

Appendix B

AAPA Certificate

Appendix C

Environmental Risk Assessment

Appendix C Paru Road Construction Environmental Risk Assessment

Risk #	Activity Description	Aspect	Impact	Inherent Risk Assessment						Mitigation Measures	Residual Risk Assessment						Hierarchy of Controls		
				Environment and Community			Law, Regs and Civil Action				Risk	Environment and Community			Law, Regs and Civil Action			Risk	
				Consequen	Likelihood	Risk Level	Consequen	Likelihood	Risk Level			Consequen	Likelihood	Risk Level	Consequen	Likelihood			Risk Level
Land																			
1	Road upgrade works - realignment of Paru road and gravel extraction	Management of Land - Soil and Erosion	Soil instability or movement as a result of construction activities or vegetation loss Description Soils within the project area are considered to have a low to moderate erosion potential.	2	3	M	2	3	M	M	<ul style="list-style-type: none"> An Erosion and Sediment Control Plan will ideally be prepared by a Certified Professional in Erosion and Sediment Control (CPESC) in accordance with best practice Erosion and Sediment Control Guidelines (IECA, 2008): <ul style="list-style-type: none"> Project superintendent will determine whether a CPESC is required Refer to DIPL <i>Standard Specification for Environmental management (2.0)</i>, Section 6 – <i>Erosion and Sediment Control Plan</i> Road realignment works to occur during the dry season and stabilise the site using design and erosion and sediment controls. Undertake activities during the dry season to minimise the risk of bogging vehicles and creating unnecessary soil disturbance. Where track intercepts the direction of overland flow and re-directs this flow to a non-natural drainage line, install erosion control works to minimise potential erosion. Reinstatement of disturbed areas post project completion. 	2	2	L	2	2	L	L	<p>Elimination</p> <ul style="list-style-type: none"> No clearing of riparian vegetation along waterways. <p>Substitution</p> <ul style="list-style-type: none"> If the 7-day forecast indicates greater than 40% chance of rain, the construction contractor will stabilise work areas. <p>Engineering</p> <ul style="list-style-type: none"> Implement ESCP controls Sections of roads will be sealed and batters compacted prior to wet season demobilisation (between 2021 & 2022 dry season works) <p>Administration</p> <ul style="list-style-type: none"> Site environmental inductions. Daily toolbox
2	Road upgrade works - realignment of Paru road and gravel extraction	Management of Land - Soil and Erosion	Soil contamination as a result of construction activities Description Road works have potential to contaminate surrounding soils if storage and handling of hazardous materials and wastewater are not managed appropriately.	2	3	M	1	3	M	M	<p>Spill prevention:</p> <ul style="list-style-type: none"> Refer to DIPL <i>Standard Specification for Environmental management (2.0)</i>, Section 33.2 – <i>Spillage Prevention and Containment</i> A designated hazardous materials storage area will be provided onsite Material Safety Data Sheets and a Hazardous Dangerous Substances Register will be maintained and kept at the storage area Hydraulic fluid, oil and fuel drums will be stored within portable bunding Bulk fuel storage is to be within a self-bunded tank or a tank that can be bunded to 120% of capacity Loading and unloading operations of hazardous liquids will be undertaken in designated areas with bunding Spill detection: daily inspections of the hazardous materials storage area will be undertaken Refuelling is not to occur within 50 m of waterways or drainage lines 	2	1	L	1	2	L	L	<p>Engineering</p> <ul style="list-style-type: none"> Hydraulic fluid and fuel facilities/tanks are to be stored within portable bunding and as per material safety data sheet (MSDS) <p>Administration</p> <ul style="list-style-type: none"> Site environmental inductions. Daily toolbox

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3	Road upgrade works - realignment of Paru road and gravel extraction	Management of Land - Soil and Erosion	Dust impacts to vegetation and amenity as a result of road upgrade activities. Description Vehicles traversing across the site have the potential to cause dust impacts on surrounding environment. Dust generation may be an issue on areas of disturbed soil. Dust is more likely to form in places where the surface crust has been disturbed and then subjected to repeated ground disturbance.	2	2	L	1	2	L	L	<ul style="list-style-type: none"> Spill response: <ul style="list-style-type: none"> Spill clean-up material will be readily available at the work site and on all vehicles where hydrocarbons and chemicals are stored and / or used Various spill clean-up methods and equipment are to be used for different types of spills Various spill disposal methods to be used for different types of spills 	1	1	L	1	1	L	L	<p>Engineering</p> <ul style="list-style-type: none"> Implement dust control measures including use of water cart Implement 60 km/hr speed limits <p>Administration</p> <ul style="list-style-type: none"> Site environmental inductions. Daily toolbox
4	Road upgrade works - realignment of Paru road and gravel extraction	Management of Land - Soil and Erosion	Loss of topsoil and land capability Description Loss of topsoil could impact on successful outcomes of rehabilitation.	2	2	L	-	-	-	L	<ul style="list-style-type: none"> Topsoil and surface material will be stored at a specific location for later use in regeneration and revegetation. A gravel pit management plan will be developed for each pit area and will include stockpiling locations and details. Where possible topsoil will be stored at a site with maximum protection from prevailing winds. Stockpiles for topsoil will be formed in low mounds of minimum height 2 m, and 3 m height for other stockpiles unless determined otherwise by superintendent. Stockpiling of topsoil will be kept to the shortest period possible 	2	2	L	-	-	-	L	Hierarchy of controls as per Risk Reference 1.
5	Road upgrade works - realignment of Paru road and gravel extraction	Management of Land - Soil and Erosion	Soil compaction as a result of construction activities Description Vehicle movement across the site has potential to cause soil compaction which will require remediation.	2	2	L	-	-	-	L	<ul style="list-style-type: none"> Sufficient tracks and turning points will be created within the project area to minimise soil compaction due to vehicle movement. Environmental inductions on site for site personnel will include the issue of soil compaction, erosion and sedimentation, and protective measures to control erosion and sediment discharge into waterways and drainage 	2	1	L	-	-	-	L	Hierarchy of controls as per Risk Reference 1.

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										systems. <ul style="list-style-type: none"> After completion of a specific phase of activity, such as the first week of road upgrade works, the project area should be inspected for early signs of compaction, erosion and soil degradation (generation of bulldust) Access/exit points for the project will be established for vehicles and machinery 									
Water																			
6	Road upgrade works - realignment of Paru road and gravel extraction	Management of Water - Surface Water	Earthmoving equipment altering natural drainage lines or sinks Description Vehicles used for road upgrade works may alter the surface flow hydrology of the project area	1	1	L	-	-	-	L	<ul style="list-style-type: none"> An Erosion and Sediment Control Plan will ideally be prepared by a Certified Professional in Erosion and Sediment Control (CPESC) in accordance with best practice Erosion and Sediment Control Guidelines (IECA, 2008): <ul style="list-style-type: none"> Project superintendent will determine whether a CPESC is required Refer to DIPL <i>Standard Specification for Environmental management (2.0)</i>, Section 6 – <i>Erosion and Sediment Control Plan</i> The Project design will account for natural drainage of the project area, including protection works around abutments to bridge or culverts. 	1	1	L	-	-	-	L	Engineering <ul style="list-style-type: none"> Implement ESCP controls Construction works are to minimise disturbances to the creek bank and bed Stabilise and rehabilitate disturbed areas prior to commencement of wet season. Administration <ul style="list-style-type: none"> Photo points and rehabilitation monitoring
7	Road upgrade works - realignment of Paru road and gravel extraction	Management of Water - Surface Water	Access tracks altering natural surface water flow, creating ponding and or erosion Description Sheet flow is likely to occur across the project area during monsoon rain events which could increase flow around roadworks (i.e. erosion beside access tracks and machinery left overnight on site if Erosion and Sediment Control Plan not effectively implemented)	3	3	M	1	3	M	M	<ul style="list-style-type: none"> Undertake road upgrade works to during the dry season. Works will be scheduled to ensure that each section is fully complete and sealed prior to wet season demobilisation. Clearing and design and construction stages of earthworks should take account of seasonal site conditions (e.g. seasonally wet areas, steep slopes or nearby waterbodies). Fit the development to the seasonal site conditions, including short-term weather forecasts. Rely on advice of Site Operational Staff in relation to local weather and climate information to make decision regarding site operations (e.g Cyclone developing off the Tiwi coast) 	3	1	L	1	2	L	L	Elimination <ul style="list-style-type: none"> Construction works are to be undertaken during the dry season during no (or low) rainfall Engineering <ul style="list-style-type: none"> Implement ESCP controls Stabilisation of disturbed areas prior to commencement of wet season. Administration <ul style="list-style-type: none"> Site environmental inductions. Daily toolbox
8	Road upgrade works - realignment of Paru road and gravel extraction	Management of Water - Surface Water	Impacts associated with soil erosion such as increased water turbidity Disturbance Disturbance and clearing of the area can increase risk for soil erosion.	1	1	L	-	-	-	L	<ul style="list-style-type: none"> An Erosion and Sediment Control Plan will ideally be prepared by a Certified Professional in Erosion and Sediment Control (CPESC) in accordance with best practice Erosion and Sediment Control Guidelines (IECA, 2008): <ul style="list-style-type: none"> Project superintendent will determine whether a CPESC is required Refer to DIPL <i>Standard Specification for Environmental management (2.0)</i>, Section 6 	1	1	L	-	-	-	L	Engineering <ul style="list-style-type: none"> Implement ESCP controls Stabilisation of disturbed areas prior to commencement of wet season Administration <ul style="list-style-type: none"> Site environmental inductions. Daily toolbox

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											<ul style="list-style-type: none"> – <i>Erosion and Sediment Control Plan</i> Activities will occur during the dry season and the site will be stabilised using design and erosion and sediment controls. If waterways are flowing during construction, a water monitoring point will be established downstream to check turbidity and instigate change/improvements to management of the site. 									<p>Engineering</p> <ul style="list-style-type: none"> Water monitoring established downstream of construction if waterways are flowing
Water - Groundwater																				
9	Road upgrade works - realignment of Paru road and gravel extraction	Groundwater	Contamination or pollution of groundwater through waste or wastewater impact (e.g. refuelling) Disturbance Spills or leaks from activities impacting groundwater	3	2	M	3	1	L	M	<ul style="list-style-type: none"> A Spill Management Plan (SMP) can be developed for the project that outlines procedures for spill prevention, spill response and spill clean-up. The SMP would include the following mitigation methods: Spill prevention: <ul style="list-style-type: none"> A designated hazardous materials storage area will be provided onsite Hydraulic fluid, oil and fuel drums will be stored within portable bunding Loading and unloading operations of hazardous liquids will be undertaken in designated areas with bunding Spill response: <ul style="list-style-type: none"> Spill clean-up material will be readily available at each work site and on all mobile service vehicles where hydrocarbons and chemicals are stored and / or used Various spill clean-up and disposal methods and equipment can be used for different types of spills 	2	1	L	1	1	L	L	<p>Hierarchy of controls as per Risk Reference 2.</p>	
Noise, vibration and lighting																				
10	Road upgrade works - realignment of Paru road and gravel extraction	Noise, Vibrations and Lighting	Impacts to surrounding communities/outstations Description Noise and vibration generated by roadworks activities are a potential nuisance to communities and outstations	1	1	L	1	1	L	L	<ul style="list-style-type: none"> Operating hours will be established for road upgrade works Construction operations will be conducted during daylight hours only (6am – 6pm) Existing noise attenuation devices fitted to construction vehicles and machinery used on site will be maintained in good working order Project works are to meet the requirements of the NT EPA Noise Pollution guidelines for construction sites. 	1	1	L	1	1	L	L	<p>Elimination</p> <ul style="list-style-type: none"> Majority of construction works undertaken >3km from closest outstation (Paru) <p>Engineering</p> <ul style="list-style-type: none"> Vehicles, machinery and equipment is maintained in good working order. <p>Administration</p> <ul style="list-style-type: none"> Construction operations will be conducted during daylight hours only (6am – 6pm) 	

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11	Road upgrade works - realignment of Paru road and gravel extraction	Noise, Vibrations and Lighting	Impacts to native fauna Description Disrupting or altering fauna feeding, breeding or other activities through noise, vibration and lighting from use of mechanical equipment	1	1	L	1	1	L	L	<ul style="list-style-type: none"> Operating hours will be established for road upgrade works Construction operations will be conducted during daylight hours only (6am – 6pm) Existing noise attenuation devices fitted to construction vehicles and machinery used on site will be maintained in good working order 	1	1	L	1	1	L	L	Hierarchy of controls as per Risk Reference 10.
Land - Pollution																			
12	Road upgrade works - realignment of Paru road and gravel extraction	Waste - Spills	Contamination of soil or water through generation of or use of hazardous materials (e.g fuel, oils and lubricants) Description Pollution of aquifers by hazardous materials is associated with low dissolved oxygen concentration, increased biological oxygen demand, presence of organic impurities and increased acidity. Impacts to surface water can deleteriously impact ecological values, while soils can increase in salinity, degrade in texture, erode and cause stress and death to vegetation.	2	2	L	1	2	L	L	<ul style="list-style-type: none"> Project staff should minimise the use of waste for the duration of the project. Hazardous chemicals, lube oils, batteries, tyres, maintenance and other industrial wastes will be segregated and safely stored for proper disposal to recycling and approved landfill facilities. Hazardous wastes are to be stored and disposed off-site in an appropriate manner. If suitable disposal sites are not available on the islands then waste will be appropriately stored and transported back to Darwin for appropriate disposal Spill mitigation methods will be implemented to prevent spills of hazardous materials and respond to and clean-up any spills that do occur (refer to Risk reference 2). 	1	1	L	1	1	L	L	Hierarchy of controls as per Risk Reference 2. Administration <ul style="list-style-type: none"> Minimise the quantity of fuel and hydraulic oils stored on site to what is necessary to conduct activities. SDS available for each chemical/fuel onsite and in vehicles (as required). Personnel familiar with the spill prevention and response plan and site environmental inductions cover transport, storage, refuelling, response and clean-up activities. Develop and maintain a waste register to track disposal of the various waste streams.
Feral animals and pest species																			
13	Road upgrade works - realignment of Paru road and gravel extraction	Waste	Encouragement of pest species to waste sites. Description Incorrectly managing waste on site could potentially attract pest species.	2	3	M	1	2	L	M	<p>The following measures should be implemented:</p> <ul style="list-style-type: none"> All waste material introduced to site will be removed from the project area and disposed of, e.g. discarded drilling equipment, oil drums, machinery, engine debris, food and drink packaging etc. All sample bags, waste materials and contaminants will be removed from site and disposed of in an appropriate manner, following completion of the project. Pets, such as dogs are not permitted on site unless pre-approval is given by the Superintendent. 	1	1	L	1	1	L	L	Administration <ul style="list-style-type: none"> All waste material introduced to site to be removed from the project area as soon as possible <p>If wastes are stored and disposed of in an appropriate manner as planned the likelihood of pest species being attracted to camp is unlikely. If pest species are attracted to camp by wastes the impacts will be minor and short-term.</p>

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14	Road upgrade works - realignment of Paru road and gravel extraction	Biting insects	<p>Facilitation of biting insect breeding on site</p> <p>Description If rainfall occurs during construction potential exists for water to pool on receptacles associated with the project and facilitate the breeding of biting insects.</p> <p>Biting insects pose potential health risks, both as pest insects and as vectors of diseases such as Ross River virus, Barmah Forest virus, Murray Valley encephalitis virus and Kunjin virus.</p>	1	1	L	1	1	L	L	<ul style="list-style-type: none"> Ponds, dams, drains, sediment traps, bunded areas and on-site excavations filled with water will be inspected for the presence of mosquito larvae during the wet season. If larvae are detected, the Medical Entomology Branch of NT Health may be contacted for assistance in choosing a suitable method of control. Depressions created in the ground surface where possible will be filled or drained to prevent the ponding of water and all drainage channels / spoon drains will be kept as shallow as possible to prevent ponding. Project personnel to wear appropriate PPE including tightly woven material, long-sleeve shirts and full-length trousers. Project personnel to stay in accommodation with insect screening. Project design will include free draining- where possible road surface water will flow into the surrounding natural surface with minimal need for roadside drains. 	1	1	L	1	1	L	L	<p>Engineering</p> <ul style="list-style-type: none"> Depressions created in the ground surface where possible will be filled or drained. <p>Administration</p> <ul style="list-style-type: none"> Ponds, dams, drains, sediment traps, bunded areas and on-site excavations filled with water will be inspected Project personnel to stay in accommodation with insect screening <p>PPE</p> <ul style="list-style-type: none"> Project personnel to wear appropriate PPE including tightly woven material, long-sleeve shirts and full-length trousers
Air Quality																			
15	Road upgrade works - realignment of Paru road and gravel extraction	Air quality and emissions	<p>Potential for an increase in dust during site roadworks</p> <p>Description Paru road is an unsealed road and dust is generated as a result of vehicle movements upon these roads during the dry season. Road upgrade works have potential to generate dust over the short-term</p>	1	5	M	1	1	L	M	<ul style="list-style-type: none"> Site environmental inductions for all site personnel and contractors will include air quality management and protective measures to control or report air emissions. Vehicles and equipment used on site will be well maintained with mufflers fitted Road conditions will be monitored, and road will be rehabilitated if dust is being generated at unacceptable levels A water truck will be used to manage dust emissions from vehicle movement on site Project design will include sealing of carriageway 	1	3	L	1	1	L	L	<p>Engineering</p> <ul style="list-style-type: none"> Implement dust control measures including use of water cart. Construction personnel to stay within designated speed limits One or more water trucks will be used on site to reduce dust generation. <p>Administration</p> <ul style="list-style-type: none"> Site environmental inductions, including protective measures to minimise dust evolution <p>Impacts from the generation of dust on access roads will be limited to vegetation in the immediate vicinity of the project area.</p>
16	Road upgrade works - realignment of Paru road and gravel	Air quality and emissions	<p>Potential for an increase in exhaust emissions from contractors' vehicles and generators resulting in localised effect on air quality</p>	1	1	L	1	1	L	L		1	1	L	1	1	L	L	<p>Hierarchy of controls as per Risk Reference 15.</p> <p>Engineering</p> <ul style="list-style-type: none"> Vehicles and equipment used on site

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	extraction		and global contribution to greenhouse gases. Description Vehicle Emissions – Several vehicles and construction machinery will be operating on Paru road as part of road upgrade works. Construction works have potential to cause a short-term increase in vehicle exhaust emissions within the project area														will be well maintained with mufflers fitted		
17	Road upgrade works - realignment of Paru road and gravel extraction	Air quality and emissions	Potential for dust generated to impact on health and functioning of the surrounding vegetation. Description Excessive dust deposited onto plant foliage can reduce the photosynthetic performance (photosynthesis, stomata conductance, transpiration etc.), reducing overall health and plant growth. Roadworks are planned for the dry season which will result in dust generation and may require dust suppression measures.	1	5	M	1	1	L	M		1	3	L	1	1	L	L	Hierarchy of controls as per Risk Reference 15. The use of a water truck during exploration activities will reduce the likelihood of vegetation being impacted by dust. Effective mitigation will ensure that dust impact to vegetation will be minor and short-term.
Vegetation and flora																			
18	Road upgrade works - realignment of Paru road and gravel extraction	Natural Environment - Vegetation and Flora	Disturbance to native vegetation and flora and potential to change of vegetation structure Description Direct impact to vegetation and flora species will occur during clearing to realign Paru road and create gravel pits.	2	5	M	1	1	L	M	<ul style="list-style-type: none"> Cleared vegetative matter will be retained for site stabilisation and assisting rehabilitation. Access tracks to gravel pits will be aligned (as reasonably as practicable) to avoid sensitive vegetation areas. Recommendations for project design have been included in the Terrestrial Biodiversity report that minimises impact to Typhonium plants Vegetation clearance will be minimised, particularly large or mature trees, riparian vegetation, slow-growing, rare or other significant vegetation All clearing is to be flagged and approved by the DIPL Project Manager prior to commencement. Dead timber on site will be important for the local ecosystem and rehabilitation therefore won't be 	1	3	L	1	1	L	L	Engineering <ul style="list-style-type: none"> Strip and stockpile topsoil and surface material for use in regeneration or revegetation if possible Administration <ul style="list-style-type: none"> Undertake assisted natural regeneration in areas cleared for gravel pits and natural regeneration for the road realignments

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19	Road upgrade works - realignment of Paru road and gravel extraction	Natural Environment - Vegetation and Flora	Removal of threatened flora habitat, loss or endangerment of threatened species Description Desktop studies of the project area revealed that the likely presence of three threatened flora species: <ul style="list-style-type: none"> <i>Cycas armstrongii</i>, Vulnerable (TPWC Act) <i>Typhonium jonesii</i>, Endangered (EPBC & TPWC Act) <i>Typhonium mirabile</i>, (EPBC & TPWC Act) 	2	1	L	1	1	L	L	<ul style="list-style-type: none"> used for campfires Include in site inductions and toolbox talks information on threatened species within the project area, including measures to avoid impacts, including: <ul style="list-style-type: none"> photo pamphlets to identify threatened species such as Typhonium plants protocols in case threatened species are encountered within the project area 	1	1	L	1	1	L	L	<p>Hierarchy of controls as per Risk Reference 18.</p> <p>Engineering</p> <ul style="list-style-type: none"> Follow recommendations in the Terrestrial Biodiversity report that includes location of road alignments and gravel pits that minimises impact to Typhonium plants <p>Administration</p> <ul style="list-style-type: none"> Include information on threatened species in site inductions and toolbox talks <p>If vegetation clearance is undertaken by minimising the quantity of vegetation cleared and avoiding sensitive and conservation significant flora then impacts can be rendered minor, with no long-term change to vegetation structure</p>
Native fauna																			
20	Road upgrade works - realignment of Paru road and gravel extraction	Natural Environment - Fauna	Disturbance of fauna Description Impacts to fauna within the vicinity of roadwork activities, through the physical presence of machinery and people, are likely to occur.	2	5	M	1	1	L	M	<ul style="list-style-type: none"> Site inductions will ensure that all personnel are aware of their obligations and know the correct procedures for fauna encounters. Include in site inductions and toolbox talks information on threatened species within the project area, including measures to avoid impacts, including: <ul style="list-style-type: none"> photo pamphlets to identify threatened species such as Red Goshawk nests protocols in case threatened species are encountered within the project area Access tracks to gravel pits will avoid sensitive areas of fauna habitat, such as tall old-growth Eucalypt forest with large hollows Common terrain or vegetation types will be favoured for access tracks because they will generally have lower habitat significance. All clearing is to be flagged and approved by the DIPL Project Manager prior to commencement. Tall old-growth Eucalypt forest with large hollows will be retained as much as practicable for the project Vehicle movement will be restricted to existing 	1	3	L	1	1	L	L	<p>Engineering</p> <ul style="list-style-type: none"> Follow recommendations in the Terrestrial Biodiversity report that includes location of road alignments and gravel <p>Administration</p> <ul style="list-style-type: none"> Driving on site will be restricted to daytime hours only. Site environmental inductions. Daily toolbox
21	Road upgrade works - realignment of Paru road and gravel extraction	Natural Environment - Fauna	Loss of habitat Description Disturbance to and loss of habitat, particularly through the clearing of vegetation to realign Paru road.	2	5	M	1	1	L	M	<ul style="list-style-type: none"> Access tracks to gravel pits will avoid sensitive areas of fauna habitat, such as tall old-growth Eucalypt forest with large hollows Common terrain or vegetation types will be favoured for access tracks because they will generally have lower habitat significance. All clearing is to be flagged and approved by the DIPL Project Manager prior to commencement. Tall old-growth Eucalypt forest with large hollows will be retained as much as practicable for the project Vehicle movement will be restricted to existing 	1	3	L	1	1	L	L	<p>Hierarchy of controls as per Risk Reference 20.</p>

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22	Road upgrade works - realignment of Paru road and gravel extraction	Natural Environment - Fauna	Loss or endangerment of Threatened species Description Roadwork activities may impact the habitat of Threatened species. Several hreatened fauna species potentially occur within the project area	2	4	M	1	1	L	M	<ul style="list-style-type: none"> access roads at a suitable speed limit. Driving on site will be restricted to daytime hours only. Fauna spotter also used on site whenever clearing of vegetation is to occur to assist in the capture and relocation of fauna if observed during clearing practices. 	1	3	L	1	1	L	L	<p>Engineering</p> <ul style="list-style-type: none"> Fauna spotter to be present to look out for large nests (such as Red Goshawk nests) to ensure they are not cleared Fauna spotter also used on site whenever clearing of vegetation is to occur to assist in the capture and relocation of fauna if observed during clearing practices. Avoid as far as practicable the removal of: <ul style="list-style-type: none"> Riparian vegetation large (diameter >30 cm) <i>Eucalyptus miniata</i>, <i>E. tetradonta</i> and <i>Corymbia nesophila</i> trees that contain large hollows Areas with high shrub density. <p>Administration</p> <ul style="list-style-type: none"> Engage Tiwi Rangers and Plantation Partners to monitor potential Red Goshawk nest within Gravel pit 1
23	Road upgrade works - realignment of Paru road and gravel extraction	Natural Environment - Fauna	Fauna mortality - Vehicle Strike Description Fauna mortality from road is more pronounced at night when nocturnal wildlife often gather on roads.	2	4	M	1	1	L	M	<ul style="list-style-type: none"> Vehicle movement will be restricted to existing access roads at a suitable speed limit Night-time travel will be minimised, occurring only when necessary 	1	3	L	1	1	L	L	<p>Hierarchy of controls as per Risk Reference 20.</p>

Risk #	Activity Description	Aspect	Impact	Inherent Risk Assessment						Mitigation Measures	Residual Risk Assessment						Hierarchy of Controls		
				Environment and Community			Law, Regs and Civil Action				Risk	Environment and Community			Law, Regs and Civil Action			Risk	
				Consequen	Likelihood	Risk Level	Consequen	Likelihood	Risk Level			Consequen	Likelihood	Risk Level	Consequen	Likelihood			Risk Level
Weeds																			
24	Road upgrade works - realignment of Paru road and gravel extraction	Natural Environment - Introduction and Spread of Weeds	<p>Transport of weeds</p> <p>Description Transport of weeds or other exotic species and plant diseases between regions through Transport operations that may compromise ecological integrity and impact pastoral and cultural activities in the area</p>	3	4	M	1	4	M	M	<p>Weed management methods must be implemented including the following:</p> <ul style="list-style-type: none"> baseline weed assessments prior to construction activities being undertaken ongoing weed monitoring weed prevention methods weed treatment <p>All project staff will learn about weed management methods as part of their site induction, including the following:</p> <ul style="list-style-type: none"> all personnel are to be made aware of vehicle weed hygiene requirements Ensure vehicles, machinery and equipment entering the project area have been cleaned and are free of vegetative matter, or have a valid weed hygiene certificate. Project staff will be educated about weeds that may be encountered within the project area during site induction: <ul style="list-style-type: none"> Mission Grass (<i>Cenchrus polystachios</i>) Gamba Grass (<i>Andropogon gayanus</i>). Drivers to undertake routine vehicle inspections. Locally sourced machinery will be used to reduce the risk of weeds being transported and introduced from other regions 	2	1	L	1	1	L	L	<p>Elimination</p> <ul style="list-style-type: none"> Corrective action initiated immediately if weed outbreaks occur <p>Substitution</p> <ul style="list-style-type: none"> Source machinery locally if available to avoid importation of exotic weeds. <p>Engineering</p> <ul style="list-style-type: none"> Construction personnel to monitor for weeds, including routine checks along roads <p>Administration</p> <ul style="list-style-type: none"> Site environmental inductions, including trained in weed identification and reporting. Monitoring and Auditing as per the CEMP
25	Road upgrade works - realignment of Paru road and gravel extraction	Natural Environment - Introduction and Spread of Weeds	<p>Degradation of the existing environment – introduction of weeds</p> <p>Description Weeds can have a range of deleterious impacts to the landscape ecosystem, such as altering fire regimes</p>	2	3	M	1	1	L	M	<p>Drivers to undertake routine vehicle inspections.</p> <p>Locally sourced machinery will be used to reduce the risk of weeds being transported and introduced from other regions</p>	1	2	L	1	1	L	L	<p>Hierarchy of controls as per Risk Reference 24.</p>
Bushfire																			
26	Road upgrade works - realignment of Paru road and gravel extraction	Bushfire	<p>Road upgrade works may increase the risk of accidental bushfires and change the fire regime</p> <p>Description Increased incidence and intensity of bushfires can lead to vegetation degradation and habitat modification. Bushfires can also cause mortality of threatened flora and fauna</p>	1	1	L	1	1	L	L	<p>Bushfire mitigation measures to be implemented during the project include:</p> <ul style="list-style-type: none"> Coordination with the landholders (including Traditional Owners, rangers and the Tiwi land Council) and other land users to discuss fire management obligations and strategies for the project Maintenance of fire access trails and fire breaks around infrastructure Develop a communication system for monitoring bushfire alerts in the area Hot works such as welding, are not undertaken on days of total fire ban or high winds. Lighting of fires is not permitted on site. A fire pit maybe approved at the workers camp on written approval from the superintendent. 	1	1	L	1	1	L	L	<p>Elimination</p> <ul style="list-style-type: none"> Regular inspections of vehicle's engine bay and remove any build-up of vegetated matter <p>Engineering</p> <ul style="list-style-type: none"> Maintenance of fire access trails and fire breaks around infrastructure Water cart to be within 100 m of construction <p>Administration</p> <ul style="list-style-type: none"> Environmental inductions, including emergency response procedure Monitor Bushfire Alerts and Warnings issued by Secure NT and act according to advice

Risk #	Activity Description	Aspect	Impact	Inherent Risk Assessment						Mitigation Measures	Residual Risk Assessment						Hierarchy of Controls		
				Environment and Community			Law, Regs and Civil Action				Risk	Environment and Community			Law, Regs and Civil Action			Risk	
				Consequen	Likelihood	Risk Level	Consequen	Likelihood	Risk Level			Consequen	Likelihood	Risk Level	Consequen	Likelihood			Risk Level
27	Road upgrade works - realignment of Paru road and gravel extraction	Bushfire	Road upgrade works may increase the risk of accidental bushfires and change the fire regime Description Bushfires can cause damage to or loss of public infrastructure, private infrastructure and equipment or community lands	3	2	M	1	1	L	M		3	1	L	1	1	L	L	Hierarchy of controls as per Risk Reference 26.
28	Road upgrade works - realignment of Paru road and gravel extraction	Bushfire	Road upgrade works may increase the risk of accidental bushfires and change the fire regime Description Fire could cause damage to culturally significant sites	1	1	L	1	1	L	L		1	1	L	1	1	L	L	Hierarchy of controls as per Risk Reference 26.
Cultural heritage and sacred sites																			
29	Road upgrade works - realignment of Paru road and gravel extraction	Social Environment - Cultural Heritage and Sacred Sites	Damage to or loss of culturally significant artefacts, areas or species Description Personnel are more likely to cause damage if they remain unaware of culturally significant artefacts, areas or species that occur within the project area	-	-	-	2	2	L	L	<ul style="list-style-type: none"> AAPA clearance certificates, consultation with the Tiwi Land Council and Traditional Owners will identify culturally sensitive areas and artefacts prior to roadworks being undertaken. Personnel will be made aware of culturally sensitive areas and artefacts within the project area as part of their site inductions. The AAPA certificate (certificate RA2020/93) for Paru road identified 4 sacred sites, including a mangrove intertidal area and 3 sacred burial sites. One Restricted Works Area (RWA) intersects a small portion (approximately 0.6 ha) of the southern road alignment An unexpected finds protocol is to be implemented that outlines procedures in case of Indigenous cultural heritage discovery. A Code of Conduct will be developed and implemented as part of site inductions for all personnel. The code of conduct will include: <ul style="list-style-type: none"> Maintain good relationships with local people Ensure appropriate behaviours outside of work hours 	-	-	-	1	1	L	L	<p>Elimination</p> <ul style="list-style-type: none"> Avoid areas of cultural heritage and significance (i.e. Restricted Work Areas detailed in AAPA certificate, RA2020/93). <p>Administration</p> <ul style="list-style-type: none"> Unexpected finds procedures (refer to CEMP) If heritage is found all work to cease within 10 m of the suspected find, and the area to be cordoned off using temporary fencing. Site inductions are to ensure that all personnel are aware of cultural awareness obligations.
30	Road upgrade works - realignment of Paru road and gravel extraction	Social Environment - Cultural Heritage and Sacred Sites	Damage to or loss of culturally significant artefacts or areas Description Disturbance or damage to registered sacred sites (in form of Restricted Work Areas (RWA)).	-	-	-	3	1	L	L		-	-	-	1	1	L	L	Hierarchy of controls as per Risk Reference 29.

Risk #	Activity Description	Aspect	Impact	Inherent Risk Assessment						Mitigation Measures	Residual Risk Assessment						Hierarchy of Controls		
				Environment and Community			Law, Regs and Civil Action				Risk	Environment and Community			Law, Regs and Civil Action			Risk	
				Consequen	Likelihood	Risk Level	Consequen	Likelihood	Risk Level			Consequen	Likelihood	Risk Level	Consequen	Likelihood			Risk Level
Rehabilitation																			
31	Rehabilitation of Paru road disturbed areas	Visual Amenity	Disturbance to the project area by clearing of vegetation Description At the completion of the project damage can continue if site is not rehabilitated correctly	2	3	M	3	4	M	M	<ul style="list-style-type: none"> The project area will be rehabilitated once works have been completed. Sites will be rehabilitated back to natural state by re-spreading previously removed vegetation and topsoil over disturbed area to promote infiltration and return of seed-bearing topsoil. Progressive rehabilitation will occur for gravel pit areas. A maximum area of 1 ha will be opened up at any time unless approved by superintendent. flagging of gravel pits will be inspected and approved by the project manager before opening and rehabilitated as per <i>Standard Specification for Environmental management (2.0)</i>, - Section 26.3 – <i>Site Clearing</i>. 	1	2	L	1	2	L	L	Administration <ul style="list-style-type: none"> The proposed rehabilitation approach is assisted natural regeneration in areas cleared for gravel pits and natural regeneration for the road realignments.

Appendix D

Construction
Environment
Management Plan
Framework

Construction Environmental Management Plan Framework

Paru Road Upgrade, NT Portion 1644

Construction Environmental Management Plan Framework

Paru Road Upgrade, NT Portion 1644

Client: Department of Infrastructure, Planning and Logistics

ABN: 84 085 734 992

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Quality Information

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Reviewed by Alana Court

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			Name/Position	Signature
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2	23-Apr-2021	Addressing DIPL comments	Alana Court Associate Director - Environment	

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1.0 Introduction

1.1 Background

This Construction Environmental Management Plan (CEMP) framework has been prepared by AECOM Pty Ltd (AECOM) on behalf of the proponent, the Northern Territory Department of Infrastructure, Planning and Logistics (DIPL) to detail the environmental management measures and controls for construction works undertaken to upgrade Paru Road. This document is a framework only, and the contractor responsible for undertaking construction works on Paru Road will be required to develop their own specific CEMP.

The Paru Road upgrade is part of a larger project to improve roads on Melville Island.

The project to upgrade Paru Road will comprise the following:

- Development of two gravel extraction pits (refer Figure 1):
 - Gravel Pit 1 (229.92 ha)
 - Gravel Pit 2 (120.73 ha)

Realignment of Paru Road in four locations (refer Figure 1):

- Chainage 11,200 m to 12,000 m in south of project area (7.3 ha) (henceforth referred to as the southern road alignment)
- Chainage 7,800 m to 9,000 m in the centre of project area (14.8 ha) (creek road alignment)
- Chainage 5,300 m to 6,300 m in the north of the project area (11.0 ha) (northern road alignment)
- Chainage 400 m to 4,400 m within the Gravel Pit 2 area

The project areas comprise a total of 383.80 ha.

1.2 Site Location

The Tiwi Islands comprises two islands, Melville and Bathurst islands, located approximately 80 km north of Darwin in the Timor Sea.

The project areas occur along and adjacent to Paru Road, located in the south-west of Melville Island, starting approximately 3 km south of the Threeways intersection extending to approximately 900 m north of Paru Outstation in the south-east of Melville Island (Figure 1). The southern end of the road terminates at the Paru barge landing, which provides access to a barge service for locals that travel between Melville and Bathurst Islands. Paru Outstation is located along the southern end of the road.

1.3 Responsibilities

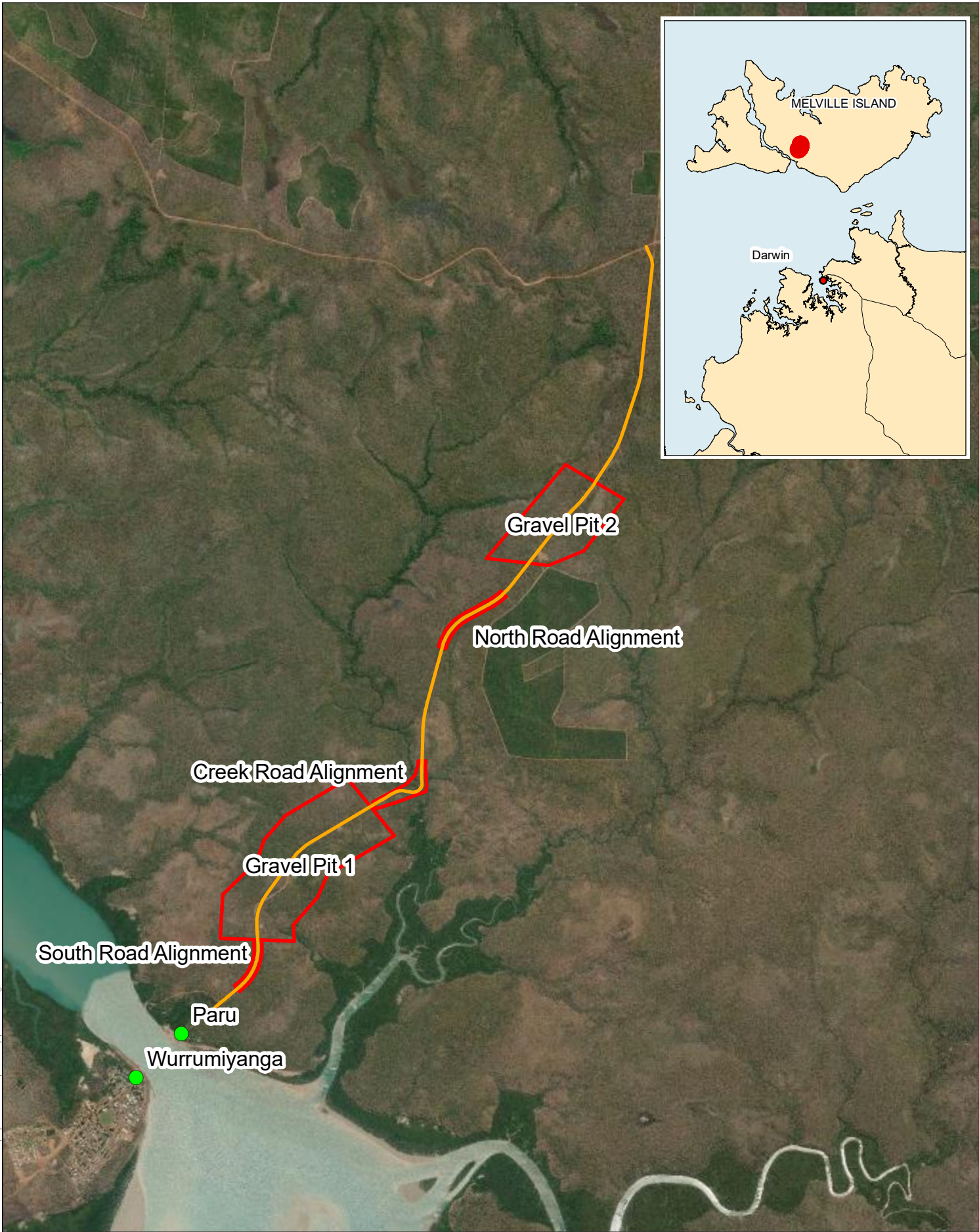
The Project Manager for the contractor undertaking road construction works on Paru Road is responsible for using this document as a framework to develop their own project-specific CEMP.

1.4 Objectives of the CEMP

This CEMP details the environmental management measures and controls necessary to avoid, reduce and mitigate the potential environmental impacts from road construction works on Paru Road. This CEMP should be read in conjunction with DIPL's Specifications for Environmental Management and has been developed to incorporate the requirements of:

- Relevant environmental legislation
- Applicable licence approval and/or permits

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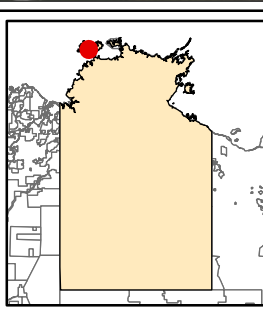
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- Tiwi Communities
- Paru Road Proposed Alignment
- Project Area



Location of the project area and project area components

PROJECT ID	60571058	Figure 1
CREATED BY	david.vandenhoek	
LAST MODIFIED	22-Feb-2021	
VERSION	1	

1.5 Statutory Requirements

A summary of legislation applicable to the project is included below:

- *Aboriginal and Torres Strait Islander Heritage Protection Act 1984* (Cth)
- *Environmental Protection and Biodiversity Conservation Act 1999* (Cth) (EPBC Act)
- *Environment Protection and Biodiversity Conservation Regulations 2000* (Cth)
- *Environment Protection (Sea Dumping) Act 1981* (Cth)
- *Quarantine Act 1908* (Cth)
- *Water Act 2007* (Cth)
- *Aboriginal Land Rights Act* (NT)
- *Aboriginal Land Rights (Northern Territory) Amendment Bill 2006*
- *Dangerous Goods Act* (NT)
- *Environmental Protection Act* (NT)
- *Marine Pollution Act* (NT)
- *Marine Pollution Regulations* (NT)
- *Northern Territory Environment Protection Authority Act* (NT)
- *Territory Parks and Wildlife Conservation Act* (NT)
- *Waste Management Pollution Control Act* (NT) (WMPC Act)
- *Waste Management and Pollution Control (Administration) Regulations* (NT)
- *Weeds Management Act* (NT)
- *Weeds Management Regulations* (NT)

The following standards and guidelines also apply to the project works:

- Australian Standards (AS)
- Other international standards
- International Erosion Control Association (IECA) best practice for erosion and sediment control
- Codes of Practice
- NT Government Publications
- Australian and New Zealand Environment and Conservation Council (ANZECC) publications
- National Environmental Protection Measure (NEPM).

1.6 Approvals, Licenses and Permits

The following permits, licenses and permits are required to undertake the project on Paru Road.

- Aboriginal Areas Protection Authority (AAPA) certificate (refer to certificate C2020/087, Appendix A)
- Work permits:
 - Companies and organisations based on the Tiwi Islands for more than three months can apply to the Tiwi Land Council for a Business Login, enabling permits to be issued directly to staff.
 - Companies or organisations based on the mainland wanting to work on the Tiwi Islands must apply for work permits for their staff.

1.7 Community Liaison

Paru road is used by Tiwi Islanders to move between Wurrumiyanga on Bathurst Island and Pirlangimpi and Milikapiti on Melville Island, as well as Paru outstation. Upgrade works on Paru Road are therefore likely to impact people across both islands, making it necessary to communicate with all Tiwi communities and outstations about the road upgrade works.

DIPL will communicate with the Tiwi land Council regarding the nature and timing of the project. DPL will also develop a letter template describing the project that can be provided to elders within each community.

The contractor undertaking construction works will definitely be in regular contact with Tiwi Islanders driving along Paru Road. As part of inductions project staff will be instructed on protocols of communicating with locals, including providing information on the project such as the timing and nature of works and safety requirements.

2.0 Description of Works

2.1 Paru Road upgrade at NT Portion 1644

The Northern Territory Department of Infrastructure, Planning and Logistics (DIPL) proposes to upgrade Paru Road within NT Portion 1644 by realigning the current road in a number of locations. To facilitate the road upgrade gravel will be extracted from two nominated locations. The project area covers a total of 383.8 ha, comprising two proposed gravel pits and four proposed road realignments near Paru Road, located in the south-west of Melville Island. The road realignment works will smooth three bends along Paru Road.

The project includes two gravel pit project areas, within which five areas suitable for gravel extraction have been identified:

- Gravel Pit 1 area:
 - GP1-1 (6.6 ha)
 - GP1-2 (9.9 ha)
 - GP1-3 (6.5 ha)
- Gravel pit 2 area:
 - GP2-1 (34.0 ha)
 - GP2-2 (3.3 ha)

The maximum area that will be cleared for gravel pits for the project is 60.3 ha. However, a smaller area is likely to be required to facilitate the road upgrade. The project will adhere to DIPL's *Standard Specification for Environmental Management* for materials extraction within gravel pits, specifically Section 19.1:

- Gravel pits should not exceed 1 ha
- Extraction areas are to be progressively rehabilitated so that one gravel pit is rehabilitated before another one is established

The project includes the following three road realignments (Figure 1):

- Chainage 11,200 m to 12,000 m in south of project area (2.4 ha) (henceforth referred to as the southern road alignment)
- Chainage 7,800 m to 9,000 m in the centre of project area (4.2 ha) (creek road alignment)
- Chainage 5,300 m to 6,300 m in the north of the project area (3.0 ha) (northern road alignment)
- Chainage 400 m to 4,400 m within the Gravel Pit 2 area (4.8 ha)

The maximum clearing footprint of the project will be 74.7 ha.

2.1.1 Roadworks

Roadworks will include the following:

- clearing and grubbing
- earthworks in cut and fill
- pavement works
- drainage works including multiple transverse drainage structures along the road, and a new bridge/major culvert at the creek.
- sealing with two coat seal
- line marking
- signage

- guardrails

2.1.2 Plant and equipment

Plant and equipment that will be used include:

- backhoe
- graders
- excavators
- water carts
- rollers
- dump trucks
- concrete trucks
- work utes
- road trains
- crane
- bitumen spray truck.

3.0 Environmental Aspects and Management

3.1 Erosion and Sediment Control

3.1.1 Potential impacts

Project construction activities, including land clearing and earthworks, create erosion and sedimentation. The potential impacts related to erosion and sedimentation are:

- loss of soil and land stability
- damage to existing road infrastructure
- dust generation
- increased sedimentation of waterways and associated impacts to water quality and aquatic health

3.1.2 Objectives

The objective of erosion and sediment control is to avoid, or minimise and control, soil erosion and discharge of sediment or soil into waterways or established drainage systems which may result from soil disturbance activities such as land clearing and earthworks.

Table 1 Erosion and sediment control actions

Action	Responsibility	Timing
If works are undertaken during September to April an Erosion and Sediment Control Plan (ESCP) will be prepared and implemented and will incorporate appropriate erosion and sediment control measures for the works. The ESCP will be consistent with the International Erosion Control Association Guidelines.	Project Construction Manager	Prior to construction
Appropriate erosion and sediment control (ESC) devices will be installed and properly maintained, including measures to ensure stormwater is diverted around works sites.	Advice from certified Erosion and Sediment Control practitioner	Prior to construction
Establish access/exit points for the site for all vehicles and machinery.	Project Construction Manager	Prior to construction
Monitoring of the 7-day forecast to determine the required ESC to be implemented around the forecasts	Project Construction Manager	Ongoing
Erosion and sediment control measures will be maintained regularly and after rainfall events.	Project Construction Manager	Ongoing
Erosion and sediment control measures will not be removed until disturbed areas have been stabilised.	Project Construction Manager	Ongoing
Disturbed areas will be stabilised and compacted progressively during the works, where necessary, and stabilisation will be undertaken after works are complete.	Project Construction Manager	Ongoing
Storage areas for fuel, oils and chemicals will be surrounded by an impervious bund that contains 120% of the largest container stored in the bund	Project Construction Manager	Ongoing
The location of storage areas will not be within 50 m of any areas of concentrated water flow, flood and poorly drained areas, on slopes above 10°	Project Construction Manager	Ongoing

Action	Responsibility	Timing
Refuelling plant and equipment will be undertaken within bunded areas and more than 50 m away from waterways.	Project Construction Manager	Ongoing
Spill containment equipment kits will be available, and appropriately sized and adequately stocked for all chemicals kept on site.	Project Construction Manager	Ongoing

3.2 Spill Prevention and Response

3.2.1 Potential Impacts

Hazardous chemicals

Hydraulic fluid and fuel drums are stored within portable bunding and bulk fuel is stored within tankers equipped with safety features such as double skins (or temporary bunding), safety cut-off valves, top accessing etc. Spill leak and drip trays will be used to address the risk of minor drips and spills associated with re-fuelling operations.

Spill scenarios

Spills that occur during construction activities are primarily caused by equipment failure or human error. During construction works leaks and spills would most likely result from:

- loss of containment of fuels from storage area
- spill during refuelling or fuel transfer
- hydraulic oil leaks from road construction vehicles.

Transport and dispatch of hazardous liquids (i.e. fuels, oils and hydraulic fluids) are activities that pose a risk of spillage if not managed well. In addition, consideration of seasonal conditions must be provided when transporting waste and wastewater (effluent), during the wet season.

The potential impacts associated with the construction activities may include:

- Groundwater:
Oil and hydrocarbon spills have the potential to leach into aquifers and pollute the groundwater. Pollution of aquifers by fuels, oils and hydraulic fluids is associated with low dissolved oxygen concentration, increased biological oxygen demand, increased water temperature, presence of organic impurities and increased acidity of groundwater. The quantity of oils and hydrocarbons required for the construction activities is unlikely to result in a significant impact on groundwater resources within construction footprint.
- Surface water:
Spills have the potential to migrate to local surface waters, such as the creek that runs through the creek road alignment. This can deleteriously effect surface water quality and the ecological values of the receiving habitat.
- Soil:
Impacts of hazardous spills to soil includes salinization and consequent degrading of soil textures and deep erosion, and stress or death to surrounding vegetation.

3.2.2 Objectives

The objectives of spill management include:

- prevent the spill/ leakage of hazardous liquids, including fuel, oils and wastewater, into the environment
- facilitate the rapid and effective response to any spills of hazardous liquids

- facilitate the effective remediation or removal and safe disposal of contaminated soil to prevent ongoing environmental impacts.

Table 2 Spill response actions

Action	Responsibility	Timing
Hydraulic fluid and fuel drums are to be stored within portable bunding (portable storage bunds create permanent or temporary relocatable watertight bunds that we can manufacture to size required and meet Australian Standards).	Project Construction Manager	Prior to construction
Plan for removal and disposal of hazardous wastes to be in accordance with NT hazardous waste disposal requirements.	Project Construction Manager	Prior to construction
Designate an area for hazardous liquids storage in the field camp.	Project Construction Manager	Prior to construction
Hydraulic fluid, oil and fuel drums will be stored within portable bunding. Bulk fuel will be stored within tankers equipped with safety features such as temporary skins and safety cut-off valves. Spill leak and drip trays will be used to mitigate the risk of spills during re-fuelling operations.	Project Construction Manager Field staff	Ongoing
Ensure the availability of spill clean-up equipment for operations.	Project Construction Manager	Ongoing
All loading, unloading, transfer and refuelling operations are to be undertaken in designated areas, with portable bunding and away from any sensitive receptors.	Project Construction Manager Field staff	Ongoing
Ensure that personnel are familiar with this spill prevention and response plan and site environmental inductions cover transport, storage, refuelling, response and clean-up activities.	Project Construction Manager Field staff	Post-construction

3.2.3 Spill response

Spills can range from large scale, which can trigger an emergency response plan, to small scale spills and leaks that can be readily dealt with by on-site personnel. Spills can be classified according to the following criteria:

- Tier 1: Spills that can be contained within the regulated activity area and can be cleaned up by site personnel without involvement of external organisations.
- Tier 2: Spills that cannot be totally contained within the regulated activity area and/or may require the involvement of external organisations.
- Tier 3: Severe spill that cannot be contained by the operator and requires substantial additional resources to manage the spill.

A spill response procedure that should be followed during construction works on Paru Road is outlined in

Figure 2.

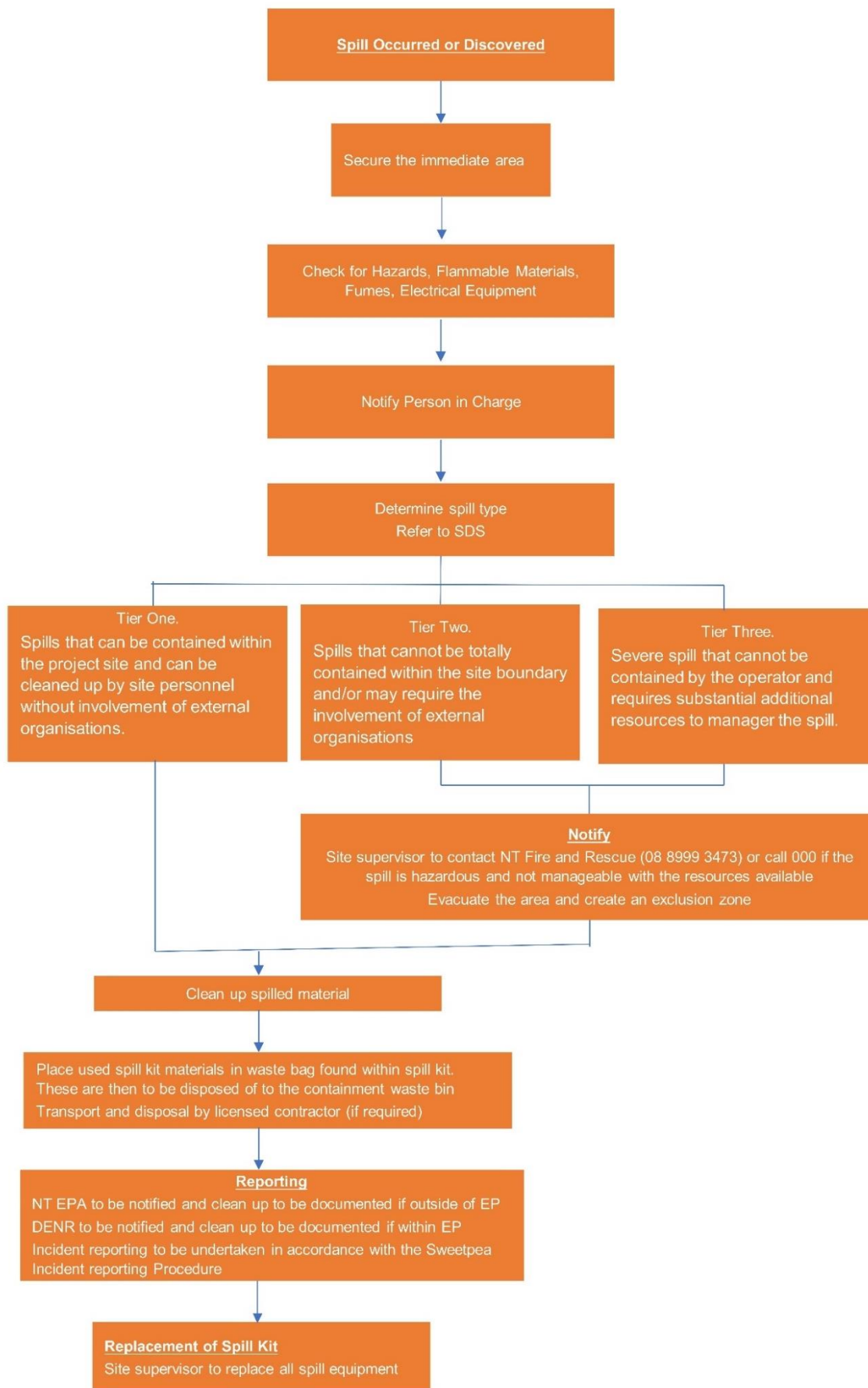


Figure 2 Spill response strategy

3.2.4 Spill assessment

When a spill occurs the operating company representative or delegate on site is required to make a site assessment to determine the type and location of emergency assistance required. This assessment shall include the following:

- Determine weather conditions particularly wind direction and strength.
- Determine safety hazard to response personnel, local population and fauna.
- Evaluate the properties of the spill as they influence movement, recovery and environmental efforts. If the properties of the spill are not known, then an assessment will be made, and the oil categorised according to the following descriptions:
 - Class A - light volatile (highly fluid, spread rapidly, penetrates porous substrate)
 - Class B - non sticky (high viscosity, low substrate penetration)
 - Class C - heavy-sticky (high viscosity, low substrate penetration)
 - Class D - Non fluid (tarry or waxy: largely non spreading).
- Determine spill movement and areas of contamination. The movement of a spill over land depends primarily on the physical and chemical properties of the spill, local topography, soil permeability and vegetation cover. The local topography will determine the shape of overland flow and consequently the area of the spill.
- Determine approximate spill size / flow rate. Spill volume based on surface coverage is difficult to estimate accurately due to surface irregularities and absorption into soils. Rough estimates can be generated by multiplying a real coverage by average thickness.
- Identify threatened sensitive areas.

Once the site assessment has been completed response priorities must be established considering prevailing meteorological conditions, properties of the spill, access to threatened areas and logistics considerations.

3.2.5 Spill emergency response plan

The Spill Emergency Response Plan will be practiced as a drill early in the project to ensure field personnel are familiar with the plan. Following this drill the plan can be updated by incorporating lessons learned via feedback from personnel.

The Spill Emergency Response Plan will include the following information:

- Location of spill clean-up equipment.
- Size and extent of spill to trigger emergency response.
- Personal Protective Equipment (PPE) required for spill clean-up.
- Spill clean-up procedure.

3.2.6 Spill clean up

In any incident where fuel or oils are spilled, safety is the prime consideration and all the appropriate safety measures must be taken.

If a spill has contaminated the ground surface, treatment will begin as soon as the source of contamination has been stopped and cordoned off.

Treatment

Maximum penetration of an oil spill will occur where pools of oil are formed on the surface. These provide a pressure head and encourage penetration of the spill. Attempts will be made to increase the spread of the spill on the surface to prevent deep penetration of oil as a result of over saturation. Area of the spill should be cordoned off immediately and vehicles should not drive over oil-saturated areas as this increases the absorption rate.

Remove any puddles of freestanding spill. Increase the absorption capacity of the surface layers by spreading absorbents granules.

Removal

- Use bulldozer to scrape the obviously contaminated topsoil into piles for the backhoe (or similarly available vehicle) to load contaminated material into available waste transport trucks or placed on an impermeable surface with bunding and sediment controls until a licensed waste transport truck arrives on site.
- If pools of pollutant are small, cover them with absorbent granules.
- Attempt to bulldoze the contaminated soil in one pass leaving clean soil behind the blade. Undertake soil sampling of 'clean soil' to validate that have removed all the contaminated material.
- Soil testing to also be conducted to determine the extent of contaminated material that will require offsite disposal including waste classification.
- Put oil, oily debris, oiled absorbents into plastic bags or leak proof skips and containers and seal for removal and dispose as hazardous waste.
- If available, depending on the size of the spill, use a shovel or back-hoe to scrape the contaminated top surface and put either directly into a lined skip bin or truck or temporarily store on an impermeable HDPE liner to reduce further impacts to the ground surface (refer Table 3).

Spill equipment requirements

Spill equipment requirements are outlined in Table 3. Additional specialist equipment may be necessary depending on the nature of the event.

Table 3 Spill clean-up application

Material	Application	Situation
Tier 1 Spill		
Granules / particulate	Use absorbent granules to soak up spilled liquid	Quick and absorbent, suitable for large spills
Lay down pads or pillows	Reduce the size of the spill / leak by gently pushing the booms towards the centre of the spill	Pillows are best for thickly spread liquids Pads are best for thinly spread liquids
Sorbents	Sorbents are materials that soak up the spill. Once the absorbent material has been applied	Used in water way spills where spill material will float on the water
Manual recovery	Manual recovery can be implemented for areas with a high concentration of oil and/or fuel	Buckets and shovels used to remove the oil, or soil containing the oil
Tier 2 and Tier 3 Spills		
Bulldozer, backhoe and trucks	Bulldozer, backhoe and trucks	Bulldozer, backhoe and trucks

3.2.7 Waste disposal

During a spill clean-up, the disposal of waste material must not pose any threat to the environment. All waste is to be classified in accordance with NT EPA guidelines and disposed of appropriately. Any Prescribed waste is to be transported by an approved waste transporter to an appropriately licensed facility.

Waste reports/ transport certificates are to be obtained from the waste contractor and all dockets / receipts for waste disposal / transport kept for auditable trail and reporting purposes.

3.3 Waste

3.3.1 Potential Impacts

The potential impacts of poor waste management associated with the project are:

- pollution of aquifers through spillage of waste pollutants
- pollution of surface waters through release of waste pollutants
- contamination of soil through inappropriate waste management
- attracting pest species due to inappropriate organic waste management.

3.3.2 Objectives

The objective of waste management is to:

- maintain water quality in nearby creeks and streams
- prevent contamination of soil
- manage waste appropriately.

Table 4 Waste management actions

Action	Responsibility	Timing
<ul style="list-style-type: none"> • Designated waste storage and handling area to be planned for and provided onsite at construction site 	Project Construction Manager	Prior to construction
<ul style="list-style-type: none"> • Ensure inductions for all project personnel and contractors include the safe storage and segregation of wastes; and disposal of wastes in appropriate containers. 	Project Construction Manager	Prior to construction
<ul style="list-style-type: none"> • Ensure provision for appropriate animal-proof waste storage containers on site. 	Project Construction Manager	Ongoing
<ul style="list-style-type: none"> • Remove from the site and dispose of all waste materials, including green waste, food scraps and other putrescible wastes, project waste, chemicals and effluent in a licensed facility 	Project Construction Manager Field staff	Ongoing
<ul style="list-style-type: none"> • Develop and maintained to track the disposal of various waste streams. 	Project Construction Manager	Ongoing
<ul style="list-style-type: none"> • Removal and disposal of hazardous wastes to be in accordance with NT hazardous waste disposal requirements. 	Project Construction Manager Field staff	Ongoing
<ul style="list-style-type: none"> • Segregate and safely store and label chemical packaging, oils, batteries, tyres, maintenance and other industrial waste for proper disposal to recycling and approved landfill facilities. 	Project Construction Manager Field staff	Ongoing
<ul style="list-style-type: none"> • Ensure Safety Data Sheets (SDS) and handling procedures for hazardous chemicals are accessible on site and widely promulgated. 	Project Construction Manager	Ongoing
<ul style="list-style-type: none"> • Undertake inspection of waste storage areas regularly, or after significant rainfall event 	Project Construction Manager	Ongoing

Action	Responsibility	Timing
<ul style="list-style-type: none"> All recyclable materials, including glass and cans, are to be separated from general waste and stored for later disposal at a recycling facility or a recycling bin. 	Project Construction Manager	Ongoing
<ul style="list-style-type: none"> All waste will be removed from site following completion of construction activities. 	Project Construction Manager	Post-construction

3.4 Weeds

3.4.1 Potential Impacts

Grassy weeds present the highest risk for weed spread and potential environmental damage across Melville Island. Grassy weeds of particular concern are Mission Grass (*Cenchrus polystachios*), Guinea Grass (*Panicum maximum syn. Urochloa maxima*) and Gamba Grass (*Andropogon gayanus*). Increased development and traffic across the Islands has led to increased spread of grassy weeds on Melville Island, including along roadsides and within plantations.

The movement of vehicles, machinery and other materials to, from and within the project area may result in weeds being imported or spread.

The potential impacts of weeds being spread or introduced include:

- loss or degradation of native vegetation communities and native fauna habitat
- increased flammability and fire risk.

3.4.2 Objectives

The focus of weed management is to ensure that any existing infestations that are likely to be spread prior to construction works commencing are controlled, and that vehicle hygiene requirements are implemented to minimise the risk of importing weeds.

The specific objectives of weed management are:

- No exotic species and plant diseases imported into or exported from the project area
- No further spreading of weeds within the project area.
- No introduction or spread of declared weeds resulting from construction activities
- Post-construction weed inspections completed within the project area.

Refer to DIPL's Standard Specification for Environmental Management or further guidance on weed management (Section 8, https://dipl.nt.gov.au/_data/assets/pdf_file/0018/241713/ssem-v2.0-01-july-2019.pdf)

Table 5 Weed management actions

Action	Responsibility	Timing
<ul style="list-style-type: none"> Source machinery locally if available. 	Project Construction Manager	Prior to construction
<ul style="list-style-type: none"> Ensure that all equipment is cleaned and free of weeds and seeds prior to construction activities 	Project Construction Manager	Prior to construction
<ul style="list-style-type: none"> Provide evidence that the vehicles and plant brought on to the site of the works are free of weeds and their seeds and are soil free (refer to DIPL Standard Specification for Environmental Management, section 8.4) 	Project Construction Manager	Prior to construction

Action	Responsibility	Timing
<ul style="list-style-type: none"> Comply with the weed spread prevention aspects of the Statutory Weed Management Plans for the weeds listed on the web site https://nt.gov.au/environment/weeds/weedmanagement-planning 	Project Construction Manager	Prior to construction
<ul style="list-style-type: none"> Project staff to be trained in weed identification and reporting, and vehicle weed hygiene requirements as part of induction 	Project Construction Manager	Prior to construction
<ul style="list-style-type: none"> Ensure machinery is clean and free from mud and plant material prior to entering or leaving the construction area. 	Project Construction Manager Field staff	Ongoing
<ul style="list-style-type: none"> Undertake regular wash-down of vehicles if facilities are available (Tiwi Forestry, Three-ways worker camp) 	Project Construction Manager Field staff	Ongoing
<ul style="list-style-type: none"> If wash-down facilities inaccessible undertake visual inspection and dry removal. This will reveal vegetative material caught in the underbody, moving parts of machinery or any other part of the vehicle or machine and the materials located could be manually removed or removed with the assistance of compressed air. 	Project Construction Manager Field staff	Ongoing
<ul style="list-style-type: none"> If an outbreak of a declared weed occurs during the project weed treatment is to be undertaken as soon as possible to control and eradicate the infestation Treatment to be undertaken according to guidelines on the DENR website. The Northern Territory Weed Control Handbook (DENR, 2018) will also serve as a reference 	Project Construction Manager Field staff	Ongoing

3.5 Bushfire

3.5.1 Potential impacts

Increased incident and intensity of bushfires can lead to vegetation degradation and habitat modification. Fire can travel over large areas therefore its impact can occur outside of the project site.

The potential impacts from bushfires include:

- Loss of life and property
- Death of fauna and loss of fauna habitat
- Increased erosion risk
- Damage to or loss of culturally significant sites
- Damage to or loss of public infrastructure, private infrastructure and equipment or community lands.

3.5.2 Objectives

The focus of bushfire management is to ensure that the risk of bushfires resulting from the project are mitigated to protect public and private infrastructure and equipment, environmental and cultural values of the project area, and ensure the health and safety of project personnel.

Specific objectives of this Bushfire Management Plan are:

- minimise the risk of fire resulting from project operations
- minimise the risk to the project from bushfires which may occur from elsewhere on Melville Island.

Table 6 Bushfire management actions

Action	Responsibility	Timing
<ul style="list-style-type: none"> • Liaise with Tiwi Land Council and ranger group to coordinate activities cognisant of fire management activities, including timing for any planned burns. 	Project Construction Manager	Prior to construction & ongoing
<ul style="list-style-type: none"> • Project staff to be trained in bushfire awareness and emergency response procedures. 	Project Construction Manager	Prior to construction
<ul style="list-style-type: none"> • Site inductions are to ensure that all personnel are aware of risk of smoking and other site activities that may cause fire 	Project Construction Manager	Prior to construction
<ul style="list-style-type: none"> • No hot works are to be undertaken on days of total fire ban and high winds. 	Project Construction Manager	Ongoing
<ul style="list-style-type: none"> • Smoking only allowed in designated smoking areas. 	Project Construction Manager Field staff	Ongoing
<ul style="list-style-type: none"> • No fires permitted on site unless formal approval given by superintendent. Fires are only permitted in the camp area in a designated fire pit. 	Project Construction Manager Field staff	Ongoing
<ul style="list-style-type: none"> • Monitor NAFI to identify any severe, extreme and catastrophic Fire Danger Index (FDI) days and assess risk of conducting activities on such days and if additional controls are required to conduct the day's activities. 	Project Construction Manager	Ongoing
<ul style="list-style-type: none"> • Ensure appropriate storage of fuel and other flammable and combustible liquids in accordance with AS1940:2004 <i>The storage and handling of flammable and combustible liquids</i>. 	Project Construction Manager Field staff	Ongoing
<ul style="list-style-type: none"> • Any rubbish, debris or oil refuse that could constitute a fire hazard shall be removed to a safe distance away from infrastructure. 	Project Construction Manager Field staff	Ongoing

3.6 Flora and Fauna

3.6.1 Impacts

The potential impacts to flora and fauna include:

- disturbance to environmentally sensitive vegetation communities

- loss or endangerment of threatened species
- loss or reduction of habitat and native vegetation extent (approximately 39 ha proposed for clearing)
- vehicle collision with fauna – fauna mortality.

3.6.2 Objectives

The predominant focus is to minimise the disturbance and removal of vegetation during project activities. Specific objectives are to:

- minimise requirements to clear native vegetation to the extent practicable
- minimise clearing riparian vegetation along creeks and other waterways across the project area
- provide optimum conditions for rapid recovery of native vegetation
- minimise disruption and to native fauna, including vehicle strike

Table 7 Flora and fauna management actions

Action	Responsibility	Timing
<ul style="list-style-type: none"> • Parking areas and turn around points for plant and equipment will be located in previously disturbed and clearly identified areas to minimise roadside vegetation disturbance. 	Project Construction Manager	Prior to construction
<ul style="list-style-type: none"> • Clearance of sensitive vegetation must be avoided • Minimise clearance of old-growth forest: <ul style="list-style-type: none"> - 5 or more eucalypt stems greater than 50 cm diameter per hectare, and/or - 30 or more eucalypt stems greater than 40cm diameter per hectare • Minimise clearance of riparian vegetation: <ul style="list-style-type: none"> - only clear an area necessary to construct crossing of the creek - all areas to be cleared will be flagged and approved by the superintendent prior to clearing • Avoid clearance of trees containing large nests (specifically Red Goshawk nests) 	Project Construction Manager Environmental advisor	Prior to construction
<ul style="list-style-type: none"> • Include in site inductions and toolbox talks information on threatened species within the project area, including measures to avoid impacts, including: <ul style="list-style-type: none"> - photo pamphlets to identify threatened species such as Typhonium plants and Red Goshawk nests - protocols in case threatened species are encountered within the project area 	Project Construction Manager Field staff	Ongoing
<ul style="list-style-type: none"> • Minimise vehicle movements during dawn and dusk to minimise risk of fauna strikes. 	Project Construction Manager Field staff	Ongoing

Action	Responsibility	Timing
<ul style="list-style-type: none"> Strip and stockpile topsoil and surface material in designated area for use in regeneration or revegetation if possible. 	Project Construction Manager Environmental advisor	Ongoing
<ul style="list-style-type: none"> Retain topsoil, scrub and vegetation cleared to facilitate rehabilitation. 	Project Construction Manager Environmental advisor	Post -construction Rehabilitation
<ul style="list-style-type: none"> Rehabilitate the ground surface to near-natural condition. 	Project Construction Manager Environmental advisor	Post -construction Rehabilitation
<ul style="list-style-type: none"> Uniformly re-spread previously removed vegetation and topsoil over disturbed area to assist with rehabilitation process through agencies of increased infiltration and return of seed-bearing topsoil. 	Project Construction Manager Environmental advisor	Post -construction Rehabilitation

3.7 Feral Animal and Pest Species

3.7.1 Potential Impacts

The potential impacts of feral animals and pests include:

- impacts to native fauna through predation or competition.
- damage to vegetation, habitat, and creeks through feral animal activity.
- introduction of diseases associated with feral and pest species may impact upon habitat quality, vegetation and native fauna.
- health and safety risks, such as Water Buffalo congregating near roads.

3.7.2 Objectives

The main objective is to prevent introduction or spread of feral animals and pest species.

Table 8 Feral animals and pest species actions

Action	Responsibility	Timing
<ul style="list-style-type: none"> No rubbish (i.e. food packaging) to be left on site. 	Project Construction Manager Field staff	Ongoing
<ul style="list-style-type: none"> Ensure waste is managed correctly to prevent attracting pest fauna such as wild dogs or Dingos. 	Project Construction Manager Field staff	Ongoing
<ul style="list-style-type: none"> No pets to be permitted on site unless written approval given by superintendent 	Project Construction Manager Field staff	Ongoing

3.8 Biting Insects

3.8.1 Potential impacts

Potential impacts associated with this project includes the facilitation of mosquito breeding by establishment of water-holding receptacles. Water-holding receptacles can be created by rainfall falling on construction equipment, such as discarded oil drums. Mosquito breeding can also be facilitated by the creation of depressions in the ground surface that create ponding.

The risk of biting insect activity increasing during the project is low due to construction works being undertaken during the dry season. The risk will increase if the project extends into the early build-up and wet season period (October – December).

3.8.2 Objectives

The biting insect objective is to prevent an increase of larvae or adult mosquito activity due to project activities and minimise impacts of biting insects to project personnel.

Table 9 Biting insect actions

Action	Responsibility	Timing
Stay in accommodation that has insect screening.	Project Construction Manager	Prior to construction
Following a rainfall event inspect ponds, drains, sediment traps, bunded areas and on-site excavations for mosquito larvae.	Project Construction Manager Field staff	Ongoing
If mosquito larvae are encountered on site contact the Medical Entomology Branch of NT Health for assistance in choosing a suitable method of control.	Project Construction Manager Field staff	Ongoing
Receptacles that hold water should be tipped upside down, stored under cover away from rain, appropriately disposed of at a well-maintained waste disposal facility, or treated with a residual insecticide until it no longer poses a potential mosquito breeding issue.	Project Construction Manager Field staff	Ongoing
Fill or drain depressions created in the ground surface where possible to prevent the ponding of water.	Project Construction Manager Field staff	Ongoing
Place stockpiles in areas that do not impede drainage and shape them to prevent ponding.	Project Construction Manager Field staff	Ongoing
Ensure sediment control structures drain freely, enabling flow from roads to natural surfaces and minimal requirement for roadside drains	Project Construction Manager Field staff	Ongoing
Take care to prevent ponding rubbish storage areas.	Project Construction Manager Field staff	Ongoing
<ul style="list-style-type: none"> • Wear appropriate PPE <ul style="list-style-type: none"> - thick clothing or tightly woven material - lightly coloured, long sleeved shirts and full-length trousers. 	Project Construction Manager Field staff	Ongoing
<ul style="list-style-type: none"> • Apply insect repellents to the skin and clothing. 	Project Construction Manager Field staff	Ongoing

3.9 Air Quality

3.9.1 Potential impacts

The potential impact associated with the project is an increase in dust due to cleared vegetation exposing bare earth and increased traffic.

Potential sources of air emissions within the project area will primarily occur from dust during dry conditions and smoke from prescribed burning activities and wildfires.

Dust

Paru Road is unsealed and dust is generated as a result of vehicle movements upon these roads during the dry season.

Smoke

Prescribed burning for vegetation and bushfire management occurs occasionally within the project area. Bushfires occasionally occur on Melville Island, usually during the dry season.

Potential impacts associated with the project is an increase in dust due to land clearing and resulting from vehicular traffic.

3.9.2 Objectives

The air quality objective is to minimise dust as a result of the project.

Table 10 Air quality actions

Action	Responsibility	Timing
<ul style="list-style-type: none"> Ensure site environmental inductions for all site personnel and contractors include protective measures to minimise dust evolution. 	Project Construction Manager	Prior to construction
<ul style="list-style-type: none"> All vehicles and equipment used on site will be well maintained to minimise emissions. 	Project Construction Manager Field staff	Ongoing
<ul style="list-style-type: none"> Water truck to be used regularly to manage dust emissions. 	Project Construction Manager	Ongoing
<ul style="list-style-type: none"> Monitor road conditions to ensure deterioration with possible increase in dust creation, does not occur and undertake road rehabilitation If required. 	Project Construction Manager	Ongoing
<ul style="list-style-type: none"> Visual monitoring of the vegetation along the access track to be undertaken to ensure not being impacted by dust. 	Project Construction Manager	Ongoing
<ul style="list-style-type: none"> Ensure dust minimisation and suppression requirements are communicated to project personnel. 	Project Construction Manager	Ongoing
<ul style="list-style-type: none"> Rehabilitate the ground surface as soon as practicable following disturbance. 	Project Construction Manager Environmental advisor	Post - construction Rehabilitation
<ul style="list-style-type: none"> Uniformly re-spread previously removed vegetation and topsoil over disturbed area to assist with rehabilitation process through agencies of 	Project Construction Manager Environmental advisor	Post - construction Rehabilitation

Action	Responsibility	Timing
increased infiltration and return of seed-bearing topsoil		

3.10 Noise and Vibration

3.10.1 Potential impacts

The potential impacts associated with the road construction activities may include:

- occupational health and safety issues due to long-term exposure to noise sources through use of mechanical equipment
- nuisance noise impacts on surrounding communities or project workers through use of mechanical equipment
- disrupting or altering fauna feeding, breeding or other activities through noise and vibration from use of mechanical equipment.

3.10.2 Objectives

The focus of noise, vibration and lighting emission management is to minimise potential impacts on the environment, surrounding community, and project staff from noise and vibration. Specific objectives are to:

- manage activities in accordance with occupational health and safety guidelines for noise, vibration and light exposure
- minimise nuisance noise and vibration impacts on nearby communities and project personnel
- minimise disruption to native fauna.

Table 11 Noise and vibration actions

Action	Responsibility	Timing
<ul style="list-style-type: none"> • Ensure project operating hours are established and communicated to personnel and contractors. The operating hours proposed for construction activities are over 12-hours during daylight hours. 	Project Construction Manager	Prior to construction
<ul style="list-style-type: none"> • Provide at least two weeks notification to people at Paru outstation of intent to start construction works 	Project Construction Manager	Prior to construction
<ul style="list-style-type: none"> • Plant and equipment to be used on the project site will be fitted where possible with appropriate noise control / attenuation devices (e.g high efficiency mufflers) and maintained and operated to ensure that noise emissions are minimised. 	Project Construction Manager	Prior to construction & ongoing
<ul style="list-style-type: none"> • Undertake works in accordance with <i>NT EPA guidelines for development sites in the Northern Territory</i>: <ul style="list-style-type: none"> - Construction activities should be restricted to: <ul style="list-style-type: none"> ▪ between the hours of 7am and 7pm Monday to Saturday; and ▪ between the hours of 9am and 6pm on a Sunday or public holiday. • Some flexibility in construction times can be exercised due to project being undertaken in a remote area 	Project Construction Manager Field staff	Ongoing

Action	Responsibility	Timing
<ul style="list-style-type: none"> Vehicles, machinery and equipment is to be maintained in good working order. 	Project Construction Manager Field staff	Ongoing
<ul style="list-style-type: none"> Regular checks will be undertaken to ensure all equipment and vehicles are in good working order and are operated correctly 	Project Construction Manager Field staff	Ongoing

3.11 Cultural Heritage

3.11.1 Background

An Aboriginal Areas Protection Authority (AAPA) certificate was provided to the Department of Infrastructure, Planning and Logistics (DIPL) on 8 December 2020 (C2020/087, Appendix A). The certificate covers the project area along Paru Road. One Restricted Works Area (RWA) intersects a small portion (approximately 0.6 ha) of the southern road alignment. This restricted work area contains a sacred burial site, which is located outside of the southern road alignment (approximately 650 m away).

Other RWAs and Sacred Sites occur at the southern end of Paru Road outside of the project footprint.

Communications with the Heritage Branch of the NT Government (Department of Territory Families, Housing and Communities) have indicated that no declared heritage places or Aboriginal archaeological sites occur within the vicinity of the project area.

3.11.2 Potential Impacts

Potential impacts related to cultural heritage are:

- Damage to or loss of culturally significant artefacts, areas or species.
- Inappropriate access to sacred sites or culturally significant places.

3.11.3 Objectives

The specific objectives of the cultural heritage management are:

- no disturbance of or damage to Aboriginal or cultural heritage artefacts or Sacred Sites
- no unauthorised access to sacred sites or culturally significant places.

Table 12 Cultural heritage actions

Action	Responsibility	Timing
<ul style="list-style-type: none"> Provide a work program to the Tiwi Land Council which includes site-specific environmental and cultural issues, likely impacts and their mitigation. 	Project Construction Manager	Prior to construction
<ul style="list-style-type: none"> Identify location of culturally sensitive areas and ensure planning and design avoids these areas. 	Project Construction Manager	Prior to construction
<ul style="list-style-type: none"> Ensure all site personnel and contractors are aware of any potential Restricted Work Areas (RWAs) and conditions outlined in the AAPA Certificates 	Project Construction Manager	Prior to construction
<ul style="list-style-type: none"> Project staff are to be briefed on the rules and regulations and disciplinary measures for breaches of the RWAs 	Project Construction Manager	Prior to construction

Action	Responsibility	Timing
<ul style="list-style-type: none"> Ensure that site personnel and contractors report all new discoveries of archaeological or cultural artefacts, as per the Unexpected Aboriginal Cultural Heritage Find procedure 	Project Construction Manager	Prior to construction & ongoing
<ul style="list-style-type: none"> Cease construction work and implement practical protection measures until the area can be assessed by a Heritage specialist. 	Project Construction Manager Field staff Heritage advisor	ongoing

3.11.4 Unexpected Finds Protocol

The following management measures are recommended for unexpected Aboriginal heritage finds and to be included as part of daily toolbox discussions.

Aboriginal Cultural Heritage

Aboriginal finds can include the following:

- Ceremonial burial areas
- Ceremonial poles
- Human remains
- Stone artefacts (sharp edged rocks that have identifiable features demonstrating evidence of human modification)
- Scarred Trees (trees with symmetrical scars that might demonstrate evidence of removal of bark for use in coolamons, shields and huts)
- Grindstones (Large sandstone items (either fixed in bedrock or mobile) that have manmade grooves in them demonstrating use)
- Bone, Shell and Charcoal (potential historical food waste dumps (also known as Middens).

Geotechnical subsurface works are typically likely to encounter shell, charcoal and bone which will appear as lens from a centimetre to several metres in depth.

Prior to surface works, geotechnical team should also be aware of potential for surface finds of artefacts and avoid impacts to scarred trees.

Aboriginal Cultural Heritage Procedure

If an object of potential Aboriginal cultural heritage value is uncovered:

1. All work to cease within 10 metres of the suspected find, and the area to be cordoned off using temporary fencing.
2. Site Supervisor is to be immediately notified who will then contact the superintendent who can arrange with the relevant authorities to visit the site or review the discovered item/s.
3. If the find is determined to be Aboriginal heritage, the Site Supervisor or Heritage Advisor to notify the relevant Heritage Department
4. Work is not to recommence in the vicinity of the find until direction is provided by the Heritage Department.

Historical Cultural Heritage

Historic finds can include the following:

- **Glass** (Coloured glass, bottles (complete or fragmentary etc.)

- **Metal** (identifiable metallic objects such as cutlery, buckles, farming equipment, woodworking and metal equipment etc.)
- **Ceramic** (Plates, cups, ink wells, pipes, etc.)
- **Wood** (identifiable human manufactured wooden items)
- **Stone** (identifiable human manufactured stone items)
- **Bone, Shell and Charcoal** (potential historical food waste dumps)

Historical Heritage Procedure

The following management measures are recommended for unexpected historic finds.

1. All work to cease within 10 metres of the suspected find, and the area to be cordoned off using temporary fencing.
2. Site Supervisor to be notified who will then contact the superintendent who can arrange with the relevant authorities to visit the site or review the discovered item/s.
3. If the find is determined to be of heritage importance, work is not to recommence in the vicinity of the find until direction is provided from the relevant Heritage Department
4. If the find is determined to be historical heritage, the Site Supervisor or Heritage Advisor to notify the Heritage Department
5. Work is not to recommence in the vicinity of the find until direction is provided by the Heritage Department.

Discovery of Human Remains

If any suspected human remains are discovered during any activity works, they must be initially assumed under the provisions of the relevant Coroners Act to be a crime scene and treated accordingly. The following procedure is to be applied:

1. All activity in the vicinity must cease and the Site Supervisor to be notified immediately.
2. The Police **must be notified immediately** of the discovery by the Site Supervisor or appointed supervisor in charge of the works area.
3. The remains must be **left in place** and protected from harm or damage with a minimum of at least a 50m buffer. It is important to use best judgement and restrict all movement in the immediate vicinity around the discovery until directed otherwise by the Police as this could contaminate a potential crime scene. Likewise do not set up temporary fencing unless directed by the Police.
4. If the appointed expert investigating the find under the relevant Coroners Act believes that there is reasonable grounds to believe the remains to be:
 - **a crime scene**, the Police will provide direction on the management of the discovery
 - **Aboriginal ancestral remains**, the relevant Aboriginal Heritage Department is to be contacted
 - **historical remains**, the relevant Historic Heritage Department is to be contacted

4.0 Systems and Policies

4.1 Induction and Training

All personnel working on the project will be made aware of this CEMP and associated sub-plans, environmentally and/or culturally sensitive areas and environmental responsibilities through the site induction process.

Environmental issues and requirements will be communicated on an on-going basis through daily pre-starts and toolbox talks.

4.2 Incident Notification and Reporting

The environmental management measures outlined in Section 3.0 provide performance indicators for the project. If these measures are not properly implemented or are not providing adequate environmental protection, corrective actions will be implemented and management methods adapted to address environmental risks.

Non-conformances will be documented through regular site inspections/audits, using the tables provided in Section 3.0. Records will be maintained stating the nature of all non-conformances and the mechanisms implemented to correct the incident.

The Project Manager will be notified of any non-conformance or an environmental incident. Corrective/preventative action will be implemented in a timely manner to ensure that the incident is addressed. Records will be kept of all environmental incidents that occur, and corrective actions implemented throughout the duration of the project. If management controls are not implemented and completed in the designated manner, additional training may be required for the project personnel.

Any complaints will be handled according to DIPL's Specifications for Environmental Management, Section 29.2. This clause stipulates that within one working day of receiving a complaint about an environmental issue, such as noise, a written report must be supplied to the Superintendent detailing the complaint and action taken to alleviate the problem. A register must be kept for all complaints, which includes the following records:

- Date and time of complaint
- The method by which the complaint was made (telephone, letter, meeting, etc.),
- Name, address, contact telephone number of complainant (if no such details were provided, a note to that effect)
- Details of complaint
- Action taken in response including follow up contact with the complainant
- Any monitoring to confirm that the complaint has been satisfactorily resolved
- If no action was taken, the reasons why no action was taken.

4.3 Inspections

The Project Manager shall ensure each element of project activities are monitored to ensure that appropriate environmental protection measures are in place. Any non-conformance and effectiveness of any remedial actions will be recorded in project progress reports and made available to the Contractor.

The HSE manager shall also undertake random site inspections and direct such action as may be considered necessary to protect, minimise or rectify any environmental concerns.

Table 13 provides a summary of the environmental monitoring program to be followed for the project.

Table 13 Summary of environmental inspections

Inspection Requirements	Frequency	CEMP Section
General		
Monitoring local weather, climate information (BOM) and bushfire (NAFI)	Daily	Section 3.5
Monitoring of the 7-day forecast to determine the works program around the forecasts	Weekly	Sections 3.1 & 3.5
Erosion and sediment control		
Visual inspection and monitoring of table drains and ESC structures	Weekly Following a significant rainfall event (>30 mm)	Section 3.1
Weeds		
Visual survey of weed and pest species on site and areas used/disturbed throughout	Pre-construction Post construction	Section 3.4
Biting insects		
Visually inspect ponds, drains, sediment traps, bunded areas and on-site excavations for mosquito larvae.	Following a rainfall event	Section 3.8
Bushfire		
Scan the surrounding area while carrying out construction	Daily	Section 3.5
Monitor Bushfire Alerts and Warnings issued by Secure NT and act according to advice	Daily	Section 3.5
Waste		
Inspect waste storage and containment systems	Weekly, or after significant rainfall event (greater than 30 mm in 24-hour period)	Section 3.3
Spill prevention and response		
Regular inspection of fuel and chemical storage areas, including containment areas and structures, containers and spill kits	Daily	Section 3.2
Noise and vibration		
Complaints reported to DIPL and followed up	Duration of works	Section 3.10
Cultural heritage		
Unexpected Finds Procedure	Duration of works	Section 3.11.4

4.4 Auditing

In addition to regular monitoring as set out in this document, CEMP audits will be undertaken by a suitably qualified person. System deficiencies, adverse or potentially adverse environmental conditions arising from project activities may be subject to the issue of Environmental Non-conformances or Corrective Action Requests.

The auditing schedule to be developed on a risk-based approach. The contractor is to provide a proposed scheduling of audits for project works.

Appendix A

AAPA Certificate

Appendix E

Erosion and Sediment Control Plan Framework

Erosion and Sediment Control Framework

Paru Road Upgrade, NT Portion 1644

Erosion and Sediment Control Framework

Paru Road Upgrade, NT Portion 1644

Client: Department of Infrastructure, Planning and Logistics

ABN: 84 085 734 992

Prepared by

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23-Apr-2021

Job No.: 60626775

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Quality Information

Document Erosion and Sediment Control Framework

Ref 60626775

Date 23-Apr-2021

Prepared by William Riddell

Reviewed by James Jentz, Alana Court

Revision History



Rev	Revision Date	Details	Authorised	
			Name/Position	Signature
0	03-Mar-2021	Draft	Alana Court Associate Director - Environment	
1	23-Apr-2021	Addressing DIPL comments	Alana Court Associate Director - Environment	

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1.0 Introduction

The focus of this Erosion and Sediment Control Plan (ESCP) Framework is to provide strategies to minimise impacts of soil and erosion during the proposed upgrades of Paru Road within NT Portion 1644.

The objectives of the ESCP include:

- To avoid, or minimise and control, soil erosion and discharge of sediment or soil into waterways or established drainage systems.
- To minimise disturbance of soil, vegetation and drainage during site activities.
- To minimise the creation of dust.

1.1 Project context

This plan covers the road upgrade construction activities undertaken by the contractor within NT Portion 1644. The project includes the following four road realignments (Figure 1):

- Chainage 11,200 m to 12,000 m in the south of project area (2.4 ha) (henceforth referred to as the southern road alignment)
- Chainage 7,800 m to 9,000 m in the centre of project area (4.2 ha) (creek road alignment)
- Chainage 5,300 m to 6,300 m in the north of the project area (3.0 ha) (northern road alignment)
- Chainage 400 m to 4,400 m within the Gravel Pit 2 area (4.8 ha)

The project includes two gravel pit project areas, within which five areas suitable for gravel extraction have been identified:

- Gravel Pit 1 area:
 - GP1-1 (6.6 ha)
 - GP1-2 (9.9 ha)
 - GP1-3 (6.5 ha)
- Gravel pit 2 area:
 - GP2-1 (34.0 ha)
 - GP2-2 (3.3 ha)

The maximum area that will be cleared for gravel pits for the project is 60.3 ha. However, a smaller area is likely to be required to facilitate the road upgrade. The project will adhere to DIPL's *Standard Specification for Environmental Management* for materials extraction within gravel pits, specifically Section 19.1:

- Gravel pits should not exceed 1 ha
- Extraction areas are to be progressively rehabilitated so that one gravel pit is rehabilitated before another one is established

The maximum clearing footprint of the project will be 74.7 ha.

1.1.1 Activities subject to ESCP

The primary activities subject to this ESCP are:

- clearing and grubbing
- earthworks in cut and fill
- pavement works

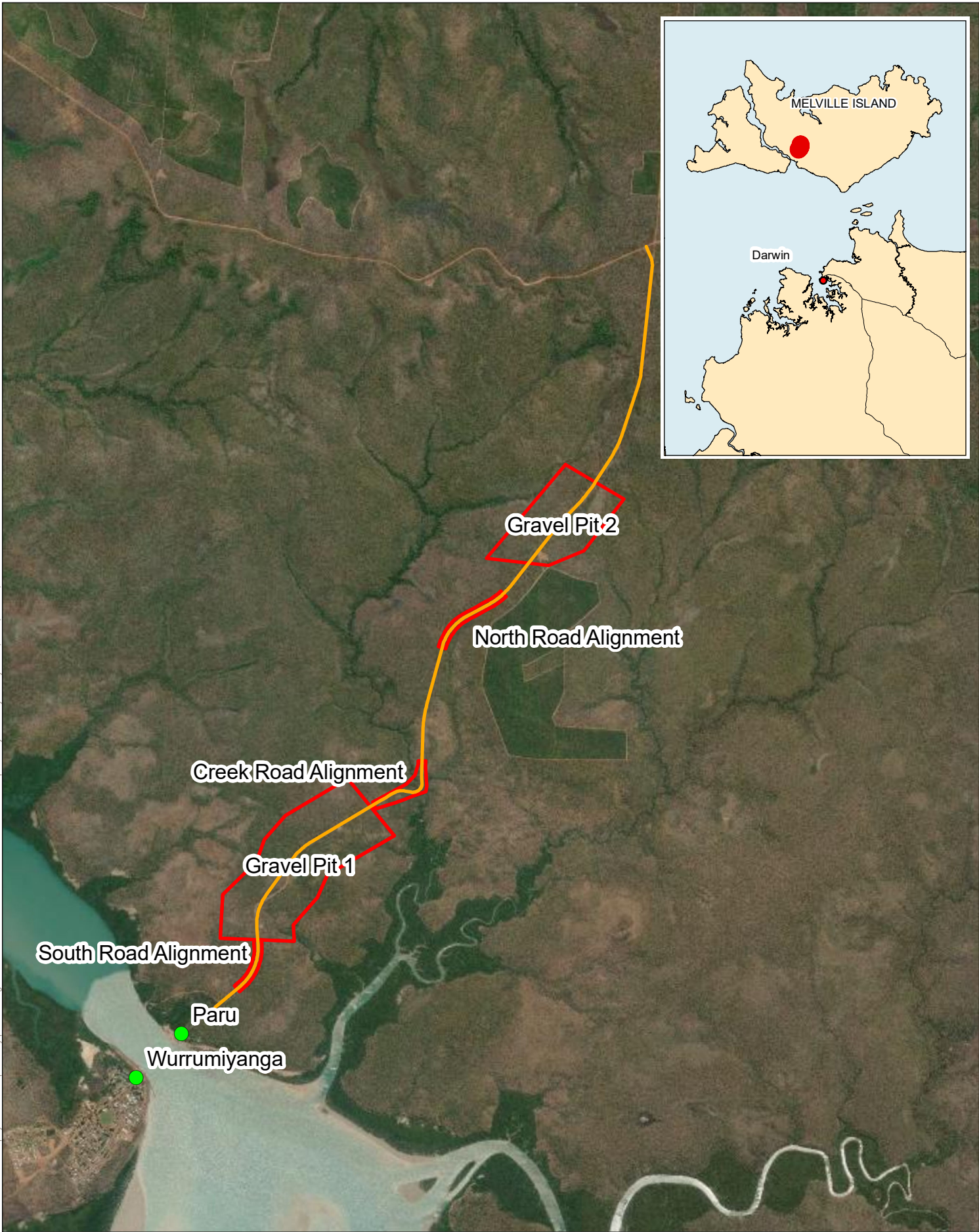
- drainage works including a new major crossing structure at the creek and one minor crossing structure along the creek realignment.
- sealing with two coat seal
- line marking
- installation of signage
- installation of guardrails.

1.2 Objective

The ESCP framework aims to:

- Address key soil and water management issues, including legislative and client requirements.
- Determine the “Type” of erosion and sediment control to be implemented during operations, post operations and until exploration activities are completed.
- Where practical identify, eliminate and reduce hazards and associated risks inherent in specific work activities, which if untreated could lead to a diminished product or create the potential for an accident, dangerous occurrence or environmental incident.

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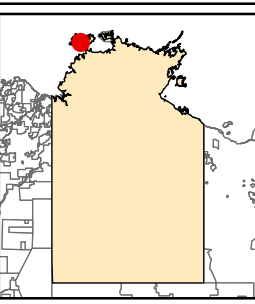
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DATUM GDA 1994, PROJECTION MGA ZONE 52

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Kilometres

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- Tiwi Communities
- Paru Road Proposed Alignment
- Project Area



Location of the project area and project area components

PROJECT ID	60571058
CREATED BY	david.vandenhoeck
LAST MODIFIED	22-Feb-2021
VERSION	1

Figure 1

2.0 Project Area Erosion Susceptibility

2.1 Project Area Risk Rating/Matrix

Erosion susceptibility varies throughout the project area, dependent upon the soil types, slope and extent of ground disturbance. Apart from the erosive impact of climatic conditions, soil erosion is influenced mainly by the inherent properties of the soils and the processes which occurred during the formation of the landscapes.

Factors considered include the following:

- Season – The timing of the project works is anticipated to be the dry season (May - September). Based on the average rainfall the timing construction works will occur during very low risk factor periods. The risk factor for October is medium if works extend outside of this period. Construction should not be undertaken on Paru Road during the November – April period when erosion risk is high to very high. See Table 1 for risk levels of rainfall within project region.

Table 1 Erosion risk rating based on average monthly rainfall at Pirlangimpi

Item	Jan	Feb	Mar	Apr	May	June	Jul	Aug	Sep	Oct	Nov	Dec
Rainfall (mm)	418.1	369.3	354.5	158.0	21.7	3.8	2.6	6.4	27.2	83.2	191.3	341.7
Erosion Risk*	E	E	E	H	VL	VL	VL	VL	VL	M	H	E

* **E** = Extreme (>225 mm); **H** = High (100+ to 225 mm); **M** = Moderate (45+ to 100 mm); **L** = Low (30+ to 45 mm); **VL** = Very Low (0 to 30 mm)

- Soil type – Soils with higher clay content are prone to generation of bulldust and are easily eroded by wind and water. Gravelly soils tend to be more robust to disturbance. The primary soil type within the project area is likely to be Kandosols with red sandy loam surface horizons grading into sandy clay loam subsoils and clays in the deeper subsoils. These soils are considered to have a low to medium erodibility potential when the soils are disturbed.
- Slope – The slope of the site is one of the characteristics that will help to determine the risk of erosion during rainfall events, with steeply inclined areas a higher risk than small undulations in the landform. The greatest risk within the project area occurs at the Creek Road alignment where slope exceeds 2% south of the creek crossing and is slightly less than 2% north of the creek
- Treatments are defined for sections less than 2% and greater than 2%. The relevant treatment will need to be selected on a case by case basis on site.
- Groundcover – Vegetation clearing will be required to undertake construction works to upgrade Paru Road. This will expose areas of bare soil and increase erosion risks.
- Creek and drainage line crossings – The project area contains two drainage line crossings, within 7,800 m to 9,000 m (Creek Road alignment). Erosion and sediment control measures undertaken for the project must ensure that the creek retains its profile.

2.2 Erosion Hazard Assessment for NT Portion 1644

An Erosion Hazard Assessment for the Paru Road project area to inform the specific issues and actions that will be required for conducting construction activities has been undertaken. Table 2 presents the results of the assessment.

The IECA (2008) Explanatory Notes were used for the assessment found in the Appendix A.

Table 2 Erosion Hazard Assessment for NT Portion 1644

Condition (as described by IECA, 2008)	Points	Score		Trigger value
		NT Portion 1644		
		Plains (Chainages 11,200m to 12,000m; 5,300m to 6,300m and gravel pits)	Creek (Chainage 7,800 m to 9,000 m)	
AVERAGE SLOPE OF DISTURBANCE AREA [1]				
• not more than 3% [3% = 33H:1V]	0	1	1	4
• more than 3% but not more than 5% [5% = 20H:1V]	1	Comment - Topographical data of project area indicates low relief with a slope 2-5%. Isolated areas increase to 6%.		
• more than 5% but not more than 10% [10% = 10H:1V]	2			
• more than 10% but not more than 15% [15% = 6.7H:1V]	4			
• more than 15%	6			
SOIL CLASSIFICATION GROUP (AS1726) [2]				
• GW, GP, GM, GC	0	2	3	-
• SW, SP, OL, OH	1	Comment – Soils at the surface within plains are SM while surface soils near the creek are ML		
• SM, SC, MH, CH	2			
• ML, CL, or if imported fill is used, or if soils are untested	3			
EMERSON (DISPERSION) CLASS NUMBER [3]				
• Class 4, 6, 7, or 8	0	4	4	6
• Class 5	2	Comment – Class 3 – Specific testing for Emerson Class not conducted. Therefore, default value used.		
• Class 3, (default value if soils are untested)	4			
• Class 1 or 2	6			
DURATION OF SOIL DISTURBANCE [4]				
• not more than 1 month	0	2	2	6
• more than 1 month but not more than 4 months	2	Comment – Soils will likely be disturbed between 1 and 4 months		
• more than 4 months but not more than 6 months	4			
• more than 6 months	6			
AREA OF DISTURBANCE [5]				
• not more than 1000 m ²	0	6	4	6
• more than 1,000 m ² but not more than 5,000 m ²	1	Comment – Gravel pits will be extracted 1 ha at a time and progressively rehabilitated, road realignments will potentially be more than 4 ha.		
• more than 5,000 m ² but not more than 1 ha	2			
• more than 1 ha but not more than 4 ha	4			
• more than 4 ha	6			
WATERWAY DISTURBANCE [6]				
• No disturbance to a watercourse, open drain or channel	0	0	2	2
• Involves disturbance to a constructed open drain or channel	1	Comment – Disturbance within the plains will not impact drainages		
• Involves disturbance to a natural watercourse	2			
		Comment – Disturbance at the Creek Road alignment close to a permanent creek.		

Condition (as described by IECA, 2008)	Points	Score		Trigger value
		NT Portion 1644		
		Plains (Chainages 11,200m to 12,000m; 5,300m to 6,300m and gravel pits)	Creek (Chainage 7,800 m to 9,000 m)	
REHABILITATION METHOD [7] Percentage of area (relative to total disturbance) revegetated by seeding without light mulching (i.e. worst-case revegetation method).				
<ul style="list-style-type: none"> not more than 1% 	1	1	4	-
<ul style="list-style-type: none"> more than 1% but not more than 5% 	2	Comment – Batters will be compacted to 95% Maximum Modified Dry Density (MMDD). Top soil will be used to rehabilitate the batters, gravel pits and old alignments.	Comment – Disturbed areas at creek are to be stabilised post construction to provide adequate degree of protection.	
<ul style="list-style-type: none"> more than 5% but not more than 10% 	3			
<ul style="list-style-type: none"> more than 10% 	4			
RECEIVING WATERS [8]				
<ul style="list-style-type: none"> Saline waters only 	0	2	0	-
<ul style="list-style-type: none"> Freshwater body (e.g. creek or freshwater lake or river) 	2	Comment – Areas in south of project area (gravel pit 1, South road alignment) are closer to marine/saline water while areas in the north are more likely to have freshwater as receiving body	Comment – Paru Creek is downstream of tidal mangrove creek	
SUBSOIL EXPOSURE [9]				
<ul style="list-style-type: none"> No subsoil exposure except of service trenches 	0	0	0	-
<ul style="list-style-type: none"> Subsoils are likely to be exposed 	2			
EXTERNAL CATCHMENTS [10]				
<ul style="list-style-type: none"> No external catchment 	0	1	1	-
<ul style="list-style-type: none"> External catchment diverted around the soil disturbance 	1	Comment – External catchment diverted around soil disturbance		
<ul style="list-style-type: none"> External catchment not diverted around the soil disturbance 	2			
ROAD CONSTRUCTION [11]				
<ul style="list-style-type: none"> No road construction 	0	2	2	-
<ul style="list-style-type: none"> Involves road construction works 	2	Comment – the project involves road realignment and access roads to gravel pits	Comment – the project involves road realignment	
pH OF SOILS TO BE REVEGETATED [12]				
<ul style="list-style-type: none"> more than pH 5.5 but less than pH 8 	0	0	0	-
<ul style="list-style-type: none"> other pH values, or if soils are untested 	1	Comment – Previous land assessments at the Tiwi Islands indicate that soil pH within plains and drainage systems are 5.0 – 6.5		
Total Score [13]		21	23	
For guidance purposes only: [13] A primary ESCP must be submitted to the local government for approval during the planning phase for any development that obtains a total point score of 17 or greater or when any trigger value is scored or exceeded.				

2.3 Erosion Risk and Determination of ESC

Table 2 demonstrates that site conditions do not reach trigger point levels for any of the Erosion Hazard Assessment criteria with the exception of waterway disturbance and area of disturbance.

The erosion risk rating based on rainfall shows that rainfall related constraints are not likely until October, when the erosion risk rating for rainfall is moderate (refer to Table 1). The erosion risk rating for the site provided in Table 3 has a rating of *very low* during the dry season

Table 3 Erosion Risk Rating (adapted from IECA, 2008, Tables 4.4.1, 4.4.2 and 4.4.3)

Erosion Risk Rating	Average Monthly Erosivity (R-Factor)	Average Monthly Rainfall Depth (mm)	Soil Loss (t/ha/yr)
Very Low	0 to 60	0 to 30*	0 to 150
Low	60+ to 100	30+ to 45	150+ to 225
Moderate	100+ to 285	45+ to 100	225+ to 500
High	285+ to 1,500	100+ to 225	500+ to 1,500
Extreme	>1,500*	>225	>1,500

Table 4, provides an indication of the “Type” of erosion and sediment controls that should be deployed during civil construction. With consideration of the civil works taking place during the dry season and referencing the applicable columns in Table 4, the civil portion of the project will trigger the use of Type 2 erosion and sediment controls.

Table 4 Sediment Control Standard (adapted from IECA, Table 4.5.1)

Catchment Area (m ²)	Soil Loss Rate Limit (t/ha/yr)		
	Type 1	Type 2	Type 3
250	N/A	N/A	All Cases
1000	N/A	N/A	All Cases
2500	N/A	>75	75
>2500	>150	150	75

**It is noted that the monthly erosivity factor would only be triggered during rainfall events. The construction period is proposed to occur from April to October and based on assessment of the average monthly rainfall for the region (refer Table 1), the erosion risk rating is considered very low (0 to 30mm during this time). It is anticipated that a completion of construction the site would be stabilised for normal operation.*

Table 5 provides a range of erosion and sediment controls that can be deployed. Under ‘Type 2’, highlighted in grey are sediment and erosion control measures that should be implemented for the civil works.

Table 5 Classification of Sediment Controls (adapted from IECA, 2008, Table 4.5.3)

Type 1	Type 2	Type 3
Sheet Flow		
Buffer Zone capable of infiltrating 100% of stormwater runoff or processed water Infiltration basin or sand filter bed capable of infiltration of 100% of flow	Buffer Zone capable of infiltrating 100% of stormwater runoff Compost/Mulch Berm	Buffer Zone capable of infiltrating 100% of stormwater runoff Filter Fence Modular Sediment Trap Sediment Fence

Type 1	Type 2	Type 3
Concentrated Flow		
Sediment basin (sized in accordance with design standard)	Block and Aggregate Drop Inlet Protection Excavated Sediment Trap with Type 2 outlet Filter Sock Filter Tube Dam Mesh and Aggregate Drop Inlet Protection Rock and Aggregate Drop Inlet Protection Rock Filter Dam Sediment Trench Sediment Weir	Coarse Sediment Trap Excavated Drop Inlet Protection Excavated Sediment Trap with Type 3 Outlet Fabric Drop Inlet Protection Fabric Wrap Field Inlet Sediment Trap Modular Sediment Trap Straw Bale Barrier (not desirable) U-shaped Sediment Trap
Dewatering Sediment Control		
Type F/D Sediment Basin Stilling Pond	Filter Bag or Filter Tube Filter Pond Filter Tube Dam Portable Sediment Tank Settling Pond Sump Pit	Compost Berm Filter Fence Grass Filter Bed Hydrocyclone Portable Sediment Tank Sediment Fence
In-stream Sediment Control		
Pump sediment-laden water to an off-stream Type F/D Sediment Basin or high filtration system	Filter Tube Barrier Modular Sediment Barrier Rock Filter Dam Sediment Weir	Modular Sediment Barrier Sediment Filter Cage

Standard drawings for erosion and sediment controls are available at:

<http://www.austieca.com.au/publications/book-6-standard-drawings>.

2.3.1 Modifying the ESC measures

It is possible that some ESC measures will require modification as the project is constructed and in response to the performance of ESC measures or changes in project circumstances. The modifications may be considered minor, moderate or significant. Moderate and minor changes will occur, and it is expected that significant modifications will be the exception. If significant erosion events occur, significant changes to the measures used will be required and should be approved by a CPESC or suitably qualified consulting engineer.

To accommodate the range of circumstances likely to occur, a change management decision matrix is presented in Table 3.

Table 6 Change management decision matrix

	Minor	Moderate	Significant	Authority required
Authority required	Maintenance of all measures	Removal or relocation of minor temporary controls	Permanent measure relocation	
Site Supervisor	✓	✗	✗	Site Supervisor
Responsible Person	-	✓	✗	Responsible Person

Authority required	Minor	Moderate	Significant	Authority required
	Maintenance of all measures	Removal or relocation of minor temporary controls	Permanent measure relocation	
CPESC	-	-	✓	CPESC
Consulting Engineer	-	-	✓	Consulting Engineer

✓ Authorised to undertake, ✗ Not authorised to undertake, - Denotes that authority level is not required.

If ESC measures are observed to be ineffective (e.g. obvious sediment deposition has occurred, or is occurring in waterway), the source of the sediment must be identified, and effective ESC measures implemented.

3.0 Erosion and Sediment Controls

3.1 Erosion and Sediment Control Measures

Table 7 Measures to be implemented for Sediment and Erosion Control

Activity	Management Controls								
<p>Vegetation clearing</p>	<ul style="list-style-type: none"> Undertake selective clearing (only clearing areas that are necessary for construction of road realignments and gravel pits), using lighter machinery such as graders or smaller bulldozers, taking care not to overwork tracks. Overworking the site can lead to the loss of topsoil, compaction, formation of windrows and wheel rutting. Design drawings will clearly identify the limits of clearing which the Contractor will need to flag on site. The limit of clearing is 1.0 m from the outer edge of the new top of batters. Ground surface to be stabilised before the onset of the wet season (November to March). Undertake clearing for each stage in small units over time, keeping the disturbed areas small and exposure time short, in conjunction with progressive re-vegetation (assisted natural regeneration using available topsoil and removed vegetation). Take all reasonable and practicable measures to minimise the removal of, or disturbance to, trees, shrubs and ground covers (organic or inorganic) All vegetation clearing must be in accordance with the Federal, Territory and local government vegetation clearing requirements and IECA Table 4.4.7 Best practice land clearing and rehabilitation requirements (refer Appendix B) and this ESCP. Best practice erosion control measures will be implemented in accordance with the ESCP following earthworks and site stabilised prior to anticipated rainfall. 								
<p>Drainage line works</p>	<p>The road alignment at chainage 7,800 m to 9,000 m road alignment crosses a permanent creek</p> <ul style="list-style-type: none"> Minimise disturbance in the riparian buffers in accordance with the stream order of the encountered drainage line in accordance with the buffers provided below: <table border="1" data-bbox="577 1201 2033 1382"> <thead> <tr> <th>Riparian class</th> <th>Stream order</th> <th>Minimum buffer width</th> <th>Measured from</th> </tr> </thead> <tbody> <tr> <td>Creek (7,800 m to 9,000 m chainage)</td> <td>Third and fourth</td> <td>100 m</td> <td>The outer edge of the riparian vegetation or levee (whichever is greater). If braided channels are present, the edge of the outer most stream channel</td> </tr> </tbody> </table> <ul style="list-style-type: none"> The activities shall be completed in a manner that does not cause a: <ul style="list-style-type: none"> material change to the shape of a waterway, 	Riparian class	Stream order	Minimum buffer width	Measured from	Creek (7,800 m to 9,000 m chainage)	Third and fourth	100 m	The outer edge of the riparian vegetation or levee (whichever is greater). If braided channels are present, the edge of the outer most stream channel
Riparian class	Stream order	Minimum buffer width	Measured from						
Creek (7,800 m to 9,000 m chainage)	Third and fourth	100 m	The outer edge of the riparian vegetation or levee (whichever is greater). If braided channels are present, the edge of the outer most stream channel						

Activity	Management Controls
	<ul style="list-style-type: none"> - material change to the volume, speed or direction of flow or likely flow of water in or into a waterway, or - alteration to the stability of the bed or banks of a waterway, including by removal of vegetation. • Ongoing monitoring of the drainage crossing condition prior to, during and at completion of rehabilitation. • Reinstate the original topography of the creek or drainage bed following construction.
Road construction works	<ul style="list-style-type: none"> • Place scrub and vegetation cleared from the route adjacent to the locations where project works are being undertaken, or in a designated stockpile area within a previously disturbed area or gravel pit, to facilitate its return. Where this occurs, spread the material out rather than form windrows. Allow disturbed areas to be stabilised and natural regeneration of the native grasses to occur.
Site management	<ul style="list-style-type: none"> • All plant and equipment brought to site is to be certified “free” of weeds, soil pathogens and pests. • All disturbed areas identified as very low, low, medium or high erosion risk must be suitably stabilised prior to anticipated rainfall, from the day that soil disturbances on the area have been finalised - IECA Table 4.4.7 in Appendix B. • Monitor road conditions to ensure deterioration does not occur. Assist in the maintenance and repair work on roads and tracks used. • No off-road driving. • Land-disturbing activities must: <ul style="list-style-type: none"> - allow stormwater to pass through the site in a controlled manner and at non-erosive flow velocities. Where this cannot be achieved, reference should be made to installing controls as detailed in the following section. - minimise soil erosion resulting from rain, water flow and/or wind. - minimise adverse effects of sediment runoff, including safety issues. - prevent, or at least minimise, environmental harm resulting from work-related soil erosion and sediment runoff. - ensure that the value and use of land/properties adjacent to the site (including access roads) are not diminished as a result of the adopted ESC measures. • Additional and/or alternative ESC measures must be implemented in the event that unacceptable off-site sedimentation is occurring as a result of the work activities. • Sediment deposited off the site as a direct result of an on-site activity, must be collected and the area appropriately rehabilitated as soon as reasonable and practicable, and in a manner that gives appropriate consideration to the safety and environmental risks associated with the sediment deposition.

Activity	Management Controls
Wet weather contingency	<ul style="list-style-type: none"> • 7-day forecast from the Bureau of Meteorology (BOM) to be monitored and the construction activities planned around the forecasts. • Where forecasts indicate rainfall is likely to result in an event that has potential to limit access to the work area, the contractor will stabilise the current work areas and disturbance works will be paused. Access will be restricted to particular areas that pose an increased erosion and sedimentation risk. Disturbance works to recommence once risk has decreased (i.e. site condition have become dry) • Emergency response - a post-rainfall/flood damage reconnaissance and assessment will be undertaken as soon as area becomes accessible. Any damage observed would be repaired as soon as practicable after the event.
Site rehabilitation	<ul style="list-style-type: none"> • Disturbed areas are to be restored and/or rehabilitated or stabilised as soon as reasonably possible (5-15 days) after construction activities have been completed on any part of the site. • Compacted areas will be ripped and scarified to promote regeneration of vegetation (provided compaction is not associated with design). • All disturbed areas will be allowed to naturally regenerate or be revegetated on completion of use. • At completion of activities, establish vegetation to the standard of that registered in the pre-assessment, or better. • All disturbed areas identified as very low, low, medium or high erosion risk must be suitably stabilised prior to anticipated rainfall, from the day that soil disturbances on the area have been finalized as per the requirements of IECA Table 4.4.7 (Appendix B). • Stabilise disturbed areas quickly to reduce the potential for erosion. • Previously removed vegetation and topsoil will be uniformly re-spread over disturbed area to assist with rehabilitation process through agencies of increased infiltration and return of seed-bearing topsoil. If required, additional native seed mix from the area could be respread to speed up rehabilitation process. This will be confirmed during rehabilitation monitoring activities. • Windrows to be removed as soon as practicable. • The type of ground cover applied to completed earthworks is compatible with the anticipated long-term land use, environmental risk, and site rehabilitation measures. • At completion of road construction works the disturbed areas are to be restored and/or rehabilitated to original pre-disturbed condition consistent with surrounding land. Rehabilitation will be required to meet a standard approved by the Tiwi Land Council.

4.0 Monitoring

4.1 General

Monitoring for soil erosion and related issues will be undertaken at critical stages, such as:

- During the baseline surveys.
- During construction preparation when there is the greatest opportunity to avoid erosion problems.
- At completion of rehabilitation works.
- After the first rainfall event.
- Pre- wet season inspections following completion of activities.

When accessing the site after the wet season, all disturbed areas should be inspected for signs of erosion. If significant impacts are identified remediation works may need to be conducted.

4.2 Operations

Visual inspections will be undertaken throughout the construction activities to assess the likelihood of erosion occurring. A review of mitigation measures implemented throughout construction will be conducted regularly to assess the efficacy and ensure high standards are maintained.

Inspections of disturbed areas is required before and after the project to identify the occurrence of erosion and sedimentation. Where erosion is observed, maintenance activities shall be undertaken. Monitoring will occur throughout the rehabilitation period to ensure that sediment and erosion mitigation measures have been effective.

4.2.1 Wet weather contingency

The following contingency measures should be undertaken if project work extends into the early wet season period when sporadic rain occurs (September - November).

- Monitoring of the 7-day forecast to determine the risk of rainfall disrupting project works.
- Daily inspections of all disturbance areas during activities.

Project works are not anticipated to occur during the monsoonal wet season (October – April). If wet season project work becomes necessary the following measures should be undertaken:

- Tracking and monitoring of the positioning of monsoonal troughs in Northern Australia.
- Tracking and monitoring of potential high rainfall incidents such as tropical lows and cyclones using BOM information.

Where a 7-day forecast identifies the high potential for rainfall over the work area, the contractor shall undertake all necessary actions to ensure site rehabilitation and protections are in place.

4.3 ESC Trigger Action Response Plan

The following Trigger Action Response Plan (TARP) is to be implemented during construction:

- **Monitoring Requirements:**
 - Daily visual inspection of construction footprint conditions for duration of civil construction activities.
 - Routine visual inspections of the creek and other infrastructure (i.e. wastewater containment system or following a rainfall event (i.e. greater than 20 mm in 24 hours).
- **Action:**
 - Repair of ESC devices immediately when found not to comply.

- Where monitoring has indicated weather condition have impacted the integrity of the erosion and sediment controls, operators must adopt one of the treatment plans from Section 2.3 to mitigate the impacts of rainfall and ensure that the ESC devices are reinstated as soon as physically practicable after the event.
- Inspection of all ESC devices across the worksite following a significant rainfall event (>20 mm).
- **Response:**
 - If water quality conditions meet discharge criteria, beneficial reuse of water may be considered for construction activities.
 - External NATA accredited laboratory testing of soil/sediment or surface water would only be required for the following Triggers:
 - Work area has a known existing contaminating event in the preceding 3 months that could influence stormwater discharge.
 - The visual inspection and physical water quality testing indicated potential contamination.
 - Where there is a sensitive receiving water body within 200 m of the discharge point.

4.4 Rehabilitation

The proposed rehabilitation approach is assisted natural regeneration in areas that have been cleared.

Where clearing is required along road chainages and in gravel pits, topsoil and cleared vegetation will be stockpiled to be respread following the works. The topsoil will contain a natural seedbank. Spreading of waste vegetative matter over disturbed areas provides micro-habitats and slows run-off during rainfall events, thus enhancing infiltration. This is proposed to be implemented progressively at the end of works within each specific construction area.

Rehabilitation monitoring should be undertaken before and after the first initial wet season following completion of works along Paru Road. Criteria for successful rehabilitation include:

- safe for humans and wildlife
- non-polluting
- stable, with appropriate vegetation cover
- waterways are not materially changed.

4.5 Records

Records shall be retained demonstrating areas that have been inspected. Georeferenced photographic records will be maintained over the duration of the activities for documenting soil disturbance.

All environmentally relevant incidents are to be recorded in a field log that must remain accessible to all relevant regulatory authorities.

Minimum records to be retained for each site include:

Location of disturbance	Area of disturbance	Date	Close out
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4.6 ESCP Revisions

Changes to ESCP during construction along Paru Road may occur as a result of the following:

- identification of opportunities for improvement
- following recommendations from site audits/inspections
- changes to operations or activities

- changes to legislation.

Implementation of the ESCP should be continually monitored and the ESCP reviewed with regards to monitoring and audit results, complaints, employee feedback and change to the program.

Should changes to the risk/impact due to the audit and reviews, then an assessment must be undertaken to re-evaluate risk and impact and appropriate changes should be made to the ESCP.

4.7 Maintenance

All temporary erosion and sediment control measures, including drainage control measures, must be fully operational and maintained in proper working order at all times during the project.

When undertaking activities on site, erosion and sediment control measures must be inspected:

- daily (when work is occurring on-site)
- within 24 hours of forecasted rainfall
- within 18 hours of a rainfall event of sufficient intensity and duration to cause runoff on-site or greater than 20mm in 24 hours.

Where erosion is observed, maintenance activities shall be undertaken.

Activity areas along Paru Road will be stabilised prior to the completion of construction activities.

Appendix A

Erosion Hazard Assessment Explanatory Notes

Appendix A Erosion Hazard Assessment Explanatory Notes

reference: IECA, 2008, *Best Practice Erosion and Sediment Control Hazard Assessment Form*)

Requirements: Specific issues or actions required by the proponent.

Warnings: Issues that should be considered by the proponent.

Comments: General information relating to the topic.

[1] REQUIREMENTS:

For sites with an average slope of proposed land disturbance greater than 10%, a preliminary ESCP must be submitted to the regulatory authority for approval during planning negotiations.

Proponents must demonstrate that adequate erosion and sediment control measures can be implemented on-site to effectively protect downstream environmental values.

If site or financial constraints suggest that it is not reasonable or practicable for the prescribed water quality objectives to be achieved for the proposal, then the proponent must demonstrate that alternative designs or construction techniques (e.g. pole homes, suspended slab) cannot reasonably be implemented on the site.

WARNINGS:

Steep sites usually require more stringent drainage and erosion controls than flatter grade sites.

COMMENTS:

The steeper the land, the greater the need for adequate drainage controls to prevent soil and mulch from being washed from the site.

[2] REQUIREMENTS:

If the actual soil K-factor is known from soil testing, then the Score shall be determined from Table 1.

If a preliminary ESCP is required during planning negotiations, then it must be demonstrated that adequate space is available for the construction and operation of any major sediment traps, including the provision for any sediment basins and their associated embankments and spillways. It must also be demonstrated that all reasonable and practicable measures can be taken to divert the maximum quantity of sediment-laden runoff (up to the specified design storm) to these sediment traps throughout the construction phase and until the contributing catchment is adequately stabilised against erosion.

WARNINGS: -

The higher the point score, the greater the need to protect the soil from raindrop impact and thus the greater the need for effective erosion control measures. A point score of 2 or greater will require a greater emphasis to be placed on revegetation techniques that do not expose the soil to direct rainfall contact during vegetation establishment, e.g. turfing and *Hydromulching*.

COMMENTS:

Table 2 provides an *indication* of soil conditions likely to be associated with a particular Soil group based on a statistical analysis of soil testing across NSW. This table provides only an initial estimate of the likely soil conditions.

The left-hand-side of the table provides an indication of the type of sediment basin that will be required (Type C, F or D). The right-hand-side of the table provides an indication of the likely erodibility of the soil based on the Revised Universal Soil Loss Equation (RUSLE) K-factor.

Table 3 provides some general comments on the erosion potential of the various soil groups.

Table 8 Score if soil K-factor is known

	RUSLE soil erodibility K-factor			
	K < 0.02	0.02<K<0.04	0.04<K<0.06	K > 0.06
Score	0	1	2	3

Table 9 Statistical analysis of NSW soil data ^[1]

Unified Soil Class System	Likely sediment basin classification (%)			Probable soil erodibility K-factor (%) ^[2]			
	Dry	Wet		Low	Moderate	High	Very High
	Type C	Type F	Type D	K < 0.02	0.02<K<0.04 4	0.04<K<0.06 6	K > 0.06
GM	30	58	12	12	51	26	12
GC	42	33	25	13	71	17	0
SW	40	48	12	49	39	12	0
SP	53	32	15	76	18	5	1
SM	21	67	12	26	48	25	1
SC	26	50	24	16	64	18	2
ML	5	63	32	4	35	45	16
CL	9	51	39	12	56	19	13
OL	2	80	18	34	61	5	1
MH	12	41	48	15	19	41	25
CH	5	44	51	39	43	11	7

Notes: [1] Analysis of soil data presented in Landcom (2004).

[2] Soil erodibility based on Revised Universal Soil Loss Equation (RUSLE) K-factor.

Unified Soil Classification System (USCS)

GW	Well graded gravels, gravel-sand mixtures, little or no fines
GP	Poorly graded gravels, gravel-sand mixture, little or no fines
GM	Silty gravels, poorly graded gravel-sand-silt mixtures
GC	Clayey gravels, poorly graded gravel-sand-clay mixtures
SW	Well graded sands, gravelly sands, little or no fines
SP	Poorly graded sands, gravelly sands, little or no fines
SM	Silty sands, poorly graded sand-silt mixtures
SC	Clayey sands, poorly graded sand-clay mixtures
ML	Inorganic silts & very fine sands, rock flour, silty or clayey fine sands with slight plasticity
CL	Inorganic clays, low–medium plasticity, gravelly clays, sandy clays, silty clays, lean clays
OL	Organic silts and organic silt-clays of low plasticity
MH	Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts
CH	Inorganic clays of high plasticity, fat clays
OH	Organic clays of medium to high plasticity

Table 10 Typical properties of various soil groups^[1]

Soil Groups	Typical properties ^[2]
GW, GP	<ul style="list-style-type: none"> Low erodibility potential.
GM, GC	<ul style="list-style-type: none"> Low to medium erodibility potential. May create turbid runoff if disturbed as a result of the release of silt and clay particles.
SW, SP	<ul style="list-style-type: none"> Low to medium erodibility potential.
SM, SC	<ul style="list-style-type: none"> Medium erodibility potential. May create turbid runoff if disturbed as a result of the release of silt and clay particles.
MH, CH	<ul style="list-style-type: none"> Highly variable (low to high) erodibility potential. Will generally create turbid runoff if disturbed.
ML, CL	<ul style="list-style-type: none"> High erodibility potential. Tendency to be dispersive. May create some turbidity in runoff if disturbed.

Note: [1] After Soil Services & NSW DLWC (1998).

[2] Any soil can represent a high erosion risk if the binding clays or silts are unstable

Table 4 provides **general** guidelines on the suitability of various soil groups to various engineering applications.

Table 11 Engineering suitability based on Unified Soil Classification^[1]

Unified Soil Class	USC Group	Embankments		Fill	Slope stability	Untreated roads
		Water retaining	Non-water retaining			
Well graded gravels	GW	Unsuitable	Excellent	Excellent	Excellent	Average
Poorly graded gravel	GP	Unsuitable	Average	Excellent	Average	Unsuitable
Silty gravels	GM	Unsuitable	Average	Good	Average	Average
Clayey gravels	GC	Suitable	Average	Good	Average	Excellent
Well graded sands	SW	Unsuitable	Excellent	Excellent	Excellent	Average
Poorly graded sands	SP	Unsuitable	Average	Good	Average	Unsuitable
Silty sands	SM	Suitable ^[2]	Average	Average	Average	Poor
Clayey sands	SC	Suitable	Average	Average	Average	Good
Inorganic silts	ML	Unsuitable	Poor	Average	Poor	Unsuitable
Inorganic clays	CL	Suitable ^[2]	Good	Average	Good	Poor
Organic silts	OL	Unsuitable	Unsuitable	Poor	Unsuitable	Unsuitable

Inorganic silts	MH	Unsuitable	Poor	Poor	Poor	Unsuitable
Inorganic clays	CH	Suitable ^[2]	Average	Unsuitable	Average	Unsuitable
Organic clays	OH	Unsuitable	Unsuitable	Unsuitable	Unsuitable	Unsuitable
Highly organic soils	Pt	Unsuitable	Unsuitable	Unsuitable	Unsuitable	Unsuitable

Notes: [1] Modified from Hazelton & Murphy (1992)

[2] Suitable only after modifications to soil such as compaction and/or erosion protection

[3] If the soils have not been tested for Emerson Class, then adopt a score of 4.

REQUIREMENTS:

Works proposed on sites containing Emerson Class 1 or 2 soils have a very high pollution potential and must submit a conceptual ESCP to the regulatory authority for review and/or approval (as required by the authority) during planning negotiations.

WARNINGS:

Class 3 and 5 soils disturbed by cut and fill operations or construction traffic are highly likely to discolour stormwater (i.e. cause turbid runoff). Chemical stabilisation will likely be required if these soils are placed immediately adjacent to a retaining wall. Any disturbed Class 1, 2, 3 and 5 soils that are to be revegetated must be covered with a non-dispersive topsoil as soon as possible (unless otherwise agreed by the regulatory authority).

Class 1 and 2 soils are highly likely to discolour (pollute) stormwater if exposed to rainfall or flowing water. Treatment of these soils with gypsum (or other suitable substance) will most likely be required. These soils should not be placed directly behind a retaining wall unless it has been adequately treated (stabilised) or covered with a non-dispersible soil.

[4] The duration of disturbance refers to the total duration of soil exposure to rainfall up until a time when there is at least 70% coverage of all areas of soil.

REQUIREMENTS:

All land developments with an expected soil disturbance period greater than 6 months must submit a conceptual ESCP to the regulatory authority for review and/or approval (as required by the authority) during planning negotiations.

COMMENTS:

Construction periods greater than 3 months will generally experience at least some significant storm events, independent of the time of year that the construction (soil disturbance) occurs.

[5] **REQUIREMENTS:**

Development proposals with an expected soil disturbance in excess of 1ha must submit a conceptual ESCP to the regulatory authority for review and/or approval (as required by the regulatory authority) during planning negotiations.

The area of disturbance refers to the total area of soil exposed to rainfall or dust-producing winds either as a result of:

- (a) the removal of ground cover vegetation, mulch or sealed surfaces;
- (b) past land management practices;
- (c) natural conditions.

WARNINGS:

A *Sediment Basin* will usually be required if the disturbed area exceeds 0.25ha (2500m²) within any sub-catchment (i.e. land flowing to one outlet point).

COMMENTS:

For soil disturbances greater than 0.25ha, the revegetation phase should be staged to minimise the duration for which soils are exposed to wind, rain and concentrated runoff.

[6] REQUIREMENTS:

All developments that involve earthworks or construction within a natural watercourse (whether that watercourse is in a natural or modified condition) must submit a conceptual ESCP to the regulatory authority for review and/or approval (as required by the regulatory authority) during planning negotiations.

Permits and/or licences may be required from the State Government, including possible submission of the ESCP to the relevant Government department.

[7] REQUIREMENTS:

No areas of soil disturbance shall be left exposed to rainfall or dust-producing winds at the end of a development without an adequate degree of protection and/or an appropriate action plan for the establishment of at least 70% cover.

COMMENTS:

Grass seeding without the application of a light mulch cover is considered the least favourable revegetation technique. A light mulch cover is required to protect the soil from raindrop impact, excessive temperature fluctuations, and the loss of essential soil moisture.

[8] COMMENTS:

All receiving waters can be adversely affected by unnatural quantities of sediment-laden runoff. Freshwater ecosystems are generally more susceptible to ecological harm resulting from the inflow of fine or dispersible clays than saline water bodies. The further inland a land disturbance is, the greater the potential for the released sediment to cause environmental harm as this sediment travels towards the coast.

For the purpose of this clause it is assumed that all sediment-laden runoff will eventually flow into saline waters. Thus, sediment-laden discharges that flow first into freshwater are likely to adversely affect both fresh and saline water bodies and are therefore considered potentially more damaging to the environment.

This clause does **not** imply that sediment-laden runoff will not cause harm to saline waters.

[9] COMMENTS:

This clause refers to subsoils exposed during the construction phase either as a result of past land practices or proposed construction activities. The exposure of subsoils resulting from the excavation of minor service trenches should not be considered.

[10] WARNINGS:

The greater the extent of external catchment, the greater the need to divert up-slope stormwater runoff around any soil disturbance.

COMMENTS:

The ability to separate “clean” (i.e. external catchment) stormwater runoff from “dirty” site runoff can have a significant effect on the size, efficiency and cost of the temporary drainage, erosion, and sediment control measures.

[11] REQUIREMENTS:

Permission must be obtained from the owner of a road reserve before placing any erosion and sediment control measures within the road reserve.

WARNINGS:

Few sediment control techniques work efficiently when placed on a road and/or around roadside stormwater inlets. Great care must be taken if sediment control measures are located on a public roadway, specifically:

- safety issues relating to road users;
- the risk of causing flooding on the road or within private property.

The construction of roads (whether temporary or permanent) will usually modify the flow path of stormwater runoff. This can affect how “dirty” site runoff is directed to the sediment control measures.

COMMENTS:

“On-road” sediment control devices are at best viewed as secondary or supplementary sediment control measures. Only in special cases and/or on very small projects (e.g. kerb and channel replacement) might these controls be considered as the “primary” sediment control measure.

[12] WARNINGS:

Soils with a pH less than 5.5 or greater than 8 will usually require treatment in order to achieve satisfactory revegetation. Soils with a pH of less than 5 (whether naturally acidic or in acid sulphate soil areas) may also limit the choice of chemical flocculants (e.g. Alum) for use in the flocculation of *Sediment Basins*.

[13] REQUIREMENTS:

A preliminary ESCP must be submitted to the local government for approval during the planning phase for any development that obtains a total point score of 17 or greater or when any trigger value is scored or exceeded.

Appendix B

Best practice land
clearing and
rehabilitation
requirements (Table
4.4.7 IECA)

Appendix B Best practice land clearing and rehabilitation requirements (Table 4.4.7 IECA)

Table 12 Table 4.4.4 Best practice land clearing and rehabilitation requirements

Risk ¹	Best practice requirements
All cases	<ul style="list-style-type: none"> All reasonable and practicable steps taken to apply best practice erosion control measures to completed earth works, or otherwise stabilise such works, prior to anticipated rainfall – including existing unstable, undisturbed, soil surfaces under the management or control of the building/construction works.
Very low	<ul style="list-style-type: none"> Land clearing limited to 8 weeks of work if rainfall is reasonably possible. Disturbed soil surfaces stabilised with minimum 60% cover^[2] within 30 days of completion of works if rainfall is reasonably possible. Unfinished earthworks are suitably stabilised if rainfall is reasonably possible, and disturbance is expected to be suspended for a period exceeding 30 days.
Low	<ul style="list-style-type: none"> Land clearing limited to maximum 8 weeks of work. Disturbed soil surfaces stabilised with minimum 70% cover^[2] within 30 days of completion of works within any area of a work site. Unfinished earthworks are suitably stabilised if rainfall is reasonably possible and disturbance is expected to be suspended for a period exceeding 30 days. Appropriate protection of all planned garden beds is strongly recommended.
Moderate	<ul style="list-style-type: none"> Land clearing limited to a maximum 6 weeks of work. Disturbed soil surfaces stabilised with minimum 70% cover^[2] within 20 days of completion of work within any area of a work site. All planned garden beds protected with a minimum 75mm layer of organic <i>Mulching</i>, heavy <i>Erosion Control Blanket</i>, <i>Rock Mulching</i>, or the equivalent. Staged construction and stabilisation of earth batters (steeper than 6H:1V) in maximum 3m vertical increments wherever reasonable and practicable. The use of turf to form grassed surfaces given appropriate consideration. Soil stockpiles and unfinished earthworks are suitably stabilised if disturbance is expected to be suspended for a period exceeding 10 days.
High	<ul style="list-style-type: none"> Land clearing limited to a maximum 4 weeks of work. Disturbed soil surface stabilised with minimum 75% cover^[2] within 10 days of completion of works within any area of a work site. All planned garden beds protected with a minimum 75mm layer of organic <i>Mulching</i>, heavy <i>Erosion Control Blanket</i>, <i>Rock Mulching</i>, or the equivalent. Staged construction and stabilisation of earth batters (steeper than 6H:1V) in maximum 3m vertical increments wherever reasonable and practicable. The use of turf to form grassed surfaces given appropriate consideration. Soil stockpiles and unfinished earthworks are suitably stabilised if disturbance is expected to be suspended for a period exceeding 10 days.
Extreme	<ul style="list-style-type: none"> Land clearing limited to maximum 2 weeks of work. Disturbed soil surfaces stabilised with minimum 80% cover^[2] within 5 days of completion of works within any area of a work site. All planned garden beds protected with a minimum 75mm layer of organic <i>Mulching</i>, heavy <i>Erosion Control Blanket</i>, <i>Rock Mulching</i>, or the equivalent. Staged construction and stabilisation of earth batters (steeper than 6H:1V) in maximum 2m vertical increments wherever reasonable and practicable. High priority given to the use of turf to form grassed surfaces. Soil stockpiles and unfinished earthworks are suitably stabilised if disturbance is expected to be suspended for a period exceeding 5 days.