SEATA

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

Environmental Risk Assessment and Management Plan

SEATA Clean Energy & Carbon Sequestration Research & Development Centre

"SEATA R&D Centre"

SEATA Group

November 2021 (Version 1.1)

DOCUMENT CONTROL

APPROVAL DETAILS:

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AMENDMENTS IN THIS RELEASE:

Section Title	Section Number	Amendment Summary
All	All	This is the first release of this document.

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1 Introduction

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.

The scalable technology uses latest generation catalysed pyrolysis and partial gasification employing chemical looping processes to deconstruct various types of carbon-based wastes (e.g. vegetation that is commonly open burned or landfilled) using pseudo direct heat transfer and fluidized bed technology to produce a very clean gas (syngas) which can be used directly for renewable energy or further processed into many other valuable derivatives including carbon-negative green hydrogen, and valuable solid carbon product (e.g. biochar), providing significant carbon sequestration to address climate change.

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 Clean Energy & Carbon Sequestration Research & Development Centre ("SEATA R&D Centre")*** at Glen Innes NSW.

The purpose of risk management is to ensure levels of risk and uncertainty are identified and then properly managed in a structured way, so any potential threat to the health and safety of employees and contractors, environment or communities, delivery of outputs (level of resourcing, time, cost and quality) and the realisation of outcomes/benefits by SEATA is appropriately managed to ensure the project is completed successfully.

This document is intended to achieve this by defining the following:

- The process that has been adopted by the Project to identify, analyse and evaluate risks during the project;
- How risk mitigation strategies will be developed and deployed to reduce the likelihood and/or impact of risks;
- Roles and responsibilities for risk management;
- How reporting on risk status, and changes to risk status, will be undertaken within the Project;
- Providing an ***Environmental Risk Register*** containing all environmental risks identified for the Project, their current gradings and the identified risk mitigation strategies to reduce the likelihood and consequence of each risk.

2 Scope & Objectives

The proposed project and associated **project description** that forms the subject of this Environmental Risk Assessment is described in detail within the Project Briefing Document and SEE prepared for the Development Application for the SEATA R&D Centre at Glenn Innes NSW. These separate documents should be consulted jointly with this document.

A pre-project scoping and broad-brush Environmental Risk Assessment was undertaken to provide direction and context for the various components associated with the project. The outcomes gained in terms of risk ratings and recommended controls have specifically guided project scoping and development.

The primary objectives of the environment and community risk assessment includes:

- Identifying those issues relating to the Project that represent **potential risk of material harm to people or the environment**;
- Determination of the consequence of the issue occurring;
- Determination of the likelihood of the issue occurring;
- Assessment of the risk by determining the probability (likelihood) and consequence (effect) of each hazard/impact; and
- Assisting in setting the level of assessment required to address each identified risk within the Environmental Assessment.

In accordance with DPIE Guidelines for preparation of Scoping Reports (July 2021), factors considered in assessing potential environmental issues for projects should include consideration of:

- ***Scale*** of the impact (Severity, geographical extent, duration)
- ***Nature*** of the Impact (direct, indirect, cumulative impacts)
- ***Sensitivity*** of the receiving environment (vulnerability, value, regulations and guidance)

A qualitative risk assessment methodology was developed and undertaken generally in accordance with the requirements of Australian Standard AS/NZS/ISO 31000 (Risk Management, 2009) to provide a consistent and reliable approach to the identification and assessment of potential environmental issues related to the project. Identified issues were assessed in light of existing mitigation measures and management strategies for the project. Where an individual risk was considered unacceptable with existing controls, or where a knowledge gap was identified, additional mitigation measures and/or management responses (proposed controls) were nominated, including the requirement for any additional specialist studies. A risk matrix was used to determine the consequence and likelihood of potential events to evaluate the subsequent risk level (risk rank) generally in accordance with AS/NZS 31000. As risk management is an ongoing process during the life of a project, this Risk Management Plan and Risk Register must be considered a ‘snap shot’ of relevant risks at the current point in time, and may be revisited where significant or material change to the scope or risk aspects occurs triggering revision.

The Environmental Risk Assessment has primarily accounted for environmental factors (including bushfire). Safety and HAZOPs have been dealt with separately elsewhere. Heads of consideration (potential issues) have included the following, whether applicable or not:

- Air Quality
- Noise
- Access/Traffic
- Visual Impact
- Cumulative Effects
- Social
- Erosion/sedimentation
- Bushfire
- Waste
- Flora and Fauna
- Aboriginal/Cultural Heritage
- European Heritage
- Surface Water
- Groundwater (N/A)
- Water Management
- Greenhouse Gas
- Surface Infrastructure
- Community and Public Safety
- Decommissioning and Rehabilitation
- Soil and land use
- Hazardous Goods
- Agriculture

Where required, the process of risk identification, assessment and the development of countermeasures will involve consultation with the Project team members, other relevant stakeholders and members.

3 Risk Assessment

3.1 Identification

The identification of key potential environmental, social and economic issues for the project has been informed by and based on consideration of:

- The existing environmental context of the Project Site and surrounding locality;
- The legislative framework applicable to the Project;
- A broad brush pre-project Environmental Risk Assessment (***this document***)
- Safety risk assessment (HAZOP Study) undertaken for the project (appended to the Project Briefing Document and SEE);
- The outcomes of pre-lodgement consultation undertaken to date with government agencies and other relevant stakeholders; and
- Technical and environmental experience of the SEATA project team.

Table 1: Risk Assessment Participants

Name	Position	Role	Years of Experience (area of expertise)
John Winter	Director	Engineering & Technical (technology Inventor)	>25
Craig Bagnall	Director	Environment & Regulatory	>25

The identification of key potential environmental, social and economic issues for the project has been informed by and based on consideration of:

- The existing environmental context of the Project Site and surrounding locality;
- The legislative framework applicable to the Project (see Section 5.0 of the Project Briefing Document);
- A broad-brush pre-project Environmental Risk Assessment;
- Safety risk assessment (HAZOP Study) undertaken for the project (refer separately appended to Project Briefing Document/SEE);
- The outcomes of pre-lodgement consultation undertaken to date with government agencies and other relevant stakeholders; and
- Technical and environmental experience of the SEATA project team.

A summary of key potential issues identified for the project is provided in **Section 6.3**. Additional specialist studies identified by the environmental risk assessment and proposed to undertaken to support the DA are outlined in **Section 6.4**.

3.2 Analysis and Evaluation

Once risks have been identified, the risk scenarios are analysed by determining how they might affect the success of the project and evaluated to determine the **likelihood** of a risk or threat being realised and the **consequence**, or impact, should the risk occur.

'Likelihood' *is a qualitative measure of probability to express the strength of our belief that the threat will emerge.* ***'Consequence'*** *is a qualitative measure of negative impact to convey the overall loss of value from a project if the threat emerges, based on the extent of the damage.*

From this analysis, risks are able to be graded as Extreme, Major, Moderate, Minor and Insignificant shown in **Table 2**. The ratings for likelihood and consequence determine a current grading for each risk that in turn provides a measure of the project risk exposure at the time of the evaluation.

Table 2a: SEATA Risk Assessment Matrix

SEATA RISK MATRIX									LIKELIHOOD					
									A	B	C	D	E	
									Almost Certain	Probable/Likely	Possible	Unlikely/Remote	Improbable/Rare	
									(>1 per yr)	(<1 per yr & >1 per 5 yrs)	(<1 per 5 yrs & >1 per 10 yrs)	(<1 per 10 yrs)	(<1 per 100 yrs)	Probability
CONSEQUENCE	Health & Safety	Environment	Compliance/Legal	Community / Reputation	Operations	Business Interruptions	Scheduling Impact (% of overall)	Financial Impact (% of Value/Cost)	Expected to occur in most circumstances	Will probably occur in most circustances	Might occur at some time	Could occur at some time	Might occur in exceptional circumstances	Description
5. Extreme / Catastrophic	Multiple fatalities or permanent disability to multiple people	Long term impairment habitats/ecosystem	Events resulting in suspended or severely reduced operations	Public exposure in national or international media	No Objectives/KPIs Achieved	>1 month	>100%	>$100%	25 [E]	24 [E]	21 [H]	19 [H]	15 [M]	
4. Major	Single Fatality, Long term or Permanent Disability (single)	Long term effects of ecosystem	Breach of licences, legislation, regulation or repeated non-compliance with high potential for prosecution	Public exposure in regional media Impacts credibility with government	50% - 25% Targets achieved	1 week to 1 month	10% to 100%	10% to 100%	23 [E]	22 [E]	18 [H]	14 [M]	10 [m]	
3. Moderate	Short term disability (i.e. sprained ankle)	Serious medium term environmental effects	Non-compliance with moderate potential for impact e.g. one-off non compliance with permit or licence	Repeated community complaints requiring site management response Significant public exposure in local media	50% - 25% Targets achieved	1 day to 1 week	1% to 10%	1% to 10% 1% to 10%	20 [H]	17 [H]	13 [M]	9 [m]	6 [L]	
2. Minor	Medical treatment injuries	Minor effects to physical environment	Minor non-compliance with external standard or operating procedure with low potential for impact	A community complaint requiring site management response One off public exposure in local media or word of mouth	80% - 50% Targets	12 hrs to 1 day	0.1% to 1%	0.1% to 1%	16 [M]	12 [M]	8 [m]	5 [L]	3 [L]	
1. Insignificant	First Aid Only	Limited physical damage	Insignificant non-compliance with internal operational procedure of standard	Minor non-compliance with external standard or operating procedure with low potential for impact	>80% Targets Achieved	<12 hrs	<0.1%	<0.1%	11 [M]	7 [m]	4 [L]	2 [L]	1 [L]	

Table 2b) SEATA Risk Ranking Classifications and Management

Risk Rating	Risk Category		Description
22 to 25	E	Extreme	Action required to **eliminate or reduce** the risk. If the risk is considered to be ALARP then the decision to accept the risk is to be made by the **full Board of SEATA Group**.
17 to 21	H	High	Action is required to eliminate or reduce the risk. If the risk is considered to be ALARP then the decision to accept the risk is to be made by the **full board of SEATA Group**.
11 to 15	M	Moderate	Action is required to eliminate or reduce the risk. If the risk is considered to be ALARP then the decision to accept the risk is to be **jointly** made by the lead Process Engineer and Environmental Management Representative.
7 to 10	m	Minor	Action is required to eliminate or reduce the risk. If the risk is considered to be ALARP then the decision to accept the risk is to be made by the lead process Engineer **or** Environmental Management Representative.
1 to 6	L	Low	Actions to eliminate or further reduce the risk should be considered. If risk is considered to be ALARP then the decision to accept the risk is to be made by the risk assessment owner (no recommended control is required to be created for this).

3.3 Summary of Risks Identified

The risk assessment identified a total of **forty** (**40) potential risk aspects/scenarios, no extreme or major risks were identified.** Nil (0) Extreme risks, Nil (0) High Risks, **One (1) Moderate Risk**, **10 Minor Risks**, **29 Low Risks**, Zero (0) identified as Not Applicable (N/A).

The risk register developed during the workshop is provided in **Appendix A**. A summary of the ***highest*** risk scenarios is provided below in **Table 3**.

Table 3: Summary of the *highest* Risk Scenarios identified

Risk ID	Risk Ranking (1-25)	Risk Scenario
R15	3	Potential for spills to occur from transport, use or storage of hazardous materials have the potential to contaminate water and soils, if not adequately controlled.
R2	3	Potential for emissions to result in dust/air quality impacts if not adequately controlled, including but not limited to consideration of the following as typically assessed & regulated in NSW for thermal treatment technologies: • Particulate matter (PM), including PM10 and PM2.5. • Acid Gases (eg Hydrogen Chloride (HCl), Hydrogen Fluoride (HF)) • Carbon Monoxide (CO) and Carbon Dioxide (CO_2) • Oxides of Sulfur (SO_X, including Sulfur Dioxide SO_2) • Oxides of Nitrogen (NO_x), including N_2O • Heavy metals (including volatile HMs such as Hg, Cd, As, Cr), and all Type 1 and Type 2 substances as regulated under POEO Act). • Gaseous and vaporous organic substances (expressed as volatile total organic carbon (VTOC or VOC)). • Hydrogen sulfide (H_2S). • Chlorine (Cl_2). • Ammonia (NH_3). • Polycyclic -aromatic hydrocarbons (PAHs). • Persistant Organic Pollutants (POP's_ including Dioxins and Furans (various forms).
R3	3	Potential to result in adverse emissions if startup/shutdown not adequately controlled (e.g. POPs).
R6	2	Potential for degradation in amenity (including cumulative) associated with construction noise, operational noise or road traffic noise, if not adequately controlled. Notes: Blower and diesel generator are in continuous use during periodic campaign-based RDSM testing (blower circulates catalyst, generator provides 3 phase power to auger motors).
R8	3	Potential for waste generated by the development to have improper storage and disposal, if not adequately controlled.
R9	3	Potential for regulatory non-compliance if not adequately identified and controlled
R14	3	Potential for erosion and sedimentation from runoff, if not adequately controlled
R32	3	Potential for hazardous or offensive development if not adequately identified and controlled (and subsequent non-compliance with State Environmental Planning Policy No.33).
R35	3	Potential for fire originating off site to encroach on the development, if not adequately controlled.
R37	3	Potential for fire originating from onsite operational activities (e.g RDSM operation) if not adequately designed and controlled.
R38	2	Potential risk of local introduction of weeds (from INS) or biological pathogen (from biosolids) during handling/storage/use for the project, if not appropriately and adequately controlled

4 Risk Mitigation

Mitigation of risks involves the identification of actions to reduce the likelihood that a threat will occur (preventative action) and/or reduce the impact of a threat that does occur (contingency action). This strategy also involves identifying the stage of the project when the action should be undertaken, either prior to the start of or during the project.

Risk mitigation strategies to reduce the chance that a risk will be realised and/or reduce the consequence of a risk if it is realised have been developed. **Table 4** has been used to determine how risks will be treated in terms of preparation and/or deployment of mitigation strategies during the life of the Project.

Table 4: Risk Mitigation Strategies

Grade	Description
Extreme	Action required to **eliminate or reduce** the risk. If the risk is considered to be ALARP then the decision to accept the risk is to be made by the **full Board of SEATA Group**.
High	Action is required to eliminate or reduce the risk. If the risk is considered to be ALARP then the decision to accept the risk is to be made by the **full board of SEATA Group**.
Moderate	Action is required to eliminate or reduce the risk. If the risk is considered to be ALARP then the decision to accept the risk is to be **jointly** made by the lead Process Engineer and Environmental Management Representative.
Minor	Action is required to eliminate or reduce the risk. If the risk is considered to be ALARP then the decision to accept the risk is to be made by the lead process Engineer **or** Environmental Management Representative.
Low	Actions to eliminate or further reduce the risk should be considered. If risk is considered to be ALARP then the decision to accept the risk is to be made by the risk assessment owner (no recommended control is required to be created for this).

ALARP – As Low As Reasonably Practicable

5 Summary of Recommended Actions & Controls

The recommended actions and additional controls (RAC) identified throughout the risk assessment process are shown in **Table 5**.

Table 5: Summary of Further Recommended Actions / Proposed Additional Controls

Action ID	Recommended Actions / Additional Controls
RAC1	• Air quality assessment to be undertaken by suitably qualified specialist consultant, prepared in consultation with GISC and EPA prior to commencement.
RAC2	• Development Consent and EPL sought from GISC, EPA/related agencies.
RAC3	• Detailed testing program to be developed by specialist air quality consultant in consultation with EPA as condition of approval. Will include mass balance characterising feed inputs and outputs (gas and biochar solid products), and any emissions (including liquid waste from wet scrubber).

Action ID	Recommended Actions / Additional Controls
RAC4	• Staged Resource Recovery Order (RRO) & Exemption approval to be sought from EPA for (a) Recovery and transport of proposed feedstocks by suppliers and receipt by SEATA (starting with INS); b) Storage and thermal processing of feedstocks onsite by SEATA, and storage of temporary biochar product (during classification for use) and C) loading/transport and suitable application of biochar product to land.
RAC5	• Whilst not expected, should NOx present issues during testing, additional appropriate wet scrubber reagents can be considered to address as successfully used in industry (e.g. urea etc)
RAC6	• Whilst proposed feedstocks are not considered likely to generate significant issues with loading dust (as noted elsewhere), should such occur dust management options at the loading hopper can be further considered (eg dust extractor or fine water spray if required)
RAC7	• If requested, additional process information (confidential) can be supplied separately to EPA/Council to assist assessment.
RAC8	• Life Cycle Analysis (LCA) to be undertaken following results of testing to validate and quantify performance.
RAC9	• Undertake desktop noise assessment by specialist consultant (suitably qualified professional) to further confirm the effectiveness of all proposed noise mitigation prior to commencement
RAC10	• Blower to be fitted with exhaust noise reduction fittings if necessary/practicable.
RAC11	• If required, further temporary noise insulation/barrier could be considered (consistent with rural character). ***Note****: Undertaken ahead of DA submission – insulation included in Sound Enclosure Module, and additional shipping containers strategically placed)*
RAC12	• Develop a Waste Management Plan for the Project as required by GISC *(**Note**: **Completed** for DA Submission).*
RAC13	• Monitor Sump water periodically (e.g once per test campaign) to ensure runoff is suitable for conventional ESC treatment (release to nearby grassed area). If not deemed suitable, water to be treated or transferred to slurry tank for appropriate disposal offsite by suitably qualified organisation.
RAC14	• Prepare dedicated MSDS for biochar produced by the project when characterised prior to use.

6 Roles and Responsibilities

6.1 Project Managers

A dedicated lead Process Engineer and Environmental Management Representative will be specifically allocated to the project and responsible for:

- Development and implementation of the Project Risk Management Plan;
- Organisation of regular risk management sessions so that risks can be reviewed, and new risks identified;
- Assessment of identified risks and developing strategies to manage those risks for each phase of the project, as they are identified; and

- Ensure that priority risks are closely monitored and managed.

6.2 Project Team

All members of the Project Team will be responsible for assisting the dedicated Environmental Management Representative and Process Engineer in the risk management process. This includes the identification, analysis and evaluation of risks and continual monitoring throughout the project life cycle.

7 Review

The Environmental Risk Register associated with this document will be reviewed and updated if/where:

- significant changes are proposed the project scope, risk aspects or controls for the priority risks identified (and/or those of highest consequences) which have the potential to cause material harm to people or the environment; or
- at least once during the three (3) year proposed R&D trial project.

APPENDIX A: ENVIRONMENTAL RISK REGISTER (AS AT NOVEMBER 2021)

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Consequence	Score
Extreme	5
Major	4
Moderate	3
Minor	2
Insignificant	1
Not applicable	n/a

Likelihood	Score
Almost Certain	A
Likely	B
Possible	C
Unlikely	D
Rare	E
Not applicable	n/a

CONSEQUENCE	E-Rare	D-Unlikely	C-Possible	B-Likely	A-Almost Certain
5-Extreme	12	19	22	24	25
4-Major	10	15	18	21	23
3-Moderate	6	9	14	17	20
2-Minor	3	5	8	13	16
1-Insignificant	1	2	4	7	11

LIKELIHOOD

Note: see the ***"Full Risk Matrix"*** tab for detailed consequence and likelihood details

Last Edited: 30/11/2021

Risk # / Identifier	Project Activity	Description of Risk	Existing Controls / Mitigation Description	MRC	L	Risk	Recommended Actions / Proposed Additional Controls
Air Quality							
R1	General project activities including minor site preparation and operations (**excluding RDSM operation** - which is assessed separately below)	Potential for dust/air quality issues **during site preparations and non-RDSM related aspects of operations** if not adequately controlled.	• No significant uncovered bulk stockpiles - Solid product from RDSM (biochar) all stored in appropriate containers/packaging (e.g. bulka bags, drums or similar) and undercover. <feedstocks> • Small daily working stockpile on pad near RDSM covered (e.g. tarped), size minimised to match daily feed requirements, and can be wetted if required to control dust. • Site layout and works with potential for dust generation minimised through design where practicable. • Active disturbance minimised and timed to avoid hot/dusty days during construction where practicable. Minor wetting during installation if required. • All proposed works onsite only. No proposed offsite works including within the public road verge (West Furracabad Rd) - no need for access changes (existing entry is appropriate). • No significant vegetation clearing (one non-native tree, periodic slashing of grassed areas to <100mm for RFS requirements) • Small scale, intermittent and non-permanent trial project. • Infrequent heavy vehicle deliveries (typically fortnightly) on gravel access. • Low speed limits and short distance for personnel light vehicles entering to carpark to minimise wheel tracked dust potential. • Timing of potential dusty activities undertaken on less windy days wherever practicable (avoidance). • Erosion and Sediment Control Plan (ESCP) prepared to control movement of gravel (including fines as potential dust source) and runoff from within Active Testing Area to dedicated sump. • Any potential effects would be expected to be temporary and short-lived during brief construction phase.	2	D		
R2	Operation of RDSM plant and associated equipment for trials *(**Note**: OH&S and related aspects for RDSM operation, including air emissions, were considered separately by the HAZOP study)*	Potential for emissions to result in dust/air quality impacts if not adequately controlled, including but not limited to consideration of the following as typically assessed & regulated in NSW for thermal treatment technologies: • Particulate matter (PM), including PM10 and PM2.5. • Acid Gases (eg Hydrogen Chloride (HCl), Hydrogen Fluoride (HF)) • Carbon Monoxide (CO) and Carbon Dioxide (CO_2) • Oxides of Sulfure (SO_x, including Sulfur Dioxide SO_2) • Oxides of Nitrogen (NOx), including N_2O • Heavy metals (including volatile HMs such as Hg, Cd, As, Cr), and all Type 1 and Type 2 substances as regulated under POEO Act). • Gaseous and vaporous organic substances (expressed as volatile total organic carbon (VTOC or VOC)). • Hydrogen sulfide (H_2S). • Chlorine (Cl_2). • Ammonia (NH_3). • Polycyclic -aromatic hydrocarbons (PAHs). • Persistent Organic Pollutants (POP's_ including Dioxins and Furans (various forms).	• SEATA partial gasification reaction process is <u>not airblown</u>, expected to result in up to ~78% less offgas volume requiring treatment compared to conventional gasification or combustion (as nitrogen is majority component of air, typically 78%). Majority of gas produced is valuable syngas instead of emissions, significantly reducing treatment volume and size/cost of emission control equipment. • Batch/bench scale technology successfully tested and pilot scale continuous RDSM designs adapted as necessary. • SEATA process provides very uniform and consistent output quality for syngas and biochar (best practice reactor design to optimise heat transfer for temperature uniformity ensuring consistent, even quality product - known temperatures for known residence time. Catalysed pseudo-direct heat transfer and fluid bed reactor design). • Continuous run process to steady state conditions promotes consistency (syngas, char) • Start-up and shut down occurrences will be infrequent (campaign based continuous process), minimising potential for associated variance in emissions • Technology design also significantly reduces particulate/dust potential compared to conventional thermal combustion as up to 50% of carbon in feedstock reports to solid biochar (i.e. up to 50% less carbon in gas product to secondary gasifier reactor). The (low) gas volumes pass through a cyclone (removal of large PM) and subsequently treated via a wet scrubber, expected to remove majority of remaining particulate (to be confirmed by R&D testing and monitoring). • High temperature secondary reactor (gasifier) >800C to deconstruct potential pollutants (including but not limited to VOC's, POP's (incl dioxins, furans etc), PAHs, hydrocarbons and other organics (eg UPOPs, PBDE, PCB etc), followed by rapid quenching to minimise risk of reformation, and subsequent treatment by both wet scrubber and afterburner prior to stack release (refer separately below and see PFD). • Wet scrubber treatment of gases produced (suitable reagents tailored as appropriate to feedstock and processing characteristics, typically alkali reagents (eg hydrated lime, sodium hydroxide or other as suitable). Capture of scrubber slurry to dedicated tank (22.5kL) for characterisation and appropriate disposal (expected disposal <20kL/yr - less than the size of a rainwater tank). • Whilst not expected to be necessary, system conservatively includes additional afterburner (thermal oxidiser) to treat post-scrubbing gases to >800°C for at least 2 seconds as per current regulatory requirements. Note: low gas volume by design (see above) significantly reduces size of afterburner required for SEATA technology compared to conventional technologies. • First proposed feedstock is Invasive Native Scrub (INS), a feedstock typically from natural areas not treated with pesticides or herbicides. Chipped to suit feed design and relatively lower fines content (lower dust potential including loading). • Clean/non-contaminated feedstocks, no plastic-based or high halogen content feedstocks. (potential for biosolids to have minor levels by mass of microplastic but appropriate controls above to manage and appropriate monitoring to confirm). • Targeted proposed feedstocks are considered generally low potential for loading dust generation (at hopper). SEATA technology can handle high moisture feedstocks (~70% moisture). Accordingly mechanically dewatered biosolid filter cakes can be loaded direct to the RDSM without pre-drying (significantly minimising potential for dust compared to conventional systems with ~20% moisture limits, which require significant pre-drying resulting in dusty feedstocks). • Design considerations for other future *potential* applications (including non-clean feedstocks) has specifically considered management of halogens and acid gases. As per various above controls, halogen gases designed to report to wet scrubber for alkali-based reagent removal (e.g. producing inert solid base salts, for example $CaCl_2$ etc. • >30% of N content in the feedstock expected to report primarily to the char during the first reactor pyrolysis, and >30% in gas phase reports as ammonia to the wet scrubber for removal, subsequently significantly reducing potential NOx/N_2O content in discharge gas emissions. • A 'clean' burning auxiliary support fuel (e.g. LPG is proposed) will be used to regulate temperature and start-up conditions. For clarity, diesel is not proposed for startup. • Whilst the process is unique from conventional pyrolysis & gasification, many of the component parts are well proven. • Deliberately staged project design ('walk before run' approach), including short preliminary runs before longer detailed trials, staged feedstocks commencing on cleanest natural feed. • Significant distance to nearest potential sensitive receptors (>850m to nearest rural residence, next closest >1200m) in low density area. • R&D project with initial three year approval (and noting all the existing and proposed controls). Whilst not expected, the potential for any unpredicted impact would be likely be temporary. • Dedicated HAZOP study undertaken for safe RDSM testing • Automated continuous sampling of temperature, pressure and flow. Periodic attended continuous sampling for NO_x, CO, CO_2, O_2 (at minimum), and SOx when trialling high sulfer feedstocks (eg coal). • Diesel powered 3-phase generator and air blower housed in dedicated ventilated sound enclosure (minimises noise but also reduces particulate direct to surrounds) • No energy recovery proposed by project, NSW Energy from Waste Policy and Eligible Fuels Guidelines conservatively considered (for R&D objective to demonstrate technology for future commercial scale up) but not technically applicable. • Emissions to comply with POEO Clean Air Regulations (Group 6) at minimum. R&D results will also compare against international Best Available Techniques (BAT) Reference documents and latest NSW EfW Policy Criteria that would be applicable for commercial scale up.	3	D		**RAC1** - Air quality assessment to be undertaken by suitably qualified specialist consultant, prepared in consultation with GISC and EPA prior to commencement. **RAC2** - Development Consent and EPL sought from GISC, EPA/related agencies. **RAC3** - Detailed testing program to be developed by specialist air quality consultant in consultation with EPA as condition of approval. Will include mass balance characterising feed inputs and outputs (gas and biochar solid products), and any emissions (including liquid waste from wet scrubber). **RAC 4** - Staged Resource Recovery Order (RRO) & Exemption approval to be sought from EPA for (a) Recovery and transport of proposed feedstocks by suppliers and receipt by SEATA (starting with INS); b) Storage and thermal processing of feedstocks onsite by SEATA, and storage of temporary biochar product (during classification for use) and C) loading/transport and suitable application of biochar product to land. **RAC5** - Whilst not expected, should NOx present issues during testing, additional appropriate wet scrubber reagents can be considered to address as successfully used in industry (e.g. urea etc) **RAC6** - Whilst proposed feedstocks are not considered likely to generate significant issues with loading dust (as noted elsewhere), should such occur dust management options at the loading hopper can be further considered (eg dust extractor or fine water spray if required) **RAC7** - If requested, additional process information (confidential) can be supplied separately to EPA/Council to assist assessment.
R3	Start-up / shut-down conditions of the RDSM (also including commissioning)	Potential to result in adverse emissions if startup/shutdown not adequately controlled (e.g. POPs).	• Appropriate 'clean' burning auxiliary support fuel (e.g. LPG) used to achieve/regulate temperature during start-up until reaches steady state. No other feedstock entry until steady state conditions. • Feedstock entry ceased prior to shutdown to minimise potential for residual material during later subsequent re-start. • Emissions from combustion of clean auxiliary support fuel would burn significantly cleaner than any remnant residual processed feedstock remaining in RDSM system. • Start-up and shut down occurrences will be infrequent (objective of continuous operation and maximised utilisation throughout each feedstock campaign trial). • Development of startup/shutdown plans and procedures as per HAZOP Study recommendations • Development of commissioning plans and procedures as per HAZOP Study recommendations • SEATA technology not direct air blown gasifier, significantly lower gas volume for emissions control • SEATA technology lower POP formation than conventional gasifier or combustion as up to half the carbon in feedstock reports to solid char (i.e. up to 50% less C reporting to gas phase in 2nd reactor, reducing volume potentially reacting with other elements to potentially form POPs) • Appropriate emissions control (high temp gasifier 2nd reactor >800°C, rapid quenching at/from below 500°C to avoid POP reformation, wet scrubber and then additional afterburner thermal oxidiser >800°C for >2s to destroy any potential residual POPs etc) • *See also related controls and design elements noted in R2 above*	3	D		
R4	Operation of other equipment onsite (diesel powered equipment including on-site 3 phase generator, blower, loading tractor, light vehicles)	Potential to result in air quality impacts if not adequately controlled.	• Site layout design specifically to minimise loading vehicle duration and movements (tractor uses daily working stockpiles near to RDSM which also minimises noise during testing). Site layout also minimises need for light vehicle movements by staff (and carpark provided for staff vehicles). • 3 Phase diesel generator and blower will primarily operate during campaign-based active testing (i.e. periodic, but continuous when operating). Staged project testing design as noted elsewhere above. • Project siting/location with significant distance to nearest potential sensitive receptors (>850m to nearest residence). • R&D project with temporary approval (and noting all the existing and proposed controls). Whilst not expected, the potential for any effects would also likely be minor and temporary. • Staff inductions include environmental training and awareness	2	D		
Greenhouse Gas & Climate Change							
R5	Operational activities including flaring, use of ancillary equipment (generator, blower, compressor)	Emission of greenhouse gases (e.g. carbon dioxide, methane, NOx)	• The trials seek to demonstrate SEATA technology as a potentially significant and scalable **Negative** Emissions Technology to remove carbon dioxide from the atmosphere. • The trials seek to demonstrate SEATA technology as a source of renewable bioenergy and potentially **carbon-negative hydrogen** (alternative/replacement fuels), which additionally employ genuine circular economy in their production (otherwise wasted resources as proposed feedstocks). • High thermal efficiency technology, significantly lower offgas volumes than conventional technology (designed for reduced atmospheric emissions and treatment, and optimal recovery of feedstock energy into useful gas and solid products). • Refer R2 above for emission controls and design avoidance measures for particulate, VOCs/CO/CO_2methane, and NO_x/N_2O. All expected to be low by design. • Diesel generator only used as 3 phase power wasn't available to rural site. Diesel generator only expected to be required at pilot scale, if R&D testing proves successful commercial scale plants will likely provide own power during standard operation. • Monitoring program will include key green house gases.	2	D		**RAC8** - Life Cycle Analysis (LCA) to be undertaken following results of testing to validate and quantify performance.
Environmental Noise (Amenity)							

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Consequence	Score
Extreme	5
Major	4
Moderate	3
Minor	2
Insignificant	1
Not applicable	n/a

Likelihood	Score
Almost Certain	A
Likely	B
Possible	C
Unlikely	D
Rare	E
Not applicable	n/a

CONSEQUENCE	E-Rare	D-Unlikely	C-Possible	B-Likely	A-Almost Certain
5-Extreme	12	19	22	24	25
4-Major	10	15	18	21	23
3-Moderate	6	9	14	17	20
2-Minor	3	5	8	13	16
1-Insignificant	1	2	4	7	11

LIKELIHOOD

Note: see the ***"Full Risk Matrix"*** tab for detailed consequence and likelihood details

Last Edited: 30/11/2021

Risk # / Identifier	Project Activity	Description of Risk	Existing Controls / Mitigation Description	MRC	L	Risk	Recommended Actions / Proposed Additional Controls
R6	General project activities (including minor site preparation and campaign based operation) *Note: campaign based operation will involve RDSM continuous operation (i.e. night time), however specific activities will only occur intermittently (e.g. loading) and minimised*	Potential for degradation in amenity (including cumulative) associated with construction noise, operational noise or road traffic noise, if not adequately controlled. Notes: Blower and diesel generator are in continuous use during periodic campaign-based RDSM testing (blower circulates catalyst, generator provides 3 phase power to auger motors).	• Daytime deliveries for heavy vehicles (no night time deliveries). • Primary notable process noise from site operations associated with ancilliary support equipment (air blower, compressor, generator) discussed further below, and loading/unloading activities at the RDSM (tractor, hopper feed, product removal). • Relatively small particle sizing (typically <40mm) of feedstocks minimises hopper loading noise. Project conservatively commencing with biomass INS (relatively lighter/less dense for less noise) • Ancillary equipment with potential to produce elevated noise housed in dedicated acoustic enclosure (e.g. blower, generator, air compressor). • Targeted lining of sound absorbing insulation in dedicated Sound Enclosure • Dedicated sound enclosure will be mobile unit (potentially relocatable as/if necessary). • Air compressor used intermittently and recently upgraded to lower noise screw drive system (rather than noisier reciprocating drive). • Other ancillary noise sources associated with trials are temporary/intermittent and minimised (eg hopper loading, minimised by daily working stockpiles located close to RDSM for short vehicle movements). • Diesel generator expected to run near idle speed (oversized 20kVA rating used to supply ~5kVA); • Lower noise emitting high performance tractor, and used intermittently during campaign-based feedstock trials (e.g. hopper loading). • RDSM runs relatively quietly by improved design – by avoiding an air-blown system up to 78% reduction in off gas volume is achieved compared to conventional systems, resulting in smaller and quieter gasification processing and emissions control systems. • Strategic placement of shipping containers to intercept directional noise toward distant receptors. • No significant source of vibration. • Ensure plant and equipment is well maintained and not making excessive noise. • Turn off machinery when not in use. • Minimise operating equipment simultaneously where practicable. • Orientate directional noise emitting equipment away from receivers where practicable. • Staff inductions include environmental training and awareness • Staff and contractor PPE in appropriate areas (ear protection)	2	C		**RAC9** - Undertake desktop noise assessment by specialist consultant (suitably qualified professional) to further confirm the effectiveness of all proposed noise mitigation prior to commencement **RAC10** - Blower to be fitted with exhaust noise reduction fittings if necessary/practicable. **RAC11** - If required, further temporary noise insulation/barrier could be considered (consistent with rural character).
Access, Traffic and Transport							
R7	General project activities (including minor site preparation and campaign based operation)	Potential to alter local traffic conditions	• Approximately 1 delivery per fortnight is expected during active trials. This is consistent with existing use by surrounding agricultural practices and not considered significant. • Only daytime heavy vehicle deliveries will be undertaken. • Personnel shift change to be scheduled to avoid school bus period wherever practicable (as requested by neighbours) • The proposed development approval is for relatively short-lived campaign-based testing and is non-permanent, and is therefore unlikely to significantly impact local traffic conditions or capacity. • Site design and layout has considered processing requirements and optimised storage to minimise vehicle deliveries. • Unsealed all weather access suitable for proposed vehicle use. • Staff inductions include environmental training and awareness	2	D		
Product and Waste Management							
R8	Generation of solid, liquid and gaseous waste streams (e.g. ash residue, liquid effluent, gaseous emissions, staff waste, other waste) during site preparation and campaign based operation (R&D testing)	Potential for waste generated by the development to have improper storage and disposal, if not adequately controlled.	• SEATA technology is specifically designed to minimise waste volumes via process (Refer R2 above). • No liquid products from reactors (unlike conventional pyrolysis) - the process specifically avoids generation of oils, tars and resins, instead further heating and deconstructing them into valuable syngas. • No solid ash or slag produced by reactors (unlike conventional gasifiers and incinerators), all non-volatile components of feed report to biochar in first reactor • Biochar product tested and classified for appropriate use in accordance with RRO & Exemption Requirements. Both agricultural and industrial purposes have been conservatively identified to provide options, with conservative redundancy considered (not expected) for a worst case scenario requiring appropriate biochar disposal (eg power station co-feed) to avoid any waste legacy risk onsite with nominated timeframes (refer Project Scoping Brief / SEE). • Slurry waste generated from the wet scrubber (emission control equipment) will be tested to EPA Waste Classification Guidelines and disposed of appropriately. • Potential for scrubber slurry water to be recycled through RDSM (trialled) to further minimise storage and disposal volume. • Wet scrubber treatment of gases produced (alkali reagents tailored as appropriate to feedstock and processing characteristics). Capture of scrubber slurry to dedicated tank (22.5kL) for characterisation and appropriate disposal (expected disposal <20kL/yr - less than the size of a rainwater tank). General Solid Waste Management: • Feedstocks delivered to site in 1t bulka bags (sealed semi-bulk transport), re-used where practicable/allowable per RRO & Exemption and relevant regulations. • Biochar product temporarily stored in 200L drums sealed with inert gas until cool (typically a few days) is then transferred to 1T covered/sealed bulka bags for interim bulk storage before deployment, allowing drums to be re-used if required. • Waste vegetation from grounds maintenance (primarily slashed grasses) left insitu to compost into soil. • 'Wheelie' bins located inside existing and proposed sheds for recycling, general and putrescible waste and periodically disposed of offsite appropriately. • Staff inductions include environmental training and awareness	3	D		**RAC12** - Develop a Waste Management Plan for the Project as required by GISC. *(**Note: Completed** for DA submission)*
R9	Transport, storage and thermal processing of feedstocks (e.g. INS/Biomass, Biosolids, Coal)	Potential for regulatory non-compliance if not adequately identified and controlled	• See also controls per R2 • No energy recovery proposed by this R&D project (gas characterisation & afterburned or used for process control), however NSW EfW Policy and Eligible Waste Fuel guidelines considered within the design (intention to provide relevant Proof of Performance data for future commercialisation elsewhere) • SEATA technology designed for genuine circular economy for both gas and solid products (clean syngas undiluted with Nitrogen facilitates economy recovery of constituent gases (eg hydrogen, food grade CO2). • Higher order use of proposed feedstocks (eg INS currently open burned to atmosphere under existing approvals), processing biosolids produces a higher quality soil ameliorant and significantly reduces costs and GHG footprint of managing raw biosolids with direct land application, and significantly reduces emissions footprint for coal. • SEATA technology is using current international best practice techniques (BAT), particularly with respect to: • Process design and control - Refer R2. • Emission control equipment design and control - Refer R2. • Emission monitoring with real-time feedback to the controls of the process - Refer R2. • Arrangements for the receipt of waste - Appropriate feedstock supply and delivery QA/QC controls (including Statement of Origin required from suppliers) • Management of residues from the energy recovery process - Designed to eliminate liquid waste streams (i.e. oils and tars) - No proposed recovery of energy (R&D project).	3	D		• Refer all Recommended Additional Controls (RAC) **per R2**.
R10	Transport, storage and thermal processing of feedstocks (e.g. INS/Biomass, Biosolids, Coal)	Potential to receive contaminated feedstocks	• See also controls as per **immediately above**, and also per **R2**. • First proposed feedstock is Invasive Native Scrub (INS), a feedstock typically from natural areas not treated with pesticides or herbicides. Chipped to suit feed design and relatively lower fines content (lower dust potential including loading). • Clean/non-contaminated feedstocks, no plastic-based or high halogen content feedstocks. (potential for biosolids to have minor levels by mass of microplastic but appropriate controls above to manage and appropriate monitoring to confirm). • Contracts are developed directly with the source of the feedstock supply (i.e. typically no intermediate contractor or processing). • See also ***Biosecurity*** elsewhere.	2	D		• Refer Recommended Additional Controls (RAC) **per R2**.
R11	Generation of biochar by the operation of the plant	Biochar produced for land application is fit-for-purpose and poses minimal risk of harm to the environment in order to meet the requirements for consideration of a resource recovery exemption by the EPA	• High quality production process with controls as detailed per **R2**. • In addition to agricultural/soil applications, Industrial uses have also been identified if needed should characterisation deem not viable to use for land application. • **Biochar will be characterised in accordance with:** - NSW EPA Guidelines on RROs and Exemptions For Land Application of Waste Materials as a Fertiliser or Soil Amendment (2018) (primary reference), for land application - Conditions of EPA approval sought for staged RRO and Exemptions - Code of Practice for classification of biochar (ANZ Biochar Industry Group) *(noting additional NSW-specific requirements as applicable to meet EPA requirements)* -Staged testing program outlined in the Scoping Brief /SEE (including detailed testing program to be developed in consultation with the EPA) • Biochar will be stored appropriately (e.g. 200L Drum with inert gas seal to prevent oxidation until cool (min 4 days) then transferred to bulka bags) until requirements of EPA conditions of secondary approval (RRO) met. • Biochar will be produced and used in accordance with conditions of an RRO and exemption approval sought from EPA.	2	D		• Refer Recommended Additional Controls (RAC) **per R2**.
R12	Generation of syngas by the operation of the plant	Potential risk of ignition of syngas product if stored, associated with operational activities	• Generated gasses will be afterburned and discharged to atmosphere, or used as feedstock to other processing steps (including process control) (no commercial energy recovery proposed by this R&D project). • Minimal gasses will be collected for sampling/analysis as part of a detailed emission testing program to be developed. • See also relevant controls per **R2** (above), and ***Fire/Bushfire*** further below	2	D		• Refer Recommended Additional Controls (RAC) **per R2**.
Soil & Water (including Groundwater)							

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Consequence	Score
Extreme	5
Major	4
Moderate	3
Minor	2
Insignificant	1
Not applicable	n/a

Likelihood	Score
Almost Certain	A
Likely	B
Possible	C
Unlikely	D
Rare	E
Not applicable	n/a

CONSEQUENCE	E-Rare	D-Unlikely	C-Possible	B-Likely	A-Almost Certain
5-Extreme	12	19	22	24	25
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	LIKELIHOOD				

Note: see the ***"Full Risk Matrix"*** tab for detailed consequence and likelihood details

Last Edited: 30/11/2021

Risk # / Identifier	Project Activity	Description of Risk	Existing Controls / Mitigation Description	MRC	L	Risk	Recommended Actions / Proposed Additional Controls
R13	Surface disturbance/ minor earthworks during site preparation activities	Potential for erosion, sedimentation and reduction of water quality in local waterways or floodplains, if not adequately controlled.	• Site has relatively gentle grades, generally north to south (slopes typically 1-2%, on average ~4%). Upslope catchment grades steeper but broken up by clean water diversion as noted separately below. • Significant ground cover (grassed) within catchment above project site and within project site. • No significant deep excavation/earthworks (except very localised small holes for shed piers) is anticipated (shallow topsoil strip <200mm for installation of unsealed all weather access/workpad). • Existing clean water diversion (contour bank) of farm immediately north of project site diverts runon stormwater away from the project site (refer ESCP figure) • Active testing area footprint is relatively small (<800m2) and even when combined with broader workpad is still below the 2500m2 threshold for a sediment basin (Type 1 ESC as per IECA and Blue Book). Type 3 sediment control (sediment fences and traps) is appropriate and included accordingly. • ESCP (Erosion & Sediment Control Plan) developed commensurate with minor level of disturbance activity and ESC required and considered natural path of water toward downslope (offsite) ephemeral drainage lines (refer scoping brief/SEE). • Cross drains installed at suitable locations on unsealed access road to break facilitate controlled water flow, delivered to simple level spreaders (or similar) onto grassed areas • Sediment fencing adjacent to the downslope edge of the development footprint. • Soil type mapping to ASC indicates Vertisols and Hydrosols, with moderate inherent soil fertility. Black earth basaltic origin soils are known onsite. Soil hydrologic group mapping (e-spade) indicates Type C and D in the surrounding area (slow infiltration). • Stripped topsoil will be recovered and appropriately used/stored on the landowners surrounding farm (same Deposited Plan). Topsoil may also be used onsite where required for landscape and amenity requirements as appropriate. • Unsealed all weather internal access will build upon and extend from existing informal tracks. • Clean imported material used for unsealed workpad, shed pads and access areas (VENM/ENM) • Staff inductions include environmental training and awareness • Duration of site preparation works minimised as far as practicable (effects temporary)	2	D		
R14	Stormwater runoff during operations	Potential for erosion and sedimentation from runoff, if not adequately controlled	• Controls as per above (including ESC drainage and controls from maintained during operations). • Runoff collected from Active Testing Area to dedicated sump will be tested once per campaign to confirm suitable for conventional ESC management (whilst unexpected, if sump water unsuitable it can be either suitably treated or disposed of appropriately eg transferred to scrubber slurry tank) • Potential erosion will be mitigated through the use of sediment fencing adjacent to the downslope edge of the development footprint. • Sediment laden runoff on workpad upslope of Active Testing Area diverted.	2	C		
R15	Transport, use and storage of potentially hazardous materials (including diesel fuel)	Potential for spills to occur from transport, use or storage of hazardous materials have the potential to contaminate water and soils, if not adequately controlled.	• Relatively small volumes of most hazardous materials to be transported, used or stored, below SEPP 33 thresholds for hazardous development (refer Section 7.5.9 of SEE). All below ADG dangerous and hazardous good quantity thresholds with exception of biochar (>1 tonne produced and stored at any time as a material defined with potential for spontaneous combustion - Note: SEATA technology approach results in low content of organic volatiles in biochar). • Transport, use and storage of hazardous materials as per standard procedures outlined in relevant MSDS and Australian Standards. • Hazardous materials appropriately stored and separated as required under ADG requirements. Bunded area/bunded pallet and/or self-bunded/double-walled containers where required/appropriate. • Fit-for-purpose diesel storage tanks and associated equipment in good condition • Tank Bunding, Siting and setbacks per AS1940 and other relevant guidelines (including Essential Energy regarding powerline setbacks) • Double-walled / self-bunded diesel tanks • Maintenance and inspection per manufacture recommendations • Appropriate spill kits maintained onsite • RDSM and Active Testing Area (where materials used) runoff collected to dedicated sump and tested once per campaign. • Staff inductions include environmental training and awareness	3	C		
R16	Transport, use and storage of feedstocks (e.g. Coal, INS, Biosolids)	Potential for feedstocks to be mis-managed/handled or inappropriately stored causing environmental impact (e.g. contaminate water or soils) if not adequately identified and controlled.	• Recovery, loading and transport of feedstocks to the site will be in accordance with a Resource Recovery Order & Exemption from NSW EPA as applicable. • Receipt, storage and processing of feedstocks (thermal treatment via RDSM) to be in accordance with RRO Exemption from NSW EPA. • Primary storage of feedstocks undercover (e.g. storage sheds) • Daily feed stockpiles within Active Testing Area sized to minimum required, bunded, covered when not active (e.g. tarped), and used in active testing as soon as possible. • Runoff within Active Testing Area (potential 'dirty water') reported to collection sump, tested to confirm suitable for release (as expected)	2	D		• See **RAC4** (re: staged Resource Recovery Order & Exemptions from NSW EPA) • **RAC 13** - Monitor Sump water periodically (e.g once per test campaign) to ensure runoff is suitable for conventional ESC treatment (release to nearby grassed area). If not deemed suitable, water to be treated or transferred to slurry tank for appropriate disposal offsite by suitably qualified persons/organisation.
R17	Water Supply - Wet Scrubber (Emission Control) and Amenities/General Use. (Note: see fire control separately below)	Adequate supply of water for project requirements (wet scrubber) and amenities/general use (fire fighting considered further below). *Note: Scrubber water requires ~0.3-0.5kL/day of make-up water due to evaporation (high temp off gas quenching for emissions control), meaning one 22.5kL rainwater tank would supply about 45 days worth to the scrubber (which is expected to be longer than each feedstock trial campaign).*	**Process Water:** • Scrubber make-up water supplied from existing and proposed water storage tanks on site (2 x 22.5kL dedicated rainwater tanks, with reserve tanks available if needed). A single 22.5kL rainwater tank is expected to last around 45 days (expected to be last more than each feedstock campaign trial). • Negligible water requirement for the operation of the RDSM itself, only the rapid quench/wet scrubber system for emissions control. • Existing in-ground concrete rainwater tank associated with Shed 1. Multiple additional proposed 22.5kL rainwater tanks associated with proposed Sheds 3 and 2 to increase capacity. Likely sufficient for more than two feedstock test campaigns to provide redundancy. Note: Dedicated 22.5kL tank at Shed 2 is separately dedicated to firefighting reserve per RFS requirements - see further below). • As a backup if required, water can be purchased (water truck) to fill rainwater tanks for project requirements on as-needs basis. • Fire fighting water will be stored separately from water used for daily operations. • Emergency redundancy only if required - existing licensed bore associated with Lot1 (also owned by John Winter) has 3x 22.5kL tanks associated with it that can supply the project site in an emergency (eg fire/extreme drought). The broader farm (Lot 1, same owner) also has >15ML in farm dam supply if required for emergency use. **Water for Amenities**: • No significant change in water use to existing (<5 personnel onsite at any one time, similar loading for potable water use from former house located on the project site (burned down c2013) which utilised the in-ground concrete water tank (now supplying existing farm Shed 1). • Multiple additional new rainwater tanks/capacity provided by proposed Sheds 2 and 3 • Backup water supply as per above for project water if required (purchased if needed). Emergency water (only if required) from bore / 15ML dam on land owner's surrounding farm (on same DP). • No significant change in loading on the existing septic system as originally used by the former household (typically <5 personnel onsite for the project) which continues to operate without issue (septic system now connected with existing Shed 1).	2	D		
R18	General project activities (including minor site preparation and campaign based operation)	Potential for impacts to groundwater, if not adequately controlled.	• No proposed use of groundwater, no deep excavation/earthworks (except very localised small holes for shed piers) or aquifer interference (and also no works within 40m of designated creeklines). • Continued use of existing septic system and associated transpiration area at similar loading to historical use which has successfully worked without issue to date (typically <5 staff working onsite at any one time).	1	D		
R19	General project activities (including minor site preparation and campaign based operation)	Potential for impacts to/from flooding, if not adequately considered/controlled.	• The site is not located within flood prone land. • 5th generation farm (same family) with no known flooding history (noting previous farmhouse was built c1906). • Existing stormwater clearwater diversion contour bank immediately upslope of site - proposed project (layout and activities) will not significantly alter existing stormwater runoff regime (ie not expected to alter downstream flows/flooding).	1	E		
R20	General project activities (including minor site preparation and campaign based operation)	Potential for existing soil contamination onsite	• Site not on registered Contaminated Land list. • Site in same family ownership for five (5) generations (good site history/knowledge), no known history of contaminated areas. No historical chemical/fuel storage on project site. • No visible or anecdotal evidence of existing or historic contaminating activities associated with the previous use of the land and site for agriculture.	1	E		
Heritage (Indigenous and Non-Indigenous/Historic)							
R21	Minor site preparation works (surface disturbance) including unsealed all weather access roads, pad	Potential for impacts to Aboriginal Heritage if not appropriately identified and controlled	• AHIMS search indicates no Aboriginal and cultural heritage sites are recorded or declared places occur on the property (or within a 1,000m buffer). • The site and its soils have been extensively disturbed through previous agricultural practices (5th generation farm) • There are no culturally modified trees ('scar trees') located on the project site (also noting targeted clearing of non-native trees) • The site is not located on or in near proximity to a registered Aboriginal Place, nor on or in proximity to *sensitive landscape features* under the NSW Due Diligence Code of Practice (the site is not located on (or near) a ridge top or headland, in proximity to a cliff face, cave or rock shelter, sand dune systems, or within 200m of a wetland, swamp, lagoon, tidal waters, waterholes, rivers, lakes, or streams. Furracabad Creek (>3rd order) is located >80m south of the site, with only an ephemeral upper drainage line (2nd order tributary) located approximately 50m downstream of the site, with no formed watercourses or drainage lines on the site itself). • Proposed ground disturbance has been minimised to that required for project. Majority of surface disturbance associated with relatively shallow topsoil strip (<200mm). • No known previous studies, reports, management plans, assessments or surveys specifically relating to the project site and Aboriginal and Cultural heritage. • As per the process under the NSW Aboriginal Due Diligence Code of Practice, given the low potential for Aboriginal heritage sites to be present within the project area (see above), further assessment/reporting/AHIP is not considered required for proposed works to proceed with caution. • In the unlikely event that Aboriginal & cultural heritage sites are discovered at the area, all works within the affected area would cease and GISC, relevant agencies and relevant Aboriginal stakeholders would be notified. • Staff inductions include environmental training and awareness	2	E		
R22	General project activities (including minor site preparation and campaign based operation)	Potential for impacts to Non-Aboriginal heritage, if not adequately identified and controlled	• No existing structures on the project site (except a recent colourbond farmshed). Footings remnants of old farmhouse (burned down c2013) only remains of structures. • The site is not listed on heritage registers at local (GISC), state or federal level. • The site has been extensively disturbed through previous agricultural practices (5th generation farm). • Given the low potential for historical archaeological remains to be present within the project area, further assessment is not considered required.	1	E		
Visual Amenity							

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Consequence	Score
Extreme	5
Major	4
Moderate	3
Minor	2
Insignificant	1
Not applicable	n/a

Likelihood	Score
Almost Certain	A
Likely	B
Possible	C
Unlikely	D
Rare	E
Not applicable	n/a

CONSEQUENCE	E-Rare	D-Unlikely	C-Possible	B-Likely	A-Almost Certain
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LIKELIHOOD

Note: see the ***"Full Risk Matrix"*** tab for detailed consequence and likelihood details

Last Edited: 30/11/2021

Risk # / Identifier	Project Activity	Description of Risk	Existing Controls / Mitigation Description	MRC	L	Risk	Recommended Actions / Proposed Additional Controls
R23	Project design, layout and activities (including site preparations and campaign based operations)	Potential for visual obtrusion, if not adequately planned for and controlled:	• Very distant sensitive receptors (>800m to nearest rural residence) with minimal potential for visual impact (i.e. obscured from view by existing vegetation/natural and built forms within the landscape and/or around residences, and existing vegetation and structures onsite). • Additional visual screening conservatively proposed in existing project design (i.e. tree planting or interim measures). • Proposed sheds 3 and 4 and shipping containers will be appropriate to surrounding rural character (no intrusive colour), designs for sheds submitted with final DA application for council approval. • RDSM has enclosed afterburner design (no open flame, no side light). • Night-lighting (RDSM operational pad area) kept to minimum required for safe operations, and directionally orientated downward and away from distant rural residences wherever practicable. • Intermittent campaign-based site activity - Lighting will be minimised during periods of site inactivity (between active campaign tests). • Staff inductions include environmental training and awareness	2	D		
Odour (Amenity)							
R24	Transport, storage and thermal processing of feedstocks (e.g. Coal, INS, Biosolids)	Release of odour emissions, if not adequately controlled.	• Small volumes of feedstocks to be transported, used or stored. • Vegetative feedstocks and coal containerised and not generally considered odorous. Vegetative feedstocks stored under cover (including daily working stockpile) to limit moisture entry. • Biosolids feedstock only stabilisation class A or B under EPA guidelines which are not expected to be odorous, containerised in storage until use. Covered daily working stockpile near RDSM (eg tarped). Stored, handled and used in accordance with conditions of a RRO & Exemption approval from EPA. • High temperature gasifier (2nd reactor), wet scrubber and Thermal oxidiser (afterburner) • Distant sensitive receptors (>850m) • All storage will take place in an undercover area (i.e. shed). • SEATA technology does not produce tars, resins or oils (no liquid products) which can potentially cause odour issues with conventional pyrolysis technologies. • SEATA technology not an air blown gasifier, hence significantly lower gas volume for emissions control • SEATA technology lower potential for organics formation in gases than conventional combustion or gasifiers as up to half the carbon of infeed reports to solid char in first reactor (i.e. up to 50% less C reporting to 2nd reactor (gas phase) • Appropriate emissions control (high temp gasifier 2nd reactor >800C, rapid quenching to avoid POP reformation, wet scrubber and then additional afterburner thermal oxidiser >850C for >2s to destroy any potential residual POPs etc) • Staff inductions include environmental training and awareness	2	D		• See **RAC4** earlier above.
R25	Waste products (solid, liquid or gas). E.g. ash residue, liquid effluent, gaseous emissions, staff waste, other waste)	Release of odour emissions, if not adequately controlled	• As above, no liquid products (no odorous oils, tars and resins). The only products are solid biochar and syngas (both negligible odour as noted above). • Liquid slurry waste from the wet scrubber emission control system (inert base salts) is stored in dedicated sealed tank for characterisation and appropriate disposal. • Sewage from amenities managed through existing septic system. Onsite personnel numbers (typically <5 onsite at any one time) similar to existing loading on system successfully used for long period. • Organic waste from staff kitchenette composted, or binned/appropriately disposed of. • Dedicated waste bins provided, routinely emptied. • Staff inductions include environmental training and awareness	2	E		as above
Community / Social / Public Safety							
R26	General project activities (including minor site preparation and campaign based operation)	Potential for disruption/unforeseen concerns raised from the community or general public safety, if not adequately identified and controlled. Note: Potential for harm to people or the environment is considered separately in other environmental aspects in this risk assessment (eg air emissions etc)	• Project environmental risk assessment undertaken including key environmental aspects • Site fully fenced and safety signage (public safety) • Site safety entry signage, visitors to be accompanied or inducted. • Well established community, site owner (SEATA Director) well known to adjacent landowners/nearest neighbours. • Neighbouring residents at R1 (direct line of sight 1228m) and R9 (~1282m) consulted regarding the project activities and inspected project site. Feedback considered and adopted. • Formal Notifications by GISC per DA requirements including R7 (857m) • Public Advertisement as per GISC DA requirements • Project Environment & Community officer • Project website with project contact emails and phone number for public enquiries • Campaign-based R&D trials to minimise potential for impacts • Site layout specifically designed to minimise noise and light toward (distant) sensitive receptors • Staff inductions include environmental training and awareness	2	D		
Human Health							
R27	Storage and Handling of Biochar	Biochar contains particulates which have potential for respiratory irritations.	• Dedicated HAZOP study undertaken for RDSM testing • Uncontaminated ' clean' natural feedstocks (see R2) used to make biochar • Biochar production and use will be undertaken in accordance with conditions of RRO & Exemption to be issued by EPA. Classification will additionally consider context to the ANZ Biochar Industry Group *Code of Practice*. • Staff working with unsealed/non-containerised biochar to wear appropriate PPE during handling (for example approved respiratory protection equipment, appropriate safety glasses, gloves and protective clothing/long sleeve shirts). • Staff inductions include environmental training and awareness	2	D		• **RAC14** - Prepare dedicated MSDS for biochar produced by the project when characterised prior to use.
R28	Storage and Handling of Biochar	If uncontrolled, Certain biochars (particularly high volatile content / dusty biochar) has potential to ignite when exposed to heat or an ignition source (also releasing carbon monoxide).	• Biochar will be initially stored in sealed containers with inert gas (nitrogen or argon) for at least 4 days until cool. Stored away from potential ignition sources, combustible materials, and heat. • Biochar produced expected to be low in volatile organic content (by technology design - see earlier above under Air Quality) • Once safely cooled, biochar may be transferred into larger sealed/covered storage containers (eg 1t duffle top bulka bag storage), and moistened as required. • Biochar will not be stored in large stockpiles or for long periods. • Biochar will be stored well beyond safe working zone (<2m) of RDSM. • Biochar is not proposed to be combusted (onsite or offsite) • Biochar exiting the site will be appropriately checked and labelled prior to pickup, and appropriately transported. • Dedicated HAZOP study undertaken for RDSM testing • Staff inductions include environmental training and awareness ***See related controls for onsite fire separately below***	2	E		• as above
R29	Emissions generated by the operation of plant and equipment	Air emissions could have potential to result in adverse health impacts if not adequately identified and controlled	• Refer all controls **per R2** • Accordingly, potential for adverse health impacts considered low and further assessment of potential risk to human health is not considered necessary.	2	D		• Refer all Recommended Additional Controls (RAC) **per R2**.
Biodiversity (Flora and Fauna)							
R30	Vegetation clearing as part of the minor site preparation/construction activities	Potential to result in unforeseen impacts to native flora and fauna (including protected communities) if not adequately identified and controlled:	• 5th generation farmland (cleared and disturbed), with little remnant native trees and shrub vegetation (trees present are preominantly non-native). • Review of LLS Native Vegetation Regulatory Map (as at 1 October 2021) shows entire Lot 3 DP1193185 and surrounds as **not** Regulated Land. • Review of NSW Biodiversity Value Map (BV Map) shows teh site is not in proximity to mapped BV protected land (subject to BOS). • Native tree vegetation is not proposed to be cleared. • Minimal clearing proposed (several non-native trees, with approximately two (2) larger trees >10m height expected for removal). 5th generation farm, insignificant impact expected by proposed topsoil stripping of ground cover (grasses for all weather access, pads and parking. Recovered topsoil reused surrounding farm (same DP) and onsite. • No mapped protected vegetation communities on or in close proximity to project site (including EEC) • Whilst surrounding broader region is in a Koala POM zone, the project site area is <1ha, no known koala records onsite or adjacent land, no habitat/feed trees in vicinity of project site, no clearing of native trees proposed. Project does not trigger Koala SEPP requirements (refer scoping brief / SEE for details). • Proposed additional plantings (significantly greater in number than removed) • Land immediately adjacent and surrounding the project site is dominated by open grassland associated with farming (no areas of significant bushland habitat adjacent or in close proximity) • Staff inductions include environmental training and awareness	2	D		
R31	Areas of soil disturbance associated with site preparations/construction activities	Potential for weed propagation along newly cleared/areas of soil disturbance, if not adequately controlled	• Proposed disturbance areas will use VENM material for proposed unsealed all weather access areas and workpad • Weeds will be removed/treated within newly disturbed areas. • See details for biosecurity controls separately below regarding management of INS. • Workpad will be swept. • Topsoil stripped will be stockpiled (<3m) for later rehabilitation if required, or used on the landowners surrounding farm. • Staff inductions include environmental training and awareness	1	D		
Hazardous Materials							
R32	Storage, handling and use of flammable and potentially hazardous substances (chemicals, fuels, and raw materials/product).	Potential for hazardous or offensive development if not adequately identified and controlled (and subsequent non-compliance with State Environmental Planning Policy No.33).	• Pre-project screening for preliminary hazard assessment of the types and quantities of potentially hazardous materials used/stored for the proposed development (as per SEPP 33 and the associated guidelines) indicated these will mostly be **below** the automatic thresholds to be considered Hazardous / Offensive development. PHA required to confirm feedstocks and biochar storage context (see recommended additional controls). • Project consistent with RU1 zoning activities and not sited alongside other sensitive or non-complimentary development (rural location, no immediately adjacent dwellings etc, nearest rural residence >850m away) • *Notwithstanding, hazards and risks associated with the likely hazardous materials used/stored for the development are considered further below.*	3	D		• See **RAC 13** (PHA)

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Consequence	Score
Extreme	5
Major	4
Moderate	3
Minor	2
Insignificant	1
Not applicable	n/a

Likelihood	Score
Almost Certain	A
Likely	B
Possible	C
Unlikely	D
Rare	E
Not applicable	n/a

CONSEQUENCE	E-Rare	D-Unlikely	C-Possible	B-Likely	A-Almost Certain
5-Extreme	12	19	22	24	25
4-Major	10	15	18	21	23
3-Moderate	6	9	14	17	20
2-Minor	3	5	8	13	16
1-Insignificant	1	2	4	7	11

LIKELIHOOD

Note: see the ***"Full Risk Matrix"*** tab for detailed consequence and likelihood details

Last Edited: 30/11/2021

Risk # / Identifier	Project Activity	Description of Risk	Existing Controls / Mitigation Description	MRC	L	Risk	Recommended Actions / Proposed Additional Controls
R33	Storage, handling and use of flammable and potentially hazardous substances (chemicals, fuels, and raw materials/product).	Potential to result in a spill and release to environment, if not adequately controlled	• Relatively small volumes of hazardous materials to be transported, used or stored, mostly below SEPP 33 thresholds for hazardous development (refer Section 7.5.9 of Scoping Brief/SEE). • Transport, use and storage of hazardous materials as per standard procedures outlined in relevant MSDS and Australian Standards. • Hazardous materials stored appropriately as per ADG requirements (including separation, bunded area/bunded pallet, and/or self-bunded/double-walled containers as relevant etc). • Fit-for-purpose diesel storage tanks and associated equipment in good condition • Tank Bunding, Siting and setbacks per AS1940 and other relevant guidelines (including Essential Energy regarding powerline setbacks) • Double-bunded / self-bunded diesel tanks • Maintenance and inspection per manufacture recommendations • Appropriate spill kits maintained onsite • Staff inductions include environmental training and awareness	2	D		• See **RAC 13** (PHA)
R34	Storage, handling and use of flammable and potentially hazardous substances (chemicals, fuels, and raw materials/product).	Potential risk of ignition of stored materials, or processes associated with the operation activities, if not adequately controlled	• See **R36, R37**.				• See **RAC 13** (PHA)
Fire/ Bushfire							
R35	Bushfires / External Threats	Potential for fire originating off site to encroach on the development, if not adequately controlled.	• **No dwellings** proposed. • **DPIE planning portal** spatial viewer (www.planningportal.nsw.gov.au/spatialviewer) and SEED databases providing mapped Bushfire Prone Land (BFPL) **do not map the project site as BFPL**. Nearest mapped BFPL shown is ~430m. • Even though not mapped BFPL, RFS Planning for Bushfire Protection (PFBP) Guidelines conservatively reviewed and key relevant design recommendations considered for project design where practicable. • Preliminary consultation with RFS undertaken prior to Project Scoping Brief. Initial recommendations were adopted, including providing dedicated >20kL rainwater tank for firefighting with RFS couplings, and steel fencing protection around tank to isolate it from fire approach. • Proposed sheds sited to reduce exposure to bush fire attack and provide suitable defendable space around the sheds, and appropriate water supply considered for fire fighting (as noted above) as per . • Proposed sheds (Class 7b/8) are all <500 m_2 wet NCC fire code classifications. Sheds will consider fire code requirements as per NCC and GISC requirements. • Asset Protection Zone (APZ) per RFS requirements considered for project site. Dominant vegetation on lands *surrounding* the project site are expected to be deemed *grasslands* with slope <15 degrees as per Appendix 1 of the RSF PFBP Guidelines. Accordingly, an effective APZ of >20m is/can be provided between permanent proposed sheds and an approaching fire hazard, which will be maintained <100mm per RFS PFBP guidelines. (Note: Whilst not expected to be required, effective APZ of up to 50m could be provided if required within Lot 3 (owned by SEATA director John Winter) to the north, east and west of the proposed sheds within the project site in part Lot 3, West Furracabad Road constrains and is located to the south of the project site. • Whilst not technically required (not BFPL), conservatively consideration given to key relevant components of Rural Development Standards of the NSW RFS BAL Risk Assessment User Guide (eg minimum water tanks size requirements, couplings, public accessible road connection, APZ maintenance (slashing to <100mm), site not in BFPL, or BAL 40 land, gas cylinders installed in accordance with AS/NZS1596 (Storage and Handling), no fixed cylinders). • Fire extinguishers, hose reels and other similar equipment will be provided per HAZOPs recommendations (refer onsite risk aspect immediately below). • Any new fencing within 6m of the project site will be made from non-combustible material (e.g star pickets instead of wood posts). • Property fully accessible to RFS if required during active testing (24/7 access). • Existing and proposed trees within property perimeter will be appropriately maintained. • Dedicated rainwater tank (22.5kL) reserved for firefighting only. • Additional 22.5kL rainwater tanks included with proposed Shed 2 to provide further capacity/redundancy if required. • SEATA Director and land owner John Winter is a member of the Glen Innes Rural Fire Service. • Whilst not expected to ever be required, additional emergency access to water is also available via a) 22.5kL rain tank attached to an existing farmshed on Lot 3 immediately adjacent outside (west) of the project site, as well as a groundwater bore on nearby land also owned by the same land owner as the project site (SEATA Director John Winter). • Staff inductions include environmental training and awareness	3	D		
R36	Onsite activities with potential for ignition/fire including the storage of chemicals and fuels.	Potential for ignition of stored flammable fuel (diesel) due to inappropriate equipment, siting and/or storage.	• Fit-for-purpose diesel storage tanks and associated equipment • Tank Bunding, Siting and setbacks per AS1940 and other relevant guidelines (including Essential Energy regarding powerline setbacks) • Double-walled / self-bunded diesel tanks • Maintenance and inspection per manufacture recommendations • Appropriate spill kits maintained onsite • Staff inductions include environmental training and awareness ***See also related R33 and R37***	2	D		• See **RAC 13** (PHA)
R37	Onsite activities with potential for ignition/fire, including RDSM operation, storage of chemicals, fuels, biochar and syngas product. *(**Note**: OH&S and related aspects for RDSM operation, including fire/ignition/gas safety, were considered separately in detail by the HAZOP study which have informed relevant parts of this environmental risk item where appropriate)*	Potential for fire originating from onsite operational activities (e.g RDSM operation) if not adequately designed and controlled.	• Highly experienced process engineering design team (recognized industry expert). • Independently facilitated detailed HAZOP with external process engineering expert. • All operations and controls as per recommendations of detailed HAZOPs study, including appropriate equipment design (code compliant), monitoring (e.g. pressure and temperature, flow/leak, bin purging with inert gas (eg Nitrogen or Argon) blanket and similar sealing of biochar product drums to inhibit combustion/sponcom), procedures and personnel awareness as per HAZOP recommendations. • Hazardous area review considered in accordance with AS60079.10.2. • Ignition sources within hazardous areas controlled according to AS60079.14 • Syngas from RDSM not stored, primarily afterburned or used in process control during operations (excluding startup) if/where required. • General site layout, storages and design minimises (and where possible separates) interaction between fuel and potential ignition sources until use in RDSM. • Dedicated storage areas and code compliant storage vessels for diesel, chemicals (e.g. for wet scrubber) and LPG (RDSM startup etc). Separation as appropriate for each. Covered and bunded storage distant to RDSM//other heat or ignition sources. • Suitably sized gravel working pad (no/negligible vegetation) surrounding RDSM. • RDSM safe working zone (SWZ)- i.e. limited hot working area (<2m), distant to any vegetation. • RDSM has no external open flame, gas emissions via enclosed afterburner system. • Appropriate Asset Protection Zone (APZ) established and maintained per **R42**. • No significant surrounding vegetation in close proximity to RDSM and its hazardous work area (existing non-native tree will be removed). • Install fire extinguishers and hose reel, develop fire response procedures/checklists, and personnel awareness aspects as per HAZOP Study recommendations. • Adequate fire-fighting supply from existing and proposed 22.5kL rainwater tanks, fitted with RFS couplings and fire-resistant fence around dedicated tank (e.g metal colourbond or similar) with access gate per RFS recommendations. Emergency access (further redundancy) to water also through groundwater bore and/or 15ML dam from surrounding farm of same land owner if required (same DP, not expected or proposed, emergency only). • High quality biochar with low volatiles content expected (volatiles are specifically targeted into gasifier for syngas production), subsequently lowering risk of spon com. • Carbonaceous feedstocks are delivered on campaign basis, stored separately, used as soon as possible in active testing, and regularly inspected. • Appropriate fire-fighting equipment near RDSM and at storage areas. Dedicated firefighting water tank at primary storage Shed 3 (plus additional rainwater tanks providing further redundancy at all sheds). • Staff inductions include environmental training and awareness	3	D		• See **RAC 13** (PHA)
Biosecurity							

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Consequence	Score
Extreme	5
Major	4
Moderate	3
Minor	2
Insignificant	1
Not applicable	n/a

Likelihood	Score
Almost Certain	A
Likely	B
Possible	C
Unlikely	D
Rare	E
Not applicable	n/a

CONSEQUENCE	E-Rare	D-Unlikely	C-Possible	B-Likely	A-Almost Certain
5-Extreme	12	19	22	24	25
4-Major	10	15	18	21	23
3-Moderate	6	9	14	17	20
2-Minor	3	5	8	13	16
1-Insignificant	1	2	4	7	11
	LIKELIHOOD				

Note: see the ***"Full Risk Matrix"*** tab for detailed consequence and likelihood details

Risk # / Identifier	Project Activity	Description of Risk	Existing Controls / Mitigation Description	MRC	L	Risk	Recommended Actions / Proposed Additional Controls
R38	Feedstocks - e.g. INS, Biosolids	Potential risk of local introduction of weeds (from INS) or biological pathogen (from biosolids) during handling/storage/use for the project, if not appropriately and adequately controlled	• INS pre-processed at source/supplier minimises seed transfer at source (vegetation cleared, raked, windrowed, collected, chipped, sized, before loading) • SEATA will liaise with suppliers transporting INS to be undertaken with appropriate biosecurity measures/vehicle hygiene. These may include (but not be limited to): prior to loading and movement vehicles free of soil and vegetative matteras as reasonably practicable, vehicle inspection before/after loading, covered loads to help prevent seeds and other live plant material escape. • Signed Statement of Origin required from all feedstock suppliers will include Chain of Custody for full supply chain and biosecurity measures undertaken. • NSW-based feedstocks only, no transfer from interstate. • Delivery vehicles inspected on arrival, if seeds observed on tyres control measures to be followed as per Biosecurity Control Procedures). • All feedstock suppliers requested to have delivery vehicles contact and use the *Glen Innes Truckwash* (National Truckwash System code TGLT) on arriving in Glen Innes and prior to arriving at site for feedstock delivery. • Delivery records maintained onsite (e.g. Visitor Register signed by delivery driver (records of date/time/Rego # or company/purpose)) • Feedstocks inspected on receipt, and stored separately and under cover (particularly INS). If high flowering/seeding observed even more focus with cover/isolation/transfer before RDSM treatment. • Proposed storage sheds 2 and 3 are full enclosable (e.g. in very windy conditions) • Dedicated storage areas for INS, consistent bays used, appropriately separated from other materials • Delivery vehicles kept to specific and consistent route onsite • Received materials to be thermally treated by RDSM trials as soon as practicable to minimise storage period. • Campaign based R&D testing program - staged for each feedstock provides control of what is onsite/when, requiring staged RRO & Exemption approvals. • Biosecurity risk period is not intended for long term. Non-commercial R&D testing focus only (campaign based) for the three year project approval. Long term commercial scale system using INS would need to be located in proximity to source (not economically viable to transport long distance). • INS and biosolids feedstocks thermally treated to destory seeds/pathogens via the RDSM • SEATA equipment used to transfer INS to RDSM/daily stockpile area (e.g. tractor bucket, tyres etc) inspected and cleaned, particularly before/after INS and biosolids feedstock campaigns. Cleaned within Active Testing Area (controlled runoff area). • INS species are not from the same climate as the upper tablelands of Glen Innes (from hot drier climate of central western NSW). • Appropriately inducted and aware staff (including handling & OH&S requirements etc). Where possible coordinated with input from Regional Weeds Coordinator. • Project site is 5th generation cleared/disturbed farmland with no significant remnant native vegetation. • Unsealed active testing area maintained around RDSM (no vegetation or soil for seeds to establish on). Surrounding farm grassed areas within APZ slashed routinely to <100mm per RFS guidelines (see *bushfire* above). • Cleanout (eg sweeping) of INS storage areas to ensure collected INS and biosolids residue material is separated and destroyed (RDSM thermal treatment). Material not to be composted or used as mulch onsite etc. • Biosolids provided by suppliers in accordance with NSW EPA biosolids guidelines (and any project-specific conditions of an RRO & Exemption sought from EPA for the project). • Biosolids (Unrestricted or Restricted Use 1 and 2 class biosolids suitable for direct application to land, which have the highest Stabilisation grades A or B). • Biosolids as mechnically dewatered filter cake (no liquid sludges). • Adherence to conditions of approval (including EPA RRO & Exemption requirements) • Appropriate PPE • Routine inspections by EMR to monitor higher risk areas: areas surrounding bulk and daily stockpile storage of INS, all weather access and pad areas/bare ground, sump collection from Active Testing Area, stormwater discharge areas from ESC runoff (including downslope of Active Testing Area). • Prompt control measures if INS weed propagule observed (including control/removal before plant goes to seed wherever possible). If herbicide control measure undertaken, avoid application near drainage areas and during plant dormancy periods where practicable (other measures required) and do so in accordance with regulatory requirements and manufacturers recommendations. Record significant application of Herbicides/Pesticides (date, chemical used, location, volume, any repeat application etc). • All works to be undertaken in accordance with the site Biosecurity Control Procedures to manage control, monitoring and record keeping measures in detail described herein. • Regional Weeds Coordinator or their representative invited for periodic inspections & recommendations • Routine site inspections by Site Manager/EMR/nominated representative, particularly prior to commencement and at completion of each trial/prior to commencement of the next feed trial.	2	C		• **Refer RAC 4**
Infrastructure / Services (Non-Farm Built Environment)							
R39	General project activities (including minor site preparation and campaign based operation)	Potential risk of disturbing buried or overhead cables (Telstra phoneline and Essential Energy powerline), if not adequately controlled	• Dial Before You Dig (DBYD) services check completed. • No proposed new excavation or access upgrade works in vicinity of the Telstra cable. Whilst not expected or proposed, should any excavation be required in future the cable would be located and excavations within 2-3m each side of mapped cable location made by hand until physically located. • Unsealed all weather access areas (including active testing area) will involve topsoil strip <200mm. • All proposed permanent structures (e.g sheds, water tanks) located outside Essential Energy LV powerline exclusion zone. • Proposed vegetation plantings (screens) setback as per Essential Energy guideline requirements. • Existing vegetation maintained near overhead powerline per RFS requirements • Powerline safety markers (or similar) used to identify overhead potential hazard where unsealed access road passes under Essential Energy power line. • Essential Energy consulted regarding site layout and design (provided with forward information ahead of DA submission). Shed 3 setbacks and pad revised in consultation with EE & ASP Level 3 advisor. • Tiger tails to be used on powerline during construction • Staff inductions and awareness	2	D		
Decommissioning & Rehabilitation							
R40	Site infrastructure & solid product (biochar)	Potential for legacy issues if decommissioning and rehabilitation is not adequately planned for.	• Site owned by SEATA Director John Winter with direct input into site layout design to be suitable for post-operations farming. • Post project considerations/requirements clarified and included in formal Land Owner's Consent • Proposed sheds 2 and 3 (including associated water tanks) and all weather access areas/pads deliberately designed and sited in consultation with the land owner with the intention to remain for beneficial reuse following project completion (i.e. as useful valuable resources, e.g. farming/other) • Proposed vegetative screening (plantings) located to provide suitable permanent vegetation • Whilst unexpected, if trials are unsuccessful the RDSM would either be upgraded to address issues, or be decommissioned and re-deployed elsewhere if necessary. • Whilst not expected, should any site contamination occur (eg diesel spills), these would be appropriately remediated and rehabilitated post-closure. • Proposed erosion and sediment controls located such that suitable to remain as permanent features post-closure. • To ensure no risk of stockpile legacy (solid biochar) for material produced by R&D trials, multiple applications are identified (including industrial) with demand uses exceeding expected supply, to maximise likelihood for use under pending RRO & Exemption approval. Whilst not expected, any unused biochar remaining onsite up to 6 months following completion of R&D approval period (i.e. 3 years 6 months) will be removed from site and appropriately disposed of. e.g. co-fired in a power station if no alternative solution available by such time.	2	D		

SEATA RISK MATRIX

									LIKELIHOOD					
									A Almost Certain	B Probable/Likely	C Possible	D Unlikely/Remote	E Improbable/Rare	
									(>1 per yr)	(<1 per yr & >1 per 5 yrs)	(<1 per 5 yrs & >1 per 10 yrs)	(<1 per 10 yrs)	(<1 per 100 yrs)	**Probability**
CONSEQUENCE	**Health & Safety**	**Environment**	**Compliance/Legal**	**Community / Reputation**	**Operations**	**Business Interruptions**	**Scheduling Impact (% of overall)**	**Financial Impact (% of Value/Cost)**	Expected to occur in most circumstances	Will probably occur in most circustances	Might occur at some time	Could occur at some time	Might occur in exceptional circumstances	**Description**
5. Extreme / Catastrophic	Multiple fatalities or permanent disability to multiple people	Long term impairment habitats/ecosystem	Events resulting in suspended or severely reduced operations	Public exposure in national or international media	No Objectives/KPIs Achieved	>1 month	>100%	>$100%	25 [E]	24 [E]	21 [H]	19 [H]	15 [M]	
4. Major	Single Fatality, Long term or Permanent Disability (single)	Long term effects of ecosystem	Breach of licences, legislation, regulation or repeated non-compliance with high potential for prosecution	Public exposure in regional media Impacts credibility with government	50% - 25% Targets achieved	1 week to 1 month	10% to 100%	10% to 100%	23 [E]	22 [E]	18 [H]	14 [M]	10 [m]	
3. Moderate	Short term disability (i.e. sprained ankle)	Serious medium term environmental effects	Non-compliance with moderate potential for impact e.g. one-off non compliance with permit or licence	Repeated community complaints requiring site management response Significant public exposure in local media	50% - 25% Targets achieved	1 day to 1 week	1% to 10%	1% to 10% 1% to 10%	20 [H]	17 [H]	13 [M]	9 [m]	6 [L]	
2. Minor	Medical treatment injuries	Minor effects to physical environment	Minor non-compliance with external standard or operating procedure with low potential for impact	A community complaint requiring site management response One off public exposure in local media or word of mouth	80% - 50% Targets	12 hrs to 1 day	0.1% to 1%	0.1% to 1%	16 [M]	12 [M]	8 [m]	5 [L]	3 [L]	
1. Insignificant	First Aid Only	Limited physical damage	Insignificant non-compliance with internal operational procedure of standard	Minor non-compliance with external standard or operating procedure with low potential for impact	>80% Targets Achieved	<12 hrs	<0.1%	<0.1%	11 [M]	7 [m]	4 [L]	2 [L]	1 [L]	

Note: *Coloured rankings are same as for Simplified/Sumamry Risk Matrix Tab, just reverse order presentation of Likelihood (A-E instead of E-A)*

Risk Rating	Risk Category		Description
22 to 25	**E**	**Extreme**	Action required to **eliminate or reduce** the risk. If the risk is considered to be ALARP then the decision to accept the risk is to be made by the **full Board of SEATA Group**.
17 to 21	**H**	**High**	Action is required to eliminate or reduce the risk. If the risk is considered to be ALARP then the decision to accept the risk is to be made by the **full board of SEATA Group**.
11 to 15	**M**	**Moderate**	Action is required to eliminate or reduce the risk. If the risk is considered to be ALARP then the decision to accept the risk is to be **jointly** made by the lead Process Engineer and Environmental Management Representative.
7 to 10	**m**	**Minor**	Action is required to eliminate or reduce the risk. If the risk is considered to be ALARP then the decision to accept the risk is to be made by the lead process Engineer **or** Environmental Management Representative.
1 to 6	**L**	**Low**	Actions to eliminate or further reduce the risk should be considered. If risk is considered to be ALARP then the decision to accept the risk is to be made by the risk assessment owner (no recommended control is required to be created for this).