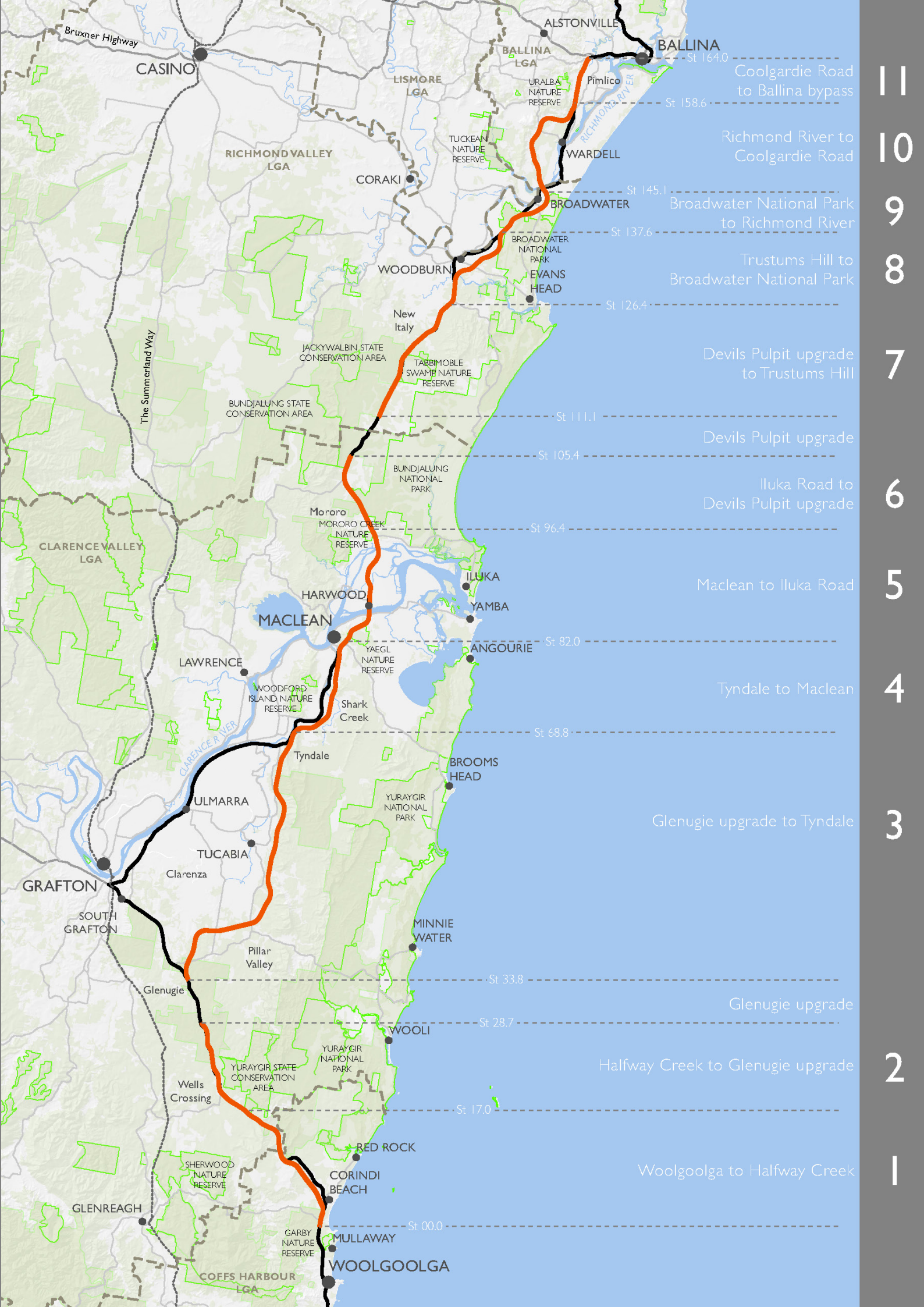


NSW Roads and Maritime Services

WOOLGOOLGA TO BALLINA | PACIFIC HIGHWAY UPGRADE SUBMISSIONS / PREFERRED INFRASTRUCTURE REPORT

Appendix H Changes made to the mitigation and management measures of the
EIS

November 2013



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Appendix H - Modifications to the environmental management measures

The revised management measures are presented in Table 5-1 of the main Submissions / Preferred Infrastructure Report. The following table provides a record of the modifications that were made to the measures. The changes to the measures were made to:

- Make additional commitments based on the response to submissions within this report.
- Make additional commitments based on the findings of the studies within this report.
- Modify the wording so that the outcome of the commitment is clearer to implement.
- Delete a measure as the commitment has been achieved.
- Delete a measure as it is sufficiently covered by a preceding measure.
- Delete a measure as it is covered within a preceding measure eg a Roads and Maritime specification, or a management plan for the issue.

The revisions to environmental management measures are presented as follows:

- Revised text is shown in italics.
- Measures or parts of measures that have been deleted are struck out.

Should the project be approved, the environmental management measures in Table 5-1 will guide the subsequent development phases of the Woolgoolga to Ballina upgrade.

Table H-1: Modifications made to environmental management measures detailed in Table 5-1 of the Submissions / Preferred Infrastructure Report

Issue	ID number	Previous number	Mitigation <i>Environmental management measure</i>	Timing	Relevant section
Hydrology and flooding					
Flood models	HF1	HF1	Flood models for the <i>areas of the project that are in the</i> Clarence, mid Richmond and lower Richmond rivers <i>will</i> be <i>updated to inform detailed design.</i> survey data (as released by the NSW government in mid 2012).	Pre-construction	4, 5, 6, 8, 9 <i>and</i> 10
	HF2	HF2	<i>Roads and Maritime will update</i> the bathymetrical data <i>at the relevant crossing of</i> on which the Clarence River <i>to inform detailed design of the crossing.</i> flood model is based <i>would be updated to reflect the current status of bathymetry at the relevant river crossing locations.</i>	Pre-construction	4, 5
Operational impacts on cane drains	HF3	HF3	Cane drain diversions <i>will</i> be designed and constructed in consultation with the relevant <i>cane industry stakeholders</i> and impacted landowners and in consideration of the potential diversions detailed in the Working Paper – Hydrology and flooding, and the additional assessment provided in Chapter 3 of the Submissions / Preferred Infrastructure Report.	Pre-construction	All 4, 8, 10
Permanent road fencing	HF4	HF4	Any permanent fencing at culvert and bridge crossings <i>will</i> need to consider the potential for blockage and be designed and operated <i>to maintain the existing flood regime.</i> in a manner that doesn't result in impacts on flooding.	Pre-construction	All
	HF5	<i>HF4a</i>	<i>Detailed design for permanent road fencing will consider hydrology and flooding impacts.</i>	<i>Pre-construction</i>	<i>All</i>
Scour protection	HF6	HF5	Scour protection and erosion protection measures at <i>temporary and permanent</i> waterway crossings <i>will</i> be <i>provided</i> designed for upstream and downstream of the highway, <i>particularly within 50 metres of Class 1 waterways or within the range of the Oxleyan Pygmy Perch as identified in section 3.9.6 of the Working paper – Biodiversity and the supplementary biodiversity report in Appendix J of the PIR. This will be undertaken in consultation with the Department of Primary Industries (Fisheries)</i> (particularly on sugarcane floodplains).	Pre-construction.	All
Waterway diversions	HF7	HF6	Waterway diversions <i>will</i> be designed <i>in consultation with Office of Environment and Heritage, NSW Office of Water and Department of Primary Industries (Fisheries)</i> in a manner so that the final diversion mimics to the greatest extent possible, <i>where feasible and reasonable</i> , the characteristics of the waterway that is being diverted. Characteristics include flow regime, flow velocity, base material, vegetation and habitat for aquatic fauna.	Construction	All
	HF8	HF7	Revegetation of <i>waterway</i> diversions and surrounding areas <i>will</i> be <i>undertaken in accordance with the following principles:</i> <ul style="list-style-type: none"> <i>Diversions will be stabilised</i> Be completed prior to the diversion receiving flows, in conjunction with the establishment of other scour and erosion control measures. <i>Diversions will establish</i> Include planting of appropriate vegetation communities along the 	Construction	All

Issue	ID number	Previous number	Mitigation <i>Environmental management measure</i>	Timing	Relevant section
			channel bed and banks, using endemic native species that are able to tolerate a potentially fast-flowing environment.		
Management of flows for aquatic habitat and movement	HF9	HF8	Velocities of flood flows through watercourse and floodplain structures (ie bridges and culverts) will would need to be assessed during detailed design in areas identified as known and potential habitat for the Oxleyan Pygmy Perch and the Purple-spotted Gudgeon in consultation with Department of Primary Industries (Fisheries) . The design of these structures will would need to consider the predicted changes to watercourse and floodplain velocities from the existing case due to the project. Structure design would include reviewing flood velocities in threatened aquatic species habitat during detailed design in consultation with Department of Primary Industries Fishing and Aquaculture.	Pre-construction	All
Picaninny Creek diversion	HF10	HF9	Batter stability issues would will be assessed due to the nearness of the water quality basin and highway batter slopes to the creek diversion. S and sufficient room would will be provided on both sides of the diversion route to allow access for maintenance and to meet batter satisfy stability requirements.	Pre-construction	3
Impacts on farm dams	HF11	HF10	Farm dams located within or partially within the project boundary would will be acquired as part of the acquisition process in accordance with the <i>Land Acquisition (Just Terms Compensation) Act 1991</i> .	Pre-construction	All
	HF12	HF11	Potential impacts to farm dams located downstream of the project that are fed by catchments upstream, and that would have a diversion of rainfall as a result of the project, will be considered during the relevant property acquisition process. <ul style="list-style-type: none"> Farm dams located outside the project boundary that would have a reduction in their catchment area due to the project would have mitigation measures applied, if possible. Potential mitigation options would include (but not be limited to) the diversion of rainfall runoff back into the farm dam through drainage routes (subject to land acquisition agreements and environmental assessment). 	Pre-construction	All
Evacuation and access		HF12	An access track would be constructed under the eastern abutment of the Coldstream River bridge at station 43.1 to assist in the movement of stock during times of flood. This access track would need to be constructed above 2.1 metres AHD and tie into the ground adjacent to the project boundary at 2.1 metres AHD.	Construction	3
		HF13	Detailed design will consider Specific instances of flood access and evacuation for affected landowners impacts would be assessed in consultation with individual landowners. Mitigation measures would be developed for including changes in stock access routes.	Pre-construction	All
		HF 14	<ul style="list-style-type: none"> The level of flood immunity of Eggins Drive into Corindi will would be built at a 100 year ARI as agreed further reviewed in consultation with Coffs Harbour City Council. 	Pre-construction	1
		HF15	<ul style="list-style-type: none"> Appropriate flood evacuation and stock refuges for a property at approximate station 52.0 near Chaffin Creek would will be further considered. 	Pre-construction	3
Construction impacts on cane	HF15	HF16	<ul style="list-style-type: none"> The potential impacts of ancillary facilities and haul roads on cane drains will would be further investigated and addressed when ancillary facility locations construction compounds are 	Pre-construction	4, 5, 6, 8,9,10,11

Issue	ID number	Previous number	Mitigation <i>Environmental management measure</i>	Timing	Relevant section
drains			<p>confirmed. The design <i>of these ancillary facilities will be developed in consultation with relevant cane industry stakeholders, affected landowners, and in accordance with the following principles:</i></p> <ul style="list-style-type: none"> • <i>Maintain conveyance characteristics of existing cane drains.</i> • <i>Provide adequate capacity in temporary drainage to prevent blockages.</i> • would need to verify that the conveyance characteristics of the cane drains are maintained by providing waterway crossings under any construction compounds and haul roads. Temporary drainage would be sized to prevent blockages. Consultation would be undertaken with the relevant cane industry stakeholders drainage unions and impacted landowners to inform the development of appropriate impact mitigation measures. 	<i>Construction</i>	
Goodwood Street underpass	HF16	HF17	<ul style="list-style-type: none"> • A drainage structure with an equivalent capacity of the current Goodwood Street underpass needs to <i>will be installed for the duration of construction</i> maintained during all flood seasons. 	Construction	4
Bridge pier construction	HF17	HF18	<ul style="list-style-type: none"> • Any temporary infrastructure (which are not fixed) associated with the construction of bridges and bridge piers in the following waterways (but not limited to) <i>in the Clarence River, Clarence North Arm, Richmond River, Tuckombil Canal and Emigrant Creek will</i> would be <i>secured or removed from the river and floodplain during flood events so not to create a debris hazard or blockage during a flood event</i> be removed from the river and floodplain during flood events greater than five year ARI events to avoid the creation of floating debris and potential blockages. 	Construction	5, 8 <i>and</i> 10
	HF18	HF18a	<ul style="list-style-type: none"> • <i>Appropriate span lengths of bridges will be specified during detailed design that consider the susceptibility of individual watercourse crossings to debris blockage.</i> 	<i>Pre-construction</i>	<i>All</i>
	HF19	HF19	<ul style="list-style-type: none"> • <i>All work within 40 metres of a permanent watercourse, crossed by the project, will be undertaken in accordance with the NSW Office of Water 'Guidelines for Controlled Actions' and industry best practice including maintaining where feasible and reasonable the geomorphic integrity and natural hydrological flow regime.</i> • All works within waterways would be constructed and managed in accordance with relevant NSW Office of Water guidelines. 	Construction	All
Temporary fencing	HF20	HF20	<ul style="list-style-type: none"> • The design of temporary fencing at culvert and bridge crossings will <i>would</i> consider the potential for blockage and be designed and operated in a manner that does not result in impacts on flooding. This could include temporary fencing that is easily removed during flood events (where ample warning time is provided), or specifically designed fencing so the blockage of structures would not occur. 	Construction	All
Climate change	HF21	HF21	<ul style="list-style-type: none"> • The need for design modifications to address changes in flood behaviour as a result of climate 	Pre-	All

Issue	ID number	Previous number	Mitigation <i>Environmental management measure</i>	Timing	Relevant section
impacts			change will would be considered in accordance with Roads and Maritime' Climate Change Plan (Roads and Maritime, 2012) assessed periodically throughout the life of the project.	construction and operation	
Impacts of ancillary facilities on flooding	HF22	HF22	<ul style="list-style-type: none"> Recommendations made in Table 8-8 of Working paper – Hydrology and flooding to minimise the flood impacts of ancillary facilities will would be considered in the final location and layout of ancillary facilities. 	Pre-construction	All 3, 4, 5, 6, 8, 10 and 11
Meeting flood management objectives	HF23	HF23	<ul style="list-style-type: none"> Continued application of the Design objectives (for road flood immunity and flood management objectives) will would apply be during throughout the detailed design phase. to provide ongoing identification and mitigation of flood impacts as a result of the project. Where these objectives are not met, Roads and Maritime will work to either: <ul style="list-style-type: none"> Achieve compliance thorough modified embankment or drainage design. Achieve an acceptable level of mitigation of impacts through alternative design measures (eg raised access tracks) in consultation with the affected land owner. 	Pre-construction	All 1, 4, 5 and 11
Drainage structures	HF24	HF24	<ul style="list-style-type: none"> The design of drainage structures across Chatsworth Island will would be further reviewed during detailed design to enable the most appropriate and cost-effective structures to be installed. 	Pre-construction	5
	HF25	HF25	<ul style="list-style-type: none"> Maintenance regime of drainage structures will be considered during detailed design. Regular cleaning of drainage structures would be required to maintain the efficacy of structures by keeping culverts and bridges free of debris. 	Pre-Construction Operation	All
	HF 26	HF25a	<ul style="list-style-type: none"> Additional culverts north of Chaffin Creek at the overflow channel around station 52.6, will be hydraulically modelled and confirmed during the detailed design to manage potential flood impacts, to meet the flood management objectives detailed in the EIS. 	Pre-construction	3
	HF 27	HF25b	<ul style="list-style-type: none"> Roads and Maritime, in consultation with Clarence Valley Council and the relevant landowner, will consider opportunities to improve the drainage system performance in the Shark Creek area, where feasible and reasonable, during the detailed design phase. 	Pre-construction	4
	HF 28	HF25c	<ul style="list-style-type: none"> The detailed design of the bridges over Shark Creek and Tyndale cane drain 1 and 2 (Crackers and Lee drain) will consider fauna connectivity in addition to the hydraulic function of these structures. 	Pre-construction	4
	HF 29	HF25d	<ul style="list-style-type: none"> Detailed design will investigate viable options to maintain the existing flood behaviour in James Creek. 	Pre-construction	5
On-going consultation on	HF 30	HF26	<ul style="list-style-type: none"> Continual Consultation with the NSW Office of Water and relevant councils affected landowners will 	Pre-	All

Issue	ID number	Previous number	Mitigation <i>Environmental management measure</i>	Timing	Relevant section
drainage matters			would be undertaken required during detailed design and construction regarding flooding impacts on properties , residences and other structures . properties.	Construction Construction and operation	
Soils, sediment and water					
Design of cut-and-fill batters	SSW1	SSW1	<ul style="list-style-type: none"> Batter slope gradients will would be designed using appropriate slope gradients to minimise erosion of selected covering topsoil. where possible, to minimise the erosion potential. 	Pre-construction	All
	SSW2	SSW2	<ul style="list-style-type: none"> Where feasible, bench cuttings are to be benched, benches will would be diverted onto contours and surface flow drainage paths designed to spread flow at the source in preference to concentrating the flow and treating it further downstream. with consideration of site constraints. 	Pre-construction	All
Management of soils, sediment and water issues	SSW3	SSW3	<ul style="list-style-type: none"> As part of the Construction Environmental Management Plan, a soils and water management plan will would be prepared and include (but not limited to): <ul style="list-style-type: none"> Erosion and sediment control plans for all stages of construction. Consideration of soil erodibility. At-source erosion controls (eg check dams). Sedimentation basin construction and management. Protection of waterways. Acid sulfate soil sub-plan issues (including from groundwater drawdown). Management of stockpiles. Tannin leachate management control. Batch plant/ chemical storage controls. Water quality monitoring and checklists. Detailed consideration of measures to prevent, where possible, or minimise any water quality impacts. 	Pre-construction	All
	SSW4	SSW4	<ul style="list-style-type: none"> Erosion and sediment control plans will would be developed in line with current Roads and Maritime specifications and as detailed in the Working paper – Water quality. 	Pre-construction	All
	SSW5	SSW5	<ul style="list-style-type: none"> A soil conservationist will would be engaged during detailed design to develop an erosion and sedimentation management report to inform the soils and water management plan. 	Pre-construction	All
	SSW6	SSW6	<ul style="list-style-type: none"> Sedimentation basins and water quality ponds will would be sized and located in accordance with the principles identified in the Working paper – Water quality. 	Pre-construction and	All

Issue	ID number	Previous number	Mitigation <i>Environmental management measure</i>	Timing	Relevant section
				construction	
	SSW7	SSW7	<ul style="list-style-type: none"> Exposed areas will would be progressively rehabilitated. Methods would will include permanent revegetation, or temporary protection with spray mulching or cover crops. 	Construction	All
	SSW8	SSW8	<ul style="list-style-type: none"> Any necessary approvals will would be obtained in accordance with Roads and Maritime specification G36 for permanent and temporary waterway crossings. from relevant agencies for permanent and temporary waterway crossing. Each contractor would will be required to comply with any conditions the approval authority imposes. 	Construction	All
	SSW9	SSW8a	<ul style="list-style-type: none"> All work potentially affecting wetlands will be undertaken in consideration of the requirements outlined in the NSW Wetlands Management Policy 2010. 	Construction	All
Stockpile management	SSW10	SSW9	<ul style="list-style-type: none"> Topsoil, earthworks and other excess spoil material will would be stockpiled and managed in accordance with Roads and Maritime Stockpile Management Guidelines (Roads and Maritime, 2011a) and the “Management of Surplus Material” in Section 3.9 of the PIR. 	Construction	All
		SSW10	<ul style="list-style-type: none"> The maintenance of established stockpile sites would be in accordance with Roads and Maritime Stockpile Management Guidelines (Roads and Maritime, 2011a). 	Construction	All
		SSW11	<ul style="list-style-type: none"> Stockpiles would be positioned in low, flat elongated embankments with a height not exceeding 2.5 metres and batter slopes not steeper than 2H:1V. 	Construction	All
	SSW11	SSW12	<ul style="list-style-type: none"> Where reasonable and feasible, stockpiles will would be placed within designated ancillary site and would: <ul style="list-style-type: none"> Not require removal of areas of native vegetation (where reasonable and feasible). Not be located under the ‘dripline’ of trees. Be located outside of known areas of weed infestation. Be located such that waterways and drainage lines are not directly or indirectly impacted. 	Construction	All
	SSW12	SSW13	<ul style="list-style-type: none"> Where practicable, stockpiles will would be located away from areas subject to concentrated overland flow. Stockpiles located on a floodplain would be finished and contoured so as to minimise loss of material in flood or rainfall events. 	Construction	All
		SSW14	<ul style="list-style-type: none"> Materials which require stockpiling for longer than 28 days would be stabilised by compaction, covering with anchored fabrics, or seeded with sterile grass. 	Construction	All
		SSW15	<ul style="list-style-type: none"> Potential runoff from stockpiles would be controlled by a suitable sediment trap such as a sediment fence or compost berm. 	Construction	All

Issue	ID number	Previous number	Mitigation Environmental management measure	Timing	Relevant section
	SSW13	SSW16	<ul style="list-style-type: none"> Topsoil will will be stockpiled separately and inspected for noxious weed seedlings at six monthly intervals and controlled with herbicide as required. 	Construction	All
	SSW14	SSW17	<ul style="list-style-type: none"> All construction stockpiles will will comply with the requirements of the <i>Protection of the Environment Operations Act 1997</i> and NSW Waste Avoidance and Resource Recovery Strategy 2007 for any waste activities that involve the generation, storage and/or disposal of waste and also consider the NSW Resource Recovery Exemptions as applying the storage of stockpiled material. 	Construction	All
	SSW15	SSW18	<ul style="list-style-type: none"> Stockpiles containing potential acid sulfate soils will will be lined, bunded and covered in accordance with relevant guidelines. 	Construction	All
	SSW16	SSW19	<ul style="list-style-type: none"> Management of tannin leaching from vegetation mulch stockpiles into waterways will will be in accordance with Roads and Maritime' Environmental Direction – Management of Tannins from Vegetation Mulch (Roads and Maritime, 2012). Management measures would include: <ul style="list-style-type: none"> Locating vegetation stockpiles away from overland flowpaths. Diverting runoff around vegetation stockpile sites. Minimising the number and size of vegetation stockpiles. Lining the base of vegetation stockpiles if they are located over a shallow water table. Treating vegetation stockpiles by covering them with plastic sheets or collecting stockpile drainage in a stockpile-specific sedimentation basin or sump and monitoring the water quality of the basin to determine its suitability for discharge to the environment. 	Construction	All
Management of contamination		SSW20	<ul style="list-style-type: none"> Opportunities to refine the project alignment in vicinity of the Tucabia landfill and old Maclean Shire Council landfills would be investigated. 	Pre-construction	3
	SSW17	SSW21	<ul style="list-style-type: none"> A Stage 1 Preliminary Site Investigation will will be conducted to verify past and present potentially contaminating activities, potential contaminants of concern and the need for further investigation. This will will include a review of past highway crashes and spills and the associated contamination risks. 	Pre-construction	All
	SSW18	SSW22	<ul style="list-style-type: none"> If necessary, (based on the results of the Stage 1 Preliminary Site Investigation), a Stage 2 Detailed Site Investigation would will be undertaken to: <ul style="list-style-type: none"> Provide information on the type, nature, extent and concentrations of contamination present, and the corresponding risks to human health and the environment. Examine pathways of contaminant dispersal and exposure, the potential for off-site impacts and the management requirements and options. 	Pre-construction	All
	SSW19	SSW23	<ul style="list-style-type: none"> If required, the Stage 2 Detailed Site Investigation recommends further action, a Stage 3 Remedial 	Pre-	All

Issue	ID number	Previous number	Mitigation <i>Environmental management measure</i>	Timing	Relevant section
			Action Plan will <i>would</i> be produced, detailing the remediation goals, environmental safeguards, and any necessary approval and licence requirements <i>in accordance with NSW Office of Environment and Heritage guidelines</i> .	construction	
	SSW20	SSW24	<ul style="list-style-type: none"> Where further assessment indicates that further action is not required, Roads and Maritime' Contaminated Land Management Guideline (RTA, 2005a) will <i>would</i> be applied to address any contamination issues and prevent any associated adverse impacts. 	Pre-construction	All
		SSW25	<ul style="list-style-type: none"> Where required, a remedial action plan or appropriate environmental management plan <i>will</i> would be prepared to remove and/or manage the contamination risks in accordance with NSW Office of Environment and Heritage guidelines. 	Pre-construction	All
	SSW21	SSW26	<ul style="list-style-type: none"> A hazardous materials buildings assessment will <i>would</i> be carried out before the demolition of any structures or buildings to identify the issues of concern and the management requirements. This is required under Clause 1.6 of Australian Standard AS 2601 – 2001 The Demolition of Structures. 	Construction	All
Emergency spill response	SSW22	SSW27	<ul style="list-style-type: none"> An emergency spill response plan will <i>would</i> be developed and incorporated into the soils and water management plan. This plan will <i>would</i> detail measures for the prevention, containment and clean-up of accidental spills of fuels and chemicals. 	Construction	All
	SSW23	SSW28	<ul style="list-style-type: none"> The storage, handling and use of the chemicals and fuels would will be in accordance with the Work Health and Safety Act 2000 and Workcover's Storage and Handling of Dangerous Goods Code of Practice (WorkCover, 2005). 	Construction	All
Acid sulfate soils	SSW24	SSW29	<ul style="list-style-type: none"> Where it is identified that a temporary sedimentation basin or permanent water quality pond is located in an area of acid sulfate soil, the basin sizing would be reviewed to reduce basin depth to avoid excavation into the acid sulfate soil layer. The minimum allowable depth would be in accordance with the Blue Book, with the volume of the basin maintained. Alternatively, where not feasible, clay capping/ lining of the basin would be undertaken. <i>Strategies to remove / reduce risks associated with acid sulfate soils will be identified.</i> 	Pre-construction, <i>Construction</i>	All
		SSW30	<ul style="list-style-type: none"> Acid-resistant construction materials would be used where possible in areas known to contain acid sulfate soils. 	Construction	All
	SSW25	SSW31	<p><i>An acid sulfate soils management plan will be implemented in accordance with Guidelines for the Management of Acid Sulfate Materials (Roads and Maritime 2005) and Waste Classification Guidelines Part 4: Acid Sulfate Soils (DECC 2008), where there is a probability of encountering acid sulfate soils during construction.</i></p> <ul style="list-style-type: none"> Where excavation is to be carried out in areas anticipated to contain acid sulfate soils, works would proceed according to the acid sulfate soils management plan. Specific controls to be implemented 	Construction	All

Issue	ID number	Previous number	Mitigation <i>Environmental management measure</i>	Timing	Relevant section
			<p>would include:</p> <ul style="list-style-type: none"> • Capping of exposed surfaces with clean fill to prevent oxidation. • Placing excavated acid sulfate soils separately in a lined, bunded and covered area. • Neutralising acid sulfate soils for reuse (where appropriate) by using additives such as lime. • Disposing of acid sulfate soils where necessary in accordance with the relevant guidelines set out in DECC (2008b). 		
		SSW32	<ul style="list-style-type: none"> • If acid sulfate soils are disturbed, any acid produced would be neutralised and acid waste leaving the site would be prevented in accordance with the applicable guidelines. 	Construction	All
Soil erosion and sedimentation control	SSW26	SSW33	<ul style="list-style-type: none"> • Appropriate erosion and sediment controls, following the guidelines of the 'Blue Books' (Landcom, 2004 and DECC, 2008a), and Roads and Maritime' Technical Guideline – Temporary Stormwater Drainage for Main Road Construction (Roads and Maritime, 2010b) will be established before the start of construction and maintained in effective working order for the duration of the construction period until site stabilisation. Specific controls would include: <ul style="list-style-type: none"> • Sediment fences and filters to intercept and filter small volumes of non-concentrated construction runoff. • Rock check dams across swales and diversion channels to reduce the velocity of flow, thereby reducing erosion of the channel bed and trapping sediment. • Level spreaders to convert erosive, concentrated flow into sheet flow. • Diversion drains that collect construction runoff and direct it away from unstable and/or exposed soil to treatment facilities. • Diversion drains to collect clean runoff from upstream of the construction area and divert it around or through the site without it mixing with construction runoff. • Lining of channels and other concentrated flow paths. • Sedimentation basins to capture sediment and associated pollutants in construction runoff (see further details below). • Specific measures and procedures for works within waterways, such as the use of silt barriers and temporary creek diversions, in accordance with Roads and Maritime' Technical Guideline – Temporary Stormwater Drainage for Main Road Construction (Roads and Maritime, 2011b). 	Construction	All
		SSW34	<ul style="list-style-type: none"> • Sensitive receiving environments will be reconsidered during detailed design to include any threatened ecological communities and non-aquatic species and their habitats that may be affected by the project. Appropriate management measures will be implemented, if required. 	Pre-construction	All

Issue	ID number	Previous number	Mitigation <i>Environmental management measure</i>	Timing	Relevant section
	SSW27	SSW35	<ul style="list-style-type: none"> When designing and implementing specific measures and procedures for Works within waterways will consider the consideration would be given to the need to maintain fish passage, in consultation with the Department of Primary Industries (Fisheries). 	Construction	All
		SSW36	<ul style="list-style-type: none"> The design and construction of works within riparian corridors and within the minimum required distance from waterways would be undertaken in accordance with NSW Office of Water guidelines for working within riparian corridors. 	Pre-construction and construction	All
	SSW28	SSW37	<ul style="list-style-type: none"> Flow discharge points will would be designed with erosion controls to manage the flow velocities. 	Pre-construction	All
		SSW38	<ul style="list-style-type: none"> In steep areas, the length between sediment fences and other physical controls would be decreased to reduce soil erosion. 	Construction	All
		SSW39	<ul style="list-style-type: none"> Construction sequencing and temporary diversions of water would be developed and designed to consider the impact of change on flow regimes and to minimise these changes throughout construction. 	Pre-construction and construction	All
Design and maintenance of construction sedimentation basins	SSW29	SSW40	<ul style="list-style-type: none"> Where appropriate and required, construction phase sedimentations basins will would be designed so they could be retained and used as permanent operational water quality ponds. where required for operational purposes. 	Pre-construction Construction	All
		SSW41	<ul style="list-style-type: none"> Temporary sediment basins would be located within the permanent boundary where possible, or on leased land, subject to approval from landowner. 	Construction	All
		SSW42	<ul style="list-style-type: none"> The final locations and sizes of sedimentation basins would be confirmed during detailed design. 	Construction	All
	SSW30	SSW43	<ul style="list-style-type: none"> Sizing of sedimentation basins that drain into the Solitary Islands Marine Park will would be reviewed to consider the use of 100th 90th percentile sedimentation basins. 	Pre-construction Construction	Section 1
		SSW44	<ul style="list-style-type: none"> In areas of highly erodible soils or in areas of large excavations or embankment construction, sedimentation basins would be designed to include sediment storage capacity sufficient for the increased sediment loading in these areas. 	Pre-construction and construction	All
		SSW31	SSW45	<ul style="list-style-type: none"> Sedimentation basins will would be inspected at regular intervals and following significant rainfall events to assess available water storage capacity, water quality, structural integrity and debris levels. 	Construction
	SSW32	SSW46	<ul style="list-style-type: none"> Where appropriate, an approved flocculent will would be applied to sedimentation basins as early as possible so that early mixing of flocculants occurs. Water quality will would be tested prior to 	Construction	All

Issue	ID number	Previous number	Mitigation <i>Environmental management measure</i>	Timing	Relevant section
			discharge in accordance with any licence requirements.		
	SSW33	SSW47	<ul style="list-style-type: none"> Where sediment has built up in a basin to a point where the total sediment storage zone has reached capacity, sediment will would be removed and appropriately disposed of. 	Construction	All
	SSW34	SSW48	<ul style="list-style-type: none"> Water from sedimentation basins will would be used for construction purposes, such as dust suppression, where feasible. 	Construction	All
	SSW35	SSW49	<ul style="list-style-type: none"> When sedimentation basins require pumping out rather than discharge via a flow outlet, a float will would be attached to the suction hose or the hose will would be located inside a bucket to prevent sediment from the basin floor from being discharged. 	Construction	All
	SSW36	SSW50	<ul style="list-style-type: none"> Records will would be kept of water quality monitoring and erosion and sediment control inspections, including details of rain events, use of flocculants, discharge, sediment removal and dewatering activities. 	Construction	All
Chemical use and storage	SSW37	SSW51	<ul style="list-style-type: none"> Physical controls to address the potential risks associated with the use and storage of chemicals on site will would include: <ul style="list-style-type: none"> Use of appropriately bunded storage facilities for chemicals and fuels. Use of appropriately bunded areas for refuelling and washdown. Availability of effective spill kits at all construction sites. 	Construction	All
Ancillary facility management		SSW52	<ul style="list-style-type: none"> Measures to be implemented to minimise impacts to surface and ground water quality include: <ul style="list-style-type: none"> Bunded storage facilities for chemicals and clay lined where located on land where groundwater is within two metres of the ground surface. Bunded areas for refuelling of plant and equipment and washdown. Locating storage areas away from areas of known near surface groundwater supplies in areas where the water table is more than five metres below the surface, otherwise the areas are to be lined if they are located over a shallow groundwater source less than two metres deep. Providing bunded storage facilities for chemicals; these bunded areas would be lined with clay where located on land where groundwater is within two metres of the ground surface. Providing bunded areas for refuelling and washdown. Locating storage areas away from areas of known near surface groundwater supplies, in areas where the water table is more than five metres below the surface; otherwise, the areas would be lined if located over a shallow groundwater source less than two metres deep. 	Construction	All
	SSW38	SSW53	<ul style="list-style-type: none"> At ancillary facilities, management of runoff and spills will would include: <ul style="list-style-type: none"> Restricting vehicle movements to designated pathways where feasible. 	Construction	All

Issue	ID number	Previous number	Mitigation <i>Environmental management measure</i>	Timing	Relevant section
			<ul style="list-style-type: none"> • Paving areas that would be exposed for extended periods, such as car parks and main access roads, where reasonable and feasible. • Diverting off-site runoff around sites where required. • Locating chemical or other hazardous material storage areas away from areas of known near-surface groundwater supplies, in areas where the water table is more than five metres below the surface; otherwise, areas would be lined if they are to be located over a shallow groundwater source less than two metres deep. • If the above local controls are not implemented, and where required, treating onsite runoff with a construction or compound-specific sedimentation basin, which would be monitored for parameters such as dissolved oxygen levels and organics to determine suitable discharge to the environment (such basins would be considered during detailed design). 		
		SSW54	<ul style="list-style-type: none"> • Where possible, stockpiles, vehicle washdown, batch plants, refuelling and chemical storage sites would be located in areas where the groundwater table is located greater than five metres from the surface. 	Construction	All
SSW39		SSW55	<ul style="list-style-type: none"> • Soil and water management Mitigation of at borrow source sites (particularly Lang Hill) will be in line with Volume 2E of the Blue Book which covers water management of mines and quarries. 	Construction	8 and 10
		SSW56	<ul style="list-style-type: none"> • Management of soil and erosion issues at borrow sources would include : <ul style="list-style-type: none"> • Development of detailed site specific erosion sediment control plans for borrow sources covering construction and rehabilitation of the site (considering the needs for any adjacent aquatic habitats). • Diverting upstream runoff around borrow sources. • Treating runoff from borrow sources at the source as per the Blue Book (Landcom, 2004 and DECC, 2008) requirements, or otherwise treating with a site specific sedimentation basin and monitoring the sedimentation basin for parameters such as dissolved oxygen levels, pH and organics to determine suitable discharge to the environment (such basins would be considered during detailed design). 	Construction	8,10
SSW40		SSW57	<ul style="list-style-type: none"> • Runoff from the Lang Hill borrow source, and other appropriate Oxleyan Pygmy Perch sites, would be treated by a sedimentation basin. The required water quality parameters for the basins discharging into this area would be determined during detailed design based on pre-construction water quality monitoring. These would be included in the EPL. Discharges from the sediment basins during construction that do not meet the water quality parameters for Oxleyan Pygmy Perch habitat should not be discharged into the waterways that are known habitat for Oxleyan Pygmy Perch. Strategies will be implemented during construction to manage discharge of basin water, so that water depth and physico-chemical conditions are not changed in areas of Oxleyan 	Construction	1, 2, 7, 8 and 9

Issue	ID number	Previous number	Mitigation <i>Environmental management measure</i>	Timing	Relevant section
			<i>Pygmy Perch habitat.</i> but rather sprayed into adjacent open grass areas or used for construction purposes such as dust suppression to avoid changing water depth and physico-chemical conditions in the potential Oxleyan Pygmy Perch Habitat. If it is not feasible to irrigate to land to completely re-use sediment basin water, then as a last resort discharge water from sedimentation basins to Oxleyan Pygmy Perch waterways will be treated to ensure it has the correct pH of between 3.3 and 6.9 and total suspended solids of less than 50 mg/L. <i>Discharge protocols and criteria will be developed in consultation with Department of Primary Industries (Fisheries) and Office of Environment and Heritage during detailed design.</i>		
Management of groundwater intersection	SSW41	SSW58	<ul style="list-style-type: none"> Further assessment involving geotechnical boreholes, monitoring boreholes and water quality testing at cutting sites will would be undertaken at Type A deep cutting sites to monitor confirm that impacts would be limited to minor impacts on local groundwater reserves. 	Pre-construction	All
	SSW42	SSW59	<ul style="list-style-type: none"> Where groundwater is released, recharge of the water table is the preferred option of managing groundwater. This will would be facilitated by collecting groundwater in grassed swales for infiltration back to the groundwater source. Where possible, these swales will would divert the groundwater around the construction area so that the groundwater does not further mix with construction runoff. 	Construction	All
	SSW43	SSW60	<ul style="list-style-type: none"> If recharging is not possible or suitable, then discharging groundwater will would be collected via the sedimentation basins before discharge into natural waterways. If discharging to downstream groundwater, then the potential effects of mounding¹ will would be mitigated. 	Pre-construction	All
	SSW44	SSW61	<ul style="list-style-type: none"> Dewatering of excavations will would be undertaken in line with Roads and Maritime' Technical Guideline – Environmental Management of Construction Site Dewatering (Roads and Maritime, 2011c), and in accordance with any licence conditions. 	Construction	All
	SSW45	SSW61a	<ul style="list-style-type: none"> <i>Further investigations will be undertaken to identify any impacts from contaminated groundwater from the former landfill sites at Firth Heinz Road and Crowleys Road.</i> 	Pre-construction	3
Prevention of groundwater impacts at type A and type B cuttings and major	SSW46	SSW62	<ul style="list-style-type: none"> The proposed management strategy to address potential impacts at type A cuttings includes: <ul style="list-style-type: none"> Pre-works investigations – geotechnical investigations of cuts to determine groundwater condition (quality parameters: electrical conductivity, groundwater depth, geological information), presence of actual or potential acid sulfate soils, presence or potential of salinisation, establishing groundwater monitoring sites, and gathering of other pertinent information. Assessment – including the EIS assessment involving this study, the pre-works investigations 	Pre-construction and construction	All

¹ An outward and upward expansion of the free water table caused by surface recharge.

Issue	ID number	Previous number	Mitigation <i>Environmental management measure</i>	Timing	Relevant section
embankments			<p>carried out, groundwater modelling of cuts (and the Rous Water Woodburn borefield site), and predictions made from those results.</p> <ul style="list-style-type: none"> Monitoring – to assess whether the investigation and its predictions are accurate and to instigate early intervention in the unlikely case/s that the actual outcomes deviate from predictions. Monitoring would start before construction, and continue during construction. Monitoring would also continue into the operation phase of the project until groundwater conditions have stabilised. Mitigation – implement environmental and engineering management measures where predictions and/or modelling and monitoring suggest that these are required to minimise impacts on groundwater. 		
	SSW47	SSW63	<ul style="list-style-type: none"> The monitoring of <i>locations in the vicinity</i> of type B cuttings and major embankments will <i>would</i> commence before construction to identify the need to implement any mitigation measure. 	Pre-construction, construction and operation	All
	SSW48	SSW64	<ul style="list-style-type: none"> If required to manage groundwater impacts at type A and type B cuttings and major embankments, the following engineering mitigation measures will <i>would</i> be considered: <ul style="list-style-type: none"> Engineering measures that transfer the seepage water downstream. Standard practice will <i>would</i> be to collect the seepage from the cut face in the drainage system for the highway, which will <i>would</i> be diverted into water quality basins before being released back into the creek or natural drainage system at some point downstream. Engineering impact mitigation measures that transfer the seepage water (where present) into the groundwater ecosystem immediately downslope of the cutting or embankments. 	Pre-construction and construction	All
	SSW49	SSW65	<ul style="list-style-type: none"> Major embankments will be designed to enable distributed flow of surface waters. 	Pre-construction and construction	All
Prevention of potential impacts on groundwater quality	SSW50	SSW66	<ul style="list-style-type: none"> Measures to manage high-risk groundwater impact areas will <i>would</i> continue to be considered through the detailed design process. In identified areas, the design of water quality controls will <i>would</i> be reviewed and the need for additional controls may be identified. 	Pre-construction	All
	SSW51	SSW67	<ul style="list-style-type: none"> Where practical <i>reasonable and feasible</i>, sites used for stockpiles, washdown, batch plants, refuelling and chemical storage will <i>would</i> be managed so that no groundwater intrusion occurs be located in areas where the water table is more than five metres below the surface. If this is not possible, and it is reasonable and feasible, the sites will <i>would</i> be lined to protect groundwater. The sites that require lining to protect groundwater will <i>would</i> be identified during detailed design and construction. 	<i>Pre-construction</i> Construction	All
Prevention of	SSW52	SSW68	<ul style="list-style-type: none"> All construction runoff to the Rous Water bore fields will <i>would</i> be diverted to appropriate 	Construction	Section 8

Issue	ID number	Previous number	Mitigation <i>Environmental management measure</i>	Timing	Relevant section
impacts on Rous Water bore fields			sedimentation controls basins. No runoff will <i>would</i> bypass the basins untreated, regardless of the size of the footprint of the work. In addition, all basins in the bore fields will <i>would</i> be clay lined to prevent seepage. If required, the depth of the basins will <i>would</i> be reduced from the standard depth of two metres to one metre in these areas to avoid penetration of the natural clay layer, with the volume of the basins maintained by increasing their footprint <i>where reasonable and feasible</i> .		
	SSW53	SSW69	<ul style="list-style-type: none"> Sizing of sedimentation basins in the Rous Water bore fields will <i>would</i> be reviewed to consider the use of 90th percentile basins. 	Construction	Section 8
	SSW54	SSW70	<ul style="list-style-type: none"> The following construction activities will <i>would</i> not be permitted within the Rous Water bore field catchment <i>without additional control measures to reduce risk of impact to the borefield and groundwater</i>: <ul style="list-style-type: none"> Refuelling. Washdown. Storage of chemicals or other hazardous substances. Installation of concrete batch plants. 	Construction	Section 8
	SSW55	SSW71	<ul style="list-style-type: none"> Water quality ponds will <i>would</i> be designed to be shallower between stations 131.1 and 134.0 (namely one metre compared to two metres) to avoid penetration of the natural clay layer, where possible. Alternatively, where not feasible, clay capping/ lining of the basin would <i>would</i> be undertaken <i>or consideration of appropriately designed swales</i>. 	Pre-construction	Section 8
	SSW56	SSW72	<ul style="list-style-type: none"> Alternative operational water quality management measures such as the use of biofilters, sand filters or measures used in the Tintenbar to Ewingsdale Pacific Highway upgrade project will <i>would</i> be considered during detailed design. 	Pre-construction	Section 8
	SSW57	SSW73	<ul style="list-style-type: none"> Consultation will be undertaken with Rous Water to co-ordinate mitigation actions including the definition of appropriate buffer zones between the project and bores. 	Pre-construction	Section 8
	SSW58	SSW73a	<ul style="list-style-type: none"> <i>Consultation will be undertaken with Rous Water to address the 12 elements of the Australian Drinking Water Guidelines Management Framework.</i> 	Pre-construction	8
	Protection of water quality		SSW74	<ul style="list-style-type: none"> Permanent water quality management and protection measures to protect adjacent waterways from pollutants from the highway upgrade would include: <ul style="list-style-type: none"> Permanent water quality basins. Grassed swales. 	Operation
SSW59		SSW75	<ul style="list-style-type: none"> All permanent water quality basins will <i>would</i> incorporate measures to contain accidental fuel and chemical spills resulting from vehicle accidents on the highway. Basins will <i>would</i> be designed to 	Operation	All

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			accommodate a spill volume of up to 40,000 litres.		
	SSW60	SSW76	<ul style="list-style-type: none"> For water quality treatment in floodplains and other locations with minimal changes in gradient, grassed swales will would be considered during detailed design. provide sufficient treatment to meet the water quality treatment targets. 	Pre-construction Operation	All
	SSW61	SSW77	<ul style="list-style-type: none"> Appropriate scour protection for drainage measures will would be determined during detailed design. In addition to water quality basins and grassed swales, rock check dams would be used to provide additional impact mitigation, including mitigation of flow concentration and scour erosion. The sizes and locations of rock check dams would be determined during detailed design. 	Operation	All
Monitoring programs	SSW62	SSW78	<ul style="list-style-type: none"> Surface water quality monitoring will would be undertaken in accordance with Roads and Maritime' Guideline for Construction Water quality Monitoring (RTA, 2003), and as per the framework outlined in the Working paper – Water quality. 	Pre-construction	All
	SSW63	SSW79	<ul style="list-style-type: none"> Groundwater monitoring would will be undertaken in accordance with the framework outlined in the Working paper – Groundwater (Section 5.2). 	Construction	All
Ordnance contamination	SSW64	SSW80	<ul style="list-style-type: none"> Consultation will be undertaken with Department of Defence regarding the potential for unexploded ordnance to be encountered east of Broadwater within the area of the Evans Head aerial bombing ranges. 	Pre-construction	9 and 10
Biodiversity					
Monitoring strategy	B1	B1	<ul style="list-style-type: none"> A measurable and targeted biodiversity monitoring program will would be developed to assess the effectiveness and success of the proposed biodiversity mitigation and management measures. The monitoring program will would be prepared based on The Ecological Monitoring Program (Appendix K of the PIR) outline in Appendix B of the Working paper – Biodiversity and would will be finalised in consultation with relevant State and Commonwealth agencies and – This program will would be finalised following project approval to incorporate any specific conditions of consent approval and feedback from the expert review. 	Pre-construction	All
Connectivity Strategy	B2	B2	<ul style="list-style-type: none"> The Connectivity Strategy will would be further developed during detailed design, in consultation with relevant State and Commonwealth agencies, building upon the Connectivity Strategy in Appendix A of the Working paper – Biodiversity and the Supplementary Biodiversity Report in Appendix J of 	Pre-construction	All

Issue	ID number	Previous number	Mitigation <i>Environmental management measure</i>	Timing	Relevant section
<i>Biodiversity fauna connectivity</i>	B3	B3	<ul style="list-style-type: none"> All fauna connectivity structures <i>will</i> be developed in accordance with the design principles outlined in the Connectivity Strategy in Appendix A of the Working paper – Biodiversity, <i>Biodiversity and the Supplementary Biodiversity Report in Appendix J of the Submissions / Preferred Infrastructure Report</i> building upon the current concept design structures. 	Pre-construction	All
	B4	<i>B3b</i>	<ul style="list-style-type: none"> <i>Opportunities for improved connectivity for koala and Long-nosed Potoroo will be further investigated at between station 144.2 and station 146.6.</i> 	<i>Pre-construction</i>	<i>9 and 10</i>
Fauna exclusion fencing	B5	B4	<ul style="list-style-type: none"> Fauna exclusion fencing locations and design <i>will</i> be further developed in accordance with the design principles outlined in the Connectivity Strategy in Appendix A of the Working paper – Biodiversity, building upon the current concept design. 	Pre-construction and construction	All
	B6	B5	<ul style="list-style-type: none"> Fauna exclusion fencing <i>in low-lying floodplains between stations 35.0 and 80.2</i> required in low-lying floodplains <i>will</i>, be designed to exclude emus from the road corridor. <i>where feasible and reasonable</i>, it would be placed higher on fill embankments to reduce <i>damage from flooding</i>. impacts of flooding on the fauna fence. 	Construction	3 and 4
Arboreal crossing <i>zones structures</i>	B7	B6	<ul style="list-style-type: none"> Tree <i>height</i> surveys <i>will</i> be conducted at proposed <i>arboreal rope and glider crossing zones</i> locations outlined in the Connectivity Strategy to determine the most appropriate location to place arboreal crossing <i>rope or pole</i> structures. <i>Where feasible</i>, the design <i>will</i> aim to place arboreal crossing <i>zones</i> structures at grade level, where average tree heights exceed 20 metres, and/ or taller trees <i>are</i> would be <i>able to be safely retained</i> naturally positioned close to the road edge. 	Pre-construction	All
Widened median	B8	B7	<ul style="list-style-type: none"> Widened medians with retained vegetation are located in the design to provide connectivity for gliders. The design <i>and construction</i> of fauna exclusion fencing, and drainage or fauna underpass structures in widened medians would minimise vegetation clearing. 	Pre-construction and construction	1, 2 and 7
	B9	<i>B7a</i>	<ul style="list-style-type: none"> <i>Where feasible and reasonable, native vegetation forming part of the identified widened medians will not be disturbed for any ancillary construction purpose including access tracks, stockpiles, materials laydown and ancillary facilities.</i> 	<i>Construction</i>	<i>1, 2 and 7</i>
Flora and fauna management plan	B10	B8	<ul style="list-style-type: none"> A n overall project Flora and Fauna Management Plan would detail consistent guidance on the general management measures required for flora and fauna <i>as relevant for the project element being constructed</i> across all stages of the project. The management plan <i>will be prepared in accordance with Roads and Maritime Biodiversity Guidelines – Protecting and managing biodiversity on RTA projects (RTA, 2011a)</i> would cover: 	Pre-construction	All

Issue	ID number	Previous number	Mitigation <i>Environmental management measure</i>	Timing	Relevant section
			<ul style="list-style-type: none"> • Pre-clearing process. • Exclusion zones. • Re-establishment of native vegetation. • Clearing of vegetation and removal of bushrock. • Re-use of woody debris and bushrock. • Weed management. • Pathogen management. • Nest boxes. • Fauna handling. • Aquatic habitats and riparian zones. 		
Threatened species management sub-plans	B11	B9	<ul style="list-style-type: none"> • <i>The threatened species management plans prepared for the project will be finalised, as relevant to the element of the project to be constructed. Development of the plans will include responding, where feasible and reasonable to:</i> <ul style="list-style-type: none"> • <i>Recommendations from expert review undertaken as part of the Submissions / Preferred Infrastructure Report (and detailed in section 1.4 of the management plans).</i> • <i>Any conditions of approval.</i> • <i>Results from baseline monitoring undertaken.</i> • <i>The threatened species management plans would will be finalised in consultation with the relevant State and Federal government agencies.</i> A threatened flora management sub-plan will would be prepared to specifically address project sections where populations of threatened flora are known to have plants immediately adjacent to the project footprint, as identified in this assessment and include: <ul style="list-style-type: none"> • Identification, and physically surveying and mapping of the specific location of individuals and patches along the edges of the project boundary to inform the management actions of the flora and fauna management plan. • A clearing protocol, translocation trial, seed collection, storage and propagation to use in revegetation of disturbed habitats. • Details for protection of retained plants, planting and maintenance and monitoring procedure during construction. • A revegetation monitoring program and performance criteria, reporting and adaptive management. 	Pre-construction	<i>All</i>
		B10	<ul style="list-style-type: none"> • A rainforest invertebrates management sub-plan focusing on the Pink Underwing Moth and Atlas Rainforest Ground Beetle would be prepared and include: 	Pre-construction	10 and 11

Issue	ID number	Previous number	Mitigation <i>Environmental management measure</i>	Timing	Relevant section
			<ul style="list-style-type: none"> ◆ Details on targeted surveys of both species within and around the project boundary to identify the extent of the population, and map the distribution of suitable habitat adjacent to the project. In particular potential breeding habitat containing the caterpillars' food plant, <i>Carronia multisepalea</i> should be identified. This would inform the detailed design, flora and fauna management plan and translocation and habitat rehabilitation program. The surveys will aim to map the species distribution and correlate presence with the habitat characteristics at identified sites to accurately model the distribution of potential habitat in proximity to the project. ◆ Consideration to minimise or avoid impacts, where possible. The identified potential habitat would be targeted for translocation of individuals and habitat rehabilitation as compensation for the loss of habitat from the project. ◆ An outline of capture and relocation actions for Rainforest Ground Beetle and Pink Underwing Moth larvae focusing on identified suitable habitat. ◆ Identify procedures for habitat rehabilitation and revegetation of suitable habitat near the project including the planting of the host plant for the Pink Underwing Moth. ◆ Details of a monitoring program for translocated individuals and retained habitat adjacent to the project. The monitoring program would include the collection of baseline data and would continue through construction and operation for a period of years post construction. The plan would include clear key milestones, performance indicators, corrective actions and timeframes for the completion of all actions outline. The plan would address the success of habitat rehabilitation as well as the translocation success by monitoring populations of the target species. 		
	B14		<ul style="list-style-type: none"> ◆ An emu management sub-plan would be prepared and include: <ul style="list-style-type: none"> ◆ The location of emu exclusion fencing to be implemented during construction. The plan should also consider fence design around bridges to domestic stock allow emus to cross. ◆ Detailed landscape plan including locations for dense plantings of Melaleuca and Casuarina species, and other suitable species to act as a natural barrier fence and to also direct emus to crossing areas where exclusion fencing is not possible. These plantings would form a natural dense barrier up to 4 to 5 metres wide. The natural brush barrier fence is to be established immediately following property acquisition through sections 3 and 4 and well in advance of clearing of vegetation to assist in educating emus to use crossing points. Gaps would be placed where the dedicated and combined structures are to finally be located. This is designed to allow time for the vegetated barrier to achieve suitable height and also to educate emus to use the designated crossing locations prior to construction. ◆ Fencing locations, including how permanent and temporary fencing would be used. ◆ Baseline monitoring of emu movements prior to clearing. ◆ Roadside plantings in emu habitat. (Section 3 and 4) would not be within the first 40 metres of the road unless there is fauna exclusion fencing in place or as part of the exclusion barrier. In 	Pre-construction	3 to 4

Issue	ID number	Previous number	Mitigation <i>Environmental management measure</i>	Timing	Relevant section
			<p>particular, common landscape species such as <i>Dianella</i>, <i>Gahnia</i>, <i>Lomandra</i>, and <i>Ficus</i> in addition to Bangalow Palm (<i>Archontophoenix cunninghamiana</i>), and s Soy, oats or rye grass cover crops would not be used as they represent food plants for emus and may attract them to the road edge.</p> <ul style="list-style-type: none"> Plantings under dedicated and combined bridges in emu crossing zones (Section 3 and 4) including the approaches to the crossing are to use grasses or low ground covers and avoid dense plantings of trees including low trees such as <i>Acacia</i> or <i>Casuarina</i>. This is to leave the opening clear. Ground cover crops such as soybean, and oats or rye grass could be used on disturbed ground around the approaches to the bridge to attract emus to the crossing zone as these represent known food plants. Identification of a trial to test the use of tethered twirling spirals, silver on one side and red or blue on the other. These can be trialled on different bridge underpasses targeted at attracting emus. These would have to be constructed in some way that could endure and would not harm other investigating wildlife. The method and approach to monitoring the effectiveness of crossing structures for emus and consider the results of the pilot program for satellite / GPS tracking and other techniques such as camera monitoring. Thresholds for action regarding the need for additional structures will also be identified. 		
	B12		<ul style="list-style-type: none"> A management sub plan for threatened fish species Oxleyan Pygmy Perch would be prepared. This would include: <ul style="list-style-type: none"> Measures to avoid and mitigate impacts to threatened fish species in particular the Purple-spotted Gudgeon and Oxleyan Pygmy Perch and their habitat. A methodology and program for survey of potential habitat for this species at least 6 months prior to construction in the appropriate season to inform the flora and fauna management plan and monitoring program. Recommendations on the location of batch plants outside and away from Oxleyan Pygmy Perch habitat wind blown materials or run off sediments will not runoff into waterways. Procedures to avoid in-stream works on known and potential habitat for Oxleyan Pygmy Perch or Purple spotted Gudgeon. The in stream construction works should avoid the critical spring-summer period (October – December) where feasible and reasonable. Where feasible and reasonable, existing pools should be retained upstream and downstream of crossings within known occurrences of the Oxleyan Pygmy Perch to provide resting and refuge habitat near crossing structures. A proposed program for monitoring the species at identified known locations, to include a before-after control impact design and continue during construction and operation for a period of five consecutive monitoring periods. Proposed adaptive management actions to be implemented for this species in the event that any 	Pre-construction	4-4-6-10

Issue	ID number	Previous number	Mitigation <i>Environmental management measure</i>	Timing	Relevant section
			<p>changes to the identified populations or habitat conditions are demonstrated and can be attributed to the project construction or operation.</p> <ul style="list-style-type: none"> Clear key milestones, performance indicators, corrective actions and timeframes for the completion of all actions outlined. 		
	B13		<ul style="list-style-type: none"> A threatened frog management sub plan (with a focus on the Giant Barred Frog, Green-thighed Frog, and Olongburra Frog) would be prepared and include: <ul style="list-style-type: none"> A survey program for survey or potential habitat for these species at least 6 months prior to construction to identify potential waterways and swamp habitat locations to inform the flora and fauna management plan. A record of riparian / habitat condition baseline data at identified sites near the project to inform construction and post construction monitoring program. Identification of known sites, protection measures to be implemented during construction, monitoring methods and timing for species and habitat condition and monitoring mitigation measures and reporting in line with the flora and fauna management plan. An outline of methods for monitoring species and habitat condition during post construction. 	Pre-construction	All
	B14		<ul style="list-style-type: none"> A koala management sub plan would be prepared address the and include details on targeted surveys to identify the presence and status of koala populations near the project alignment. The surveys will focus near the project alignment and the data used to inform further development of connectivity structures. 	Pre-construction	6 to 10 <i>All</i>
	B15		<ul style="list-style-type: none"> A glider management sub plan would be prepared and include: <ul style="list-style-type: none"> Targeted surveys for Squirrel Glider and Yellow bellied Glider to inform the flora and fauna management plan, nest box management plan and the detailed design. The targeted surveys would inform the appropriate placement of the arboreal crossing structures, and widened medians. 	Pre-construction	1 to 3, 6 to 8
	B16		<ul style="list-style-type: none"> A Lowland Rainforest management sub plan would be prepared and include targeted surveys for Lowland Rainforest to more accurately identify the distribution, condition and area of this community in proximity to the alignment. The survey would concentrate on classifying the community according the criteria used under the EPBC Act to identify the patches which meet the Commonwealth listed separately to the State listed community. The data from the survey would provide input into the flora and fauna management plan and the compensatory habitat measures for this community and for dependent threatened fauna species such as the Pink Underwing Moth. 	Pre-construction	8 to 11
Re-establishment of native	B12	B17	<ul style="list-style-type: none"> A landscape management plan <i>will</i> would be developed to provide specific details for the re-establishment of native vegetation on batters, cut faces, surrounding sediment basins and other areas disturbed during construction. This would include details for the appropriate removal and restoration 	Pre-construction	All

Issue	ID number	Previous number	Mitigation <i>Environmental management measure</i>	Timing	Relevant section
vegetation			<p>of temporary creek crossings. The landscape management plan would be developed in line with Roads and Maritime Biodiversity Guidelines (RTA, 2011a), the design principles identified in the Connectivity Strategy and the design principles in Working paper – Urban design, landscape character and visual impact.</p> <ul style="list-style-type: none"> The approach to landscape planting for the purposes of fauna management would be consistent with principles set out in the urban design and landscape strategy for this project (refer to Working paper – Urban design, landscape character and visual impact). 		
Minimising loss of vegetation and habitat	B13	B18	<ul style="list-style-type: none"> Disturbance and clearing of vegetation will would be minimised, particularly: <ul style="list-style-type: none"> Avoiding and minimising vegetation removal wherever possible through the detailed design process. Sensitive selection of ancillary facilities. The ancillary facilities identified present a selection of available sites; however during detailed design an evaluation would be conducted to select the minimum number of sites required with a priority to avoid native vegetation clearing if possible. A prior site inspection is required to survey and map hollow bearing trees and check for large nests for species such as raptors, including Osprey and also Black-necked Stork at these sites. Construction compounds and stockpile sites are to be sited in cleared or sparsely treed portions of the ancillary facility sites where feasible and reasonable, to avoid unnecessary clearing of vegetation and threatened flora species. Placing water quality basins would be placed in the optimal location for treating surface runoff. During detailed design, the location of water quality treatment measures will would consider the competing environmental requirement of minimising vegetation removal, particularly where there is the potential for threatened plant species, threatened fauna habitat or in identified regional wildlife corridors. 	Pre-construction and construction	All
Bridge and culvert design	B14	B19	<ul style="list-style-type: none"> Instream structures such as bridges and culverts are to will be designed and managed to minimise any potential impact to flow regimes and fish passage, in accordance with Fairfull and Witheridge (2003). Use of bridges or bobo arch is the preferred structures for Class 1 (major fish habitat) waterways. 	Pre-construction	All
	B15	B20	<ul style="list-style-type: none"> <i>During detailed design, the waterway class will be confirmed and the design will be reviewed to include appropriate crossing structures for the relevant waterway class at the following locations:</i> <ul style="list-style-type: none"> <i>Unnamed waterway station 114.0</i> <i>Oaky Creek station 122.5</i> <i>Nortons Gully station 123.6</i> <i>Unnamed waterway station 133.4</i> 	Pre-construction	7 and 8

Issue	ID number	Previous number	Mitigation <i>Environmental management measure</i>	Timing	Relevant section
			<ul style="list-style-type: none"> • <i>Unnamed waterway at station 134.7</i> • <i>Tributary of Macdonalds Creek at station 135.5</i> • <i>Montis Gully tributary at station 141.8</i> • <i>Eversons Creek station 143.6</i> 		
	B16	B21	<ul style="list-style-type: none"> • All drainage structures between station 134.5 to 143.0 will would be reviewed in consultation with Department of Primary Industries (Fisheries) to ensure suitable connectivity for threatened fish species is maintained. 	Pre-construction	8 <i>and</i> 9
	B17	B22	<ul style="list-style-type: none"> • Each <i>permanent</i> waterway crossing is to be designed to ensure no physical, hydraulic and behavioural barriers to aquatic fauna movements. Impacts would be minimised by ensuring that: <ul style="list-style-type: none"> • The natural stream flow and velocity are maintained as closely as possible. • Surface level of any causeway is the same or lower than the natural stream bed to reduce interference with flow. • Habitat within a culvert is as natural as possible (eg allow rock and bed materials to infill the culvert base). • There is the maximum light penetration. • Fauna and fish passage standards are maintained, as detailed in the Connectivity Strategy, including minimum design widths, including for natural banks, while also providing for scour protection and cut and fill batters. • Creek crossing structures will would be designed to maximise habitat features within the passage. To achieve this, the design of bridge and culverts would encourage the deposition of sediment creating similar bed substrate to adjacent creek and the planning of specific plant species. • Pools would be constructed or retained upstream and downstream of the waterway crossings to provide resting and refuge habitat near the crossing structures. • Design culverts (specifically where Oxleyan Pygmy Perch has been confirmed) so that hydraulic conditions would will be suitable for fish passage. • Bridges will would be designed and sized to limit peak flood velocities to less than 1m one metre per second in commonly occurring flood events. <i>Bridges will be designed and sized to ensure peak flood velocities are not increased by more than one metre per second than the existing flood event, where Oxleyan Pygmy Perch have been confirmed.</i> similarly to the bridge design over Macdonalds Creek where Oxleyan Pygmy Perch have been confirmed. 	Pre-construction	All
	B18	B23	<ul style="list-style-type: none"> • Bridge structures will would be designed <i>to minimise impacts to flow regimes and fish passage.</i> in light of the following principles, <i>Where feasible and reasonable the following principles will</i> 	Pre-construction	All

Issue	ID number	Previous number	Mitigation <i>Environmental management measure</i>	Timing	Relevant section
			<p><i>apply:</i></p> <ul style="list-style-type: none"> • Bridge s are to be single span bridges with piers to be located outside the main channel. • Bridge structures to be designed to prevent an increase of backup of water during times of flood, that will would enable Plague Minnow to access waterbodies where they are currently not found (eg Broadwater National Park). • Construction would not alter or reduce flow where there are existing or potential Oxleyan Pygmy Perch populations (primarily within Sections 7, 8 and 9) which would negatively impact on this threatened species by draining the waterbodies. 		
Temporary and permanent waterway diversions/ crossings	B19	B24	<ul style="list-style-type: none"> • Where temporary access tracks are required over drainage lines with no flow, fords may be installed. 	Construction	All
	B20	B25	<ul style="list-style-type: none"> • Where possible, existing crossings will would be used. Where this is not feasible or reasonable, the temporary crossings will would be designed to minimise impacts on the existing aquatic ecology and water quality. 	Construction	All
		B26	<ul style="list-style-type: none"> • Where possible, temporary crossings will would be further investigated during detailed design including, location, type of structure, duration of need and rehabilitation process. 	Pre-construction	All
	B21	B27	<ul style="list-style-type: none"> • General Temporary waterway access track mitigation measures include have been provided below: <ul style="list-style-type: none"> • Installation and subsequent decommissioning of temporary crossings will would be undertaken outside of Oxleyan Pygmy Perch spawning seasons (October to December), where Oxleyan Pygmy Perch have been confirmed. • Temporary crossings will would be constructed from clean fill using pipe or box culvert cells to carry flows. • All temporary works (eg crossings, flow diversion barriers) will would be removed as soon as practicable and in a way that does not promote future channel erosion. • The preferred temporary structure for crossing waterways will would be consistent with Witheridge (2002) where the use of bridges is the preferred structure for Class 1 (major fish habitat waterways). • Scour protection works will would be established at temporary crossings as required. • At the completion of construction, the temporary crossings will would be removed and rehabilitated. 	Construction	All
Fish translocation	B22	B28	<ul style="list-style-type: none"> • Fish that become stranded due to temporary access crossings or construction of temporary or permanent creek diversions must be captured and translocated following the Department of Primary Industries Fisheries Guidelines – A Guide to Acceptable Procedures and Practices for Aquaculture and Fisheries Research. General mitigation measures include: 	Construction	All

Issue	ID number	Previous number	Mitigation <i>Environmental management measure</i>	Timing	Relevant section
			<ul style="list-style-type: none"> • Fish to be captured from the creek using appropriate gear for the watercourse and species present. These methods may include electrofishing, seine nets, bait and fyke traps. • Threatened fish species are unlikely to occur within Picaninny Creek, however, translocation would be done in the cooler months to minimise stress to the fish (as fish are less active in the cooler months). • Captured fish to be handled, transported and released in a manner that minimises any damage and stress to the fish (such as handling the fish with wet hands). • Fish would be released into an equivalent watercourse with similar water quality and habitat conditions. • The capture of fish for translocation would require a Fisheries Permit and Animal Ethics Approval. 		
Pre-clearing surveys	B23	B29	<ul style="list-style-type: none"> • The pre-clearing process will be consistent with Roads and Maritime Biodiversity Guidelines: Protecting and Managing Biodiversity on RTA projects (RTA, 2011a) and include: <ul style="list-style-type: none"> • Pre-clearing surveys by an experienced ecologist to identify the location and extent of important habitats in the construction footprint to be salvaged for reuse/relocation, such as bushrock, hollow trees and woody debris. • Pre-clearing surveys by an experienced ecologist for large bird nests, particularly for listed species such as the Black-necked Stork, Eastern Osprey, Square-tailed Kite and Little Eagle during the nesting and breeding season (July to December) and tree roosting (eg Southern Myotis) or cave dwelling bats in trees or existing culvert/bridge structures. If the species is present in or directly adjacent to the project footprint (including ancillary facilities), measures to manage any species including buffer and exclusion zones, translocation of nests or establishment of adjacent nesting platforms would be considered, if required. • Habitat features to be protected during construction, would be identified and marked on-site by a qualified ecologist. • Checking for threatened flora and fauna species immediately before clearing begins. This includes a targeted survey for threatened flora during the appropriate season and a survey of any bridges or culverts to be removed to search for roosting bats. • Identifying and marking on-site any exclusion zones. • Identifying nearby habitats on both sides of the existing highway along the length of the proposal suitable for the release of fauna that may be encountered during the pre-clearing process or habitat removal. • Mapping the location of any threatened flora and/or fauna species, Threatened Ecological Communities and habitat. • Developing an unexpected threatened species finds procedure to be included in the CEMP as outlined in the Roads and Maritime Biodiversity Guidelines (RTA, 2011a). 	Pre-construction and construction	All

Issue	ID number	Previous number	Mitigation <i>Environmental management measure</i>	Timing	Relevant section
			<ul style="list-style-type: none"> No parking of vehicles and/or machinery and storage of equipment and resources under the dripline of any trees. Construction traffic would will be restricted to defined access tracks, fenced prior to the start of construction and maintained until construction is complete. 		
Exclusion zones	B24	B30	<ul style="list-style-type: none"> The location of exclusion zones will would will be identified, with temporary fencing or flagging tape to indicate the limits of clearing (in accordance with the Roads and Maritime Biodiversity Guidelines (RTA, 2011a)). Permanent fauna exclusion fencing for the project (as described in the Connectivity Strategy), where reasonable and feasible, will would will be installed prior to clearing and can function as exclusion fencing. 	Construction	All
Staged removal process	B25	B31	<ul style="list-style-type: none"> A staged habitat removal process will would will be implemented consistent with the Roads and Maritime Biodiversity Guidelines (RTA, 2011a). and involve the following steps: Contact vet and/or wildlife carers to ensure they are willing to assist in treating injured animals if necessary. An experienced and licensed wildlife carer and/or ecologist would be present during all habitat removal activities to capture and relocate any encountered fauna. Remove non-habitat vegetation first. Identified habitat (eg hollow bearing trees) would be left for at least 24 hours after removing non-habitat vegetation to allow fauna to escape. Remove habitat trees as carefully as possible to avoid injury to any fauna still remaining in trees. An experienced and licensed wildlife carer and/or ecologist would inspect habitat once it is removed. All hollows would be placed in adjacent habitat until the following day for further inspection by a licensed wildlife carer and/or ecologist to verify no fauna is present. If possible, the hollows would be permanently relocated in adjacent areas in accordance with the Roads and Maritime Biodiversity Guidelines (RTA, 2011a). Outcomes of the clearing process would be recorded to relevant personnel (eg environment manager or Roads and Maritime regional environment staff). 	Construction	All
Re-use of woody debris and bushrock	B26	B32	<ul style="list-style-type: none"> Woody debris and bushrock will would will be re-used on site for habitat improvement where possible and will would will be detailed in the landscape management plan in accordance with the Roads and Maritime Biodiversity Guidelines (RTA, 2011a). and include: Implementing the removal, stockpiling, transportation and relocation of woody debris and/or bushrock in a manner that minimises disturbance to native vegetation or bushrock. Engaging an ecologist in the pre-clearing phase of the proposal to provide advice on the re-use of woody debris and bushrock including potential negative impacts and positioning of woody debris 	Construction	All

Issue	ID number	Previous number	Mitigation <i>Environmental management measure</i>	Timing	Relevant section
			<ul style="list-style-type: none"> and bushrock at the relocation areas. When relocating woody debris, placing it evenly across the site whilst keeping topsoil disturbance to a minimum. Avoiding the spread of any weeds or pathogens that may be in the soil when relocating woody debris and bushrock from stockpiles. Mulching would include only native vegetation and separate stockpiles need to be established for weedy vegetation and the native vegetation to be mulched. Manage stockpiles in accordance with RTA's Stockpile Site Management Guideline, RTA Environmental Protection (Management System) QA Specification C36 and RTA Vegetation QA Specification R178. Preparing a mulch tannin management plan for the project where tannins are likely to be generated. 		
Weed management	B27	B33	<ul style="list-style-type: none"> A weed management plan will would be developed as part of the CEMP, in accordance with the Roads and Maritime Biodiversity Guidelines (RTA, 2011a) and the Introductory Weed Management Manual (Richards, 2004). and would include: <ul style="list-style-type: none"> Taxa and potential sources of the weed species (including alligator weed, tropical soda apple and myrtle rust). Weed management priorities and objectives. Sensitive environmental areas within or adjacent to the site. Location of weed infested areas. Mechanical weed control methods such as slashing or mowing, as well as a range of herbicides to avoid the development of herbicide resistance. Measures to prevent the spread of weeds. A monitoring program to measure the success of weed management. Strategic management with adjacent landowners. Appropriate disposal of weed infested materials and soils to be identified in the CEMP. Communication strategies to improve contractor awareness of weeds and weed management. 	Pre-construction and construction	All
	B28	B34	<ul style="list-style-type: none"> A site assessment by an ecologist or person trained in weed identification will would be undertaken to identify the presence and extent of Alligator weed. If present, management measures in the Weed Management Plan will would be in accordance with the Department of Primary Industries Alligator Weed control manual (van Oosterhout, 2007). 	Pre-construction	7-10
Pathogen management	B29	B35	<ul style="list-style-type: none"> Measures to prevent the introduction and/or spread of pests and disease causing agents such as bacteria and fungi will would be incorporated into the CEMP, in accordance with the Roads and Maritime Biodiversity Guidelines (RTA, 2011a). and would include: 	Pre-construction and	All

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			<ul style="list-style-type: none"> A background search of government-maintained websites for the most up-to-date hygiene protocols for each pathogen. Provide vehicle and boot wash down facilities and ensure vehicles and footwear is free of soil before entering or exiting the site. The risk of spreading pathogens and the mitigation measures required on site should be regularly communicated to staff and contractors during inductions and toolbox talks. Construction works would be programmed to move from uninfected areas to any known infected areas. Restrict vehicles to designated tracks, trails and parking areas. 	construction	
	B30	B36	<ul style="list-style-type: none"> If pathogens are identified on site: <ul style="list-style-type: none"> Testing may be required to confirm the presence of pathogens. Advice from government departments would be sought on practical hygiene management measures. Fenced exclusion zones would be identified to restrict access into contaminated areas. 	Construction	All
Nest boxes	B31	B37	<ul style="list-style-type: none"> Nest boxes would be installed as per Roads and Maritime Biodiversity Guidelines (RTA, 2011a) and a nest box strategy developed as part of the CEMP, detailing: <ul style="list-style-type: none"> The number and type of nest boxes required based on the number, quality and size of the hollows that would be removed. Specifications for nest box dimensions, installation requirements, locations of nest boxes and ongoing monitoring and maintenance. Installation timeframes, including the installation of 70 % of nest boxes prior to the removal of any vegetation <i>in the vicinity of the hollows.</i> 	Pre-construction and construction	All
Fauna handling	B32	B38	<ul style="list-style-type: none"> To prevent injury and mortality of fauna during the clearing of vegetation and drainage of farm dams, an experienced and licensed wildlife carer and/or ecologist <i>will</i> be present to <i>supervise</i> vegetation clearing and capture and relocate fauna where required. Further details regarding fauna handling and vegetation clearing procedures are provided in the Roads and Maritime Biodiversity Guidelines (RTA, 2011a). The following would be implemented to avoid injury and fauna mortality: <ul style="list-style-type: none"> Allow fauna to leave an area without intervention as much as possible. In circumstances where the handling of fauna is completely unavoidable, best practice methods need to be followed as outlined in the Roads and Maritime Biodiversity Guidelines – Guide 9 Fauna Handling (RTA 2011). Include the procedures in project inductions for construction staff to implement if fauna is found or injured on site and also the importance of not feeding any wildlife that may be encountered on construction sites. 	Construction	All

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			<ul style="list-style-type: none"> Never deliberately kill a snake as all snakes are protected under the NSW National Parks and Wildlife Act 1974. Keep records of fauna captured and relocated. Report any injury to or death of a threatened species to the Roads and Maritime environmental staff. 		
Riparian and aquatic habitat management	B33	B39	<ul style="list-style-type: none"> Prior to any disturbance of waterway banks, a thorough inspection by a qualified ecologist will would be undertaken for aquatic fauna such as turtle nests. 	Construction	All
	B34	B40	<ul style="list-style-type: none"> Where possible, streams will be crossed perpendicular to flow, with and where possible crossing sites selected to avoid unstable banks, bends in the channel, deep pools and confluences with other channels. 	Pre-construction	All
		B41	<ul style="list-style-type: none"> Scour protection will would be provided on any constructed works and temporary and permanent crossing structures within 50 m metres of Class 1 waterways or within the range of the Oxleyan Pygmy Perch as identified in section 3.9.6 of the Working paper – Biodiversity. 	Construction	All
	B35	B42	<ul style="list-style-type: none"> The bed and banks are to be reinstated to a condition similar to or better than the original condition ensuring that there are no adverse impacts on the aquatic values (different measures may be required for each crossing) and where feasible and reasonable, avoid impacts on geomorphic processes. Banks are to be graded to a slope that is no steeper than existing site conditions 	Construction	All
		B43	<ul style="list-style-type: none"> The reinstatement process would need to ensure that there is no detrimental impact on geomorphic processes which in turn impacts aquatic values. 	Construction	All
	B36	B44	<ul style="list-style-type: none"> All construction materials used for permanent watercourse crossings (rocks and gravel) are to be free of fine particles washed prior to being used for construction to minimise turbidity. 	Construction	All
	B37	B45	<ul style="list-style-type: none"> Instream and riparian disturbance will would be minimised and sediment, woody snags or debris removed from a stream or stream channel will would be minimised. Trimming or 'lopping' of branches and logs will would be considered as a first option before moving. 	Construction	All
	B38	B46	<ul style="list-style-type: none"> Any instream woody debris removed during construction will would be replaced at the completion of the works within the same waterways from which it was removed, where feasible and reasonable. 	Construction	All
		B47	<ul style="list-style-type: none"> A vegetation clearing strategy and a revegetation management strategy will would be developed and implemented, where feasible and reasonable. 	Construction	All
	B48	<ul style="list-style-type: none"> Avoid in-stream works on known and potential habitat (as identified in section 3.9.6 of the Working paper – Biodiversity and the Supplementary Biodiversity Report) for Oxleyan Pygmy Perch or Purple 	Construction	All	

Issue	ID number	Previous number	Mitigation <i>Environmental management measure</i>	Timing	Relevant section
			spotted Gudgeon to minimise sedimentation impacts. In stream works will should be timed as far as practicable in a manner that minimises impacts to aquatic fauna. The in-stream construction works are to should avoid the critical spring-summer period (October—December) where feasible and reasonable, as this represents the typical water temperatures between 19-34°C and high rainfall period when aquatic habitats are flowing and the spawning season for many fish species including the Oxleyan Pygmy Perch and Purple-spotted Gudgeon.		
	B39	B49	<ul style="list-style-type: none"> Where feasible and reasonable <i>within the road corridor</i>, existing pools will would be retained upstream and downstream of crossings within known <i>habitat</i> of the Oxleyan Pygmy Perch to provide resting and refuge habitat near crossing structures.. 	Construction	1,2,7,8, and 9 4 to 6 to 10.
	B40	B50	<ul style="list-style-type: none"> Appropriate plant species will would be incorporated into the rehabilitation of disturbed aquatic habitats and drains as a result of construction, in regions of suitable Oxleyan Pygmy Perch habitat. 	Construction	All
	B41	B51	<ul style="list-style-type: none"> All construction sediment and erosion control measures will would be put in place during the construction process and may include sediment and erosion control curtains in the waterways to control turbidity generated during the construction and restoration process. 	Construction	All
	B42	B52	<ul style="list-style-type: none"> No turbid water generated from the construction corridor or construction area is to be discharged to any waterway <i>unless in accordance with relevant Environment Protection Licence conditions and developed in consultation with Environment Protection Agency and Department of Primary Industries (Fisheries).</i> 	Construction	All
		B53	<ul style="list-style-type: none"> The proposed road surface <i>will</i> would drain away from known Oxleyan Pygmy Perch habitat to reduce potential for pollution. 	Pre-construction, construction and operation	1 to 4 and 6 to 10.
	B43		<ul style="list-style-type: none"> <i>No in stream work will occur in known Oxleyan Pygmy Perch habitat during the Oxleyan Pygmy Perch spawning season (October to December inclusive) or within 24 hours of the commencement of any rainfall event (>10 millimetres).</i> 	Construction	1,2,7,8, and 9 4 to 6 to 10.
Water quality	B44	B54	<ul style="list-style-type: none"> Operational spill basins are to be installed at key locations ie near Broadwater National Park and other key drainage lines that lead directly into threatened fish habitat. 	Operation	All
	B45	B55	<ul style="list-style-type: none"> Chemicals and fuels will would be appropriately stored and bunded, away from waterways and drainage lines. 	Construction	All
	B46	B56	<ul style="list-style-type: none"> Discharges from sediment basins and/or treatment wetlands <i>located in Oxleyan Pygmy Perch</i> 	Construction	1,2,7,8,

Issue	ID number	Previous number	Mitigation <i>Environmental management measure</i>	Timing	Relevant section
			<p><i>habitat</i> that do not meet the water quality parameters for Oxleyan Pygmy Perch habitat (to be determined through pre-construction water quality monitoring) <i>will</i> not be discharged <i>directly</i> into waterways, <i>with other methods or uses employed to discharge. This could include, but not be limited to:</i></p> <ul style="list-style-type: none"> <i>Spraying onto</i> but rather sprayed into adjacent open grass areas or used for construction purposes such as dust suppression to avoid changing water depth and physio-chemical conditions in potential threatened fish habitat. <i>Treating the water to ensure the pH is between 5.0 and 6.5 and total suspended solids of less than 50 mg/L, before discharging, depending on environmental protection licensing requirements.</i> 		<i>and 9</i> to 4 and 6 to 10.
		B57	<ul style="list-style-type: none"> If not reasonable and feasible, to irrigate land to completely re-use water from sedimentation basins during construction in Oxleyan Pygmy Perch habitat, as a last resort, water could be discharged to waterways after treatment (to ensure the pH less than 6.5 and total suspended solids of less than 50 mg/L) depending on environmental protection licensing requirements. 	Construction	1 to 4 and 6 to 10.
	B47	B58	<ul style="list-style-type: none"> Water quality monitoring <i>will</i> be undertaken to assess the effectiveness of (and where necessary amend) water, sediment and erosion management strategies that aim to protect <i>native fish species</i> the Oxleyan Pygmy Perch and Purple-spotted Gudgeon, their habitat and other aquatic flora and fauna species. Water quality monitoring program would be undertaken in line with details in Appendix B of the Working paper – Biodiversity. 	Construction	All 4 to 4 and 6 to 10.
Stockpile and ancillary facilities management	B48	B59	<ul style="list-style-type: none"> <i>Where feasible and reasonable</i>, stockpiles <i>will</i> be located above the 1:100 year flood level with appropriate management control measures in place such as bunding. 	Construction	All
	B49	B60	<ul style="list-style-type: none"> <i>Specific management measures will be implemented to limit impacts from</i> stockpiling of material for bridgeworks at known <i>and potential</i> areas of Oxleyan Pygmy Perch <i>during</i> the would be undertaken after April to avoid the <i>spawning</i> breeding seasons of October to December March. 	Construction	<i>1,2,7,8, and 9</i> to 4 and 6 to 10.
	B50	B61	<ul style="list-style-type: none"> Batch plants <i>will</i> be located <i>at least 300 metres</i> outside well-away from Oxleyan Pygmy Perch habitat where sediment erosion would not runoff into waterways (due to the risk of high alkaline runoff). 	Construction	<i>1,2,7,8, and 9</i> to 4 and 6 to 10.
	B51	B62	<ul style="list-style-type: none"> Ancillary facilities <i>will be located</i> would be sensitively location are to be sited in cleared or sparsely treed portions of the ancillary facility sites, where feasible and reasonable <i>and avoid unnecessary clearing of native vegetation.</i> 	Pre-construction and construction	All

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	B52a		<ul style="list-style-type: none"> <i>Ancillary facility - Section 2 site 1a:</i> <ul style="list-style-type: none"> <i>Flag and avoid hollow bearing trees</i> <i>Revegetation of the section of the site in the road reserve or the entire site (if practicable).</i> 	<i>Construction</i>	<i>2</i>
	B52b		<ul style="list-style-type: none"> <i>Ancillary facility - Section 2 site 5a:</i> <ul style="list-style-type: none"> <i>Avoid isolated trees and flag and avoid hollow bearing trees where possible. Site to remain cleared to benefit emus.</i> 	<i>Construction</i>	<i>2</i>
	B52c		<ul style="list-style-type: none"> <i>Section 2 site 6a and 6b:</i> <ul style="list-style-type: none"> <i>Site to remain clear (not vegetated) to benefit emus.</i> 	Construction	2
	B52d		<ul style="list-style-type: none"> <i>Section 3 Site 1:</i> <ul style="list-style-type: none"> <i>This compound site that was used for the Glenugie Upgrade and has been revegetated post-construction. A site inspection and survey is required prior to construction to determine its suitability for future use as an ancillary site.</i> <i>Avoid mature trees.</i> <i>Revegetation of the section of the site in the road reserve or the entire site (if practicable).</i> 	Construction	3
	B52e		<ul style="list-style-type: none"> <i>Ancillary facility - Section 3 Site 2:</i> <ul style="list-style-type: none"> <i>Provide a buffer of 50 metres minimum from creek and sediment fencing where required.</i> <i>Avoid mature trees.</i> <i>Revegetation of the section of the site in the road reserve or the entire site (if practicable).</i> 	<i>Construction</i>	<i>3</i>
	B52f		<ul style="list-style-type: none"> <i>Ancillary facility - Section 3 Site 4:</i> <ul style="list-style-type: none"> <i>Ancillary site to be restricted to the western parts of the site adjoining Wooli Road.</i> <i>Vegetation in the road reserve along Wooli Road to be protected from disturbance.</i> <i>The population of the Slender Screw Fern plants is to be avoided.</i> <i>Existing trails or disturbed areas to be used for access to site. Bostock Road not to be used for access.</i> 	<i>Construction</i>	<i>3</i>
	B52g		<ul style="list-style-type: none"> <i>Ancillary facility - Section 3 Site 8:</i> <ul style="list-style-type: none"> <i>Identify and mark Angophora robur during pre-clearing and provide exclusion fencing.</i> 	<i>Construction</i>	<i>3</i>

Issue	ID number	Previous number	Mitigation <i>Environmental management measure</i>	Timing	Relevant section
	B52i		<ul style="list-style-type: none"> Ancillary facility - Section 3 Site 9: <ul style="list-style-type: none"> Provide buffer to the surrounding forest. Identify and mark <i>Angophora robur</i> during pre-clearing and provide exclusion fencing Provide sediment fencing on eastern boundary where required. Avoid and buffer koala feed trees in the northwest corner of the site. Buffer required from edge of the forest to reduce edge effects, sediment fencing where required. 	Construction	3
	B52j		<ul style="list-style-type: none"> Ancillary facility - Section 5 Site 6: <ul style="list-style-type: none"> Consult with OEHL on future use of this site post-construction, which may have offset potential with assisted regeneration and could be considered as a potential addition to Mororo Creek Nature Reserve Flag and buffer habitat patch on southern boundary. 	Construction	5
	B52k		<ul style="list-style-type: none"> Ancillary facility - Section 5 Additional site 9: <ul style="list-style-type: none"> Provide buffer around Mororo Creek and sediment fencing to protect riparian areas Flag and buffer habitat patch on southern boundary 	Construction	5
	B52l		<ul style="list-style-type: none"> Ancillary facility - Section 6 Site 3a and 3b: <ul style="list-style-type: none"> Mark and avoid small dam in north-west corner of site and buffer activities from a large remnant patch adjoining to the north. Avoid scattered mature trees where possible. 	Construction	6
	B52m		<ul style="list-style-type: none"> Section 6 site 5: <ul style="list-style-type: none"> Site is currently being used as a compound site for the Devils Pulpit upgrade. On completion of construction for that project, the site would be stabilised with a quick growing cover crop to stabilise the site. A site inspection and survey is required prior to construction to confirm the suitability of the site. Site to be rehabilitated post- construction. 	Pre-construction, construction	6
	B52n		<ul style="list-style-type: none"> Ancillary facility - Section 7 Site 1: <ul style="list-style-type: none"> To be used for only low risk activities, no chemical or fuel storage on site. 	Construction	7
	B52o		<ul style="list-style-type: none"> Ancillary facility - Section 7 Site 2a and 2b: <ul style="list-style-type: none"> To be used for only low risk activities, no chemical or fuel storage on site. 	Construction	7
	B52p		<ul style="list-style-type: none"> Ancillary facility - Section 7 site 3: <ul style="list-style-type: none"> Provide sediment fencing along eastern boundary. 	Construction	7

Issue	ID number	Previous number	Mitigation <i>Environmental management measure</i>	Timing	Relevant section
	B52q		<ul style="list-style-type: none"> <i>Ancillary facility - Section 7 Site 4:</i> <ul style="list-style-type: none"> <i>Provide buffer of minimum 50 metres from the wetland on northern boundary and sediment fencing where required. Avoid tree removal where possible</i> 	<i>Construction</i>	<i>7</i>
	B52r		<ul style="list-style-type: none"> <i>Ancillary facility - Section 8 Site 2a, 2b and 2c:</i> <ul style="list-style-type: none"> <i>Recommend use for stockpile only, no chemical or fuel storage on site.</i> 	<i>Construction</i>	<i>8</i>
	B52s		<ul style="list-style-type: none"> <i>Ancillary facility - Section 8 Site 3:</i> <ul style="list-style-type: none"> <i>Provide bunding around the site. No chemical storage.</i> 	<i>Construction</i>	<i>8</i>
	B52t		<ul style="list-style-type: none"> <i>Ancillary facility - Section 9 Site 1:</i> <ul style="list-style-type: none"> <i>Provide buffer and sediment fencing at southern end.</i> <i>Provide sediment fencing at southern end of site, stockpiling only at northern half, no chemical storage</i> 	<i>Construction</i>	<i>9</i>
	B52u		<ul style="list-style-type: none"> <i>Ancillary facility - Section 9 site 2:</i> <ul style="list-style-type: none"> <i>Provide sediment fencing at southern end of site, stockpiling only at northern half, no chemical storage</i> 	<i>Construction</i>	<i>9</i>
	B52v		<ul style="list-style-type: none"> <i>Ancillary facility - Section 9 site 3:</i> <ul style="list-style-type: none"> <i>Provide sediment fencing at southern end of site, stockpiling only at northern half, no chemical storage</i> 	<i>Construction</i>	<i>9</i>
	B52w		<ul style="list-style-type: none"> <i>Ancillary facility - Section 10 site 1b:</i> <ul style="list-style-type: none"> <i>Revegetation of the section of the site in the road reserve or the entire site (if practicable).</i> 	<i>Construction</i>	<i>10</i>
	B52x		<ul style="list-style-type: none"> <i>Ancillary facility - Section 10 site 3b:</i> <ul style="list-style-type: none"> <i>Map and avoid strip of trees along northern boundary</i> 	<i>Construction</i>	<i>10</i>
	B52y		<ul style="list-style-type: none"> <i>Ancillary facility - Section 10 site 4:</i> <ul style="list-style-type: none"> Revegetate site post-construction, focus on approaches to land bridge and avoid <i>Arthraxon hispidus</i>. 	<i>Construction</i>	<i>10</i>
		B63	Stockpiles would be managed in accordance with RTA's Stockpile Site Management Guideline.	Construction	All
Slender Screw Fern	B53	B64	<ul style="list-style-type: none"> The project boundary <i>footprint</i> in section 1 <i>will</i> be reviewed to identify any opportunities to avoid significant impacts to the existing population. 	Pre-construction	1
	B54	B65	<ul style="list-style-type: none"> The project boundary <i>footprint</i> and placement of sedimentation basins <i>will</i> be evaluated to 	Pre-	6

Issue	ID number	Previous number	Mitigation <i>Environmental management measure</i>	Timing	Relevant section
			minimise impacts to Slender Screw Fern.	construction	
Biodiversity Offset Strategy	B55	B66	<ul style="list-style-type: none"> The Biodiversity Offset Strategy (detailed in Appendix C of the Working paper – Biodiversity) will would be further developed further, in consultation with relevant State and Commonwealth agencies, and implemented during detailed design. 	Pre-construction	All
Interchange at Wardell	B56	B67	<ul style="list-style-type: none"> Street lighting on the western roundabout at the interchange at Wardell, would be designed to reduce light spill during detailed design. This could include using deflection shields around the lights or using a UV light, with reduced UV light emissions. 	Pre-construction	10
	B57	B68	<ul style="list-style-type: none"> Further investigation will be undertaken of the road runoff capture and storage to the east side of the existing Pacific Highway between station 158.2 and 159.4 to protect remaining in situ aquatic habitats south of Laws Road. 	Pre-construction	11
	B58	B69	<ul style="list-style-type: none"> Roads and Maritime owned land surrounding the dedicated landbridge at station 156.0 would be revegetated in accordance with the connectivity strategy and the landscape management plan. 	Construction	10
Impacts to Lang Hill	B59	B70	<ul style="list-style-type: none"> The Lang Hill Environmental Management Work Statement would be further developed and implemented during the use and rehabilitation of the borrow site. 	Pre-construction and construction	8
	B60	B71	<ul style="list-style-type: none"> The creekline on the ‘Lang Hill’ property will should be fenced off from cattle and the vegetation allowed to regenerate to improve the habitat conditions downstream. 	Construction and operation	8
Maundia triglochinos	B61	B72	<ul style="list-style-type: none"> Detailed design will investigate measures to reduce impacts to Maundia triglochinos: <ul style="list-style-type: none"> near Redbank Creek (population 14). near North of New Italy (population 12). 	Pre-construction	1 and 7
Urban design and landscape					
Noise wall visual impacts	UD1	UD1	<ul style="list-style-type: none"> If further noise modelling undertaken during detailed design identifies that noise walls are would be required, further visual assessment will be required to address the visual implications of the change. Their location and design will would be in accordance with the Noise Wall Design Guideline (RTA, 2007) and the principles identified in Working Paper – Urban design, Landscape Character and Visual Impact (Section 4.6.3). 	Pre-construction	All
Clarence River and Richmond River bridge	UD2	UD2	<ul style="list-style-type: none"> Changes to if the design of the Clarence and Richmond rivers bridges changes from the structures identified and assessed in this EIS, will require further visual assessment would be required, including assessment of any shadowing impacts. Any changes will would consider the principles 	Pre-construction	5, 9 and 10

Issue	ID number	Previous number	Mitigation <i>Environmental management measure</i>	Timing	Relevant section
impacts			identified in Working Paper – Urban design, Landscape Character and Visual Impact (Section 4.6.2), <i>the performance criteria outlined in Chapter 5 of the EIS and funding arrangements.</i>		
Landscaping and planting strategy	UD3	UD3	<ul style="list-style-type: none"> The project will would be carried out in accordance with the urban design and landscaping strategy, as identified in Section 11.4.1 of this EIS. It will would be further developed into a Detailed landscape design for all project batters, and median planting areas will be developed in accordance with the Landscape Guidelines (RTA, 2008), the requirements of the Working Paper – Biodiversity (Section 5.2.2) and the landscape strategy to provide a robust, successful and effective planting design. 	Pre-construction	All
		UD4	<ul style="list-style-type: none"> Mitigation measures identified to mitigate visual impacts to viewpoints will would be implemented as per the Working Paper – Urban Design, Landscape Character and Visual Impact (Section 4) and the urban design and landscape strategy. 	Pre-construction and construction	All
Design of urban design features and road furniture	UD4	UD5	<ul style="list-style-type: none"> The built form of the project, including consideration of the height, bulk, scale, materials and finishes for: <ul style="list-style-type: none"> Bridges. Retaining walls. Cuttings and embankments. Road barriers. Signage. Fences. Clear zones. Topsoil management. Water quality control ponds. Fauna crossing. Place marking and cultural plantings. <p>The project will Would be designed in accordance with the design principles identified in Working Paper – Urban Design, Landscape Character and Visual Impact, and relevant Roads and Maritime guidelines, including Beyond the Pavement (RTA, 2009a), Pacific Highway Urban Design Framework (RTA, 2005) and Bridge Aesthetic Guidelines (Roads and Maritime, 2012).</p>	Pre-construction	All
Shadowing	UD5	UD6	<ul style="list-style-type: none"> Further assessment will would be undertaken of the impact of overshadowing on areas surrounding the project, particularly around Harwood Bridge, interchanges and overpasses near residential properties. 	Pre-construction	All

Issue	ID number	Previous number	Mitigation <i>Environmental management measure</i>	Timing	Relevant section
Visual impacts from viewpoints	UD6	UD7	<ul style="list-style-type: none"> Measures to mitigate visual impacts to viewpoints will would be implemented, as identified in Table 11-42 and Working Paper – Urban Design, Landscape Character and Visual Impact. If any further viewpoints were identified during detailed design that would have a moderate–high or high impact, screen planting would also be considered. 	Construction	All
Construction visual impacts	UD7	UD8	<ul style="list-style-type: none"> Disturbed areas will would be progressively revegetated throughout the construction period. 	Construction	All
Visual impacts of ancillary facilities	UD8	UD9	<ul style="list-style-type: none"> Where required, typical landscape treatments for ancillary facilities in forest areas will would include: <ul style="list-style-type: none"> Providing screen planting at ancillary facility locations to minimise visual impact and disturbance. Considering reinstatement of disturbed forest in heavily forested areas to ensure existing ecological corridors are maintained. Considering the importance of the visual landscape at each ancillary facility location and allowing restoration of important forest vegetation to prominent ridge lines or other landscape elements as appropriate where feasible and reasonable. Negotiating with private landowners, as applicable, to determine future treatments for other non-forested ancillary facility locations. Regrading disturbed areas to achieve a sustainable and functional landform. Stabilising all surfaces in accordance with good engineering and environmental practice. 	Construction	All
Visual impacts of ancillary facilities	UD9	UD10	<ul style="list-style-type: none"> Typical landscape treatments for ancillary facilities in agricultural areas will would include: <ul style="list-style-type: none"> Considering returning remnant agricultural land to agricultural uses. Providing screen planting to ancillary facility locations to minimise visual impact and disturbance. Reinstating 'fingers' of riparian vegetation through ancillary facilities, where practicable, in the open landscape. Considering the visual landscape at each ancillary facility and considering restoration of important forest vegetation to prominent ridge lines or other landscape elements as appropriate where feasible and reasonable. Regrading disturbed areas to achieve a sustainable and functional landform. Stabilising all surfaces in accordance with good engineering and environmental practice. 	Construction	All
Visual impact of borrow sites Lang Hill and Lumleys hill material source	UD10	UD11	<ul style="list-style-type: none"> The extent of excavation and the landscaping strategy at Lang Hill and Lumleys Hill will would be reviewed considering material requirements on the project and the visual impact on the resultant cuttings. 	Pre-construction	All Section 8 and 10
	UD11	UD11a	<ul style="list-style-type: none"> Any backfilling of the Lang Hill and West of Wardell borrow sites will be undertaken with 	Construction	Section 8

Issue	ID number	Previous number	Mitigation <i>Environmental management measure</i>	Timing	Relevant section
			<i>available surplus material from the project. Rehabilitation of the sites will be undertaken in accordance of the landscape strategy (UD3), design principles (UD5) and the intended future land use of the sites.</i>		and 10
	UD12	UD11b	<ul style="list-style-type: none"> <i>Any backfilling of the Eaton and Gibson borrow sites will be undertaken with available surplus material from the project. Landscaping on the site would use indigenous species, including those species suitable for Koala. The landscaping will connect to the existing vegetation to the east of the project by a fauna land bridge to be constructed at station 147.6. Rehabilitation of the sites will be undertaken in accordance of the landscape strategy (UD3) and design principles (UD5).</i> 	Construction	Section 10
Monitoring of landscaping and rehabilitation	UD13	UD12	<ul style="list-style-type: none"> Landscape and rehabilitation works will <i>would</i> be monitored and remedial measures implemented where required until vegetation has stabilised. 	Operation	All
Earth mounds	UD14	UD13	<ul style="list-style-type: none"> Any earth mound design is to ensure that <i>The mounding profile of any earth mound will blend suitably into the existing landscape setting. Any mounding to be landscaped will should be compacted in 1.5 metre layers with 1:3 maximum batter slopes where reasonable in consideration of constraints within the project corridor. Where feasible and reasonable, permanent mounds will would be treated with ameliorants and overlaid with topsoil to minimum 150 millimetres to ensure suitable planting conditions are achieved.</i> 	Construction	All
		UD14	<ul style="list-style-type: none"> Where mounding batters is to be steeper than 1:3, treatments such as the use of gabions or retaining walls should be considered. 	Construction	All
Aboriginal heritage					
General impacts to Aboriginal archaeological sites	AH1	AH1	<ul style="list-style-type: none"> Where artefact concentrations per square metre (over all depths) encountered are 50 per cent greater than previously encountered, additional salvage excavation using hand tools will <i>would</i> be undertaken. If these artefact concentrations are encountered during machine excavation, then machine excavation will <i>would</i> stop within 20 metres of the artefact concentrations. Up to, but no more than, an additional six square metres will <i>would</i> be excavated in this situation at that site, unless rare features are encountered, in which case discussions with the registered Aboriginal stakeholders and NSW Office of Environment and Heritage will <i>would</i> be undertaken to agree on a suitable approach. 	Pre-construction and construction	All
	AH2	AH2	<ul style="list-style-type: none"> For areas avoided by construction, exclusion zones will <i>would</i> be put in place to ensure archaeological deposits are not incidentally damaged. These would be fenced with <i>high visibility construction</i> parawebbing or some other similar fencing <i>and have a 'Do Not Enter' sign</i> that would exclude entry by people or plant to avoid incidental impacts on the site. <i>Exclusion zones will be marked on construction plans and be maintained until construction is completed. A</i> 	Construction	All

Issue	ID number	Previous number	Mitigation <i>Environmental management measure</i>	Timing	Relevant section
			<i>representative of the Local Aboriginal Land Council will be present during establishment of the fencing.</i>		
	AH3	AH2a	<ul style="list-style-type: none"> <i>If any part of the project (such as an ancillary facility) is located in an area which has not been subject to Aboriginal heritage field survey and assessment, an assessment will be undertaken before that part of the project proceeds.</i> 	Pre-construction	All
	AH4	AH3	<ul style="list-style-type: none"> Salvage excavation and systematic collection of previously recorded artefacts that will would be impacted by the project, along with any other impacted sites that are identified prior to or during construction, are to be undertaken by qualified archaeologists in conjunction with the registered Aboriginal stakeholders: <ul style="list-style-type: none"> The location of excavations will would be within the area of the site to be impacted, and would be decided upon in the field by a qualified archaeologist and registered Aboriginal stakeholders. If any datable material is located, a minimum of two samples (per archaeological site) will would be subject to either radiocarbon, standard or accelerated mass spectrometry dating. For all salvaged material, suitable storage will would be agreed upon with the registered Aboriginal stakeholders prior to commencing salvage in those areas. 	Construction	All
	AH5	AH4	<ul style="list-style-type: none"> Heritage evidence collected will be curated in an appropriate manner, as determined in consultation with the registered Aboriginal stakeholders and the NSW Office of Environment and Heritage and in accordance with the <i>National Parks and Wildlife Act 1974</i>, details of the material's nature and context will would also be provided. 	Construction and post-construction	All
	AH6	AH5	<ul style="list-style-type: none"> Preparation of a A detailed technical report documenting the results of the salvage excavations and the archaeological material analysis will be prepared. Development of A summary report (to be made public) will be developed to accompany the technical report. 	Construction and post-construction	All
	AH7	AH6	<ul style="list-style-type: none"> Lodgement of Site records will be lodged with NSW Office of Environment and Heritage for any previously unrecorded evidence that is identified and for any evidence that is salvaged. 	Construction and post-construction	All
	AH8	AH6a	<ul style="list-style-type: none"> <i>Aboriginal Site Impact Recording (ASIR) forms will be lodged with the Aboriginal Heritage Information Management Systems (AHIMS) Register within three months of sites being impacted.</i> 	Construction	All
Human skeletal remains	AH9	AH7	<ul style="list-style-type: none"> <i>An unexpected finds (including human skeletal remains) procedure will be developed</i> In the event that the project reveals possible human skeletal remains, the following procedure would be followed (in accordance with Roads and Maritime' Standard Management Procedures: Unexpected Archaeological Finds 2011-2012: <ul style="list-style-type: none"> As soon as remains are exposed, all construction would halt at that location immediately and the 	Construction	All

Issue	ID number	Previous number	Mitigation <i>Environmental management measure</i>	Timing	Relevant section
			<ul style="list-style-type: none"> on-site supervisor would be immediately notified to allow assessment and management. The on-site supervisor would notify the Environmental Representative, Roads and Maritime Project Manager and Roads and Maritime Senior Environmental Officer. Police, EPA (Environment Line on 131 555) and the Heritage Branch ((02) 9873 8500) would also be contacted. A physical or forensic anthropologist would inspect the remains in situ (organised by the police unless otherwise directed by the police) and make a determination of ancestry (Aboriginal or non-Aboriginal) and antiquity (pre-contact, historic or forensic). Should the remains be identified as a forensic matter (ie crime scene), liaison with the police would be undertaken. Should the remains be identified as Aboriginal, liaison with Roads and Maritime, the EPA, the Department of Planning and Infrastructure (DP&I) and registered Aboriginal stakeholders would be undertaken. Should the remains be identified as non-Aboriginal (historical), liaison with Roads and Maritime, the Heritage Branch and the DP&I would be undertaken. No construction is to recommence in the area until appropriate clearances have been given. 		
Aboriginal stakeholder consultation	AH10	AH8	<ul style="list-style-type: none"> Aboriginal focus group consultation (through letters or meetings), will occur at least once every six months, prior to and during construction (unless management actions have been completed). 	Pre-construction and construction	All
		AH9	<ul style="list-style-type: none"> Further consultation with the registered Aboriginal stakeholders in relation to the project to provide them with the opportunity to be involved in the ongoing management of the Aboriginal heritage resource within the project boundary. 	Construction and post-construction	All
Awareness of Aboriginal heritage	AH11	AH10	<ul style="list-style-type: none"> Aboriginal culture awareness training for all relevant staff and contractors will occur prior to commencing work on-site. This could include information about the Aboriginal culture and history of the locality, the location of sites and items that require protection and movement corridors nature of the identified and potential Aboriginal heritage evidence and cultural values within the project boundary, heritage management measures and protocols, and legal obligations. This service training will be developed in consultation with provided by suitably trained personnel from local Aboriginal organisations represented by the relevant registered stakeholders for that area. 	Pre-construction and construction	All
		AH11	<ul style="list-style-type: none"> Appropriate precautionary measures to avoid identified heritage evidence. This would include informing relevant staff and contractors of the nature and location of the items and the need to avoid impacts, and temporary protective fencing and signage. 	Pre-construction and construction	All
	AH12	AH12	<ul style="list-style-type: none"> Prepare a An Aboriginal heritage interpretation strategy will be prepared as part of the Aboriginal 	Pre-	All

Issue	ID number	Previous number	Mitigation <i>Environmental management measure</i>	Timing	Relevant section
			heritage management plan. This will identify how archaeological and cultural information can be sustainably communicated to different audiences, including the local Aboriginal community, the local general public and the broader group of people interested in Aboriginal heritage as part of the North Coast's history. Measures <i>will</i> would include opportunities for promoting salvage and investigation, the recovery of information, permanent installations and ways of marking the presence of Aboriginal people in the landscape, including, signage, interpretation products such as written materials, and through place naming.	construction and construction	
		AH13	<ul style="list-style-type: none"> Regular review of the Aboriginal heritage management plan to establish that it is functioning to the standard required. 	Pre-construction and construction	AH
	AH13	AH14	<ul style="list-style-type: none"> Compliance auditing of the cultural heritage management measures <i>will</i> would be undertaken <i>as part of the environmental management audit regime</i>. every three months during construction. 	Construction	All
Ancillary facilities		AH15	<ul style="list-style-type: none"> At all locations proposed for ancillary facilities and spoil placement that are situated outside the current boundary of the project: <ul style="list-style-type: none"> Before the commencement of the use of the ancillary facilities area for the project, field survey would be undertaken by a suitably qualified and experienced heritage consultant. Any Aboriginal heritage items identified would be assessed for their level of significance, and appropriate recommendations presented to Roads and Maritime for avoidance, harm minimisation and / or impact mitigation. Any investigation should be in accordance with the Due Diligence Code of Practice for the Protection of Aboriginal Objects in New South Wales (Office of Environment and Heritage 2010b), and have regard to the Code of Practice for Archaeological Investigations of Aboriginal Objects in NSW (DECCW 2010b), and Procedure for Aboriginal cultural heritage consultation and investigation (PACHCI), (Roads and Maritime, 2011). 	Pre-construction	AH
	AH14a	AH15a	<p>Ancillary facility - Section 1, Site 1a (at Taylors Run 2):</p> <ul style="list-style-type: none"> All previously recorded artefacts must be recovered and removed off-site, and passed to registered Aboriginal stakeholders for reburial or storage at a chosen location, subject to a care agreement being established. If the Aboriginal archaeological site is not to be impacted, an exclusion zone will be established as per management measure AH2. <p>Ancillary facility - Section 1, Site 1a (at Taylors Run 3):</p> <ul style="list-style-type: none"> Exclusion zones will be established as per management measure AH2. 	Pre-construction and construction	1

Issue	ID number	Previous number	Mitigation <i>Environmental management measure</i>	Timing	Relevant section
			<p><i>Ancillary facility - Section 1, Site 1a (at Taylors Run 1):</i></p> <ul style="list-style-type: none"> <i>The surface scatter portion of this Aboriginal archaeological site outside the proposed ancillary facility, will be avoided. An exclusion zone with a buffer of 15 metres of the surface artefact point will be established as per management measure AH2.</i> <i>Any ground disturbance impacts to the archaeological site in the ancillary facility, will require the top soil down to the sterile clay layer to be graded, stockpiled separately (within a portion of the ancillary facility area), and reinstated at the same area following completion of the activity.</i> <i>Any portions of the Aboriginal archaeological site not to be impacted will be protected by exclusion zones as per management measure AH2.</i> <p><i>Ancillary facility - Section 1, Site 1a (at WWC37 (22-1-0344)):</i></p> <ul style="list-style-type: none"> <i>Within the Aboriginal archaeological site in the boundary of the project, after salvage activities, but before any other ground disturbance, the top soil down to the sterile clay layer will be graded from the area, stockpiled separately and used in batters (not fill) of the road/bridge. This will be undertaken in consultation with the relevant registered Aboriginal stakeholders and will be engaged to direct this activity. In addition:</i> <ul style="list-style-type: none"> <i>The salvage to be excavated by machine is 30 % of the Aboriginal archaeological site.</i> <i>The older house nearest to the river within the Aboriginal archaeological site will be removed, with minimal ground disturbance, before salvage excavations being undertaken, so that this area may be targeted for a portion of the salvage.</i> <i>Their nominated site officers are present during removal of the plastic covering the blueberry bush rows, to identify artefacts on the surface under the plastic – an archaeologist will also be present to document finds.</i> <i>All cultural material recovered will be subject to detailed analysis, which will be included in a technical report, including detailed discussion and interpretation.</i> <i>Any portions of the Aboriginal archaeological site that are not to be impacted will be protected by exclusion zones as per management measure AH2.</i> 		
AH14b	AH15b		<p><i>Ancillary facility - Section 1, Site 1a, 1b (at WWC39 (22-1-0343)):</i></p> <ul style="list-style-type: none"> <i>If impact to WWC39 is necessary, salvage excavation of the portion of the Aboriginal archaeological site to be impacted will be undertaken as detailed in the Ancillary facility and design change CHAR (Appendix D of the Submissions/ Preferred Infrastructure Report) and in consultation with RAPs.</i> 	Pre-construction	1

Issue	ID number	Previous number	Mitigation <i>Environmental management measure</i>	Timing	Relevant section
			<ul style="list-style-type: none"> If impacts to the Aboriginal archaeological site are necessary, following archaeological salvage the top soil down to the sterile clay layer will be graded from the area, stockpiled separately and placed in batters. Where ground disturbance is not necessary, geotextile fabric and crushed rock or similar will be used to protect the ground from compaction. The area of the Aboriginal archaeological site not to be impacted will be protected by an exclusion zone as per management measure AH2. 		
AH14c	AH15c		<p>Ancillary facility - Section 1, Additional site 5:</p> <ul style="list-style-type: none"> Sub-surface test excavation will be undertaken prior to the use of the ancillary facility. This will be conducted in accordance with the methodology used in the working paper, and will occur several months before any ground disturbance in this location. Further recommendations for the Aboriginal archaeological site will then be made in consultation with the registered Aboriginal stakeholders. 	Pre-construction	1
AH14d	AH15d		<p>Ancillary facility - Section 2, Site 1b (at Lemon Tree Road 1 (13-4-0180)):</p> <ul style="list-style-type: none"> An exclusion zone will be established around this Aboriginal site as per management measure AH2. 	Construction	2
AH14e	AH15e		<p>Ancillary facility - Section 2, Site 3 (at Kungala Road 1 (13-4-0181)):</p> <ul style="list-style-type: none"> Sub-surface test excavation will be undertaken prior to construction, conducted in accordance with the methodology used in the working paper, and occur several months before any ground disturbance at this location. Further recommendations for the Aboriginal archaeological site will then be made in consultation with the registered Aboriginal stakeholders, including potentially establishing a care agreement will be necessary to enable this. Any portions of the Aboriginal archaeological site that are not to be impacted will be protected by exclusion zones as per management measure AH2. 	Pre-construction and construction	2
AH14f	AH15f		<p>Ancillary facility - Section 2, Site 4 (at Wells Crossing Artefacts 1 (13-4-0183)):</p> <ul style="list-style-type: none"> If this Aboriginal archaeological site is to be impacted, salvage excavation of the portion of the Aboriginal archaeological site to be impacted will be undertaken as detailed in the Ancillary facility and design change CHAR (Appendix D of the Submissions/ Preferred Infrastructure Report) and in consultation with RAPs. 	Pre-construction	2
AH14g	AH15g		<p>Ancillary facility - Section 2, Site 5b (at WWC139 (13-4-0157)):</p> <ul style="list-style-type: none"> The Aboriginal archaeological site that are not to be impacted will be protected by exclusion zones as per management measure AH2. 	Construction	3

Issue	ID number	Previous number	Mitigation <i>Environmental management measure</i>	Timing	Relevant section
AH14h	<i>AH15h</i>		<p><i>Ancillary facility - Section 3, Site 3b (at WX2I Site 8 (09-4-0108)):</i></p> <ul style="list-style-type: none"> <i>All previously recorded artefacts will be recovered and removed off-site before construction, subject to a care agreement being established.</i> <i>All cultural material recovered will be subject to detailed analysis, which will be included in a technical report, including detailed discussion and interpretation.</i> 	<i>Pre-construction</i>	<i>3</i>
AH14i	<i>AH15i</i>		<p><i>Ancillary facility - Section 3, Site 6b (at Old Tucabia Dump 1 (13-4-0184)):</i></p> <ul style="list-style-type: none"> <i>An exclusion zone will be established at the boundary of the Aboriginal archaeological site (including a buffer based on the drip zone of the tree) as per management measure AH2.</i> 	<i>Construction</i>	<i>3</i>
AH14j	<i>AH15j</i>		<p><i>Ancillary facility - Section 3, Site 9 (at Upper Coldstream 1 (13-4-0182)):</i></p> <ul style="list-style-type: none"> <i>All previously recorded artefacts will be recovered and removed off-site, subject to a care agreement being established.</i> <i>Any portions of the Aboriginal archaeological site not to be impacted will be protected by exclusion zones as per management measure AH2.</i> 	<i>Pre-construction and construction</i>	<i>3</i>
AH14k	<i>AH15k</i>		<p><i>Ancillary facility - Section 4, Site 1:</i></p> <ul style="list-style-type: none"> <i>Sub-surface test excavations will be undertaken in accordance with the methodology used in the working paper, and will occur before any ground disturbance at this location. Further recommendations for the Aboriginal archaeological site will then be made in consultation with the registered Aboriginal stakeholders.</i> 	<i>Pre-construction</i>	<i>4</i>
AH14l	<i>AH15l</i>		<p><i>Ancillary facility - Section 4, Site 3:</i></p> <ul style="list-style-type: none"> <i>This property could not be accessed for field investigations. Sub-surface test excavation are to be undertaken. This will be conducted in accordance with the methodology used in the working paper, and will occur before ground disturbing work for the project or ancillary activities being undertaken at this location. Further recommendations for the Aboriginal archaeological site will then be made in consultation with the RAPs.</i> 	<i>Pre-construction</i>	<i>4</i>
AH14m	<i>AH15m</i>		<p><i>Ancillary facility - Section 4, Site 5 (at Hirst 3 (13-1-0192)):</i></p> <ul style="list-style-type: none"> <i>This Aboriginal archaeological site is to be avoided if possible unless agreement can be reached with the RAPs. An exclusion zone will be established as per management measure AH2.</i> <i>If agreement to use the site is reached with RAPs, salvage excavation of the portion of the Aboriginal archaeological site to be impacted will be undertaken as detailed in the Ancillary facility and design change CHAR (Appendix D of the Submissions/ Preferred Infrastructure Report) and in consultation with RAPs.</i> 	<i>Pre-construction</i>	<i>4</i>

Issue	ID number	Previous number	Mitigation <i>Environmental management measure</i>	Timing	Relevant section
AH14n	AH15n		<p><i>Ancillary facility - Section 5, Site 7 (at Mororo Creek 1 (13-1-0191)):</i></p> <ul style="list-style-type: none"> <i>This Aboriginal archaeological site within the ancillary facility location will be avoided. An exclusion zone at least five metres outside the boundary of the Aboriginal archaeological site will be established as per management measure AH2.</i> 	Construction	5
AH14o	AH15o		<p><i>Ancillary facility - Section 5, Site 5 and Site 7 (at Mororo Creek 2 (13-1-0193)):</i></p> <ul style="list-style-type: none"> <i>This Aboriginal archaeological site within the ancillary facility location will be avoided. An exclusion zone at least five metres outside the boundary of the Aboriginal archaeological site will be established as per management measure AH2.</i> 	Construction	5
AH14p	AH15p		<p><i>Ancillary facility - Section 7, Site 1:</i></p> <ul style="list-style-type: none"> <i>A site walk over survey will be undertaken to confirm whether sub-surface test excavations are required. This will be conducted in accordance with the methodology used in the working paper, and will occur several months before any ground disturbance at this location. Further recommendations and use of the Aboriginal archaeological site will be developed in agreement with the registered Aboriginal stakeholders.</i> 	Pre-construction	7
AH14q	AH15q		<p><i>Ancillary facility - Section 7, Site 3 (Dubaijeen Site (New Italy 1)):</i></p> <ul style="list-style-type: none"> <i>Salvage excavation of the portion of the Aboriginal archaeological site to be used will be undertaken as detailed in the Ancillary facility and design change CHAR (Appendix D of the Submissions/ Preferred Infrastructure Report) and in consultation with RAPs. The excavations apply to the portion of the site that would be impacted by the project as well as the ancillary facility.</i> <i>Any portions of the Aboriginal archaeological site that are not to be impacted will be protected by exclusion zones as per management measure AH2.</i> 	Pre-construction and construction	7
AH14r	AH15r		<p><i>Ancillary facility - Section 7, Site 4 (The Gap Rd 1(13-1-0194)):</i></p> <ul style="list-style-type: none"> <i>If impact to The Gap Rd 1 is necessary, salvage excavation of the portion of the Aboriginal archaeological site to be impacted will be undertaken as detailed in the Ancillary facility and design change CHAR (Appendix D of the Submissions/ Preferred Infrastructure Report) and in consultation with RAPs.</i> <i>Any portions of the Aboriginal archaeological site that are not to be impacted will be protected by exclusion zones will be established as per management measure AH2.</i> 	Pre-construction and construction	7
AH14s	AH15s		<p><i>Ancillary facility - Section 10, Site 1a:</i></p> <ul style="list-style-type: none"> <i>A site walk over survey will be undertaken to confirm whether sub-surface test excavation is required. This will be conducted in accordance with the methodology used in the working paper, and will occur several months before any ground disturbance at this location. Further recommendations for the Aboriginal archaeological site will then be made in consultation with</i> 	Pre-construction	10

Issue	ID number	Previous number	Mitigation <i>Environmental management measure</i>	Timing	Relevant section
			<i>the registered Aboriginal stakeholders.</i>		
	AH14t	<i>AH15t</i>	<p><i>Ancillary facility - Section 10, ancillary facility 5At Rudgley Site 1 (04-4-0167) ():</i></p> <ul style="list-style-type: none"> <i>This Aboriginal archaeological site will be avoided, where practical, using an exclusion zone as per management measure AH2.</i> <i>If avoidance is not possible, salvage excavation of the portion of the Aboriginal archaeological site to be impacted will be undertaken as detailed in the Ancillary facility and design change CHAR (Appendix D of the Submissions/ Preferred Infrastructure Report) and in consultation with RAPs.</i> <i>Any portions of the Aboriginal archaeological site that are not to be impacted will be protected by exclusion zones as per management measure AH2.</i> 	<i>Pre-construction and construction</i>	<i>10</i>
	AH14u	<i>AH15u</i>	<p><i>Ancillary facility - Section 10, Site 6 (Site 12 (11-2-0082)):</i></p> <ul style="list-style-type: none"> <i>If avoidance is not possible, salvage excavation of all portions of the Aboriginal archaeological site to be impacted will be undertaken as detailed in the Ancillary facility and design change CHAR (Appendix D of the Submissions/ Preferred Infrastructure Report) and in consultation with RAPs.</i> <i>Any portions of the Aboriginal archaeological site that are not to be impacted will be protected by exclusion zones as per management measure AH2.</i> 	<i>Pre-construction and construction</i>	<i>10</i>
	AH14v	<i>AH15v</i>	<p><i>Ancillary facility - Section 11, Site 1a:</i></p> <ul style="list-style-type: none"> <i>The ground will be inspected for any Aboriginal archaeological material by an archaeologist and registered Aboriginal stakeholders during and following clearing activities. Any archaeological material will be recorded, removed from the Aboriginal archaeological site, and a suitable location for the material determined in consultation with the stakeholders. An AHIMS record will be submitted for any finds and any locations where the material is to be stored – unless reburied on or near Aboriginal archaeological site, establishing a care agreement will also be necessary.</i> 	<i>Pre-construction and construction</i>	<i>11</i>
Impacts on WWC39	AH15	AH16	<ul style="list-style-type: none"> Salvage excavation will <i>would</i> be undertaken within the portion of the site to be impacted <i>by the project footprint as detailed in the Working paper Aboriginal Cultural Heritage (Woolgoolga to Wells Crossing) and in consultation with RAPs.</i> Each excavation would be undertaken in 50 mm spits to sterile base deposits. The WWC39 (22-1-0343) site, 80 m² would be excavated by machine (a mechanical sieve and an excavator (about 900 mm bucket)). <i>An exclusion zone will be erected</i> around 40% of the site that will <i>would</i> be avoided by construction <i>as per management measure AH2.</i>, exclusion zones would be put in place to ensure the remaining archaeological deposits are not incidentally damaged. These would be fenced with 	<i>Pre-Construction</i>	<i>1</i>

Issue	ID number	Previous number	Mitigation <i>Environmental management measure</i>	Timing	Relevant section
			parawebbing or some other similar fencing, that would exclude entry by people or plant to avoid incidental impacts on the site.		
Impacts on WWC46	AH16	AH17	<ul style="list-style-type: none"> Salvage excavation <i>will</i> be undertaken within the portion of the site to be impacted <i>by the project footprint as detailed in the Working paper Aboriginal Cultural Heritage (Woolgoolga to Wells Crossing) and in consultation with RAPs.</i> Each excavation would be undertaken in 50 mm spits to sterile base deposits. The WWC46 (22-1-0342) site, 40 m² would be excavated by machine (a mechanical sieve and an excavator (about 900 mm bucket)). 	Pre-Construction	1
Impacts on WWC Dirty Creek 1	AH17	AH18	<p>Due to restricted property access the WWC Dirty Creek 1 (22-1-0403) site has only been subject to field survey. Therefore the following approach would be followed:</p> <ul style="list-style-type: none"> Subsurface testing: The methodology outlined in the archaeological assessment in the Woolgoolga to Ballina Aboriginal Cultural Heritage Assessment Report: Woolgoolga to Wells Crossing Section Volume 2 would be applied if identified as being required. Salvage would be undertaken if the requirement is identified during subsurface testing. The triggers for subsurface testing would be: <ul style="list-style-type: none"> More than 10 but less than 50 artefacts – a minimum of 10 m² to be excavated by machine. More than 50 but less than 100 artefacts – a minimum of 30 m² to be excavated by machine. More than 100 but less than 300 artefacts – a minimum of 60 m² to be excavated by machine and hand excavation. If multiple site components are identified or a higher number of artefacts (300+) are identified within the area, these salvage measures may require revision. All salvage quotas and revisions to salvage quotas would be approved by Roads and Maritime' Senior Environmental Officer (Heritage), or the Office of Environment and Heritage. All machine excavation would be undertaken with a mechanical sieve and an excavator (900 mm bucket) Each excavation would be undertaken in 50 mm spits to sterile base deposits. <i>Prior to ground disturbance to WWC Dirty Creek 1c (22-1-0403), the ground surface would be inspected within 50 m of the site for any Aboriginal archaeological material by an archaeologist and RAP nominated site officers. Any archaeological material would be recorded, removed from the site, and a suitable location for the material determined in consultation with the RAPs. The AHIMS record would be updated with any new finds and any locations where the material is to be stored – unless reburied on or near site, establishing a care agreement would be necessary.</i> 	Pre-Construction	1
Impacts on	AH18	AH19	<ul style="list-style-type: none"> Salvage excavation would be undertaken within the portion of the site to be impacted <i>by the project</i> 	Pre-	4

Issue	ID number	Previous number	Mitigation <i>Environmental management measure</i>	Timing	Relevant section
Tyndale 2			<p><i>footprint as detailed in the Working paper Aboriginal Cultural Heritage (Wells Crossing to Iluka Road) and in consultation with RAPs.</i> Each excavation would be undertaken in 50 mm spits to sterile base deposits.</p> <ul style="list-style-type: none"> The Tyndale 2 (13-1-0115) site, 20 m² would be excavated by machine (a mechanical sieve and an excavator (900 mm or 1100 mm bucket)). 	construction	
<i>Impacts to Chaffin Creek Scarred tree</i>	AH19	<i>AH19a</i>	<p><i>Chaffin Creek scarred tree (Chaffin Creek Tree 2):</i></p> <ul style="list-style-type: none"> <i>Before construction, an exclusion zone will be established as per management measure AH2. An arborist will be consulted to develop a management strategy to ensure the health and preservation of the tree .</i> 	<i>Pre-construction</i>	<i>3</i>
Impacts on IR2W4	AH20	AH20	<p>Salvage excavation will would be undertaken within the portion of the site to be impacted <i>by the project footprint as detailed in the Working paper Aboriginal Cultural Heritage (Iluka Road to Woodburn) and in consultation with RAPs.</i> Each excavation would be undertaken in 50 mm spits to sterile base deposits.</p> <ul style="list-style-type: none"> The IR2W4 (13-1-0115) site, 60 m² would be excavated by machine (a mechanical sieve and an excavator (900 mm bucket)). 	<i>Pre-Construction</i>	8
Impacts on Gittoes Jali	AH21	AH21	<p>For the Gittoes Jali (09-1-0204, 09-1-0205, 09-1-0203) site:</p> <ul style="list-style-type: none"> Where possible, impacts on the Gittoes Jali site will would be reduced or avoided. To avoid impact, avoided areas would be protected by an exclusion fence as per management measure AH2. fenced to ensure they are protected. If avoidance is not an option, then extensive salvage is recommended <i>will be undertaken as per the methodology detailed in the Ancillary facilities and design change CHAR (refer to Appendix D of the Submissions/ Preferred Infrastructure Report).</i> Salvage excavation would be undertaken in 50 mm spits to sterile base deposits. Any sediment from the site to 0.6 m metre depth that is proposed to be used outside the boundary of the site will would be sieved to remove any cultural material to ensure new sites are not recorded in relocation areas. 150 m² would be excavated by machine, which would be undertaken with a mechanical sieve and excavator (900 mm bucket). Hand excavation of around would be undertaken in a controlled manner using trowels and / or shovels and 5 mm hand or mechanical sieves. This will be undertaken using an open excavation methodology to explore the features (such as knapping events, caches, etc) initially detected during subsurface testing (and any new features detected). Intra-site variability should be explored to attempt to detect activity zones within the site. <p>Paint wells and grinding rock:</p>	Pre-construction and construction	8

Issue	ID number	Previous number	Mitigation <i>Environmental management measure</i>	Timing	Relevant section
			<ul style="list-style-type: none"> Residue analysis will <i>would</i> be undertaken to determine if any pigment is found within the wells. This will <i>would</i> be undertaken by a suitably qualified consultant. The location of these paint wells will <i>would</i> be accurately plotted and drawn. If the paint wells cannot be avoided, they will <i>would</i> be relocated; this would require consultation with the registered Aboriginal stakeholders. <p>Geomorphology assessment:</p> <ul style="list-style-type: none"> A geomorphology assessment will <i>would</i> be undertaken that encompasses the Gittoes Jali, E2/2, Site 11, and Molino sites. The assessment will <i>would</i> be non-invasive, but could use observations of the machine salvage excavation. <p>Borrow site:</p> <ul style="list-style-type: none"> The extent of excavation at Lang Hill (encompassing the Gittoes Jali sites) would be reviewed in consultation with relevant Aboriginal stakeholders and consideration of urban design guidelines. Haul routes from the project formation to the borrow source that limit direct impacts to Aboriginal heritage will be confirmed in consultation with Registered Aboriginal Parties. 		
Impacts on E2/2	AH22	AH22	<p>For the E2/2 (13-1-01-09) site:</p> <ul style="list-style-type: none"> Salvage excavation will <i>would</i> be undertaken at and around the shell midden by the project footprint as detailed in the Working paper Aboriginal Cultural Heritage (Woodburn to Ballina) and in consultation with RAPs. in 50 mm spits to sterile base deposits. Any sediment from the site to 1.5 m metre depth that is proposed to be used outside the boundary of the sites <i>will</i> would be sieved to remove any cultural material to ensure new sites are not recorded in relocation areas. <p>Shell Midden:</p> <ul style="list-style-type: none"> Hand excavation of 10 m² (near the fence line) of the midden that would be impacted to a total depth of 500 mm. This would be excavated in a controlled manner using trowels and 3 mm and 5 mm nested sieves. It is recommended that A sequence of dates (radiocarbon or AMS) <i>will</i> be collected from the hand excavation. All shell recovered will <i>would</i> be subject to analysis including minimum number of individuals (MNI) and weight (g). An analysis of the number of individual specimens (NISP) may also be undertaken if deemed appropriate. <p>Area surrounding the shell midden:</p>	Pre-construction and construction	9

Issue	ID number	Previous number	Mitigation <i>Environmental management measure</i>	Timing	Relevant section
			<ul style="list-style-type: none"> 80 m² would be excavated by machine (a mechanical sieve and an excavator (900 mm bucket)). <p>Overburden:</p> <ul style="list-style-type: none"> All overburden will be removed and sieved for cultural materials, to ensure any cultural material located within the overburden is collected. <p>Geomorphology assessment:</p> <ul style="list-style-type: none"> A geomorphology assessment would be undertaken that encompasses the Gittoes Jali, E2/2, Site 11, and Melino sites. The assessment would be non-invasive, but could use observations of the machine salvage excavation. 		
Impacts on Aboriginal heritage Site 11	AH23	AH23	<p>For Site 11 (13-1-0189):</p> <ul style="list-style-type: none"> Salvage excavation will be undertaken by the project footprint as detailed in the Working paper Aboriginal Cultural Heritage (Woodburn to Ballina) and in consultation with RAPs. in 50 mm spits to sterile base deposits. Any sediment from the sites to 1.5 m metre depth that is proposed to be used outside the boundary of the site will be sieved to remove any cultural material to ensure new sites are not recorded in relocation areas. A minimum of 100 m² would be excavated by machine, which would be undertaken with a mechanical sieve and excavator (900 mm bucket). A minimum of 20 m² would be excavated by hand within the vicinity of the mechanical transect where a knapping floor was identified (543354E/6790480N). This would be excavated in a controlled manner using trowels and 3 mm and 5 mm nested sieves. <p>Geomorphology assessment:</p> <ul style="list-style-type: none"> A geomorphology assessment will be undertaken that encompasses the Gittoes Jali, E2/2, Site 11, and Melino sites. The assessment will be non-invasive, but could use observations of the machine salvage excavation. 	Pre-construction and construction	9
Impacts on Melino site	AH24	AH24	<p>For the Melino (04-4-0173) site:</p> <ul style="list-style-type: none"> Salvage excavation will be undertaken at the artefact scatter including a discrete knapping floor as detailed in the Working paper Aboriginal Cultural Heritage (Woodburn to Ballina) and in consultation with RAPs. in 50 mm spits to sterile base deposits. Any sediment from the sites to 1.5 m metre depth that is proposed to be used outside the boundary of the site will be sieved to remove any cultural material to ensure new sites are not recorded in relocation areas. An artefact scatter including a discrete knapping floor was located on the top of the rise. 30 m² would be excavated by machine. This would be undertaken with a mechanical sieve and excavator (900 mm 	Pre-construction and construction	10

Issue	ID number	Previous number	Mitigation <i>Environmental management measure</i>	Timing	Relevant section
			<p>bucket). Unless it can be avoided, directly adjacent to the original 1 m x 1 m Test Pit (542652E/6702777N), two 2 m x 1 m areas would require hand excavation. These would be excavated in a controlled manner using trowels and 5 mm sieve.</p> <p>Shell Midden:</p> <ul style="list-style-type: none"> Salvage excavations as detailed in the Working paper Aboriginal Cultural Heritage (Woodburn to Ballina) and in consultation with RAPs. Hand excavation of 20 m² of the midden that would be impacted to a total depth of 1 m (this would be excavated in a controlled manner using trowels and 3 mm and 5 mm nested sieves). It is recommended that a A sequence of dates (radiocarbon or AMS) will be collected from the hand excavation. All shell recovered will would be subject to analysis including minimum number of individuals (MNI) and weight (g). An analysis of the number of individual specimens (NISP) may also be undertaken if deemed appropriate. <p>Area surrounding the shell midden:</p> <ul style="list-style-type: none"> Salvage excavations will be undertaken as detailed in the Working paper Aboriginal Cultural Heritage (Woodburn to Ballina) and in consultation with RAPs. 100 m² would be excavated by machine (a mechanical sieve and an excavator (900 mm bucket)). <p>Geomorphology assessment:</p> <ul style="list-style-type: none"> A geomorphology assessment will would be undertaken that encompasses the Gittoes Jali, E2/2, Site 11, and Molino sites. The assessment will would be non-invasive, but could use observations of the machine salvage excavation. 		
Impacts on Site 1	AH25	AH25	<p>For Site 1 (04-4-0179):</p> <ul style="list-style-type: none"> Further salvage excavations will be undertaken as detailed in the Working paper Aboriginal Cultural Heritage (Woodburn to Ballina) and in consultation with RAPs. mechanical excavation would be undertaken in order to reach and record the depth of the archaeological deposit 10 m² to be excavated by machine. This would be undertaken with a mechanical sieve and an excavator (900 mm bucket). If constraints such as the water table are encountered, measures would be taken to safely stabilise and then proceed with deeper excavation. Salvage excavation would be undertaken in 50 mm spits to sterile base deposits. Any sediment to one metre 4 m depth from the site that is proposed to be used outside the boundary of the site will would be sieved to remove any cultural material to ensure new sites are not recorded 	Pre-construction and construction	10

Issue	ID number	Previous number	Mitigation <i>Environmental management measure</i>	Timing	Relevant section
			in relocation areas.		
Impacts on Site 2	AH26	AH26	<p>For Site 2 (04-4-0178):</p> <ul style="list-style-type: none"> • Salvage excavation will be undertaken as detailed in the Working paper Aboriginal Cultural Heritage (Woodburn to Ballina) and in consultation with RAPs. Further mechanical excavation would be undertaken in order to reach and record the depth of the archaeological deposit. • 30 m² to be excavated by machine. This would be undertaken with a mechanical sieve and an excavator (900 mm bucket). If constraints such as the water table are encountered, measures would be taken to safely stabilise and then proceed with deeper excavation. • Salvage excavation would be undertaken in 50 mm spits to sterile base deposits. • Any sediment to 1.5 m metres depth from the site that is proposed to be used outside the boundary of the site will be sieved to remove any cultural material to ensure new sites are not recorded in relocation areas. <p>Excavation at Site 2 will be undertaken at a time of the year when the water table is at its lowest, to ensure maximum depth can be reached with a machine.</p>	Pre-construction and construction	10
Impacts on Site 3	AH27	AH27	<p>For Site 3 (04-4-0175):</p> <ul style="list-style-type: none"> • Further salvage excavations will be undertaken as detailed in the Working paper Aboriginal Cultural Heritage (Woodburn to Ballina) and in consultation with RAPs. Further mechanical excavation will be undertaken in order to reach and record the depth of the archaeological deposit. • 40 m² to be excavated by machine. This would be undertaken with a mechanical sieve and an excavator (900 mm bucket). If constraints such as the water table are encountered, measures would be taken to safely stabilise and then proceed with deeper excavation. • Salvage excavation would be undertaken in 50 mm spits to sterile base deposits. • Any sediment to 1.5 m metres depth from the site that is proposed to be used outside the boundary of the site will be sieved to remove any cultural material to ensure new sites are not recorded in relocation areas. <p>Excavation at Site 3 will be undertaken at a time of the year when the water table is at its lowest, to ensure maximum depth can be reached with a machine.</p>	Pre-construction and construction	10
Impacts on Site 4	AH28	AH28	<p>For Site 4 (04-04-0132):</p> <ul style="list-style-type: none"> • Further salvage excavations will be undertaken as detailed in the Working paper Aboriginal Cultural Heritage (Woodburn to Ballina) and in consultation with RAPs. Further mechanical excavation will be undertaken in order to reach and record the depth of the archaeological 	Pre-construction and construction	10

Issue	ID number	Previous number	Mitigation <i>Environmental management measure</i>	Timing	Relevant section
			<p>deposit.</p> <ul style="list-style-type: none"> 20 m² to be excavated by machine. This would be undertaken with a mechanical sieve and an excavator (900 mm bucket). If constraints such as the water table are encountered, measures would be taken to safely stabilise and then proceed with deeper excavation. Salvage excavation would be undertaken in 50 mm spits to sterile base deposits. Any sediment to 0.5 m metre depth from the site that is proposed to be used outside the boundary of the site will be sieved to remove any cultural material to ensure new sites are not recorded in relocation areas. 		
Impacts on Site 12	AH29	AH29	<p>For Site 12 (04-4-0176):</p> <ul style="list-style-type: none"> Further mechanical excavation will be undertaken in order to reach and record the depth of the archaeological deposit. 10 m² will be excavated by machine. This would be undertaken with a mechanical sieve and an excavator (900 mm millimetre bucket). If constraints such as the water table are encountered, measures will be taken to safely stabilise and then proceed with deeper excavation. Salvage excavation will be undertaken in 50 mm millimetre spits to sterile base deposits. Any sediment to 1.2 m metres depth from the site that is proposed to be used outside the boundary of the site will be sieved to remove any cultural material to ensure new sites are not recorded in relocation areas. An exclusion zone would be established at the boundary of the site where construction is to occur within 10 m of the site, as per management measure AH2. 	Pre-construction and construction	10, 11
Impacts on the Gumi Site Scarred Tree	AH30	AH30	<p>For the Gumi site (04-4-0180):</p> <ul style="list-style-type: none"> The Gumi scarred tree (registered on AHIMS database) will be removed and the trunk will be relocated to an area agreed to with the registered stakeholder groups and Roads and Maritime – an arborist will be consulted to guide in the removal of the tree. The final tree location will be visually protected with during the construction and operation of the road with culturally sensitive plantings or by existing vegetation. Access to the tree will be provided for local Aboriginal people to enable them to be able to use the tree as a teaching site. 	Pre-construction and construction	10
Impacts on the Melino Scarred	AH31	AH31	<p>For the Melino Scarred Tree 4 (04-4-0166) site:</p>	Pre-construction	10

Issue	ID number	Previous number	Mitigation <i>Environmental management measure</i>	Timing	Relevant section
Tree			<ul style="list-style-type: none"> Prior to construction a 15 m metre exclusion zone will be established around the scarred tree as per management measure AH2, and maintained until construction activities have ceased. The exclusion zone would be fenced using chain wire or plastic mesh and star pickets. A 'Do Not Enter' signage would be attached to the fencing. A representative of the Local Aboriginal Land Council would be present during establishment of the fencing. An arborist will be consulted to develop an ongoing management strategy to ensure the preservation and health of the tree. 	and construction	
Impacts on the MST3 Scarred Tree	AH32	AH32	<p>For the MST3 (04-4-0131) site:</p> <ul style="list-style-type: none"> Prior to construction a 15 m metre exclusion zone will be established around the scarred trees as per management measure AH2, and maintained until construction activities have ceased. The exclusion zone would be fenced using chain wire or plastic mesh and star pickets. A 'Do Not Enter' signage would be attached to the fencing. A representative of the Local Aboriginal Land Council would be present during establishment of the fencing. An arborist will be consulted to develop an ongoing management strategy to ensure the preservation and health of the tree. 	Pre-construction and construction	10
Impacts on the C21 Scarred Tree	AH33	AH33	<p>For the C21 (04-4-0107) site:</p> <ul style="list-style-type: none"> Prior to construction a 15 m metre exclusion zone will be established around the scarred trees as per management measure AH2, and maintained until construction activities have ceased. The exclusion zone would be fenced using chain wire or plastic mesh and star pickets. A 'Do Not Enter' signage would be attached to the fencing. A representative of the Local Aboriginal Land Council would be present during establishment of the fencing. An arborist will be consulted to develop an ongoing management strategy to ensure the preservation and health of the tree. 	Pre-construction and construction	10
Impacts on the MSRT2 Scarred Tree	AH34	AH34	<p>For the MSRT2 (04-4-0130) site:</p> <ul style="list-style-type: none"> Prior to construction a 15 m metre exclusion zone will be established around the scarred trees as per management measure AH2, and maintained until construction activities have ceased. The exclusion zone would be fenced using chain wire or plastic mesh and star pickets. A 'Do Not Enter' signage would be attached to the fencing. A representative of the Local Aboriginal Land Council would be present during establishment of the fencing. An arborist will be consulted to develop an ongoing management strategy to ensure the preservation and health of the tree. 	Pre-construction and construction	10
Impacts on the Rudgley Scarred	AH35	AH35	<p>For the Rudgley Scarred Tree (04-4-0170) site:</p> <ul style="list-style-type: none"> Prior to construction a 15m metre exclusion zone will be established around the scarred trees 	Pre-construction	10

Issue	ID number	Previous number	Mitigation <i>Environmental management measure</i>	Timing	Relevant section
Tree			<p><i>as per management measure AH2</i>, and maintained until construction activities have ceased. The exclusion zone would be fenced using chain wire or plastic mesh and star pickets. A 'Do Not Enter' signage would be attached to the fencing. A representative of the Local Aboriginal Land Council would be present during establishment of the fencing.</p> <ul style="list-style-type: none"> An arborist <i>will</i> would be consulted to develop an ongoing management strategy to ensure the preservation and health of the tree. 	and construction	
<i>Coolgardie Road, Rudgley Scarred Tree 2</i>	AH36	<i>AH35a</i>	<i>An exclusion zone would be established 5 metres from the boundary of Rudgley Scarred Tree 2 as per management measure AH2.</i>	<i>Pre-construction</i>	<i>10</i>
<i>Coolgardie Road, Rudgley Site 2</i>	AH37	<i>AH35b</i>	<p><i>The area of site to be impacted would be subject to salvage excavation as detailed in the Addendum CHAR (Appendix D of the Submissions/ Preferred Infrastructure Report) and in consultation with RAPs.</i></p> <p><i>All cultural material recovered would be subject to detailed analysis, interpretation and reporting.</i></p>	<i>Pre-construction</i>	<i>10</i>
Impacts to Corridors of Movement	AH38	AH36	<ul style="list-style-type: none"> Aboriginal culture and heritage awareness induction workshops <i>will</i> would be undertaken by all construction staff. Educational and cultural signage <i>will</i> would be placed at viable locations along the highway in this locality, potentially describing the history of Aboriginal occupation of the area. At a minimum, signage <i>will</i> would include acknowledging the area as the traditional lands of the Gumbaynggir peoples. Any signage <i>will</i> would be subject to approval by the registered Aboriginal stakeholders. 	Pre-construction, during, and post-construction	1
	AH39	AH37	<p>Tyndale and Woodford Island Corridors of Movement:</p> <ul style="list-style-type: none"> Pedestrian access across the project <i>will</i> would be provided, if reasonable and feasible within the existing local road network, to maintain the connectivity of this corridor of movement. 	Pre-construction, during, and post-construction	3
	AH40	AH38	<p>Pillar Valley Corridors of Movement:</p> <ul style="list-style-type: none"> Pedestrian access across the project <i>will</i> would be provided, if reasonable and feasible within the existing local road network, to maintain the connectivity of this corridor of movement. 	Pre-construction, during, and post-construction	3
Direct impact on culturally significant places	AH41	AH39	<p>Place B:</p> <ul style="list-style-type: none"> To maintain connectivity, access <i>will</i> would be provided across the project area, from the end of Richmond Road, Pine Tree Road, or Fischer Street to Broadwater National Park during construction and operation, in consultation with the traditional owners. Pedestrian access within the project boundary <i>will</i> would be provided, where feasible and reasonable 	Pre-construction, during, and post-construction	9, 10

Issue	ID number	Previous number	Mitigation <i>Environmental management measure</i>	Timing	Relevant section
			from the eastern side of the project to the western side of Broadwater National Park. A connection from the existing Pacific Highway to Broadwater National Park along Eversons Lane would be considered, in consultation with traditional owners and relevant land owners.		
	AH42	AH40	Place D: <ul style="list-style-type: none"> Welcome to country signage will be installed within the highway corridor between Woodburn and Wardell and information on culture installed at the rest area in Section 10, as agreed with the registered Aboriginal parties. Signage acknowledging the traditional owners of the area and providing information on culture would be installed within the highway as agreed with the registered stakeholder group. 	Pre-construction, during, and post-construction	9, 10
	AH43	AH41	Place K: <ul style="list-style-type: none"> To gather further information on the broader landscape, it is recommended that a A geomorphological assessment within the extent of Place K will be undertaken, including the geomorphological setting of the archaeological sites within this landscape, and how the landscape has formed and changed over the last 40,000 years. This would take into account both the cultural and scientific significance of the place. A report will would be produced by a geomorphologist in conjunction with an archaeologist / anthropologist. 	Pre-construction, during, and post-construction	11
Indirect impact on culturally significant places	AH44	AH42	Place E: <ul style="list-style-type: none"> This place will would be fenced prior to and during construction to avoid incidental impact on it. Surface water runoff from the construction site or from the highway pavement during operation of the project will would be prevented from directly entering into Place E. 	Pre-construction, during, and post-construction	9
Indeterminate impact on culturally significant places	AH45	AH43	Place C: <ul style="list-style-type: none"> An education package will would be prepared to pass information associated with this area onto future generations. This will would include at a minimum a printed document detailing the story of the occupation of this area and the ensuing massacre. Further research and interviews will would be undertaken for this purpose. Where possible, oral recordings and/or video footage will would also be compiled into the package. Caution will would be undertaken in and around the project in this area with regard to potential human remains. 	Pre-construction, during, and post-construction	9, 10
Mororo Road cutting site	AH46	AH44	<ul style="list-style-type: none"> <i>Before construction at Mororo Road, between station 97.45 and 98.9, a field inspection of the area to be cleared and excavated will be undertaken by an Aboriginal heritage consultant with Registered Aboriginal Parties.</i> 	Pre-construction	6

Issue	ID number	Previous number	Mitigation <i>Environmental management measure</i>	Timing	Relevant section
<i>Old Bagotville Road Lot 109 DP1137975</i>	AH47	<i>AH45</i>	<ul style="list-style-type: none"> <i>As the property occurs in an area of low-moderate Aboriginal heritage potential, survey, and if necessary test excavation, should be undertaken to determine the presence and extent of potential archaeological evidence. This will be conducted in accordance with the methodology agreed with RAPs, and prior to ground disturbing works for the project and/or proposed design change. Further recommendations for the site would then be made in consultation with the RAPs.</i> 	<i>Pre-construction</i>	<i>10</i>
<i>Saezza 1 artefact scatter: salvage excavation</i>	AH48	<i>AH46</i>	<p><i>The area of this site to be impacted will be subject to salvage excavation as detailed in the Addendum CHAR (Appendix D of the Submissions/ Preferred Infrastructure Report) and in consultation with RAPs.</i></p> <p><i>All cultural material recovered will be subject to detailed analysis, interpretation and reporting. The portion of the site that not be impacted (at least 70%), will be protected by fencing as per management measure AH2.</i></p>	<i>Pre-construction</i>	<i>10</i>
Non-Aboriginal (Historical) heritage					
Unidentified historical heritage materials, features and/or deposits	HH1	HH1	<ul style="list-style-type: none"> If at any time during construction associated with the project, unidentified historical heritage materials, features and/or deposits are found, the Roads and Maritime Standard Management Procedure: Unexpected Archaeological Finds (20124) will be followed. specifically: All construction that could potentially harm the historical heritage materials, features or deposits would cease (including stopping all construction within at least 10 metres). Only construction that is required to comply with occupational and environmental health and safety standards and/or to protect the historical heritage would occur. Construction that does not have the potential to harm the historical heritage would continue only if it is outside the minimum 10-metre buffer. A suitably qualified and experienced archaeologist (the archaeologist) would be contacted as soon as practicable in relation to the unexpected discovery of any historical heritage and would be responsible for recording, in detail, the location and context of any historical heritage. Any materials, features and/or deposits would be analysed and/or catalogued and any official site records would be created or updated (where appropriate). The archaeologist would also make recommendations for the management of the historical heritage in relation to the project. If avoidance of the heritage item were not possible, the archaeologist would conduct a salvage excavation. The aims of the salvage excavation would be to obtain as much information as possible from the historical heritage materials, features and/or deposits. The archaeologist would provide a report detailing the excavation, salvage and analysis results to the Heritage Branch of the Office of Environment and Heritage at the completion of the salvage. Roads and Maritime would be responsible for the costs associated with assessing, cataloguing, labelling and packaging (etc) any historical heritage materials, features and/or deposits. 	Construction	All

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			<ul style="list-style-type: none"> Construction would only recommence within the area of exclusion when appropriate protective measures have been undertaken, relevant records updated and/or completed and when all parties agree there is no other prudent or feasible course of action. 		
Human skeletal remains		HH2	<ul style="list-style-type: none"> Should human skeletal remains be identified during construction, the procedure outlined in AH7 would apply (refer to section 12.4 of this EIS). 	Construction	All
Awareness of non- Aboriginal heritage items	HH2	HH3	<ul style="list-style-type: none"> Contractors will would be given awareness training on non-Aboriginal historical heritage prior to commencement of construction works to ensure understanding of potential heritage items and the procedure in the event of discovery of historical heritage materials, features or deposits, or the discovery of human remains. 	Construction	All
	HH3	HH3a	<ul style="list-style-type: none"> The Heritage management plan will be developed in consultation with the Heritage Council of NSW. 	Construction	All
	HH4	HH3b	<ul style="list-style-type: none"> Should the impact to any historic heritage item change during detailed design, further assessment of impacts on the items will be undertaken. 	Pre-construction	All
Ancillary facilities		HH4	<ul style="list-style-type: none"> At the nine proposed locations for ancillary facilities that have been identified as having medium potential for the presence of previously unrecorded or unknown historical heritage sites: <ul style="list-style-type: none"> Before the commencement of the use of the ancillary facilities, field survey would be undertaken by a suitably qualified and experienced heritage consultant. Any historical heritage items identified would be assessed for their level of significance. For those heritage items identified as being of state or local heritage significance an impact assessment would be undertaken and provided to the Heritage Branch of the Office of Environment and Heritage. 	Pre-construction	All
	HH5	HH4a	<ul style="list-style-type: none"> At project section 1, site 2: a temporary barrier fence will be erected between item 39 and the ancillary site. The fence will remain in place until the conclusion of the use of the ancillary site at which time it will be removed. 	Construction	1
	HH6	HH4b	<ul style="list-style-type: none"> At project section 10, site 4: a temporary barrier fence will be erected to protect the drainage channel that is not directly impacted by the project (item 43). The fence will remain in place until the conclusion of the use of the ancillary site at which time it will be removed. 	Construction	10
	HH7	HH5	<ul style="list-style-type: none"> Where local or state significant heritage items not previously identified are identified on an ancillary site and use of the site will would impact on the heritage significance of the item, the site would not be used for ancillary facilities. 	Pre-construction	All
	HH8	HH6	<ul style="list-style-type: none"> Where local or state significant heritage items are identified on an ancillary site and use of the site will would not impact on the heritage significance of the item, appropriate management measures 	Pre-construction	All

Issue	ID number	Previous number	Mitigation <i>Environmental management measure</i>	Timing	Relevant section
			(such as barrier fencing) will would be put in place to clearly identify the heritage item and exclude use of the ancillary site within the heritage item's curtilage. Use of these ancillary facilities may commence: <ul style="list-style-type: none"> • When the appropriate protective measures have been implemented. • When the relevant records have been updated and/or completed. 		
	HH9	HH7	<ul style="list-style-type: none"> • Should a Any new ancillary facility and spoil placement locations not identified as part of this EIS be considered for use, will require a non-Aboriginal heritage assessment would be undertaken, with a database search and site walkover to identify any potential heritage items. If items are found, HH4-HH6 will would be followed. 	Pre-construction	All
Impacts on item 2: House, sheds and stockyards, Milleraa	HH10	HH8	<ul style="list-style-type: none"> • A temporary barrier fence will would be erected between the stockyards and the works area prior to road construction works commencing. The fence will would remain in place until the conclusion of the works in the vicinity of the items at which time it will would be removed. The batter slope will would not be constructed within five metres of the stockyards. 	Pre-construction and construction	1
	HH11	HH9	<ul style="list-style-type: none"> • The house has been identified for a Architectural noise treatment to the house to control noise levels from the project. The noise controls will would be investigated and provided developed where reasonable and feasible and in consultation with a qualified heritage consultant to minimise impacts on the heritage significance of the item. Consideration will be given for the need to revise the SOHI A more detailed SOHI would be prepared for this item when the specific architectural noise treatment options for the house are identified. 	Pre-construction	1
Impacts on item 7: Service station complex, Halfway Creek	HH12	HH10	<ul style="list-style-type: none"> • Salvage excavation (to salvage any subsurface artefacts from of the coach way station and early coach road) will would be undertaken in an area extending from the project boundary running along the front of the complex buildings to the edge of the existing highway before construction starts in the vicinity of the heritage item. Excavations will would be undertaken in accordance with Heritage Branch guidelines and under the supervision of an appropriately qualified and experienced historical archaeologist. An appropriate research design and methodology will would be prepared to best realise the research potential of this area of the site. 	Pre-construction and construction	2
	HH13	HH11	<ul style="list-style-type: none"> • The batter slope for the motorway upgrade will would not be constructed within eight metres of the bar/restaurant building. 	Construction	2
	HH14	HH12	<ul style="list-style-type: none"> • A temporary fence will would be erected between the bar/restaurant building and the motorway upgrade construction before work starts in the vicinity of the heritage item. The fence will would remain in place until construction is completed, at which time it will would be removed. 	Pre-construction and construction	2
	HH15	HH13	<ul style="list-style-type: none"> • A photographic condition survey will would be undertaken of the current condition of the heritage 	Pre-construction	2

Issue	ID number	Previous number	Mitigation <i>Environmental management measure</i>	Timing	Relevant section
			items with any damage to the item from construction to be repaired once construction is complete.	and construction	
	HH16	HH14	<ul style="list-style-type: none"> The house has been identified for a Architectural noise treatment to the house to control noise levels from the project. The noise controls will would be investigated and provided developed where reasonable and feasible and in consultation with a qualified heritage consultant to minimise impacts on the heritage significance of the item. Consideration will be given for the need to revise the SOHI A more detailed SOHI would be prepared for this item when the specific architectural noise treatment options for the house are identified. 	Pre-construction	2
Impacts on item 36: North Coast Railway Branch Tramway	HH17	HH15	<ul style="list-style-type: none"> Archival photographic recording will would be undertaken in accordance with the Heritage Branch guidelines How To Prepare Archival Records Of Heritage Items (NSW Heritage Office, 1998) prior to its removal. 	Pre-construction	2
Impacts on item 11: Tyndale residence, Tyndale	HH18	HH16	<ul style="list-style-type: none"> Prior to the start of construction, the location and condition of the mature bunya trees will would be recorded by an arborist. In consultation with an arborist, protective fencing will would be erected adjacent to the property boundary to control impacts on the trees. 	Pre-construction and construction	3
	HH19	HH17	<ul style="list-style-type: none"> The house has been identified for a Architectural noise treatment to the house to control noise levels from the project. The noise controls will would be investigated and provided developed where reasonable and feasible and in consultation with a qualified heritage consultant to minimise impacts on the heritage significance of the item. Consideration will be given for the need to revise the SOHI A more detailed SOHI would be prepared for this item when the specific architectural noise treatment options for the house are identified. 	Pre-construction	3
Impacts on item 12: Cane barge and former Ashby ferry, Maclean	HH20	HH18	<ul style="list-style-type: none"> A photographic condition survey will would be undertaken of the current condition of the heritage items with any damage to the item from construction to be repaired once construction is complete. 	Pre-construction	4
	HH21	HH19	<ul style="list-style-type: none"> Where appropriate, and before construction commences, any loose or unstable components of the heritage item will would be secured to minimise vibration impacts and remain secured until the conclusion of construction, at which time the securing mechanism/s will would be removed. Any methods to secure the heritage item will would be reversible and not cause damage to the item. 	Pre-construction and construction	4
		HH20	<ul style="list-style-type: none"> Roads and Maritime will would install appropriate directional signage on both the northbound and southbound highway approaches to help maintain a high level of awareness regarding of the heritage item's existence. 	Operation	4
Impacts on item 17: Harwood tram tracks,	HH22	HH21	<ul style="list-style-type: none"> The Petticoat Lane tram tracks section will would have a protective covering placed over them, (eg a geo textile fabric and heavy duty metal sheeting or similar) to minimise impacts from construction in the area. The covering will would be secured before construction and will would remain in place until 	Pre-construction and	5

WOOLGOOLGA TO BALLINA | PACIFIC HIGHWAY UPGRADE

Issue	ID number	Previous number	Mitigation <i>Environmental management measure</i>	Timing	Relevant section
Harwood			the end of construction.	construction	
Impacts to item 20: Harwood Bridge, Harwood	HH23	HH22	<ul style="list-style-type: none"> The design of the new bridge will would be undertaken in accordance with Bridge Aesthetics: Design Guidelines to Improve the Appearance of Bridges in NSW (RTA, 2003 <i>Roads and Maritime, 2012</i>) with specific reference to section 6.1, New bridges next to existing bridges. 	Pre-construction	5
Impacts on item 21: Convent, Harwood	HH24	HH23	<ul style="list-style-type: none"> An archival photographic recording will would be made of the convent building and its surrounds in accordance with the Heritage Branch guidelines How to Prepare Archival Records of Heritage Items (NSW Heritage Office, 1998) prior to its removal or relocation. 	Pre-construction	5
	HH25	HH24	<ul style="list-style-type: none"> The feasibility of relocating the building to an appropriate site within the Harwood Heritage Conservation Area will would be investigated. The investigation will would be undertaken in consultation with an appropriately qualified house removal contractor and an appropriately qualified heritage consultant. 	Pre-construction	5
Impacts on item 34 Townsend Residence, Townsend	HH26	HH25	<ul style="list-style-type: none"> The house has been identified for a Architectural noise treatment to the house to control noise levels from the project. The noise controls will would be investigated and provided developed where reasonable and feasible and in consultation with a qualified heritage consultant to minimise impacts on the heritage significance of the item. Consideration will be given for the need to revise the SOHI. A more detailed SOHI would be prepared for this item when the specific architectural noise treatment options for the house are identified. 	Pre-construction	5
Impacts on New Italy Settlement (State Heritage Register 1648), New Italy Museum Complex (item 23: New Italy Settlement sites, New Italy)	HH27	HH26	<ul style="list-style-type: none"> A photographic condition survey will would be undertaken of the current condition of the heritage items with any damage to the item from construction to be repaired once construction is complete. 	Pre-construction and construction	7
	HH28	HH27	<ul style="list-style-type: none"> Monitoring of dust will would be undertaken at this location in accordance with the project dust management plan. 	Pre-construction and construction	7
	HH29	HH28	<ul style="list-style-type: none"> A temporary fence will would be erected between the State Heritage Register boundary and the construction works before work starts in the vicinity of the heritage item. The fence will would remain in place until construction is completed at which time it would be removed. 	Operational	7
	HH30	HH29	<ul style="list-style-type: none"> Appropriate directional signage to the New Italy Museum Complex will would be installed at both the interchange at Woodburn and interchange at Illuka Road to divert visitors onto the service road in order to access the museum complex. Signage would comply with relevant Pacific Highway signage policy. 	Operation	7

Issue	ID number	Previous number	Mitigation <i>Environmental management measure</i>	Timing	Relevant section
Impacts on New Italy Memorial and Stone-lined well (item 23: New Italy Settlement sites, New Italy)		HH30	<ul style="list-style-type: none"> Before construction starts, the memorial and flagpole would be removed from their current location and reinstated within the boundaries of Lot 1 DP207390, outside the project boundary to the north of the stone-lined well. This work would be undertaken under the supervision of an appropriately qualified monumental stonemason and a qualified heritage professional. 	Pre-construction	7 (initial upgrade)
		HH34	<ul style="list-style-type: none"> An archival photographic recording and dilapidation survey would occur prior to the movement of the memorial and flagpole in accordance with Office of Environment and Heritage guidelines. 	Pre-construction	7 (initial and motorway upgrades)
		HH32	<ul style="list-style-type: none"> A photographic condition survey would be undertaken of the condition of the heritage items in their re-located positions with any damage to the items from construction to be repaired once construction is complete. 	Pre-construction	7 (initial and motorway upgrades)
	HH31	HH33	<ul style="list-style-type: none"> Monitoring of dust will would be undertaken at this location in accordance with the project dust management plan. 	Pre-construction and construction	7
	HH32	HH34	<ul style="list-style-type: none"> A temporary fence will would be erected between the new location of the memorial and flagpole and the construction works (within five metres of the heritage items) before work starts in the vicinity of the heritage item. The fence will would remain in place until conclusion is completed at which time it will would be removed. 	Pre-construction and construction	7
Impacts on Roder's stone-lined well and orchard (item 23: New Italy Settlement sites, New Italy)	HH33	HH35	<ul style="list-style-type: none"> Salvage excavation will would be undertaken to salvage any subsurface artefacts related to the well and adjacent wall. Excavations will would be undertaken under the supervision of an appropriately qualified and experienced historical archaeologist and in accordance with the Heritage Branch guidelines, including an appropriate research design and methodology in order to best realise the research potential of this area of the site. Consideration will be given to providing salvaged artefacts to the New Italy Museum. 	Pre-construction and construction	7
	HH34	HH36	<ul style="list-style-type: none"> Before construction starts in the vicinity of the orchard, the location and condition of each of the mango trees will would be recorded by an arborist. 	Pre-construction and construction	7
	HH35	HH37	<ul style="list-style-type: none"> Protective barrier fencing to protect the mango orchard will would be erected between the construction area and the trees with a buffer of at least five metres. This will would be erected before construction starts in the vicinity of the items and would remain in place until the end of construction at which time it will would be removed. 	Pre-construction and construction	7

Issue	ID number	Previous number	Mitigation <i>Environmental management measure</i>	Timing	Relevant section
	HH36	HH38	<ul style="list-style-type: none"> An archival photographic recording will would be made of the mango orchard and its surrounds in accordance with the Heritage Branch guidelines How To Prepare Archival Records Of Heritage Items (NSW Heritage Office, 1998) prior to its demolition. 	Pre-construction	7
Impacts on Historic New Italy Village Area	HH37	HH39	<ul style="list-style-type: none"> If any historical heritage remains are discovered at the New Italy Village Area during construction, management measure HH1 will would be applied. 	Pre-construction and construction	7
Impacts on item 26: Maloney property, Broadwater	HH38	HH40	<ul style="list-style-type: none"> An archival photographic recording will would be made of the buttery/creamery, the dairy and its surrounds in accordance with the Heritage Branch guidelines How To Prepare Archival Records Of Heritage Items (NSW Heritage Office, 1998) prior to demolition. 	Pre-construction	9
	HH39	HH41	<ul style="list-style-type: none"> The house has been identified for a Architectural noise treatment <i>to the house</i> to control noise levels from the project. The noise controls will would be investigated and provided developed <i>where reasonable and feasible and</i> in consultation with a qualified heritage consultant to minimise impacts on the heritage significance of the item. <i>Consideration will be given for the need to revise the SOHI</i> A more detailed SOHI would be prepared for this item when the specific architectural noise treatment <i>options</i> for the house are identified. 	Pre-construction	9
	HH40	<i>HH41a</i>	<ul style="list-style-type: none"> <i>Further investigations for gold shafts within and adjacent to the project corridor will occur near item 26.</i> 	<i>Pre-construction</i>	<i>9</i>
Impacts on item 27: Meerschaum Vale brickworks, Wardell	HH41	HH42	<ul style="list-style-type: none"> If brick material or any other historical heritage remains are discovered during works, management measure HH1 will would be applied. 	Construction	10
Impacts on item 28: Byrne property, Broadwater	HH42	HH43	<ul style="list-style-type: none"> An archival photographic recording will would be made of the stone quarry and small clay pit in accordance with the Heritage Branch guidelines How To Prepare Archival Records Of Heritage Items (NSW Heritage Office, 1998) is to be undertaken prior to construction. 	Pre-construction	9
	HH43	HH44	<ul style="list-style-type: none"> Salvage excavations to the south of the quarry (to salvage any artefacts relating to of the impact area of the site situated to the south of the quarry) will would be undertaken under the supervision of an appropriately qualified and experienced historical archaeologist. Salvage excavation will would be undertaken in accordance with the Heritage Branch guidelines including an appropriate research design and methodology in order to best realise the research potential of this area of the site. 	Pre-construction	9
		HH45	<ul style="list-style-type: none"> The brick lined well would be retained in situ and protected from all impacts. 	Pre-construction and	9

Issue	ID number	Previous number	Mitigation <i>Environmental management measure</i>	Timing	Relevant section
				construction	
	HH44	HH46	<ul style="list-style-type: none"> A photographic condition survey and structural audit of the brick-lined well will would be undertaken of the current condition of the heritage item with any damage to the item from construction to be repaired once construction is complete. 	Pre-construction	9
	HH45	HH47	<ul style="list-style-type: none"> Should blasting be required in the vicinity of this item, a detailed assessment of the level of vibration at the brick-lined well will be undertaken based on factors including distance from the blast site and the quantity of the explosive, and modelling of the predicted vibration levels at the brick-lined well. This assessment may result in additional mitigation measures for the structure including, but not limited to: <ul style="list-style-type: none"> Construction of temporary or permanent supports or shoring within the brick-lined well. Stabilisation of the brick-lined well. Installation of vibration monitoring devices. 	Pre-construction and construction	9
	HH46	HH48	<ul style="list-style-type: none"> Protective barrier fencing will would be erected around the brick-lined well with a 15-metre buffer before the start of construction and will would remain in place until the conclusion of the work, at which time it will would be removed. 	Pre-construction and construction	9
	HH47	HH49	<ul style="list-style-type: none"> Due to the proximity of the well to the roadway, the well may be closed for safety reasons. Any measures to close the well will enable access would ensure that the well could be accessed in the future for heritage research or other purposes and that no detrimental physical impact on the well occurs. 	Operation	9
Impacts on item 29: 'Stonehenge' Property, Wardell	HH48	HH50	<ul style="list-style-type: none"> An archival photographic recording will would be made of the main residence and the drainage system and its surrounds in accordance with the Heritage Branch guidelines How To Prepare Archival Records Of Heritage Items (NSW Heritage Office, 1998) prior to its demolition. A detailed survey and recording of the location of the drainage system within the 'Stonehenge' property will would also be undertaken. 	Pre-construction	10
	HH49	HH51	<ul style="list-style-type: none"> The house has been identified for a Architectural noise treatment to the house to control noise levels from the project. The noise controls will would be investigated and provided developed where reasonable and feasible and in consultation with a qualified heritage consultant to minimise impacts on the heritage significance of the item. Consideration will be given for the need to revise the SOHI A more detailed SOHI would be prepared for this item when the specific architectural noise treatment options for the house are identified. 	Pre-construction	10
Impacts on item 38: Cemetery reserve	HH50	HH52	<ul style="list-style-type: none"> To protect the heritage item from construction activities, the boundary of the reserve will would be clearly identified on site/construction plans as an area of exclusion, and temporary barrier fencing will would 	Pre-construction and	9

Issue	ID number	Previous number	Mitigation <i>Environmental management measure</i>	Timing	Relevant section
			<p>would be constructed continuously along the project boundary:</p> <ul style="list-style-type: none"> • Immediately south of the cemetery reserve. • Where it crosses the south east corner of the cemetery reserve. • Where it follows the east boundary of the cemetery reserve. 	construction	
Impacts on Item 33: High Conservation Value Old Growth Forest	HH51	HH53	<ul style="list-style-type: none"> • During detailed design <i>will consider the extent to which clearing High Conservation Value Old Growth Forest within the project boundary may be minimised</i>, further consideration would be given to minimising the area of HCVOGF to be cleared. 	Pre-construction	2, 6 and 7
	HH52	HH54	<ul style="list-style-type: none"> • The area to be cleared <i>will</i> would be clearly identified on-site. High Conservation Value Old Growth Forest adjacent to areas to be cleared would be delineated to avoid accidental disturbance on further areas. 	Construction	2, 6 and 7
<i>Impacts on Item 43: Drainage channels, Broadwater</i>	HH53	<i>HH54a</i>	<ul style="list-style-type: none"> • <i>An archival photographic recording would be made of the drainage channels and its surrounds in accordance with the Heritage Branch guidelines prior to its destruction.</i> 	<i>Pre-construction</i>	<i>10</i>
Traffic and transport					
Construction traffic management	T&T1	T&T1	<ul style="list-style-type: none"> • Construction traffic management plans <i>will</i> would be prepared and implemented for work sites. They <i>will</i> would include: <ul style="list-style-type: none"> • Identification of all public roads to be used by construction traffic. • Management methods to direct construction traffic to use identified roads. • Identification of all public roads that may be partially or completely closed during construction, and the expected timing and duration of closures. • Details on likely impacts on existing traffic (including pedestrians, vehicles, cyclists and disabled persons). • Temporary traffic arrangement measures, including property access. • Details on access to construction sites, including entry and exit locations, and measures to prevent construction vehicles queuing on public roads. • A response plan for any incident involving construction traffic. • Mechanisms for monitoring, reviewing and amending the success of the plans. <p>The traffic management plans would be prepared in consultation with councils.</p>	Pre-construction and construction	All
Bulk earthworks haulage	T&T2	T&T2	<ul style="list-style-type: none"> • A strategy <i>will</i> would be prepared for bulk earthworks haulage between the crossing of the Richmond River and the interchange at Wardell. The strategy <i>will</i> would seek to maximise the extent of haulage 	Pre-construction	Section 10

Issue	ID number	Previous number	Mitigation <i>Environmental management measure</i>	Timing	Relevant section
			within the project boundary and limit the need to haul material through the town of Wardell.	and construction	
Inspection of roadwork traffic schemes	T&T3	T&T3	<ul style="list-style-type: none"> Traffic control schemes will would be inspected as follows: <ul style="list-style-type: none"> Pre-start and pre-closedown inspections of short-term traffic controls. Weekly inspections of long-term traffic controls. Night-time inspections of long-term traffic controls. 	Construction	All
Vehicle movement	T&T4	T&T4	<ul style="list-style-type: none"> Vehicle movement plans and haulage route plans will would be prepared. Drivers would be briefed on these vehicle movement plans during project induction. Deliveries would be planned to occur outside peak traffic periods, where possible. To minimise queuing of construction vehicles on the highway, site personnel would use two-way radios to call up haulage trucks from layover areas on a 'just in time' basis. 	Construction	All
Road occupancy	T&T5	T&T5	<ul style="list-style-type: none"> Applications for Road Occupancy licences will would be submitted to Roads and Maritime Services and the relevant council at least 10 working days prior to proposed occupancy. 	Pre-construction and construction	All
Road damage	T&T6	T&T6	<ul style="list-style-type: none"> Pre-construction road dilapidation reports will would be prepared for all roads likely to be used by construction traffic. Post-construction road dilapidation reports will would be prepared following the completion of construction for all roads assessed prior to construction. Dilapidation resulting from construction activity will would be repaired. Copies of road dilapidation reports will would be sent to the relevant roads authority. 	Pre-construction and construction	All
Property and road access	T&T7	T&T7	<ul style="list-style-type: none"> Access would be maintained to properties during construction including, where necessary and feasible, temporary alternative access unless otherwise agreed with property owners. Where any legal access is permanently affected, alternative access to an equivalent standard to and from a public road will would be provided where a property has no other legal means of access and where such alternative access is feasible and practical. Where alternative access arrangements are not feasible or practical and a property is left with no access to a public road, negotiations will would be undertaken with the relevant property owner for acquisition of the property in accordance with the provisions of the Land Acquisition (Just Terms Compensation) Act 1991. 	Construction	All
Bus services	T&T8	T&T8	<ul style="list-style-type: none"> Where changes in access affect bus stop locations, temporary alternatives will would be provided in 	Construction	All

WOOLGOOLGA TO BALLINA | PACIFIC HIGHWAY UPGRADE

Issue	ID number	Previous number	Mitigation <i>Environmental management measure</i>	Timing	Relevant section	
			conjunction with bus operators and affected schools to maintain access during construction.			
Access to State forests	T&T9	T&T9	<ul style="list-style-type: none"> Where access to State forest land is affected during construction, a new access route will would be provided in consultation with the Department of Primary Industries (Forests NSW). 	Construction	All	
Maritime traffic	T&T10	T&T10	<ul style="list-style-type: none"> Where maritime traffic access to the Clarence and Richmond rivers is affected during construction of bridge crossings, appropriate signage will would be provided indicating alternative means of access and the timing of the works. 	Construction	Section 5 and Section 10	
	T&T11		<ul style="list-style-type: none"> Access to the Clarence and Richmond rivers will be maintained for industry and recreational waterway users. 	Construction	5 and 10	
Access and connectivity		T&T11	<ul style="list-style-type: none"> The interchange arrangement at Range Road would be reviewed to refine local access to and from the highway. 	Pre-construction	Section 4	
		T&T12	<ul style="list-style-type: none"> The location of access to the service station for northbound traffic at Lemon Tree Road, Halfway Creek will would be reviewed at the detailed design stage. 		Section 2	
		T&T12	T&T13	<ul style="list-style-type: none"> Access to Glenugie State Forest around the interchange at Eight Mile Lane and Lookout Road will would be further reviewed in consultation with State Forest Corporation Forests NSW. 	Pre-construction and construction	Section 3
		T&T14		<ul style="list-style-type: none"> Access arrangements between the interchange at Maclean and Townsend via Jubilee Street would be reviewed taking into consideration the current heavy vehicle movements to the industrial estate at Townsend. 		Section 4
		T&T13	T&T15	<ul style="list-style-type: none"> The layout of the intersection at Yamba Road will would be reviewed to better meet the needs of truck movements from Harwood Mill, where reasonable and feasible. 	Pre-construction	Section 5
		T&T14	T&T17	<ul style="list-style-type: none"> The need for a full interchange at Yamba Road will would be investigated should traffic growth warrant it in the future and when funding is available. 	Pre-construction	Section 5
		T&T15	T&T18	<ul style="list-style-type: none"> The need for a full interchange with south facing ramps at Watts Lane, Harwood will would be investigated should traffic growth warrant it in the future and when funding is available. 	Pre-construction	Section 5
		T&T16	T&T19	<ul style="list-style-type: none"> The need for the overpass and the arrangement of local access at Chatsworth Road will would be reviewed at the detailed design stage depending on specific staging and delivery of the highway. 	Pre-construction	Section 5
		T&T17	T&T20	<ul style="list-style-type: none"> The need for the overpass and arrangement of local access at Carrols Lane would be reviewed at the 	Pre-construction	Section 5

Issue	ID number	Previous number	Mitigation <i>Environmental management measure</i>	Timing	Relevant section
			detailed design stage depending on specific staging and delivery of the highway		
		T&T24	<ul style="list-style-type: none"> The need and delivery strategy for the heavy vehicle checking station at the rest area in Section 10 north of Richmond River would be reviewed. 		Section 10
	T&T18	T&T16	<ul style="list-style-type: none"> Connectivity between the shared user path from Harwood Bridge to Yamba Road would be reviewed to refine pedestrian and cyclist access 		Section 5
Noise and vibration					
Construction <i>noise</i> phase					
Noise	CNV1	CNV1	<ul style="list-style-type: none"> Affected receivers will will be notified prior to the commencement of out of hours work. Notification would include contact details of project personnel in charge of the out of hours works. 	Construction	All sections
Noise	CNV2	CNV2	<ul style="list-style-type: none"> Construction will will be timetabled to minimise noise impacts where feasible and reasonable. This may include time and duration restrictions and respite periods. These measures will will be considered after consultation with affected receivers. 	Construction	All sections
Noise	CNV3	CNV3	<ul style="list-style-type: none"> Haulage routes will will be located as far away as possible from residential receivers, where this is reasonable and feasible. 	Construction	All sections
Noise		CNV4	<ul style="list-style-type: none"> The use of noisy plant simultaneously and/or close together will will be avoided, where possible. This will will include equipment operating at separate early work sites to avoid cumulative noise impacts. 	Construction	All sections
Noise		CNV5	<ul style="list-style-type: none"> Equipment/plant within ancillary facilities will will be located as far as possible from receivers. 	Construction	All sections
Noise	CNV4	CNV6	<ul style="list-style-type: none"> Equipment will will be maintained in efficient working order. 	Construction	All sections
Noise	CNV5	CNV7	<ul style="list-style-type: none"> Quieter construction methods will will be used, where there are sensitive receivers potentially affected and where this is considered reasonable and feasible. These may include grinding, rock splitting or terrain levelling instead of hydraulic rock breaking. 	Construction	All sections
Noise	CNV6	CNV8	<ul style="list-style-type: none"> Where acceptable from a work health and safety perspective, quieter alternatives to reversing alarms 	Construction	All

Issue	ID number	Previous number	Mitigation <i>Environmental management measure</i>	Timing	Relevant section
			(such as spotters, closed circuit television monitors and 'smart' reversing alarms) will <i>would</i> be used, particularly during night-time activities.		sections
Noise	CNV7	CNV9	<ul style="list-style-type: none"> All noise complaints received will <i>would</i> be dealt with promptly. Construction methods may need to be altered to reduce noise impacts at the affected locations. 	Construction	All sections
Noise	CNV8	CNV10	<ul style="list-style-type: none"> Machinery will <i>would</i> not be turned on prior to the work hours outlined in this EIS. This will <i>would</i> include daily maintenance activities and/or 'warming up' of engines. 	Construction	All sections
Noise	CNV9	CNV11	<ul style="list-style-type: none"> Truck movements will <i>would</i> be restricted to identified haulage routes and the routes outlined in the Construction Traffic Management Plan. 	Construction	All sections
Noise	CNV10	CNV12	<ul style="list-style-type: none"> Where it has been identified as necessary (eg in response to community complaints), noise monitoring will <i>would</i> be undertaken to check that the noise mitigation measures are effective. 	Construction	All sections
Noise	CNV11	CNV13	<ul style="list-style-type: none"> After community consultation, The use of temporary noise shielding will <i>would</i> be considered at locations where substantial exceedances of noise criteria are predicted. 	Construction	All sections
Noise	CNV12	CNV14	<ul style="list-style-type: none"> Static noise sources, such as generators, pumps and lighting towers, will <i>would</i> be located as far as possible from sensitive receivers. 	Construction	All sections
Noise	CNV13	CNV15	<ul style="list-style-type: none"> Regular noise monitoring will <i>would</i> be undertaken during normal business hours <i>proposed construction</i> hours at a representative receiver location, <i>between:</i> <ul style="list-style-type: none"> <i>6am to 7pm, Monday to Friday.</i> <i>8am to 5pm, Saturday.</i> 	Construction	All sections
Noise	CNV14	CNV16	<ul style="list-style-type: none"> The selection of plant and equipment will <i>would</i> be based on noise emission levels. This equipment will <i>would</i> be operated and maintained so that noise emissions are minimised. 	Construction	All sections
Vibration	CNV15	CNV17	<ul style="list-style-type: none"> Where piling, hydraulic hammering or dynamic compaction is proposed within 50 metres of any structure or service, a building condition survey will <i>would</i> be conducted and preliminary vibration monitoring undertaken by a qualified contractor. 	Construction	All sections
Vibration	CNV16	CNV18	<ul style="list-style-type: none"> Where piling, hydraulic hammering or dynamic compaction is proposed within 50 metres of any heritage structure or potentially structurally unsound service, a building condition survey will <i>would</i> be conducted and preliminary vibration monitoring undertaken by a qualified contractor. A follow-up survey will <i>would</i> be conducted in response to any vibration complaints. 	Construction	All sections
Vibration	CNV17	CNV19	<ul style="list-style-type: none"> Appropriately sized equipment will <i>would</i> be selected in order to minimise vibration emissions, where 	Construction	All sections

Issue	ID number	Previous number	Mitigation <i>Environmental management measure</i>	Timing	Relevant section
			required.		
Blasting (controlled)	CNV18	CNV20	<ul style="list-style-type: none"> A blast management plan will would be prepared prior to the start of blasting activities. 	Pre-construction	All sections
Blasting (controlled)	CNV19	CNV21	<ul style="list-style-type: none"> Where sensitive receivers are located close to the blast site, a series of trials will would be undertaken at a reduced scale to determine site-specific blast response characteristics, in order to define allowable blast sizes to occur within the criteria. 	Construction	All sections
Blasting (controlled)	CNV20	CNV22	<ul style="list-style-type: none"> Controlled blasting activities will would only be undertaken between the hours of: <ul style="list-style-type: none"> 8am to 5pm, Monday to Friday. 8am to 1pm, Saturday. <p>These times may be increased with the written agreement of affected residents.</p> <p>Where the blast management plan has identified potential impacts on sensitive receivers, these hours will would be subject to change.</p>	Construction	All sections
Blasting (controlled)	CNV21	CNV23	<ul style="list-style-type: none"> A minimum of 24 hours' notice will would be provided to all residences located within 500 metres of any blast, including an indication of blasting times and a contact name and telephone number. 	Construction	All sections
Construction Blasting (controlled)	CNV22	CNV24	<ul style="list-style-type: none"> Monitoring of overpressure and vibration levels will would be undertaken for each blast at the potentially most affected receivers. 	Construction	All sections
Blasting (controlled)	CNV23	CNV25	<ul style="list-style-type: none"> A building condition survey will would be undertaken for all buildings located within 200 metres of the proposed blasting area prior to the start of blasting. The proponent will would be responsible for rectifying any damage occurring from the blasting, with the cost to be borne by the proponent. 	Construction	All sections
	CNV24	CNV25a	<ul style="list-style-type: none"> <i>Should blasting be required within 200 metres of the water reservoirs at the Lang Hill borrow source, a dilapidation or preconstruction condition survey will be undertaken before blasting work commences in consultation with Richmond Valley Council and Rous Water.</i> 	Construction	8
Blasting (controlled)	CNV25	CNV26	<ul style="list-style-type: none"> The maximum instantaneous charge (MIC) will would be reduced to the lowest possible level by the use of delays, reduced diameter holes, and/or deck loading. 	Construction	All sections
Blasting (controlled)	CNV26	CNV27	<ul style="list-style-type: none"> Adequate stemming will would be provided and exposed detonating cord would be eliminated (by covering with at least 300 millimetres of quarry dust or road base). 	Construction	All sections
Blasting (controlled)	CNV27	CNV28	<ul style="list-style-type: none"> Secondary blasting will would be eliminated. (A rock breaker or drop hammer would be used instead of popping). Effort will would be made to eliminate the need for toe shots (eg by better control of drill patterns). 	Construction	All sections

Issue	ID number	Previous number	Mitigation <i>Environmental management measure</i>	Timing	Relevant section
Blasting (controlled)	CNV28	CNV29	<ul style="list-style-type: none"> Weather conditions at the time of the blast will would be assessed. Blasting will would be avoided where possible during heavy cloud cover and/or if a strong wind is blowing towards residences. Days of severe temperature inversion will would be avoided where possible or, (if not possible) blasting will would occur between 11am and 1pm. 	Construction	All sections
Blasting (controlled)	CNV29	CNV30	<ul style="list-style-type: none"> Strict control will would be exercised over the spacing and orientation of all blast drill holes. Holes will would be spaced in such a manner that the explosive force is just sufficient to break the stone to the required size. 	Construction	All sections
Blasting (controlled)	CNV30	CNV31	<ul style="list-style-type: none"> Controlled blasting times will would be determined in consideration of site-specific conditions and in consultation with affected residents and would take place, where possible, when impacts are likely to be the least intrusive (eg all blasts would be fired at a set time acceptable to residents and preferably when the background noise is highest). 	Construction	All sections
Consultation	CNV31	CNV32	<ul style="list-style-type: none"> Identified receivers will would be notified by letter of the proposed hours and asked for comment and feedback. This will would include justification for the proposed extended working hours along with the benefits the community can expect. Where the community or individual residents wish to receiver further clarification on the proposed hours, individual interviews or public meetings will would be organised to address any further issues. Discussions will would be sufficiently detailed to provide a general summary of the expected impacts but also how this relates to individual receivers. At this stage, more detail will would be available regarding the proposed construction activities to be undertaken in the extended hours. Property owners will would be provided with the complaints management procedures to be in place for extended working hours. Feedback will would be collected to help determine the final adopted working hours for the project, with community consultation continuing throughout the project. 	Pre-construction	All sections
Operation <i>noise</i> phase					
Road traffic noise	ONV1	ONV1	<ul style="list-style-type: none"> Architectural treatments will would be considered for all identified noise-affected receivers identified in the EIS and Submissions / Preferred Infrastructure Report (Appendix F), subject to confirmation at the detailed design stage. 	Pre-operation	All Noise affected sections
Road traffic noise	ONV2	ONV2	<ul style="list-style-type: none"> Low noise wearing surface will would be implemented in areas identified in section 5.3.21 of the EIS. considered noise-affected sections of the project where required, subject to confirmation at the detailed design stage. 	Pre-operation	1,3,4,5,8, and 10 Noise affected sections

Issue	ID number	Previous number	Mitigation <i>Environmental management measure</i>	Timing	Relevant section
Road traffic noise	ONV3	ONV3	<ul style="list-style-type: none"> No later than one year after commencement of operation of the project stages as they are constructed, Roads and Maritime will undertake operational noise monitoring to compare the actual noise performance of the project against predicted noise performance. The report will include, but not necessarily be limited to: <ul style="list-style-type: none"> Noise monitoring to assess compliance with the operational noise levels predicted. A review of the operational noise levels in terms of criteria and noise goals. Methodology, location and frequency of noise monitoring undertaken. Details of any complaints and enquiries received in relation to operational noise. Any required recalibrations of the noise model. An assessment of the performance and effectiveness of applied noise mitigation measures. Any additional feasible and reasonable measures required. 	Post-operation	All sections
Land use and property					
Property acquisition and managing surplus land	LU1	LU1	<ul style="list-style-type: none"> Undertake Ongoing communication and consultation will be undertaken with directly affected property owners about the property acquisition process. This includes the provision of information on the timing of acquisitions, and the process for property acquisitions under the <i>Land Acquisition (Just Terms Compensation) Act 1991</i> and Roads and Maritime' Land Acquisition Policy (RTA, 1999). 	Pre-construction	All
	LU2	LU2	<ul style="list-style-type: none"> Undertake Ongoing consultation will be undertaken with directly affected property owners during the detailed design phase to identify measures to mitigate potential impacts on the use and viability of land. This will relate to matters such as adjustments to fencing, access, farm infrastructure and relocation of impacted ancillary structures, as required. 	Pre-construction	All
Fencing Strategy	LU3	LU3	<ul style="list-style-type: none"> Complete Property adjustments will be completed for fencing, access tracks, cattle underpasses and other farm infrastructure in consultation with the impacted land owner. 	Pre-construction	All
	LU4	LU3a	<ul style="list-style-type: none"> The Fencing Strategy will be further developed during detailed design, in consultation with relevant stakeholders. This will build upon the principles of the strategy described in Chapter 3 of the Submissions and Preferred Infrastructure Report (Roads and Maritime, 2013). 	Pre-construction	All
Property acquisition and managing surplus land	LU5	LU4	<ul style="list-style-type: none"> Minimise Sterilisation and severance of land uses and lots will be minimised by amalgamating severed parcels of land together, where possible, with provision of road access, in accordance with the project's remnant land use strategy. 	Pre-construction	All
	LU6	LU5	<ul style="list-style-type: none"> Where required, undertake acquisition of State forests will be minimised in accordance with the provisions of the <i>Forestry Act 2012-1946</i>. Revocation of land dedicated or reserved as national parks or nature reserves will be in accordance with the <i>National Parks and Wildlife Act 1974</i>. 	Pre-construction	All

Issue	ID number	Previous number	Mitigation <i>Environmental management measure</i>	Timing	Relevant section
			Acquisition of land owned by Local Aboriginal Land Councils will would be in accordance with the provisions of the <i>Aboriginal Land Rights Act 1983</i> .		
	LU7	LU6	<ul style="list-style-type: none"> A remnant land strategy to minimise land use severance and sterilisation, and a mitigation strategy for final land uses will would be developed in consultation with cane industry stakeholders, Coffs Harbour City, Clarence Valley, Richmond Valley and Ballina Councils. 	Pre-construction	All
	LU8	LU6a	<ul style="list-style-type: none"> <i>The requirement for a retaining wall structure at station 83.2, between the road reserve and adjoining property, will be confirmed during detailed design.</i> 	Pre-construction	5
Property access during construction	LU9	LU7	<ul style="list-style-type: none"> Maintain Access to properties near construction works will be maintained, including where required for the movement of farm equipment and livestock between properties, unless otherwise agreed with landowners. 	Construction	All
	LU10	LU8	<ul style="list-style-type: none"> Where temporary changes to property access are required during construction, determine alternative access will be determined in consultation with affected property owners and tenants. 	Construction	All
	LU11	LU9	<ul style="list-style-type: none"> Undertake There will be ongoing communication with local communities about changes to the local road network, including likely delays and disruptions and alternative accesses if required. 	Construction	All
Local amenity during construction		LU10	<ul style="list-style-type: none"> Undertake early and ongoing consultation and communication with residents and local communities closest to construction works about construction activities, including timing, duration and likely impacts. This is particularly important where works are proposed outside standard daytime construction hours. 	Construction	All
Construction impacts to primary industry, including forestry, and agriculture uses	LU12	LU11	<ul style="list-style-type: none"> Develop a spoil management plan to manage surplus spoil from construction. Where possible, onsite reuse of any spoil is the preferred solution for managing the impacts, although alternative options for the reuse or disposal of spoil would be identified in the spoil surplus material management plan. 	Construction	All
	LU13	LU11a	<ul style="list-style-type: none"> <i>The management of surplus material will be further developed during detailed design, in consultation with relevant stakeholders. This will build upon the principles of the strategy described in Chapter 3 of the Submissions and Preferred Infrastructure Report (Roads and Maritime, 2013).</i> 	Pre-construction	All
	LU14	LU12	<ul style="list-style-type: none"> Forests Forestry Corporation of NSW would will be able to harvest millable timber in affected State forests prior to works commencing. However, consideration should will also be given to opportunities for the productive use of trees removed from non State forest areas of the project, including ancillary facilities where necessary. 	Construction	All
	LU15	LU13	<ul style="list-style-type: none"> Implement Environmental management measures will be implemented to minimise potential for 	Construction	All

Issue	ID number	Previous number	Mitigation <i>Environmental management measure</i>	Timing	Relevant section
			impacts on adjoining agricultural uses, including from changes in water quality and spread of weeds and pests.		
	LU16	LU14	<ul style="list-style-type: none"> Where pesticides are required during construction, implement appropriate environmental management measures to avoid potential impacts on adjoining agricultural properties. 	Construction	All
	LU17	LU15	<ul style="list-style-type: none"> Undertake There will be ongoing consultation and communication with managers of agricultural properties to identify any potential impacts on nearby construction workers from farm operations (ie use of pesticides on agricultural properties). 	Construction	All
	LU18	LU16	<ul style="list-style-type: none"> Undertake Ongoing consultation and communication will be undertaken with commercial fishing and relevant aquaculture operators about construction activities within and near the Clarence and Richmond rivers. Stakeholders would include the estuary prawn trawl fishery, and estuary general fishery within the Clarence River, the NSW Department of Primary Industries (Fisheries) and licensed fishing interests within the Richmond River regarding the timing and duration of construction, potential impacts (including changes to river access) and proposed mitigation measures. 	Construction	All
Utilities and infrastructure	LU19	LU17	<ul style="list-style-type: none"> Where Relocation or adjustment of infrastructure is required, these should be planned to minimise disruptions and impacts on surrounding properties. 	Construction	All
	LU20	LU18	<ul style="list-style-type: none"> Communicate Communication will be undertaken with nearby communities about the timing and duration of potential disruptions to infrastructure. 	Construction	All
Property management	LU21	LU19	<ul style="list-style-type: none"> Ensure Roads and Maritime' land that is required for the project will be appropriately maintained. This would be undertaken by regional Roads and Maritime officers or a designated local authority. Roads and Maritime would manage the leasing and maintenance of property identified as suitable for tenants. 	Operation	All
	LU22	LU20	<ul style="list-style-type: none"> Ensure that Excavation works near Lot7008 DP92609 will be carefully managed in consultation with Richmond Valley Council to minimise potential impacts on any unknown heritage items including potential burials. 	Construction	9
Operational impacts to primary industries, including forestry, agriculture and	LU23	LU21	<ul style="list-style-type: none"> Undertake Ongoing consultation will be undertaken with owners of agricultural properties affected by the project – through acquisition, changes to local access or fragmentation of properties – about potential impacts on farming operations and potential measures to manage or mitigate identified impacts. 	Operation	All
	LU24	LU22	<ul style="list-style-type: none"> Consultation with Forestry Corporation will be undertaken regarding access to and within State forests where required, in accordance with the <i>Forestry Act 192012</i>. 	Operation	All

Issue	ID number	Previous number	Mitigation <i>Environmental management measure</i>	Timing	Relevant section
aquaculture	LU25	LU23	<ul style="list-style-type: none"> Consult with Forests NSW about Consultation with Forestry Corporation will be undertaken regarding the relocation of fire trails directly impacted by the project's construction or operation. 	Operation	All
	LU26	LU24	<ul style="list-style-type: none"> Revegetate land as appropriate, particularly where there are ecological and/or landscape opportunities. 	Operation	All
Cane Farm Strategy	LU27	LU25	<ul style="list-style-type: none"> Identify suitable locations for relocated cane pads and restore affected cane drains where possible in consultation with cane growers and affected property owners. The Cane Farm Strategy will be further developed during detailed design, in consultation with relevant stakeholders. This will build upon the principles of the strategy described in Chapter 3 of this Submissions and Preferred Infrastructure Report. 	Operation- Pre-construction	All
Property access	LU28	LU26	<ul style="list-style-type: none"> As far as possible, reinstate or provide new property accesses will be reinstated or new access provided to replace those that are lost or modified, in consultation with impacted landowners. 	Operation	All
	LU29	LU26a	<ul style="list-style-type: none"> Access to national parks and nature reserves will be reinstated in consultation with the relevant department in Office of Environment and Heritage. 	Operation	All
	LU30	LU27	<ul style="list-style-type: none"> The tie in to the existing highway and land requirement for the property at station 145.0 would be reviewed at the detailed design stage. 	Pre-construction	9
Mining and petroleum production	LU31	LU28	<ul style="list-style-type: none"> Consultation will be undertaken Undertake on-going consultation with land owners operating quarries within the project boundary and adjacent to the project, including those near Tucabia, Broadwater and Bagotville, and relevant NSW State government agency. Consultation would aim to identify appropriate management measures required due to the realignment of the project near to operational quarries. In particular, management arrangements would be determined for each affected quarry, particularly regarding operational approvals in terms of site access, extraction limits, blasting limits, and timing of works, noise and vibration. 	Pre-construction	3, 9 and 10
	LU32	LU29	<ul style="list-style-type: none"> Consultation will be undertaken with the coal seam gas proponents operating in the study area and the relevant State Government agency to ensure that consider any future coal seam gas production in the vicinity of the project are minimised. 	Pre-construction	All
Utilities and infrastructure	LU33	LU30	<ul style="list-style-type: none"> Consultation will be undertaken with service and utility providers to verify locations, impacts and any relocation or construction protection work required and specific impacts on infrastructure and utilities. 	Operation	All
	LU34	LU30a	<ul style="list-style-type: none"> Consultation will be undertaken with Rous Water and local Aboriginal stakeholders before the removal of part or any of the abandoned pipelines through Lang Hill will be undertaken in 	Pre-construction	8

Issue	ID number	Previous number	Mitigation <i>Environmental management measure</i>	Timing	Relevant section
			<i>consultation</i>		
	LU35	LU31	<ul style="list-style-type: none"> Consultation will be undertaken with Richmond Valley Council during the detailed design phase, regarding the location and timing of the Broadwater Sewerage Scheme rising pump station, located off Broadwater-Evans Head Road. 	Pre-construction	9
Social and economic					
Consultation with local business, community facilities and residents	SE1	SE1	<ul style="list-style-type: none"> Consultation will be undertaken Ongoing communication and consultation with local business owners, industry and tourism operators directly affected by construction and located closest to construction works. The focus will will be on the timing, duration and likely impact of construction activities, and to identify appropriate measures to manage potential impacts. 	Pre-construction and during construction	All
	SE2	SE2	<ul style="list-style-type: none"> Consultation will be undertaken Ongoing communication and consultation with managers of community services and facilities near the proposed construction works, to ensure that potential impacts are appropriately managed. 	Pre-construction and during construction	All
	SE3	SE3	<ul style="list-style-type: none"> Consultation will be undertaken early and ongoing consultation and communication with residents and local communities closest to construction works about construction activities, including timing, duration and likely impacts. This would be particularly important where works are proposed outside of standard daytime construction hours. 	Pre-construction and during construction	All
Strategy for bypassed towns, local government areas and amenity	SE4	SE4	<ul style="list-style-type: none"> Implementation of effective Signage would be implemented for bypassed towns in accordance with Roads and Maritime signage guidelines and in consultation with relevant councils. Signage on the project will will identify bypassed townships (Grafton, Ulmarra, Tyndale, Maclean, New Italy, Woodburn, Broadwater and Wardell) as places for 'stopovers' for fuel, supplies and short term accommodation, to support demand for goods and services within these townships. 	During construction, and operation	All
	SE5	SE5	<ul style="list-style-type: none"> Roads and Maritime will will work with Councils affected by the upgrade, where relevant, to support strategies by local councils and/or chamber of commerce and industry to promote townships and villages as stopovers for tourist activities with the aim of bringing increased business to nearby townships and villages. 	During construction, and operation	All
Ownership of the existing Pacific Highway	SE6	SE5a	<ul style="list-style-type: none"> Roads and Maritime will work with Councils affected by the upgrade, during detailed design, to discuss the classification of the existing Pacific Highway and, where appropriate, the required transfer process of state road assets to Council. 	Pre-construction	All
Access and connectivity	SE7	SE6	<ul style="list-style-type: none"> Maintain access to properties near to the project during construction, including, where required, for the movement of farm equipment and livestock between properties, and for access to the Berry 	During construction	All

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			Exchange and other affected agribusinesses.		
	SE8	SE7	<ul style="list-style-type: none"> Where temporary changes to property access are required during construction, alternative access will should be determined in consultation with affected property owners and tenants. 	During construction	All
Access and Connectivity	SE9	SE8	<ul style="list-style-type: none"> Undertake consultation with the New Italy community about proposed access changes for the New Italy Museum, including potential impacts and recommended mitigation measures. In particular, access into Swan Bay New Italy Road and the New Italy museum would be investigated at the detailed design stage. 	Pre-construction	All
	SE10	SE9	<ul style="list-style-type: none"> Undertake consultation with the Harwood Island Public School and other community facilities located adjacent to the project about proposed changes to local access. 	During operation	All
	SE 11	SE10	<ul style="list-style-type: none"> Undertake early and ongoing communication and consultation with emergency services to allow planning for potential changes to response patterns and input into the design development. 	During operation	All
		SE11	<ul style="list-style-type: none"> Appropriate access arrangements to and from Gulmarrad, including the provision of a highway overpass at McIntyres Lane would be considered at the detailed design stage in consultation with Clarence Valley Council. 	Pre-construction	Section 4
		SE12	<ul style="list-style-type: none"> Access arrangements between Bondi Hill and Byron Lane, and north towards Gallaghers Lane, would be reviewed at the detailed design stage in consultation with affected property owners and the cane industry. 	Pre-construction	Section 4
		SE13	<ul style="list-style-type: none"> Access arrangements east and north of Watts Lane would be reviewed at the detailed design stage to facilitate delivery as part of the initial upgrade to arterial standard. 	Pre-construction	Section 5
	SE12	SE14	<ul style="list-style-type: none"> Access to Broadwater mill land between MacDonalds Street and River Road will would be reviewed at the detailed design stage. 	Pre-construction	Section 9
	SE13	SE15	<ul style="list-style-type: none"> The access arrangements for local traffic at Whytes Lane and the tie into the Ballina bypass upgrade will would be reviewed together with any potential boundary refinements at the detailed design stage. 	Pre-construction	Section 11
River access		SE16	<ul style="list-style-type: none"> Maintain access to the Clarence and Richmond rivers near construction activities, including for industry, tourism, fishing (general and prawn trawl) and recreation users. 	During construction	Sections 5 and 10
		SE17	<ul style="list-style-type: none"> Maintain recreational access to the Clarence and Richmond rivers near construction activities, including access to existing boat ramps upstream of the existing Clarence River bridge at Harwood. Where river access is disrupted, suitable alternative access should be provided. 	During construction	Sections 5 and 10

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Greenhouse gas emissions					
Carbon stored in vegetation		GHG1	<ul style="list-style-type: none"> Vegetation clearance would be minimised where feasible. Areas to be revegetated would be revegetated with native species, where practicable, taking into account potential for offsetting lost CO₂ clearance. 	Construction	All
Embodied carbon in concrete production	GH1	GHG2	<ul style="list-style-type: none"> Flyash content within concrete would be specified where feasible. Contractors will would be required to propose recycled content construction materials where they are cost, quality and performance competitive. 	Pre-construction / construction	All
Re-use of excavated road materials	GHG2	GHG3	<ul style="list-style-type: none"> Reuse of excavated road materials will would be maximised as far as possible where they are cost, quality and performance competitive to reduce use of materials (with embedded energy). 	Pre-construction / construction	All
Embodied carbon in steel	GHG3	GHG4	<ul style="list-style-type: none"> Steel with high recycled content will would be specified where feasible where they are cost, quality and performance competitive. Contractors will would be required to propose recycled content construction materials where they are cost, quality and performance competitive. 	Pre-construction / construction	All
Carbon in fuel	GHG4	GHG5	<ul style="list-style-type: none"> The feasibility of using biofuels (biodiesel, ethanol, or blends such as E10 or B80) will would be investigated by the contractor, taking into consideration the capacity of plant and equipment to use these fuels, ongoing maintenance issues and local sources. Works will would be planned to minimise fuel use. 	Construction	All
Energy consumption: construction	GHG5	GHG6	<ul style="list-style-type: none"> An energy management plan will would be developed during the construction of the project. The plan will would include a commitment to monitor on-site energy consumption and identify and address on-site energy waste. 	Pre-construction / construction	All
Energy consumption: operation	GHG6	GHG7	<ul style="list-style-type: none"> Roads and Maritime will would investigate the use of LED lighting in place of incandescent lamps as part of the project's detailed design, and use them where practicable to reduce electrical energy consumption. Any energy-efficient alternatives will would have to meet lighting standards for major roads. 	Operation	All
Education	GHG7	GHG8	<ul style="list-style-type: none"> An education program will would be developed and delivered to the construction personnel to promote energy-efficient work practices. 	Construction	All
Air quality					
Air quality management planning		AQ1	<ul style="list-style-type: none"> An air quality management plan will would be developed for the construction stage of the project prior to the start of construction. The air quality management plan will would address all aspects of construction including spoil handling, machinery operating procedures, soft soil treatments, stockpile management, traffic management, haulage, dust suppression and monitoring. 	Pre-construction	All

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Air quality management during construction	AQ1	AQ2	<ul style="list-style-type: none"> An air quality management plan will <i>would</i> be prepared and implemented by the contractor during construction to mitigate dust. <i>The air quality management plan will would address all aspects of construction including spoil handling, machinery operating procedures, soft soil treatments, stockpile management, traffic management, haulage, dust suppression and monitoring.</i> The following dust mitigation measures will <i>would</i> be used on-site and included as part of the management plan: <ul style="list-style-type: none"> Covering materials transported to and from construction sites. Covering or spraying water on stockpiles of soil or other potential dust generating materials, particularly during dry or windy conditions. Temporarily seed and stabilise temporary stockpiles that are planned to be in place for long periods. Imposing speed limits for vehicles and equipment travelling on unsealed surfaces. Minimising the extent of disturbed areas as far as practicable. This would be achieved by staging the works to minimise the number of disturbed areas at any one time. Progressively rehabilitating disturbed areas as soon as practicable. Suppressing dust on unsealed surfaces, temporary roadways, stockpiles and other exposed areas using water trucks, hand held hoses, temporary vegetation and other practices. Modifying or stopping dust generating activities during very windy conditions. Installing wheel wash facilities at appropriate locations to reduce tracking of mud and soil off-site. Monitoring air quality, both visually, using instrumentation and/or depositional dust gauges, near representative sensitive receptors to verify the effectiveness of controls. Amend controls where necessary to minimise any impacts identified through monitoring, consider the use of mitigation measures (such as covers) where dust is impacting water tanks or other drinking water sources, and cannot be controlled at the dust source. 	Construction	All
Waste management					
Sustainable management of resources	WM1	WM1	<ul style="list-style-type: none"> The cut-and-fill balance of the project will <i>would</i> be further refined to obtain as much material as possible for reuse on the project. 	Pre-construction	All
	WM2	WM2	<ul style="list-style-type: none"> A resource management strategy will <i>would</i> be prepared for construction of the project to identify the hierarchy for sourcing and use of resources. It would include <i>the following</i> provisions: <ul style="list-style-type: none"> Available project cutting material (including Select Material Zone (SMZ) and verge material) would be used for the construction of embankments, SMZ and verge within that section to the extent that it is suitable. Project sections with a deficit in material would import surplus material from other project 	Pre-construction / construction	All

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			<p>sections in preference to external sources.</p> <ul style="list-style-type: none"> Where possible, the distances that earthworks materials are moved across the project as a whole would be minimised, notwithstanding the above two requirements. Any unsuitable material would be used for landscaping or disposed of within each project section, either for batter flattening or noise mounds or placed in stockpile. Contractors will reduce the amount of unsuitable waste generated during excavations, where feasible (eg treatment at source). Other locations of disposal of unsuitable material will be considered including borrow source areas created as part of the project. The generation and management of unsuitable material during project earthworks will be monitored to ensure appropriate management of the issue. The resource management strategy will would also identify: <ul style="list-style-type: none"> Details on materials that would be sourced from the project (including location and type). Viable material suppliers (including water) near the project. Proposed sustainable material sources practices (such as use of recycled materials or wastewater). Materials that could be recycled and re-used on-site or transferred to other project sections. 		
Minimising construction waste	WM3	WM3	<ul style="list-style-type: none"> A waste register will would be maintained by each contractor, detailing types of waste collected, amounts, date, time, and details of disposal. 	Construction	All
	WM4	WM4	<ul style="list-style-type: none"> Where possible, materials will would be bought in bulk to minimise the amount of package required. Sources of material that have sustainable packaging design, recycled and recyclable packaging would be favoured over other material sources where cost effective. 	Construction	All
	WM5	WM5	<ul style="list-style-type: none"> Waste material generated on-site (including chemical, fuel and lubricant containers, and solid and liquid wastes) will be dealt with classified and disposed of in accordance with the <i>Protection of the Environment Operations Act 1997</i> and Waste Classification Guidelines Part 1: Classifying Waste (DECCW, 2009). 	Construction	All
	WM6	WM6	<ul style="list-style-type: none"> Waste minimisation and management measures will would be developed based on the principles in the <i>Waste Avoidance and Resource Recovery Act 2001</i>, the NSW Government's Waste Reduction and Purchasing Policy, and waste exemptions including: <ul style="list-style-type: none"> Excavated Natural Material Exemption (EPA, 2008). Excavated Public Road Material Exemption (EPA, 2012). Raw Mulch Exemption (EPA, 2008). 	Construction	All

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			<ul style="list-style-type: none"> Reclaimed Asphalt Pavement Exemption (EPA, 2012). Recovered Aggregate Exemption (EPA, 2010). Stormwater Exemption (EPA, 2008). Treated Drilling Mud Exemption (EPA, 2011). Measures would seek to avoid, minimise, re-use, recycle, treat or dispose of waste streams during construction and address transport and disposal arrangements. 		
		WM7	<ul style="list-style-type: none"> Chemical, fuel and lubricant containers, and solid and liquid wastes will be disposed of in accordance with the requirements of Waste Classification Guidelines Part 1: Classifying Waste (DECCW, 2009). 	Construction	All
	WM7	WM8	<ul style="list-style-type: none"> Millable timber will be harvested for reuse off site. All other felled timber would be reused on-site in the form of habitat recreation or mulch in landscaping and erosion and sedimentation controls. Where mulch cannot be reused on-site, consideration will be given to making the mulch available to the public in accordance with the Roads and Maritime Environmental Direction 25 (2012) and the Raw Mulch Exemption (EPA, 2008). 	Construction	All
	WM8	WM9	<ul style="list-style-type: none"> Sediment removed from sedimentation basins will be used, where appropriate, be used on-site in landscaping and/or flattening of batters. 	Construction	All
	WM9	WM10	<ul style="list-style-type: none"> The use of recycled products in construction works will be investigated. 	Construction	All
	WM10	WM11	<ul style="list-style-type: none"> Where feasible, the contractor will be required to re-use materials. This could include, but is not limited to, concrete formwork or surplus concrete pours. 	Construction	All
	WM11	WM12	<ul style="list-style-type: none"> Site inductions and on-site training will be required to include waste minimisation principles and measures. 	Construction	All
	WM12	WM13	<ul style="list-style-type: none"> At site compounds, on-site recycling facilities will be provided for recycling paper, plastic, glass and other re-useable materials. Liquid waste such as paints and solvents would be disposed of in accordance with the Waste Classification Guidelines Part 1: Classifying Waste (DECCW, 2009) and the Protection of the Environment Operations Act 1997. 	Construction	All
	WM13	WM14	<ul style="list-style-type: none"> Regular visual inspections will be conducted to ensure that work sites are kept tidy and to identify opportunities for reuse and recycling. 	Construction	All
Management of waste water	WM14	WM15	<ul style="list-style-type: none"> Water captured in excavations will be required to be either: <ul style="list-style-type: none"> Managed in accordance with the construction Soil and Water Management Plan. 	Construction	All

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			<ul style="list-style-type: none"> Transferred to a licensed sediment basin, treated and discharged in accordance with any licence conditions that apply to the discharge of water, or, Re-used for construction water or dust suppression. 		
	WM15	WM16	<ul style="list-style-type: none"> Tannin rich leachate generated from mulch stockpiles will be managed in accordance with the Roads and Maritime Environmental Direction – Management of Tannins from Vegetation Mulch (2012). Any tannin impacted water captured in bunded areas or traps will not be released into the environment. Tannin effected water will be removed from bunded areas or traps within five days of a rainfall event and used as construction water, dust suppression or landscape watering. These activities will be managed to prevent any pooling or runoff tannin impacted water. The reuse of this water will also be in accordance with the mitigation measures identified in Chapter 10 of this EIS. 	Construction	All
Management of operational wastes	WM16	WM17	<ul style="list-style-type: none"> Appropriate waste and recycling facilities will would be provided at rest areas and heavy vehicle checking stations. 	Operation	All
	WM17	WM18	<ul style="list-style-type: none"> All operational waste will would be managed in accordance with the Roads and Maritime waste management procedures and Environmental Management System. 	Operation	All
	WM18	WM19	<ul style="list-style-type: none"> Green waste from highway maintenance activities will would be collected and, where possible, recycled for mulch within the road reserve. 	Operation	All
	WM19	WM20	<ul style="list-style-type: none"> Collection and removal of roadside litter will would be undertaken in accordance with the Roads and Maritime Environmental Management System. 	Operation	All
	WM20	WM21	<ul style="list-style-type: none"> Sediment removed from operational water quality basins will would, where appropriate, be classified in accordance with the Waste Classification Guidelines (DECCW, 2009), and be disposed of in accordance with the <i>Protection of the Environment Operations (Waste) Regulation 2005</i>. Where appropriate possible, this material will would be reused within the road corridor. 	Operation	All