KUR-World

Hazards, Health and Safety

Chapter 18.0

Environmental Impact Statement

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18.0 HAZARDS, HEALTH AND SAFETY

The purpose of this Chapter is to:

- Identify all anticipated, unplanned or accidental risks that may occur during the construction and operations phases which should be considered in the development of KUR-World.
- Provide a comprehensive assessment of the identified risks.
- Provide mitigation and management measures to reduce the impacts of the potential risks which will be applicable throughout the life of the project.

18.1 Introduction

The management of risk is an integral component of the proposed KUR-World development. This chapter presents an assessment of reasonably anticipated, unplanned or accidental risks. The risks include natural hazard events, wildlife and human health hazards, technological hazards, accidents, spillages and abnormal events that may occur during the construction and/or operational phases of KUR-World. Implications related to climate change are also identified and assessed.

The probability or likelihood of occurrence of a hazard is assessed and the potential severity of the consequences to people, environment, economy, reputation, social setting and property are included. The comparison of likelihood and consequences determines the overall risk rating for each hazard prior to the implementation of any treatment strategies or control measures. This Chapter identifies and describes treatment strategies and controls across the spectrum of prevention, preparation, response and recovery which must be implemented to effectively manage the potential risks associated with the development and to reduce the overall level of risk. The residual (mitigated) risk level for each potential hazard is identified. This chapter also identifies the integrated emergency management arrangements that need to be developed for the project. It concludes by considering the overall acceptability of the project impacts, considering the residual uncertainties and risk profile.

18.2 Definitions, abbreviations and key terminology

This Hazard, Health & Safety Impact Assessment report adopts the following terms from AS/NZ ISO 31000:2009: Risk management – principles and guidelines:

Risk: is defined as the effect of uncertainty on objectives and is measured in terms of the combination of the consequences of an event and its likelihood.

Consequence: describes the outcome of an event affecting objectives. In terms of KUR-World, there are a range of potential consequences associated with the project identified in terms of people, environment, economy, reputation, social setting and property. (Refer to Table 0-1 below for more detail on the consequence descriptors).

Likelihood: is the chance of something happening and is commonly referred to as the probability or frequency of an event. This chapter expresses likelihood using Annual Exceedance Probability (AEP) which is the probability that events of the specified magnitude will occur in any 1 year, expressed as a percentage (i.e. 1% AEP or 0.1% AEP). This is the preferred terminology as other concepts imply that rare events are in some way separated by fixed periods of time, for example 1 in 100-year event, etc. (Refer to Appendix 18, page 139 for more detail on the likelihood descriptors).

Controls: are measures that modify the risk. This may include any process, policy, device, practice, or other actions which modify risks.
Residual Risk: is the risk remaining after risk treatment.

Table 0-1 Consequence descriptors

Consequence Level	People	Environment	Economy	Reputational	Social Setting	Property
Catastrophic	Multiple loss of life and / or multiple critical injuries with long term or permanent incapacitation and / or displacement of people beyond KUR-World's ability to cope.	Permanent destruction of an ecosystem or species recognised at the local, regional, state or national level, and / or Severe damage to or loss of an ecosystem or species recognised at the national or state level, and / or Significant loss or impairment of an ecosystem or species recognised at the national level Permanent destruction of environmental values of interest.	Decline of economic activity due to an unplanned disruption to core business for 4+ weeks and / or major international investment compromised.	KUR-World image affected globally by adverse and damaging international and national media coverage, prolonged negative effect on reputation.	The community of interest unable to support itself e.g. impacts beyond emotional and psychological capacity in all parts of the community and / or widespread loss of objects of cultural and / or community significance.	Asset loss or damage >$1 million and / or widespread disruption due to long-term failure or destruction of significant infrastructure which is beyond KUR-World's ability to cope
Major	Single fatality and / or single case of critical injuries with long term or permanent incapacitation and / or large numbers of displaced persons from resort facilities (more than 24 hours)	Minor damage to ecosystems or species recognised at the national level, and / or Significant loss or impairment of an ecosystem or species recognised at the state level, and / or Severe damage to or loss of an ecosystem or species recognised at the local or regional level and / or severe damage to environmental values of interest.	Decline of economic activity due to an unplanned disruption to core business for 1-4 weeks and / or major national investors or contactors compromised and / or inability of large numbers of staff to attend work.	KUR-World image affected nationally by adverse and damaging national media coverage, major negative effect on reputation.	Reduced quality of life within community of interest e.g. impacts beyond emotional and psychological capacity in large parts of the community and / or significant loss or damage to objects of cultural and / or community significance.	Asset loss or damage $500,000 to $1 million. Operational impacts requiring external support due to a mid to long term failure of significant infrastructure.
Moderate	Multiple serious injuries and / or isolated cases of displacement of people from resort facilities (less than 24 hours).	Minor damage to ecosystems and species recognised at the state level, and / or Significant loss or impairment of an	Decline of economic activity due to an unplanned disruption to core business for 1 week maximum and / or major	KUR-World image affected by adverse and damaging media coverage within the State, moderate	Ongoing reduced services within community of interest e.g. impacts beyond emotional and psychological capacity in some	Asset loss or damage $100,000 to $500,000 Widespread disruption due to a mid-term

Consequence Level	People	Environment	Economy	Reputational	Social Setting	Property
		ecosystem or species recognised at the local or regional level and / or significant damage to environmental values of interest	State investors or contactors compromised and / or inability of small numbers of staff to attend work.	negative effect on reputation.	parts of the community and / or permanent damage to objects of cultural and / or community significance.	failure of (significant) Infrastructure.
Minor	Single case of serious injury and / or multiple minor injuries resulting in first aid.	Minor damage to ecosystems and species recognised at the local or regional level and / or minor damage to environmental values of interest	Decline of economic activity due to an unplanned disruption to core business for up to 1 day. No investment or contractors compromised.	KUR-World image affected by low level adverse local media coverage, minor negative effect on reputation.	Isolated and temporary cases of reduced services within community of interest e.g. impacts beyond emotional and psychological capacity in some individuals and / or repairable damage to objects of cultural and / or community significance.	Asset loss or damage $10,000 to $100,000 Isolated cases of disruption due to a short- to mid-term failure of infrastructure.
Insignificant	Near misses or isolated minor injuries resulting in first aid.	No damage to ecosystems at any level Inconsequential damage to environmental values of interest	Minor or inconsequential impacts to core business due to an unplanned business disruption. No loss of economic activity.	KUR-World subject to a single complaint. No media attention. No negative effect on reputation.	Inconsequential short-term reduction of services e.g. no further adverse emotional and psychological impacts to individuals and / or no damages to objects of cultural and / or community significance.	Asset loss or damage <$10,000 and / or no disruption due to an inconsequential short-term failure of infrastructure.

Table 0-2 Abbreviations used in this chapter are as follows:

Abbreviation	Meaning
ABLV	Australian Bat Lyssavirus
AEP	Annual Exceedance Probability
ATSB	Australian Transport Safety Bureau
BoM	Bureau of Meteorology
CASA	Civil Aviation Safety Authority
CCTV	Closed-Circuit Television
CSIRO	Commonwealth Scientific and Industrial Research Organisation
DAF	The Department of Agriculture and Fisheries

Abbreviation	Meaning
DDMG	Local Disaster Management Group
DDMP	District Disaster Management Plan
DEHP	The Department of Environment and Heritage Protection
DNRM	Department of Natural Resources and Mines
EAP	Emergency Action Plan
FIA	Failure Impact Assessment
GP	General Practitioner
ICT	Information and Communications Technology
IRM	Immediately Reportable Matters
LDMG	Local Disaster Management Group
LDMP	Local Disaster Management Plan
MSC	Mareeba Shire Council
NERAG	National Emergency Risk Assessment Guidelines
PPRR	prevention, preparation, response and recovery
QFES	Queensland Fire and Emergency Services
QH	Queensland Health
RRM	Routine Reportable Matters
SEWS	Standard Emergency Warning Signal
STP	Sewerage Treatment Plant
SWMS	Safe Work Method Statements
TC	Tropical Cyclone
WHO	World Health Organisation

18.3 Methodology

This Hazards, Health & Safety Impact Assessment has been undertaken in accordance with the National Emergency Risk Assessment Guidelines (NERAG) which provide a contextualised, emergency-related risk assessment method consistent with the Australian Standard AS/NZ ISO 31000:2009 Risk management – Principles and guidelines. The key elements of the methodology employed to undertake this Hazards, Health & Safety Impact Assessment are as follows:

1. Establish the Context: Establishing the context relates to defining the external and internal parameters to be considered when managing risks. It also includes establishing the scope and risk criteria, as well as identifying responsibilities, stakeholders and reporting for the Hazards, Health & Safety Impact Assessment.

2. Risk Identification: The risk identification phase involved a systematic and comprehensive approach to identify and describe potential hazards, accidents, spillages, fire and abnormal events associated with the construction and operation phases of the proposed development.

3. Risk Analysis: Risk analysis is the process undertaken to comprehend the nature and level of risk. This involves analysis of each hazard to identify the level of risk determined by considering the likelihood to against the category of consequence severity (refer to Appendix 18, pages 137-139).

4. Risk Evaluation: The risk evaluation process considers the results of the risk analysis and compares the risk criteria to determine whether the risk and/or its magnitude is acceptable or tolerable. The risk matrix (see Figure 0-1) provides the tool to determine comparative levels of risk and to assist with the determination of priorities for risk treatment. During this stage, the level of confidence in the analysis (see Appendix 18, page 141) is assessed by considering factors such as the divergence of opinion, level of expertise and the uncertainty, quality, quantity and relevance of data available to inform the assessment.

5. Risk Treatment: The risk treatment stage involves processes to modify risk. Risk treatment can involve identifying, designing and evaluating appropriate controls and mitigation measures to effectively manage the identified hazard and overall level of risk. The purpose of treating risks is to eliminate or reduce the impact whilst enhancing resilience.

	Consequence level				
Likelihood	**Insignificant**	**Minor**	**Moderate**	**Major**	**Catastrophic**
Almost certain	Medium	Medium	High	Extreme	Extreme
Likely	Low	Medium	High	Extreme	Extreme
Unlikely	Low	Low	Medium	High	Extreme
Rare	Very low	Low	Medium	High	High
Very rare	Very low	Very low	Low	Medium	High
Extremely rare	Very low	Very low	Low	Medium	High

Figure 0-1: Risk Matrix.

6. Monitoring and Review: Risk management is an iterative process. One of the critical factors is to establish ongoing processes for monitoring and reviewing risks to confirm the effectiveness of the risk assessment process and to account for changes in complex and evolving circumstances. The proponent will need to establish these activities which complete the risk management cycle to continually improve risk assessments; undertake analysis of lessons learned from any events that arise; and to ensure changes to exposure and vulnerability, and changes in the frequency and severity of hazardous events are captured.

7. Communication and Consultation: Communication and consultation are fundamental to the risk management process. This iterative process is undertaken to engage in dialogue with stakeholders and to provide, share or obtain information regarding the management of risk. Consultation has been undertaken with appropriate emergency management authorities via an Emergency Management Focus Group meeting where stakeholders were invited to contribute. Additionally, follow up communication with some of the stakeholders was also undertaken. Details of attendees are listed in Table 0-3 below. The presentation slides and outcomes from the workshop can be found at Appendix 18 (pages 142-178).

Overall, risk assessment is a dynamic process. The Proponent is committed to adapt and assess unknown changing environments and also to ongoing communication and consultation with key stakeholders on an as required basis (informally) and on at least an annual basis (formally).

Table 0-3 Emergency management stakeholder workshop attendees.

Organisation	Representative	Position Title
Strategic Disaster Solutions	Sarah Dean	Consultant (Facilitator)
Queensland Health	Tjaart Grobbelaar	Medical Superintendent Mareeba Hospital
Queensland Fire & Emergency Services	Wayne Coutts	Regional Director - State Emergency Service

Organisation	Representative	Position Title
Queensland Fire & Emergency Services	Sean McGuinness	Area Controller - State Emergency Service
Queensland Fire & Emergency Services	Neil Parker	Area Director – Rural Fires
Queensland Police Service	Bill Stanley	Executive Officer - Far North District Disaster Management Group
Queensland Police Service	Derek Garner	Senior Sergeant – Mareeba Local Disaster Management Group representative
Queensland Police Service	Mark Stewart	A/Inspector Tablelands Patrol Group
Queensland Ambulance Service	Gavin Rablin	Officer in Charge, Mareeba
Ergon Energy	Charlie Casa	CID Manager
Biosecurity Queensland	Apologised	
SunWater	Apologised	
Sustainable Solutions Global	Geraldine McGuire	Managing Director
Sustainable Solutions Global	Ana Palma	Senior Consultant

18.4 Information sources

This Hazards, Health & Safety Impact Assessment has considered information gathered from Commonwealth, State and Local Government sources. A full list of references can be found at the end of the Chapter. A summary of the key sources consulted and the information gathered is presented below.

1. Bureau of Meteorology: Historical weather data and information on natural hazards.

2. Geoscience Australia: Historical earthquake data and information on earthquake and landslide hazards.

3. Mareeba Shire Council Planning Scheme: The Mareeba Shire Council Planning Scheme (July 2016) sets out the intention of Council for future development in the planning scheme area over the next 10 years; to enable development, protect the natural environment and allow communities to grow and prosper. The Mareeba Shire Council Planning Scheme contains different hazard overlays which were used to inform this Hazards, Health & Safety Impact Assessment.

4. Mareeba Local Disaster Management Plan: The Mareeba Local Disaster Management Plan (LDMP) was prepared by the Local Disaster Management Group (LDMG) and adopted by Mareeba Shire Council on July 6, 2016. It provides a risk assessment and broad strategy of response for hazards that may occur in the Mareeba Shire Council area of responsibility.

5. Far North District Disaster Management Plan: The Far North District Disaster Management Plan (DDMP) is an overarching document prepared for the trial amalgamation of the Cairns and Mareeba District Disaster Management Groups (DDMG's) which currently links to both the Cairns DDMP and the Mareeba DDMP. These plans provide a broad description and assessment of hazards potentially occurring in the now Far North DDMG area of responsibility. The plans assign responsibilities for the response of specific hazards and provide some details regarding the planned response.

18.5 Risk Assessment

In this section the residual risks are presented (i.e. assessed after implementing mitigation measures). The range of risks include: natural hazard events, wildlife and human health hazards, technological hazards, accidents, spillages and abnormal events that may occur during the construction and/or operational phases of KUR-World.

Further information regarding the assessment of the unmitigated risks and the risk context can be found on Appendix 18 (pages 13-131).

18.5.1 Natural risks

18.5.1.1 Earthquakes

Earthquakes occur every day throughout Australia. However, most of them are so small that they are not felt. In 2012, Geoscience Australia released a National Earthquake Hazard Map of Australia. Amongst other applications, the map is a research product that informs the hazard component of Australia's earthquake loading code AS1170.4 (Burbidge *et al,* 2012). Figure 0-2 shows that KUR-World, is in an area of low earthquake risk.

Examination of the Geoscience Australia database demonstrates that there have been 186 recorded earthquakes of varying magnitude within a 200km radius of Myola since 1955. The data reveals that the most significant seismic activity within this 200km radius in the previous 62 years in terms of intensity, was a magnitude 5 earthquake that occurred offshore of Port Douglas on 1 December 1958. Other significant earthquakes that have occurred within a 200km radius of the proposed development are identified in Table 0-4.

The Mareeba Local Disaster Management Plan (LDMP) confirms that earthquakes have not been a major threat in the Mareeba Shire in recent years and whilst some recent historical data exists in relation to low magnitude tremors, none have caused any great concern (Mareeba Shire Council, 2016 p.44).

Table 0-4: Significant earthquakes within a 200km radius of Myola

Date	Magnitude	Location
May 13 1990	4.3	Off Innisfail
September 4 1994	4.0	18km NNW of Chillagoe
November 16 1989	4.0	Off Innisfail
May 6 1974	4.0	Innisfail
August 19 1961	4.1	NW of Lakeland

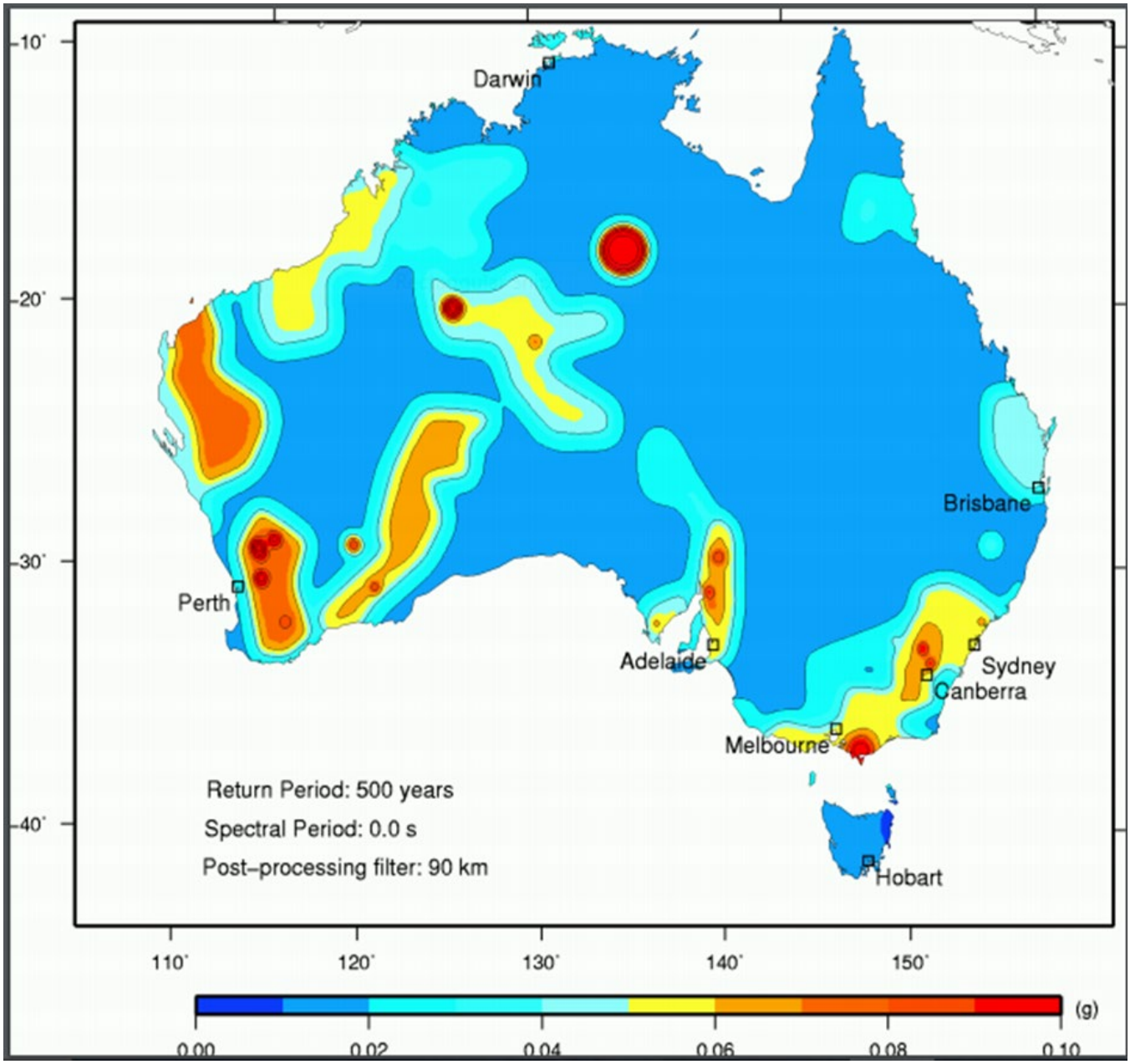

Figure 0-2:National Earthquake Hazard Map of Australia (0.2%AEP).

Whilst the likelihood of an earthquake greater than magnitude 5 would be rare, the consequences could be catastrophic. Apart from causing shaking, the secondary impacts of large earthquakes may also trigger landslides or fires which can potentially cause casualties, damage roads or power and communication lines and other critical infrastructure. Additionally, it is important to be aware that earthquakes can cause a tsunami or series of waves which can cross oceans and cause extensive damage to coastal regions. Whilst this is extremely unlikely, it is important to note that even though the project would not be directly impacted (due to its elevated location); the secondary effects to supply chains, transport and the tourism industry could be significant.

18.5.1.1.1 Risk assessment before mitigation

The assessment of earthquake hazard is identified in the Risk Assessment and Control Measures document as NH1.
The likelihood of a large earthquake (>magnitude 5) affecting the KUR-World site resulting in ground shaking that impacts guests and staff members, buildings, structures, the ecology in the surrounding forest and creeks and the ability to provide services was assessed as rare with an annual exceedance probability (AEP) between 0.1% to <1% per year.

The consequences to people were identified as major resulting in a HIGH risk rating. The consequences to environment, economy and reputation were assessed as moderate resulting in a MEDIUM risk rating. Finally, the consequences to social setting and property were assessed as minor resulting in a MEDIUM risk rating prior to the consideration or implementation of any control measures or mitigation strategies. The confidence of these data is scored as moderate.

18.5.1.1.2 Proposed controls and mitigation strategies

The structure of buildings can be subjected to shearing, bending, torsion, tension and compression during earthquakes. To effectively mitigate the risks, it is vital to ensure that all structures comply with the earthquake loading provisions of the Building Code of Australia (AS1170.4). All infrastructure deemed critical must meet or exceed current design standards.

Additional controls and treatment strategies include: development of an Emergency Management Plan for the construction and operations phases of KUR-World, which will need to address: prevention, preparation, response and recovery (PPRR) for earthquake hazard; emergency management training for key personnel; and a Business Continuity Plan to minimise disruption to the business should an earthquake occur. Additionally, adequate insurance is needed in the unlikely event of damage. Assessment on the effectiveness of these controls resulted in a rating of high.

Table 0-5 Proposed controls and treatment strategies for earthquake.

Proposed Controls and Treatment Strategies	Control Level	Impact Category	Residual Consequence	Residual Likelihood	Residual Risk
- Ensure structures comply with the earthquake loading provisions of the Building Code of Australia. - Emergency Management Plan to address PPRR for earthquake hazard. - Emergency management training for key personnel. - Insurance. - Business Continuity Plan. - Critical infrastructure meets or exceeds current design standards.	High	People	Minor	Rare	Low
		Environment	Minor	Rare	Low
		Economy	Minor	Rare	Low
		Reputation	Minor	Rare	Low
		Social Setting	Minor	Rare	Low
		Property	Minor	Rare	Low

18.5.1.1.3 Residual risk

Following the application of the proposed control measures and mitigation strategies, the residual likelihood of a large seismic event (>magnitude 5) impacting KUR-World is still considered a rare event (AEP 0.1% to <1% per year). However, the consequences to people, environment, economy, reputation, social setting and property are reassessed as minor resulting in a **LOW** residual risk rating.

18.5.1.2 Cyclones

Tropical cyclones pose a considerable dual threat from destructive winds and heavy rains. KUR-World is in an area of Queensland that is vulnerable to annual tropical cyclones mainly during November to April. The proposed development is only 20 km as the crow flies from the east coast and is vulnerable to cyclones from two directions; either from the Pacific Ocean to the east or from the Gulf of Carpentaria to the north-west. On average, 4.7 tropical cyclones affect the Queensland Tropical Cyclone Warning Centre area of responsibility every year (BoM, 2017).

In recent times, the Mareeba Shire Council area has been impacted by several severe tropical cyclones. Tropical Cyclone (TC) Larry (Category 4) in 2006, TC Yasi (Category 5) in 2011 which was the largest and most intense cyclone to have affected Queensland since records began (BoM, 2011) and in 2014 with TC Ita (Category 4).

A cyclone could impact KUR-World on an annual basis during November to April during both the construction and operations phases of the development. Wind gusts more than 90 km/hr are common. In the most severe cyclones, gusts can exceed 280 km/hr. During these severe cyclones, the Standard Emergency Warning Signal (SEWS) will be used. The very destructive winds associated with severe tropical cyclones can cause extensive property and infrastructure damage and are a risk to human life. Additionally, fauna injury or death may occur, as well as significant damage to the environment and loss of wildlife habitat.

During the construction phase, construction staff would secure the site and equipment to prevent damage and then leave site to shelter in their own homes or at other appropriate accommodation. The greatest level of risk associated with cyclones is therefore during the operational phase, when it will be necessary to implement multiple strategies to respond effectively to an impending cyclone impact. Sufficient warning is generally available for cyclones thus measures can be taken to reduce the number of people on site when the event occurs. Assumptions are as follows:

- Resort occupancy will be lower during the wet season / cyclone season. It is assumed that some international tourists will avoid travelling to areas at risk of cyclones.
- Resort occupancy will diminish to 30% when a severe cyclone is imminent. It is assumed that warnings may result in some early departures and reduce arrivals until the cyclone has crossed and any damage at the resort has been assessed.
- Day guests will not be present on site. It is assumed the resort will close all day guest facilities
- A skeleton staff will be maintained throughout the cyclone impact phase. It is assumed that a significant proportion of locally-based resort staff will want to attend to their own properties during the event.

Guests that choose to depart early due to the impending threat or because they have special needs they feel cannot be adequately met on site, should be supported by the resort to ensure they can reach their intended destinations prior to the onset of destructive winds. All travel including medevacs must be completed before the winds reach 75 km/hr (varies dependent upon speed of system but approximately 6 hours before landfall). At this stage, calls to 000 will not be responded to.

The size of the resort will make evacuation logistically difficult. The preferred response in any cyclonic event will therefore be for all guests that remain on site to shelter in place, preferably in their own accommodation, as this will be constructed in accordance with the wind loading provisions of the Building Code of Australia and will not be in low-lying areas at risk of inundation by flood waters. As a result, the shelter in place strategy is appropriate and is supported by local emergency management agencies. This

strategy, requires that hard infrastructure such as the medical facility and generators, need to be located above any inundation levels and to be adequately planned to ensure that emergency supplies are stockpiled and available (e.g. food, water, fuel, bedding, consumables, etc.) to cater for all guests (including self-contained accommodation). Supplies should last for at least a week with no access to external assistance as supply chains and transportation infrastructure will likely be disrupted. Staff remaining on site will need to be provided with appropriate shelter facilities and require food and other supplies. Whilst all accommodation on site will be adequate as a place of refuge (as it will be constructed in accordance with the Building Code of Australia), some communal facility should be established for those guests that would feel more comfortable sheltering together rather than alone (e.g. single guests, families with young children, the elderly, etc.).

In addition to the steps above, which are focused on personal safety of guests and staff, there are also several actions that should be taken in preparation for the cyclone season as well as deliberate actions when a cyclone is announced.

18.5.1.2.1 Risk assessment before mitigation

The assessment of cyclone hazard is identified in the Risk Assessment and Control Measures document as NH2 (category 1 or 2) and NH3 (category 3 or above).

The likelihood of a category 1 or 2 cyclone affecting the KUR-World site resulting in destructive winds that impact guests and staff members, buildings, structures, ecology in the surrounding forest and creeks and the ability to provide services was assessed as almost certain with an annual exceedance probability (AEP) greater than 63% per year.

The consequences to people were assessed as moderate resulting in a HIGH risk rating, whilst the consequences to environment, economy, reputation, social setting and property were identified as minor resulting in a MEDIUM risk rating prior to the consideration or implementation of any control measures or mitigation strategies.

The likelihood of a severe tropical cyclone (category 3 or above) affecting the KUR-World site resulting in destructive winds that impact guests and staff members, buildings, structures, ecology in the surrounding forest and creeks and the ability to provide was assessed as likely with an AEP between 10% to 63% per year.

The consequences to people, environment, economy and property were assessed as catastrophic resulting in an EXTREME risk rating and the consequences to economy, reputation and social setting were assessed as major, also resulting in an EXTREME risk rating prior to the consideration or implementation of any control measures or mitigation strategies.

There is the highest level of confidence in these data based on recent events (TC Larry 2006, TC Yasi 2011 and TC Ita 2014).

18.5.1.2.2 Proposed controls and mitigation strategies

During the wet season, the management of KUR-World must monitor tropical cyclone warnings from the Bureau of Meteorology closely, track any cyclones that threaten the development and take appropriate action to protect people, property and the environment. To effectively mitigate the risks associated with cyclones, it is vital to ensure that all structures comply with the wind loading provisions of the Building Code of Australia so that a shelter in place strategy can be adopted.

During the construction phase of the project, it is assumed that construction staff will leave site to shelter in their own homes or at other appropriate accommodation. It is essential that a site Emergency Management Plan is in place that covers suspension of operations and securing the site in the event of a cyclone to prevent wind-borne debris and damage to equipment and assets.

To support a shelter in place strategy during operations, KUR-World will need to undertake significant planning to ensure sufficient supplies of food, water and other consumable items are available to cater for demand. A Place of Refuge and/or Evacuation Centre facility with access to communications should be provided on site and procedures will need to be developed to effectively manage this facility. A helipad will also be provided on site to enable the timely evacuation of injured persons. However, aircraft will not be able to fly during cyclonic conditions and emergency services will not respond to any 000 calls once winds speeds reach 75km/hr.

To mitigate the risks associated with cyclones it is vital to ensure that all critical infrastructure meets or exceeds current design standards and is located on high ground outside of any flood inundation area. Additional controls and treatment strategies include an Emergency Management Plan for KUR-World which will need to address prevention, preparation, response and recovery (PPRR) for cyclone hazard during the construction and operations phases of the project; emergency management training for key personnel; a Business Continuity Plan to minimise disruption to the business should a severe cyclone occur; and adequate insurance cover in case of damage.

An Environmental Recovery Plan that includes revegetation and temporary feeding for animals should also be developed. It is vital that KUR-World takes a proactive approach to guest safety which may include a high level of communication and support to guests to facilitate alternative travel arrangements (e.g. early departures, delaying arrivals), as well as provision of guest briefings, regular communication and education materials relevant to cyclones and resort response and recovery arrangements. An assessment on the effectiveness of these controls resulted in a rating of high for category 1 and 2 cyclones and medium for category 3 and above cyclones.

Table 0-6 Proposed controls and mitigation strategies for tropical cyclones

Proposed Controls and Treatment Strategies	Control Level	Impact Category	Residual Consequence	Residual Likelihood	Residual Risk
- Ensure structures comply with the wind loading provisions of the Building Code of Australia. - Critical infrastructure meets or exceeds current design standards. - Construction site management plan for tropical cyclones. - High level of communication and support to guests to facilitate alternative travel arrangements e.g. early departures, delaying arrivals, etc. - Shelter in place strategy and availability of stocks to support the strategy e.g. food, water, etc. - Adequate Place of Refuge / Evacuation Centre facility on site with communications infrastructure. - Emergency Management Plan to address PPRR for cyclone hazard. - Emergency management training for key personnel. - Provision of guest briefings, regular communication and education materials relevant to cyclones and resort response and recovery arrangements. - Availability of helipad on site to allow evacuation of injured persons. - Environmental recovery plan that includes temporary feeding for animals (minimum 1 week), revegetation, etc. - Business Continuity Plan. - Insurance.	High	People	Minor	Likely	Medium
		Environment	Minor	Likely	Medium
		Economy	Minor	Likely	Medium
		Reputation	Minor	Likely	Medium
		Social Setting	Minor	Likely	Medium
		Property	Minor	Likely	Medium

18.5.1.2.3 Residual risk

Following the application of the proposed control measures and mitigation strategies, the residual likelihood of a severe tropical cyclone (category 3 or above) impacting KUR-World is still considered a likely event (10% to 63% per year).
However, the consequences to people, environment, economy, reputation, social setting and property would be reduced to minor. This results in a **MEDIUM** residual risk rating. The residual risk rating for a category 1 or 2 cyclone is assessed as **LOW**.

18.5.1.3 Severe storms and rainfall events

Severe thunderstorms can produce hail, wind gusts, flash floods, tornadoes, and, lightning which can cause death, injury and damage to property. The Mareeba Local Disaster Management Plan (p.41) identifies that the "Tableland area has experienced hail storms and mini-tornadoes resulting in environmental damage and the destruction of homes". Flooding has also caused issues in the Mareeba Shire (p.42) and is most likely to be associated with tropical cyclones and depressions during the summer months.

A Bureau of Meteorology (BoM) Flood warning system exists for the Barron River (BoM, 2016). The Barron River has a well recorded flood history with documented evidence of flooding as far back as the early 1900's. Records at the key reference river height gauge at Myola show that the largest flood occurred in early 1911 and significant floods have occurred in the late 1970's and in 1999 (Figure 0.3).Tinaroo Falls Dam, constructed in 1958, has little effect on large floods in the Barron River.

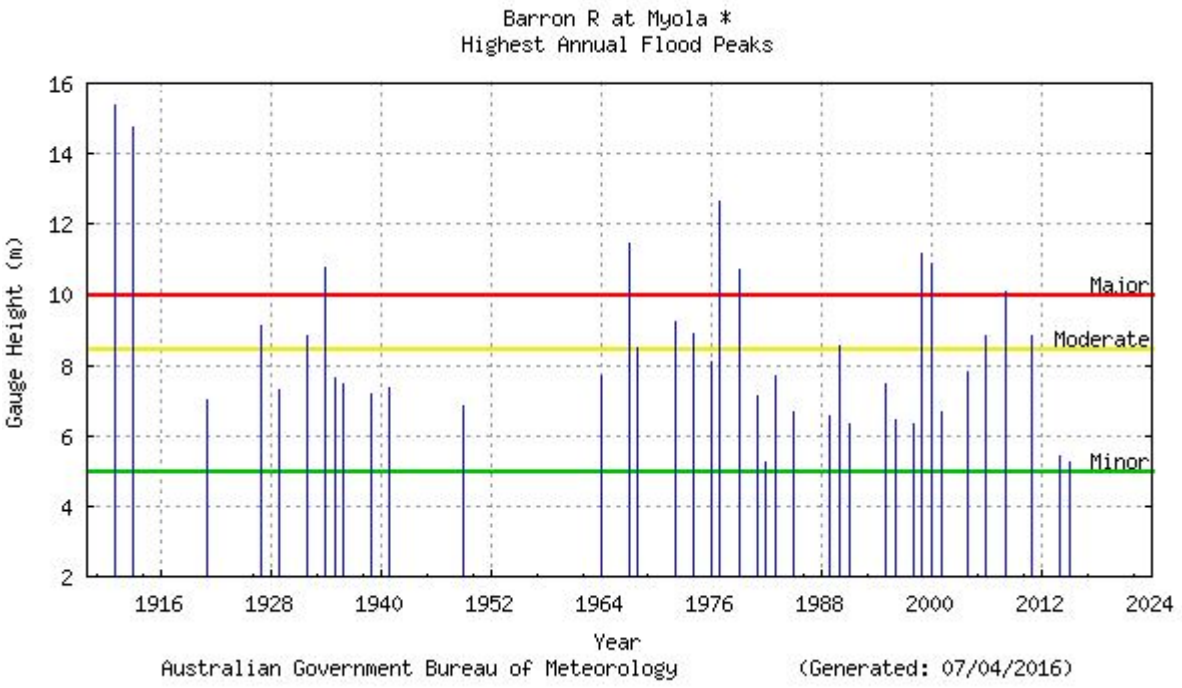

Figure 0.3: Historical flood peaks – Barron River at Myola

Flash flooding from creeks and streams not serviced by the BoM Flood Warning Service, or events where the rainfall exceeds the design capacity of storm water drainage systems could present a significant risk because of the rapid onset nature of such events. The closest official BoM rainfall gauge to Myola is at the Kuranda Railway Station. This station opened in 1896 and the BoM website has historical rainfall records dating back to 1898. Table 0-7 below, indicates that the mean rainfall during the wet season is around 409.2mm in January 429.2mm in February and 443.2mm during March. The highest total daily rainfall to have ever occurred at this station was 731.5mm on April 2 1911. This is considered an exceptional event.

Statistic	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Mean	409.2	429.2	443.2	233.1	108.2	72.3	49.3	44.1	37.9	49.6	79.5	182.8
Median	347.9	385.0	360.4	183.6	95.0	56.5	37.5	31.0	24.4	32.0	54.2	121.8
Highest Daily	535.0 4th 1979	437.0 11th 1974	472.4 31st 1911	731.5 2nd 1911	165.4 1st 1913	129.5 23rd 1912	154.7 1st 1935	135.0 31st 1998	100.3 14th 1953	172.7 6th 1930	171.5 23rd 1950	244.0 31st 1974

Table 0-7: Kuranda Railway Station rainfall gauge – summary statistics for all years

There is also a rainfall gauge at Myola which is owned by the Department of Natural Resources, Mines and Energy (DNRME). This data is not publicly accessible. However, an extract of data from this gauge was obtained for the purposes of this impact assessment and it reveals that the highest daily rainfall recorded at this gauge in the last 17 years was 334.0mm on March 5 2008.

18.5.1.3.1 Hydraulic results and modelling

An investigation of the existing flood conditions at the site and potential impact of the project on flooding within and in the vicinity of the KUR-World site has been undertaken. The Flooding Technical Report is included in Appendix 19, completed by Arup Pty Ltd. A summary has been provided below:

A number of previous studies were assessed during the preparation of the KUR-World study including reporting by the following sources:

- Queensland Reconstruction Authority (QRA) (AECOM, 2013)
- Department of Natural Resources and Mines (DNRM) (Kellogg Brown & Root Pty Ltd 2015)

This data was utilised to define boundary conditions of the Barron River in the hydraulic model used for the KUR-World flood risk assessment.

From the 2013 study, 1% AEP flood maps showed that Barron River (located near the KUR-World site) remained relatively channelised and did not interact with the site. Creek bathymetry was not included in these previous studies and therefore would not provide suitable assessment of flow paths on the KUR-World site. Therefore, a hydrological and hydraulic model was developed specifically for this study to capture and assess the detailed flood behaviour throughout the KUR-World site. The methodology for the model development is described in the Flooding Technical Report (refer Appendix 19).

The modelled peak water levels and peak flood depths at a number of reference points across the site are summarised in the Flooding Technical Report for both the existing and developed cases. Flood Extent, Depth and Velocity Mapping has been produced below and is included in the Flooding Technical Report (refer Appendix 19).

18.5.1.3.2 Flood hazard

The Australian Rainfall & Runoff 2016 guidelines provides general flood hazard curves to specifically assist in emergency management planning. The flood hazard curves are combined curves that aim to inform the flooding risk to people, vehicles and buildings. A flood hazard assessment of the site was undertaken for the design case using the flood hazard curves recommended in AR&R 2016. Two overall aims for this assessment included:

- Identifying the risk for people stability
- Assessing vehicle stability for emergency evacuation planning purposes during a 1% AEP flood event.

The flood hazard risks are discussed in the Flooding Technical Report (refer Appendix 19). Any potential risks will be managed throughout the site through detailed design, construction and operational phases.

The 1% AEP peak water level (refer Figure 0-4) and the 1% AEP peak water velocity for the base case (refer Figure 0-5) are copied below for ease of reference.

Additionally, the 1% AEP peak water level (refer Figure 0-6) and the 1% AEP peak water velocity for the design case (refer Figure 0-7) and the PMF flood extent (refer Figure 0-8) for the design case are copied below for ease of reference.

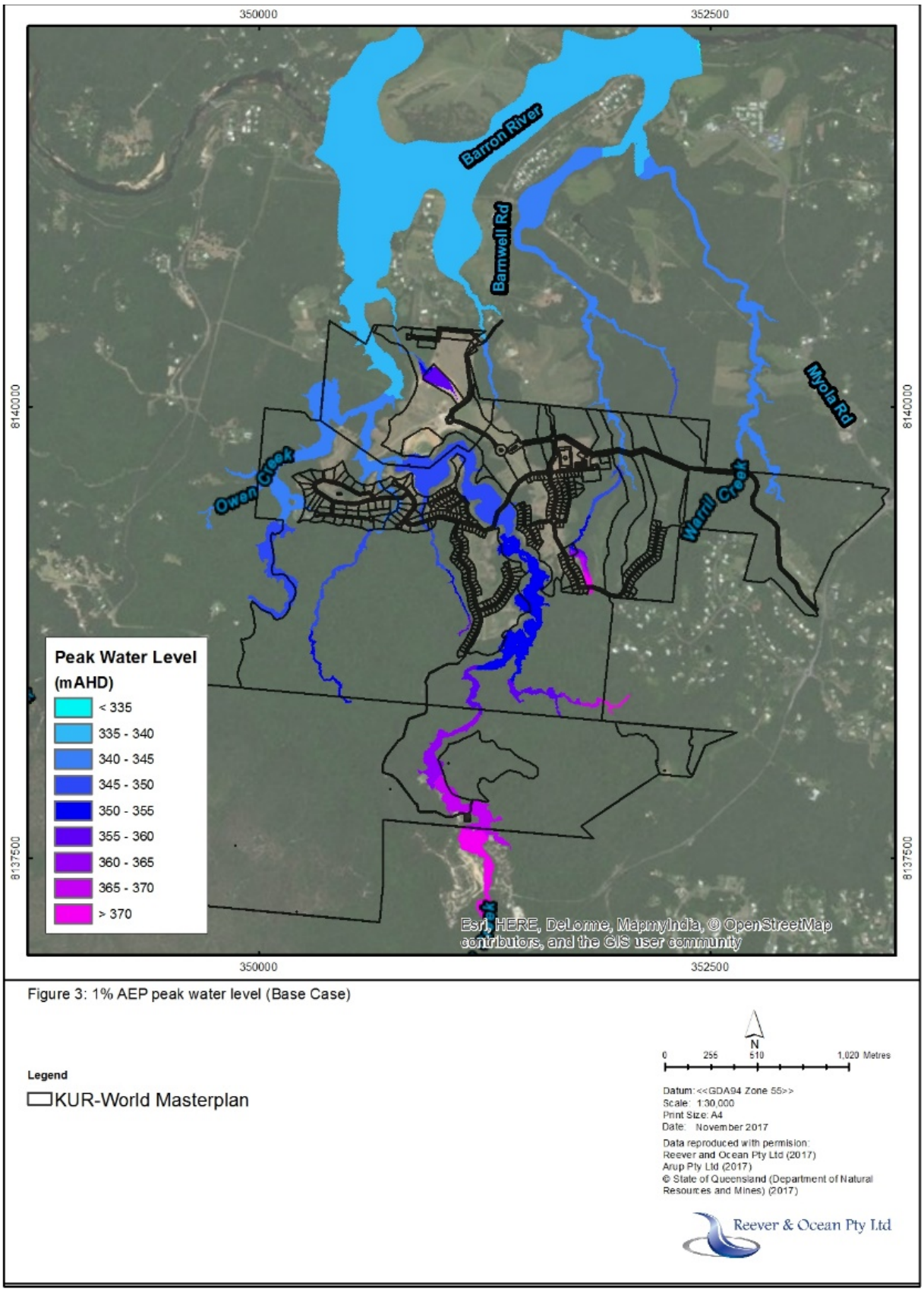

Figure 0-4: 1% AEP Peak Water Level (Base Case)

Note: Figure 18-4 sourced from Appendix 19 - ARUP flooding technical report.

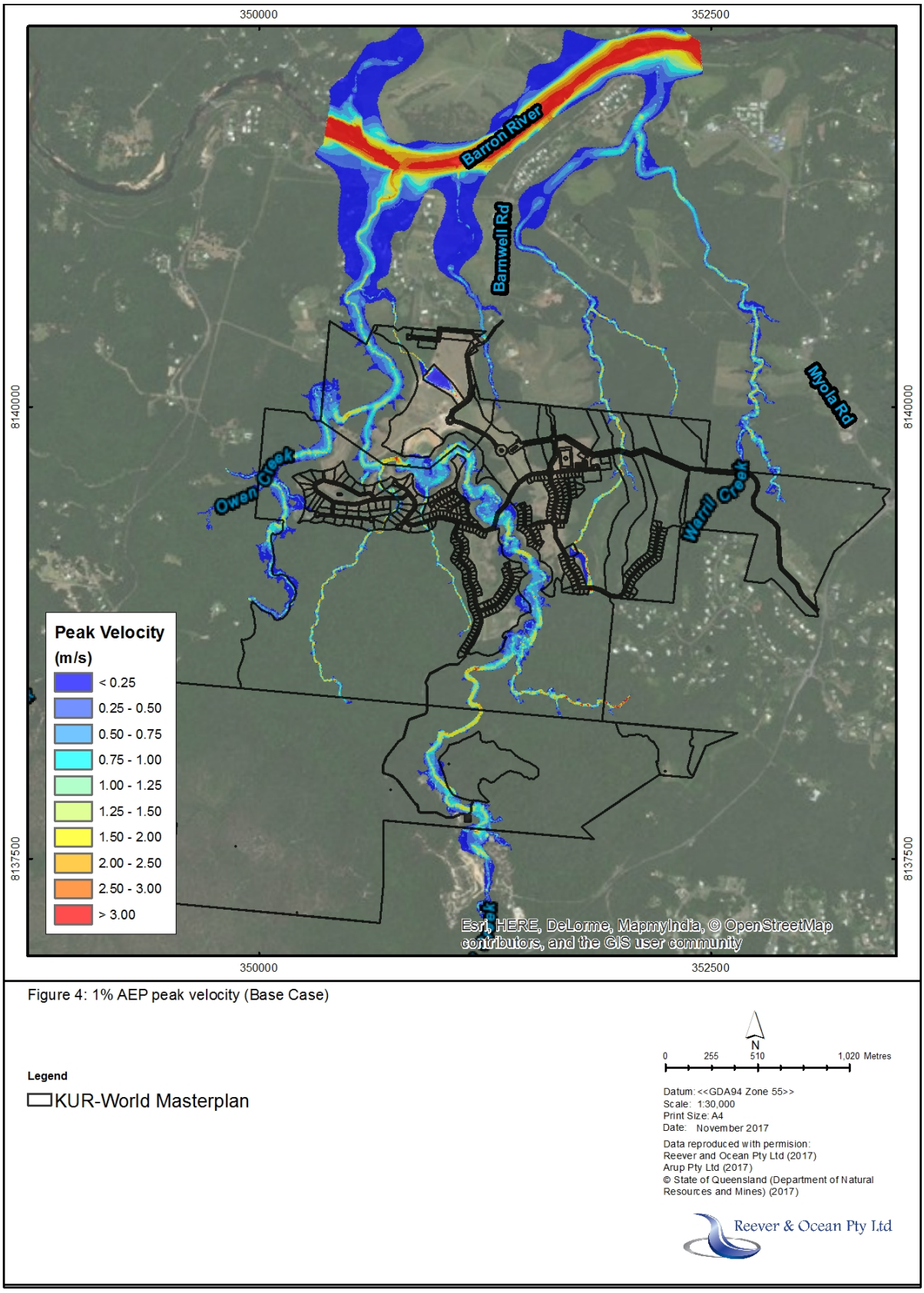

Figure 0-5: 1% AEP Peak Water Velocity (Base Case)

Note: Figure 18-5 sourced from Appendix 19 - ARUP flooding technical report.

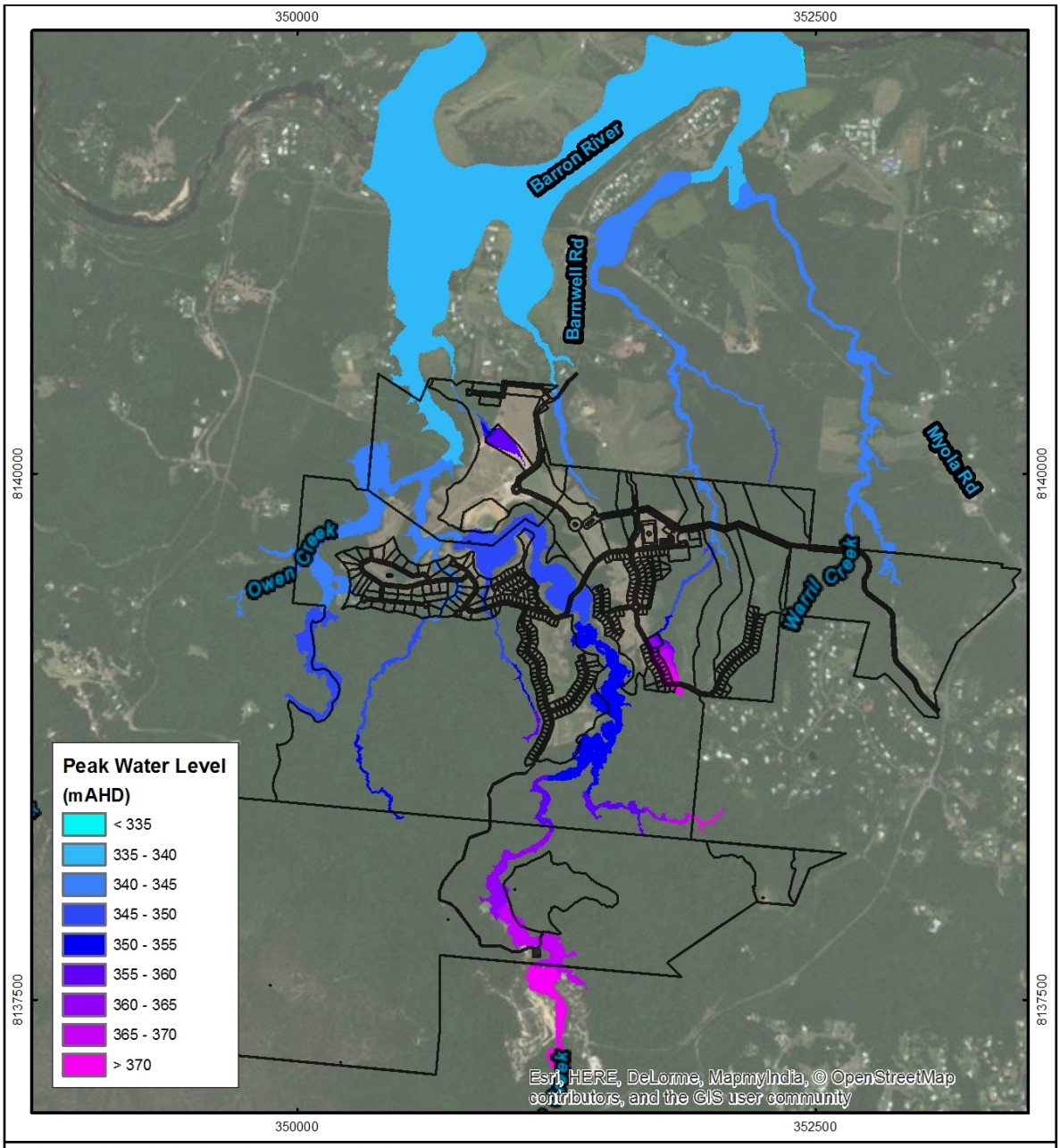

Figure 3a: 1% AEP peak water level (Design Case)

Legend

KUR-World Masterplan

N

0 260 520 1,040 Metres

Datum: <<GDA94 Zone 55>>
Scale: 1:30,000
Print Size: A4
Date: November 2017

Reever & Ocean Pty Ltd

Figure 0-6: 1% AEP Peak Water Level (Design Case)

Note: Figure 18-6 sourced from Appendix 19 - ARUP flooding technical report.

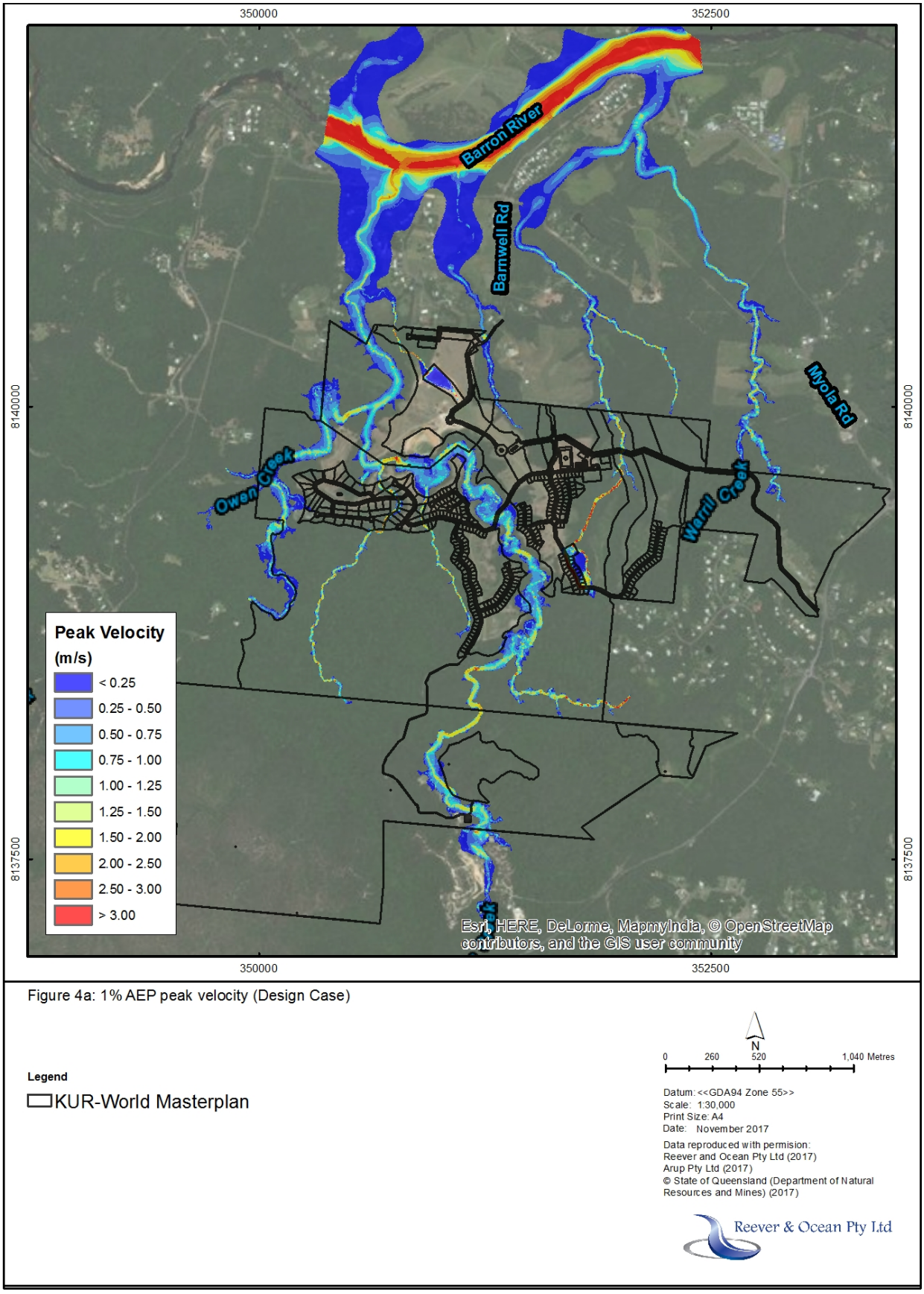

Figure 0-7: 1% AEP Peak Water Velocity (Design Case)

Note: Figure 18-7 sourced from Appendix 19 - ARUP flooding technical report.

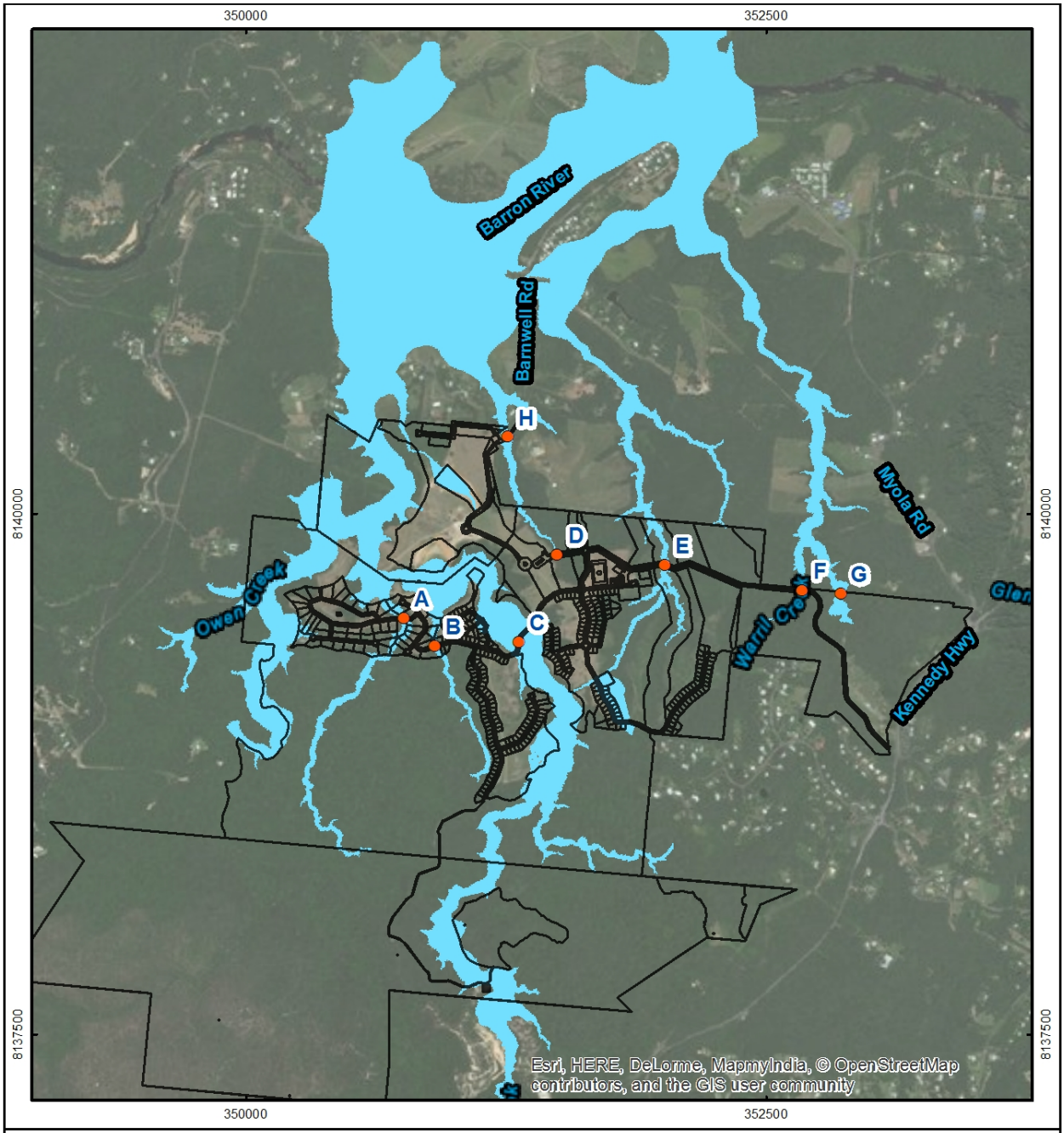

Figure 5: PMF flood extent (Design Case) and point reporting locations

Legend

- Reference Points
- KUR-World Masterplan
- PMF extent

N

0 255 510 1,020 Metres

Datum: <<GDA94 Zone 55>>
Scale: 1:30,000
Print Size: A4
Date: November 2017

Data reproduced with permision:
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Arup Pty Ltd (2017)
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Reever & Ocean Pty Ltd

Figure 0-8: PMF Flood Extent (Design Case) and Point Reporting Locations

Note: Figure 18-8 sourced from Appendix 19 - ARUP flooding technical report

The modelling was used to assess flood impacts associated with the proposed KUR-World development, both within and external to the project site. As shown in the peak flood impact maps, no adverse impacts were observed for properties adjacent to or downstream of the KUR-World site. Changes to flood behaviour are generally contained within the site, but do not compromise the developability of the site (refer to the Flooding Technical Report where this is outlined in further detail). Hydraulic modelling has assumed that any additional stormwater runoff generated by the increase in impervious areas within the catchment are to be captured and attenuated within on-site detention basins. Therefore, adverse impacts caused by increases in peak water levels downstream of the site would be mitigated. Note that this is a standard approach for developments of this nature.

Flooding can cause potential human health impacts, environmental nuisance and land and waterway contamination. Flooding can also result in secondary impacts such as disease and vector transmission. Whilst impacts on site can be minimised as a result of mitigation strategies, floods in the Barron River have the potential to impact the project in other ways. As an example, bridges in the local area have flooded during recent large rainfall events which may create access issues to the site via Myola Road. Additionally, the Kennedy Highway could flood as well and detrimental impacts to tourism could occur as a result of wide area impact events where other roads or critical infrastructure have been damaged by floods.

18.5.1.3.3 Risk assessment before mitigation

The assessment of severe storms and/or rainfall events is identified in the Risk Assessment and Control Measures document as NH4.

The likelihood of a severe storm and/or rainfall event affecting KUR-World and impacting guests and staff members, buildings, structures, ecology in the surrounding forest and creeks and the ability to provide services was assessed as unlikely with an annual exceedance probability (AEP) between 1% to <10% per year). The consequences to people, reputation and property were assessed as catastrophic resulting in an EXTREME risk rating prior to the consideration or implementation of any control measures or mitigation strategies. The consequences to environment and economy were assessed as major resulting in a HIGH risk rating and the consequences to social setting were assessed as moderate resulting in a MEDIUM risk rating prior to the consideration or implementation of any control measures or mitigation strategies. The confidence of these data is scored as high.

18.5.1.3.4 Proposed controls and mitigation strategies

To effectively mitigate the risks associated with severe storms and/or rainfall events, habitable development must be avoided within the 50m riparian buffer established on both sides of waterways across the site. All habitable development should be located at least 300mm above expected inundation levels from a 1% AEP event. Critical infrastructure should meet or exceed current design standards and be located on high ground outside of identified flood areas. It is also necessary to undertake detailed flood and drainage analysis of the site once the reference design has been determined and use natural flow paths and engineered solutions to contain and control water and to channel it away from buildings (e.g. water detention basins, ornamental lakes, stormwater drains.). Captured rainwater and stormwater should be treated and recycled to minimise erosion and environmental impacts. Water that is released into creeks should mimic natural flow patterns rather than being released all at once.

During construction, a site management plan should be developed for heavy rainfall. During operations, weather events and potential flooding should be communicated to guests and outside (high risk) activities should be suspended during storms and heavy rainfall events so guests do not put themselves or others in danger. The Emergency Management Plan for the project should address prevention, preparation, response and recovery (PPRR) for storms and flood hazards and emergency management training should be provided for key personnel. Additional controls and treatment strategies include a Business Continuity Plan and insurance should a severe storm or rainfall event occur and availability of a helipad on site to allow

evacuation of injured persons. An assessment on the effectiveness of these controls resulted in a rating of high.

Table 0-8 Proposed controls and mitigation strategies for severe storms/rainfall events.

Proposed Controls / Treatment Strategies	Control Level	Impact Category	Residual Consequence	Residual Likelihood	Residual Risk
- Ensure site has more than one access for emergency services vehicles, that access roads are not prone to flooding and that all roads can accommodate emergency services vehicles. - Prohibit habitable development within the 50m riparian buffer established on both sides of waterways across the site. - Ensure all habitable development is located at least 300mm 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 e.g. water retention pits, storm water drains, etc. 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. - Critical infrastructure to meets or exceed current design standards and to be located on high ground outside of identified flood areas. - 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. - Construction site management plan for heavy rainfall. - Emergency Management Plan to address PPRR for storm and flood hazard. - Emergency management training for key personnel. - Availability of helipad on site to allow evacuation of injured persons. - Business Continuity Plan. - Insurance.	High	People	Insignificant	Unlikely	Low
		Environment	Minor	Unlikely	Low
		Economy	Minor	Unlikely	Low
		Reputation	Minor	Unlikely	Low
		Social Setting	Minor	Unlikely	Low
		Property	Minor	Unlikely	Low

18.5.1.3.5 Residual risk

Following the application of the proposed control measures and mitigation strategies, the residual likelihood of a severe storm and/or rainfall event impacting KUR-World is still considered an unlikely event (AEP between 1% to <10% per year).

However, the consequences to environment, economy, reputation, social setting and property would be reduced to minor resulting in a **LOW** residual risk rating whilst the consequences to people would be reduced to insignificant resulting also in a **LOW** residual risk rating.

18.5.1.4 Bushfire

The threat of bushfire is a seasonal risk. The bushfire season officially starts on August 1 and continues until the start of the wet season. The Myola area has the potential to receive high rainfall during the wet season which results in high vegetation growth rates. During the dry season, some vegetation matures and cures to become vulnerable to bushfires. The high temperatures, low humidity and gusty westerly winds that traditionally arrive in spring, increase the risk of bushfire and provide prime conditions to fuel fires. Bushfires can be caused by natural occurrences such as lightning strike, be accidentally started or deliberate acts of arson.

The Mareeba Shire Council Planning Scheme contains a Bushfire Hazard Overlay based on the State Planning Policy. This is a key component of Queensland's land use planning system, which enables responsible development and allows communities to be liveable, sustainable and prosperous. This overlay is designed to minimize the threat of bushfire to people and property and seeks to achieve its intended outcome by ensuring that development in bushfire prone area is compatible with the nature of the bushfire hazard, that the number of people and property subject to bushfire hazards are minimized through appropriate building design and location and that appropriate infrastructure is available for the purposes of fire-fighting.

Figure 0-9 below, shows the MSC Planning Scheme overlay which identifies that lots within the southern area of KUR-World are located within a Bushfire Prone Area which is subject to medium to very high bushfire intensity risk.

A "Bushfire Prone Area" includes a potential impact buffer with a default width of 100m from all areas of medium, high or very high potential bushfire intensity. This is an area with the potential to support a significant bushfire or the potential to be subject to significant bushfire attack. Bushfires in these areas have the potential for high to extreme levels of flame attack, radiant heat and ember attack as a result of high potentially hazardous vegetation, fuel loads, slope and severe fire weather.

Impacts in the Bushfire Prone Area are potentially harmful to people and to property and may cause damage to or loss of infrastructure, fauna injury or death and loss of ecological habitat. A bushfire prone area can also be found to the north-west of the site boundary. The closest Rural Fire Brigade is at Myola and the closest urban auxiliary brigade is at Kuranda. Other Rural Fire Brigades are located at Speewah and Koah.

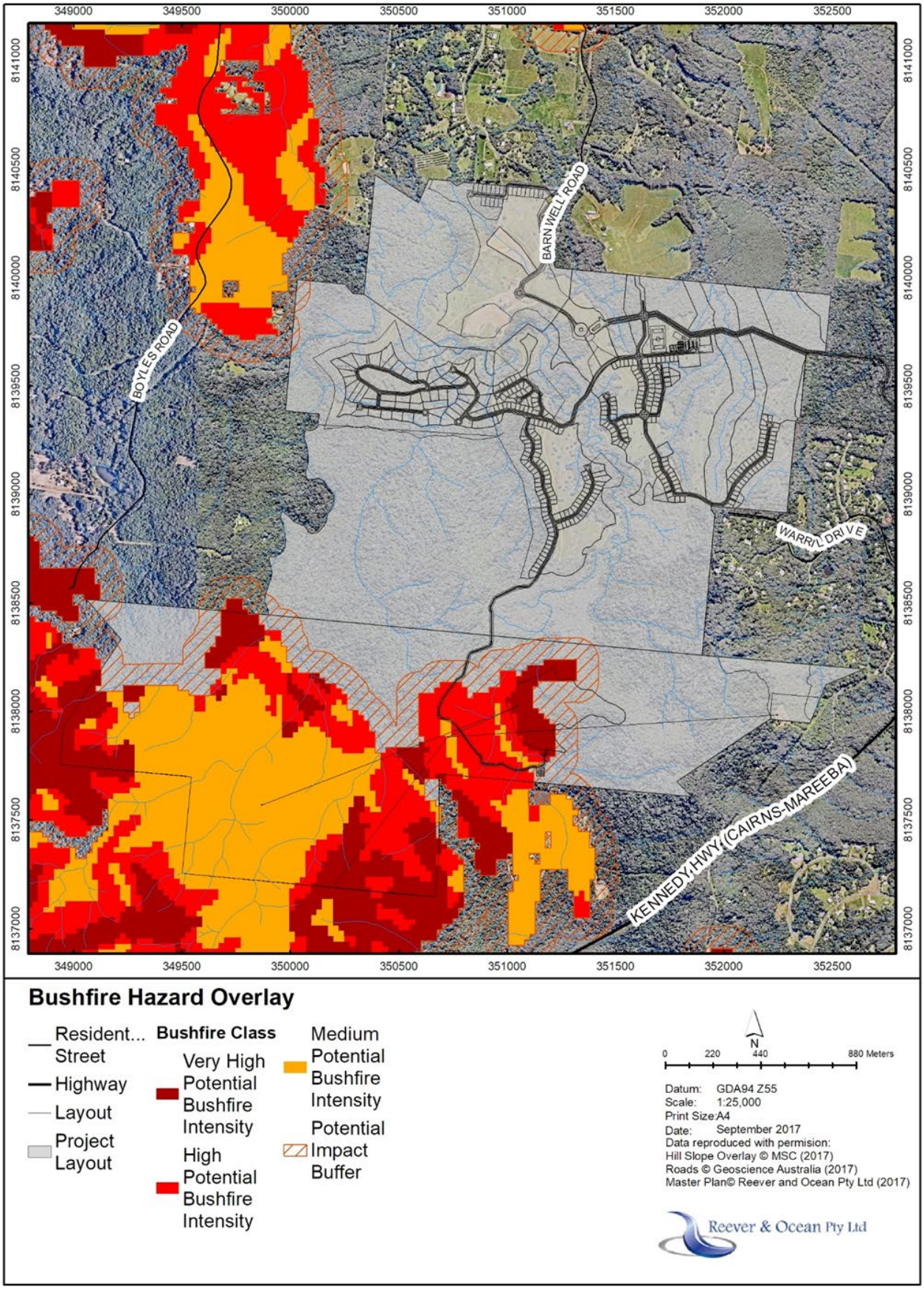

Figure 0-9: MSC bushfire hazard on KUR-World site.

18.5.1.4.1 Risk assessment before mitigation

The assessment of bushfire hazard is identified in the Risk Assessment and Control Measures document as NH5 (northern area of site) and NH6 (southern area of site).

The likelihood of a high intensity bushfire impacting the northern area of the KUR-World was assessed as unlikely with an annual exceedance probability (AEP) between 1% to <10% per year for people, environment, economy, reputation, social setting and property. The consequences to people, environment, economy, reputation, social setting and property were assessed as minor resulting in a LOW risk rating prior to the consideration or implementation of any control measures or mitigation strategies.

The likelihood of a high intensity bushfire impacting the southern area of the KUR-World was assessed as likely with an annual exceedance probability (AEP) between 10% to <63% per year for people, environment, economy, reputation and social setting. The likelihood of a bushfire affecting property was assessed as unlikely with an annual exceedance probability (AEP) between 1% to <10% per year. The consequences to people and environment were identified as catastrophic resulting in an EXTREME risk rating, the consequences to reputation were assessed as major also resulting in an EXTREME risk rating, the consequences to economy and social setting were assessed as moderate resulting in a HIGH risk rating and the consequences to property were assessed as major also resulting in a HIGH risk rating prior to the consideration or implementation of any control measures or mitigation strategies.

The confidence of these data is scored as moderate.

18.5.1.4.2 Proposed controls and mitigation strategies

To effectively mitigate the risks associated with bushfires, residential development must not take place within the high and very high bushfire areas, and accommodation facilities must be free from vegetation hazards and defendable. Adequate firebreaks and fire trails should be constructed and maintained as containment lines. The site must have more than one access for emergency services vehicles and lots should be designed so that their size and shape allow for efficient emergency access to buildings for fire-fighting appliances (e.g. by avoiding single points of access and dead-end roads). Building construction and design can also be used to minimise the impact of ember attack and radiant heat on a building. Critical infrastructure must meet or exceed current design standards, be located outside of bushfire prone areas and have regular maintenance programs implemented to ensure a defendable space is provided around physical and critical infrastructure which is free from vegetation and other bushfire hazards.
KUR-World must identify key personnel that can be trained as the Fire Management Team to manage bushfire risk and to implement fire protection strategies for the resort. This may include undertaking an annual program of planned mitigation burns (in cooperation with QFES and other agencies/landholders) to protect people and assets and to minimise risk. Adequate and accessible water supply must be available for fire-fighting purposes (e.g. reticulated supply and / or no less than 5,000L located within 40m of habitable buildings, dam for air asset buckets) and appropriate equipment should be available (e.g. tanks with fire brigade fittings, hoses.). Additionally, the Emergency Management Plan for the site should address prevention, preparation, response and recovery (PPRR) for bushfire hazard and include arrangements for providing warnings and information to guests during times of high bushfire danger; suspending outside (high risk) activities in the event of a bushfire occurring, as well as identification of bushfire safe places on the site (e.g. Golf Course) in liaison with Queensland Fire & Emergency Services (Rural).
Key personnel should be provided with emergency management training. Additional controls and treatment strategies include developing and implementing a robust Biosecurity Plan to address weeds and pests in cooperation with Biosecurity Queensland (DAF). Planting native species that are bushfire resistant wherever appropriate should be considered. Ensuring an adequate level of insurance cover is also essential

in the event of a fire occurring and impacting the site. An assessment on the effectiveness of these controls resulted in a rating of high.

Table 0-9 Proposed controls and mitigation strategies for bushfire.

Proposed Controls / Treatment Strategies	Control Level	Impact Category	Residual Consequence	Residual Likelihood	Residual Risk
- 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 (e.g. by avoiding long narrow lots with long access drives to buildings and single point of access or dead-end roads). - No residential development in the high and very high bushfire prone areas. - 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. - Undertake an annual program of planned mitigation burns (in cooperation with QFES and other agencies / landholders) to protect people and assets and to minimise risk. - Development and implementation of a robust Biosecurity Plan to address weeds and pests in cooperation with Biosecurity Queensland (DAF). - Construct and maintain adequate firebreaks (minimum cleared width of 20m 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. - Consideration given to planting bushfire resistant native species where appropriate. - Critical infrastructure to meets or exceed current design standards, to be located outside of bushfire prone area and ensure a regular maintenance program to ensure areas around physical and critical infrastructure are free from vegetation and other hazards. - Provide warnings and information to guests during times of high bushfire danger and suspend outside (high risk) activities in the event of a bushfire occurring.	High	People	Minor	Likely	Medium
		Environment	Minor	Likely	Medium
		Economy	Minor	Likely	Medium
		Reputation	Minor	Likely	Medium
		Social Setting	Minor	Likely	Medium
		Property	Minor	Likely	Medium

Proposed Controls / Treatment Strategies	Control Level	Impact Category	Residual Consequence	Residual Likelihood	Residual Risk
- Identification of bushfire safe places on the site (e.g. Golf Course) in liaison with Queensland Fire & Emergency Services (Rural). - Provide an adequate and accessible water supply for fire-fighting purposes (e.g. reticulated supply and / or no less than 5,000L located within 40m of habitable buildings, dam for air asset buckets) and ensure appropriate equipment is available (e.g. tanks with fire brigade fittings, hoses, etc.). - Emergency Management Plan to address PPRR for bushfire hazard as well as a specific Bushfire Management Plan for the site. - Emergency management training for key personnel. - Insurance.					

18.5.1.4.3 Residual risk

Following the application of the proposed control measures and mitigation strategies, the residual likelihood of a high intensity bushfire impacting the southern area of the KUR-World is still considered a likely event (10% to <63% per year). However, the consequences to people, environment, economy, reputation, social setting and property would be reduced to minor. This results in a **MEDIUM** residual risk rating. The residual likelihood of a high intensity bushfire affecting the northern zone is still considered unlikely (1% to <10% per year).
However, the consequences across all categories after mitigation strategies were reduced to insignificant resulting in a **LOW** residual risk rating.

18.5.1.5 Landslide

A landslide is the movement of rock, debris or earth down a slope. Landslides result from the failure of the materials which make up the hill slope and are driven by the force of gravity. Landslides are known also as landslips, slumps or slope failure and can be triggered by natural causes or by human activity. Debris flows, sometimes referred to as mudslides, are common types of fast moving landslides. These flows generally occur during periods of intense rainfall and flash flooding and can create a significant risk to life and property. In areas burned by bushfire, a lower threshold of rainfall may initiate landslides.

Landslides in Australia have caused fatalities, environmental degradation and millions of dollars damage to buildings, roads, railways, pipelines, communication networks and agricultural land. The National Landslide Database reveals that 183 landslides have occurred within 100km of the proposed development site between the years 1800-2017 (Geoscience Australia, 2017). Fourteen of these landslide events are recorded as causing injuries or fatalities or damage to property. Although many of these landslides have resulted from natural phenomenon, approximately half of those causing death and injury can be attributed to human activity.

The Mareeba Shire Council Planning Scheme includes a Hill and Slope Hazard Overlay which is designed to minimise the threat of landslide to people and property by ensuring that future development avoids sloping land where possible. Any development on sloping land implements control measures to maintain slope stability and minimise erosion potential. Figure 0-10 below depicts the Mareeba Shire Council Hill and Slope Hazard overlay across the proposed development site.

Gravity is the force driving landslide movement. Factors that allow the force of gravity to overcome the resistance of earth material to landslide movement include saturation by water, steepening of slopes by erosion, earthquake shaking and construction activities. During the construction of roads and the excavation of building sites, the natural surface will be disturbed and this may increase this risk, especially where development extends into slopes. Some landslides move slowly and cause damage gradually, other move so rapidly that they can destroy property and take lives suddenly and unexpectedly.

Landslides external to the development site may significantly impact on the project. As an example, recently landslides associated with heavy rains have resulted in large sections of key transport networks (e.g. Kuranda, Gillies and Rex ranges) becoming impassable and requiring emergency clearing and subsequent reconstruction. Closure of the Kuranda range road for any significant period has the potential to create secondary impacts to tourism and the project's reputation.

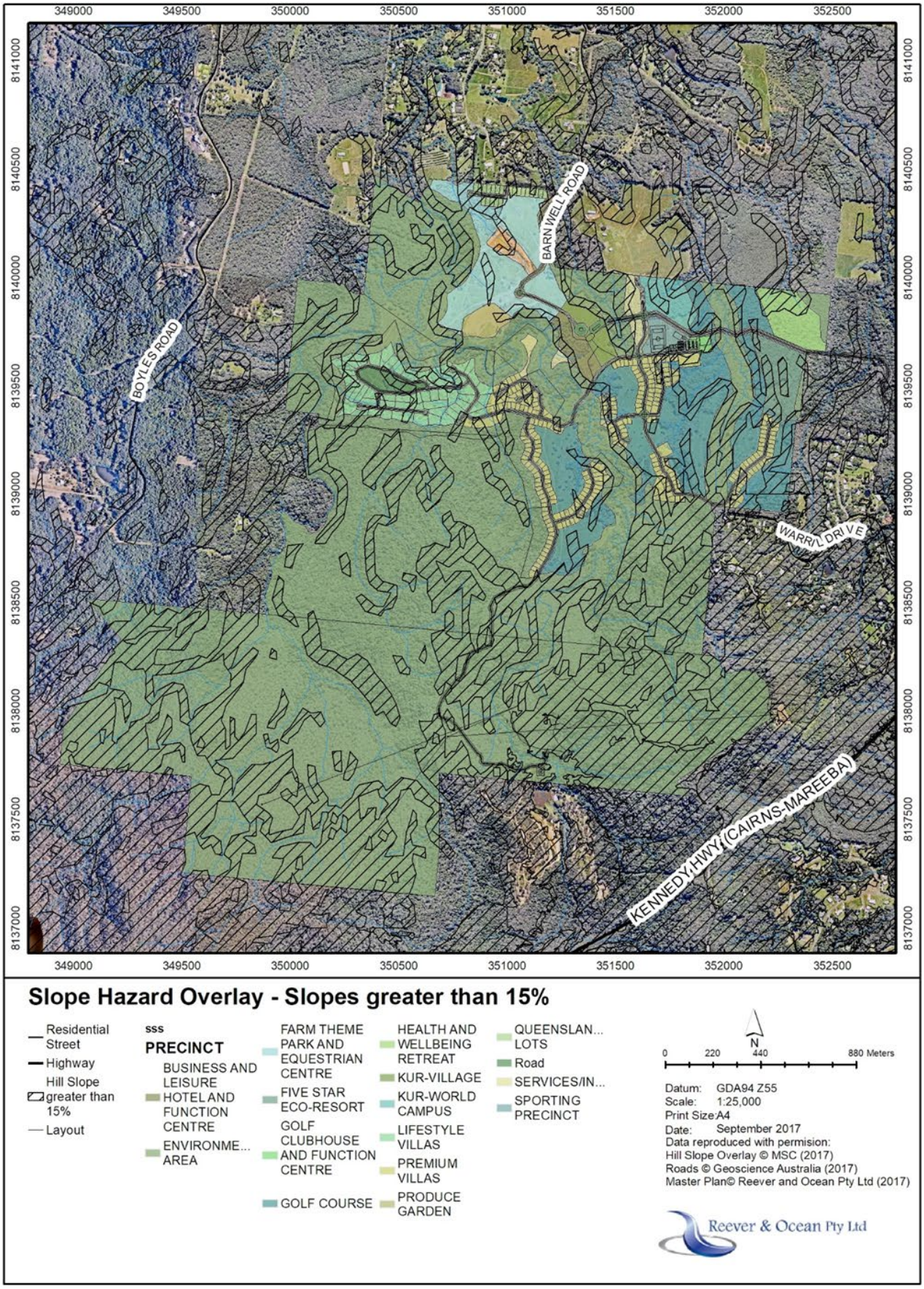

Figure 0-10: MSCPS hill and slope hazard on KUR-World site.

18.5.1.5.1 Risk assessment before mitigation

The assessment of landslides is identified in the Risk Assessment and Control Measures document as NH7.

The likelihood of a landslide affecting the KUR-World site resulting in an impact to guests and staff members, buildings, structures, wildlife in the surrounding forest and creeks and the ability to provide services was assessed as rare with an annual exceedance probability (AEP) between 0.1% to <1% per year).

The consequences to people, environment, economy, reputation, social setting and property were assessed as moderate resulting in a MEDIUM risk rating prior to the consideration or implementation of any control measures or mitigation strategies.

The confidence of these data is scored as moderate.

18.5.1.5.2 Proposed controls and mitigation strategies

To effectively mitigate the risks associated with landslides, the proposed development should be located to avoid sloping land where possible and where clearing of vegetation has already occurred. No development should occur on land with a gradient that exceeds 25% (1 in 4) and a geotechnical report should be prepared for building work, filling or excavation which occurs on land with a slope of 15% or greater. Additionally, critical infrastructure which meets or exceeds current design standards should be located to avoid sloping land wherever possible. The Emergency Management Plan for the project should address prevention, preparation, response and recovery (PPRR) for landslide hazard. Emergency management training should be provided for key personnel. Additional controls and treatment strategies include a Business Continuity Plan and adequate insurance should a landslide occur. An assessment on the effectiveness of these controls resulted in a rating of high.

Table 0-10 Proposed controls and mitigation strategies for bushfire.

Proposed Controls / Treatment Strategies	Control Level	Impact Category	Residual Consequence	Residual Likelihood	Residual Risk
- Development is located to avoid sloping land where possible and where clearing of vegetation has already occurred. - 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. - Emergency Management Plan to address PPRR for landslide hazard. - Emergency management training for key personnel. - Critical infrastructure to meets or exceed current design standards and to be located to avoid sloping land where possible. - Business Continuity Plan. - Insurance.	High	People	Minor	Rare	Low
		Environment	Minor	Rare	Low
		Economy	Minor	Rare	Low
		Reputation	Minor	Rare	Low
		Social Setting	Minor	Rare	Low
		Property	Minor	Rare	Low

18.5.1.5.3 Residual risk

Following the application of the proposed control measures and mitigation strategies, the residual likelihood of a landslide impacting the KUR-World Integrated Eco Resort is still considered a rare event (AEP between 0.1% to <1% per year).
However, the consequences to people, environment, economy, reputation, social setting and property would be reduced to minor resulting in a **LOW** residual risk rating.

18.5.1.6 Heatwaves and droughts

In the last 200 years, severe and extreme heatwaves have taken more lives than any other natural hazard in Australia (BoM, 2013). Heatwaves are calculated using the forecast maximum and minimum temperatures over the next three days, comparing this to actual temperatures over the previous 30 days, and then comparing these same three days to the 'normal' temperatures expected for that location. The National Heatwave Forecasting and Assessment Service is a Bureau of Meteorology (BoM) product, which operates from the start of November to the end of March, and provides warning of unusually hot conditions allowing government, emergency services and communities' time to adopt measures to reduce the impact. Under the State Disaster Management Plan, Queensland Health (QH) is the primary agency with responsibility for heatwaves.

Since May 2015, large parts of the Mareeba Shire Council area (approximately 75%) have been declared drought affected. Figure 0-11 below is the latest drought situation as at May 25, 2017 which shows that KUR-World will be located in an area that is currently partly drought affected (DAF, 2017).

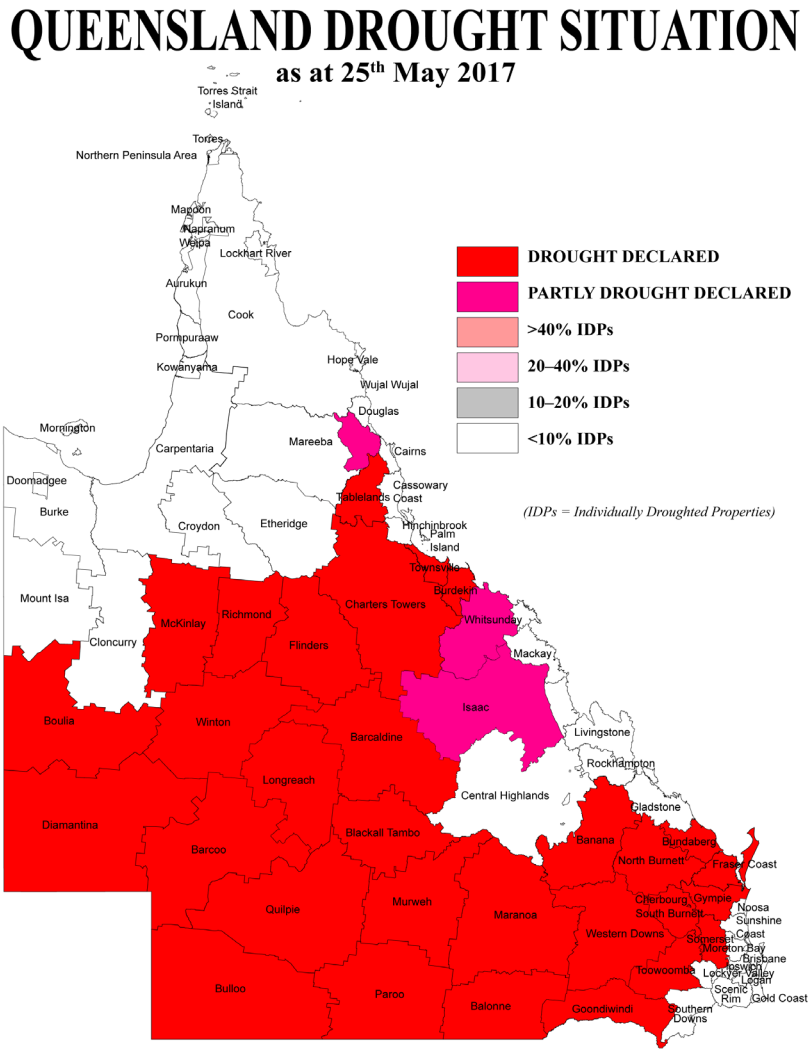

Figure 0-11: Queensland drought situation as at 25 May 2017.

During heatwaves, there will likely be an increase in emergency calls from people suffering heat-related illnesses. Heat-related illnesses occur when the body absorbs too much heat. While the very young and the elderly are most at risk, anyone can be affected. In the context of the proposed KUR-World it is important to acknowledge that many tourists may not be used to the temperatures regularly experienced in Far North

Queensland. As well as clinical effects, a heatwave may cause damage to infrastructure and utilities, and lead to electricity spikes due to increased air conditioning use, which can create power outages. Roads and highways can buckle in extreme heat, water lines can potentially burst and power transformers can overheat potentially causing electrical fires. Heatwaves can also contribute to bushfires. Additionally, anthropogenic and fauna health impacts may be experienced.

Drought is a slow onset event which evolves over months or even years and can produce a complex web of impacts with the potential to affect KUR-World directly and indirectly in various ways. The impacts are extremely varied but could potentially include lack of available water for drinking, showering, cooking, etc. There may also be increased costs associated with irrigation and obtaining animal feed and water, lack of food and drinking water for native wildlife, impacts on soil quality, crop failure and other associated impacts. Water resources need to be efficiently managed to ensure adequate water is available to meet the demands of the resort.

18.5.1.6.1 Risk assessment before mitigation

The assessment of a prolonged heatwave and/or drought occurring is identified in the Risk Assessment and Control Measures document as NH8.

The likelihood of a prolonged heatwave and/or drought affecting the KUR-World site resulting in impacts to guests and staff members, buildings, structures, ecology in the surrounding forest and creeks and the ability to provide services was assessed as likely with an annual exceedance probability (AEP) between 10% to <63% per year.

The consequences to people, environment, economy, reputation, social setting and property were assessed as minor resulting in a MEDIUM risk rating prior to the consideration or implementation of any control measures or mitigation strategies.

The confidence of this data is scored as moderate.

18.5.1.6.2 Proposed controls and mitigation strategies

To effectively mitigate the risks associated with heatwaves and droughts, critical infrastructure must meet or exceed current design standards and heat reducing strategies must be considered during the design and construction of all facilities. The resort may require year-round cooling to ensure visitors are comfortable. Adequate air conditioning should be provided in guest residential areas and communal facilities; guests should be provided with self-care information during periods of extreme heat (e.g. drink plenty of fluids, take cold showers, wear light clothing.). Additional control measures and mitigation strategies include: harvesting, reusing and recycling water; installing water saving devices to ensure water is always used wisely and to employ a guest education strategy to try to conserve water.

The Emergency Management Plan should address prevention, preparation, response and recovery (PPRR) for heatwave and drought hazard and an Environmental Recovery Plan that includes a temporary water supply for wildlife should also be provided. A Business Continuity Plan should be developed to minimise business disruption in the event of a heatwave or drought and adequate insurance should be available to cover all eventualities. An assessment on the effectiveness of these controls resulted in a rating of medium.

Table 0-11 Proposed controls and mitigation strategies for heatwave or drought.

Proposed Controls / Treatment Strategies	Control Level	Impact Category	Residual Consequence	Residual Likelihood	Residual Risk
- Consideration of heat-reducing strategies and materials in the design and construction of resort facilities e.g. 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 e.g. drink plenty of fluids, take cold showers, wearing light clothing, etc. - Emergency Management Plan to address PPRR for heatwave and drought hazards. - Relevant WHS training for employees and contractors. - Critical infrastructure to meet or exceed current design standards. - Environmental Recovery Plan that includes a temporary water supply for wildlife. - Install water saving devices to ensure water is used wisely at all times and employ a guest education strategy to try to conserve water. - Harvest, reuse and recycle water wherever possible e.g. irrigation, etc. - Business Continuity Plan. - Insurance.	Medium	People	Insignificant	Likely	Low
		Environment	Minor	Likely	Medium
		Economy	Insignificant	Likely	Low
		Reputation	Insignificant	Likely	Low
		Social Setting	Insignificant	Likely	Low
		Property	Insignificant	Likely	Low

18.5.1.6.3 Residual risk

Following the application of the proposed control measures and mitigation strategies, the residual likelihood of a heatwave or drought impacting KUR-World is still considered a likely event (AEP between 10% to <63% per year).
However, the residual consequences to people, economy, reputation, social setting and property would be reduced to insignificant resulting in a **LOW** residual risk rating whilst the residual consequences to environment remained at minor resulting in a **MEDIUM** residual risk rating.

18.5.1.7 Climate change

Climate change will likely exacerbate the frequency and severity of natural hazard events. Climate change predictions indicate that we will increasingly be affected by changes in temperature, rainfall, sea level and extreme weather conditions. Therefore, KUR-World should consider effective adaptation measures at the outset of the project to better manage future climate risks.

Climate change projections for Far North Queensland are based on data from CSIRO, the Department of Environment and Heritage Protection (DEHP) and the Bureau of Meteorology (BoM). Regarding KUR-World, the relevant climate change predictions include:

Higher Temperatures
Maximum, minimum and average temperatures are projected to continue to rise. For the near future (2030), the annually averaged warming is projected to be between 0.5 and 1.4°C above the climate of 1986–2005. By 2070, the projected range of warming is 1.0 to 3.2°C, depending on future emissions. The region's summer average temperature is currently 27°C. This could rise to over 28°C by 2030 and to over 30°C by 2070. In the context of KUR-World, these predictions are important because, although it would provide cooler accommodation and activities than those on the coast, higher temperatures will lead to hotter and more frequent hot days.

There is likely to be a substantial increase in the temperature reached on the hottest days, and an overall increase in the frequency of hot days and the duration of warm weather. This may exacerbate the risks associated with heatwaves and droughts and could potentially lead to changes in fire frequency. Changes to fire frequency depend on the spatial variability of future rainfall. However, when and where fire does occur, its behaviour is likely to be more extreme due to the increased higher temperatures.

More Intense rainfall events
High climate variability is likely to remain the major factor influencing rainfall changes in the next few decades. Rainfall changes for 2070 will continue to show a large amount of variability. However, there may be slight declines in spring rainfall by the end of the century. The intensity of heavy rainfall events is likely to increase. In the context of KUR-World, it is important to consider the changes to intensity and frequency of extreme events (especially cyclones and rainfall).
It is anticipated that there will be a stronger but shorter rainfall season during January and February, leading to dryer autumns; that the number of rainy days will decrease but the amount of rain falling on wet days may increase by up to 20%. Tropical cyclones are projected to become less frequent, but with increases in the proportion of the most intense storms.

18.5.1.7.1 Risk assessment before mitigation

The assessment of climate change is identified in the Risk Assessment and Control Measures document as NH9.

For the purposes of this EIS, the likelihood of climate change affecting the KUR-World site resulting in impacts to guests and staff members, buildings, structures, ecology in the surrounding forest and creeks and the ability to provide services was assessed as almost certain.

The consequences will vary from insignificant to perhaps moderate over the design life of the project; resulting in an assigned risk rating of between MEDIUM and HIGH prior to the consideration or implementation of any control measures or mitigation strategies.

18.5.1.7.2 Proposed controls and mitigation strategies

The management of the hazard imposed by climate change involves a risk-based approach to adaptation. KUR-World should consider the likely impacts of climate change during the design stage. This might involve consideration of adopting heat-reducing strategies and materials in the design and construction of all facilities (e.g. light-coloured buildings, increasing green spaces.); adopting additional freeboard to extreme water levels from all sources; adopting a conservative approach to design loads to allow for stronger winds; ensuring that all critical infrastructure exceeds current design standards. This will require analysis of the costs and benefits of allowing for the likely effects to determine whether these mitigation strategies should be adopted. Regardless of the design elements, KUR-World must develop a climate change adaptation strategy to consider how it will manage the ongoing impacts of climate change. This will involve strategies to reduce greenhouse gas emissions and may include use of renewable energies, ensuring the use of energy efficient equipment across the site and likely measures. It is also important that staff and guests are aware of energy use and steps they can take to reduce consumption. An assessment on the effectiveness of these controls resulted in a rating of medium.

Table 0-12 Proposed controls and mitigation strategies for climate change.

Proposed Controls / Treatment Strategies	Control Level	Impact Category	Residual Consequence	Residual Likelihood	Residual Risk
- Develop a climate change adaptation strategy for the resort. - Implementation of strategies to reduce emissions of greenhouse gasses e.g. use of renewable energies, use of energy efficient equipment, etc. - Staff and guest awareness regarding energy consumption and reduction strategies. - Consideration of heat-reducing strategies and materials in the design and construction of resort facilities e.g. light-coloured buildings, increasing green spaces, etc. - Consider adopting additional freeboard to extreme water levels from all sources. - Consider adopting a conservative approach to design loads to allow for stronger winds. - Critical infrastructure to exceed current design standards.	Medium	People	Insignificant	Almost Certain	Medium
		Environment	Minor	Almost Certain	Medium
		Economy	Insignificant	Almost Certain	Medium
		Reputation	Insignificant	Almost Certain	Medium
		Social Setting	Insignificant	Almost Certain	Medium
		Property	Minor	Almost Certain	Medium

18.5.1.7.3 Residual risk

The residual risk of climate change is considered negligible in the short term. However, over time some adaptation may be required. It is almost impossible to predict what this may entail, therefore, for this assessment following the application of the proposed control measures and mitigation strategies, the residual likelihood of climate change impacting KUR-World is still considered to be almost certain (AEP 63% per year or more), albeit mitigated by altitude, when compared to the coast.

However, the residual consequences to people, economy, reputation, social setting and property would be reduced to insignificant resulting in a **MEDIUM** residual risk rating whilst the residual consequences to environment remained at minor also resulting in a **MEDIUM** residual risk rating. Animal and human health hazards.

18.5.2 Animal and human health hazards

18.5.2.1 Ground borne anthrax

Anthrax occurs throughout the world and causes disease which can be fatal in livestock and people. "Incidents can vary from occasional cases to widespread outbreaks, depending on soil, climate and degree of contamination" (Business Queensland, 2016).

In Australia, anthrax occurs most commonly in the "anthrax belt", from the centre of New South Wales into Victoria. Incidents have occurred in Queensland on the Marlborough Peninsular, Dirranbandi, Wandoan and most recently there has been a confirmed case of anthrax at St George which has resulted in the death of approximately 80 cattle.

"Since 2001, there have only been three human cases of anthrax in Australia in 2006, 2007 and 2010" (Queensland Health, 2017). These cases had skin infections caused by exposure to anthrax spores. When exposed to air, spores form rapidly, and are resistant to most influences. These bacterial spores rarely persist beyond a few years where soil moisture and microbial activity are high, but can remain viable in the environment (e.g. in dry soil) for more than 50 years.

Anthrax is a zoonotic disease that can be fatal to large numbers of livestock, particularly cattle. Anthrax may cause sudden death of grazing animals and other symptoms include weakness, staggering and laboured breathing. Blood stained discharges after death are usually seen at all external orifices and carcasses decay rapidly.

Depending on the severity of the outbreak, impacts to KUR-World may include animal deaths, treatment and vaccination costs, movement and control orders, decontamination, disposal costs of carcasses, marketing restrictions, abattoir rejection, consumer rejection of animal products as well as human health risks. Anthrax is a category 1 restricted matter. Whilst there have been no known cases in Far North Queensland, if the presence of this disease is suspected in any species of animal, Biosecurity Queensland must be notified.

18.5.2.1.1 Risk assessment before mitigation

The assessment of ground borne anthrax is identified in the Risk Assessment and Control Measures document as HA1.

The likelihood of ground borne anthrax being detected on KUR-World resulting in an impact to guests and staff members, ecology in the surrounding forest and creeks and the ability to provide services was assessed as rare with an annual exceedance probability (AEP) between 0.1% to <1% per year.

The consequences to environment, economy and reputation were assessed as moderate resulting in a MEDIUM risk rating, whilst the consequences to people, social setting and property were assessed as minor resulting in a LOW risk rating prior to the consideration or implementation of any control measures or mitigation strategies.

The confidence of these data is scored as moderate.

18.5.2.1.2 Proposed controls and mitigation strategies

To effectively mitigate the risks associated with ground borne anthrax it is essential that a robust Farm Biosecurity Plan is developed and implemented in cooperation with Biosecurity Queensland (part of the State Government Department of Agriculture and Fisheries - DAF). Additional controls and treatment strategies include: ensuring that animal feed is sourced from reputable suppliers to reduce any risks associated with contamination; ensuring that wildlife and domestic animals are separated and domestic animals are vaccinated, in good health and are regularly monitored by trained staff and veterinarians for signs of illness. Any unexplained deaths of animals (domestic and native) will be reported to Biosecurity Queensland. Additionally, emergency management training will be provided for key personnel and a Business Continuity Plan will be developed to minimise disruption to the business should an outbreak occur. An assessment on the effectiveness of these controls resulted in a rating of high.

Table 0-13 Proposed controls and mitigation strategies for anthrax.

Proposed Controls / Treatment Strategies	Control Level	Impact Category	Residual Consequence	Residual Likelihood	Residual Risk
- Development and implementation of a robust Farm Biosecurity Plan in cooperation with Biosecurity Queensland (DAF). - Ensure animal feed is sourced from reputable suppliers to reduce risks associated with contamination. - Domestic animals to be regularly monitored by trained staff and veterinarians for signs of illness. - Any cases of unexplained deaths of animals (domestic and native) to be reported to Biosecurity Queensland. - Ensure that any domestic animals on site have complete vaccinations and are in good health. - Keep wildlife and domestic animals separated. - Emergency management training for key personnel. - Business Continuity Plan	Low	People	Insignificant	Rare	Very Low
		Environment	Minor	Rare	Low
		Economy	Minor	Rare	Low
		Reputation	Minor	Rare	Low
		Social Setting	Insignificant	Rare	Very Low
		Property	Insignificant	Rare	Very Low

18.5.2.1.3 Residual risk

Following the application of the proposed control measures and mitigation strategies, the residual likelihood of ground borne anthrax being detected on KUR-World resulting in an impact to guests and staff members, ecology in the surrounding forest and creeks and the ability to provide services is still considered a rare event (AEP between 0.1% to <1% per year).
However, the consequences to environment, economy and reputation would be reduced to minor resulting in a **LOW** residual risk rating and the consequence to people, social setting and property would be reduced to insignificant resulting in a **VERY LOW** residual risk rating.

18.5.2.2 Hendra virus

The natural hosts for Hendra virus are flying foxes. The virus can spread from flying foxes to horses, horses to horses and rarely from horses to people. “Since Hendra virus was first identified in 1994, more than 90 horses are known to have been infected” (Queensland Health, 2017). These animals have either died as a direct result of the infection or have been euthanised.

Several hundred people are known to have been exposed to Hendra virus in horses but only a handful have been confirmed to have contracted it. There have been four human deaths relating to Hendra virus, the most recent occurring in 2009.

In 2015, there was an outbreak of Hendra virus at a property near the proposed KUR-World site. Biosecurity Queensland completed testing on this property and it was released from quarantine on August 21 2015.

“Hendra virus can cause a broad range of signs in horses and should be considered in any sick horse when the cause of the illness is unknown and particularly where respiratory or nervous signs progress with rapid deterioration” (Business Queensland, 2016). Flying foxes infected with Hendra virus do not show any signs of illness.

Horses will roam amongst other farm animals at KUR-World, which incorporates an equestrian centre with a covered equestrian arena for training and events, stables and riding yards. Depending on the severity of any outbreak, impacts to KUR-World may include animal deaths, treatment and vaccination costs, movement restrictions, decontamination and disposal costs of carcasses and human health risks.

Hendra virus is a category 1 restricted matter and if the presence of this disease is suspected in any species of animal then Biosecurity Queensland must be notified.

18.5.2.2.1 Risk assessment before mitigation

The assessment of Hendra virus is identified in the Risk Assessment and Control Measures document as HA2.

The likelihood of Hendra virus being detected on the KUR-World site resulting in an impact to guests and staff members, ecology in the surrounding forest and creeks and the ability to provide services was assessed as likely with an annual exceedance probability (AEP) between 10% to 63% per year.

Prior to the consideration or implementation of any control measures or mitigation strategies, the consequences to economy were assessed as catastrophic resulting in an EXTREME risk rating and consequences to people and reputation were assessed as major also resulting in an EXTREME risk rating.

The risk rating prior to the consideration or implementation of any control measures or mitigation strategies, resulted in an assessment of the consequences to the environment as moderate and in a HIGH risk rating; whilst the consequences to social setting and property were assessed as minor resulting in a MEDIUM risk rating.

The confidence of these data is assessed as moderate.

18.5.2.2.2 Proposed controls and mitigation strategies

To effectively mitigate the risks associated with Hendra virus a robust Farm Biosecurity Plan must be developed and implemented in cooperation with Biosecurity Queensland (DAF). Additional controls and treatment strategies include: (i) ensuring that any equines brought onto the KUR-World site are fully vaccinated against Hendra Virus and have horse health vaccination certificates; (ii) placement of animal feed and water under a shelter and away from trees: (iii) removal of horses from paddocks where flowering or fruiting trees may be attracting flying foxes; (iii) separation of wildlife and domestic animals as far as practicable and any sick horses must be isolated from other horses, people and other animals until the sick horse can be assessed by a veterinarian.; (iv) staff should wear appropriate PPE when handling sick horses and ensure appropriate biosecurity control procedures are in place e.g. cleaning and disinfecting, isolating sick horses and not moving sick animals off site; (v) the Emergency Management Plan for the site should address prevention, preparation, response and recovery for zoonotic diseases and emergency management training should be provided for key personnel; and (vi) a Business Continuity Plan should be developed and implemented where appropriate to minimise disruption to the business should an outbreak of Hendra virus occur. An assessment on the effectiveness of these controls resulted in a rating of high.

Table 0-14 Proposed controls and mitigation strategies for Hendra virus.

Proposed Controls / Treatment Strategies	Control Level	Impact Category	Residual Consequence	Residual Likelihood	Residual Risk
- Development and implementation of a robust farm biosecurity plan in cooperation with Biosecurity Queensland (DAF). - Ensure any equines brought onto the KUR-World site are fully vaccinated against Hendra Virus and have appropriate chip / certificate of vaccination / horse health certificate. - Animal feed and water to be placed under a shelter and away from trees. - Horses to be removed from paddocks where flowering or fruiting trees may be attracting flying foxes. - Isolate sick horses from other horses, people and other animals until the horse can be assessed by a veterinarian. - Wear appropriate PPE when handling sick horses and ensure appropriate biosecurity control procedures are in place (e.g. cleaning and disinfecting, isolating sick horses and not moving sick animals off site.). - Keep wildlife and domestic animals separated. - Emergency Management Plan to address PPRR for Zoonotic Diseases. - Emergency management training for key personnel. - Business Continuity Plan.	Low	People	Minor	Likely	Medium
		Environment	Minor	Likely	Medium
		Economy	Minor	Likely	Medium
		Reputation	Minor	Likely	Medium
		Social Setting	Insignificant	Likely	Low
		Property	Insignificant	Likely	Low

18.5.2.2.3 Residual risk

Following the application of the proposed control measures and mitigation strategies, the residual likelihood of Hendra virus impacting KUR-World is still considered a likely event (AEP between 10% to 63% per year).
However, the consequences to people, environment, economy and reputation would be reduced to minor resulting in a **MEDIUM** residual risk rating and the consequence to social setting and property would be reduced to insignificant resulting in a **LOW** residual risk rating.

18.5.2.3 Australian bat Lyssavirus

Australian bat lyssavirus (ABLV) is a virus endemic to Australian bats. It is closely related to the classic rabies virus found overseas and causes invariably fatal infection and inflammation of the brain (encephalitis) in bats, humans and other animals. "It is presumed that ABLV is transmitted by bites or contamination of a fresh wound, scratch or mucous membranes with infected saliva" (Business Queensland, 2016).

In May 2013, two horses were confirmed as being infected with ABLV on a property in South East Queensland (Business Queensland, 2016). These were the first known cases of the disease in an animal other than a bat. Eradication of ABLV is not possible due to an inability to vaccinate free-living bats and culling flying foxes is not considered an ethical or feasible method to control or eradicate ABLV.

ABLV is a restricted matter and if it is suspected that an animal is clinically ill with ABLV or if an animal has been bitten or scratched by a bat or other animal known to be infected with ABLV, then Biosecurity Queensland must be notified.

Australian Bat Lyssavirus infection produces a range of clinical signs of central nervous system disease including weakness, an inability to fly or hang properly, paralysis, seizures, tremors, unusual vocalisation, difficulty swallowing or incessant licking, changes in behaviour. Other animals that become infected with ABLV are expected to show clinical signs consistent with encephalitis in that species (Business Queensland, 2016).

ABLV is a zoonosis and there have been three human cases of the disease, all were fatal. Infection of humans is rare and there is no known risk of contracting ABLV from bats flying overhead, contact with bat urine, faeces, blood or from living, playing or walking near bat roosting areas. The risks of infection in humans and animals can be minimised by avoiding contact with bats and seeking urgent medical or veterinary advice about the use of rabies vaccines to prevent disease.

18.5.2.3.1 Risk assessment before mitigation

The assessment of Australian Bat Lyssavirus is identified in the Risk Assessment and Control Measures document as HA3.

The likelihood of ABLV being detected on the KUR-World site resulting in an impact to guests and staff members, ecology in the surrounding forest and creeks and the ability to provide services was assessed as rare with an annual exceedance probability (AEP) between 0.1% to <1% per year.

The consequences to people were identified as major resulting in a HIGH risk rating, the consequences were assessed as moderate in relation to reputation resulting in a MEDIUM risk rating and minor for environment, economy, social setting and property resulting in a LOW risk rating prior to the consideration or implementation of any control measures or mitigation strategies.

The confidence of these data is scored as low.

18.5.2.3.2 Proposed controls and mitigation strategies

To effectively mitigate the risks associated with Australian Bat Lyssavirus, a robust Farm Biosecurity Plan must be developed and implemented in cooperation with Biosecurity Queensland (DAF). Additional controls and treatment strategies include: education for visitors to not handle or feed wildlife including injured bats; to ensure that any person who is scratched or bitten by a bat is provided with first aid assistance (e.g. washing the wound thoroughly with soap and water, applying antiseptic) whilst seeking urgent medical advice from a General Practitioner (GP). It is recommended that a GP is available on site for timely treatment of this, or any other injury. The Emergency Management Plan for the site should address prevention, preparation, response and recovery for zoonotic diseases and emergency management training should be provided for key personnel. An assessment on the effectiveness of these controls resulted in a rating of medium.

Table 0-15: Proposed controls and mitigation strategies for ABLV.

Proposed Controls / Treatment Strategies	Control Level	Impact Category	Residual Consequence	Residual Likelihood	Residual Risk
- Development and implementation of a robust farm biosecurity plan in cooperation with Biosecurity Queensland (DAF). - Education for visitors to not handle or feed wildlife including injured bats. - Any person who has been scratched or bitten by a bat should wash the wound thoroughly with soap and water for at least five minutes. If available, apply an antiseptic such as iodine or alcohol (ethanol) after washing and seek urgent medical advice. - Emergency Management Plan to address PPRR for Zoonotic Diseases. - Emergency management training for key personnel. - Availability of a General Practitioner (GP) on site. - Provision of adequate first aiders and supplies on site.	Low	People	Minor	Rare	Low
		Environment	Minor	Rare	Low
		Economy	Minor	Rare	Low
		Reputation	Minor	Rare	Low
		Social Setting	Insignificant	Rare	Very Low
		Property	Insignificant	Rare	Very Low

18.5.2.3.3 Residual risk

Following the application of the proposed control measures and mitigation strategies, the residual likelihood of Australian Bat Lyssavirus impacting KUR-World is still considered a rare event (AEP between 0.1% to <1% per year).
However, the consequences to people, environment, economy and reputation would be reduced to minor resulting in a **LOW** residual risk rating and the consequence to social setting and property would be reduced to insignificant resulting in a **VERY LOW** residual risk rating.

18.5.2.4 Infectious disease outbreak

The term infectious disease is broad, covering a range of different diseases that can be spread, directly or indirectly, from one person to another. In recent years, the World Health Organization (WHO) has warned of viruses that could potentially mutate and easily transfer from human to human, creating a pandemic with significant world-wide consequences. A pandemic is a disease outbreak that occurs worldwide when a new strain of virus emerges to which no-one is immune; the virus causes disease in humans; and the virus is easily spread between humans. In recent times, at least two influenza pandemics have posed a threat to Australia. The avian influenza outbreak in 2003 and the swine flu influenza in 2009 demonstrated how quickly pandemics can develop.

In Queensland, the response to a disease outbreak and consequent pandemic is coordinated by Queensland Health as the lead agency with assistance from Local Disaster Management Group's (LDMG's), other State agencies and the Commonwealth Government. The National Pandemic Influenza Airport Border Operations Plan (FLUBORDERPLAN 2009) advises that should a pandemic virus arrive in Australia, a six-staged response would be implemented:

- **Alert** - to the risk of a pandemic and preparing for a pandemic by increasing Australia's readiness and supporting overseas responses.
- **Delay** – the entry of the pandemic virus to Australia by applying border measures, supporting the overseas response and increasing surveillance.
- **Contain** – or slow the early spread of a pandemic virus once it emerges in Australia, including by strategic deployment of the National Medical Stockpile and strengthening public information campaigns to promote individual hygiene practices and community level measures such as social distancing.
- **Sustain** – the response while a customised vaccine is developed, including by supporting maintenance of essential infrastructure and services and strengthening community social distancing measures.
- **Control** – the pandemic with a customised pandemic vaccine when it becomes widely available.
- **Recover** – providing the necessary support and stimulus to help the Australian community return to normal living as quickly as possible following a pandemic.

This response was developed following the H1N1 influenza (human swine influenza) outbreak in 2009 and is now considered as the appropriate response for any other human virus that may become a pandemic.

In the absence of immunity, a new virus can rapidly spread across the globe, causing epidemics or pandemics, infecting large numbers of people, with fatal results. The risk of an outbreak at KUR-World could be perceived as being higher than in the general population, as a majority of the visitors will arrive direct from international flights. Potential or actual disease outbreaks at the resort will be managed in the same way as the general population and could potentially involve the isolation and quarantine of people for some time to prevent transmission.

Additionally, impacts to the business may arise as a result of staff absenteeism due to high levels of sickness. It is proposed that health and medical facilities will be provided at the resort and if designed appropriately, this may assist with managing the spread of any disease outbreak detected on site.

18.5.2.4.1 Risk assessment before mitigation

The assessment of Infectious Diseases is identified in the Risk Assessment and Control Measures document as HA4.

The likelihood of an outbreak of an infectious disease being detected on the KUR-World site resulting in an impact to guests and staff members, ecology in the surrounding forest and creeks and the ability to provide services was assessed as unlikely with an annual exceedance probability (AEP) between 1% to <10% per year.

The consequences to people and economy were identified as major resulting in a HIGH risk rating, the consequences to environment, reputation and social setting were assessed as moderate resulting in a MEDIUM risk rating and the consequences to property were assessed as minor resulting in a LOW risk rating prior to the consideration or implementation of any control measures or mitigation strategies.

The confidence of these data is scored as low.

18.5.2.4.2 Proposed controls and mitigation strategies

To effectively mitigate the risks associated with infectious diseases, a GP should be available on site. The on-site medical resource should be developed in collaboration with Queensland Health to provide the level of care required in the event of an outbreak and to develop appropriate procedures. Guests and staff should be encouraged to undertake good hand and respiratory hygiene measures at all times and if an outbreak of infectious diseases occurs, affected guests must be isolated and cleaning regimes should increase. The Emergency Management Plan for the site should address prevention, preparation, response and recovery for infectious diseases and emergency management training should be provided for key personnel. A Business Continuity Plan should exist to ensure minimal business interruption in the event of an infectious disease outbreak. An assessment on the effectiveness of these controls resulted in a rating of medium.

Table 0-16 Proposed controls and mitigation strategies for infectious disease.

Proposed Controls / Treatment Strategies	Control Level	Impact Category	Residual Consequence	Residual Likelihood	Residual Risk
- Design medical centre to provide level of medical care required in the event of a disease outbreak. - Collaborate with Queensland Health to develop appropriate procedures. - Encourage good hand and respiratory hygiene measures. - Increase cleaning regimes should an outbreak occur e.g. cleaning frequently touched surfaces with detergent. - Availability of a General Practitioner (GP) on site. - Emergency management training for key personnel. - Business Continuity Plan.	Medium	People	Minor	Unlikely	Low
		Environment	Minor	Unlikely	Low
		Economy	Minor	Unlikely	Low
		Reputation	Minor	Unlikely	Low
		Social Setting	Minor	Unlikely	Low
		Property	Insignificant	Unlikely	Low

18.5.2.4.3 Residual risks

Following the application of the proposed control measures and mitigation strategies, the residual likelihood of an infectious disease impacting KUR-World is still considered an unlikely event (AEP between 1% to <10% per year).
However, the consequences to people, environment, economy, reputation and social setting would be reduced to minor resulting in a **LOW** residual risk rating and the consequence to property would be reduced to insignificant also resulting in a **LOW** residual risk rating.

18.5.2.5 Leptospirosis

Leptospirosis has a worldwide distribution, most commonly in warm, wet climates. It is a disease that primarily affects people whose occupation brings them into direct contact with animals including small marsupials, rodents, dogs, pigs, sheep, cattle, horses and other farm animals.

Leptospirosis is a potentially lethal disease that occurs in all parts of Australia with the highest incidence of the disease in Queensland. Approximately 100 cases of leptospirosis are reported in humans each year in Queensland. “Clinical signs include fever, haemolytic anaemia, abortion, infertility and weak newborns. In cattle, a specific form of mastitis, known as “milk-drop syndrome” can occur. Horses can develop blindness due to inflammation of eye tissue and animals can become carriers and shed the bacteria in their urine” (DAF, 2012).

Leptospirosis is spread through ingestion or contamination of cuts and abrasions by the urine of infected animals. It is generally not transmitted from person to person. People that come into direct contact with animal urine are at risk. Indirect contact from water (ponds or pools) that has been contaminated with urine is also a risk. In the context of KUR-World, the greatest risk will be during the operations phases of the project to staff working in direct contact with farm animals and/or contact with wild animals that travel through the area.

18.5.2.5.1 Risk assessment

The assessment of Leptospirosis is identified in the Risk Assessment and Control Measures document as HA5.

The likelihood of Leptospirosis being detected on the KUR-World site resulting in an impact to guests and staff members, ecology in the surrounding forest and creeks and the ability to provide services was assessed as likely (AEP 10% to 63% per year) for people, environment, reputation and social setting.

The consequences were assessed as minor resulting in a MEDIUM risk rating prior to the consideration or implementation of any control measures or mitigation strategies. The consequences to economy and property were also identified as minor but the likelihood was assessed as unlikely (AEP between 1% to <10% per year) resulting in a LOW risk rating prior to the consideration or implementation of any control measures or mitigation strategies.

The confidence of these data is scored as low.

18.5.2.5.2 Proposed controls and mitigation strategies

To effectively mitigate the risks associated with Leptospirosis, exclusion fencing should be installed around the perimeter of the property to control feral pigs and contact with small marsupials such as bandicoots should be managed (e.g. they should not be encouraged in communal areas). An annual vaccination program for farm animals should be implemented and rodent control measures must be undertaken regularly. Additional controls and treatment strategies include: exercising good personal hygiene before and after high risk activities (e.g. availability of handwashing facilities at the petting farm, appropriate PPE whilst working outdoors). It is important to avoid situations where contact with animal urine might occur and to not allow guests to swim or wade in water that might be contaminated with animal urine. Open wounds, lesions or burns should be protected from meeting potentially contaminated soil or water using waterproof dressings. If potential exposure occurs, skin should be washed thoroughly and medical advice sought from the on-site General Practitioner (GP).

Additionally, it is vital that animals are regularly monitored by trained staff and veterinarians for signs of illness and any contact with potentially infected animals, should be eliminated.

The Emergency Management Plan for the site should address prevention, preparation, response and recovery for zoonotic diseases, emergency management training should be provided for key personnel. An assessment on the effectiveness of these controls resulted in a rating of high.

Table 0-17 Proposed controls and mitigation strategies for leptospirosis

Proposed Controls / Treatment Strategies	Control Level	Impact Category	Residual Consequence	Residual Likelihood	Residual Risk
- Installation of exclusion fencing around the property to control feral pigs and discouragement of small marsupials such as bandicoots in communal areas. - Annual vaccination program for farm animals. - Undertake rodent control measures on a regular basis. - Good personal hygiene to be exercised before and after high risk activities (e.g. handwashing facilities at petting farm). - Avoid situations where contact with animal urine might occur. - Do not allow guests to swim or wade in water that might be contaminated with animal urine. - Animals to be regularly monitored by trained staff and veterinarians for signs of illness. Contact with potentially infected animals should be eliminated. - Wear appropriate PPE whilst working outdoors e.g. protective clothing, footwear, gloves, etc. - Open wounds, lesions or burns should be protected from meeting potentially contaminated soil or water using waterproof dressings. If potential exposure occurs skin should be washed thoroughly. - Availability of a General Practitioner (GP) on site. - Emergency Management Plan to address PPRR for Zoonotic Diseases. - Emergency management training for key personnel.	Low	People	Minor	Unlikely	Low
		Environment	Minor	Unlikely	Low
		Economy	Insignificant	Unlikely	Low
		Reputation	Minor	Unlikely	Low
		Social Setting	Minor	Unlikely	Low
		Property	Insignificant	Unlikely	Low

18.5.2.5.3 Residual risk

Following the application of the proposed control measures and mitigation strategies, the residual likelihood of Leptospirosis impacting KUR-World is still considered an unlikely event (AEP between 1% to <10% per year).
However, the consequences to people, environment, reputation and social setting would be reduced to minor resulting in a **LOW** residual risk rating and the consequence to economy and property would be reduced to insignificant also resulting in a **LOW** residual risk rating.

18.5.2.6 Melioidosis

Melioidosis is an infectious disease that can affect humans and animals. It is a notifiable disease caused by the bacterium *Burkholderia pseudomallei* found in soils. The disease occurs mostly in tropical areas, including north Queensland. Most cases notified in Queensland are from the north of the State, in particular from the northwest Gulf country, the Torres Strait islands and from Townsville and nearby environs. "During the dry season, the bacterium is found in deeper soil layers, but during the wet season it can be found in the surface layers and in muddy surface waters" (Queensland Health, 2014).

Melioidosis is uncommon with approximately 10 to 30 cases occurring each year in Queensland. Most cases of melioidosis occur during the wet season following heavy rains and flooding. Most infections occur when skin abrasions or wounds come into direct contact with wet soil or water contaminated with the bacterium. Rarely, it can be acquired through swallowing contaminated water, or through breathing in fine droplets of contaminated water.

The symptoms of melioidosis in animals varies depending on the species but generally includes fever, weight loss, respiratory signs, lameness, swelling of the joints and in some circumstances, death.

Person-to-person spread is very rare and not everyone is at risk. "Adults with certain underlying diseases and conditions – notably diabetes, chronic lung or kidney diseases, excessive alcohol consumption, cancers and treatments (such as steroids) which lower immunity – are at a greater risk. Melioidosis is very uncommon in healthy adults and is rarely seen in children in Queensland" (Queensland Health, 2014).

Melioidosis can present in several different ways. The most likely at the resort would be cases that have a "sudden onset, from a few days to three weeks after an apparent exposure to soil or muddy water. These 'acute' cases can present as pneumonia with fever, cough and difficulty breathing or as blood poisoning with fever, confusion and shock" (Queensland Health, 2014). Acute melioidosis can be very severe, and in most circumstances, requires hospital inpatient management. Other cases present more slowly, months or even years after an apparent exposure.

18.5.2.6.1 Risk assessment before mitigation

The assessment of Melioidosis is identified in the Risk Assessment and Control Measures document as HA6.

The likelihood of Melioidosis being detected on the KUR-World site resulting in an impact to guests and staff members, ecology in the surrounding forest and creeks and the ability to provide services was assessed as being unlikely (AEP between 1% to <10% per year).

The consequences to people and environment were assessed as moderate resulting in a MEDIUM risk rating whilst the consequences to reputation, social setting and property were assessed as minor resulting in a LOW risk rating. The consequences to the economy were assessed as insignificant also resulting in a LOW risk rating prior to the consideration or implementation of any control measures or mitigation strategies.

The confidence of these data is scored as low.

18.5.2.6.2 Proposed controls and mitigation strategies

To effectively mitigate the risks associated with Melioidosis it is recommended that exclusion fencing is installed around the perimeter of the property to control feral pigs, that adequate drainage is provided in animal enclosures to prevent surface water accumulation and that animals are removed from high risk areas where necessary. Appropriate PPE must be used whilst working outdoors (e.g. protective clothing,

footwear, gloves, etc.) and open wounds, lesions or burns must be protected from meeting potentially contaminated soil or water using waterproof dressings. If potential exposure does occur, skin should be washed thoroughly and medical advice sought from the on-site first aiders and General Practitioner (GP).

Additional controls and treatment strategies include ensuring that guests and staff avoid exposure to muddy water and soil, particularly after periods of heavy rainfall, ensuring that all water systems are properly maintained and that a water quality monitoring regime is implemented in accordance with the relevant health and safety standards and regulations. Additionally, it is vital that animals are regularly monitored by trained staff and veterinarians for signs of illness and any contact with potentially infected animals, should be eliminated. The Emergency Management Plan for the site should address prevention, preparation, response and recovery for zoonotic diseases and emergency management training should be provided for key personnel. An assessment on the effectiveness of these controls resulted in a rating of high.

Table 0-18 Proposed controls and mitigation strategies for melioidosis

Proposed Controls / Treatment Strategies	Control Level	Impact Category	Residual Consequence	Residual Likelihood	Residual Risk
- Installation of exclusion fencing around the property to control feral pigs. - Provision of drainage in animal enclosures to prevent surface water accumulation and removal of animals from high risk areas where necessary. - Animals to be regularly monitored by trained staff and veterinarians for signs of illness. - Guests and staff to avoid exposure to muddy water and soil, particularly after periods of high rainfall. '- Ensure that all water systems are properly maintained and conform to relevant health and safety regulations. - Implementation of a robust water quality monitoring regime in accordance with the relevant standards. - Wear appropriate PPE whilst working outdoors e.g. protective clothing, footwear, gloves, etc. - Open wounds, lesions or burns should be protected from meeting potentially contaminated soil or water using waterproof dressings. If potential exposure occurs skin should be washed thoroughly. - Availability of a General Practitioner (GP) on site. - Provision of adequate first aiders and supplies on site. - Emergency Management Plan to address PPRR for Zoonotic Diseases. - Emergency management training for key personnel.	Low	People	Minor	Unlikely	Low
		Environment	Minor	Unlikely	Low
		Economy	Insignificant	Unlikely	Low
		Reputation	Insignificant	Unlikely	Low
		Social Setting	Minor	Unlikely	Low
		Property	Minor	Unlikely	Low

18.5.2.6.3 Residual risk

Following the application of the proposed control measures and mitigation strategies, the residual likelihood of Melioidosis impacting KUR-World is still considered an unlikely event (AEP between 1% to <10% per year).

However, the consequences to people, environment, social setting and property would be reduced to minor resulting in a **LOW** residual risk rating and the consequence to economy and reputation would be reduced to insignificant also resulting in a **LOW** residual risk rating.

18.5.2.7 Legionellosis

"Legionella is a type of bacteria found in the natural environment around the world. There are over 50 species of *Legionella"* (Queensland Health, 2014). Most thrive in warm water and need require other organisms to multiply. *Legionella* multiplies rapidly in man-made environments such as inside plumbing fixtures and pipes, where warm temperatures and the build-up of nutrients and microorganisms on surfaces provide an ideal environment.

Legionellosis is a collective term for diseases caused by *Legionella* bacteria including Pontiac fever and the more serious, Legionnaires' disease. Legionnaires' disease is a type of pneumonia caused by the Legionella bacteria. "Outbreaks occur when susceptible people have a common or shared exposure to an environmental source" (Queensland Health, 2014). Legionellosis is a notifiable disease under the *Public Health Act 2005*.

Legionella bacteria can be found in a variety of water handling systems, at temperatures ranging from 5 to 60 degrees Celsius including showers, sprinkler and hose reels, horticultural misting systems, drinking water fountains, air-conditioning processes, swimming pools and spas, hot water systems, etc. Humans might contract this disease by inhaling microscopic droplets of contaminated water from man-made system.

"The first symptoms of Legionnaires' disease are non-specific flu-like symptoms including fever, headache and muscle aches. There may also be a mild cough with or without phlegm. Some people may develop diarrhoea, vomiting and abdominal pain. The illness usually progresses rapidly and the chest infection (pneumonia) symptoms become obvious, with high fever, shortness of breath and chest pain being typical symptoms" (Queensland Health, 2016).

18.5.2.7.1 Risk assessment before mitigation

The assessment of Legionellosis is identified in the Risk Assessment and Control Measures document as HA7. The likelihood of Legionellosis being detected on the KUR-World site resulting in an impact to guests and staff members, ecology in the surrounding forest and creeks and the ability to provide services was assessed as being unlikely (AEP between 1% to <10% per year).

The consequences to property were assessed as major resulting in a HIGH risk rating whilst the consequences to people, economy, reputation and social setting and were assessed as moderate resulting in a MEDIUM risk rating. The consequences to the environment were assessed as insignificant resulting in a LOW risk rating prior to the consideration or implementation of any control measures or mitigation strategies.

The confidence of these data is scored as moderate.

18.5.2.7.2 Proposed controls and mitigation strategies

To effectively mitigate the risks associated with Legionellosis it is essential that a water quality monitoring regime is implemented in accordance with the relevant standards and health and safety regulations and that all water systems are regularly maintained to prevent legionella colonisation. Additional controls and

treatment strategies include ensuring that all water cooling systems are serviced and maintained by appropriately qualified personnel and in accordance with Queensland Health's Guide to control *Legionella* in cooling water systems and that swimming pools and spas are to be serviced and maintained by appropriately qualified personnel in accordance with Queensland Health's swimming and spa pool water quality operational guidelines. Anyone developing legionellosis symptoms (e.g. fever, cough, chills, or muscle aches) must seek medical advice from the on-site General Practitioner. An assessment on the effectiveness of these controls resulted in a rating of high.

Table 0-19 Proposed controls and mitigation strategies for Legionellosis.

Proposed Controls / Treatment Strategies	Control Level	Impact Category	Residual Consequence	Residual Likelihood	Residual Risk
- Implementation of a robust water quality monitoring regime in accordance with the relevant standards and health and safety regulations. - Ensure that all water systems are regularly maintained to prevent legionella colonisation (growth). - Water cooling systems are to be serviced and maintained by appropriately qualified personnel and in accordance with Queensland Health's Guide to control Legionella in cooling water systems. - Swimming pools and spas are to be serviced and maintained by appropriately qualified personnel in accordance with Queensland Health's swimming and spa pool water quality operational guidelines. - Medical treatment of anyone developing legionellosis symptoms, such as fever, cough, chills, or muscle aches. - Availability of a General Practitioner (GP) on site.	High	People	Minor	Unlikely	Low
		Environment	Insignificant	Unlikely	Low
		Economy	Minor	Unlikely	Low
		Reputation	Minor	Unlikely	Low
		Social Setting	Minor	Unlikely	Low
		Property	Minor	Unlikely	Low

18.5.2.7.3 Residual Risk

Following the application of the proposed control measures and mitigation strategies, the residual likelihood of Legionellosis impacting KUR-World is still considered an unlikely event (AEP between 1% to <10% per year).

However, the consequences to people, economy, reputation, social setting and property would be reduced to minor resulting in a **LOW** residual risk rating and the consequence to environment would be reduced to insignificant also resulting in a **LOW** residual risk rating.

18.5.2.8 Foot and mouth disease

Foot-and-mouth disease is a highly contagious viral infection of domestic and wild cloven-hooved animals. Australia is currently free of foot-and-mouth disease and an outbreak has not occurred in Australia since 1872 (Business Queensland, 2016).

However, foot-and-mouth disease has been identified as the single biggest threat to Queensland's livestock industry. Livestock owners, veterinarians and everyone involved in the livestock supply chain have a critical role to play in preventing a Foot and Mouth Disease outbreak (DAF, 2016).

Foot and Mouth Disease is a prohibited matter under the *Biosecurity Act 2014*. If the presence of this disease is suspected in any animal, it must be reported to Biosecurity Queensland.

Illegal importation of virus-contaminated animal products such as meat and dairy products is the most significant risk in terms of FMD entry into Australia. The virus is capable of surviving for long periods of time in a variety of fresh, partly cooked, cured and smoked meat products and dairy products that are inadequately heat treated. The most likely means by which the disease may enter the animal population is via passengers on aircraft or ships who bring in illegal virus-contaminated products which are then later fed to susceptible animals.

Depending on the severity of the outbreak, impacts to KUR-World may include animal deaths, movement restrictions, decontamination of facilities to limit the spread of the virus and destruction and disposal costs of infected animals and animal products. The social, economic and environmental consequences of a Foot and Mouth Disease worst-case scenario outbreak involve key beef and lamb export markets being closed for an extended period. A major foot-and-mouth outbreak could cause major production losses and seriously affect Australia's international livestock trade. The Productivity Commission (2002) estimates that the cost of a major Foot and Mouth Disease outbreak would be between $8 billion and $13 billion of gross domestic product and its consequences would be felt nationally for nearly 10 years after the event.

18.5.2.8.1 Risk assessment before mitigation

The assessment of Foot-and-mouth disease is identified in the Risk Assessment and Control Measures document as HA4.

The likelihood of Foot-and-mouth disease being detected on the KUR-World site resulting in an impact to guests and staff members, ecology in the surrounding forest and creeks and the ability to provide services was assessed as rare with an annual exceedance probability (AEP) between 0.1% to <1% per year.

The consequences to environment, economy, reputation and property was assessed as moderate resulting in a MEDIUM risk and the consequences to people and social setting were assessed as minor resulting in a LOW risk rating prior to the consideration or implementation of any control measures or mitigation strategies.

The confidence of these data is scored as low.

18.5.2.8.2 Proposed controls and mitigation strategies

To effectively mitigate the risks associated with foot-and-mouth disease, a robust Farm Biosecurity Plan must be developed and implemented in cooperation with Biosecurity Queensland (DAF). Additional controls and treatment strategies include ensuring that animal feed is sourced from reputable suppliers to reduce risks associated with contaminated and/or prohibited feed (e.g. swill) and guest education regarding the importance of not feeding animals. Proactive controls such as bins in high risk areas with (e.g. at petting farm) with clear signage stating, “no food stuffs past this point” should be provided.

Animals must be regularly monitored by trained staff and veterinarians for signs of illness and any suspected cases of foot-and-mouth disease in any animal species must be reported immediately to Biosecurity Queensland. An assessment on the effectiveness of these controls resulted in a rating of high.

Table 0-20 Proposed controls and mitigation strategies for foot and mouth disease.

Proposed Controls / Treatment Strategies	Control Level	Impact Category	Residual Consequence	Residual Likelihood	Residual Risk
- Development and implementation of a robust Farm Biosecurity Plan in cooperation with Biosecurity Queensland (DAF). - Ensure animal feed is sourced from reputable suppliers to reduce risks associated with contaminated and / or prohibited feed (e.g. swill). - Guest education regarding the importance of not feeding animals as well as controls such as bins in high risk areas with signage e.g. no food stuffs past this point. - Animals to be regularly monitored by trained staff and veterinarians for signs of illness. - Any suspected cases of foot and mouth disease in any species of animal is to be reported immediately to Biosecurity Queensland.	High	People	Insignificant	Rare	Very Low
		Environment	Minor	Rare	Low
		Economy	Minor	Rare	Low
		Reputation	Minor	Rare	Low
		Social Setting	Insignificant	Rare	Very Low
		Property	Minor	Rare	Low

18.5.2.8.3 Residual risk

Following the application of the proposed control measures and mitigation strategies, the residual likelihood of a foot-and-mouth disease outbreak impacting KUR-World is still considered a rare event (AEP between 0.1% to <1% per year).
However, the consequences to environment, economy, reputation and property would be reduced to minor resulting in a **LOW** residual risk rating whilst the consequence to people and social setting would be reduced to insignificant resulting in a **VERY LOW** residual risk rating.

18.5.2.9 Vector borne disease

"Vector-borne diseases are a major health threat globally. They infect more than one billion people a year and cause more than one million deaths" (WHO, 2014). Vectors are living organisms that spread infectious diseases from one host to another (e.g. amongst humans or from animals to humans). Many vectors are bloodsucking insects (e.g. mosquitoes, ticks, etc.) which ingest disease-producing microorganisms during a blood meal from an infected human or animal host and then inject it into a new host during a later blood meal.

Some vector-borne diseases are notifiable under the *Public Health Act 2005*.

Anecdotal evidence suggests that several cases of scrub typhus have been recorded in State Emergency Services (SES) volunteers undertaking land searches in the Kuranda and Myola area.

Mosquitoes cause more deaths than any other disease vector. In Queensland, the most common mosquito-borne diseases are Ross River Virus, Dengue and Barmah Forest Virus. Some mosquito-borne diseases are locally acquired in Queensland, whilst others are imported to Queensland when people carrying the disease enter the country after travelling overseas.

"Zika virus is a globally emerging mosquito-borne disease. It has been diagnosed in Queensland in travellers returning from affected countries" (Queensland Health, 2016). The same mosquitoes that transmit dengue also transmit Zika virus.

Travellers play an essential role in the spread of vector-borne diseases, as they can carry new disease strains into areas where disease vectors can transmit infection. Infections in travellers can provide early alerts to outbreaks and effective prevention and control of vector-borne diseases at KUR-World can safeguard the health of the resort guests and staff.

18.5.2.9.1 Risk assessment before mitigation measures

The assessment of vector-borne diseases is identified in the Risk Assessment and Control Measures document as HA9.

The likelihood of a vector-borne disease being detected on the KUR-World site resulting in an impact to guests and staff members, ecology in the surrounding forest and creeks and the ability to provide services was assessed as being unlikely (AEP between 1% to <10% per year).

The consequences to people were assessed as major resulting in a HIGH risk rating. The consequences to environment, economy, reputation and social setting and were assessed as moderate resulting in a MEDIUM risk rating and the consequences to property were assessed as minor resulting in a LOW risk rating prior to the consideration or implementation of any control measures or mitigation strategies.

The confidence of these data is scored as low

18.5.2.9.2 Proposed controls and mitigation strategies

To effectively mitigate the risks associated with vector-borne diseases it is essential to develop and implement an integrated pest management strategy. This will include control strategies on site to minimise mammals, birds, insects or any other vectors which may transmit disease pathogens. Habitat and environmental control measures should be taken by removing or reducing areas where vectors can easily breed (e.g. stagnant water). Additional controls and treatment strategies include guest education to raise awareness of vector threats and measures they can implement to limit exposure to insects or animals that are known disease vectors (e.g. use screens on windows, protective clothing, insect repellent, etc.). A

General Practitioner (GP) should be available on site to provide medical care to guests as required. An assessment on the effectiveness of these controls resulted in a rating of medium.

Table 0-21 Proposed controls and mitigation strategies for vector borne disease.

Proposed Controls / Treatment Strategies	Control Level	Impact Category	Residual Consequence	Residual Likelihood	Residual Risk
- Development of an integrated pest management strategy. - Implement control strategies on site to limit the mammals, birds, insects or other arthropod vectors which may transmit disease pathogens. - Habitat and environmental control by removing or reducing areas where vectors can easily breed e.g. stagnant water. - Guest education to raise awareness of vector threats and to limit exposure to insects or animals that are known disease vectors e.g. use screens on windows, protective clothing, insect repellent, etc. - Availability of a General Practitioner (GP) on site to provide medical care to guests.	High	People	Minor	Unlikely	Low
		Environment	Minor	Unlikely	Low
		Economy	Minor	Unlikely	Low
		Reputation	Minor	Unlikely	Low
		Social Setting	Minor	Unlikely	Low
		Property	Insignificant	Unlikely	Very Low

18.5.2.9.3 Residual risk

Following the application of the proposed control measures and mitigation strategies, the residual likelihood of vector-borne diseases impacting KUR-World is still considered an unlikely event (AEP between 1% to <10% per year).
However, the consequences to people, environment, economy, reputation and social setting would be reduced to minor resulting in a **LOW** residual risk rating and the consequence to property would be reduced to insignificant resulting in a **VERY LOW** residual risk rating.

18.5.2.10 Pests and diseases

Australia's biosecurity system provides protection from exotic pests and diseases. "Exotic plants, pests and diseases are either not present in Australia, or are present but not established and are under an official containment and/or eradication program" (DAF, 2017). These exotic pests have far reaching impacts and the potential to damage the natural environment, destroy plant production and agricultural industries. Invasive weed species (e.g. *Lantana camara*, navua sedge, etc.) also have the potential to damage ecosystems, reduce productivity and profitability, limit the long-term sustainability of the State's agricultural and natural resources and potentially affect human health and peoples' livelihoods. Weeds also increase the risk of fire and costs to infrastructure maintenance and make recreation areas less pleasant.

Queensland is fortunate to be free from many of the world's most damaging plant diseases, pests and weeds. However, some recent examples in Far North Queensland include:

- The detection of Navua Sedge in Cairns in 1979 (now prolific in FNQ).
- The detection of yellow crazy ants in the Kuranda area (Russett Park) in 2013.
- The detection of Panama Disease TR4 on a banana farm in Tully in 2015.

Different animal and plant species that might be vulnerable to pests and diseases can be found on the KUR-World site (e.g. *Litoria myola*). Pests and diseases could enter the property and be spread by equipment, vehicles and machinery and affect these species. Therefore, equipment hygiene is necessary and all vehicles that visit the property should be clean and well-maintained.

Pests and diseases can also occur in plant material, soil or manure. The introduction or spread of new weeds, pests and diseases onto the KUR-World property may result in reduced production and cost time and money. The best defence is to try to prevent the spread of new and existing pests and diseases on the KUR-World property by implementing sound biosecurity practices.

18.5.2.10.1 Risk assessment before mitigation

The assessment of pests and diseases is identified in the Risk Assessment and Control Measures document as HA10.

The likelihood of a pest or disease outbreak occurring on the KUR-World site resulting in an impact to guests and staff members, ecology in the surrounding forest and creeks and the ability to provide services was assessed as unlikely with an annual exceedance probability (AEP) between 1% to <10% per year for people, economy, reputation, social setting and property. The likelihood for environment was assessed as likely with an annual exceedance probability (AEP) between 10% to <63% per year.

The consequences to environment were identified as catastrophic resulting in an EXTREME risk rating, the consequences to economy were also assessed as major resulting in a HIGH risk rating, the consequences to reputation, social setting and property were assessed as moderate resulting in a MEDIUM risk rating. The consequences to people were assessed as minor resulting in a LOW risk rating prior to the consideration or implementation of any control measures or mitigation strategies.

The confidence of these data is scored as low.

18.5.2.10.2 Proposed controls and mitigation strategies

Management Plan as part of the Biosecurity Plan for the site. This plan should be developed in cooperation with Biosecurity Queensland and include a range of quick and simple measures built into everyday practices to help protect the property. It is recommended that vehicle wash down facilities are provided during the construction phase to minimise pests and diseases bought to site. Additional controls and treatment

strategies include ensuring that all seeds and plants are sourced from reputable sources and suppliers, that all imported material be certified as free of biosecurity risk (and also free of harmful by products of any associated treatment to afford biosecurity free status), restrict site access and movement within the site and undertake periodic surveys targeted to the early detection and timely control of biosecurity risks. An assessment on the effectiveness of these controls resulted in a rating of medium.

Table 0-22 Proposed controls and mitigation strategies for pests and diseases.

Proposed Controls / Treatment Strategies	Control Level	Impact Category	Residual Consequence	Residual Likelihood	Residual Risk
- Development and implementation of a robust Biosecurity Plan to address weeds and pests in cooperation with Biosecurity Queensland (DAF). - All seeds and plants to be sourced from reputable sources and suppliers. - Vehicle wash-down facilities provided during the construction phase to minimise pests and weeds brought to site. - Integrated Weed and Pest Management Plan. - All imported material to be certified as free of biosecurity risk (and also free of harmful by products of any associated treatment to afford biosecurity free status). - Restrict site access and movement within the site. - Periodic surveys targeted to the early detection, and timely control, of biosecurity risks.	Medium	People	Insignificant	Rare	Very Low
		Environment	Major	Unlikely	High
		Economy	Minor	Rare	Low
		Reputation	Minor	Rare	Low
		Social Setting	Insignificant	Rare	Very Low
		Property	Insignificant	Rare	Very Low

18.5.2.10.3 Residual risk

Following the application of the proposed control measures and mitigation strategies, the residual likelihood of a pest or disease impacting KUR-World is reduced to a rare event (AEP between 0.1% to <1% per year) in terms of people, economy, reputation, social setting and property. However, the residual likelihood of a pest or disease affecting the environment is considered unlikely (AEP 1% to <10% per year).
The residual consequences to environment were assessed as major resulting in a HIGH risk rating, the residual consequences to economy and reputation were assessed as minor resulting in a LOW risk rating whilst the residual consequences to people, social setting and property were reduced to insignificant resulting in a VERY LOW residual risk rating.

18.5.2.11 Biological hazards

Biological agents include bacteria, viruses, fungi, parasitic worms and some plants that pose a threat to human health and other living organisms. Biological agents are living organisms that can cause illness and disease in humans. Biological agents enter the body when they are inhaled, eaten or absorbed, multiply quickly and may be passed from one person to another. Some can survive outside the body for a quite a long time if they have the right conditions, such as water or food; others die quickly without the body for protection.

Biological agents that can cause disease are known as pathogens. People who work with animals or plants or in health and child care are most at risk in terms of biological hazards. People who work with ventilation systems, sanitation or sewage operations are also at higher risk. The proposed KUR-World will have workers at high risk for biological hazards (e.g. farm workers, maintenance workers and health clinic workers).

18.5.2.11.1 Risk assessment before mitigation

The assessment of biological hazards is identified in the Risk Assessment and Control Measures document as HA11. The likelihood of exposure to a biological hazard at the KUR-World site resulting in an impact to guests and staff members, buildings, structures, ecology in the surrounding forest and creeks and the ability to provide services was assessed as likely with an annual exceedance probability (AEP) between 10% to <63% per year).

The consequences to people, environment, reputation, social setting and property were assessed as minor resulting in a MEDIUM risk rating prior, whilst the consequences to economy were assessed as insignificant resulting in a LOW risk rating prior to the consideration or implementation of any control measures or mitigation strategies.

The confidence of these data is scored as low.

18.5.2.11.2 Proposed controls and mitigation strategies

To effectively mitigate the risks associated with biological hazards, good personal hygiene must be practiced (e.g. regular hand-washing) as it is one of the best ways to prevent the transmission of infections. Any equipment that could harbour bio-hazards (e.g. fans, ventilation systems) must be regularly maintained, cleaned and sterilized, and any spills cleaned up immediately. Work surfaces should be cleaned and disinfected regularly. Relevant staff will need to be provided with training on safe handling and disposal of biological materials and personal protective equipment (e.g. gloves, masks, etc.) should be worn where appropriate. Blood and any other bodily fluids should always be handled carefully as they could be infectious. In case of an injury, every individual should be handled in a way that minimizes exposure to blood and other body fluids. Additional controls and treatment strategies include the provision of adequate first aiders and a GP on site to provide medical care to guests. An assessment on the effectiveness of these controls resulted in a rating of high.

Table 0-23 Proposed controls and mitigation strategies for biological hazards.

Proposed Controls / Treatment Strategies	Control Level	Impact Category	Residual Consequence	Residual Likelihood	Residual Risk
- Practice good personal hygiene (e.g. regular hand-washing) as it is one of the best ways to prevent the transmission of infections. - Ensure that any equipment that might harbour bio-hazards (e.g. fans, ventilation systems) is regularly maintained, cleaned and sterilized. - Clean and disinfect work surfaces often. - Clean up spills immediately. - Handle and dispose of all bio-hazardous waste materials safely. Blood and any other bodily fluids should always be handled carefully as they could be infectious. In the event of an injury or bleeding, every individual should be handled in a way that minimises exposure to blood and body fluids. - Wear personal protective equipment (e.g. gloves, masks, etc.) where appropriate. - Ensure relevant staff are provided with training on safe handling of biological materials. - Availability of a General Practitioner (GP) on site to provide medical care to guests. - Provision of adequate first aiders and supplies on site.	High	People	Insignificant	Likely	Low
		Environment	Insignificant	Likely	Low
		Economy	Insignificant	Likely	Low
		Reputation	Insignificant	Likely	Low
		Social Setting	Insignificant	Likely	Low
		Property	Insignificant	Likely	Low

18.5.2.11.3 Residual risk

Following the application of the proposed control measures and mitigation strategies, the residual likelihood of exposure to a biological hazard at the KUR-World site is still considered a likely event (AEP between 10% to <63% per year).
However, the residual consequences to people, environment, economy, reputation, social setting and property would be reduced to insignificant resulting in a **LOW** residual risk rating.

18.5.2.12 Interactions with wildlife and vegetation

Set in the Wet Tropics rainforest, the proposed KUR-World provides habitat for a diverse range of animals and plants. Native animals and plants that may be present on the proposed site include: snakes, cassowaries, frogs, pigs, wild dogs, marsupials (kangaroos, possums, etc.), leeches, Wait-a-while and stinging tree amongst others.

Guests and staff members of KUR-World may encounter native animals and vegetation. Interactions with native wildlife or vegetation (e.g. photographing wildlife seen on site and/or chance encounters on walking tracks, etc.) in an unsafe manner open the risks for potential injuries or accidents to occur.

18.5.2.12.1 Risk assessment before mitigation

The assessment of humans interacting with native wildlife and/or vegetation is identified in the Risk Assessment and Control Measures document as HA12.

The likelihood of guests of KUR-World interacting with native wildlife (e.g. snakes, cassowaries, frogs, wild dogs, etc.) and/or vegetation (e.g. stinging bush, etc.) resulting in an impact to guests and staff members and ecology in the surrounding forest and creeks was assessed as likely with an annual exceedance probability (AEP) between 10% to <63% per year).

The consequences to people and environment were assessed as major resulting in an EXTREME risk rating, the consequences to reputation and social setting were assessed as minor resulting in a MEDIUM risk rating. The consequences to economy and property were assessed as insignificant resulting in a LOW risk rating prior to the consideration or implementation of any control measures or mitigation strategies.

The confidence of these data is scored as moderate.

18.5.2.12.2 Proposed controls and mitigation strategies

To effectively mitigate the risks associated with guests interacting with native wildlife and/or vegetation, it is essential to provide guest education and information regarding hazards associated with wildlife interactions (e.g. If you encounter a snake, don't panic, back away to a safe distance and allow the snake to move away). Guest education can be in many forms and may include interpretive signage (e.g. be Cass-O-wary), signage with pictures and warnings of stinging trees, lawyer cane (aka wait-a-while), including first aid tips and information.

Additional controls and treatment strategies include provision of adequate first aiders and supplies on site including an Automatic External Defibrillator (AED), availability of a General Practitioner (GP) on site to provide medical care to guests as required. Relevant staff must be provided with training on adequate and safe handling of wildlife. It may be appropriate to provide opportunities for humans to interact with fauna in controlled circumstances (e.g. supervised frogging expeditions). An assessment on the effectiveness of these controls resulted in a rating of low.

Table 0-24 Proposed controls and mitigation strategies for interactions with wildlife and vegetation.

Proposed Controls / Treatment Strategies	Control Level	Impact Category	Residual Consequence	Residual Likelihood	Residual Risk
- Guest education and information regarding hazards (for humans and fauna) associated with wildlife interactions e.g. If you encounter a snake, don't panic. Back away to a safe distance and allow the snake to move away. Education can be in many forms and may include interpretive signage (e.g. be Cass-O-wary), information sheets, briefings, etc. - Guest education and information regarding hazards associated with vegetation interaction e.g. pictures and warnings of stinging trees, lawyer cane (aka wait-a-while) with first aid tips on what to do. - Availability of a General Practitioner (GP) on site to provide medical care to guests. - Provision of adequate first aiders and supplies on site including an Automatic External Defibrillator (AED). - Ensure relevant staff are provided with training on adequate and safe handling of biological wildlife. - Provide opportunities for humans to interact with fauna in controlled circumstances (e.g. supervised frogging expeditions).	Low	People	Minor	Likely	Medium
		Environment	Insignificant	Likely	Low
		Economy	Minor	Rare	Low
		Reputation	Insignificant	Likely	Low
		Social Setting	Insignificant	Likely	Low

18.5.2.12.3 Residual risk

Following the application of the proposed control measures and mitigation strategies, the residual likelihood of guests interacting with native wildlife and/or vegetation is still considered a likely event (AEP between 10% to <63% per year). For people, economy, reputation, social setting and property. For environment, the residual likelihood was assessed as rare with an annual exceedance probability (AEP) between 0.1% to <1% per year.
However, the consequences to people are reduced to minor resulting in a **MEDIUM** residual risk rating, the consequences to environment are reduced to minor resulting in a **LOW** risk rating whilst the consequences to economy, reputation, social setting and property would be reduced to insignificant, also resulting in a **LOW** residual risk rating.

18.5.3 Technological, abnormal and health and safety hazards

18.5.3.1 Structural fires

A structure fire is a fire involving the structural components of various types of residential, commercial or industrial buildings. In large development complexes, fire dangers are found almost everywhere and have the potential to present a major risk to people's safety, to property and to business continuity. Fire incidents could not only result in financial losses, they could also severely damage the reputation of KUR-World.

The 'population' of KUR-World cannot only be considered in terms of guests and employees, but must also include people in conference rooms and function rooms as well as visitors and patrons of shops, bars and restaurants. The goal is to protect people and property as effectively as possible and to minimise any operational interruptions and loss of customer base.

Fire in a large resort complex like KUR-World can occur because of malfunctions in electrical equipment (e.g. electrical distribution systems, motors, transformers, ventilators,); maintenance work such as welding or soldering; carelessness such as negligence in turning off electrical equipment; use of combustible materials and liquids (cleaning, painting.); smoking, cooking, temporary decorations for festivities and functions, etc. False fire alarms in resort facilities are also common occurrences and this will need to be effectively managed.

18.5.3.1.1 Risk assessment before mitigation

The assessment of structural fires is identified in the Risk Assessment and Control Measures document as TH1.

The likelihood of a structural fire occurring on the KUR-World site resulting in an impact to guests and staff members, buildings, structures, ecology in the surrounding forest and creeks and the ability to provide services was assessed as unlikely with an annual exceedance probability (AEP) between 1% to <10% per year.

The consequences to people and property were identified as catastrophic resulting in an EXTREME risk rating. The consequences to economy, reputation and social setting were assessed as major resulting in a HIGH risk rating and the consequences to environment were assessed as minor resulting in a LOW risk rating prior to the consideration or implementation of any control measures or mitigation strategies. The confidence of these data is scored as high.

18.5.3.1.2 Proposed controls and mitigation strategies

To effectively mitigate the risks associated with structural fires, any critical infrastructure must meet or exceed current design standards. KUR-World must also achieve compliance with the *Fire & Emergency Services Act 1990*, the Building Fire Safety Regulations 2008 and the fire safety technical provisions of the Building Code of Australia for the design and construction of buildings; including the use of fire retardant materials where appropriate. Approved fire alarms, detection, suppression and fire-fighting systems must be designed and installed in collaboration with Queensland Fire and Emergency Services and regular staff training, fire drills and evacuation exercises must be undertaken and lessons identified implemented. Additional controls and treatment strategies include: A Closed-Circuit Television (CCTV) system; provision of adequate on-site security personnel during the construction and operations phases to provide a high level of vigilance and a strong security regime; ensuring that combustible materials are stored in accordance with relevant legislation. Codes of Practice and Australian Standards and that general housekeeping should be undertaken regularly to ensure rubbish is not piled up underneath or against buildings. A Site Emergency Plan and an Emergency Evacuation Procedure needs to be developed identifying adequate Fire Assembly

Points (e.g. Golf Course) for the site and it is vital to ensure accurate records are maintained of guests, staff, contractors and visitors on site. Additionally, a Business Continuity Plan should be developed to ensure that the resort can continue to deliver critical business functions in the event of an unplanned disruption as well as ensuring adequate insurance cover if a fire does occur. An assessment on the effectiveness of these controls resulted in a rating of high.

Table 0-25: Proposed controls and mitigation strategies for structural fires.

Proposed Controls / Treatment Strategies	Control Level	Impact Category	Residual Consequence	Residual Likelihood	Residual Risk
- Compliance with the Fire & Emergency Services Act 1990, the Building Fire Safety Regulations 2008 and the fire safety technical provisions of the Building Code of Australia for the design and construction of buildings. - Approved fire alarm, detection, suppression and fire-fighting system designed and installed in collaboration with Queensland Fire and Emergency Services. - Provision of adequate on-site security personnel during construction phase with a high level of vigilance and a strong security regime. - Closed Circuit Television (CCTV) system. - Use of fire retardant materials during construction. - Ensure combustible materials are stored in accordance with relevant legislation, Codes of Practice and Australian Standards and that general housekeeping is undertaken regularly to ensure rubbish is not piled up underneath or against buildings, etc. - Development of a Site Emergency Plan and an Emergency Evacuation Procedure including identification of Fire Assembly Points (e.g. Golf Course). - Critical infrastructure meets or exceeds current design standards. - Ensure accurate records are maintained of guests, staff, contractors and visitors on site. - Undertake regular staff training, fire drills and evacuation exercises and implement lessons identified. - Insurance. - Business Continuity Plan.	High	People	Minor	Unlikely	Low
		Environment	Minor	Unlikely	Low
		Economy	Moderate	Unlikely	Medium
		Reputation	Moderate	Unlikely	Medium
		Social Setting	Minor	Unlikely	Low
		Property	Moderate	Unlikely	Medium

18.5.3.1.3 Residual risk

Following the application of the proposed control measures and mitigation strategies, the residual likelihood of a structural fire impacting KUR-World is still considered an unlikely event (AEP between 1% to <10% per year).

However, the consequences to economy, reputation and property would be reduced to moderate resulting in a **MEDIUM** residual risk rating, whilst the consequence to people, environment and social setting would be reduced to minor resulting in a **LOW** residual risk rating.

18.5.3.2 Disruption to water supply

The KUR-World property is not presently serviced with an existing connection to Mareeba Shire Council's water supply network. The existing water supply and storage infrastructure on the KUR-World site includes:

- Two operational groundwater bores fitted with submersible bore pumps, temporary headworks and 75mm diameter polyethylene supply mains servicing the existing homestead and farm dam.
- Five additional (non-operational) test bores that have not been fitted with pumps or headworks
- An existing 19ML earthen farm dam fed by the two operational groundwater bores and rainfall.

The proposed KUR-World project will generate significant water demands. The estimated total water demand is anticipated to be within the ultimate spare capacity of Mareeba Shire Council's existing Kuranda treatment plant. Connection to this network will require construction of new trunk distribution infrastructure including mains extension, pipelines and additional storage reservoirs. This will supply potable water to the site.

In addition to potable water which must meet strict quality criteria, the resort will also capture, treat and recycle water (e.g. storm water) which can be used for toilet flushing, fire-fighting and irrigation amongst others. The abstraction of groundwater through a system of on-site bores (and associated treatment, storage and distribution infrastructure) will also form a key component of the KUR-World's water supply strategy.

Good business planning includes reducing risk and strengthening resiliency to overcome adverse events. The importance of a constant supply of water during the construction and operations phases of the proposed KUR-World development cannot be underestimated. During construction, water will be needed to meet workforce demand and the construction process (e.g. earthworks, dust control, concreting).

During operations, water will be needed to meet guest and staff demand as well as kitchens, laundries, swimming pools, irrigation, and other facilities. Water supply interruptions can be caused by several types of events including natural disasters, infrastructure failure or damage, contamination or even an act of terrorism. A water supply failure would be a significant issue for the resort and impacts may include no water for drinking, handwashing, food preparation, flushing toilets, showering, laundry services, fire suppression sprinkler systems, heating, ventilation and air conditioning, etc.

Water supply interruptions may be short lived lasting a few hours or possibly extend to a few days or more depending on the issue and the degree of damage sustained. In some circumstances, a boil-water order may be issued by the Mareeba Shire Council for those on the Kuranda reticulated supply and might remain in effect until satisfactory microbial sample results are obtained and approved.

18.5.3.2.1 Risk assessment before mitigation

The assessment of disruption to the water supply is identified in the Risk Assessment and Control Measures document as TH2.

The likelihood of the water supply being disrupted as a result of infrastructure failure and/or contamination resulting in an impact to guests and staff members, buildings, structures, ecology in the surrounding forest and creeks and the ability to provide services, was assessed as likely with an annual exceedance probability (AEP) between 10% to <63% per year.

The consequences to people, economy, social setting and property were identified as moderate resulting in a HIGH risk rating, whilst the consequences to environment and reputation were assessed as minor resulting in a MEDIUM risk rating prior to the consideration or implementation of any control measures or mitigation strategies.

The confidence of these data is assessed as high.

18.5.3.2.2 Proposed controls and mitigation strategies

To effectively mitigate the risks associated with the water supply being disrupted, it is necessary to ensure compliance with the *Water Act 2000* and all other relevant legislation and standards. It is intended to connect to the Mareeba Shire Council (Kuranda scheme) reticulated water supply for potable water which will provide some level of resilience in terms of water treatment, monitoring and testing regimes, ensuring potable water supply remains safe for human consumption. Given the complex legislative and regulatory environment surrounding the supply of drinking water to consumers and associated technical capacity and capability required to operate and maintain drinking water systems, it is proposed that all drinking water required for KUR-World is supplied by Mareeba Shire Council via connection to their network. Despite this, it will be necessary for KUR-World to provide an emergency water supply for use during periods of disruption (e.g. utilizing storage of potable water and/or bore water and/or rainwater).

Tanks, reservoirs and other water infrastructure must be roofed and vermin proof and a Water Quality Incident Management Strategy must be developed and implemented. Generators should be available to service critical water infrastructure on site in the event of a power failure. Various strategies should be implemented to minimise water usage and wastage across the site.

Additionally, regular checks, maintenance and calibration of all water infrastructure must be undertaken. Commonly replaceable spare parts should be kept on hand. Management of the resort should ensure that all water quality complaints on site are investigated in a timely manner. A robust Business Continuity Plan should also be developed to ensure critical functions can be maintained in the event of a water supply disruption. An assessment on the effectiveness of these controls resulted in a rating of high.

Table 0-26: Proposed controls and mitigation strategies for water supply infrastructure failure.

Proposed Controls / Treatment Strategies	Control Level	Impact Category	Residual Consequence	Residual Likelihood	Residual Risk
- Compliance with the *Water Act 2000* and all other relevant legislation and standards. - Connection to the Mareeba Shire Council (Kuranda scheme) reticulated water supply for potable water. - Provision of an emergency water supply for use during periods of disruption e.g. installation of rainwater tanks (in accordance with Department of Health requirements), bore water, etc. - Tanks, reservoirs and other water infrastructure to be roofed and vermin proof. - Development and implementation of a Water Quality Incident Management Strategy e.g. alarms, escalation and notification procedure, action plans, etc. - Implementation of various strategies to minimise water usage and wastage e.g. strategies to recharge groundwater, capturing and treating storm water for irrigation, toilet flushing, native planting, etc. - Minimise water consumption through water efficient planning, design, construction and operation. - Maximise opportunities for on-site harvesting, treatment and reuse of rainwater, storm water and site generated wastewater. - Design and operational strategies to minimise water use (e.g. water wise education / signage to guests and staff, leak detection and maintenance strategies, etc.). - Undertake regular checks, maintenance and calibration of all water infrastructure and keep spare replacement parts on hand. - Timely investigation of all water quality complaints. - Availability of generator in the event of a power failure. - Business Continuity Plan.	High	People	Insignificant	Likely	Low
		Environment	Insignificant	Likely	Low
		Economy	Minor	Likely	Medium
		Reputation	Insignificant	Likely	Low
		Social Setting	Minor	Likely	Medium
		Property	Insignificant	Likely	Low

18.5.3.2.3 Residual risk

Following the application of the proposed control measures and mitigation strategies, the residual likelihood of the water supply being disrupted as a result of infrastructure failure and/or contamination resulting in an impact to guests and staff members, buildings, structures, ecology in the surrounding forest and creeks and the ability to provide services is still considered a likely event (AEP between 10% to <63% per year).

However, the consequences to economy and social setting would be reduced to minor resulting in a **MEDIUM** residual risk rating whilst the consequences to people, environment, reputation and property would be insignificant resulting in a **LOW** residual risk rating.

18.5.3.3 Disruption to wastewater services

The KUR-World site is not presently serviced with a connection to the Mareeba Shire Council's reticulated wastewater collection system. The existing wastewater infrastructure on the KUR-World site is limited to a small scale (domestic) septic tank system servicing the existing homestead building.

The proposed development will generate significant wastewater loads. It is proposed that all wastewater generated by KUR-World will be dealt with on-site as it is expected to exceed any spare capacity within the Kuranda wastewater treatment plant and reticulation network. This will require appropriate infrastructure to be constructed and maintained to collect and treat wastewater from toilets, showers, baths, kitchen sinks and any other facilities. The inclusion of an on-site Wastewater Treatment Plant to treat site generated wastewater and produce high quality recycled water for on-site reuse has been identified in the Masterplan. The Wastewater Treatment Plant will need to be appropriately sized and managed effectively to cater for peak flows, ensure a suitable effluent quality for disposal and to prevent environmental harm. The importance of a reliable reticulated wastewater system during the operations phases of the proposed KUR-World development cannot be underestimated.

Treated wastewater from onsite STP's typically contains contaminants such as organic matter and disease-causing microorganisms (i.e. pathogenic bacteria and viruses). If not properly treated and managed, these contaminants could potentially cause a nuisance through offensive odours and pose a risk to the health of humans and harm to the environment. The potential health and environmental impacts that could result from discharging poorly treated or untreated effluent into the receiving environment (land and waters) include: contamination of soil, creeks, rivers and groundwater, as well as negative impacts on ecosystems and organisms residing in receiving waters. Additionally, public health risks may arise due to the presence of pathogens. Exposure to sewage or its products may result in many illnesses. People can be affected by direct or indirect spread of germs and parasites from sewage if it is not disposed of properly. Workers who will operate the on-site wastewater treatment plant are at higher risk as they may encounter sewage whilst performing their duties. However, an uncontrolled release of sewage as a result of infrastructure failure may also result in guests and visitors being exposed.

Failure of the sewerage system would create significant issues for the resort. Disruption may be short lived lasting a few hours or possibly extend to a few days or more depending on the issue and the degree of damage sustained to the infrastructure.

18.5.3.3.1 Risk assessment before mitigation

The assessment of sewerage infrastructure failure is identified in the Risk Assessment and Control Measures document as TH3.
The likelihood of the sewerage infrastructure failing resulting in an impact to guests and staff members, buildings, structures, ecology in the surrounding forest and creeks and the ability to provide services was assessed as likely with an annual exceedance probability (AEP) between 10% to <63% per year.

The consequences to people were assessed as major resulting in an EXTREME risk rating, while the consequences to environment, economy, social setting and property were identified as moderate resulting in a HIGH risk rating. The consequences to reputation were assessed as minor resulting in a MEDIUM risk rating prior to the consideration or implementation of any control measures or mitigation strategies.
The confidence of these data is scored as high.

18.5.3.3.2 Proposed controls and mitigation strategies

To effectively mitigate the risks associated with the sewerage infrastructure failing, it is essential to provide an on-site tertiary wastewater treatment facility with stand-alone back up power supply that is regularly maintained. A Sewerage Treatment, Maintenance & Operations Plan must be developed and implemented. Treated effluent water will be recycled and re-used within the resort (e.g. for toilet systems, emergency fire-fighting reserve, irrigation systems) and only treated effluent water that meets strict environmental quality standards will be released into creeks and rivers. An annual water quality monitoring program will also be implemented to ensure that KUR-World is not having any negative impact on the environment. Additional controls and treatment strategies include provision of emergency storage of sewage and consideration of viable strategies to capture biogas from sewage treatment process to generate renewable energy. A robust Business Continuity Plan should also be developed to ensure critical functions can be maintained in the event of a disruption caused by sewerage infrastructure failure. An assessment on the effectiveness of these controls resulted in a rating of high.

Table 0-27: Proposed controls and mitigation strategies for sewerage infrastructure failure.

Proposed Controls / Treatment Strategies	Control Level	Impact Category	Residual Consequence	Residual Likelihood	Residual Risk
- Provision and ongoing regular maintenance of an on-site tertiary sewerage treatment facility with stand-alone back up power supply. - Treated effluent water is to be recycled and re-used within the resort e.g. toilet systems, emergency fire-fighting reserve, irrigation systems, etc. - Only treated effluent water that meets strict environmental quality standards is to be released into creeks and rivers (no raw sewage). - Implement an annual water quality monitoring program to ensure that the resort is not having a negative impact on the environment. - Consider capturing biogas from sewage treatment process to generate renewable energy. - Design and operational strategies to minimise water use (e.g. water wise education / signage to guests and staff, leak detection and maintenance strategies, etc.). - Business Continuity Plan. - Provision of emergency storage of wastewater. - Implementation of Sewerage Treatment, Maintenance & Operations Plan.	High	People	Minor	Unlikely	Low
		Environment	Insignificant	Unlikely	Low
		Economy	Minor	Unlikely	Low
		Reputation	Insignificant	Unlikely	Low
		Social Setting	Minor	Unlikely	Low
		Property	Moderate	Unlikely	Medium

18.5.3.3.3 Residual risk

Following the application of the proposed control measures and mitigation strategies, the residual likelihood of the sewerage infrastructure failing resulting in an impact to guests and staff members, buildings, structures, ecology in the surrounding forest and creeks and the ability to provide services is reduced to an unlikely event (AEP between 1% to <10% per year).

The residual consequences to property were assessed as moderate resulting in a **MEDIUM** residual risk rating whilst the consequences to people, economy and social setting were reduced to minor resulting in a **LOW** residual risk rating and the residual consequences to environment and reputation were assessed as insignificant resulting in a **LOW** residual risk rating. Disruption to electricity supply.

18.5.3.4 Disruption to electricity supply

A constant supply of electrical power is an indispensable part of modern day life. Our work, leisure, healthcare, economy, and livelihoods depend on it and even temporary interruptions can be highly disruptive and result in relative chaos, monetary setbacks, and possible loss of life. The electrical supply is vulnerable to external influences such as weather conditions or third-party events causing supply interruptions.

The current electrical network servicing the Kuranda district is fed from a substation located in Mareeba, approximately 30km south west of Kuranda. This electrical network passes through the bounds of the KUR-World property. Another Ergon owned electrical network which is fed from a substation at Kamerunga is also located within the bounds of the development site. Currently, the electrical consumption at the KUR-World property is minor and exists as a single-phase feed that is utilised for farming tools, electric fencing and for the utilities of a small house.

The proposed development holds different challenges associated with energy supply. The loads generated during the construction phase will be large but much less significant than the final demand of the project. Throughout the construction stages, electricity will be required to provide power for minor loads at night and significant loads during the daytime. The construction stage large load consumers will include: compressors, fans, cranes, vehicles, lighting, hand tools amongst others. During construction, there should be adequate capacity on the existing substation in Mareeba. Supplementary power will also be provided by a generator on site as means to reduce the strain on the grid.

Annual energy demands (attributed to lighting, air-conditioning, general power, cooking, hot water, etc.) for the completed KUR-World development are estimated to be more than 30GWh per annum. To meet the substantial load that will be attributable to the proposed development, sizeable electrical works (substation upgrades and major infrastructure works) will be required to supply power to the site.

Power outages will present a unique challenge to KUR-World which is potentially a high-risk facility because of its design and high concentration of people. Loss of power will result in impacts to guest and employee safety, bearing in mind that resort guests will not be familiar with their surroundings and will vary greatly in physical condition and age. Loss of power will also lead to food spoilage and other impacts on the business. There is the potential for a “ripple effect”, where the failure of one essential service may lead to progressive failures of other essential services (e.g. loss of power could lead to loss of communications, loss of reticulated water supply, loss of sewage treatment capability). It is probable that loss of power may not only affect the resort, but could also have state-wide and possibly national consequences, resulting in a lack of external support capacity.

18.5.3.4.1 Risk assessment before mitigation

The assessment of electricity failure is identified in the Risk Assessment and Control Measures document as TH4.
The likelihood of an electricity infrastructure fail resulting in total or partial loss of supply that impacts to guests and staff members, buildings, structures, ecology in the surrounding forest and creeks and the ability to provide services was assessed as likely with an annual exceedance probability (AEP) between 10% to <63% per year.

The consequences to people, economy, social setting and property were identified as moderate resulting in a HIGH risk rating. The consequences to environment and reputation were assessed as minor resulting in a MEDIUM risk rating prior to the consideration or implementation of any control measures or mitigation strategies.

The confidence of these data is scored as high.

18.5.3.4.2 Proposed controls and mitigation strategies

Subject to further discussion with Ergon, KUR-World intends to connect to the Ergon network via high voltage extensions from the Kennedy Highway. To effectively mitigate the risks associated with power failure, it is essential that procedures are developed for the operation of any KUR-World owned High Voltage (HV) infrastructure in line with legislation and that regular maintenance of KUR-World owned electricity infrastructure is undertaken. The project should implement a mixed on-site power generation strategy to meet demand (e.g. generators, solar panels, bio-fuels, battery back-ups, etc.) and electricity generation equipment must be regularly maintained and tested. A Business Continuity Plan should also be developed to ensure that critical business functions can be maintained in the event of an unplanned power disruption. An assessment on the effectiveness of these controls resulted in a rating of medium.

Table 0-28 Proposed controls and mitigation strategies for electricity infrastructure failure.

Proposed Controls / Treatment Strategies	Control Level	Impact Category	Residual Consequence	Residual Likelihood	Residual Risk
- Planned connection to the Ergon network via high voltage extensions from the Kennedy Highway (requires further discussion with Ergon). - Procedures developed for operation of any KUR-World-owned High Voltage (HV) infrastructure in line with legislation. - Regular maintenance of KUR-World owned electricity infrastructure. - Mixed on-site energy generation strategy to meet requirements e.g. generators, solar panels, bio-fuels, wind, battery back-ups, etc. - Implement energy efficiency measures where appropriate (e.g. occupancy sensors, natural ventilation, energy efficient lighting, etc.) - Ensure electricity generation equipment is regularly maintained and tested. - Business Continuity Plan. - Environmental restoration plan.	Medium	People	Insignificant	Likely	Low
		Environment	Minor	Likely	Medium
		Economy	Minor	Likely	Medium
		Reputation	Insignificant	Likely	Low
		Social Setting	Insignificant	Likely	Low
		Property	Minor	Likely	Medium

18.5.3.4.3 Residual risk

Following the application of the proposed control measures and mitigation strategies, the residual likelihood of a power failure impacting KUR-World is still considered a likely event (AEP between 10% to <63% per year).

However, the consequences to environment, economy and property would be reduced to minor resulting in a **MEDIUM** residual risk rating whilst the consequence to people, reputation and social setting would be reduced to insignificant resulting in a **LOW** residual risk rating.

18.5.3.5 Disruption to Information and Communication Technology (ICT) services

Telephone communications (landline and mobile) are relatively good but can be prone to failure at critical times. Information and communications technologies (ICT) are at the core of day-to-day operations in thousands of enterprises from every sector, and often this hardware and software is business critical. Entrepreneurs understand that time is money, and as computer technology can work harder, faster and longer than any individual, investing in appropriate ICT and specialist software is essential.

However, as businesses become more dependent on technology, it needs to consider the implications of what will happen to the business if the technology fails. One of the most serious issues for crisis management in the future is society's dependence upon technology. The same technology which makes

life easier for all, and which everyone takes for granted when it is functioning as planned, has the potential to fail, for a variety of reasons, with potentially devastating consequences.

KUR-World, like many other businesses will be heavily reliant upon ICT. This will include phones, booking and reservation systems, EFTPOS, internet, television, radios, amongst other services. All forms of electronic communication could be impacted during a disruption which may affect one or multiple technologies. It is probable that the problem will not only affect the resort but may extend to an event with state-wide or possibly national consequences, resulting in a lack of external support capacity. KUR-World intends to connect to the Telstra/NBN network from the Kennedy Highway which will provide some resilience but it is important to have back up communication systems in place for when these networks are unavailable.

18.5.3.5.1 Risk assessment before mitigation

The assessment of ICT failure is identified in the Risk Assessment and Control Measures document as TH5. The likelihood of Information and communications technology infrastructure fails resulting in disruption to services which impacts guests and staff members, buildings, structures, ecology in the surrounding forest and creeks and the ability to provide services was assessed as likely with an annual exceedance probability (AEP) between 10% to <63% per year.

The consequences to economy were assessed as moderate resulting in a HIGH risk rating, the consequences to people, social setting and property were assessed as minor resulting in a MEDIUM risk rating and the consequences to environment and reputation were assessed as insignificant resulting in a LOW risk rating prior to the consideration or implementation of any control measures or mitigation strategies.

The confidence of these data is scored as high. Proposed controls and mitigation strategies.

KUR-World intends to connect to the Telstra/NBN network from the Kennedy Highway. To effectively mitigate the risks associated with ICT failure, it is essential that the resort considers alternative communications systems that can be used. An emergency alarm and control system with appropriate voice warnings and orders should be provided across the facilities, along with a robust messaging system to cater and communicate with employees. A private (closed channel) radio network is also recommended. Additionally, KUR-World should ensure generator capacity and an uninterrupted power supply for ICT infrastructure and implement a range of security measures to ensure networks are protected from cyber-attack. A Business Continuity Plan should also be developed to ensure critical functions can continue in the event of an unplanned disruption affecting information and communications technologies. An assessment on the effectiveness of these controls resulted in a rating of medium.

Table 0-29 Proposed controls and mitigation strategies for ICT infrastructure failure.

Proposed Controls / Treatment Strategies	Control Level	Impact Category	Residual Consequence	Residual Likelihood	Residual Risk
- Connection to the Telstra / NBN network from the Kennedy Highway. - Availability of private (closed channel) radio network. - Availability of Emergency Notification Network for employees. - Availability of a robust messaging system for all guests (e.g. non-English speaking). - Uninterrupted power supply and appropriate generator capacity available and maintained for information and communications infrastructure during power outages. - Ensure ICT networks are protected from cyber-attack. - Business Continuity Plan.	Medium	People	Minor	Likely	Medium
		Environment	Insignificant	Likely	Low
		Economy	Minor	Likely	Low
		Reputation	Insignificant	Likely	Low
		Social Setting	Insignificant	Likely	Low
		Property	Minor	Likely	Medium

18.5.3.5.2 Residual risk

Following the application of the proposed control measures and mitigation strategies, the residual likelihood of an ICT failure impacting KUR-World is still considered a likely event (AEP between 10% to <63% per year).
However, the consequences to economy, reputation and property would be reduced to moderate resulting in a **MEDIUM** residual risk rating whilst the consequence to people, environment and social setting would be reduced to minor resulting in a **LOW** residual risk rating.

18.5.3.6 Hazardous chemicals

The Work Health and Safety Regulation 2011 (WHS), covers workplace hazardous substances and dangerous goods under a single framework for hazardous chemicals.

Hazardous substances may be in the form of gas, vapour, fume, liquid or solid and are those that, following worker exposure, can have an adverse effect on health. Examples of hazardous chemicals include poisons, substances that cause burns or skin and eye irritation and substances that may cause cancer. Hazardous substances are classified based on health effects, whether acute (immediate) or chronic (longer term).

Dangerous goods are substances, mixtures or articles that, because of their physical, chemical or acute toxicity properties, present an immediate hazard to people, property or the environment. Dangerous goods include explosives, flammable liquids and gases, corrosives and chemically reactive or highly toxic substances. Dangerous goods are classified based on immediate physical or chemical effects, such as fire, explosion, corrosion and poisoning. An incident involving dangerous goods has the potential to seriously affect property and the environment.

The WHS Regulation 2011 also introduces a new hazard classification and hazard communication system based on the United Nations Globally Harmonised System of Classification and Labelling of Chemicals which became mandatory on 1 January 2017.

Whilst it is premature to try to identify all hazardous chemicals that may be used, stored, processed or produced by KUR-World, the proponent is committed to implementing a robust procedure to ensure chemicals are managed appropriately in the workplace. This will involve purchasing and supplier controls, contractor controls and management controls to ensure that the Principal Contractor (during the construction phase) and Resort Management (during the operations phase) have ultimate oversight of any hazardous chemicals used on site.

In addition to human health effects, improper storage, use or transport of hazardous chemicals may result in spills of hydrocarbons or other contaminants which may cause contamination of groundwater, surface water or land resulting in damage to flora, fauna and surrounding waterways. Appropriate precautions must be taken during natural hazard events such as cyclones and storms to avoid the release of hazardous materials into the environment (e.g. through floodwaters).

Table 0-30 below identifies the range of hazardous substances and dangerous goods likely to be used, stored, processed or produced by the KUR-World Integrated Eco-Resort as well as the estimated rates of usage.

Table 0-30: Identification of hazardous substances and dangerous goods for KUR-World resort

Dangerous Goods / Hazardous Chemical	Class and Packaging Group	Estimated Storage	UN Number	Purpose
Ammonium Hydroxide	Class 8 PG III	25L	2672	pH adjustment
Caustic Soda (Sodium Hydroxide)	Class 8 PG II	100L	1824	pH adjustment
Chlorine	Class 2.3	250L	1017	Disinfectant and pool maintenance

Dangerous Goods / Hazardous Chemical	Class and Packaging Group	Estimated Storage	UN Number	Purpose
Copper Chloride Hydroxide	Class 9 PG III	100L	3077	Pesticide, fungicide and algae control
Diesel	Class 3 PG III	5000L	1202	Fuel supply for generators, vehicles, plant, machinery, etc.
Ferric Chloride	Class 8 PG III	200L	2582	Flocculent
Fertilizer (nitrogen based)	Class 5.1 PG III	100kg	2067	Golf course, Farm
Hydrated Lime	Class 8 PG III	200kg	3262	Control hardness
Hydrogen Gas	Class 2.1	100kg	1049	Generator cooling
Industrial Adhesive	Class 3 PG III	50L	1133	Construction
Lithium-Ion Batteries	Class 9 PG II	200kg	3480	Energy demands, electrical devices
Liquid Alum	Class 8 PG III	00L	3264	Water treatment
LP Gas	Class 2.1	200L	1075	Vehicle / machinery fuel supply and commercial kitchen, hot water, etc.
Oil	Class 9 PG III	100L	3082	Vehicle / machinery oil supply
Paint (oil based)	Class 3 PG II	250L	1263	Internal and external decorative finishes
Paint (water based)	Class 2.1	250L	1950	Internal and external decorative finishes
Petrol	Class 3 PG II	2000L	1203	Vehicles and machinery
Silica Sand	-	5000kg	-	Construction – roads and buildings
Sodium Hypochlorite	Class 8 PG II	250L	1791	Sanitiser, disinfectant and pool treatment
Sulphuric Acid	Class 8 PG II	50L	1830	pH adjustment

18.5.3.6.1 Risk assessment before mitigation

The assessment of hazardous chemicals is identified in the Risk Assessment and Control Measures document as TH6.

The likelihood of an uncontrolled release of a hazardous chemical occurring resulting in an impact to guests and staff members, buildings, structures, ecology in the surrounding forest and creeks and the ability to provide services was assessed as likely with an annual exceedance probability (AEP) between 10% to <63% per year.

The consequences to people, environment, reputation and property were identified as moderate resulting in a HIGH risk rating. The consequences to economy and social setting were assessed as minor resulting in a MEDIUM risk rating prior to the consideration or implementation of any control measures or mitigation strategies. The confidence of these data is scored as high.

18.5.3.6.2 Proposed controls and mitigation strategies

To effectively mitigate the risks associated with hazardous chemicals, a Hazardous Substances Management Plan must be developed and implemented to ensure the appropriate storage, use and transport of hazardous materials in compliance with Australian Standards and all relevant legislation. This will include information on appropriate separation distances as well as incident response and reporting procedures. Additional controls and treatment strategies include: storing minimum volumes of required hazardous materials on site; notifying Emergency Services (e.g. QFES) of quantities held; and ensuring the availability of Safety Data Sheets (SDS) at appropriate locations. Refuelling of vehicles will be in designated areas only, fitted with spill containment. Any hazardous chemical storage areas will be bunded and spill kits will be made available on site. Hazardous chemical storage areas will have good road access for emergency vehicles. Training and education will be provided for relevant personnel including annual exercises to test clean up procedures and a robust Environmental Management System that includes annual reviews and ongoing maintenance will be implemented. Additionally, KUR-World should negotiate service for access to an online chemical management and compliance system and a professional services contract for hazardous material clean up and recovery operations if required. Through application of appropriate WHS standards and strict adherence to relevant Australian standards and other relevant industry codes of practice, the risk posed by identified dangerous goods and hazardous substances is considered manageable. An assessment on the effectiveness of these controls resulted in a rating of high.

Table 0-31 Proposed controls and mitigation strategies for release of a hazardous chemical

Proposed Controls / Treatment Strategies	Control Level	Impact Category	Residual Consequence	Residual Likelihood	Residual Risk
- Ensure appropriate storage, use and transport of hazardous materials in compliance with Australian Standards and all relevant legislation and codes of practice. - Bunded storage areas, availability of spill kits on site and clear access road to storage areas. - Development and implementation of a Hazardous Chemicals Management Register and Plan including appropriate storage as well as incident response and reporting procedures. - Training and education for relevant personnel including annual exercises to test clean up procedures. - Minimum volumes of required hazardous materials to be stored on site. Consider the need to notify Emergency Services (e.g. QFES) of quantities of hazardous materials held on site. - Availability of Safety Data Sheets (SDS) held at appropriate locations - Refuelling of vehicles in designated areas fitted with spill containment. - Implementation of a robust Environmental Management System that includes annual reviews and ongoing maintenance. - Negotiate a professional services contract for access to an online chemical management and compliance system as well as a contract for hazardous material clean up and recovery operations.	High	People	Insignificant	Likely	Low
		Environment	Insignificant	Likely	Low
		Economy	Insignificant	Likely	Low
		Reputation	Insignificant	Likely	Low
		Social Setting	Insignificant	Likely	Low
		Property	Insignificant	Likely	Low

18.5.3.6.3 Residual risk

Following the application of the proposed control measures and mitigation strategies, the residual likelihood of an uncontrolled release of a hazardous substance impacting KUR-World is still considered a likely event (AEP between 10% to <63% per year).

However, the consequences to people, environment, economy, reputation, social setting and property would be reduced to insignificant resulting in a **LOW** residual risk rating.

18.5.3.7 Security or terrorist related incident

The National Terrorism Threat Advisory System is a scale of five levels to provide advice about the likelihood of an act of terrorism occurring in Australia. “Credible intelligence, assessed by our security agencies, indicates that individuals or groups continue to possess the intent and capability to conduct a terrorist attack in Australia” (Australian National Security, n.d).

“The terrorist threat in Australia is from Islamist extremist individuals or small groups who use simple attack methodologies that enable them to act independently and with a high degree of agility. The simple nature of these attacks means preparation may not involve activity that is concerning enough to come to the attention of authorities—meaning there is no guarantee of early detection or disruption” (Australian National Security, n.d).

International tourist resorts are alluring targets for attack by terrorists. By their nature, these facilities are “soft targets”, attractive because their operational characteristics (e.g. crowded with people, multiple entrances and exits, lack of security and screening prior to entry, etc.) can potentially make them vulnerable and easy to exploit, thereby ensuring higher success. Around the world, there is evidence that hotels and resorts have been the target of such attacks. Terrorist attacks are designed to cause maximum disruption and fear and such attacks can have catastrophic impacts to the wider economy.

18.5.3.7.1 Risk assessment before mitigation

The assessment of a security or terrorist related incident is identified in the Risk Assessment and Control Measures document as TH7.

The likelihood of a security or terrorist related incident affecting the KUR-World site resulting in an impact to guests and staff members, buildings, structures, ecology in the surrounding forest and creeks and the ability to provide services was assessed as unlikely for people, economy, reputation and property with an annual exceedance probability (AEP) between 1% to <10% per year. The likelihood was assessed as rare for environment and social setting with an AEP between 0.1 to <1% per year.

The consequences to people were assessed as catastrophic resulting in an EXTREME risk rating, the consequences to environment, economy, reputation and property were assessed as major resulting in a HIGH risk rating and the consequences to social setting were identified as moderate resulting in a MEDIUM risk rating prior to the consideration or implementation of any control measures or mitigation strategies.

The confidence of these data is scored as low.

18.5.3.7.2 Proposed controls and mitigation strategies

To effectively mitigate the risks associated with security or terrorist related incidents it is essential to consult with Queensland Police Service Counter Terrorism liaison to ensure prevention through environmental design. This may include traffic management arrangements in heavily concentrated areas, pre-defined staging areas, etc. The KUR-World management team needs to understand the threats to the resort and its vulnerabilities. Dynamic risk assessments should be conducted on a regular basis and control measures implemented to manage risks (e.g. if alert level is raised due to internal or external threats/intelligence). Additional controls and treatment strategies include provision of adequate on-site security personnel with a high level of vigilance and a strong security regime, a CCTV system and availability of a robust alert system that is suitable for all guests (e.g. non-English speaking). It is vital that employees are trained on security principles, that plans are available for locking-down the development as well as evacuation arrangements; security measures should be maintained; plans and arrangements are exercised and lessons identified implemented. It is also important to consider cyber security and to establish a robust

ICT network and take steps to protect information, computers and networks from cyber-attacks. Back-ups of important business information and data should be undertaken on a regular basis. An assessment on the effectiveness of these controls resulted in a rating of medium.

Table 0-32: Proposed controls and mitigation strategies for security or terrorist related incident

Proposed Controls / Treatment Strategies	Control Level	Impact Category	Residual Consequence	Residual Likelihood	Residual Risk
- Consultation with Queensland Police Service Counter Terrorism liaison) to ensure prevention through environmental design e.g. traffic management in heavily concentrated areas, pre-defined staging areas, etc. - Train employees on security principles. - Provision of adequate on-site security personnel, a high level of vigilance and a strong security regime. - Closed Circuit Television (CCTV) system. - Establish a robust ICT network and take steps to protect information, computers and networks from cyber-attacks. Ensure regular back-ups of important business information and data. - Understand the threats to the resort and vulnerabilities. Conduct dynamic risk assessments and put in place control measures to manage risks if alert level is raised due to internal or external threats / intelligence. - Ensure plans are available for locking-down the resort as well as evacuation arrangements. - Regularly review and maintain security measures, exercise plans and arrangements and implement lessons identified. - Availability of a robust alert system that is suitable for all guests (e.g. non-English speaking, etc.)	Medium	People	Minor	Unlikely	Low
		Environment	Minor	Rare	Low
		Economy	Moderate	Unlikely	Medium
		Reputation	Minor	Unlikely	Low
		Social Setting	Minor	Rare	Low
		Property	Minor	Unlikely	Low

18.5.3.7.3 Residual risk

Following the application of the proposed control measures and mitigation strategies, the residual likelihood of a security or terrorist related incident impacting KUR-World is still considered a likely event (AEP between 10% to <63% per year).

However, the consequences to people, environment, economy, reputation, social setting and property would be reduced to insignificant resulting in a **LOW** residual risk rating.

18.5.3.8 Emergency condition arising at Tinaroo Falls Dam

Tinaroo Falls Dam is situated 14 km to the north east of Atherton on the Barron River. Completed in 1958, Tinaroo Falls Dam is a mass concrete gravity dam. The dam is owned by SunWater and its purpose is to supply irrigation water to the Mareeba-Dimbulah Water Supply Scheme and the Barron Gorge Hydro Power Station. The storage capacity at full supply level is 438,900 ML. Upgrade works were completed at the dam in 2011 with the installation of post-tensioned anchors and overflow scour protection. The Tinaroo Falls Dam is a category 1 referable dam. Referable dams, by definition, would put lives at risk if they were to fail. The dam has been designed to conform to the latest accepted design standards, so that its failure is highly unlikely. To maintain the dam in a safe condition and detect any emergency conditions as soon as they begin to develop or become apparent, SunWater undertakes a program of regular inspections at Tinaroo Falls Dam.

Under the Water Supply (Safety and Reliability) Act 2008, the owner of a referable dam must have an approved Emergency Action Plan (EAP) for the dam. The purpose of the EAP is to identify emergency conditions that could arise at Tinaroo Falls Dam, identify the areas likely to be affected for each condition and to prescribe emergency actions to be taken by the dam owners and operating personnel in identifying and responding to emergency conditions and notifying relevant entities. The Emergency Action Plan (EAP) for Tinaroo Falls Dam which is a publicly available document identifies different emergency conditions that may arise at the dam. An emergency condition for a dam, means a dam failure hazard, a dam release hazard or a circumstance that potentially indicates an increase in likelihood of a dam failure hazard or downstream release hazard happening. According to the SunWater Failure Impact Assessment (FIA) mapping, the following scenarios would result in inundation of the KUR-World project site:

Scenario 1: A flood event occurring in the Barron River with no failure of the dam.

A downstream release hazard may arise where the Tinaroo Falls Dam is at full supply level (EL 670.42m) and the rate of flow exceeds the capacity of the outlet works. The primary spillway will then discharge water downstream into the Barron River. These flood flows can create a downstream release hazard. As the rate of discharge increases, there will be an impact on low level road crossings. When the storage height exceeds moderate flood level (1.5m over the spillway), flows will begin to break out of the river banks and inundate low lying areas. When the storage height exceeds major flood level (2.7m over the spillway – EL 673.12m) flows will impact on urban areas. Historical data in the EAP shows that the Tinaroo Falls Dam reached EL 672.74m with 2.32m of water over the crest in February 1999. Impacts to the KUR-World site under this scenario would be minor.

Scenario 2: A Probable Maximum Precipitation Failure which is essentially the dam failing which coincides with the worst possible concurrent flooding.

The Probable Maximum Precipitation Design Flood is the worst flood that could occur in the catchment. The higher the storage levels in the dam, the greater the loads on the dam structure. This scenario essentially considers the worst possible flood with a concurrent failure of the dam. This would result in a downstream release hazard. Impacts to the KUR-World site under this scenario would be significant. Scenario 3: A dam failure occurring with no concurrent flooding. This is also known as a Sunny Day Failure and may arise as a result of a significant earthquake or due to foundation or piping condition at the dam. Impacts to the KUR-World site under this scenario would be significant.

The mapping showing inundation of the project site for a sunny day failure scenario is shown in Figure 0-12.

GIS data was not made available by SunWater for the PMP Design Flood – Dam Failure as this is currently being reviewed. Hard copy maps indicate that this scenario produces slightly worsening impacts on site to

the sunny day failure scenario. The Standard Emergency Warning Signal (SEWS) would be used in these scenarios and a warning period of approximately 6 hours would be available. Actual levels may differ from those shown in flood inundation maps due to variations in assumptions made in the models to actual flood events. The depth of water across the site is not known but is anticipated to be significant. Further work is required to compare inundation levels to terrain levels on the KUR-World site to provide a more qualified and confident assessment.

18.5.3.8.1 Risk assessment before mitigation

The assessment of a failure of Tinaroo Falls Dam is identified in the Risk Assessment and Control Measures document as TH8.

The likelihood of failure of Tinaroo Falls Dam resulting in flooding affecting the KUR-World site which in turn impacts guests and staff members, buildings, structures, ecology in the surrounding forest and creeks and the ability to provide services was assessed as very rare with an annual exceedance probability (AEP) between 0.01% to <0.1% per year.

The consequences to people and property were assessed as catastrophic resulting in a HIGH risk rating prior to the consideration or implementation of any control measures or mitigation strategies. The consequences to environment, economy, reputation and social setting were assessed as major resulting in a MEDIUM risk rating prior to the consideration or implementation of any control measures or mitigation strategies.

The confidence on these data is scored as moderate.

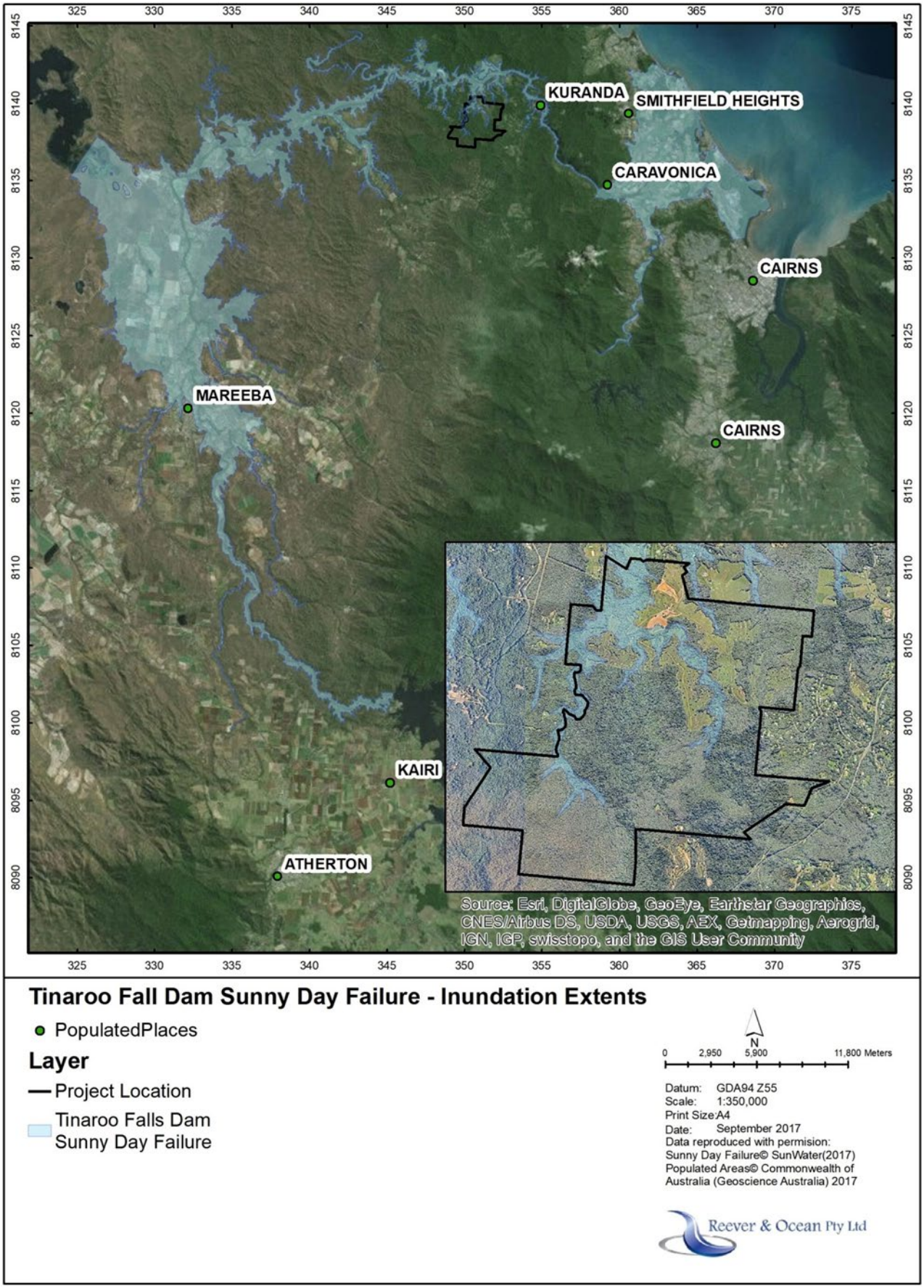

Figure 0-12: Tinaroo Falls Dam sunny day failure inundation on KUR-World site.

18.5.3.8.2 Proposed controls and mitigation strategies

It is not possible for the proponent to effectively mitigate all the risks associated with a failure of the Tinaroo Falls Dam. This must be considered in the context of the likelihood of such an event occurring and the fact that the consequences will be much greater for the region than local impacts to the KUR-World project. Mapping of this event indicates that any flooding should be contained within the existing flows on site. However, if the project is approved, the proponent should undertake their own detailed modelling of a failure of Tinaroo Falls Dam to better understand the flood depths that may occur on the project site. The KUR-World Emergency Management Plan will need to address prevention, preparation, response and recovery for dam failure hazard including a site evacuation plan for implementation when required. A helipad and evacuation facility on site (outside of anticipated flood inundation area) would be a last resource in the event of an emergency. Emergency management training will need to be provided for key personnel ensuring they understand the content and intent of the Tinaroo Falls Dam Emergency Action Plan (publicly available) and under what circumstances warnings will be issued and how they will be received and acted upon. An assessment on the effectiveness of these controls resulted in a rating of medium.

Table 0-33 Proposed controls and mitigation strategies for failure of Tinaroo Falls Dam.

Proposed Controls / Treatment Strategies	Control Level	Impact Category	Residual Consequence	Residual Likelihood	Residual Risk
- Undertake detailed modelling of a failure of Tinaroo Falls Dam to better understand the flood risk for the project site. - Ensure that key staff understand the content and intent of the Tinaroo Falls Dam Emergency Action Plan (publicly available). - Identification of a place of refuge on site (outside of anticipated flood inundation area) in the event of an emergency arising at Tinaroo Falls Dam. - Development and implementation of a site evacuation plan. - Emergency Management Plan to address PPRR for dam failure hazard. - Emergency management training for key personnel. - Helipad on site.	Medium	People	Moderate	Very Rare	Low
		Environment	Major	Very Rare	Medium
		Economy	Major	Very Rare	Medium
		Reputation	Moderate	Very Rare	Low
		Social Setting	Major	Very Rare	Medium
		Property	Catastrophic	Very Rare	High

18.5.3.8.3 Residual risk

Following the application of the proposed control measures and mitigation strategies, the residual likelihood of a failure of Tinaroo Falls Dam impacting KUR-World is still considered very rare (AEP 0.01% to <0.1% per year).

The proponent will need to accept that however unlikely, a risk to the project exists and it is beyond the control of the proponent to fully mitigate the consequences of this event on property which remains as a **HIGH** risk and similarly with environment, economy and social setting which remains a **MEDIUM** risk. The risk to people and to reputation can be effectively mitigated through implementation of the proposed controls and treatment strategies and this reduces the consequences to moderate which results in a **LOW** risk rating.

18.5.3.9 Failure of waste management

The existing site comprises a homestead, stables, grazing paddocks and a mixture of regrowth and old growth forests. Currently, there is no available data on the existing waste generation. However, given the current site use waste generation is expected to be negligible.

The proposed KUR-World development is anticipated to generate significant amounts of household municipal solid waste, commercial and industrial waste, green waste and manure waste. From the waste generation forecast, the following key waste streams can be identified:

Recyclables (paper, cardboard, plastic, glass, metal).
Organic waste (green waste, manure, food waste).
Mixed general waste and other residual waste.

Waste will be managed in accordance to the waste hierarchy which advocates the following order of preference:

- Prevention
- Preparing for re-use
- Recycling
- Other recovery
- Disposal as a last resort

Managing waste in this manner will help to achieve the principal objective of sustainable resource and waste management which is to use material resources more efficiently and to reduce the amount of waste requiring final disposal by landfill. In addition to negative environmental impact, as landfill capacity diminishes, the cost of waste disposal becomes more expensive.

If waste is not managed effectively, it has the potential to create unpleasant odours and may attract rodents and other wildlife and create human health hazards. It will also be important to monitor the effectiveness of the waste management systems (e.g. if organic waste is used to supplement the use of fertilisers, it will be important to monitor watercourses to ensure no negative effects).

18.5.3.9.1 Risk assessment before mitigation

The assessment of disruption to the on-site management of waste is identified in the Risk Assessment and Control Measures document as TH9.

The likelihood of the on-site management of waste failing resulting in an impact to guests and staff members, buildings, structures and, ecology in the surrounding forest and creeks was assessed as unlikely with an annual exceedance probability (AEP) between 1% to <10% per year.

The consequences to environment and reputation were assessed as moderate resulting in a MEDIUM risk rating whilst the consequences to people, economy, social setting and property were identified as minor resulting in a LOW risk rating prior to the consideration or implementation of any control measures or mitigation strategies.

The confidence of these data is scored as high.

18.5.3.9.2 Proposed controls and mitigation strategies

To effectively mitigate the risks associated with waste management, a three-stream bin system (mixed general waste, co-mingled recycling and food waste) should be provided throughout the site. Manure should be collected and stockpiled separately. Green waste will also be stockpiled separately at key locations across the site. It will be essential to have adequate waste collection points for all facilities across the site and once collected the waste should be taken to a centralised on-site waste and recycling collection point for sorting. Rodent and other wildlife control measures will need to be implemented to prevent infestation in storage facility areas and management plans will be developed and implemented for both, the construction and operations phases on how to manage different types of waste efficiently. There will be no burial of waste on site and all refuse and other waste will be taken off-site by licensed transporters and disposed of at Mareeba and/or Cairns waste transfer facility or other appropriate facilities dependent on the class of waste. Roads within the development that require access from waste collection vehicles must be at least 6.5m wide with a 12.5m turning radius (minimum). Additional controls and treatment strategies include encouraging staff and guests to recycle, compost and reduce waste through the provision of appropriate facilities and provision of on-site treatment (composting or anaerobic digestion) of the organic waste streams be used on site (e.g. for landscaping). An assessment on the effectiveness of these controls resulted in a rating of high.

Table 0-34 Proposed controls and mitigation strategies for onsite waste management failure.

Proposed Controls / Treatment Strategies	Control Level	Impact Category	Residual Consequence	Residual Likelihood	Residual Risk
- Provision of a three-stream bin system (mixed general waste, co-mingled recycling and food waste) throughout the site. - Collection points provided at key locations across the site. - Centralised on-site waste and recycling collection point (e.g. sorting, recycling, etc.) - Development of site management plans for different types of waste e.g. bio-fuels, solid waste, recycling, etc.) for the construction and operations phases. - Encourage recycling, composting and waste reduction through the provision of appropriate facilities. - Rodent / wildlife control to prevent infestation in storage facility areas. - No burial of waste on site. - Provision of green waste stockpiles at key locations across the site. - Provision of on-site treatment (composting or anaerobic digestion) of the organic waste streams is used on site (e.g. landscaping). - Manure to be collected and stockpiled separately.	High	People	Insignificant	Unlikely	Low
		Environment	Minor	Unlikely	Low
		Economy	Insignificant	Unlikely	Low
		Reputation	Minor	Unlikely	Low
		Social Setting	Insignificant	Unlikely	Low
		Property	Insignificant	Unlikely	Low

Proposed Controls / Treatment Strategies	Control Level	Impact Category	Residual Consequence	Residual Likelihood	Residual Risk
- All classes of waste to be dealt with appropriately e.g. waste to be taken off-site by licensed transporters to designated facilities e.g. Mareeba and / or Cairns. - Roads within the development that require access from waste collection vehicles must be at least 6.5m wide with a 12.5m turning radius (minimum).					

18.5.3.9.3 Residual risk

Following the application of the proposed control measures and mitigation strategies, the residual likelihood of a failure of waste management affecting the KUR-World site resulting in an impact to guests and staff members, buildings, structures, ecology in the surrounding forest and creeks and the ability to provide services is still considered an unlikely event (AEP between 1% to <10% per year).

However, the people, economy, social setting and property would be reduced to insignificant resulting in a **LOW** residual risk rating, whilst the consequences to environment and reputation would be reduced to minor also resulting in a **LOW** residual risk rating.

18.5.3.10 Helicopter accident

The Australian Transport Safety Bureau (ATSB) receives accident and incident notifications from pilots, airline operators, air traffic control, maintenance personnel, aerodrome operators, emergency services authorities, and from the public. The ATSB monitors safety through its core functions of independent investigation of accidents and incidents, and the analysis of data to identify emerging trends and identify issues before they lead to accidents. The types of occurrences required to be reported to the ATSB are detailed in the Transport Safety Investigation Regulations 2003 and deemed as either immediately reportable matters (IRMs) or routine reportable matters (RRMs).

The Australian Transport Safety Bureau website indicates that of the 15,324 aircraft on the Australian civil aircraft (VH-) register, 14 per cent (2,164 aircraft) are rotary-wing aircraft. The website also indicates that helicopters were involved in around one-quarter of all general aviation accidents and fatal accidents in the last 10 years, although they only account for 14 per cent of the Australian VH-registered fleet and flew far less hours than aeroplanes (ATSB, 2017 p.55).

The project site is approximately 16km (in a straight line) from the Cairns International Airport and 32km (in a straight line) from the Mareeba aerodrome. The proponent intends to provide some limited travel to and from the KUR-World site for guests by helicopter. A helipad will be provided on site to facilitate these arrangements. It is not anticipated that the project will have any effect on the operations of either the Cairns International Airport or the Mareeba aerodrome except for refuelling facilities. A helicopter accident could be caused by any number of factors including pilot error, aircraft damage, intrusion of a vehicle, person, animal or object within the helipad area that creates a collision hazard, bird or bat strike. Impacts may include fatalities and injuries, property damage and release of hazardous substances (e.g. aviation fuel) into the environment

18.5.3.10.1 Risk assessment before mitigation

The assessment of a helicopter accident occurring is identified in the Risk Assessment and Control Measures document as TH10.

The likelihood of a helicopter accident occurring resulting in an impact to guests and staff members, buildings, structures, ecology in the surrounding forest and creeks and the ability to provide services was assessed as unlikely with an annual exceedance probability (AEP) between 1% to <10% per year.
The consequences to people were assessed as catastrophic resulting in an EXTREME risk rating, the consequences to property were assessed as major resulting in a HIGH risk rating, the consequences to environment and economy were assessed as moderate resulting in a MEDIUM risk rating and the consequences to reputation and social setting were assessed as minor resulting in a LOW risk rating prior to the consideration or implementation of any control measures or mitigation strategies.

The confidence of these data is assessed as moderate.

18.5.3.10.2 Proposed controls and mitigation strategies

To effectively mitigate the risks associated with helicopter accidents, it is essential to consult with relevant stakeholders regarding the design and capacity of the on-site helipad to ensure it meets operational requirements. Relevant stakeholders will include commercial helicopter pilots as well as the QFES rescue helicopter crew to ensure that the rescue aircraft can land safely if required. The helipad will require suitable physical barriers to provide security and prevent unauthorised entry to the pad and surrounds by people and/or wildlife and a sealed access road from the helipad to other areas of the site. Areas disturbed during the construction of the helipad should be regenerated with grass and plant species known not to provide bird or bat food or shelter and strategies to control birds and bats away from the helipad area should be implemented, where required.

The proponent should restrict general helicopter operations to daytime flying only and ensure that all aircraft and infrastructure meet Australian Standards and relevant legislation, that routine maintenance schedules are strictly adhered to and that helicopter pilots hold the appropriate licences, insurances, have an impeccable safety standard and comply with CASA regulations. Despite restricting operations to day-time flying only, it is vital that the helipad meets safety standards (e.g. lighting, etc.) for night time operations if emergency medevac of guests is necessary. Prior to any flight, is important to ensure that conditions are safe and that every passenger receives a simple but comprehensive pre-flight safety briefing. Pilots should avoid flying over residential areas (on and off site) where possible.

Additional controls and treatment strategies include ensuring the availability of spill kits and containment equipment and ensuring a fire emergency plan is in place and that staff are trained in emergency procedures.

It is recommended that no aviation fuel (avgas) should be stored on site and that refuelling of helicopters takes place off site at either Cairns or Mareeba airports. It is also essential to ensure that an appropriate level of insurance is in place as a last resort control measure in the unlikely event that an accident does occur. An assessment on the effectiveness of these controls resulted in a rating of high

Table 0-35 Proposed controls and mitigation strategies for helicopter accident.

Proposed Controls / Treatment Strategies	Control Level	Impact Category	Residual Consequence	Residual Likelihood	Residual Risk
- Consult with relevant stakeholders (e.g. helicopter pilots and the QFES rescue helicopter crew) with regards to the design and capacity of the on-site helipad (e.g. size, weight requirements, need for a raised pad, ramp, etc.). - Areas disturbed during the construction of the helipad should be regenerated with grass and plant species known not to provide bird or bat food or shelter and strategies to control birds and bats away from the helipad area should be implemented where required. - Ensure all helicopter operators are licensed, insured, have an impeccable safety record and comply with CASA regulations. - Restrict general helicopter operations to daytime flying only. - Suitable physical barriers to prevent unauthorised entry of wildlife and people to landing pad and surrounds. - Ensure all flight conditions are safe. - Before departure, every passenger is to receive a simple but comprehensive pre-flight safety briefing. - Avoid flying over residential areas (on and off site). - All aircraft and infrastructure to meet Australian Standards and relevant legislation and routine maintenance schedules strictly adhered to. - Meet safety standards (e.g. lighting, etc.) for night time emergency operations e.g. medevac. - Fire emergency plans in place and regularly reviewed and staff trained in emergency procedures. - Availability of spill kits and containment equipment. - Insurance. - No Avgas to be stored on site. Refuelling of helicopters to take place off site (e.g. Cairns or Mareeba). - Sealed access road to / from the helipad.	High	People	Minor	Unlikely	Low
		Environment	Insignificant	Unlikely	Very Low
		Economy	Minor	Unlikely	Low
		Reputation	Minor	Unlikely	Low
		Social Setting	Minor	Unlikely	Low
		Property	Minor	Unlikely	Low

18.5.3.10.3 Residual risk

Following the application of the proposed control measures and mitigation strategies, the residual likelihood of a helicopter accident impacting KUR-World is still considered an unlikely event (AEP between 1% to <10% per year).

However, the residual consequences to people, economy, reputation, social setting and property would be reduced to minor resulting in a **LOW** residual risk rating whilst the residual consequences to environment were reduced to insignificant resulting in a **VERY LOW** residual risk rating.

18.5.3.11 Workplace accident

The work-related traumatic injury fatalities data from Safe Work Australia provides statistics about people who die each year from injuries caused by work-related activity. It includes fatalities that result from an injury sustained during a work activity (worker fatality) and as a result of someone else's work activity (bystander fatality).

In the 12 years from 2003 to 2015, 3,207 workers lost their lives in work-related incidents. 65% of worker fatalities involved vehicles, of which over 40% were due to a vehicle collision on a public road. In 2015, there were 195 worker fatalities, equating to a fatality rate of 1.6 fatalities per 100,000 workers—the lowest rate during that 2003-2015. "As at 26 April, 51 Australian workers have been killed at work in 2017 (Safe Work Australia, 2017)". The term workplace accident is deliberately broad and may include falls from height, drownings, electrocution, vehicle collision, crushing, workplace assault, etc.

Workplace accidents and fatalities may occur at any time during the construction and operations phases of KUR-World. However, the construction industry is a high risk industry in terms of workplace accidents and fatalities. Figure 0-13 below, indicates that 14% of all worker fatalities in Australia during 2003 to 2015 occurred in the construction industry. In 2015, the percentage of worker fatalities in the construction industry rose to 17% (Safe Work Australia, 2017).

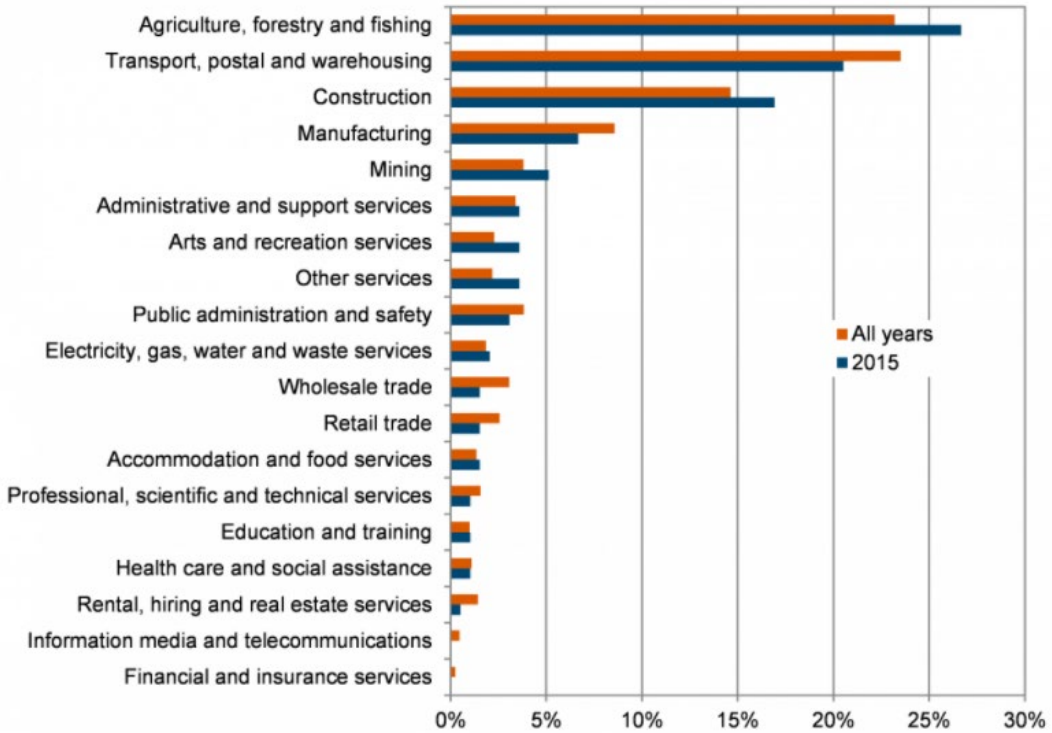

Figure 0-13: Worker fatalities: proportion by industry of employer, all years (2003 to 2015 combined) and 2015

18.5.3.11.1 Risk assessment before mitigation

The assessment of a workplace accident occurring is identified in the Risk Assessment and Control Measures document as TH11.

The likelihood of a workplace accident occurring which results in a fatality which impacts guests and staff members, buildings, structures, ecology in the surrounding forest and creeks and the ability to provide services was assessed as likely with an annual exceedance probability (AEP) between 10% to <63% per year.

The consequences to people and economy were assessed as major resulting in an EXTREME risk rating, the consequences to reputation and social setting were assessed as moderate resulting in a HIGH risk rating, the consequences to property were assessed as minor resulting in a MEDIUM risk rating and the consequences to environment were assessed as insignificant resulting in a MEDIUM risk rating prior to the consideration or implementation of any control measures or mitigation strategies.

The confidence of these data is scored as high.

18.5.3.11.2 Proposed controls and mitigation strategies

To effectively mitigate the risks associated with workplace accidents, KUR-World must adopt a strong positive safety culture throughout all phases of the project. This will include compliance with the *Work Health and Safety Act 2011*, the Work Health and Safety Regulation 2011, *Electrical Safety Act 2002* and the Electrical Safety Regulation 2013 and all other relevant legislation, Codes of Practice and Australian Standards.

Workplace Health and Safety Policy and Procedures including a Safety Management Plan will need to be developed and implemented for the construction and operations phases of the project which will include appointment of Health and Safety Representatives and establishment of a Health and Safety Committee to proactively identify, assess, control, monitor and review work health and safety risks. All activities conducted on site are to be performed by authorised personnel holding the relevant licenses, certifications and competencies and contractors should be selected on their ability to comply with WHS requirements. Additionally, all contractors will be required to submit Safe Work Method Statements (SWMS), risk assessments for all works and their own Safety Management Plans. A general Construction Induction Card (White Card) is required by all personnel working on site during the construction phase and a specific site induction process for all employees, contractors and visitors will be required for both the construction and operations phases of the project. On site security, signage and other methods of ensuring that no unauthorised access is obtained to the construction site is necessary. This may include barriers and fencing, CCTV and security lighting, systems to escort visitors and so on.

Appropriate Workplace Health and Safety training will be provided to employees and contractors (e.g. working at heights, safety management systems, etc.), effective fitness for work and fatigue management regimes will be implemented and pre-start meetings, toolbox talks and random safety audits will be regularly undertaken.

In terms of mitigating the risks associated with vehicles, proof of registration and insurance is required for all plant operating on site. It is vital that all plant, vehicle and equipment has radio communications and that operators (including contractors) are certified to operate designated plant, vehicle and equipment and that daily inspections are undertaken prior to the commencement of each shift. On and off-site traffic management plans will be developed and implemented for the construction and operation phases including speed limit restrictions and public notices regarding the timing of works and any likelihood of delays on the road network (e.g. Kuranda Range) will need to be issued as required. The Mareeba District

Disaster Management Plan identifies that the risk of multiple fatality road accidents is significant throughout the District, particularly in the Kuranda Range. (Mareeba DDMG, 2016 p.44).

Additional controls and treatment strategies include ensuring that all equipment is maintained and checked on a regular basis and that isolation, tagging and lock-out processes are implemented as required, ensuring that all employees and contractors have appropriate Personal Protective Equipment (PPE) as required, provision of suitable fire-fighting equipment including various classes of extinguisher for buildings and vehicles, availability of spill kits and training and education for relevant personnel including clean up and incident response and reporting procedures.

It is vital to develop a Site Emergency Plan and a Site Emergency Evacuation Procedure and ensure adequate provision of first aiders and supplies on site including an Automatic External Defibrillator (AED) and a helipad for medevac emergencies. During the operations phase, it will be important to ensure that all swimming pools meet requirements of relevant legislation, Code of Practice and Australian Standards and that trained lifeguards are available.

The KUR-World management should investigate and record all incidents, injuries and near misses (regardless of severity) so that lessons identified can be incorporated and ensure that reporting of relevant incidents to the appropriate bodies as required by legislation (e.g. WorkSafe QLD occurs in a timely manner). In the event of an accident occurring, it will be essential to have insurance including Workers Compensation in accordance with relevant legislation as well as a Business Continuity Plan to minimise the consequent disruption on the business. An assessment on the effectiveness of these controls resulted in a rating of high.

Table 0-36 Proposed controls and mitigation strategies for a fatality in the workplace incident.

Proposed Controls / Treatment Strategies	Control Level	Impact Category	Residual Consequence	Residual Likelihood	Residual Risk
- Compliance with the *Work Health and Safety Act 2011*, the Work Health and Safety Regulation 2011, *Electrical Safety Act 2002* and the Electrical Safety Regulation 2013 and all other relevant legislation, Codes of Practice and Australian Standards. - Development and implementation of Workplace Health and Safety Policy and Procedures including a Safety Management Plan for the construction and operations phases of the project. - Proactively identify, assess, control, monitor and review work health and safety risks. - Development of a Site Emergency Plan and a Site Emergency Evacuation Procedure. - Appointment of Health and Safety Representatives, establishment of a Health and Safety Committee and development of a strong and positive safety culture within the resort. - Appropriate Workplace Health and Safety training for all employees and contractors e.g. working at heights, safety management systems, etc.). - General Construction Induction Card (White Card) is required by all personnel working on site during the construction phase. - A specific site induction process for all employees, contractors and visitors (construction and operations phases). - All activities conducted on site are to be performed by authorised personnel holding the relevant licenses, certifications and competencies. - Select contractors on their ability to comply with WHS requirements and ensure that all contractors submit Safe Work Method Statements (SWMS), risk assessments for all works and their own Safety Management Plans. - Proof of registration and insurance required for all plant operating on site. - All plant, vehicle and equipment operators (including contractors) to be certified to operate designated plant, vehicle and equipment. - Daily inspection of plant, vehicles and equipment prior to commencement of shift.	High	People	Minor	Likely	Medium
		Environment	Insignificant	Likely	Low
		Economy	Insignificant	Likely	Low
		Reputation	Insignificant	Likely	Low
		Social Setting	Insignificant	Likely	Low
		Property	Minor	Likely	Medium

Proposed Controls / Treatment Strategies	Control Level	Impact Category	Residual Consequence	Residual Likelihood	Residual Risk
- Development and implementation of on-site and off-site traffic management plans for construction and operations phases including speed limit restrictions. - Public notices regarding the timing of works and any likelihood of delays on road network e.g. Kuranda Range. - Radio communications in vehicles / plant. - Availability of spill kits as well as training and education for relevant personnel including clean up and incident response and reporting procedures. - Undertake regular pre-start meetings, toolbox talks and random safety audits. - Implementation of effective fatigue management and fitness for work regimes. - Ensure that all equipment is regularly maintained and checked on a regular basis and that employees and contractors have appropriate Personal Protective Equipment (PPE) as required. Implement isolation, tagging and lock-out processes as required. - Ensure swimming pools meet requirements of relevant legislation, Code of Practice and Australian Standards and ensure the provision of trained lifeguards at resort swimming pools. - Provision of adequate first aiders and supplies on site including an Automatic External Defibrillator (AED). - Provision of suitable fire-fighting equipment including various classes of extinguisher (buildings and vehicles). - Availability of helipads. - Insurance including Workers Compensation in accordance with relevant legislation. - On site security, signage and other methods of ensuring no unauthorised access to construction site e.g. barriers and fencing, CCTV and security lighting, escorting visitors, etc. - Investigation and recording of incidents, injuries and near misses (regardless of severity) so that lessons identified can be incorporated. Reporting of relevant incidents to the appropriate bodies as required by legislation e.g. WorkSafe QLD.					

Proposed Controls / Treatment Strategies	Control Level	Impact Category	Residual Consequence	Residual Likelihood	Residual Risk
- Business Continuity Plan.					

18.5.3.11.3 Residual risk

Following the application of the proposed control measures and mitigation strategies, the residual likelihood of a workplace accident occurring which results in a fatality which impacts the KUR-World Integrated Eco Resort is still considered a likely event (AEP between 10% to <63% per year). However, the residual consequences to people and property would be reduced to minor resulting in a **MEDIUM** residual risk rating whilst the residual consequences to environment, economy, reputation, social setting were reduced to insignificant resulting in a **LOW** residual risk rating.

18.5.3.12 Noise, vibration and air quality issues

There are no known noise, vibration or air quality issues associated with the existing KUR-World property which comprises of a homestead, farm holding, stables and undeveloped land.

Noise, vibration and air quality issues could potentially be significant during the construction phase of the Integrated Eco-Resort and will need to be effectively managed to minimise the risks to people, adjoining properties and the environment.
The risks associated with noise, vibration and air quality issues are significantly higher during the construction phase, as opposed to the operations phase of the project. Construction site noise, vibration, dust and fumes require careful management as these environmental factors can affect human health, public safety and quality of life.

Contractors and adjoining properties could be exposed to health and safety hazards from construction if controls are not managed effectively. During later stages, it is probable that construction and operations will be occurring simultaneously which means that guests and staff of the resort could also potentially be impacted.

Noise: Excessive exposure to loud noise can irreversibly damage the ear, resulting in noise-induced hearing loss. 'Nuisance' noise can be annoying and distracting and result in reduced job performance and satisfaction. Noise may also be unsafe if it impairs communication in the work environment, such as by overpowering auditory alarms.

Vibration: Whole body vibration, e.g. from riding a mower, can affect comfort and performance even at low levels and can cause damage to the spine, stomach pain and gastrointestinal complaints. Hand-arm vibration, such as from hand tools, can have negative effects on muscles and the skeleton, and can contribute to carpal tunnel syndrome, low-back pain and vibration white finger, for example.

Air quality: Ventilation is important for the control of dust, fumes, gases, aerosols, climate and thermal comfort factors. Exposure to different types of dust can result in fibrosis of the lung, allergic reactions and asthma attacks. Various vapours, gases and aerosols can cause respiratory and skin damage. Air quality may also cause visibility issues.

18.5.3.12.1 Risk assessment before mitigation

The assessment of noise, vibration and air quality issues is identified in the Risk Assessment and Control Measures document as TH12.

The likelihood of noise, vibration and air quality issues arising at the KUR-World site which results in an impact to guests and staff members, buildings, structures, ecology in the surrounding forest and creeks and the ability to provide services was assessed as likely with an annual exceedance probability (AEP) between 10% to <63% per year.

The consequences to people were assessed as moderate resulting in a HIGH risk rating, the consequences to environment and economy were assessed as minor resulting in a MEDIUM risk rating and the consequences to reputation, social setting and property were assessed as insignificant resulting in a LOW risk rating prior to the consideration or implementation of any control measures or mitigation strategies.

The confidence of these data is scored as high.

18.5.3.12.2 Proposed controls and mitigation strategies

To effectively mitigate the risks associated with noise, vibration and air quality, it is essential to proactively identify, assess, control, monitor and review work health and safety risks and these should be included in the construction phase Environmental Management Plan. In terms of noise, all equipment used on site is to be designed and operated to comply with the Environmental Protection (Noise) Policy 1997 as well as any local by-laws. A noise complaints register will also be established and maintained for the entire life of the project. In terms of vibration and air quality issues, it is essential to enforce speed restrictions on site and to ensure that water trucks are available during the construction phase to assist with controlling dust from road and earthworks. Contractors should be selected on their ability to comply with WHS requirements and all contractors should submit Safe Work Method Statements (SWMS), risk assessments for all works and their own Safety Management Plans where appropriate. Additional controls and treatment strategies include ensuring that all employees and contractors receive appropriate Workplace Health and Safety training, that Health and Safety Representatives are appointed and that a Health and Safety Committee is established to develop a strong and positive safety culture within the resort. All incidents, injuries and near misses (regardless of severity) should be investigated and recorded so that trends can be identified and lessons incorporated. It is vital that reporting of relevant incidents to the appropriate bodies is undertaken as required by legislation e.g. WorkSafe QLD and that sufficient first aiders and supplies are available on site including an Automatic External Defibrillator (AED) in case of any accidents or injuries. An assessment on the effectiveness of these controls resulted in a rating of high.

Table 0-37 Proposed controls and mitigation strategies for noise, vibration and water quality issues.

Proposed Controls / Treatment Strategies	Control Level	Impact Category	Residual Consequence	Residual Likelihood	Residual Risk
- Design and operate all equipment to comply with the Environmental Protection (Noise) Policy 1997. - Compliance with local by-laws. - Complaints register. - Enforcement of speed restrictions on site. Water trucks available during construction phase to assist with controlling dust from road and earthworks. - Proactively identify, assess, control, monitor and review work health and safety risks. - Appointment of Health and Safety Representatives, establishment of a Health and Safety Committee and development of a strong and positive safety culture within the resort. - Appropriate Workplace Health and Safety training for all employees and contractors e.g. working at heights, safety management systems, etc.). - Select contractors on their ability to comply with WHS requirements and ensure that all contractors submit Safe Work Method Statements (SWMS), risk assessments for all works and their own Safety Management Plans where appropriate. - Undertake regular pre-start meetings, toolbox talks and random safety audits. - Provision of adequate first aiders and supplies on site including an Automatic External Defibrillator (AED). - Investigation and recording of incidents, injuries and near misses (regardless of severity) so that lessons identified can be incorporated. Reporting of relevant incidents to the appropriate bodies as required by legislation e.g. WorkSafe QLD. - Construction Environmental Management Plan.	High	People	Insignificant	Likely	Low
		Environment	Insignificant	Likely	Low
		Economy	Insignificant	Likely	Low
		Reputation	Insignificant	Likely	Low
		Social Setting	Insignificant	Likely	Low
		Property	Insignificant	Likely	Low

18.5.3.12.3 Residual risk

Following the application of the proposed control measures and mitigation strategies, the residual likelihood of noise, vibration and/or air quality issues arising at the KUR-World site and resulting in an impact to guests and staff members, buildings, structures, ecology in the surrounding forest and creeks and the ability to provide services is still considered a likely event (AEP between 10% to <63% per year).

However, the consequences to people, environment, economy, reputation, social setting and property would be reduced to insignificant resulting in a **LOW** residual risk rating.

18.5.3.13 Missing persons

Australia has very large open spaces. “Every year, more than 38,000 people are reported missing across the country. While most people are found within a short period of time, there remain approximately 1,600 long term missing persons. Long term missing persons are defined as those who have been missing for more than three months” (Australian Federal Police, 2016). State and Territory Police are responsible for investigating missing persons’ cases.

International visitors from around the world as well as domestic tourists and locals will be attracted to the KUR-World Integrated Eco-Resort to enjoy the natural beauty of the site and wider region. The site is quite large (625 ha) and occasionally, some guests (especially those from an urban environment) may get lost. In some cases, the impact may be a few hours or days of discomfort, in other cases the end result could be far more serious.

If a missing person scenario does arise on the site, the response will be coordinated by the Queensland Police Service with the assistance of the State Emergency Service (SES) where appropriate. Search operations may be conducted from the land or via air and have the potential to cause significant disruption to the business.

18.5.3.13.1 Risk assessment before mitigation

The assessment of missing persons is identified in the Risk Assessment and Control Measures document as TH13. The likelihood of a missing person scenario arising on the KUR-World site resulting in an impact to guests and staff members, buildings, structures, ecology in the surrounding forest and creeks and the ability to provide services was assessed as likely for people, economy, reputation and social setting with an annual exceedance probability (AEP) between 10% to <63% per year) and unlikely for environment and property with an annual exceedance probability (AEP) between 1% to <10% per year).

18.5.3.13.2 Risk assessment before mitigation

The assessment of missing persons is identified in the Risk Assessment and Control Measures document as TH13. The likelihood of a missing person scenario arising on the KUR-World site resulting in an impact to guests and staff members, buildings, structures, ecology in the surrounding forest and creeks and the ability to provide services was assessed as likely for people, economy, reputation and social setting with an annual exceedance probability (AEP) between 10% to <63% per year) and unlikely for environment and property with an annual exceedance probability (AEP) between 1% to <10% per year).

The consequences to people were assessed as major resulting in an EXTREME risk rating, the consequences to reputation were assessed as moderate resulting in a HIGH risk rating, the consequences to economy and social setting were assessed as minor resulting in a MEDIUM risk rating and the consequences to environment and property were assessed as minor resulting in a LOW risk rating prior to the consideration or implementation of any control measures or mitigation strategies.

The confidence of these data is scored as moderate.

18.5.3.13.3 Proposed controls and mitigation strategies

To effectively mitigate the risks associated with a missing person scenario arising on the KUR-World site it is essential that adequate signage is provided around the site especially on walking tracks. It will be necessary to implement a safety management system where guests tag in and out of walking tracks or are issued with some form of tracking device. There should be designated safety meeting points at key locations around the site which provide mobile phone reception, water supply and signage with details of the latitude and longitude and instruction to call 000 in an emergency and await rescue. Additional controls and treatment strategies include guest education in relation to bushwalking on the site (e.g. provision of maps, safety tips, essential gear, etc.). An assessment on the effectiveness of these controls resulted in a rating of medium.

Table 0-38 Proposed controls and mitigation strategies for missing person scenario.

Proposed Controls / Treatment Strategies	Control Level	Impact Category	Residual Consequence	Residual Likelihood	Residual Risk
- Provision of adequate signage around the site including walking tracks. - Implementation of safety management systems e.g. tag in and out of walking tracks, use of GPS tracking devices, etc. - Availability of designated safety meeting points at key locations around the site (e.g. with mobile reception, details of latitude and longitude, water, call 000 and wait here signage, etc.). - Guest education in relation to bushwalking e.g. maps, safety tips, essential gear, etc.	Medium	People	Insignificant	Likely	Low
		Environment	Insignificant	Unlikely	Low
		Economy	Insignificant	Likely	Low
		Reputation	Insignificant	Likely	Low
		Social Setting	Insignificant	Likely	Low
		Property	Insignificant	Unlikely	Low

18.5.3.13.4 Residual risk

Following the application of the proposed control measures and mitigation strategies, the residual likelihood of a of a missing person scenario arising on the KUR-World site is still considered likely for people, economy, reputation and social setting (AEP between 10% to <63% per year) and unlikely for environment and property (AEP between 1% to <10% per year).

However, the residual consequences across all categories were assessed as insignificant resulting in a **LOW** residual risk rating.

18.5.3.14 Security or terrorist related incident

The National Terrorism Threat Advisory System is a scale of five levels to provide advice about the likelihood of an act of terrorism occurring in Australia. "Credible intelligence, assessed by our security agencies, indicates that individuals or groups continue to possess the intent and capability to conduct a terrorist attack in Australia" (Australian National Security, n.d).

"The terrorist threat in Australia is from Islamist extremist individuals or small groups who use simple attack methodologies that enable them to act independently and with a high degree of agility. The simple nature of these attacks means preparation may not involve activity that is concerning enough to come to the attention of authorities—meaning there is no guarantee of early detection or disruption" (Australian National Security, n.d).

International tourist resorts are alluring targets for attack by terrorists. By their nature, these facilities are "soft targets", attractive because they have operational characteristics (e.g. crowded with people, multiple entrances and exits, lack of security and screening prior to entry, etc.) that can potentially make them vulnerable and easy to exploit, thereby ensuring higher success. Around the world, there is evidence that hotels and resorts have been the target of such attacks. Terrorist attacks are designed to cause maximum disruption and fear and such attacks can have catastrophic impacts to the wider economy.

18.5.3.14.1 Risk assessment before mitigation

The assessment of a security or terrorist related incident is identified in the Risk Assessment and Control Measures document as TH7. The likelihood of a security or terrorist related incident affecting the KUR-World site resulting in an impact to guests and staff members, buildings, structures, ecology in the surrounding forest and creeks and the ability to provide services was assessed as unlikely for people, economy, reputation and property with an annual exceedance probability (AEP) between 1% to <10% per year. The likelihood was assessed as rare for environment and social setting with an AEP between 0.1 to <1% per year.

The consequences to people were assessed as catastrophic resulting in an EXTREME risk rating, the consequences to environment, economy, reputation and property were assessed as major resulting in a HIGH risk rating and the consequences to social setting were identified as moderate resulting in a MEDIUM risk rating prior to the consideration or implementation of any control measures or mitigation strategies.

The confidence of these data is scored as low.

18.5.3.14.2 Proposed controls and mitigation strategies

To effectively mitigate the risks associated with security or terrorist related incidents it is essential to consult with Queensland Police Service Counter Terrorism liaison to ensure prevention through environmental design of the resort. This may include traffic management arrangements in heavily concentrated areas, pre-defined staging areas, etc. The KUR-World management team needs to understand the threats to the resort and its vulnerabilities. Dynamic risk assessments should be conducted on a regular

basis and control measures implemented to manage risks (e.g. if alert level is raised due to internal or external threats/intelligence).

Additional controls and treatment strategies include provision of adequate on-site security personnel with a high level of vigilance and a strong security regime, a Closed-Circuit Television (CCTV) system and availability of a robust alert system that is suitable for all guests (e.g. non-English speaking, etc.). It is vital that employees are trained on security principles, that plans are available for locking-down the resort as well as evacuation arrangements and that security measures are maintained, plans and arrangements are exercised and lessons identified implemented. It is also important to consider cyber security and to establish a robust ICT network and take steps to protect information, computers and networks from cyber-attacks. Back-ups of important business information and data should be undertaken on a regular basis. An assessment on the effectiveness of these controls resulted in a rating of medium.

Table 0-39 Proposed controls and mitigation strategies for security or terrorist related incident.

Proposed Controls / Treatment Strategies	Control Level	Impact Category	Residual Consequence	Residual Likelihood	Residual Risk
- Consultation with Queensland Police Service Counter Terrorism liaison) to ensure prevention through environmental design e.g. traffic management in heavily concentrated areas, pre-defined staging areas, etc. - Train employees on security principles. - Provision of adequate on-site security personnel, a high level of vigilance and a strong security regime. - Closed Circuit Television (CCTV) system. - Establish a robust ICT network and take steps to protect information, computers and networks from cyber-attacks. Ensure regular back-ups of important business information and data. - Understand the threats to the resort and vulnerabilities. Conduct dynamic risk assessments and put in place control measures to manage risks if alert level is raised due to internal or external threats / intelligence. - Ensure plans are available for locking-down the resort as well as evacuation arrangements. - Regularly review and maintain security measures, exercise plans and arrangements and implement lessons identified. - Availability of a robust alert system that is suitable for all guests e.g. non-English speaking, etc.	Medium	People	Minor	Unlikely	Low
		Environment	Minor	Rare	Low
		Economy	Moderate	Unlikely	Medium
		Reputation	Minor	Unlikely	Low
		Social Setting	Minor	Rare	Low
		Property	Minor	Unlikely	Low

18.5.3.14.3 Residual risk

Following the application of the proposed control measures and mitigation strategies, the residual likelihood of a security or terrorist related incident impacting KUR-World is still considered a likely event (AEP between 10% to <63% per year).

However, the consequences to people, environment, economy, reputation, social setting and property would be reduced to insignificant resulting in a **LOW** residual risk rating.

18.6 Proposed integrated emergency management arrangements

18.6.1 Integrated emergency management framework

The primary concern of the KUR-World Integrated Eco-Resort in any emergency will be staff, guest and visitor safety followed by the need to resolve the incident and recover the business. A key operational element of KUR-World's response to hazards is an Integrated Emergency Management Framework that comprises a suite of policies, plans and procedures.

The Integrated Emergency Management Framework and associated plans and procedures should be developed in consultation with the Mareeba Local Disaster Management Group (LDMG). Management of the KUR-World Integrated Eco-Resort should seek membership of the LDMG to facilitate communication between the project and senior emergency response personnel.

An overview of the required policies, plans and procedures that will comprise the Integrated Emergency Management Framework is provided below:

18.6.1.1 Emergency management plan

An overarching Emergency Management Plan will be needed for both the construction and operations phases of the project. Since the construction of the project will be staged over a period of 7.5 years and will at times occur simultaneously with operations, it is important that the plan is based on an all-hazards approach and is flexible and adaptable enough to ensure an integrated, coordinated and timely response to deal with any eventuality.

The overarching Emergency Management Plan for the project will be tailored to the cultural background and demographics of the visitors and will detail the structure, management arrangements and governance provisions which underpin the process. It will detail activities to be undertaken in the preparation phase to facilitate the best use of available resources and provide an overview of the arrangements in place for dealing with any emergency affecting the KUR-World site. This will involve setting out the role and responsibilities of the management team and key personnel from the initial notification through the various stages of response and recovery.

Whilst it is premature to develop a final Emergency Management Plan at this early stage of project planning, the framework of what the Emergency Management Plan should include is provided below:
Section 1: Overview of Emergency Management Plan

- Context
- Aim and Objectives
- Scope
- Planning Assumptions

- Ownership
- Affected Parties
- Linkages with other Plans and Documentation

Section 2: Activation & Notification Procedures

- Define what an emergency is for KUR-World.
- Decision criteria/triggers for activating the plan.
- Levels of activation (e.g. Alert, Lean Forward, Stand Up and Stand Down).
- Escalation process during the response to emergencies (internal and external).
- Notification and communication methods throughout the resort to staff and guests and external to emergency services, the public and the LDMG.

Section 3: Roles and Responsibilities
This section will document the role and responsibilities of all key staff involved in emergency response and recovery operations. This may include the KUR-World Chief Executive, the management team, various workgroups and sections, etc. The plan will build on the strengths and capabilities of the various teams involved.
Section 4: Concept of Operations - Response and Recovery

- Emergency Operations Centre
- Warnings & Information Dissemination
- Media Management
- Financial management
- Logistics and Resupply
- Undertaking impact and needs assessment
- Management of staff in the event of an emergency (given that many will want to defend and protect their own premises)
- Implementation of evacuation strategy
- Implementation of shelter in place strategy
- Reporting arrangements
- Activation of recovery arrangements and recovery operations (human-social, economic, environmental, built environment)

Section 5: Post-Event Procedures

- Debriefs
- Lessons identified
- Incident reports
- Review and renew plans
- Training and exercise schedule

Appendices

- Contact Lists
- Resource Lists

- Plan Distribution List

18.6.1.2 Sub-plans

The overarching Emergency Management Plan is to be complemented by several functional **Sub-Plans** which are designed to expand on information contained in the generic Emergency Management Plan by providing detailed operational information for the activation and operation of specific functions. Sub-Plans are designed to operate on a stand-alone basis or as part of a wider response, integrating seamlessly with other plans as required. Some examples of Sub Plans that may be required are identified below:

Media & Communications Sub-Plan
It is vital that the management of KUR-World adopts a proactive approach to crisis communications. The aim of the Media and Communications Sub Plan is to document the processes that will be implemented by the resort for managing the media and for the effective collection, monitoring, management and dissemination of accurate, useful and timely information and warnings to guests and staff before, during and after crisis events. The plan will also contain information on the communications systems available to support operations (e.g. radio system, guest notification system, PA systems).

Shelter & Evacuation Sub-Plan
This plan will enable all personnel on site to manage an effective and safe response to any emergency and will provide guidelines for actions to be taken during an incident to minimise potential for loss of life, injury to people and damage to the environment. The plan will contain the shelter-in-place strategy as well as information on when evacuation is required and evacuation routes. The plan will also document the arrangements for managing an on-site Place of Refuge/Evacuation Centre facility.

Bushfire Mitigation Sub-Plan
A coordinated approach to bushfire management is vital. The Bushfire Mitigation Sub-Plan will provide detail on the bushfire risks present at the resort and identify planning and mitigation efforts to reduce the risk of bushfire impacts to prevent loss of life and property.

Hazardous Substances Sub-Plan
The resort will need to develop and implement a Hazardous Substances Management Plan including appropriate storage as well as incident response and reporting procedures.

Health Sub-Plan
The Health Sub Plan will document the procedures to be followed in the event of an emergency to minimise health risks to guests and staff and will include the arrangements for dealing with biohazards as well as an outbreak of infectious diseases on the site including the procedures to be implemented by the Medical and Wellbeing Centre to provide the level of care required to affected guests.

Environmental Management Plan
An Environmental Management Plan (EMP) is a site or specific plan developed to ensure that appropriate environmental management practices are followed during a project's construction and/or operation. It is recommended that this plan contains a recovery strategy for regeneration of the environment and for feeding of wildlife as required.

Farm Biosecurity Management Plan
A Biosecurity Plan is a statutory obligation for farming businesses and also needs to be developed for the wider site. This plan will address animal diseases, plant diseases and pests and weeds and will document

the control measures to be implemented to manage biosecurity risks during the construction and operations phases of the project.

18.6.1.3 Business continuity plans

It is vital that KUR-World develops a robust Business Continuity Plan (BCP) to be implemented in the event of an incident which may result in an unplanned interruption to the business. The plan will identify the critical functions of the operation as well as areas of the business that can be suspended for a period of time to facilitate more critical activities. The BCP will also identify recovery priorities to resume normal operations.

18.6.2 Other policies and procedures

Work Health and Safety
WHS will meet industry best practice standards, relevant codes of practice and statutory provisions including but not necessarily limited to the Work Health and Safety Act. KUR-World will need to adopt a strong safety culture that proactively identifies WHS risks, identifies and implements control measures and regularly monitors and reviews the effectiveness of WHS risk management.

Risk Management Policy
The proponent is committed to continuous improvement of risk management processes as per AS/NZ ISO 31000:2009 Risk management – principles and guidelines.
First Aid
All site personnel will undergo a mandatory induction which will include first aid training. Selected personnel will be trained in advance resuscitation techniques. First aid stations and emergency response kits will be located at easily accessible and appropriate locations throughout the project site.

Fire Fighting
All site personnel will undergo a mandatory induction which will include simple fire training. All fire-fighting equipment utilised throughout the life of the project will meet Australian Standards and all other legislative requirements. Suitably sited fire-fighting equipment (including fire hose reels, blankets, and hand-held extinguishers) will be fitted to all buildings along with alarms, emergency lighting and exit signage in accordance with relevant Australian standards.

18.6.3 Training and exercises

KUR-World must ensure that a suitable training program is designed and implemented to maintain knowledge and understanding of employees around risk, emergency and business continuity management. Personnel that have responsibilities under emergency management plans will be expected to demonstrate their knowledge, skills and experience and undertake a program of continuous development. Evaluation of all training events must be undertaken to ensure training is effective and meets the end-user needs. An auditable record of attendance must be maintained.

Exercises are a key component of emergency management strategies as they allow procedural and functional weaknesses to be identified and mitigated prior to a real event. Exercising can take many forms from simple discussion type exercises to full scale, live operations and must be undertaken on a regular basis to allow staff opportunities to practice their roles in a safe and supportive learning environment.

18.7 Conclusion

Risk is integral to the proposed KUR-World Integrated Eco-Resort and it is within the proponent's interest to implement measures to effectively manage the risks to people, the environment, economy, reputation, social setting and property associated with the development. This Hazards, Health & Safety Impact Assessment is a robust process, designed to identify and describe the potential hazards, accidents, spillages, fires and abnormal events that may occur during the construction and operations stages of the proposed project. Control measures and strategies have also been identified to mitigate the consequences associated with each hazard and to determine the residual level of risk.

The proposed control measures for some of the identified hazards will impose constraints on the design levels of various components of KUR-World and the overall form of development. All hazards require further attention during the detailed design phase to ensure any likely effects are minimised. Hazards such as cyclones, which pose an extreme level of risk, can be mitigated to an acceptable level by adherence to engineering requirements in building codes. Other hazards such as pandemics principally require a management-oriented response, where management plans and procedures need to be developed to effectively manage the associated consequences.

Considering the residual uncertainties and risk profile, the risk assessment process has not identified any hazards that cannot be effectively mitigated through the application of appropriate work health and safety standards and strict adherence to relevant Australian Standards and other relevant industry codes of practice. Additionally, modelling undertaken by the proponent demonstrates that the resort can feasibly be designed to achieve a no significant worsening impact beyond the site.

As a result, the residual risks associated with the proposed KUR-World Integrated Eco-Resort development are considered manageable by the proponent. The proponent is committed to the process of risk management which is recognised as a dynamic and ongoing process that requires regular monitoring and review.

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