATA Director John Winter. The site is zoned RU1. **Accordingly, clearing and site preparation activities are relatively minimal.**

Site preparation is primarily associated with:

- topsoil stripping <200mm and VENM fill to establish all weather access areas and pads for shed construction, the Active Testing Area / workpad and parking;
- minimal vegetation removal (small number of primarily non-native trees to be removed as shown on the Site Plan – approximately six non-native in total, of which only two are larger trees of >10m in height). If/where not composted onsite, when staged testing is approved for the RDSM, vegetation also has potential to be pyrolyzed if required (as part of staged approvals with regulators).

It is anticipated that waste generated from both site preparation and construction will be consistent with the relatively small project scope and size.

Avoiding, reducing and separating waste during all project activities is the responsibility of the entire project team (including procurement, handling, storage and use of materials). Bulk materials will be used wherever possible to minimise waste. Key waste sources will be separated for ease of recovery where practicable.

Waste generated during construction will be reused (where possible), recycled or disposed to landfill. It is expected that this will be dominated by metal from shed construction (e.g. steel and aluminium).

The major waste streams, weight, proposed reuse or on-site recycling methods, and the destination and disposal are listed below in

Table 4.1 and

Table 4.2.

Waste management activities are consistent with the SEATA **Environmental Risk Assessment (ERA)** in **Appendix 5** to the project SEE.

Table 4.1. Waste management during initial Site Preparation

Type of Materials (as per GISC WMP template)	Estimated Amount/ Weight	Avoidance/Reduction of Waste	Reuse and Recycle (on-site and/or off-site) Specify proposed reuse or on-site recycling methods	Destination / Disposal Specify Contractor and Landfill Site	Comments / Assumptions
Excavation Material (i.e. VENM, ENM)	Nil excess from excavation. (fill sourced from surrounding farm (same landowner)).	<ul style="list-style-type: none"> Locally imported material matched to specific site needs, not likely to be in sourced in significant excess. 	<ul style="list-style-type: none"> No material would require disposal at any other location. 	<ul style="list-style-type: none"> No disposal to landfill required. 	<ul style="list-style-type: none"> See Section 4.2.1 for further information regarding imported VENM / ENM required to establish all weather access areas, workpad and shed pads.
Stripped Topsoil	~1300 m ³ (bulked) stripped from all-weather / unsealed areas incl. pads	<ul style="list-style-type: none"> Strip minimum area and depth required to mitigate excess. 	<ul style="list-style-type: none"> Topsoil stored temporarily during 3 year project for later use in rehabilitation (or on broader farm if rehabilitation not required at such time). Topsoil stockpiled <3m in height and stabilised (e.g. grassed), and location recorded for later reference. Potential use in visual/acoustic screening if required. 	<ul style="list-style-type: none"> Used onsite. No disposal to landfill required. 	<ul style="list-style-type: none"> Assumes topsoil stripped <200mm to establish unsealed all-weather access areas, and 1.3 bulking factor. Potential use in screening
Garden Organics ('green waste') (i.e. Grass clippings, cleared vegetation)	Six trees (all non-native, 2 large trees >10m, 4x small trees <5m)	<ul style="list-style-type: none"> Site layout designed to avoid / minimise clearing. Only selected vegetation will be cleared (see Site Plan) 	<ul style="list-style-type: none"> Waste vegetation from ground maintenance (mainly slashed grass) will be left insitu to compost in the soil In future garden waste will be process through the RDSM (RDSM trialled through a staged approach) 	<ul style="list-style-type: none"> Composted / used onsite. Unlikely to be sent to landfill. 	<ul style="list-style-type: none"> All green waste to be separated to assist all options for recovery. GISC Waste Management Centre recovers separated greenwaste (mulched and used by GISC as capping material).
Bricks	Not Applicable / Insignificant for entire project				
Concrete	Not Applicable / expected to be insignificant for site preparation works (considered during construction in Table 4.2 below)				
Timber	As above				
Plasterboard	As above				
Metals (i.e. steel, aluminium)	As above				
Hazardous Material & Lead based Paints	As above (noting existing buildings for no demolition)				

Table 4.2. Waste Management during Construction

Type of Materials on Site	Avoidance and Reduction of Waste	Reuse and Recycling (on-site and off-site) <i>Specify proposed reuse or on-site recycling methods</i>	Destination / Disposal <i>Specify Contractor and Landfill Site</i>	Comments/Assumptions <i>(where applicable)</i>
Excavation Material	<i>Refer Table 4.1 (Site Preparation earlier above)</i>			
Garden Organics	<i>Refer Table 4.1 (Site Preparation earlier above)</i>			
Bricks	Not Applicable / Insignificant			
Concrete	<ul style="list-style-type: none"> Sourced concrete matched to slab requirements for sheds. 	<ul style="list-style-type: none"> Builders Waste Storage Area (see Site Plan) 	<ul style="list-style-type: none"> GISC Waste Management Centre (off-site) 	
Timber	<ul style="list-style-type: none"> Majority of construction is steel (metal sheds), minimal timber requirements. Endeavour not to 'over-order' timber if required 	<ul style="list-style-type: none"> Builders Waste Storage Area (See Site Plan) Given minimal amount expected, stockpile and use on site (see comments). 	<ul style="list-style-type: none"> Onsite (untreated timbers) GISC Waste Management Centre (treated timbers) 	<ul style="list-style-type: none"> Untreated timbers have potential to be managed onsite under staged R&D testing when approved.
Plasterboards (i.e. Gyprock)	<ul style="list-style-type: none"> Minimal use only in part Shed 3. Sourced to match construction need as closely as possible 	<ul style="list-style-type: none"> Builders Waste Storage Area (see Site Plan) 	<ul style="list-style-type: none"> GISC Waste Management Centre (off-site) 	<ul style="list-style-type: none"> The mezzanine floor of Shed 3 that contains a kitchenette may utilise gyprock
Metals (i.e. Steel, Aluminium)	<ul style="list-style-type: none"> Conventional shed sizing to avoid specialist sizing / minimise off cuts Sheet metal matched for shed design as closely as possible. 	<ul style="list-style-type: none"> Builders Waste Storage Area (see Site Plan) – bulk bin 	<ul style="list-style-type: none"> GISC Waste Management Centre (off-site) – Community Recycling Centre (CRC) 	<ul style="list-style-type: none"> Expected to be the primary recoverable construction material for recycling
Liquid Waste	Not Applicable / Insignificant			
Hazardous Material & Lead based Paints	<ul style="list-style-type: none"> No building demolition proposed (no sources of historical lead-based paints). No hazardous waste expected during site preparation and construction. 	<ul style="list-style-type: none"> N/A 	<ul style="list-style-type: none"> N/A 	

4.2.1 Virgin Excavated Natural Material (VENM)

Virgin Excavated Natural Material (VENM) is defined within the Protection of the Environment Operations Act 1997 (POEO Act) as *natural material (such as clay, gravel, sand, soil or rock fines) that:*

- has been excavated or quarried from areas that are not contaminated with manufactured chemicals, or with process residues, as a result of industrial, commercial, mining or agricultural activities; and
- does not contain any sulfidic ores or soils or any other waste
- and includes Excavated Natural Material (ENM) that meets such criteria for virgin excavated natural material as may be approved for the time being pursuant to an EPA Gazettal notice (e.g. a Resource Recovery Order and Exemption).

VENM is a waste that has been pre-classified as general solid waste (non-putrescible). In summary, VENM is uncontaminated and chemically stable soil (e.g. not acid sulfate soil) that exists in its natural undisturbed state. Disturbance of the soil or contamination from past or previous land uses, removes the possibility of a VENM classification.

If the above definition for VENM is met and the excavated material has been properly classified, it can be reused on or offsite without chemical testing and without an EPA Licence. Natural material that does **not** comply with the requirements of **Virgin** Excavated Natural Material (VENM) may be suitable for classification as Excavated Natural Material (ENM) as outlined further below.

The EPA provides a template certificate to assist generators, transporters and/or receivers of VENM to have confidence that a range of relevant factors have been considered in the classification of excavated material as VENM. The template certificate can be completed by the generator of the excavated waste by addressing the required questions, and will be required from generators of VENM prior to use of VENM for the project. Generators of VENM can consider options for the re-use of VENM on or off-site, subject to required government approvals, before deciding to dispose of it. The Codes SEPP 2008 allows certain earthworks to be undertaken on a site as exempt or complying development. If the provisions of the Codes SEPP do not apply, a development application for the earthworks can be made to the relevant consent authority. SEATA's project Development Application for the R&D Centre has sought to allow VENM or ENM to be used for proposed earthworks at the site accordingly to provide regulatory clarity.

ENM:

Excavated Natural Material (ENM) is classified in accordance with the NSW EPA *Excavated Natural Material Order 2014* and can be applied to land in accordance with the NSW EPA *Excavated Natural Material Exemption 2014*.

ENM must be chemically and physically analysed in accordance with the requirements of the Order, and is defined as: "*naturally occurring rock and soil (including but not limited to materials such as sandstone, shale, clay and soil)* that has:

- a) Been excavated from the ground, and
- b) Contains at least 98% (by weight) natural material, and
- c) Does not meet the definition of Virgin Excavated Natural Material in the Act.

Excavated Natural Material does not include:

- material located in a hotspot;
- that has been processed;
- or that contains asbestos,
- Acid Sulfate Soils (ASS), Potential Acid Sulfate Soils (PASS) or sulfidic ores.”

ENM can be applied to land as engineering fill or used in earthworks compliant under the order.

The POEO requirements for VENM and/or the ENM RRO and Exemption (2014) have potential to apply to the project in regards to material used for earthworks including all weather access, light vehicle parking, working pad/active testing area and pad preparations for proposed sheds for the project. VENM is currently proposed to be used for these works wherever possible, and is proposed to be sourced locally, allowing the volume of material to be readily matched to requirements to avoid excess/oversupply. If/where VENM is not available/used, any ENM used for the proposed works will be required to comply with the Order. See also related comments under the *Codes SEPP (2008)*.

4.3 Operational Waste Management

As for site preparation and construction waste, operational waste is expected to be reflective of the relatively minor project scope and size, and in addition the campaign-based approach to active R&D testing. The types of waste generated from operations has been considered below in Error! Reference source not found..

As detailed in the SEE and Environmental Risk Assessment (ERA, Appendix 5 to the SEE), there are no liquid products from the RDSM reactors as the process design **avoids** the generation of oils, tars and resins. Additionally, there is no solid ash or slag produced by reactors – all non-volatile components of feed report to biochar in the first reactor. Notwithstanding this, the emissions control equipment (wet scrubber) will create a liquid slurry waste expected to be comprised of inert base salts for characterisation and disposal as described in **Section 4.3.1**. As detailed in Section 7.5.9, process consumables for the RDSM testing are expected to generate spent storage containers such as plastic drums and IBCs (Intermediate Bulk Containers). These are outlined further in **Section 4.3.2**.

Stormwater runoff (including separated runoff from within the active testing area) is managed as illustrated within the ESCP (**Figure 2.2**) and discussed further in **Section 4.3.3**.

Table 4.3. Waste Management During Operations (active R&D testing)

Type of Waste to be Generated	Avoidance / Reduction	Proposed Onsite Storage/Treatment Facilities	Destination (Recycling, Disposal)	Comments / Assumptions (where applicable)
Green Waste / Organic Waste <ul style="list-style-type: none"> Slashed grass tree clippings 	<ul style="list-style-type: none"> Trees and grass trimmed when necessary (e.g. for powerline safety maintenance requirements). Project site selection and layout for minimal clearing (existing cleared farmland). 	<ul style="list-style-type: none"> Waste vegetation from ground maintenance (mainly slashed grass) will be left insitu to compost in the soil <u>except during summer and mid spring</u> (as per RFS APZ Guidelines) when it will be collected and composted. Composting for tree pruning/cuttings. 	<ul style="list-style-type: none"> Insitu/onsite composting Unrecyclable food waste disposed to GISC Waste Management Centre. 	<ul style="list-style-type: none"> Grass slashings from maintenance <100mm within APZ. Tree clippings primarily from powerline safety maintenance, and routine grounds maintenance.
General Solid Waste <ul style="list-style-type: none"> Pallets Packaging (eg cardboard), End of life plastics General Mixed Solid Waste 	<ul style="list-style-type: none"> Materials ordered in appropriate quantities to minimise long term excess/waste, and in bulk containers to minimise packaging waste. 	<ul style="list-style-type: none"> Waste Storage Area with designated recycling and disposal bins (Site Plan). 240L 'Wheelie' bins located inside existing and proposed sheds for recycling, general waste. Pallets reused (e.g. for biochar drum storage and transport) or returned to supplier wherever possible. Preference to untreated pallets to facilitate recovery. 	<ul style="list-style-type: none"> Pallets re-used onsite or returned to supplier where practicable. Recyclable materials taken to Community Recycling Centre (or via contractor). Unrecyclable material (mixed solid waste) disposed to GISC Waste Management Centre 	<ul style="list-style-type: none"> Pallets, cardboards and higher value recyclable plastics (HDPE, PET) recovered where practicable. Untreated pallets sourced where possible to allow for ease of recycling.
Recyclable Waste <ul style="list-style-type: none"> Metals (e.g. steel & aluminium) Cardboard/paper Recycled plastics (e.g. HDPE/PET) Glass 	<ul style="list-style-type: none"> Materials ordered in bulk where practicable to minimise packaging but ordered to the appropriate quantities needed to minimise long term excess / waste. 	<ul style="list-style-type: none"> Designated Waste Storage Area at northern end of workpad for bulk material bins. 240L 'Wheelie' bins located inside existing and proposed sheds for recycling, general waste. 	<ul style="list-style-type: none"> All recyclable materials taken to GISC Waste Management Centre - Community Recycling Centre or via contractor 	<ul style="list-style-type: none"> GISC CRC states can take polystyrene. Soft plastic recycling may also be considered where REDCycle accessible at local supermarkets in Glen Innes.
Liquid Waste <ul style="list-style-type: none"> Wet Scrubber Waste (slurry tank) Stormwater from active testing area 	<ul style="list-style-type: none"> Inert base salts in wet slurry will be tested and characterised for other potential recovery options, but conservatively earmarked for licenced disposal. Stormwater runoff to sump will be tested to confirm can be managed by conventional ESC instead of disposal. 	<ul style="list-style-type: none"> Refer section 4.3.3. for stormwater management from Active Testing Area captured by dedicated sump. See Figure 2.2. 	<ul style="list-style-type: none"> Licenced contractor used for disposal as per testing characterisation requirements. 	<ul style="list-style-type: none"> Stormwater run-off, etc has been considered in detail in the ERA (Appendix 5)
Hazardous Waste <i>Spent containers from process consumables (refer s7.5.9 of SEE):</i> <ul style="list-style-type: none"> IBCs 205L PP and steel drums Cylinders 	<ul style="list-style-type: none"> Process consumables ordered in bulk where practicable to minimise packaging but ordered to the appropriate quantities needed to minimise long term excess. 	<ul style="list-style-type: none"> Undercover storage for all ADG classed materials (including spent containers until swapped out /disposed). Separation and storage as per ADG code requirements. 	<ul style="list-style-type: none"> IBC's and 205L drums returned to supplier wherever practicable (swap out system) If reuse and recycling not practicable, disposal via contractor as required. GI Community Recycling Centre (CRC) Chemical Cleanouts if/where applicable. 	<ul style="list-style-type: none"> All potentially hazardous waste materials stored as per ADG class requirements including separation. Refer Table 7.6 in Section 7.5.9 of the SEE for full details. Note: Biochar (ADG Cl 4.2 spon com) managed separate to this WMP as a focal point of project (seeking EPA conditional approval).

4.3.1 RDSM Wet Scrubber Waste (Slurry Tank)

- As a result of RDSM testing, waste from emissions control treatment via a wet scrubber (using alkali reagents tailored as appropriate to feedstock and processing characteristics) is expected to produce inert base salts.
- 'Slurry wastes' generated from the wet scrubber will be stored in a dedicated storage tank (22.5kL, refer Site Plan for location) and tested to the EPA Waste Classification Guidelines to characterise them for appropriate disposal.
- Expected disposal volume is <20kL/yr – less than the size of a rainwater tank.
- The Site Manager and Environment Officer will respectively be responsible for the monitoring and disposal of slurry waste, using licenced waste contractors as appropriate (see **Section 5.1**)

4.3.2 Process Consumables (R&D testing)

- Process consumables for processing feedstocks through the RDSM and wet scrubber emissions control are expected to generate solid waste in the form of bulk storage containers (e.g. IBC's, metal and plastic drums). Where available these will be managed through drum reuse and recycling programs and supplier return programs, as outlined in Table 4.3.
- Gas cylinders (e.g. LPG) will be reused through return to suppliers for re-filling.
- As noted earlier, air emissions are beyond the scope of this WMP and a focal point of the SEE and other documents. For clarity, syngas (RDSM gas output) is afterburned and discharged to the atmosphere (under regulatory approval with monitoring) or compressed and used as feedstock to other processing steps.

4.3.3 Stormwater Runoff

- As detailed in the SEE and ERA, the project and site layout have been specifically designed to expect uncontaminated stormwater runoff including from the active testing area, remaining suitable for conventional management of erosion and sediment control. Stormwater runoff within that area is separated from all other areas through diversion drainage to a collection sump as shown on the Erosion and Sediment Control Plan (ESCP) and outlined in the SEE and ERA.
- This will be conservatively confirmed through testing the water quality collected in the sump during each feedstock campaign until consistent results are obtained confirming the approach (minimum of three tests).
- Stormwater runoff from all other areas onsite will be managed as conventional clean sediment-laden stormwater per the SEE, ERA and the Erosion and Sediment Control Plan (ESCP).

4.4 Material Storage - Site Bin System

The system utilised onsite will be concurrent with available recycling and disposal mechanisms available locally through GISC and/or private contractors, and as relevant to the stage of project (e.g. construction or operations). Available recovery opportunities will be reviewed on an annual basis to see if there have been changes in the region.

Where practicable, separate bins will be provided for key recoverable materials and general waste for disposal.

- Bulk waste/recovery bins will be located within the Builders Waste Storage Area (refer **Site Plan** for location). This area has all weather access for skip bin delivery/recovery when required.
- 240 L ('Wheellie') bins will be located inside existing and proposed sheds for recycling, general and putrescible waste and periodically disposed of offsite appropriately.
- Spent chemical drums and IBCs will be stored undercover wherever practicable prior to collection/transport for recovery.

Materials considered for recovery/recycling (where available) will include:

- Aluminium, steel and other metals
- Concrete
- Timber / pallets
- Green waste (garden organics)
- Plasterboard
- Plastic (eg drums, IBC's, HDPE, PET)
- Cardboard & Paper
- Glass

Certain waste materials (e.g. paints and oils) can be disposed of at an EPA designated disposal unit if/when required. Glen Innes region has an established **Community Recycling Centre (CRC)** which accepts the following:

- Water-based and oil-based paints;
- Used motor and cooking oils;
- Lead-acid and hand-held batteries;
- Gas cylinders and fire extinguishers;
- Conventional tube and compact fluorescent lamps;
- Smoke detectors;
- Polystyrene, paper and cardboard; and
- Plastic and glass bottles.

When processing is approved for Stage 3 R&D testing, there is also potential for onsite generated garden waste *and untreated wood/pallets* to be processed through the RDSM. Prior to this these materials will be managed through onsite composting, storage or sent to GISC Waste Management Centre for processing or disposal.

4.5 Packaging

SEATA will endeavour to use minimal packaging through encouraging the supply of bulk goods and reusable transport containers (whilst matching needs as closely as possible to avoid long term excess/waste), and preference suppliers who provide recoverable containers and packaging minimisation measures where practicable.

Treated pallets will be returned to suppliers. Untreated pallets will be sought from suppliers of bulk materials to facilitate recycling/recovery where available and practicable, and/or potentially with onsite processing in future (through R&D testing in Stage 3 through staged approvals).

5 Compliance Management

Generally, waste will be separated and stored onsite for re-use and recycling or disposal as applicable. On-going management of the waste is further described in the following sections.

5.1 Roles and Responsibilities

Table 5.1. Key Personnel and Accountabilities

Roles	Responsibility
Site Preparation & Construction	
SEATA / Construction Contractors Procurement Reps	<ul style="list-style-type: none"> • Ensure the correct amount of material is ordered to avoid wastage • Seek to order materials in bulk where practicable, to avoid excess packaging • Endeavour to purchase pre-cut or prefabricated materials where practicable • Establish the proposed construction waste area with separated bins for recovery/disposal of waste.
Contracted Construction Team	<ul style="list-style-type: none"> • Separate recyclable material and general waste • Use respective bins in storage area provided
Waste Management Contractor	<ul style="list-style-type: none"> • Lawful recovery/disposal of separated materials (e.g. metal, timber, cardboard/paper, organics, general waste)
Site Operations (R&D Testing)	
Site Manager	<ul style="list-style-type: none"> • Ensure waste materials are appropriately stored • Monitor Slurry Tank level and Coordinate testing and disposal with Environmental Representative • Monitor ESC Sump water level and coordinate testing / management with Environmental Representative. • Coordinate return of used consumable containers (IBC's, drums, pallets, cylinders) to reuse/recycling programs / suppliers.
Waste Management Contractor	<ul style="list-style-type: none"> • Lawful recovery/disposal of waste materials (inc. slurry tank waste once characterised). • Provide written documentation to SEATA for waste management/disposal as appropriate/required.
Environment Representative	<ul style="list-style-type: none"> • Confirm waste materials are appropriately stored • Carry out of targeted inspections, monitoring and reporting • Coordinate monitoring of Slurry Tank and sump material characterisation for disposal • Liaise with waste contractors as relevant/required

5.2 Training

Staff inductions will include environmental training and awareness components addressing material recovery and waste management requirements onsite, including those relevant aspects identified in the project SEE, ERA and this WMP.

5.3 Monitoring and Inspections

During site operations observations of waste management activities including waste separation for recovery/disposal will be undertaken during periodic general environmental sites inspections by the environmental officer or nominated delegate during site operations. At least one inspection will also be undertaken during site preparation and construction. Where identified, actions to improve or correct activities will be communicated to the project team as appropriate.

5.4 Records and Reporting

Waste management contractors will be responsible for providing records to SEATA (particularly for disposal) which will be kept for up to four (4) years (and/or in accordance with any relevant conditions of RROs and Exemptions as may be applicable).

The Environment Officer and/or Waste Management Contractor will be responsible for providing summary reports to the Site Manager. Due to the campaign-based nature of operations (R&D testing), operational reporting will be undertaken on as required based, or annually at minimum.