

KUR-World

Environmental Monitoring and Management Plan

Chapter 21.0

Environmental Impact Statement



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Abbreviations used in this chapter are as follows:

Abbreviation	Meaning
AEP	Annual Exceedance Probability
CHMP	Cultural Heritage Management Plan



Abbreviation	Meaning
CPESC	Certified Professional in Erosion and Sediment Control
EIS	Environmental Impact Statement
EMP	Environmental Management Plan
EPCP	Erosion and Sedimentation Control plans
ESC	Erosion and Sediment Control
EVNT	Endangered, Vulnerable, Near Threatened species
FNQROC	Far North Queensland Regional Organisation of Councils
GPT	Gross Pollutant Traps
MEDLI	Model for Effluent Disposal Using Land Irrigation
MNVF	Mesophyll to Notophyll Vine Forest
MSC	Mareeba Shire Council
QFES	Queensland Fire and Emergency Services
T&NT	threatened and near-threatened



21.0 ENVIRONMENTAL MONITORING AND MANAGEMENT PLAN

21.1 Introduction

Issues that require consideration and focus have been identified during the environmental impact assessment (EIS) process. The environmental monitoring and management plan (EMP) which also includes social and economic areas has been prepared to provide strategies to manage and monitor these focus areas during the construction and operation phases.

The aim of the EMP is to present and describe the objectives, actions, strategies and responsibilities to be carried out during the project's lifetime and to mitigate potential negative impacts and enhance positive impacts.

Commitments for each of these focus areas have been summarised in Appendix 21.

21.1.1 Objectives

- Establish objectives and performance criteria for relevant concerns.
- Demonstrate compliance with relevant legislative requirements.
- Provide evidence of prevention, minimisation and mitigation measures for potential adverse impacts to stakeholders and the community.
- Provide details of the implementation responsibilities.
- Set achievable reporting requirements and auditing responsibilities for meeting performance objectives.
- Provide a plan for monitoring, assessing and controlling potential impacts on identified values.

The EMP identifies eight environmental elements that require strategic assessment and management.

- 1) Land Management
- 2) Flora and Fauna
- 3) Water Quality and Aquatic Ecology
- 4) Water Resources
- 5) Air Quality
- 6) Noise and Vibration
- 7) Waste Management
- 8) Biosecurity

Eight social and economic elements have also been identified that require strategic assessment and management plans.

- 1) Community and stakeholder engagement
- 2) Workforce
- 3) Housing and accommodation
- 4) Local business
- 5) Community wellbeing
- 6) Transport
- 7) Cultural Heritage
- 8) Hazards, Health and Safety.



21.1.2 Responsibilities

Beyond the technical matters described in the EIS, are matters specific to project and people management. The key to the avoidance of predictable negative impacts and achieving positive outcomes is effective project management. Appropriate management practices (that is planning, design, installation, maintenance, monitoring and corrective actions) require effective implementation. Given project delivery will involve third parties beyond the proponent, commercial contractual aspects are critical to project management. A known limitation to effective project management is disconnection between the project phases integral to project delivery. Disconnections can occur due to changes in entities and personnel, with this limitation escalating as the project delivery timeframe extends.

Even when control measures are conditioned in regulatory approvals, this does not deliver adequate protection. Resources need to be directed to the development of a strategic approach to managing the known risks and sensitivities at this site.

The following six core principles apply to this project.

1. Senior Management Endorsement

Effective management is built on senior management endorsement. The EMP is built from the top down. Its components are introduced at senior management level first then implementation progresses downwards within the organisation. Each building block of the EMP must be securely in place with management endorsement before proceeding to the next level in an organisation.

2. Understand the Relevant Environmental Issues and Impacts

A review of current and potential issues is undertaken periodically to maintain a pro-active attitude to changing conditions. The potential impacts that project activities can have on each issue are evaluated. A comprehensive stakeholder engagement plan as described in Chapter 11.2 has been undertaken to inform this EMP and enable ongoing engagement to maintain the currency of the monitoring and management measures.

3. Measurable Objectives for all Controls

Planned outcomes must be agreed, and be capable of being measured. An objective must have measurable targets developed against it to allow performance to be assessed. This way, the objective becomes realistic and can be shown to have been met or not. Likewise, control practices must be operated to measurable specifications.

4. Responsibility is Tied to Authority over Activities

Authority resides with staff who can control outcomes, that is, people who have the final say over designs, construction, operations, pollution prevention, validation and rehabilitation. Authority for parts of these steps may be delegated, but the responsibility for the overall performance remains with the entity who delegates the work, that is delegation is not abrogation. This principle has particular relevance to the engagement, commissioning and management of third parties.

5. Staff are Empowered

At all levels of management, officers with responsibility must be empowered to carry out their tasks, that is they must have the appropriate authority. The onus is on the manager allocating authority, or any officer delegating authority, to ensure that resources, budget, skills and time are assigned. For the allocation and enforcement of authority to be equitable, the tasks must be clearly defined. Planned outcomes (refer to the third principle above) are performance indicators in themselves.



6. Outcomes are Verified

Performance of management systems must be measured against the established objectives and targets and, most importantly, results must be reviewed and evaluated. Monitoring alone, which is simply measuring, does not ensure outcomes. Feedback must be delivered to officers who have ultimate responsibility, for their consideration of improvements or initiation of corrective action.

21.1.3 Monitoring, reporting, review and audits

The EMP is intended to be a 'living' document that will be responsive to changes in construction plans, stakeholder priorities and research results. Notwithstanding the evolution of the document in response to an expanding knowledge base, the logic behind the EMP should remain. Amendments to the EMP may require engagement with relevant stakeholder groups. As a minimum, the EMP will need to be reviewed and, if necessary, revised in conjunction with changes to the construction and operation phase. Changes to the construction and/or operation schedule or methods, and recommendations based on the performance monitoring of the control measures, will necessitate changes to the EMP. The performance of the EMP should be audited periodically (for example annually).

21.1.4 Environmental Monitoring

A schedule of statutory and internal monitoring requirements for the site is to be included in a Monitoring and Reporting Manual. Monitoring is to be carried out in accordance with the Monitoring and Reporting Manual.

21.1.5 Reporting

Various statutory and internal reports will need to be prepared and submitted to assist in monitoring and advising on environmental performance. Reporting requirements are to be detailed in Monitoring and Reporting Manual. Examples that are applicable to the construction phase include:

21.1.5.1 Monthly internal monitoring report

A quarterly report is required. This is to be included with contract administration documentation. This report will include a summary and an analysis of monitoring results collected following the previous month's report. Areas of concern are to be reported together with corrective actions (if required). The report will include provision for the following.

- Environmental Incidents and Corrective Actions
- Environmental Monitoring
- Audits and Regulatory Non-conformances
- Land Management (including clearing and rehabilitation)
- Water Management
- Waste Management
- Biosecurity
- Stakeholder Engagement
- Community and Safety Monitoring
- Community and Safety Incidents and Corrective Actions
- Licences and Legislation.

21.1.5.2 Annual internal environmental report

An Annual Internal Environmental and Social (Sustainability) Report is required. This report will compile information from the quarterly monitoring reports into one document.



21.1.6 Records

All records shall be stored in an electronic format and retained for a period of not less than seven years.

21.1.7 Auditing

Periodic audits (internal as well as third party) will be undertaken. The audits will be of the systems and, importantly, of the environmental outcomes.

21.1.8 Management review

A management review of the EMP will be carried out annually with third party assistance.

21.2 Environmental Monitoring and Management Plan

21.2.1 Land management

Objective	Protect the properties of soils from contamination
Potential Impacts	<ul style="list-style-type: none"> Contamination of soils. Adverse impacts on human health. Adverse impacts to the environment.
Performance Indicators	<ul style="list-style-type: none"> No unacceptable impacts to the receiving environment associated with the storage, handling and disposal of hazardous materials. Compliance with all statutory requirements including that of the <i>Environmental Protection Act 1994</i>.

Task Number	Tasks	Action
1.0	Hazardous materials shall be stored in accordance with regulatory requirements	<ul style="list-style-type: none"> Design plans for communal building and infrastructure facilities should consider the potential need for storage and handling of chemicals and hazardous substances. All potentially contaminating substances should be stored in accordance with applicable Australian Standards (for example <i>Australian Standard AS1940-2004 The storage and handling of flammable and combustible liquids</i>), with available Material Safety Data Sheets for all products. Specific site induction training shall include instructions on correct procedures for storage, handling and/or disposal of dangerous and hazardous substances. The volumes of petroleum hydrocarbons stored on-site should be kept below the thresholds nominated for notifiable activity number 29 (as defined in the <i>Queensland Environmental Protection Act 1994</i>). If these thresholds are exceeded, the administering authority must be notified of this change in writing.
2.0	Appropriate management of hazardous materials to prevent contamination of soils	<ul style="list-style-type: none"> All contractors should be made aware that farm and domestic waste may have been buried in unmarked locations on-site. They should identify, report and manage such sites if they are found or disturbed during earthworks or infrastructure installation. Appropriate spill kits should be made available at locations where potentially contaminating substances are stored or transferred to intermediate containers. Where appropriate, organic or integrated pest management approaches should be employed for the KUR-World farm and adjacent amenity areas. Planning for sports and amenity land uses should take into account soil chemical and physical constraints identified in Chapter 6.



Task Number	Tasks	Action
		<ul style="list-style-type: none"> An Effluent Irrigation Management Plan should be prepared: <ul style="list-style-type: none"> Only land identified as suitable for irrigation should be used for effluent disposal Appropriate buffer zones/set-backs should be applied around creeks. Irrigable land with moderate slopes (12-20%) should be managed and land condition monitored to prevent run-off and accelerated erosion. No effluent irrigation should occur to native vegetation. Effluent from the Rainforest Education Centre should be pumped to the on-site waste water treatment plant for treatment.

Monitoring	<ul style="list-style-type: none"> Prepare and implement a self-auditing programme (including scope, frequency, reporting regime) for the construction phase and operational phase. Undertake annual third-party audits during construction phase.
Reporting	<ul style="list-style-type: none"> Quarterly environmental reports shall be submitted to the relevant company director during the construction and operation phase. Any non-compliance with this EMP should be documented, corrective action taken and reported. Records of monitoring and non-compliance shall be retained. Records will be presented to the regulatory authorities as relevant.

21.2.2 Flora and fauna

Objective	Minimise adverse impacts on significant native flora and fauna and support ecosystems for long-term and sustainable conservation of biodiversity
Potential Impacts	<ul style="list-style-type: none"> Habitat loss, fragmentation and edge effects due to land clearing. Death and injury to fauna. Reduction or loss of core habitat and extent of the listed species, for example Kuranda Tree Frog (<i>Litoria myola</i>). Reduction in ecological values of significant flora and fauna habitat areas and habitat connectivity.
Performance Indicators	<ul style="list-style-type: none"> No unacceptable adverse impacts from the project site to the surrounding ecosystem. Compliance with all relevant approval and statutory requirements. Minimal fauna deaths or injuries. Minimal degradation of habitat.

Task Number	Tasks	Action
3.0	Minimise the impacts of vegetation clearing and habitat loss	<ul style="list-style-type: none"> Minimise vegetation clearing extent via planning and implementation of systems/controls during construction (for example permit to clear system and clearly marking clearing extents prior to disturbance). This includes clearing for new roads and bridges. Implement systems to prevent unauthorised vegetation clearing throughout the operational life of the development.



Task Number	Tasks	Action
		<ul style="list-style-type: none"> In areas which have not been surveyed, conduct surveys for threatened and near-threatened (T&NT) plants in accordance with the Queensland Protected Plant Survey Guidelines [note: some of this work is complete; see Astrebla (2015b)]. Subsequent management of any T&NT plants threatened by development should occur in accordance with relevant legislation. Develop and implement a rehabilitation plan. The plan should be prepared by a suitably qualified person and be appropriate for the setting (that is consider project and activity-related threats and all values of the receiving environment). All areas in the Environmental Area currently devoid of native vegetation should be rehabilitated to natural conditions. Areas disturbed during construction that are not needed for the operation phase should be rehabilitated as soon as they become available. Reduce the extent of fauna habitat loss in the north-east of the project area. The primary objectives for habitat retention should be to: (a) reduce net Endangered Vulnerable Near Threatened (EVNT) species habitat loss; (b) reduce net Mesophyll to Notophyll Vine Forest (MNVF) habitat loss; & (c) retain a forest corridor along the Warril Creek tributary. Any adjustment in the configuration of retained habitats should optimise protection of habitats where listed frog species occur at high densities, which in the north-east of the project area corresponds with the downstream reach of the Warril Creek tributary. Restrict access to known sensitive areas. Lighting in public spaces should be designed to minimise artificial light impacting natural habitats, in particular avoid artificial light impacts on riparian habitats. The use of lighting shields, directional lighting, timers and motion-sensors should be considered.
4.0	Fauna management measures are used during vegetation clearing	<ul style="list-style-type: none"> In areas which have not been surveyed, conduct surveys for EVNT fauna species, in particular the Kuranda Tree Frog (<i>Litoria myola</i>) in accordance with Queensland Government Terrestrial Vertebrate Fauna Survey Guidelines. Woody vegetation clearing should occur progressively to give animals that survive the tree-felling activity a chance to move out of the area. This is especially important in areas of potential frog habitat. Inspect disturbance areas for roosting or nesting fauna prior to clearing. If nesting or roosting fauna are found, clearing at that location should cease until the appropriate management and approval requirements are ascertained and implemented. A licensed fauna spotter/catcher is to be present during clearing activities. Pathways through the development area should be designed to prevent pedestrian access to core Kuranda Tree Frog habitat, and areas immediately upstream of this habitat. Avoidance of activities which are potentially harmful for Kuranda Tree Frog habitat. Barrier netting should not be used along the golf course unless it poses a negligible threat to flying fauna as determined by a suitably qualified ecologist.
5.0	Protect the value of the Environmental Area	<ul style="list-style-type: none"> A management plan for the Environmental Area should be developed by a suitably qualified and experienced ecologist. The management plan should aim to protect the value of the area as habitat for native flora and fauna, and protect its value as a wildlife corridor. The management plan should identify the values of the area, existing and emerging threats, and actions to address and monitor existing and emerging threats.



Task Number	Tasks	Action
6.0	Manage bushfire impact on native vegetation	<ul style="list-style-type: none"> Develop and implement a fire management plan (construction and operation). The plan should include methods for prevention of uncontrolled wildfire and emergency response. Utilise fire management for prescribed controlled burns in consultation with the authorised by regulatory authorities. In general, no burning of vegetation is to be undertaken on-site; exceptions being controlled burns authorised by regulatory authorities.
7.0	Use of endemic plants in landscaping and restoration of vegetation	<ul style="list-style-type: none"> Develop and implement an appropriate project-wide landscaping plan (construction and operation phases). The plan should provide guidance on plant species selection and describe limitations or precautions with regard to the receiving environment (for example limitations or issues when landscaping in or near habitats for threatened stream-dwelling frogs). The plan should be developed by, or reviewed by, a suitably qualified person(s) to ensure it is appropriate for the setting (that is, consider activity-related threats and all values of the receiving environment). Restore riparian vegetation along Haren Creek, Owen Creek, Cain Creek and the tributary of Warril Creek. Habitat restoration should aim to improve the condition of riparian habitats for fauna and be of a habitat type that reflects pre-clearing conditions.
8.0	Employees and public are to be informed of specific site management procedures	<ul style="list-style-type: none"> The development should include a visitor education program so that all visitors are aware of the sensitivity of the receiving environment, and aware of any relevant rules or regulations. Implement education opportunities about frogs found in the area and provide access to nature-based activities to residents by providing supervised frogging activities.
9.0	Minimise the likelihood of fauna being hit by vehicles	<ul style="list-style-type: none"> A maximum 50 km/hour speed limit should apply to the access roads, though the need for further speed reductions, and speed reduction furniture, should be considered during the design phase. Roads through forest areas, notably the proposed access roads, should be designed to minimise the barrier effects to fauna movements and to reduce the likelihood of fauna being hit by vehicles. A suitably qualified and experienced ecologist should be involved with the designs. All fauna groups should be considered, though specific attention should be given to threatened stream-dwelling frogs and Southern Cassowary. Clearing widths (construction and operation) should be kept as low as possible and strategies to reduce the impact of light and acoustic pollution, especially near streams, should be incorporated into designs. Bridges should be used over larger streams, and designed to permit fauna movements (including Southern Cassowary) and minimise ground disturbance.

Monitoring	<ul style="list-style-type: none"> Prepare and implement a self-auditing programme (including scope, frequency, reporting regime) for the construction phase and operational phase. Undertake annual third-party audits during construction phase. Implement and appropriately resource (capital, labour, time, equipment) a management system to ensure that recommendations presented in Chapter 8, and any subsequent flora and fauna assessments, are implemented. The system should identify lines of responsibility/accountability and encompass the life of project (construction and operation).
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Reporting	<ul style="list-style-type: none"> Quarterly environmental reports shall be submitted to the relevant company director during the construction and operation phase. Any non-compliance with this EMP should be documented, corrective action taken and reported. Records of monitoring and non-compliance shall be retained. Records will be presented to the regulatory authorities as relevant.
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21.2.3 Water quality and aquatic ecology

Objective	Protect and enhance the water quality of sensitive receptors including four streams and their associated tributaries; Owen Creek, Warril Creek, Cain Creek and the Barron River
Potential Impacts	<ul style="list-style-type: none"> Degradation of the aquatic environment.
Performance Indicators	<ul style="list-style-type: none"> No unacceptable release of contaminants or sediment from the project site into receiving water environments. Compliance with the Water Quality Objectives for the project area. No unacceptable adverse impacts to aquatic ecosystem values.

Task Number	Tasks	Action
10.0	Minimise the impacts of vegetation clearing	<ul style="list-style-type: none"> Prepare and implement an appropriate rehabilitation plan to ensure the aquatic ecosystem and water quality values are protected. Where practical, undertake works in the dry season. Where not practical, devote additional resources to erosion and sediment control. Where clearing within listed frog habitat cannot be avoided, manage bank stability and stormwater discharge to avoid no adverse change in the environmental values of the aquatic receiving environment.
11.0	Appropriate management for the storage and handling of chemicals and hazardous waste to prevent contamination of water resources	<ul style="list-style-type: none"> Prepare and implement a Spill Management Plan. Emergency response training and site inductions to increase environmental awareness, identification of potential hazardous threats and management requirements/obligations. Have procedures and controls (for example a spill response procedure) in place in the event of an inadvertent release of chemicals or hazardous waste (these procedures should be displayed). All equipment is maintained in accordance with manufacturer's specifications.
12.0	Protect the water quality of the receiving environment	<ul style="list-style-type: none"> Develop and implement Erosion and Sedimentation Control plans (ESCP): <ul style="list-style-type: none"> For each area during the construction phase Certification of each plan must be completed by a Certified Professional in Erosion and Sediment Control (CPESC) or equivalent. Measures identified in the ESCP should be developed in accordance with the Best Practice Erosion & Sediment Control guidelines (IECA 2008). Detail the location, timing and sequence of actions and measures to effectively minimise erosion, sediment and run-off.



Task Number	Tasks	Action
		<ul style="list-style-type: none"> ○ Mandatory 'hold points' are to be identified, and incorporated into project scheduling documentation. Punitive measures for non-conformance with 'hold points' should be included in contractual documentation in a form and style known to prove effective in providing a meaningful incentive to achieve conformance. ● Prevent cattle and pig access to creeks via fencing and the provision of off-creek watering points. ● Irrigation practices should be managed to reduce run-off from irrigated water or the infiltration of potentially contaminated water (for example nutrients, pesticides, herbicides) to groundwater (prepare Irrigation Management Plan). ● Maintain integrity of storm water management devices, for example gross pollutant traps (GPTs), remove litter/debris from vegetation/banks, water body, GPTs and other structures, and dispose of appropriately. Sediment should be removed and disposed of in accordance with the <i>Environmental Protection Act 1994</i>.
13.0	Protect the aquatic ecosystem habitat	<ul style="list-style-type: none"> ● Develop and implement a Stormwater Management Plan designed to achieve no adverse change in environmental values of the aquatic receiving environment. The management plan should include a monitoring programme capable of detecting change in key indicators (that is indicators that are specific to potential project-related contamination sources and specific to known values of the receiving environment). ● The stormwater plan should consider offsetting nutrient loads from stormwater discharge by improving water quality through environmental works in the catchment that receives discharge. It should also address minimising stormwater generation and enhancing nutrient and suspended solids removal by amending design specifications of proposed management features or installing additional features during the design stage. ● Survey farm dams on the property or in the relevant subcatchments to determine if the Giant Gudgeon <i>Oxyeleotris selheimi</i> is established in these habitats and eradicate it. On-site dams should not be stocked with species that are not endemic to the area. ● All required bridges will provide adequate fish passage in accordance with the <i>Fisheries Act 1994</i>. ● Manage run-off or wash-down water from animal enclosures/stables by removing faecal matter and contaminated bedding daily to the site's composting facility. ● Training and site inductions to increase environmental awareness, identification of project related threats and management requirements/obligations.

Monitoring	<ul style="list-style-type: none"> ● Prepare and implement a self-auditing programme (including scope, frequency, reporting regime) for the construction phase and operational phase. ● Undertake annual third-party audits during construction phase. ● It is recommended that the timing, parameters monitored, sites monitored and methods for surface water, groundwater and aquatic ecology monitoring follow that of Chapter 9. ● Compliance with an approved ESCP to ensure erosion and sediment control practices are working effectively. Routine inspection of erosion and sediment control devices.
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	<ul style="list-style-type: none"> Inspect, maintain or repair erosion and sediment control (ESC) measures following run-off events (trigger to be nominated in the ESCP). Review the adequacy of the ESC measures prior to each wet season. Surface water samples should be collected from reference (benchmark/background) and receiving sites as required. All management and monitoring plans should consider the requirements of Kuranda Tree Frog and Tapping Green-eyed Frog. In addition to the recommended routine monthly programme, aquatic ecosystem monitoring should be initiated in the event of accidental discharge of contaminants and sediments during construction. Aquatic ecology surveys (fish) should be undertaken at a minimum of once annually, and aquatic ecology (aquatic macroinvertebrates) should be undertaken annually, along with sediment monitoring. The requirements for ongoing monitoring following completion of the proposed development should be reviewed with consideration to potential ongoing impacts. Groundwater monitoring should be undertaken quarterly. Litter and sediment removal should occur quarterly or after significant storms (for example 100 millimetres in 24 hours). Water level control should be completed every month (in conjunction with water quality monitoring).
Reporting	<ul style="list-style-type: none"> Quarterly environmental reports shall be submitted to the relevant company director during the construction and operation phase. Any non-compliance with this EMP should be documented, corrective action taken and reported. Records of monitoring and non-compliance shall be retained. Records will be presented to the regulatory authorities as relevant.

21.2.4 Water resources

Objective	Resourceful, efficient and sustainable use of water resources
Potential Impacts	<ul style="list-style-type: none"> Over exploitation of water resources.
Performance Indicators	<ul style="list-style-type: none"> No adverse impacts to waters and associated ecosystems. Compliance with all relevant approval and statutory requirements.

Task Number	Tasks	Action
14.0	Appropriate design and management of the golf course	<ul style="list-style-type: none"> Prepare and implement an Irrigation Management Plan that maximises reuse of recycled water and limits the impacts of pesticides and fertiliser on the receiving environment.
15.0	Waste water is treated and disposed of appropriately	<ul style="list-style-type: none"> Design and operate a wastewater treatment system to meet Barron River Water Quality Objectives or site-specific targets appropriate for the Barron River, Wet Tropics Water Quality Improvement Plan 2015 – 2020 and the Reef Water Quality Protection Plan 2013. Effluent irrigation protocols should be developed based on MEDLI modelling using physical and chemical parameters for site soils and a 90% reuse target (to minimise discharge risk).



		<ul style="list-style-type: none"> Stormwater should be directed to water treatment systems or appropriately designed retention dams considering worst case discharge scenarios to achieve water quality performance objectives for the Wet Tropics nominated in Arup (2017). Explore options for effluent discharge off-site into a less sensitive or already impacted waterway.
16.0	Water use demand management	<ul style="list-style-type: none"> Water saving devices and appliances to be installed and used throughout. Site inductions and staff training to increase environmental awareness and encourage the sustainable use of water resources.

Monitoring	<ul style="list-style-type: none"> Prepare and implement a self-auditing programme (including scope, frequency, reporting regime) for the construction phase and operational phase. Undertake annual third-party audits during construction phase.
Reporting	<ul style="list-style-type: none"> Quarterly environmental reports shall be submitted to the relevant company director during the construction and operation phase. Any non-compliance with this EMP should be documented, corrective action taken and reported. Records of monitoring and non-compliance shall be retained. Records will be presented to the regulatory authorities as relevant.

21.2.5 Air quality



Objective	Protect the values of air in the environment and nearby sensitive receptors for human health and wellbeing and ecosystem function
Potential Impacts	<ul style="list-style-type: none"> Dust generation and fume emissions impacting on visibility, terrestrial and freshwater ecology. Odour generation associated with the animal farm, solid wastes and sewage treatment plant. Production of carbon monoxide (CO), sulfur dioxide (SO₂), nitric oxide (NO) and particulates associated with power generators, boilers and cooking exhausts.
Performance Indicators	<ul style="list-style-type: none"> No unacceptable production of emissions from the project site into the environment. Compliance with all statutory requirements. No unresolved complaints.

Task Number	Tasks	Action
17.0	Reduce the generation of dust during construction	<ul style="list-style-type: none"> Develop and implement a Dust Management Plan during construction. All site personnel to complete an environmental site induction prior to commencement of work. Induction to include topics regarding dust management. Use of water on unsealed road surfaces from truck-mounted sprays to suppress dust generation (water application must be of more than 2 L/m²/h). Implementation of erosion control and sediment control measures. Minimise activity during dry, windy conditions. Create stabilised wind breaks using shade cloth on stockpiles or strategically locate stockpiles next to dense trees to prevent generation of dust. Revegetate as soon as practical.
18.0	Minimise odour during construction	<ul style="list-style-type: none"> Assessment of the sewage treatment plant should be undertaken to determine a suitable odour treatment of ventilation point(s). A separation distance of at least 50 metres from vents to sensitive receptors should be achieved unless odour filters are installed and 30 metres separation is provided or site-specific dispersion modelling demonstrates less is acceptable. Bins for waste are to be placed in dispersed locations and large bins for storage of wastes prior to removal off-site are to be placed at least 6 metres away from sensitive receptors. Weekly removal of wastes by suitably certified methods and personnel.
19.0	Minimise odour during operation	<ul style="list-style-type: none"> Ensure proper aeration of wastewater in the sewage treatment plant and operate in accordance with manufacturer specifications. Biosolids storage and handling must be done in a suitable area at least 50 metres away from sensitive receptors. Use an enclosed composter for green wastes and manure, located at least 50 metres from sensitive receptors. Processing and application of manure should be scheduled when wind conditions are favourable to avoid unacceptable air impacts. Remove manure, uneaten food and urine-affected bedding from the animal farm regularly. Ensure weekly removal of manure to appropriate composting/disposal facilities or for appropriate agricultural reuse.
20.0	Protect the quality of air	<ul style="list-style-type: none"> All mobile plant and equipment to be utilised on-site is to be certified in writing as appropriate for task and serviceable.



Task Number	Tasks	Action
		<ul style="list-style-type: none"> All mobile plant and equipment to be regularly maintained, re-fuelled and cleaned in designated areas that have been appropriately designed, constructed and maintained. Maintain service records. All equipment associated with diesel power generation is maintained to environmental best practice and emissions are minimised to avoid adverse impacts on air quality. Exhaust systems should be designed such that exhausts are away from sensitive receptors if practical and not blowing towards windows and doors and located high enough for proper dispersion to occur before plume reaches publicly accessible ground-level. A separation distance of 6 metres from sensitive users should be adopted for the vents.

Monitoring	<ul style="list-style-type: none"> Prepare and implement a self-auditing programme (including scope, frequency, reporting regime) for the construction phase and operational phase. Undertake annual third-party audits during construction phase. During the construction phase, there will be daily visual monitoring by the construction manager to identify if dust or exhaust plumes reach the site boundary, and initiate additional controls measures if this occurs. Pre-start checks to be completed prior to use of mobile plant and equipment on a per shift basis. Works are to be periodically audited by a suitable Environmental Officer. Dust monitoring should be undertaken prior to construction, and continue during construction at the locations specified in Chapter 12.
Reporting	<ul style="list-style-type: none"> Quarterly environmental reports shall be submitted to the relevant company director during the construction and operation phase. Any non-compliance with this EMP should be documented, corrective action taken and reported. Records of monitoring and noncompliance shall be retained. Records will be presented to the regulatory authorities as relevant.



21.2.6 Noise and vibration

Objective	The project is planned, designed and constructed to protect the environmental values of the acoustic environment and to avoid unacceptable impacts on identified sensitive receptors
Potential Impacts	<ul style="list-style-type: none"> • Helicopter activity may result in high levels of noise. • Excessive vehicle noise during the construction phase. • Excessive noise from ziplines, sewerage treatment plant, mechanical plant equipment, people and music. • Increase in noise emissions and vibrations from construction activities within the project area.
Performance Indicators	<ul style="list-style-type: none"> • No unacceptable production of noise and vibration from the project site into the environment. • Compliance with all statutory requirements. • No unresolved complaints.

Task Number	Tasks	Action
21.0	Mitigate noise and vibration impacts during the construction phase	<ul style="list-style-type: none"> • A construction Noise and Vibration Management Plan should be developed. The management plan will be based on <i>Australian Standard AS2436-2010 Guide to noise and vibration control on construction, demolition, and maintenance sites</i>. • During the construction phase, develop and implement controls relating to noise management (including: maintain vehicles and machinery according to manufacturer specifications; fit and maintain appropriate mufflers on machinery used on-site). • Do not carry out construction outside of standard operating hours, Sundays or Public Holidays unless there is strong justification. If all feasible and reasonable practices have been applied, the proponent should negotiate with the community where noise is 5 dBA above the noise affected level. • In the event of any noise or vibration incidents, the incident will be investigated by a suitably qualified person.
22.0	Mitigate zipline noise	<ul style="list-style-type: none"> • Design and implement a detailed Noise and Vibration Management Plan. • It is recommended that the 'background creep' criterion be applied to this noise source (Environmental Protection (Noise) Policy 2008 (EPP (Noise))). Further investigation should be conducted as the design progresses in the future. • If it is desired to operate ziplines in the evening or night when lower noise limits apply or have more than 2 zipline runs per 15 minutes, further noise investigation would be required.
23.0	Minimise helicopter noise	<ul style="list-style-type: none"> • Flights must not take place before 7am or after sunset on a weekday, or before 8am or after sunset on a weekend or holiday. • Movements are limited to no more than 7 helicopter flight movements per week (including taking off or landing); otherwise further noise investigation would be required.
24.0	Mitigate sewerage treatment plant noise	<ul style="list-style-type: none"> • The proposed sewerage treatment plant requires to be addressed in the Noise and Vibration Management Plan. • Post-construction noise testing is recommended to prove compliance with noise levels.



Task Number	Tasks	Action
25.0	Minimise noise of amplified music and moderate to large numbers of people	<ul style="list-style-type: none"> Noise emissions from activities within buildings should be readily controlled via building construction measures. Where sports fields are proposed, it is recommended to locate any stands, stadia, clubhouse or other gathering areas, as far from sensitive receivers as possible.
26.0	Minimise impact of vehicular traffic	<ul style="list-style-type: none"> The Noise and Vibration Management Plan for the development should have a specific section addressing the traffic noise issue of Barnwell Road and Myola Road on nearby residents, including any potential noise control measures. Additional roadside noise barriers are recommended adjacent to residential property on the southern side of the primary access road.
27.0	Maintain plant and equipment	<ul style="list-style-type: none"> All mobile plant and equipment to be re-fuelled, maintained and cleaned in designated areas that have been appropriately designed, constructed and maintained. Maintain staff awareness in relation to reducing noise and vibration impacts from equipment operation.

Monitoring	<ul style="list-style-type: none"> Prepare and implement a self-auditing programme (including scope, frequency, reporting regime) for the construction phase and operational phase. Undertake annual third-party audits during construction phase. Compliance with an approved noise management plan to ensure noise is properly considered and monitored. Monthly noise monitoring will be carried out during the construction phase at the baseline locations. Perform daily visual inspection of the work area and investigate corrective actions where necessary. Preparation of quarterly monitoring reports, detailing the results of all monitoring and any exceedances of project criteria. This should be used to inform the construction team on whether compliance conditions are being met and if mitigation measures need be altered.
Reporting	<ul style="list-style-type: none"> Quarterly environmental reports shall be submitted to the relevant company director during the construction and operation phase. Any non-compliance with this EMP should be documented, corrective action taken and reported. Records of monitoring and non-compliance shall be retained. Records will be presented to the regulatory authorities as relevant.



21.2.7 Waste management

Objective	Manage and minimise the generation of waste by avoiding, reusing, reducing and recycling appropriately
Potential Impacts	<ul style="list-style-type: none"> Contamination to land, water and air. Harm to fauna, flora and humans. Decline in visual amenity through increase in waste pollution. Pest species attraction.
Performance Indicators	<ul style="list-style-type: none"> Minimise contamination to land and water by containing and disposing of wastes appropriately. Minimise waste generation through avoidance, reuse and recycling strategies. Dispose of all waste in accordance with the <i>Queensland Waste Reduction and Recycling Act 2011</i>. No persons are exposed to hazardous wastes.

Task Number	Tasks	Action
28.0	Maximise environmental awareness	<ul style="list-style-type: none"> All site personnel to complete an environmental site induction prior to commencement of work. Induction to include topics regarding waste management. Education and signage will be utilised at all waste management areas.
29.0	Waste management	<ul style="list-style-type: none"> Develop and implement a Waste Management Plan to align with waste handling and compliance requirements in accordance with legislation and industry best practice waste management strategies. Work camps to include sufficient self-contained portable toilets to meet maximum expected demand. Spill kits and a dedicated spill response protocol should be developed and implemented. Dispose of wastes in accordance with the <i>Waste Reduction and Recycling Act 2011</i>. Engage licensed entities to collect and remove waste products from site. Provide separate bins for glass, cardboard/paper and general waste to encourage recycling. Collect waste hydrocarbons in an appropriate storage container, store in bunded area and transport to licensed disposal or recycling facility. All receptacles and bins will be secure and covered, including food waste and organics bins.

Monitoring	<ul style="list-style-type: none"> Prepare and implement a self-auditing programme (including scope, frequency, reporting regime) for the construction phase and operational phase. Undertake annual third-party audits during construction phase. Compliance with the Waste Management Plan. Perform a daily visual inspection of the area and investigate corrective actions where necessary. Conduct quarterly internal audits of incidents, corrective actions, daily inspection results and Waste Management Plan implementation. Maintain training register to include inducted personnel.
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	<ul style="list-style-type: none"> All waste management areas should be inspected on a daily basis and kept clean and tidy at all times. If evidence of vermin is found, vermin control measures should be introduced.
Reporting	<ul style="list-style-type: none"> Quarterly environmental reports shall be submitted to the relevant company director during the construction and operation phase. Any non-compliance with this EMP should be documented, corrective action taken and reported. Records of monitoring and non-compliance shall be retained. Records will be presented to the regulatory authorities as relevant.

21.2.8 Biosecurity

Objective	Minimise adverse impacts of pests and diseases that threaten the environment and ecological values
Potential Impacts	<ul style="list-style-type: none"> Increase in pest species abundance/distribution and consequent decreases in native flora and fauna biodiversity. Introduction of pests and diseases.
Performance Indicators	<ul style="list-style-type: none"> Prevention of the introduction of pests and diseases. Compliance with all relevant statutory requirements.

Task Number	Tasks	Action
30.0	Non-native (exotic and pest species) vegetation shall be controlled using appropriate best-practice methods	<ul style="list-style-type: none"> Destroy existing infestation of Cat's Claw Creeper and monitor the area for re-emergence or recovery of the species. Re-treat as required to achieve eradication. The dominant weed species (that is Lantana, Sky Flower and Giant Raspberry) should be controlled by the appropriate best-practice methods. Ensure that all non-native vegetation is appropriately disposed off-site to minimise the risk of exotic regeneration and vegetation dispersal. A weed management database to manage weed species, analyse results and report on outcomes should be designed. The database should include location, weed type, treatment type, chemical product (application details, that is rate, mode of application), date of treatment, man hours required, estimated cost and efficacy. Weed control priorities should be reviewed annually, with changes to on-site weed occurrences (based on field surveys) and weed species status taken into account.
31.0	Minimise and manage the impacts of pest/weed species on native fauna and flora	<ul style="list-style-type: none"> Develop and implement a project-specific Biosecurity and Pest Management Plan (construction and operation phases). The plan should include methods for prevention of introduction and/or spread of weeds, pests and pathogens, inspections/monitoring and control. The plan should be developed by a suitably qualified person and be appropriate for the setting. The project biosecurity management plan should include specific focus on protecting riparian habitats, in particular core habitat for Kuranda Tree Frog. All site personnel to complete an environmental site induction prior to commencement of work. Induction elements to include key species occurring in the project area and hygiene procedures.



Task Number	Tasks	Action
		<ul style="list-style-type: none"> All plant and machinery and materials arriving and departing from the project area will subscribe to the project specific biosecurity plan Feral pigs should be managed to reduce numbers and limit access to creeks across the project area. The use of toxic baits to control feral vertebrate pests is discouraged. Toxic baits should only be considered if the potential for non-target impacts on native fauna has been properly assessed (for example by a suitably qualified person) and if strategies to negate non-target impacts are available and implemented. Determine if exotic and translocated fish species exist in any farm dams on the project area. If these species exist, euthanase humanely and re-stock dam with native species endemic to the area.
32.0	Minimise the risk of introducing 'tramp ants' (Yellow Crazy Ants and Electric Ants)	<ul style="list-style-type: none"> All vehicles, machinery and equipment obtained from Yellow Crazy Ant or Electric Ant regions are to be washed down and inspected prior to entering the project area in accordance with relevant procedures. Regular surveys for tramp ants should be conducted in the project area, with visual inspections, baiting and sniffer dogs used to detect tramp ants. A quick response procedure should be developed to guide operators in what actions to take if tramp ants are detected (early intervention measures). The procedure will ensure a timely response and will outline actions such as immediately quarantining the area and eradicating the ants through baiting or spraying. Detection of tramp ants should be reported to Biosecurity Queensland immediately. Provide education to staff members and guests regarding the importance of minimising the risk of introducing tramp ants.
33.0	Manage impacts of domestic pets to ecological values	<ul style="list-style-type: none"> Prohibit cat and dog ownership and visitation, with the exception of certified assistance dogs. Feral Cats and wild Domestic Dogs should be monitored and managed under the Biosecurity and Pest Management Plan.
34.0	Manage impact of mosquitoes on human health	<ul style="list-style-type: none"> To control mosquito numbers, suitably qualified personnel should inspect water depth in areas of 'lake margin' planting. Aim to maintain favourable water quality to encourage predator colonisation and survival. Once the dam is established and water quality data is available, consult with the Department of Agriculture and Fisheries regarding the introduction of appropriate native fish species to enhance biological control of mosquitos. Where routine maintenance procedures alone cannot prevent a serious increase in the adult mosquito population and in situations where there is a public health risk, mosquito control agents (either biological or chemical) may be required. Any mosquito control programme that requires the use of agents should be developed in consultation with Mareeba Shire Council and conform with the Mosquito Management Code of Practice for Queensland (LGAQ 2014).

Monitoring	<ul style="list-style-type: none"> Prepare and implement a self-auditing programme (including scope, frequency, reporting regime) for the construction phase and operational phase. Undertake annual third-party audits during construction phase. Preparation of quarterly monitoring reports, detailing the results of all monitoring and any exceedances of project criteria. This should be used to inform the construction team on
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	<p>whether compliance conditions are being met and if mitigation measures need to be altered.</p> <ul style="list-style-type: none"> Annual weed surveys should occur across the entire project area and be conducted by a suitably qualified person. Annual monitoring for non-native aquatic species should be implemented and conducted by a suitably qualified person. Quarterly surveys and routine monitoring targeted to the early detection, and timely control, of biosecurity risks (such as tramp ants).
Reporting	<ul style="list-style-type: none"> Quarterly environmental reports shall be submitted to the relevant company director during the construction and operation phase. Any non-compliance with this EMP should be documented, corrective action taken and reported. Records of monitoring and non-compliance shall be retained. Records will be presented to the regulatory authorities as relevant.

21.2.9 Community and stakeholder engagement

Objective	Inform stakeholders of project progress and address concerns
Potential Impacts	<ul style="list-style-type: none"> Misinformation within the community. Elevated concerns within the community. Division of the community.
Performance Indicators	<ul style="list-style-type: none"> Number of stakeholders accessing project progress reports and utilising feedback mechanisms. Number of stakeholders utilising feedback mechanisms Percentage of positive vs negative feedback Number of grievances resolved

Task Number	Tasks	Action
35.0	Grievance Mechanism	<ul style="list-style-type: none"> A Grievance Mechanism reviewed by the Community Reference Group during the EIS process is finalised by the project team and communicated to all stakeholders via local newspapers and the project website prior to the commencement of construction. Grievances are recorded and responded to in accordance with the mechanism during construction. A Grievance Mechanism for operations is finalised by the project team and communicated to all stakeholders via local newspapers and the project website prior to the commencement of operations. Grievance are recorded and responded to in accordance with the mechanism during operations.
36.0	Newsletter	<ul style="list-style-type: none"> A newsletter detailing the progress of the development will be produced and issued quarterly during construction or if significant information (such as an emergency) requires communication. The newsletter will be published via the project website.
37.0	Website	<ul style="list-style-type: none"> The project website will be maintained during construction and operations. Submissions to the website will be responded to in a timely manner.



Monitoring	<ul style="list-style-type: none"> • Prepare and implement a self-auditing programme (including scope, frequency, reporting regime) for the construction phase and operational phase. • Evaluation mechanisms are to be based on standards outlined by the International Association for Public Participation. • Undertake annual third-party audits during construction phase.
Reporting	<ul style="list-style-type: none"> • Quarterly social and safety reports shall be submitted to the relevant company director during the construction and operation phase. • Any non-compliance with this EMP should be documented, corrective action taken and reported. • Records of monitoring and non-compliance shall be retained. • Records will be presented to the regulatory authorities as relevant.

21.2.10 Workforce

Objective	Preferentially employ locals
Potential Positive Impacts	<ul style="list-style-type: none"> • Reduction in the currently high unemployment rates for locals, especially young, Indigenous people. • Reduction in currently high crime rates. • Access to training for young, unskilled locals.
Performance Indicators	<ul style="list-style-type: none"> • Unemployment rates in Kuranda and Atherton Tablelands. • Youth Unemployment rates in Kuranda and Atherton Tablelands. • Indigenous Unemployment rates in Kuranda.

Task Number	Tasks	Action
38.0	Local Employment Policy	<ul style="list-style-type: none"> • Establish a Local Employment policy prior to the commencement of construction to ensure the priority employment of locals, in particular young indigenous people. • Determine training requirements and partnerships to enable preferential employment and participation of locals, especially young Indigenous people in accordance with skill requirements identified in the Social and Economic Impact Assessment (Chapter 11)

Monitoring	<ul style="list-style-type: none"> • Prepare and implement a self-auditing programme (including scope, frequency, reporting regime) for the construction phase and operational phase. • Undertake annual third-party audits during construction phase. • Implement and appropriately resource (capital, labour, time, equipment) a local employment plan system to ensure that recommendations presented in Chapter 11 (Social and Economic Impact Assessment) are implemented. The system should identify lines of responsibility/accountability and encompass the life of project (construction and operation).
Reporting	<ul style="list-style-type: none"> • Quarterly employment and training reports shall be submitted to the relevant company director during the construction and operation phase. • Any non-compliance with this EMP should be documented, corrective action taken and reported.



	<ul style="list-style-type: none"> Records of monitoring and non-compliance shall be retained. Records will be presented to the regulatory authorities as relevant.
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21.2.11 Housing and accommodation

Objective	Ensure adequate local housing for staff and contractors
Potential Impacts	<ul style="list-style-type: none"> Overcrowding of local accommodation options by project staff and contractors Excessive price increase of local accommodation options Unavailability of affordable housing options for long-term locals
Performance Indicators	<ul style="list-style-type: none"> Availability of temporary accommodation options in Kuranda and Mareeba for construction staff and contractors Availability of long term accommodation options in Kuranda and the Atherton Tablelands for operational staff and contractors Rental prices of local accommodation Selling prices of local accommodation

Task Number	Tasks	Action
39.0	Local Accommodation during construction	<ul style="list-style-type: none"> Undertake an audit of existing temporary accommodation options for project staff and contractors to ensure that it aligns with predictions in Chapter 11 (Social and Economic Impact Assessment) Develop a detailed Housing and Accommodation Strategy for project staff and contractors prior to the commencement of construction.
40.0	Local Accommodation during operations	<ul style="list-style-type: none"> Undertake an audit of existing permanent accommodation options for project staff and contractors to ensure that it aligns with predictions in Chapter 11 (Social and Economic Impact Assessment) Develop a detailed Housing and Accommodation Strategy for operations project staff and contractors prior to the commencement of operations.

Monitoring	<ul style="list-style-type: none"> Prepare and implement a self-auditing programme (including scope, frequency, reporting regime) for the construction phase and operational phase. Undertake annual third-party audits during construction phase.
Reporting	<ul style="list-style-type: none"> Quarterly housing and accommodation reports shall be submitted to the relevant company director during the construction and operation phase. Any non-compliance with this EMP should be documented, corrective action taken and reported. Records of monitoring and non-compliance shall be retained. Records will be presented to the regulatory authorities as relevant.



21.2.12 Community wellbeing

Objective	Enhance community services, wellbeing and amenity in the local area
Potential Impacts	<ul style="list-style-type: none"> Increased pressure on existing local services which are at full capacity (banking, child care, medical centre) Increased pressure services such as health facilities, aged care and emergency services which are located nearby in Mareeba and Smithfield Decrease in lifestyle, amenity, social character and community cohesion of particular demographics in Kuranda
Potential Positive Impacts	<ul style="list-style-type: none"> Increased availability of health and medical services incorporated into the proposed development Increased availability of facilities within the proposed development which could be used by youth, elderly or emergency services personnel. Increased involvement in opportunities associated with the proposed development.
Performance Indicators	<ul style="list-style-type: none"> Capacity of existing local services in Kuranda, Mareeba and Smithfield Utilisation of new-services provided by the development No unresolved complaints.

Task Number	Tasks	Action
41.0	Existing Community Services Capacity	<ul style="list-style-type: none"> Finalise the preliminary register of critical community services and capacity within the Kuranda, Mareeba and Smithfield areas. Establish focus groups to directly engage with health and medical, emergency, child care and education service providers. Predict requirements for these services by staff, contractors and visitors at each stage of the project for construction and operational phases.
42.0	Additional Community Services Capacity	<ul style="list-style-type: none"> Finalise the preliminary register of community services that the proposed project will provide. Develop mechanisms for access to these services by the local community.
43.0	Enhanced Amenity	<ul style="list-style-type: none"> Undertake improvements in site amenity in accordance with recommendations in Chapter 6 - Visual Impact Mitigations regarding site planning, built form, roads and infrastructure, golf course and lighting.

Monitoring	<ul style="list-style-type: none"> Prepare and implement a self-auditing programme (including scope, frequency, reporting regime) for the construction phase and operational phase. Undertake annual third-party audits during construction phase.
Reporting	<ul style="list-style-type: none"> Quarterly reports on community services capacity shall be submitted to the relevant company director during the construction and operation phase. Any non-compliance with this EMP should be documented, corrective action taken and reported. Records of monitoring and noncompliance shall be retained. Records will be presented to the regulatory authorities as relevant.



21.2.13 Transport

Objective	Maintain the safety and efficiency of all modes of transport required for the construction and operation of the project
Potential Impacts	<ul style="list-style-type: none"> Adverse impacts associated with construction and operations traffic. Vehicle incidents/accidents.
Performance Indicators	<ul style="list-style-type: none"> Compliance with all relevant statutory and approval requirements. No unresolved complaints. No road safety incidents relating to construction traffic.

Task Number	Tasks	Action
44.0	Minimise impact of construction traffic	<ul style="list-style-type: none"> A Construction Traffic Management Plan will be required prior to the commencement of construction to detail access to the site including the use of Park and Ride Shuttles for Cairns and Tablelands based workers. Barnwell Road is to be upgraded to a sealed standard in accordance with FNQROC standards prior to the completion of Stage 1A construction.
45.0	Minimise impact of operational traffic	<ul style="list-style-type: none"> Sufficient on-site car parking is to be provided to accommodate the expected operational and construction traffic.

Monitoring	<ul style="list-style-type: none"> Prepare and implement a self-auditing programme (including scope, frequency, reporting regime) for the construction phase and operational phase. Undertake annual third-party audits during construction phase. Road Safety Audits of Barnwell Road, Myola Road and Rob Veviers Drive are to be completed and required mitigation measures (to be determined in coordination with MSC) implemented prior to development traffic volumes exceeding 5% of the base traffic volumes on these roads.
Reporting	<ul style="list-style-type: none"> Quarterly reports shall be submitted to the relevant company director during the construction and operation phase. Any non-compliance with this EMP should be documented, corrective action taken and reported. Records of monitoring and non-compliance shall be retained. Records will be presented to the regulatory authorities as relevant.



21.2.14 Cultural Heritage

Objective	Protect Indigenous and non-Indigenous cultural heritage values of the project site and surrounding area
Potential Impacts	<ul style="list-style-type: none"> Damage to or adverse impacts to indigenous cultural heritage sites/objects, places or values during the clearing and excavation works.
Performance Indicators	<ul style="list-style-type: none"> Compliance with all relevant legislative and approval requirements, including the requirements listed under the <i>Aboriginal Cultural Heritage Act 2003</i>. Ensure cultural heritage values are not destroyed during project activities. No unresolved complaints, issues or objections raised by the Aboriginal Parties during construction.

Task Number	Tasks	Action
46.0	Protect any known cultural heritage values and discovered cultural heritage values during the construction and operation phase	<ul style="list-style-type: none"> Ground surveys should be completed prior to construction and advice taken from the Aboriginal party on how to protect the cultural heritage values identified in this area. Heritage boundaries are recommended for the following items/places: Significant mature trees located across the property, mango grove, weir and associated pumping system and James Hamilton's grave site Cultural heritage values discovered during the construction and operations phases of the project should be managed in accordance with 'Incidental Finds Procedure'. The weir and associated pumping system should be retained in the landscape and a report prepared for the Queensland Heritage Council for it to be entered onto the Queensland Heritage Register. A report should be prepared for the Queensland Heritage Council recommending that James Hamilton's gravesite be entered onto the Queensland Heritage Register. Protection and/or management of the Aboriginal nut cracking rocks and any high priority areas identified in Chapter 17 and revealed during construction monitoring activities.
47.0	Implement a Cultural Heritage Management Plan (CHMP)	<ul style="list-style-type: none"> Care will be taken when in proximity to registered cultural heritage, with the advice and knowledge from relevant Indigenous parties required. This must also be in accordance with the CHMP to minimise and reduce any adverse effects to cultural heritage. Maintain communication and consultation with the relevant Aboriginal Parties over the duration of the project.
48.0	Provide education to construction and operational workers to inform them of the need to protect cultural heritage values	<ul style="list-style-type: none"> Provide cultural awareness training for all personnel during the construction phase of the project to meet duty of care requirements under the <i>Aboriginal Cultural Heritage Act 2003</i>. On-site cultural heritage induction to all employees and contractors within the project area during the operational phase.



Task Number	Tasks	Action
49.0	Encourage partnerships between local groups and Aboriginal parties	<ul style="list-style-type: none"> • Provide and encourage employment and training opportunities to local Aboriginal people. • Encourage local groups and Aboriginal parties to be involved in environmental restoration.

Monitoring	<ul style="list-style-type: none"> • Prepare and implement a self-auditing programme (including scope, frequency, reporting regime) for the construction phase and operational phase. • Undertake annual third-party audits during construction phase. • Compliance with the CHMP to ensure cultural heritage values are properly considered and monitored. • Consultation with Aboriginal party representatives will be ongoing (as and when required) during the construction and operation phase. • Monitoring of future ground disturbance for Aboriginal cultural heritage in accordance with the CHMP process. • Carry out a cultural heritage audit at the completion of the project.
Reporting	<ul style="list-style-type: none"> • Quarterly cultural heritage reports shall be submitted to the relevant company director during the construction and operation phase. • Any non-compliance with this EMP should be documented, corrective action taken and reported. • Records of monitoring and non-compliance shall be retained. • Records will be presented to the regulatory authorities as relevant.



21.2.15 Hazards, health and safety

Objective	Avoid or minimise adverse impacts arising from hazards and protect the health of persons on and within the vicinity of the project area
Potential Impacts	<ul style="list-style-type: none"> Impact on human health and the environment from dust, fumes, liquids, infection, flooding, landslides, fire, cyclones, heat waves, droughts, explosion or other hazards.
Performance Indicators	<ul style="list-style-type: none"> No health-related issues as a result of project activities. No loss of human life. All staff and contractors trained in evacuation and emergency management procedures.

Task Number	Tasks	Action
50.0	Establish and provide workplace health and safety	<ul style="list-style-type: none"> Prepare and implement an Environmental, Health and Safety Management Plan for the construction and operational phase of the project. All construction workers are required to wear personal protective equipment when on-site. Ensure contractors and employees work in accordance with the <i>Work Health and Safety Act 2011</i>, regulations and codes of practice. Ensure site supervisors are first aid trained and certified.
51.0	All staff members are aware of evacuation and emergency response procedures on-site	<ul style="list-style-type: none"> An Evacuation and Emergency Management and Response Plan and Natural Disaster Strategy should be developed collaboratively with contractors and regulators in response to emergencies such as bushfires, cyclones, flooding, earthquakes, droughts/heatwaves, building fires and release of hazardous materials. All contractors must have a site induction of emergency response and evacuation plans. All key personnel should have emergency management training.
52.0	Mitigate the impacts of natural disasters	<ul style="list-style-type: none"> A Recovery Plan that includes revegetation plans and temporary procedures for feeding for animals (minimum 1 week). Develop a Business Continuity Plan. Critical infrastructure meets or exceeds current design standards.
53.0	Minimise the impacts of fire	<ul style="list-style-type: none"> No residential development in the high and very high bushfire prone areas. The zipline should be designed and constructed with the knowledge that the area could be fire-affected. Critical infrastructure and habitable buildings to meet or exceed current design standards, to be located outside of bushfire prone area and ensure a regular maintenance programme to ensure areas around physical and critical infrastructure are free from vegetation and other hazards. Consideration given to planting native species that are bushfire resistant where appropriate. Construct and maintain adequate firebreaks (minimum cleared width of 20 metres and maximum gradient 12.5%) and fire trails (minimum cleared width of 6m and maximum gradient 12.5%) in liaison with QFES and in accordance with the MSC Bushfire Hazard Overlay code. Ensure site has more than one access for emergency services vehicles and that lots are designed so that their size and shape allow for efficient emergency access to buildings for fire-fighting appliances (for example by



Task Number	Tasks	Action
		<p>avoiding long narrow lots with long access drives to buildings and dead-end roads).</p> <ul style="list-style-type: none"> • Provision of a Fire Management Team (training for key personnel by QFES) to manage bushfire risk and to implement fire protection strategies to protect the resort. • Provide warnings and information to guests during times of high bushfire danger and suspend outdoor (high risk) activities in the event of a bushfire occurring. • Identification of bushfire safe places on the site (for example Golf Course) in liaison with Queensland Fire & Emergency Services (Rural). • Provide an adequate and accessible water supply for fire-fighting purposes (for example reticulated supply and / or no less than 5,000 litres located within 40 metres of habitable buildings, dam for air asset buckets) and ensure appropriate equipment is available (for example tanks with fire brigade fittings, hoses).
54.0	Mitigate potential water body accidents	<ul style="list-style-type: none"> • Prevent drownings and water injuries by educating staff, contractors and guests on potential risks. • Provide relevant signage around all water bodies and life saving devices.
55.0	Minimise the impact of earthquakes	<ul style="list-style-type: none"> • Ensure structures comply with the earthquake loading provisions of the Building Code of Australia.
56.0	Minimise the impact of cyclones	<ul style="list-style-type: none"> • Ensure that all structures comply with the wind loading provisions of the Building Code of Australia. • Construction site management plan for tropical cyclones. • Shelter in place strategy and availability of stocks to support the strategy for example food, water. • Provision of guest education materials relevant to cyclones and resort response and recovery arrangements.
57.0	Minimise the impact of storms	<ul style="list-style-type: none"> • Prohibit habitable development within the 50 metres riparian buffer established on both sides of waterways across the site. • Ensure all habitable development is located at least 300 millimetres above expected inundation levels from a 1% AEP event. • Undertake detailed flood and drainage analysis of the site and use natural flow paths and engineered solutions to contain and control water and to channel it away from buildings, for example water retention pits, stormwater drains so that water running into creeks mimics natural flow patterns rather than being released all at once. • Storm water drainage strategy for the site including capturing rainwater and storm water for treatment, reuse and recycling to minimise erosion, sediment and environmental impacts. • Communicate weather events and potential flooding issues to guests and suspend outside (high risk) activities during storms and heavy rainfall events so guests do not put themselves or others in danger.
58.0	Minimise the impact of landslides	<ul style="list-style-type: none"> • Development is located to avoid sloping land where possible and where clearing of vegetation has already occurred.



Task Number	Tasks	Action
		<ul style="list-style-type: none"> No development is to occur on land with a gradient that exceeds 25% (1 in 4). A geotechnical report is to be prepared for building work, filling or excavation that occurs on land with a slope of 15% or greater.
59.0	Minimise the impact of heatwaves/droughts	<ul style="list-style-type: none"> Consideration of heat-reducing strategies and materials in the design and construction of resort facilities for example light coloured buildings, increasing green spaces. Provision of adequate air conditioning in guest residential areas and communal facilities. Provide self-care information to guests during periods of extreme heat, for example drink plenty of fluids, take cold showers, wearing light clothing.
60.0	Minimise the impact of climate change	<ul style="list-style-type: none"> Develop a climate change adaptation strategy for the resort. Implementation of strategies to reduce emissions of greenhouse gasses for example use of renewable energies, use of energy efficient equipment. Consider adopting additional freeboard to extreme water levels from all sources. Consider adopting a conservative approach to design loads to allow for stronger winds.

Monitoring	<ul style="list-style-type: none"> Prepare and implement a self-auditing programme (including scope, frequency, reporting regime) for the construction phase and operational phase. Undertake annual third-party audits during construction phase. Compliance with an approved Hazard, Health and Safety Management Plan and Evacuation and Emergency Management and Response Plan to ensure health and safety values are properly considered and monitored.
Reporting	<ul style="list-style-type: none"> Quarterly reports shall be submitted to the relevant company director during the construction and operation phase. Any non-compliance with this EMP should be documented, corrective action taken and reported. Records of monitoring and noncompliance shall be retained. Records will be presented to the regulatory authorities as relevant.



21.3 References

ARUP 2017, *KUR-World Eco Resort Development Stormwater Drainage Strategy* - Revision 1, Prepared by ARUP, November 2017.

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