

Ref.	Potential event (how the Project interacts with assets, values, uses and location. Include clear description of the cause)	Impact pathway			Initial Risk			Planned Controls to Manage Risk (as per Project Description, and elements of Standards / Codes of Practice)	Residual Risk			Additional Controls Recommended to Reduce Risk	Comment	
		Environmental Factor	Chapter reference	Time period Construction (S3 up to 15 years) Post rehab short term (S4 up to 20 years) Post rehab long term (S5 >20 years)	Description of impact	Consequence	Likelihood		Risk Rating	Consequence	Likelihood			Risk Rating
1	Flooding causing overtopping of Main and Intermediate Pits during backfilling causing transporting of contaminants to downstream waters, due to an extreme flood event that exceeds design criteria and/or poor construction.	Aquatic ecosystems	12, 11	Construction (S3 up to 15 years)	Reduced water quality due to contamination and sedimentation of surrounding land and ephemeral waterways from uncontrolled release.	Major	Likely	High	<ul style="list-style-type: none"> <li>- Development and implementation of Erosion and Sediment Control Plan ( ESCP)</li> <li>- Construction QA/QC Program - to be included in technical specifications.</li> <li>- Appropriate weather monitoring implemented.</li> <li>- Development and implementation of adverse weather procedure.</li> <li>- Development and implementation of inspection process for post flood events and wet season to ensure integrity of structures.</li> <li>- All designs to Australian Standards, where applicable (and Australian Rainfall &amp; Runoff 2016) for hydrology.</li> </ul>	Major	Rare	Medium		
		Human health - Other	15	Construction (S3 up to 15 years)	Flooding events may result in injury.	Major	Possible	High		Medium	Rare	Low		
		Terrestrial flora and fauna	14	Construction (S3 up to 15 years)	Loss of vegetation due to inundation within flow path leading to a decrease in the diversity and/or abundance of species	Medium	Unlikely	Low		Minor	Rare	Low		
		Terrestrial flora and fauna	14	Post rehab long term (S5 >20 years)	Reduction in habitat quality (due to soil contamination from floodwaters) leading to a decrease in the diversity and/or abundance of species.	Medium	Unlikely	Low		Minor	Rare	Low		
		Aquatic ecosystems	12	Post rehab long term (S5 >20 years)	Reduction in habitat quality (due to contamination from floodwaters) leading to a decrease in the diversity and/or abundance of species.	Medium	Unlikely	Low		Minor	Rare	Low		
2	<b>Run-off from incomplete/open waste rock dumps or waste storage facilities</b> contains leachable solutes (incl. Acid and Metalliferous Drainage (AMD) and radioactive materials), due to rainfall events during earthworks.	Inland water environmental quality	10	Construction (S3 up to 15 years)	Contamination of waterways resulting in decline of water quality with acidity and metals contaminating the surface water.	Serious	Likely	High	<ul style="list-style-type: none"> <li>-Development and implementation of Erosion and Sediment Control Plan (ESCP).</li> <li>- Engineered seepage interception and treatment system installed along toes of existing waste rock dumps (WRDs).</li> <li>- Limit movement of high risk materials (PAF1 and radioactive) soils to movement only in the dry season having them sealed in the Waste Storage Facility by the wet season.</li> <li>- Surface water management basins.</li> <li>- Development and implementation of Water Management Plan (WMP) to detail controlled and managed site drainage and release (incl. water storage facilities) and seepage interception controls.</li> <li>- Development and implementation of Radiation Management Plan (RadMP).</li> </ul>	Medium	Unlikely	Low		
		Human health - Radiation	16	Construction (S3 up to 15 years)	Radioactive contamination of surface water and/or aquatic foods (e.g. fish) causing increased dose to humans.	Serious	Unlikely	Medium		Medium	Rare	Low		
		Aquatic ecosystems	12	Construction (S3 up to 15 years)	Reduction in habitat quality (due to contamination) leading to a decrease in the diversity and/or abundance of species.	Serious	Possible	Medium		Minor	Unlikely	Low		
3	Waste Storage Facility (WSF) contains <b>elevated acidity and metal levels</b> in hot spots, due to inadequate mixing of neutralant (i.e. lime).	Inland water environmental quality	10	Post rehab long term (S5 >20 years)	Leachable acidity and metals in waste material impacts seepage water quality in the waste storage facility (WSF)	Serious	Almost Certain	High	<ul style="list-style-type: none"> <li>- Refinement of neutralant dosing modelling to refine Mixing and dosage requirements preventing the mobilisation of metals.</li> <li>- Development and implementation of Appropriate mixing methodology.</li> <li>- mixing QA/QC Program - to be included in technical specifications.</li> </ul>	Medium	Unlikely	Low		
4	Poor quality <b>leachate from rehabilitated former Waste Rock Dump</b> footprints entering drainage lines, due to insufficient neutralant (i.e. lime) and/or cover	Aquatic ecosystems	12	Construction (S3 up to 15 years)	Continued degradation of water quality in East Branch Finnis River (EBFR)	Serious	Likely	High	<ul style="list-style-type: none"> <li>- Minimum excavation depth of 2m within waste rock dump footprints to remove contamination (additional excavation depths be confirmed by excavation profile testing during earthworks).</li> <li>- Removal of contaminated material during earthworks to waste storage facility (WSF).</li> <li>- Addition of sufficient neutralant (i.e. lime) to neutralise the bounds of excavation.</li> <li>- Cover material placed to 1m above natural surface to shed surface water and reduce infiltration rates.</li> <li>- Effective collection and treatment of groundwater and interflow at Intermediate and Main Waste Rock Dumps.</li> </ul>	Medium	Unlikely	Low		
		Inland water environmental quality	10	Post rehab short term (S4 up to 20 years)		Serious	Likely	High		Medium	Rare	Low		
		Inland water environmental quality	10	Post rehab long term (S5 >20 years)	Failure to meet water quality objectives as part of rehabilitation success.	Serious	Possible	Medium		Minor	Rare	Low		
5	Potential <b>water discharges</b> from other mines, due to changes in production downstream or uncontrolled release.	Aquatic ecosystems	12	Construction (S3 up to 15 years)	Cumulative water quality impacts when Rum Jungle is discharging treated water to the East Branch Finnis River (EBFR).	Minor	Rare	Low	<ul style="list-style-type: none"> <li>- Due to historic activities this project is perceived as a net positive water quality improvement project.</li> <li>- DPIR communication and planning coordination to manage releases and control contaminant loads to the river.</li> <li>- Monitoring water quality at immediate release points</li> </ul>	Minor	Rare	Low		This is a net water quality improvement project. Water discharge is a highly regulated activity, and other requests to

Ref.	Potential event (how the Project interacts with assets, values, uses and location. Include clear description of the cause)	Impact pathway			Initial Risk			Planned Controls to Manage Risk (as per Project Description, and elements of Standards / Codes of Practice)	Residual Risk			Additional Controls Recommended to Reduce Risk	Comment	
		Environmental Factor	Chapter reference	Time period Construction (S3 up to 15 years) Post rehab short term (S4 up to 20 years) Post rehab long term (S5 >20 years)	Description of impact	Consequence	Likelihood		Risk Rating	Consequence	Likelihood			Risk Rating
		Hydrological processes	11	Construction (S3 up to 15 years)	Change in regional groundwater regime if Browns Pit is dewatered	Minor	Rare	Low	<ul style="list-style-type: none"> <li>- Monitoring water quality at immediate release point.</li> <li>- Modelling shows a majority of contaminant loading in the EBFR is driven by Rum Jungles water. Water modelling for post works shows compliance with Locally Derived Water Quality Objectives (LDWQO). This is including discharge from Browns.</li> </ul>	Minor	Rare	Low		change discharge requires approvals.
6	Flooding event during Stage 3 that exceeds limitations of creeks, due to larger than expected wet season volumes.	Human health - Other	15	Construction (S3 up to 15 years)	Flood event creates inrush of water on project site impacting the safety of those onsite, leading to injuries and fatalities  Inrush of water impacts storage of hazardous materials	Catastrophic	Possible	High	<ul style="list-style-type: none"> <li>- Development and implementation of Erosion and Sediment Control Plan (ESCP).</li> <li>- Development and implementation of Water Management Plan (WMP).</li> <li>- The location of the project site is out of 1000 ARI flood modelled area.</li> <li>- Development and implementation of Emergency Response Plan (ERP).</li> <li>- Commence construction works during dry season.</li> </ul>	Medium	Unlikely	Low	- Prepare a response plan for unexpected wet season conditions (starting time, velocities, volumes) to prevent contamination to the Finnis main branch	
		Inland water environmental quality	10	Construction (S3 up to 15 years)	Peak flood flow introduces contamination and sedimentation that exceeds the Construction Locally Derived Water Quality Objectives (WQOs) for a short period  Inrush of water impacts storage of hazardous materials	Medium	Likely	Medium		Medium	Possible	Medium		
7	The start of the wet season creates a "first flush" rainfall event, causing exceedance of Locally Derived Water Quality Objectives (LDWQO)	Inland water environmental quality	10	Construction (S3 up to 15 years)	First flush event creates a pulse of contamination and sedimentation that exceeds the constructions Water Quality Objectives (WQOs) for a short period	Medium	Almost Certain	High	<ul style="list-style-type: none"> <li>- Engineered seepage interception and treatment system installed along toes of existing Intermediate and Main waste rock dumps (WRDs), managing the main source of contamination from site.</li> <li>- Development and implementation of Erosion and Sediment Control Plan (ESCP) which includes wet season specific erosion and sediment control management structures.</li> <li>- Continue the First Flush monitoring program that is in place for site.</li> <li>- Develop Construction Locally Derived Water Quality Objectives (CLDWQO)</li> </ul>	Medium	Likely	Medium		
8	Failure to prepare site for wet season and/or early onset of wet season leading to higher rates of erosion and sedimentation than expected	Aquatic ecosystems	12	Construction (S3 up to 15 years)	Increased sediment load to East Branch Finnis River (EBFR) leading to adverse impacts on habitat and aquatic fauna	Medium	Possible	Medium	<ul style="list-style-type: none"> <li>- Scheduling and weather forecasting incorporated in Erosion and Sediment Control Plan (ESCP) (incl. open sedimentation ponds).</li> <li>- Waste Storage Facility (WSF) is located away from the East Branch Finnis River (EBFR).</li> <li>- Progressive closure of both waste storage facilities (WSF) and waste rock dumps WRDs) to reduce exposed waste rock surface area</li> <li>- Safe vertical deconstruction of existing waste rock dumps (WRDs) to reduce exposed waste rock surface area.</li> <li>- Development and implementation of Water Management Plan (WMP).</li> <li>- The location of the project site is out of 1000 ARI flood modelled area.</li> <li>- Development and implementation of Emergency Response Plan.</li> <li>- Commence construction works during dry season.</li> <li>- Water discharge licence for emergency events (incl. communication with relevant authorities on expectations of exceedance of water objectives).</li> <li>- Suitably experienced management and supervisory staff</li> </ul>	Medium	Unlikely	Low		
9	Uncertainty in the contaminant transport rates in groundwater leading to shorter or longer timeframes and a higher contaminant load  Note: Contaminant (metals) sorption rates being higher/faster or lower/slower	Inland water environmental quality	10	Post rehab long term (S5 >20 years)	Larger loads impacting on groundwater quality	Serious	Almost Certain	High	<ul style="list-style-type: none"> <li>- Groundwater modelling includes sensitivity analysis of these rates.</li> <li>- Design and implement a seepage and interflow collection and treatment system for the Intermediate and Main WRDs.</li> </ul>	Serious	Unlikely	Medium		

Ref.	Potential event (how the Project interacts with assets, values, uses and location. Include clear description of the cause)	Impact pathway			Initial Risk			Planned Controls to Manage Risk (as per Project Description, and elements of Standards / Codes of Practice)	Residual Risk			Additional Controls Recommended to Reduce Risk	Comment	
		Environmental Factor	Chapter reference	Time period Construction (S3 up to 15 years) Post rehab short term (S4 up to 20 years) Post rehab long term (S5 >20 years)	Description of impact	Consequence	Likelihood		Risk Rating	Consequence	Likelihood			Risk Rating
		Inland water environmental quality	10	Post rehab long term (S5 >20 years)	Larger groundwater loads ultimately discharging at surface and degrading water quality in the East Branch Finnis River (EBFR).	Serious	Almost Certain	High		Serious	Unlikely	Medium		
10	Formation of <b>hazardous sludge</b> from water treatment facility that will require appropriate disposal	Inland water environmental quality	10	Construction (S3 up to 15 years)	Sludge is not managed appropriately resulting in a pathway for the sludge to impact surface water quality	Major	Likely	High	- Waste Management Plan to include this. - Sludge appropriately disposed of within the waste storage facility (WSF)	Medium	Unlikely	Low		
11	Changes to the <b>landform and catchment characteristics</b> , due to construction activities	Hydrological processes	11	Construction (S3 up to 15 years)	Hydrology impacts downstream of project site, including flow rates and velocities	Medium	Likely	Medium	- Hydrology modelling indicates that design will not alter surface water regime after Pit Backfilling is complete. - Existing wet season flow regimes will not be altered during construction. - Dry season regimes will be altered by low flow discharge during 3 year Pit Backfilling.	Medium	Possible	Medium		
		Aquatic ecosystems	12	Construction (S3 up to 15 years)	Reduction in habitat quality (due to changes in flow regimes) leading to a decrease in the diversity and/or abundance of species.	Minor	Possible	Low		Minor	Unlikely	Low		
12	<b>Contamination loads in the East Branch Finnis River (EBFR)</b> are not sufficiently reduced, due to continued loads from residual impacted groundwater	Inland water environmental quality	10	Post rehab long term (S5 >20 years)	Locally Derived Water Quality Objectives (LDWQO) are not met in the East Branch Finnis River (EBFR)	Catastrophic	Almost Certain	Extreme	- Design and implement a groundwater and interflow pump and treat system for Intermediate and Main WRDs. - Earlier active groundwater treatment. - Treatment duration extended to meet Locally Derived Water Quality Objectives (LDWQOs).	Medium	Possible	Medium		
13	Emissions of dust from exposed surfaces due to wind erosion, excavation and material handling and vehicle movements on haul roads.	Human health - Other	15	Construction (S3 up to 15 years)	Transport of dust to sensitive receptors leading to increase of inhalation of ambient particulate matter (TSP, PM10, PM2.5)	Medium	Likely	Medium	- Development and implementation of Air and Dust Management Plan. Will include standard dust mitigation procedures as required including, use of water sprays on haul roads and unsealed surfaces, implement road speed limits including lower speeds during highest of wind events. - Limit the amount and frequency of material transported. - External haul roads to the project site are to be appropriately treated to minimise dust production (e.g. primer sealing on dirt roads).	Medium	Possible	Medium		Chapter 8 has split this line into 2 risks 8.2.8. Just leave the chapter as 2 risks.
		Terrestrial environmental quality	9	Post rehab long term (S5 >20 years)	Reduction of success on revegetation	Serious	Possible	Medium		Minor	Rare	Low		
		Social, economic and cultural surroundings	8	Construction (S3 up to 15 years)	Transport to and deposition of dust at cultural heritage site, sacred site or artefacts leading to loss of amenity and/or disturbance of the site.	Medium	Unlikely	Low		Serious	Rare	Low		
		Biodiversity - Terrestrial Ecosystems	14	Construction (S3 up to 15 years)	Transport to and deposition of dust in the environment leading to reduction in habitat quality and/or quality (within and surrounding the project area) leading to a decrease in the diversity and/or abundance of species.	Medium	Possible	Medium		Medium	Rare	Low		
14	Emissions of radionuclides within dust emissions from exposed surfaces due to wind erosion, excavation and material handling and vehicle movements on haul roads and access tracks.	Human health - Other	15	Construction (S3 up to 15 years)	Transport of dust to sensitive receptors leading to increase of inhalation and ingestion of radionuclides	Major	Possible	High	- Design and implement a revegetation methodology that aims to stabilise soil on rehabilitated landforms as soon as possible. - Development and implementation of Rehabilitation Management Plan (RehMP) that includes landform care and maintenance. - Rehabilitation works to be undertake progressively to reduce footprint of exposed ground. - Development and implementation of Air and Dust Management Plan (ADMP). Will include standard dust mitigation procedures as required including, minimise open areas exposed to wind erosion, topsoil striping to occur only during suitable wind and weather conditions, waste dump footprints will be developed as required to minimise dust, use of water sprays on haul roads, unsealed surfaces, ongoing dust deposition monitoring program. - Development and implementation of Radiation Management Plan (RadMP).	Medium	Unlikely	Low		
		Human health - Other	15	Post rehab short term (S4 up to 20 years)	Impacts from dust fallout and deposition, including to amenity at sensitive receptors.	Medium	Possible	Medium		Medium	Unlikely	Low		
		Terrestrial environmental quality	9	Post rehab long term (S5 >20 years)	Reduction of success on revegetation	Major	Unlikely	Medium		Serious	Rare	Low		
		Terrestrial flora and fauna	14	Construction (S3 up to 15 years)	Reduction in habitat quality and/or quantity (due to smothering of vegetation) leading to a decrease in the diversity and/or abundance of species.	Medium	Possible	Medium		Medium	Unlikely	Low		
		Human health - Other	15	Construction (S3 up to 15 years)	Worker exposure to dust leading to increased inhalation and ingestion of radionuclides	Major	Possible	High		Serious	Rare	Low		

Ref.	Potential event (how the Project interacts with assets, values, uses and location. Include clear description of the cause)	Impact pathway			Initial Risk			Planned Controls to Manage Risk (as per Project Description, and elements of Standards / Codes of Practice)	Residual Risk			Additional Controls Recommended to Reduce Risk	Comment	
		Environmental Factor	Chapter reference	Time period Construction (S3 up to 15 years) Post rehab short term (S4 up to 20 years) Post rehab long term (S5 >20 years)	Description of impact	Consequence	Likelihood		Risk Rating	Consequence	Likelihood			Risk Rating
		Biodiversity - Terrestrial Ecosystems	14	Construction (S3 up to 15 years)	Transport of dust to the environment leading to reduction in habitat quality and/or quantity (within and surrounding the project) leading to a decrease in the diversity and/or abundance of species.	Serious	Likely	High	- Majority of load and haul operations already within disturbed footprint. - Dust suppression activities in load, haul, place production sequence. - Environmental dust monitoring program	Medium	Possible	Medium		
15	Emissions of hazardous pollutants due to combustion of fuels from mobile plant	Human health - Other	15	Construction (S3 up to 15 years)	Transport of dust to sensitive receptors leading to increase in inhalation of hazardous pollutants (CO,NOx, SOx, volatile organic compounds)	Medium	Likely	Medium	- Scheduled vehicle and heavy equipment maintenance as per Original Equipment Manufacturer (OEM) requirements. - Diesel fuel to Australian standards (for S content). - Use solar powered infrastructure where possible. - Optimisation of haul routes to decrease run distances - Optimisation of machinery operation to minimise operating times	Medium	Likely	Medium		
16	Dispersion of <b>particulates and dust</b> , due to excavation and material handling	Human health - Other	15	Construction (S3 up to 15 years)	Dispersion of particulate matter (i.e. total suspended particulate TSP) in the air resulting in reduced air quality at the site boundary and/or at nearby sensitive receptors	Major	Possible	High	- Development and implementation of Air and Dust Management Plan (ADMP). To include standard dust mitigation procedures as required including, use of water sprays on haul roads and unsealed surfaces, implement road speed limits including lower speeds during highest of wind events. Radiation Management Plan including PPE and Monitoring - Development and implementation of Radiation management Plan (RadMP). -Air conditioned cabins to limit exposure during loading -Scheduling to relocate radiological soils early in project to reduce exposure	Medium	Unlikely	Low		
		Human health - Radiation	16	Construction (S3 up to 15 years)	Dispersion of dust causing an increase of inhalation and ingestion of radionuclides causing an increase in radiological dose to workers	Catastrophic	Almost Certain	Extreme		Major	Rare	Medium		
		Human health - Radiation	16	Construction (S3 up to 15 years)	Transport of pollutants beyond the site boundary or to nearby sensitive receptors with impacts to human health. (i.e. Dispersion of radionuclides in dust causing health effects to public from radiation exposure)	Catastrophic	Possible	High		Major	Rare	Medium		
17	Vehicles / mobile plant / excavation / material movements creating <b>noise and vibration</b> at elevated levels	Human health - Other	15	Construction (S3 up to 15 years)	Transport noise beyond the site boundary or at nearby sensitive receptors with impacts to human health	Medium	Possible	Medium	- Development and implementation of Traffic Management Plan (TMP). - Development of baseline noise modelling taking into consideration the impacts on the projects limited sensitive receptors - Daylight works only.	Medium	Unlikely	Low		
		Social, economic and cultural surroundings	8	Construction (S3 up to 15 years)	Altered character of sacred sites or heritage places caused by vibration impacts	Minor	Rare	Low		Minor	Rare	Low		
		Terrestrial flora and fauna	14	Construction (S3 up to 15 years)	Reduction in habitat quality due to noise, leading to a decrease in the diversity and/or abundance of fauna species.	Medium	Unlikely	Low		Minor	Possible	Low		
		Social, economic and cultural surroundings	8,13	Construction (S3 up to 15 years)	Loss of amenity	Serious	Possible	Medium		Medium	Unlikely	Low		
18	<b>Clearing riparian vegetation</b> , due to the construction of water crossing(s)  <i>Note: only very small areas of riparian vegetation will be disturbed</i>	Terrestrial flora and fauna	14	Construction (S3 up to 15 years)	Loss of significant vegetation type (as described in the NT Land Clearing Guidelines) leading to a decrease in the diversity and/or abundance of species, and/or a decrease in ecological function	Serious	Possible	Medium	- Development and implementation of Vegetation Clearing Procedure minimising vegetation clearing (particularly of significant vegetation types) and demarcating the limits of clearing and no-go areas. - Development and implementation of Erosion and Sediment Control Plan (ESCP). - Schedule works to avoid risk of early wet season. - Development and implementation of Water Management Plan (WMP) to detail risks and mitigation measures during construction activities (to align with the Construction Locally Derived Water Quality Objectives (CLDWQO)). - Re-vegetate cleared areas around water crossings as soon as possible post-construction activities. - New land disturbance minimised by focussing works on already disturbed footprint as far as possible.	Serious	Unlikely	Medium		Water crossing(s) will be in place for construction only. Riparian zone will be restored post rehab works. Sensitive species - Lorentz Grunter (only found in the Finnis River)
		Aquatic ecosystems	12	Construction (S3 up to 15 years)	Reduction in quality and/or quantity of habitat (due to sedimentation caused by destabilised banks as a result of vegetation clearing) leading to a decrease in the diversity and/or abundance of species.	Medium	Possible	Medium		Medium	Unlikely	Low		Short term (months) smothering of benthic habitat likely to have only temporary impacts. Sedimentation could potentially be seasonal. However bed sedimentation could extend for a longer

Ref.	Potential event (how the Project interacts with assets, values, uses and location. Include clear description of the cause)	Impact pathway				Initial Risk			Planned Controls to Manage Risk (as per Project Description, and elements of Standards / Codes of Practice)	Residual Risk			Additional Controls Recommended to Reduce Risk	Comment
		Environmental Factor	Chapter reference	Time period Construction (S3 up to 15 years) Post rehab short term (S4 up to 20 years) Post rehab long term (S5 >20 years)	Description of impact	Consequence	Likelihood	Risk Rating		Consequence	Likelihood	Risk Rating		
		Terrestrial environmental quality	9	Construction (S3 up to 15 years)	Erosion and sedimentation resulting from vegetation clearing. Seasonal degradation of surface water quality due to turbidity caused by erosion of soils and landforms. Loss of stabilising vegetation leading to erosion of banks and impacts to channel morphology.	Medium	Possible	Medium		Medium	Unlikely	Low		duration depending on the performance on the upstream control measures. Large deposits of sediment could result in altered river flow.
19	<b>Clearing land</b> for haul roads, borrow pits, laydown areas, waste storage facility etc.  <i>Note: Most of the land to be cleared has been the subject of past disturbance. The area of sensitive vegetation that will be cleared is very small.</i>	Terrestrial flora and fauna	13,14	Construction (S3 up to 15 years)	Loss of significant vegetation type (as described in the NT Land Clearing Guidelines) leading to a decrease in ecological function.	Major	Almost Certain	Extreme	<ul style="list-style-type: none"> <li>- Development and implementation of Erosion and Sediment Control Plan (ESCP).</li> <li>- Development and implementation of Excavation Management Plan.</li> <li>- Development and implementation of Vegetation Clearing Procedure that minimise vegetation clearing (particularly of significant vegetation types) demarcates the limits of clearing and no-go areas.</li> <li>- Store topsoil in such a manner as to minimise leaching of nutrients and loss of structure.</li> <li>- Re-vegetate cleared areas as soon as possible.</li> <li>- Section 19 Agreement ALRA conditions relating to final land form.</li> <li>- Development and implementation of Cycad Salvaging Procedure.</li> <li>- Progressive stripping of surfaces to ensure that entire borrows are progressively opened and closed and not open for the entire project life.</li> <li>- Design footprint of disturbance to target low ecological value systems, previously disturbed ground. Design to consider 'freeform' shape within borrow areas to preserve high value vegetation patches and blocks</li> </ul>	Medium	Possible	Medium		
		Terrestrial flora and fauna	14	Construction (S3 up to 15 years)	Loss of habitat leading to a decrease in the diversity and/or abundance of species	Serious	Almost Certain	High		Medium	Possible	Medium		
		Terrestrial flora and fauna	14	Construction (S3 up to 15 years)	Mortality of individual animals (due to interaction with machinery and vehicles during land clearing) leading to a decline in local population	Minor	Unlikely	Low		Minor	Unlikely	Low		
		Terrestrial environmental quality	9	Construction (S3 up to 15 years)	Loss of soil in borrow pit area (because material is removed) and in the capping areas (because soil is stored over 8 years and becomes inert) which is no longer capable of supporting revegetation and/or require to clear more land	Serious	Likely	High		Medium	Unlikely	Low		
		Terrestrial environmental quality	9	Construction (S3 up to 15 years)	Erosion from cleared land causing sediment entrainment	Medium	Possible	Medium		Minor	Unlikely	Low		
		Aquatic ecosystems	12	Construction (S3 up to 15 years)	Reduction in quality and/or quantity of habitat (due to sedimentation erosion caused by vegetation clearing) leading to a decrease in the diversity and /or abundance of species	Major	Almost Certain	Extreme		Medium	Possible	Medium		
		Social, economic and cultural surroundings	8	Construction (S3 up to 15 years)	Degradation of landform, leading to Traditional Owners not accepting the changes to Finnis River Aboriginal Land Trust (FRALT) land during handback.	Major	Likely	High		Medium	Unlikely	Low		
20	<b>Proliferation of weeds on re-established native ecosystems</b> (especially Gamba grass) across project area  <i>Note: Weeds (especially Gamba Grass) are prolific within and surrounding the project area.</i>	Terrestrial flora and fauna	14	Post rehab short term (S4 up to 20 years)	Reduction in quality and/or quantity of habitat leading to a decrease in the diversity and/or abundance of species	Serious	Unlikely	Medium	<ul style="list-style-type: none"> <li>- Design and implementation of a revegetation methodology that aims to minimise weed establishment.</li> <li>- Development and implementation of Post rehab (S4 up to 20 years) Weed Management &amp; Monitoring Plan that provides for an active and ongoing weed management program (for the project area and surrounding land).</li> <li>- Development and implementation of Construction Weed Management Plan that covers the vehicle hygiene, movement of materials, stockpiling of soils, and weed control (both prior to, and during construction).</li> </ul>	Medium	Unlikely	Low	This is one of the worst areas of Gamba Grass in the NT.	
		Terrestrial flora and fauna	14	Post rehab long term (S5 >20 years)	Failure of native revegetation to establish to the extent that completion criteria cannot be met and/or landforms are not stabilised	Serious	Possible	Medium		Serious	Possible	Medium		
		Inland water environmental quality	10	Construction (S3 up to 15 years)	Spray drift of herbicides used to control weeds, results in unintended contamination to waterways.	Medium	Possible	Medium		Minor	Unlikely	Low		
		Human health - Other	15	Construction (S3 up to 15 years)	Gamba Grass promotes intense bushfire events (compared to a normal bushfire), leading to exposure of land holders or visitors in the vicinity to the project area.	Serious	Unlikely	Medium		Serious	Rare	Low		

Ref.	Potential event (how the Project interacts with assets, values, uses and location. Include clear description of the cause)	Impact pathway			Initial Risk			Planned Controls to Manage Risk (as per Project Description, and elements of Standards / Codes of Practice)	Residual Risk			Additional Controls Recommended to Reduce Risk	Comment	
		Environmental Factor	Chapter reference	Time period Construction (S3 up to 15 years) Post rehab short term (S4 up to 20 years) Post rehab long term (S5 >20 years)	Description of impact	Consequence	Likelihood		Risk Rating	Consequence	Likelihood			Risk Rating
		Social, economic and cultural surroundings	8	Post rehab long term (S5 >20 years)	Unable to establish culturally significant species within project area. Changes in vegetation influence erosion and fires, changing the character, cultural and environmental context of sacred sites and heritage.	Major	Likely	High		Serious	Unlikely	Medium		
21	Introduction of <b>new weeds or spread of existing terrestrial and aquatic weeds</b> , due to transport of material, vehicle movement or inappropriate topsoil management.	Terrestrial flora and fauna	14	Construction (S3 up to 15 years)	Reduction in habitat quality and/or quantity leading to a decrease in the diversity and/or abundance of species.	Catastrophic	Almost Certain	Extreme	- Development and implementation of Construction Weed Management Plan that covers the vehicle hygiene, movement of materials, stockpiling of soils, and weed control (both prior to and during construction).	Serious	Possible	Medium		
		Aquatic ecosystems	12	Construction (S3 up to 15 years)	Reduction in habitat quality and/or quantity leading to a decrease in the diversity and/or abundance of species.	Serious	Unlikely	Medium		Medium	Unlikely	Low		
22	<b>Storage of contaminated surface water</b> at project site	Terrestrial flora and fauna	14	Construction (S3 up to 15 years)	Mortality of individual animals (due to ingestion or exposure to contaminated water) leading to a decline in local populations	Serious	Possible	Medium	- Water Management Plans to specify monitoring of water quality over duration of project. - There will not be any water stored on the project site that is in addition to what is already there now (i.e. currently in the pits). Mortality of fauna drinking from the pits has not been a documented problem at this site.	Medium	Unlikely	Low		
23	Loss of biodiversity offsite, due to the selected <b>borrow pits potentially having higher biodiversity values</b> than those that will occur in the rehabilitated areas.	Terrestrial flora and fauna	14	Construction (S3 up to 15 years)	Net reduction in habitat quality and/or quantity leading to a decrease in the diversity and/or abundance of species.	Serious	Likely	High	- Selection of borrow areas and pits avoids sites with high biodiversity values	Medium	Possible	Medium		
24	<b>Habitat and/or population fragmentation</b> , due to construction of linear infrastructure (e.g. access tracks, haul roads etc.)	Terrestrial flora and fauna	14	Construction (S3 up to 15 years)	Reduction in habitat quality and/or quantity leading to a decrease in the diversity and/or abundance of species.	Medium	Unlikely	Low	- Development and implementation of Construction Weed Management Plan with mitigation measures to control existing weeds, and to minimise the spread of others – including vehicle hygiene (wash-down facilities); keeping vehicles to established tracks and roads; and active weed control programs - Development and implementation of Vegetation Clearing Procedure minimising vegetation clearing (particularly of sensitive vegetation types) and demarcating the limits of clearing and no-go areas. - Utilise existing roads / corridors (as much as possible). - Road rehabilitation at the conclusion of the project.  <i>Note: 14km haul road that accessed Stage 2 borrow pits removed from updated design.</i>	Medium	Unlikely	Low		
25	<b>Creation of an edge and/or barrier effect</b> , due to vegetation clearing	Terrestrial flora and fauna	14	Post rehab short term (S4 up to 20 years)	Reduction in habitat quality and/or quantity leading to a decrease in the diversity and/or abundance of species.  <i>Note: this is not a significant issue in the open woodland habitat that dominates the project area; it is more marked in closed forests</i>	Minor	Unlikely	Low	- Development and implementation of Weed Management Plan with mitigation measures to control existing weeds, and to minimise the spread of others – including vehicle hygiene (wash-down facilities); keeping vehicles to established tracks and roads; and active weed control programs - Development and implementation of Vegetation Clearing Procedure minimising vegetation clearing (particularly of sensitive vegetation types) and demarcating the limits of clearing and no-go areas. - Re-vegetate cleared areas as soon as possible.	Minor	Unlikely	Low		
26	Transport of materials and personnel on public roads results in impacts on <b>road network conditions</b> . Including consideration of seasonal variability of road surface conditions.	Human health - Other	15	Construction (S3 up to 15 years)	Increase in traffic volumes, resulting in decline in condition of sealed and unsealed public roads, with adverse impact on safety of other road users	Serious	Likely	High	- Decision of road network use to be decided in consultation with Coomalie Community Government Council (CCGC) and Department of Infrastructure, Planning and Logistics (DIPL). - Audit of service provider during selection process to ensure competence. - Development and implementation of Traffic Management Plans	Serious	Possible	Medium		

Ref.	Potential event (how the Project interacts with assets, values, uses and location. Include clear description of the cause)	Impact pathway				Initial Risk			Planned Controls to Manage Risk (as per Project Description, and elements of Standards / Codes of Practice)	Residual Risk			Additional Controls Recommended to Reduce Risk	Comment
		Environmental Factor	Chapter reference	Time period Construction (S3 up to 15 years) Post rehab short term (S4 up to 20 years) Post rehab long term (S5 >20 years)	Description of impact	Consequence	Likelihood	Risk Rating		Consequence	Likelihood	Risk Rating		
		Social, economic and cultural surroundings	13	Construction (S3 up to 15 years)	Impacts to public safety on the roads	Serious	Likely	High	management Plans. - Vehicle maintenance program including pre-start inspections and routine maintenance. - Undertake Traffic Impact Assessment and implement findings. - Increased schedule time to minimise traffic volume per day. - Improved road safety (e.g. upgrade intersections, signage).	Serious	Possible	Medium		
27	Vehicle impacts on public roads, due to the cumulative traffic effects associated with co-current projects and tourism (e.g. existing public traffic, potential introduction of other projects)	Social, economic and cultural surroundings	13	Construction (S3 up to 15 years)	Cumulative traffic effects on public roads (including tourists and local residents), leading to injuries or fatality	Catastrophic	Likely	Extreme	- Development and implementation of Traffic Management Plan. - Decision of road network use to be decided in consultation with Coomalie Community Government Council (CCGC) and Department of Infrastructure, Planning and Logistics (DIPL). - NTG to coordinate overall traffic management strategy. - Consultation and awareness with local community and council.	Major	Unlikely	Medium		
28	Not meeting Traditional Owners expectations for employment, due to poor identification of existing skills or lack of training planning for new skills	Social, economic and cultural surroundings	13	Construction (S3 up to 15 years)	Traditional Owner opportunities are not maximised	Major	Likely	High	- Work with training providers in the pre-works phase of project to maximise opportunity and help Traditional Owners to be work ready. - Develop Skills Matrix to identify existing skilled Traditional Owners and also which traditional owners would be willing to be trained up. - On the job training for Traditional Owners (ongoing program). - Traditional Owners Plan to connect opportunities to existing government services to set these linkages up. - Schedule project to provide long term training and employment opportunities.	Serious	Possible	Medium		
29	Community expectations of the project are not met particularly re local employment and economic opportunities	Social, economic and cultural surroundings	13	Construction (S3 up to 15 years)	Community and economic opportunities are limited.	Major	Likely	High	- Stakeholder Engagement and Communication Plan. - Project schedule and scope redefined to improve opportunities and reduce risk. - Pre-construction engagement to identify interested potential local staff and match skills to roles wherever possible.	Medium	Possible	Medium		
30	Long lead time for project funding approval, results in loss of project knowledge and deterioration of relationships with Traditional Owners and local communities	Social, economic and cultural surroundings	13	Construction (S3 up to 15 years)	Traditional Owners and community relationships are lost with NT Government.  Project knowledge loss.	Major	Likely	High	- Ongoing engagement with Traditional Owners. - Business Case for project defines design scope. - Approval of Rum Jungle Environmental Impact Statement (EIS). - Detailed design, as per the Business Case scope.	Serious	Possible	Medium		
31	Lack of project communication and engagement to all stakeholders	Social, economic and cultural surroundings	13	Construction (S3 up to 15 years)	Negative perception of the project as a result of insufficient or lack of information. Negative perceptions of the project have the potential to affect community values and enhance negative social impacts on communities.	Major	Likely	High	- Stakeholder Engagement and Communication Plan (for the full project life cycle). - Adequate resourcing required to deliver these tasks	Medium	Possible	Medium		
32	Perception that the remediation works onsite are not safe, due to elevated radioactive material	Social, economic and cultural surroundings	13	Construction (S3 up to 15 years)	Negative reputation to the project and reluctance to work on the site.	Serious	Likely	High	- Stakeholder Engagement and Communication Plans. - Rum Jungle Environmental Impact Statement (EIS).	Medium	Possible	Medium		
33	Failure to obtain Section 19 Agreement under the ALRA (with NLC on behalf of the Traditional Owners) for borrow materials	Social, economic and cultural surroundings	13	Construction (S3 up to 15 years)	Failure to meet community expectations, and negative perception of the project.	Catastrophic	Possible	High	- Stakeholder Engagement and Communications Plan. - Engagement with the NLC and abide with their Statutory process.	Major	Unlikely	Medium		

Ref.	Potential event (how the Project interacts with assets, values, uses and location. Include clear description of the cause)	Impact pathway			Initial Risk			Planned Controls to Manage Risk (as per Project Description, and elements of Standards / Codes of Practice)	Residual Risk			Additional Controls Recommended to Reduce Risk	Comment	
		Environmental Factor	Chapter reference	Time period Construction (S3 up to 15 years) Post rehab short term (S4 up to 20 years) Post rehab long term (S5 >20 years)	Description of impact	Consequence	Likelihood		Risk Rating	Consequence	Likelihood			Risk Rating
34	Failure to <b>establish council agreement</b> regarding the use of borrow areas and roads	Social, economic and cultural surroundings	13	Construction (S3 up to 15 years)	Failure to meet community & council expectations, and negative perception of the project.	Major	Possible	High	- Development and implementation of a Stakeholder Engagement and Communications Plan.	Major	Possible	High	- Develop consultation process with Coomalie Community Government Council to establish "agreement making" mechanisms for all parties. - If an agreement cannot be reached, the project may	
35	<b>Disturbance of unidentified sites</b> / objects of heritage significance, artefacts, skeletal remains, aboriginal sacred sites during rehabilitation activities	Social, economic and cultural surroundings	8	Construction (S3 up to 15 years)	Inadvertent / intentional damage, destruction or removal of heritage items or sites. Non-compliance with legislative requirements.	Major	Possible	High	- Risk assessment of site disturbance to identify known and unknown heritage sites. - Have completed Archaeology survey and produce assessment. - Undertake search of projects areas with Aboriginal Areas Protection Authority regarding Aboriginal sacred sites and obtain Authority Certificate for (potential) future works. - Development and implementation of Cultural Heritage Management Plan, including pre-clearing / disturbance visual investigations, consultation and engagement with Traditional Owners, induction of onsite personnel, procedure of unexpected discovery, compliance requirements. - Development and implementation of Disturbance Permits. Prior to any ground breaking works occurring a permit must be issued that gives permission for operators to travel ground/break ground. These permits have a various check boxes that are a linked to an approvals system (e.g. AAPA, Cultural Heritage, Vegetation etc.)	Medium	Possible	Medium		
36	<b>Disturbance of known sites</b> / objects of heritage significance, artefacts, skeletal remains, Aboriginal sacred sites during rehabilitation activities  <i>Note: Known sites could include Declared Heritage Places and Objects, Aboriginal Heritage Places and Objects, Significant Historical Places and Objects, and Aboriginal Sacred Sites</i>	Social, economic and cultural surroundings	8	Construction (S3 up to 15 years)	Inadvertent / intentional damage, destruction or removal of heritage items or sites. Non-compliance with legislative requirements.	Catastrophic	Possible	High	- Risk assessment of site disturbance to identify known and unknown heritage sites. - Archaeology survey and assessment. - Undertake search of projects areas with Aboriginal Areas Protection Authority regarding Aboriginal sacred sites and obtain Authority Certificate for (potential) future works. - Development and implement a Cultural Heritage Management Plan, including pre-clearing / disturbance visual investigations, consultation and engagement with Traditional Owners, induction of onsite personnel, visual barriers of known sites, compliance requirements. - Artefacts that need to be disturbed require appropriate government approvals, documentation and archaeological salvage. - Design around any known highly significant cultural and heritage sites wherever possible. Relocation plan for less significant objects where appropriate, as per the Cultural Heritage Management Plan. - Planned work disturbance considers locations of cultural heritage objects and places.	Major	Rare	Medium		
37	Disturbing the <b>cultural significance of known sacred sites</b> , due to construction activities	Social, economic and cultural surroundings	8	Construction (S3 up to 15 years)	Work practices cause cultural offense.	Major	Almost Certain	Extreme	- Traditional Owners have been consulted with regarding design of new facilities via Northern Land Council led engagement meetings. -Haul Roads have been located to shift operations as far away from Sacred Sites as possible. - Design to avoid impacting the cultural visual lines of site. -Develop and Implement Cultural Heritage Management Plan - Conform to Aboriginal Areas Protection Authority (AAPA) requirements.	Serious	Unlikely	Medium		
		Social, economic and cultural surroundings	8	Post-rehab short term (S4 up to 20 years)		Major	Almost Certain	Extreme		Serious	Unlikely	Medium		
38	Project construction activities impact <b>culturally significant species</b> (incl. cycads, milkwoods, fauna) onsite	Social, economic and cultural surroundings	8	Construction (S3 up to 15 years)	Loss of culturally significant specimens	Major	Likely	High	- Minimise disturbance to all significant species. - Consultation with Traditional Owners. - Development and implementation of the Cycad Salvaging Procedure.	Serious	Possible	Medium		



Ref.	Potential event (how the Project interacts with assets, values, uses and location. Include clear description of the cause)	Impact pathway				Initial Risk			Planned Controls to Manage Risk (as per Project Description, and elements of Standards / Codes of Practice)	Residual Risk			Additional Controls Recommended to Reduce Risk	Comment
		Environmental Factor	Chapter reference	Time period Construction (S3 up to 15 years) Post rehab short term (S4 up to 20 years) Post rehab long term (S5 >20 years)	Description of impact	Consequence	Likelihood	Risk Rating		Consequence	Likelihood	Risk Rating		
		Terrestrial flora and fauna	14	Post rehab short term (S4 up to 20 years)		Serious	Possible	Medium	- Waste Storage Facility (WSF) design considers location of culturally significant species to protect as far as is possible. Focussing on use of already disturbed footprint as far as possible.	Medium	Unlikely	Low		
39	Onsite fire event escalates to an uncontrolled fire offsite / onsite, due to ignition from construction activities or lightning	Terrestrial flora and fauna	14	Post rehab long term (S5 >20 years)	Fire impacts the revegetation success	Serious	Possible	Medium	- Development and implementation of Bushfire Management Plan, including; fire breaks, active fire management and vegetation reduction program, fire detection and suppression systems, fire extinguishers, housekeeping standards, fire-fighting training, emergency response procedures. - Availability of Emergency Services and equipment. - Development and implementation of Emergency Response Plan.	Medium	Possible	Medium		
		Terrestrial flora and fauna	14	Construction (S3 up to 15 years)	Reduction in habitat quality and/or quantity (within and surrounding the project area) leading to a decrease in the diversity and/or abundance of species	Serious	Possible	Medium		Serious	Unlikely	Medium		
		Inland water environmental quality	10	Construction (S3 up to 15 years)	Loss of vegetation leads to exposure of land surface and higher erosion rates impacting water quality	Medium	Unlikely	Low		Medium	Unlikely	Low		
		Social, economic and cultural surroundings	8	Construction (S3 up to 15 years)	Impacts to culturally significant flora species, or cultural heritage or sacred sites.	Major	Likely	High		Serious	Possible	Medium		
		Human health - Other	15	Construction (S3 up to 15 years)	Personnel fatality or injury (particularly around bulk fuel storage areas)	Major	Unlikely	Medium		Medium	Unlikely	Low		
40	Personnel <b>drowning</b> while working in or around water bodies. (e.g. rivers, pit lake etc.).  Causes could include slips, trips and falls (e.g. due to slippery surface, uneven ground), unintended vehicular entry into liquid bodies, failure to identify liquid body (e.g. poor visibility).	Human health - Other	15	Construction (S3 up to 15 years)	Drowning of site worker  <i>Note. The maximum reasonable consequence would be a single fatality.</i>	Catastrophic	Unlikely	High	- Development and implementation of adverse weather procedure. - Development and implementation of working in and around water bodies procedure. - Appropriate use of portable edge protection. - Appropriate use of personal flotation device (PFD). - Availability of Emergency Services and equipment. - Development and implementation of Emergency Response Plan.	Medium	Unlikely	Low		
41	Personnel impacted by <b>climatic extremes</b> while working on site in adverse weather conditions.  This includes high winds, lightning, storms, hail, heat, UV radiation etc.  Personnel may be impacted by climate extremes through flying debris in high winds, struck by lightning or experience heat stress when working in hot conditions either due to the local climate.	Human health - Other	15	Construction (S3 up to 15 years)	Consequences will vary depending on the type of exposure, where effects may range from dehydration, sunburn, injuries from being struck by items through to fatality due to heat stroke, struck by lightning.  <i>Note: The maximum reasonable consequence would be a single fatality as it is considered unlikely for multiple people to be impacted by a single climatic event.</i>	Major	Likely	High	- Development and implementation of Fitness for work management system including hours of work, drug & alcohol policy, medicals, fatigue management etc. - Appropriate use of Lightning tracking and development and implementation of stop work and refuge procedures. - Weather monitoring. - Development and implementation of adverse weather procedure. - Development and implementation of Emergency Response Plan - Development and implementation of lone and isolated workers procedure. - Appropriate use of PPE - Development and implementation of heat stress / hydration monitoring program. - Appropriate use of communication protocols. - Good site housekeeping. - Availability of Emergency Services and equipment. - Development and implementation of site induction.	Major	Unlikely	Medium		

Ref.	Potential event (how the Project interacts with assets, values, uses and location. Include clear description of the cause)	Impact pathway			Initial Risk			Planned Controls to Manage Risk (as per Project Description, and elements of Standards / Codes of Practice)	Residual Risk			Additional Controls Recommended to Reduce Risk	Comment	
		Environmental Factor	Chapter reference	Time period Construction (S3 up to 15 years) Post rehab short term (S4 up to 20 years) Post rehab long term (S5 >20 years)	Description of impact	Consequence	Likelihood		Risk Rating	Consequence	Likelihood			Risk Rating
42	Personnel exposed to <b>hazardous flora or fauna</b> including snakes, spiders, mosquitoes, biting insects, bees, wasps, larger animals such as crocodiles etc.	Human health - Other	15	Construction (S3 up to 15 years)	Consequences will vary depending on the flora or fauna to which personnel come into contact and whether they have an allergic reaction to bites / stings.  <i>Note: The maximum reasonable consequence would be a single fatality.</i>	Catastrophic	Possible	High	<ul style="list-style-type: none"> <li>- Appropriate use of PPE</li> <li>- Development and implementation of site Induction.</li> <li>- Snake awareness training.</li> <li>- Development and implementation of vegetation management program.</li> <li>- Availability of Emergency Services and equipment.</li> <li>- Qualified snake handlers on site.</li> <li>- Appropriate pest control program (insects, spiders etc.).</li> <li>- Development and implementation of lone and isolated worker procedure.</li> <li>- Appropriate use of communication protocols.</li> <li>- <del>Development and implementation of site induction</del></li> </ul>	Serious	Unlikely	Medium		
43	<b>Unauthorised site access</b> / security breach.  This includes all unauthorised access to site and other restricted areas.  Access may occur as an intended event or may be unintentional, in both circumstances those entering site will be in danger and may potentially put site personnel in danger. This also includes site personnel accessing site / restricted areas with the intention to cause harm, sabotage and protesters etc.	Human health - Other	15	Construction (S3 up to 15 years)	Consequences will vary depending on the location of unauthorised access and the reason for access (e.g. if they are deliberately causing harm). Personnel may be exposed to many of the site hazards including mobile equipment movements, hazardous materials etc.  <i>Note: The maximum reasonable consequence would be a single fatality.</i>	Major	Likely	High	<ul style="list-style-type: none"> <li>- Site security and access restrictions including signage and fencing.</li> <li>- Development and implementation of site access control procedures.</li> <li>- Contractor management system.</li> <li>- Development and implementation of media communication protocols / plan.</li> <li>- Stakeholder Engagement and Communications Plan.</li> <li>- Availability of Emergency Services and equipment.</li> </ul>	Serious	Possible	Medium		
44	Project staff exposed to <b>work place hazards</b>	Human health - Other	15	Construction (S3 up to 15 years)	Injury to staff	Catastrophic	Possible	High	<ul style="list-style-type: none"> <li>- Development and implementation of Workplace Health and Safety Systems</li> <li>- Contractor's Safe System of Work to be established</li> </ul>	Catastrophic	Rare	Medium		

Ref.	Potential event (how the Project interacts with assets, values, uses and location. Include clear description of the cause)	Impact pathway				Initial Risk			Planned Controls to Manage Risk (as per Project Description, and elements of Standards / Codes of Practice)	Residual Risk			Additional Controls Recommended to Reduce Risk	Comment
		Environmental Factor	Chapter reference	Time period Construction (S3 up to 15 years) Post rehab short term (S4 up to 20 years) Post rehab long term (S5 >20 years)	Description of impact	Consequence	Likelihood	Risk Rating		Consequence	Likelihood	Risk Rating		
45	Remediation works at sites containing <b>radioactive material</b>	Human health - Radiation	16	Construction (S3 up to 15 years)	Increased occupational exposure from gamma radiation which may lead to detrimental health effects	Major	Possible	High	<ul style="list-style-type: none"> <li>- Radiological material to be managed and sectioned into clearly defined areas, clearly signposted.</li> <li>- Radiation soils and Hazard assessment excavation plan.</li> <li>- Compliance with relevant national and international guidelines and legislative requirements as provided by IAEA, ICRP, ARPANSA;</li> <li>- Radiation Management Plan (RadMP) (as per ARPANSA Guideline) which includes;</li> <li>- Radioactive Waste Management Plan ;</li> <li>- Identification of any Controlled Areas of higher radiation levels;</li> <li>- Dust suppression systems;</li> <li>- Mobile equipment design specifications include filtered air conditioned air supply (HEPA filters);</li> <li>- Radiation monitoring plan;</li> <li>- Radiation Equipment Clearance Procedures;</li> <li>- PPE protection;</li> <li>- hygiene standards and equipment wash down areas;</li> <li>- All employee and visitor site inductions coverage</li> <li>- Different levels of protection for different staff roles</li> <li>- Hygiene protocols etc.</li> <li>- Constant radon monitoring across site with RGM's and real time radon sniffs throughout construction.</li> <li>- Limited offsite monitoring through RGMs.</li> </ul>	Major	Rare	Medium		
		Human health - Radiation	16	Construction (S3 up to 15 years)	Ingestion or exposure of radioactive materials causing health effects to workers	Major	Possible	High		Major	Rare	Medium		
		Human health - Radiation	16	Construction (S3 up to 15 years)	Exposure to radon causing health effects to workers onsite	Major	Possible	High		Major	Rare	Medium		
		Human health - Radiation	16	Construction (S3 up to 15 years)	Exposure to radon causing health effects to members of the public	Medium	Possible	Medium		Medium	Rare	Low		
46	Vehicles or <b>equipment contaminated by radioactive material</b> leaving the project area	Human health - Radiation	16	Construction (S3 up to 15 years)	Health effects to members of the public from exposure to radiation	Medium	Possible	Medium	<ul style="list-style-type: none"> <li>- Dedicated wash down facilities for vehicles and equipment</li> <li>- Development and implementation of radiation clearance permit control system for all onsite equipment/vehicles</li> <li>- All equipment and vehicles subject to Radiation Clearance procedures, including Clearance certificates and contamination surveys</li> </ul>	Minor	Unlikely	Low		
47	<b>Flora and fauna</b> inhabiting areas with high <b>radiation</b> levels	Human health - Radiation	16	Post rehab long term (S5 >20 years)	Consumption by Traditional Owners of contaminated or irradiated animals and plants leading to an increase in dose	Catastrophic	Likely	Extreme	<p><i>Note: Radiation is unlikely to cause mortality of individual animals in the wild as they are short-lived and with the nature of low level radiation means that the formation of terminal cancers is a longer prospect.</i></p> <ul style="list-style-type: none"> <li>- Excavation of radioactive material prior to construction works.</li> <li>- Radioactive materials to be permanently stored in the waste storage facility (WSF) as per detailed engineering design.</li> <li>- Development and implementation of Land Use Plan that matches planned exposure scenarios.</li> <li>- Rehabilitation planning excludes the use of edible flora during the rehabilitation process.</li> <li>- Development and implementation of Radiation Management Plan (RadMP).</li> <li>- Stakeholder Engagement and Communications Plan.</li> </ul>	Serious	Possible	Medium		
		Terrestrial flora and fauna	14	Post rehab long term (S5 >20 years)	Mortality of individual animals (due to ongoing exposure to radiation) leading to a decline in local population	Minor	Unlikely	Low		Minor	Rare	Low		

Ref.	Potential event (how the Project interacts with assets, values, uses and location. Include clear description of the cause)	Impact pathway			Initial Risk			Planned Controls to Manage Risk (as per Project Description, and elements of Standards / Codes of Practice)	Residual Risk			Additional Controls Recommended to Reduce Risk	Comment	
		Environmental Factor	Chapter reference	Time period Construction (S3 up to 15 years) Post rehab short term (S4 up to 20 years) Post rehab long term (S5 >20 years)	Description of impact	Consequence	Likelihood		Risk Rating	Consequence	Likelihood			Risk Rating
48	Traditional Owners, members of the public and staff spending extended periods in areas with high radiation levels	Human health - Radiation	16	Post rehab long term (S5 >20 years)	Increased radiological dose	Major	Possible	High	<ul style="list-style-type: none"> <li>- Radioactive materials to be stored in the waste storage facility (WSF) as per detailed engineering design.</li> <li>- Field testing and mapping of areas with elevated radiation levels to develop radiation excavation plans. Areas identified as having elevated levels will be processed first into the waste storage facility, minimising worker exposure.</li> <li>- Development and implementation of Land Use Plan that matches exposure scenarios.</li> <li>- Development and implementation of Radiation Management Plan is adhered to.</li> <li>- Site fencing and signage to stop people entering the site.</li> <li>- Stakeholder Engagement and Communications Plan.</li> </ul>	Medium	Unlikely	Low		
49	Disturbance of unidentified areas containing materials that have elevated levels of radionuclides	Human health - Radiation	16	Construction (S3 up to 15 years)	Increased exposure to radiation increasing the dose to critical groups.	Serious	Likely	High	<ul style="list-style-type: none"> <li>- Active waste and material management on the project site through ongoing monitoring and inspections.</li> <li>- Undertake hazard assessment to identify and map radioactive material. Identified materials to be included in radiation excavation plans.</li> </ul>	Medium	Unlikely	Low		
50	Onsite radiological hazards not identified, and therefore not remediated	Human health - Radiation	16	Post rehab long term (S5 >20 years)	Potential increase in exposure to radiation increasing the dose to site end user groups	Serious	Unlikely	Medium	<ul style="list-style-type: none"> <li>- Hazard identification survey forms radiation excavation mapping. Mapping to be included in rehabilitation plan as appropriate.</li> <li>- Development and implementation of Land Use Management Plan (LUMP).</li> </ul>	Serious	Rare	Low		
51	Increase concentration of contaminants when plants uptake metals and/or salts, due to roots extending into waste material on top of the Waste Storage Facility (WSF)	Human health - Radiation	16	Post rehab long term (S5 >20 years)	There is the potential for end users of the site to ingest contaminants, causing health effects, from the contaminants in local flora and fauna.  Consumption by Traditional Owners of contaminated animals and plants leading to an increased radiological dose that may lead to detrimental health effects	Major	Possible	High	<ul style="list-style-type: none"> <li>- Ensure that revegetation methodology only utilises native species with shallow roots to be used on any capped material.</li> <li>- Revegetation will not include native food plants (to decrease the potential use as a food source by Traditional Owners).</li> <li>- Development and implementation of Land Use Plan (LUP).</li> <li>- Ensuring that capping material meets published requirements to allow for growth of flora on it.</li> </ul>	Medium	Rare	Low		
		Terrestrial environmental quality	9	Post rehab long term (S5 >20 years)	No establishment of vegetation on the WSF	Catastrophic	Possible	High		Serious	Rare	Low		
52	Failure of the WSF, due to insufficient neutralant (i.e. lime), damage to capping, poor design / construction / material selection etc.	Human health - Other	15	Post rehab long term (S5 >20 years)	Wind erosion due to capping failure leading to mobilisation of contaminated material into the air	Serious	Possible	Medium	<ul style="list-style-type: none"> <li>- Appropriately engineered cover design by suitably qualified engineer with oxygen and water infiltration reduction controls.</li> <li>- AMD reduction processes to include appropriate addition and mixing of neutralant (i.e. lime) as advised by the project geochemists and compaction of the neutralised waste rock to increase stability and reduce oxygen/water diffusion/infiltration.</li> <li>- Surface water control design over complete WSF to ensure adequate erosion mitigation structures over the facility and ensure controlled shedding drainage of excess surface water.</li> <li>- Cover system to include low permeability layers, store and release covers, topsoil and rock mulch to reduce erosion.</li> <li>- Minimise the WSF surface area through effective designing.</li> </ul>	Medium	Unlikely	Low		
		Terrestrial environmental quality	9	Post rehab long term (S5 >20 years)	Failure to meet completion criteria and/or to stabilise landforms.	Catastrophic	Almost Certain	Extreme	<ul style="list-style-type: none"> <li>- Development and implementation of the Erosion and Sediment Control Plan.</li> <li>- Undertake detailed material investigation.</li> </ul>	Serious	Unlikely	Medium		
		Human health - Radiation	15	Post rehab long term (S5 >20 years)	Increased radiological dose from radon which may lead to detrimental health effects to end of project site users	Major	Possible	High	<ul style="list-style-type: none"> <li>- Development and implementation of Water Management Plan (WMP) for post rehabilitation long term (stage 5 &gt;20 years).</li> </ul>	Medium	Unlikely	Low		
		Inland water environmental quality	10	Post rehab long term (S5 >20 years)	Oxygen penetration through capping layer leading to sulphide oxidation and AMD leachate impacting groundwater	Catastrophic	Almost Certain	Extreme		Serious	Unlikely	Medium		

Ref.	Potential event (how the Project interacts with assets, values, uses and location. Include clear description of the cause)	Impact pathway			Initial Risk			Planned Controls to Manage Risk (as per Project Description, and elements of Standards / Codes of Practice)	Residual Risk			Additional Controls Recommended to Reduce Risk	Comment	
		Environmental Factor	Chapter reference	Time period Construction (S3 up to 15 years) Post rehab short term (S4 up to 20 years) Post rehab long term (S5 >20 years)	Description of impact	Consequence	Likelihood		Risk Rating	Consequence	Likelihood			Risk Rating
		Inland water environmental quality	10	Post rehab long term (S5 >20 years)	Degradation of surface water quality due to topsoil and subgrade erosion causing migration of nutrients, dissolved solids, and sediments to watercourses.  Oxygen penetration through capping layer leading to AMD leachate impacting seepage quality and ultimately surface water quality.  Potential impacts on biological health of downstream watercourse, risks to recreational users of watercourses, impacts to consumers of aquatic foods, and downstream water users  Diminished integrity of final landform cover and potential exposure of contained materials to environment.	Major	Likely	High	term (stage 3 >20 years). - Cover and WSF QA/QC construction plan to be included in technical specifications. - Development and implementation of Revegetation Plan to include maintenance and monitoring plan for capping design. - Development and implementation of Bushfire and Weed Management Plans (to include tree removal) - Undertake Erosion Modelling to incorporate into design phase. - Development and implementation of Land Use Plan. - Placement of the Dysons WRD NAF and PAF 3 near surface of new WSF to scavenge diffused oxygen. - Only a selection of native species with shallow roots to be used on any capped material.	Major	Unlikely	Medium		
53	Revegetation of the capped material is unsuccessful, due to insufficient growth substrate material, poor preparation, or lack of water during initial establishment phase	Social, economic and cultural surroundings	13	Post rehab long term (S5 >20 years)	Store and release cover design requires evapo-transpiration by vegetation on capped material, but does not work as intended  Visual amenity doesn't meet community expectations	Major	Possible	High	- Construction as per design specifications (e.g. store and release cover dimensions). - Appropriate vegetation selection for suitability on capping material. - Ensure availability of sufficient material to support appropriate vegetation growth. - Development and implementation of Rehabilitation Management Plan (RehMP). - Revegetation will include progressive trials and adaptation of vegetation.	Serious	Rare	Low		
		Inland water environmental quality	10	Post rehab long term (S5 >20 years)	Increase percolation into the Waste Storage Facility (WSF) and seepage to groundwater	Major	Possible	High	See also Potential event #52	Serious	Rare	Low		
54	Implementation of design is incomplete, due to external factors	Inland water environmental quality	10	All	Incomplete implementation results in pollution, contamination and seepage into surface and ground water, with potential downstream consequences	Catastrophic	Possible	High	- Appropriate project governance. - Accurate cost estimation in the business case. - Stakeholder Engagement and Communications Plan.	Serious	Possible	Medium		
		Social, economic and cultural surroundings	13	All	No social licence provided for the final works	Major	Possible	High		Serious	Unlikely	Medium		
		Terrestrial environmental quality	9	All	Failure to meet completion criteria and/or to stabilise landforms.  Need to go back to EIS and resubmit a different scope of works.	Major	Possible	High		Serious	Unlikely	Medium		
55	Failure of the designed and implemented revegetation program, due to lack of attention / impact of the wet season / introduction of weeds	Terrestrial environmental quality	9	Post rehab long term (S5 >20 years)	Failure to meet completion criteria and/or to stabilise landforms.	Serious	Likely	High	- Appropriate vegetation selection for suitability on capping material. - Appropriate supply of seedlings. - Development and implementation of staged revegetation program and trials. - Ensure appropriate timing of vegetation planting with soil moisture content. - Appropriate resources for revegetation team, including supervision by suitably qualified individual. - Appropriate revegetation program. - Seed collection comes from local region (i.e. matching genetic adaptation). - Identify adequate resources to ensure vegetation management during and post construction activities. - Development and implementation of Weed Management Program. - Development and implementation of Fire Management	Serious	Possible	Medium		

Ref.	Potential event (how the Project interacts with assets, values, uses and location. Include clear description of the cause)	Impact pathway			Initial Risk			Planned Controls to Manage Risk (as per Project Description, and elements of Standards / Codes of Practice)	Residual Risk			Additional Controls Recommended to Reduce Risk	Comment	
		Environmental Factor	Chapter reference	Time period Construction (S3 up to 15 years) Post rehab short term (S4 up to 20 years) Post rehab long term (S5 >20 years)	Description of impact	Consequence	Likelihood		Risk Rating	Consequence	Likelihood			Risk Rating
56	Post-rehabilitation <b>radiation dose target</b> levels not reached	Human health - Radiation	16	Post rehab long term (S5 >20 years)	Unacceptable radiological exposure increasing dose to post land use groups	Major	Possible	High	- Radioactive materials to be stored in the waste storage facility (WSF) as per detailed engineering design. - Field testing and mapping of areas with elevated radiation levels to develop radiation excavation plans. Areas identified as having elevated levels will be processed first into the waste storage facility, minimising worker exposure. - Post rehabilitation radiological surveys including mapping - Development and implementation of Land Use Plan (LUP). - Development and implementation of Radiation Management Plan (RadMP).	Medium	Unlikely	Low		
57	Overall visual amenity impacted, due to introduction of Waste Storage Facility (WSF) and borrow areas	Social, economic and cultural surroundings	13	Construction (S3 up to 15 years)	Introduction of trucks on roads along haul roads impacts visual amenity during construction phase	Medium	Possible	Medium	- Visual Amenity report (which only takes into account the final land form post construction) states the project cannot be seen from the road. - Information Centre and Notice Boards include information on the project.	Medium	Possible	Medium		
		Social, economic and cultural surroundings	13	Post rehab long term (S5 >20 years)	The creation of the WSF, impacts the overall visual amenity of the site for public driving along the public roads	Medium	Rare	Low		Medium	Rare	Low		
58	Inappropriate putrescible <b>waste management</b>	Terrestrial flora and fauna	14	Construction (S3 up to 15 years)	Mortality of individual animals (due to introduction or spread of pest species attracted to food waste) leading to a decline in local population	Major	Unlikely	Medium	- Development and implementation of Waste Management Plan, including measures to control putrescible waste ensuring it does not enter the environment and for the segregation of waste during construction activities. All non-mining waste will be taken offsite (excluding the use of compostable toilets, if deemed appropriate for the project).	Minor	Rare	Low		Not actively trying to control pests.
59	Extraction of groundwater from aquifer for remediation purposes  <i>may need revising given change to project - dependent on Paul F modelling info.</i>	Terrestrial flora and fauna	14	Construction (S3 up to 15 years)	Reduction in habitat quality and/or quantity (due to reduced groundwater availability for groundwater-dependent ecosystems) leading to a decrease in the diversity and/or abundance of species.	Major	Unlikely	Medium	-Development and implementation of groundwater remediation plan. - Obtain a Water Extraction Licence (if required). - Intermediate Pit flooded void assists to moderate groundwater elevation.	Serious	Unlikely	Medium		
		Social, economic and cultural surroundings	10	Construction (S3 up to 15 years)	Water extraction for construction impacts on other water users	Serious	Unlikely	Medium		Medium	Rare	Low		
60	External bushfire encroaches within the project boundary, due to adverse weather events or arson activities etc.	Human health - Other	15	All	Personnel fatality or injury (particular around bulk fuel storage areas)	Major	Unlikely	Medium	- Development and implementation of Fire Management Plan, including; fire breaks, active fire management and vegetation reduction program, fire detection and suppression systems, fire extinguishers, fire-fighting training, emergency response procedures. - Availability of Emergency Services and equipment. - Development and implementation of Emergency Response Plan.	Medium	Unlikely	Low		
		Social, economic and cultural surroundings	8	All	Impacts to culturally significant flora species, or cultural heritage or sacred sites.	Major	Possible	High		Serious	Unlikely	Medium		
		Terrestrial flora and fauna	14	Post rehab long term (S5 >20 years)	Fire impacts the revegetation success	Serious	Possible	Medium		Medium	Possible	Medium		
61	Inadequate management of <b>asbestos</b> or asbestos contaminated soils	Human health - Other	15	Construction (S3 up to 15 years)	Asbestos particles become airborne and impact human health	Serious	Unlikely	Medium	- Development and implementation of Waste Management Plan. - Available asbestos register with location and amounts for Rum Jungle. - Appropriate Asbestos Control Plan (incl. disposal in the Waste Storage Facility (WSF)). - All surface asbestos to be removed and disposed. - Use of licensed subcontractor to handle and dispose asbestos. - Make safe central working area for purpose of construction (i.e. until appropriate timing for disposal to WSF). - Undertake independent audit by Contaminated Land Auditor.	Medium	Rare	Low		

Ref.	Potential event (how the Project interacts with assets, values, uses and location. Include clear description of the cause)	Impact pathway			Initial Risk			Planned Controls to Manage Risk (as per Project Description, and elements of Standards / Codes of Practice)	Residual Risk			Additional Controls Recommended to Reduce Risk	Comment	
		Environmental Factor	Chapter reference	Time period Construction (S3 up to 15 years) Post rehab short term (S4 up to 20 years) Post rehab long term (S5 >20 years)	Description of impact	Consequence	Likelihood		Risk Rating	Consequence	Likelihood			Risk Rating
62	Uncontrolled release, spill or passive discharge of <b>hazardous materials</b> at project site  <i>Note: Hazardous materials include asbestos, hydrocarbons etc.</i>	Inland water environmental quality	10	Construction (S3 up to 15 years)	Reduction in water quality	Serious	Possible	Medium	<ul style="list-style-type: none"> <li>- Storage of materials in accordance with Australian codes and standards, with controls such as weatherproofing and bunding.</li> <li>- Waste discharge licence needs to be applied (incl. (potential) discharge and/or receiving water limits and/or trigger values, and incident reporting).</li> <li>- Engineered runoff water quality controls from facilities. E.g. grease traps and first flush containment systems.</li> <li>- Development and implementation of site procedures for spill response, clean-up and reporting (incl. spill kits).</li> <li>- Development and implementation of Waste Management Plan.</li> <li>- Development and implementation of Erosion and Sediment Control Plan (ESCP).</li> <li>- Development and implementation of Emergency Response Plan.</li> <li>- Development and implementation of Radiation Management Plan (RadMP).</li> </ul>	Medium	Unlikely	Low		
		Human Health - other	15	Post rehab long term (S5 >20 years)	Failure to meet Rehabilitation criteria	Major	Possible	High		Medium	Rare	Low		
		Human health - Radiation	16	Construction (S3 up to 15 years)	Dispersion of dust causing an increase of inhalation and ingestion of radionuclides causing an increase in radiological dose	Major	Possible	High		Medium	Unlikely	Low		
		Human health - Radiation	16	Post rehab long term (S5 >20 years)	Radioactive contamination of water and/or aquatic foods (e.g. fish or mussels) causing an increase in dose to critical groups.  Increase in dose for Traditional Owners using the area from increased radiological exposure due to the creation of un-remediated hotspots	Major	Possible	High		Medium	Unlikely	Low		
		Aquatic ecosystems	12	Construction (S3 up to 15 years)	Reduction in habitat quality and/or quantity due to water contamination leading to a decrease in the diversity and/or abundance of species.	Major	Possible	High		Serious	Unlikely	Medium		
63	Materials used for the construction and maintenance of new access and haul roads and embankments could contain contaminants	Inland water environmental quality	10	Construction (S3 up to 15 years)	Decreased water quality due to local Acid Mine Drainage (AMD) from Potentially Acid Forming (PAF) materials.  Decreased quality of dust suppression water.	Serious	Possible	Medium	<ul style="list-style-type: none"> <li>- Geochemical investigation of construction materials for infrastructure (haul roads, embankments).</li> <li>- Review of construction materials (e.g. primer agents) prior to use.</li> <li>- Construction quality QA/QC to be included in technical specifications.</li> <li>- Road rehabilitation and removal of roads post construction works.</li> </ul>	Serious	Unlikely	Medium		
		Aquatic ecosystems	12	Construction (S3 up to 15 years)	Reduction in habitat quality and/or quantity (due to contamination) leading to a decrease in the diversity and/or abundance of species	Serious	Possible	Medium		Serious	Rare	Low		
64	Overtopping of <b>bunded facilities</b> onsite, during rainfall events  <i>Note: Facilities that require bunding include the water treatment plant, fuel tanks, hydrocarbon and neutralant storage, and secondary containment of other hazardous storages</i>	Aquatic ecosystems	12	Construction (S3 up to 15 years)	Reduction in habitat quality (due to contamination) leading to a decrease in the diversity and/or abundance of species.	Serious	Possible	Medium	<ul style="list-style-type: none"> <li>- Storage of materials in accordance with Australian codes and standards, with controls such as weatherproofing and bunding.</li> <li>- Locate the water treatment plant (WTP) under roofing</li> <li>- Minimise the amount of hazardous materials stored onsite during the wet season</li> <li>- Development and implementation of Inspection program ensuring good housekeeping practices inside bunds.</li> </ul>	Serious	Unlikely	Medium		
		Inland water environmental quality	10	Construction (S3 up to 15 years)	Contamination to surface water during a rainfall event	Medium	Likely	Medium		Medium	Unlikely	Low		
65	Leak from <b>sewerage treatment facilities</b> , due to poor maintenance	Inland water environmental quality	10	Construction (S3 up to 15 years)	Release from site facilities impacting the surface water	Minor	Unlikely	Low	<ul style="list-style-type: none"> <li>- Development and implementation of sewerage monitoring program ensuring system pumped out as required.</li> <li>- Building of facilities in accordance with Australian codes and standards by suitably qualified builder.</li> </ul>	Minor	Rare	Low		
		Inland water environmental quality	10	Construction (S3 up to 15 years)	Seepage of site facilities impacting the groundwater	Minor	Unlikely	Low		Minor	Rare	Low		
66	Visual impact of historical scrap across project site (e.g. <b>tyres, drums</b> ), due to inappropriate waste management	Social, economic and cultural surroundings	13	Construction (S3 up to 15 years)	Impacts the aesthetics of site	Medium	Unlikely	Low	<ul style="list-style-type: none"> <li>- Site readiness for construction (incl. clean up).</li> <li>- Clean-up crew to dispose surface waste as it is identified.</li> </ul>	Minor	Rare	Low		
		Human health - Other	15	Construction (S3 up to 15 years)	Trip hazard	Medium	Unlikely	Low		Medium	Rare	Low		
67	Use of <b>vehicles</b> to move equipment, plant, materials and/or personnel onsite and between sites	Terrestrial flora and fauna	14	Construction (S3 up to 15 years)	Mortality of individual animals (due to interaction with machinery and vehicles) leading to a decline in local populations	Minor	Possible	Low	<ul style="list-style-type: none"> <li>- Development and implementation of Traffic Management Plans.</li> <li>- Increased schedule time to minimise traffic volume per day.</li> <li>- No driving will occur at night (when most small mammals are active)</li> </ul>	Minor	Unlikely	Low		

Ref.	Potential event (how the Project interacts with assets, values, uses and location. Include clear description of the cause)	Impact pathway			Initial Risk			Planned Controls to Manage Risk (as per Project Description, and elements of Standards / Codes of Practice)	Residual Risk			Additional Controls Recommended to Reduce Risk	Comment	
		Environmental Factor	Chapter reference	Time period Construction (S3 up to 15 years) Post rehab short term (S4 up to 20 years) Post rehab long term (S5 >20 years)	Description of impact	Consequence	Likelihood		Risk Rating	Consequence	Likelihood			Risk Rating
68	Movement and/or containment of <b>radioactive materials</b>	Terrestrial flora and fauna	14	Post rehab long term (S5 >20 years)	Mortality of individual animals (due to radionuclide exposure from dust emissions, contaminated water or remnant radioactive material) leading to a decline in local populations	Minor	Unlikely	Low	<ul style="list-style-type: none"> <li>- Radioactive materials to be stored in the waste storage facility (WSF) as per detailed engineering design.</li> <li>- Field testing and mapping of areas with elevated radiation levels to develop radiation excavation plans.</li> <li>- Areas identified as having elevated levels will be processed first into the waste storage facility, minimising worker exposure.</li> <li>- Development and implementation of Land Use Plan that matches exposure scenarios.</li> <li>- Development and implementation of Radiation Management Plan.</li> </ul>	Minor	Rare	Low		
69	Construction activities inhibit passage of aquatic fauna to upstream reaches of EBFR	Aquatic ecosystems	12	Post rehab long term (S5 >20 years)	Impediment to aquatic fauna passage through site during construction causing low population density upstream.	Serious	Possible	Medium	<ul style="list-style-type: none"> <li>- Passage currently inhibited due to chemical and physical impediments.</li> <li>- Construction Phase will see EBFR flow through the diversion channel as is the current condition.</li> <li>- Restoration works will restore the EBFR flow regime therefore restoring conditions for aquatic fauna movement through the site.</li> </ul>	Serious	Possible	Medium		
70	Intermediate Pit draw down and groundwater treatment give rise to reduced groundwater levels	Hydrological processes	11	Construction (S3 up to 15 years)	Groundwater dependant ecosystems are impacted by groundwater drawdown during construction	Serious	Possible	Medium	<ul style="list-style-type: none"> <li>- Intermediate Pit draw down set at 8m below outlet elevation.</li> <li>- Modelling indicates minimal impact to groundwater dependant ecosystem north of intermediate pit.</li> <li>- Monitoring of groundwater network surrounding Intermediate Pit during works.</li> </ul>	Medium	Rare	Low		
71	Spills or loss of containment associated with storage of bulk hazardous materials	Terrestrial environmental quality	9	Construction (S3 up to 15 years)	Contamination of soils, impact on flora and fauna and potential contamination of surface water	Serious	Unlikely	Medium	<ul style="list-style-type: none"> <li>- Where possible avoid or limit the storage of hazardous materials</li> <li>- Storage and handling of materials to Australian Standards including self-bunded fuel tanks, sealed filling areas, availability of spill kits, segregation of chemicals. above rather than below ground storage tanks, regular inspections, emergency response plan</li> <li>- Appropriate handling and storage of other bulk chemicals such as lime and WTP additives, completion of a hazardous substance management plan, regular audits</li> </ul>	Minor	Rare	Low		
72	Intermediate Pit draw down and groundwater treatment give rise to historic and introduced contamination of soils	Terrestrial environmental quality	9	Post rehab long term (S5 >20 years)	Contamination of soils, impact on flora and fauna and potential contamination of surface water	Serious	Unlikely	Medium	<ul style="list-style-type: none"> <li>- Detailed investigations to determine contamination extent, detailed assessment to determine appropriate liming rate, development and implementation of a remediation action plan, undertaking watching brief and completing validation sampling/reporting, assessment of the process by a VIC EPA Auditor, QA/QC during construction, appropriate superintendence</li> </ul>	Serious	Rare	Low		