

## Summary of Additional or Modified Management Measures

	Pre-construction	During Construction	Post-Construction
<b>Long-nosed Potoroos</b>	<p>Develop an integrated plan of management for the Long-nosed Potoroo in consultation with relevant agencies and land owners.</p>	<p>Construction phase measures to be considered during the development of the integrated plan of management would include:</p> <ul style="list-style-type: none"> <li>• installation of animal proof fencing along the boundary of potoroo habitat and the road proposal</li> <li>• initiation of a fox control program on NSW Crown land</li> <li>• preparation and implementation of a fire management plan for the NSW Crown land taking into account the habitat requirements of the potoroo by prescribing a mosaic of 'patch' burning and the prevention of catastrophic wildfires</li> </ul>	<p>Post-construction phase measures to be considered during the development of the integrated plan of management would include:</p> <ul style="list-style-type: none"> <li>• inclusion in the Operation Environmental Management Plan of a monitoring program to check on the effectiveness of the integrated plan of management and to monitor the status of the population</li> <li>• annual selective burning of understorey vegetation</li> <li>• maintenance of the fox control program</li> <li>• Undertaking of population surveys annually for a period of five years</li> </ul>
<b>Wallum Sedge Frog</b>	<p>Measures to prevent frog mortality during construction would be determined and specified for implementation during Detailed Design. Such measures may include temporary frog fencing or, if practical the early implementation of sections of permanent frog fence.</p>	<p>Constructed wetlands would be revegetated with native species characteristic of the area. Where possible, wetland vegetation from areas to be disturbed would be used.</p> <p>A total of three, purpose built frog ponds would be constructed as early as practical in association with construction of the Tugun Bypass.</p> <p>'Below ground ' ponds would be constructed and generally accord with the following specifications:</p> <ul style="list-style-type: none"> <li>• be generally spoon shaped and constructed to a depth immediately above the organic hard pan layer or to a maximum depth of one (1) metre, which ever is the lesser</li> <li>• approximately 15 to 20m long and 5 to 10m wide</li> <li>• intersect a major ephemeral drainage line</li> <li>• revegetate the pond margins with species consistent with the local habitat requirements for the Wallum Sedge Frog, such as Restio spp.</li> </ul>	<p>Monitoring of constructed ponds</p>

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<b>Common Planigale</b>	<p>Underpass structure/s would be designed, implemented and monitored at approximate chainage 5270m. Revegetation at the entrance and exit of each purpose built culvert/pipe would also be undertaken. Additional survey for Common Planigale would be undertaken on Block F. Should no Common Planigale be identified within Block F, surveys would then be undertaken on Block A. Survey methods would reflect previous methods (pit fall traps) and be undertaken during the warmer month of October. Should the presence of Common Planigales not be confirmed on either Block F (subject to purchase) or Block A, then options such as further land or financial contribution to management of known habitat in conservation reserves would be discussed with relevant agencies</p>	<p>Translocation of Common Planigale is proposed prior to clearing and grubbing of habitat. Works to be undertaken in accordance with the approved Threatened Species Management Plan</p> <p>Construction of underpass structures</p> <p>Revegetation of disturbed of habitat adjacent to underpass entry and exit points</p>	
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<b>Fauna Habitat</b>			
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	<p>During the design of the box culvert proposed for the waterway crossing, consideration would be given to measures which would enhance light penetration to assist fish passage during the detailed design phase of the Proposal. The fish habitat of this waterway could be classified as class 3 or 4 habitat under the DPI (Fisheries) classification and therefore a culvert would be considered as acceptable for fish passage. Further consultation would be undertaken with the DPI (Fisheries) to determine what is appropriate for the Proposal.</p> <p>Rehabilitation of two cleared areas within the road reserve, north of 'Hidden Valley' would occur to improve a fauna corridor.</p> <p>Damaged or destroyed hollows would be replaced at a ratio of 1:1 and with appropriately designed nest or roost boxes. In the following instances this would include,</p> <p>Medium sized hollows would be replaced with those designed for Squirrel Gliders and Brush-tailed Phascogales,</p> <p>Large hollows would be replaced with nest boxes designed for owls.</p> <p>These would be located on Blocks A and E and in suitable locations along the Tugun Bypass alignment as detailed and approved in the Flora and Fauna Management Sub Plan.</p>		
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<b>Birds</b>	<p>Within and adjacent to Gold Coast Airport, a number of measures are proposed to manage the incidence of bird strike. These include:</p> <ul style="list-style-type: none"> <li>• avoiding the localised ponding of water during construction</li> <li>• locating stockpiles of topsoil far as practical from the runway or covering them</li> <li>• avoiding the use of plant species in landscaping that are highly attractive to birds and flying-fox</li> <li>• the timely collection of large roadkills, if they occur</li> <li>• the use of tunnel lights that are less attractive to insects</li> </ul> <p>Such measures would be detailed within the Contractors Construction Environmental Management Plan</p>		
<b>Flora</b>	<p>The translocation of flora would be undertaken following consultation with State and Commonwealth agencies.</p> <p>The <i>Australian Network for Plant Conservation Guidelines for the Translocation of Threatened Plants in Australia</i>, 2nd edition, 2004 would be used when developing the flora translocation components of the Construction Environmental Management Plan and Threatened Species Management Plan.</p> <p>Prescribed species likely to be impacted by construction would be translocated to suitable habitat if this is agreed by relevant agencies. Such habitat would be identified for each species prior to construction with preference given to immediately adjacent locations.</p> <p>A suitably qualified botanist/ecologist/scientist would be appointed to coordinate revegetation of the significant rainforest associated species known to be impacted during construction with the aim to mitigate net loss. These species consist of the Long-leaved Tuckeroo, Black Walnut, Fine-leaved Tuckeroo and Stinking Cryptocarya.</p>		

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<b>Cultural Heritage</b>	<p>The intent to develop a Cultural Heritage Management Plan/Cultural Heritage Assessment Report (CHMP/CHAR) would be publicly advertised, Archaeological survey would be undertaken prior to and during construction, as defined within the CHMP/CHAR,</p> <p>Anthropological work would be undertaken and in consultation with all Stakeholders.</p> <p>Sub-surface investigations would be undertaken prior to the start of construction. This is to be undertaken in consultation with the Traditional Owners. The following areas would be tested for sub-surface deposits prior to ground clearance:</p> <ul style="list-style-type: none"> <li>• the area opposite John Flynn Hospital between chainages 2080 and 2530 [Zone 4 – Eastern Yugambeh Limited/Tweed Byron Local Aboriginal Land Council report]</li> <li>• the area on Commonwealth/airport land between chainages 4250 and 5090 (Zones 8, 9 and 10 - Eastern Yugambeh Limited report ) and chainages 4520 and 4750 (Turnix Pty Ltd/Ngarang-Wal report)</li> </ul> <p>The potential burial sites for an area from Boyd Street to the southern end of the project (chainages 2530 to 6800 – Zones 5 to 13 in the Eastern Yugambeh Limited report) would be assessed during vegetation clearing activities which would be undertaken prior to commencement of the major construction works. This would be done with presence of the Cultural Heritage Monitors and in accordance with the methodology outlined in the final Cultural Heritage Management Plan/Cultural Heritage Assessment Report.</p>	As detailed in the Cultural Heritage Management Plan / Assessment Report	As detailed in the Cultural Heritage Management Plan/ Assessment Report
<b>Ground Water (tunnel and approach ramps)</b>	<p>Hydraulic (slug) tests on a 4-6 bores along the tunnel alignment would be undertaken,</p> <p>'Baseline' monitoring (groundwater) adjacent to the tunnel and approach ramps would be undertaken 6 months prior to construction,</p> <p>More detailed modelling ('WinFlow', 'PLAXIS' or equivalent) to assess groundwater flow and/ or patterns would be undertaken within the 'void' of</p>		

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	<p>temporary slurry walls and between the eventual diaphragm walls.</p> <p>Undertake extraction and injection tests if detailed modelling indicates dewatering for slurry wall construction would exceed 0.5 metres or re-injection rates exceed 2.5 L/s per well.</p> <p>Dewatering for slurry wall installation <i>would be to a maximum depth of 1 metre</i> (similar to natural seasonal variation).</p>		
<b>Compensatory Habitat</b>	<p>The package of compensatory measures described at Appendix H of the Submissions Report would be implemented.</p>		
<b>Noise and Vibration</b>	<p>Develop a Noise and Vibration Management Plan as part of the Construction Environmental Management Plan. This plan would demonstrate that best practice environmental management is applied to all aspects of construction activities. Best practice environmental management would be expected to include (as a minimum) the following:</p> <ul style="list-style-type: none"> <li>• restriction of construction hours</li> <li>• use of plant and equipment designed with inbuilt attenuation</li> <li>• plant and equipment maintained in good working order and compliance with manufacturer's noise ratings for individual plant items</li> <li>• installation of appropriate temporary noise attenuation infrastructure, where necessary, based on advice from acoustic consultants</li> <li>• regular consultation with the community to keep them informed of up-coming works</li> <li>• operational noise mitigation measures to be built, where possible, early in the construction period to provide early benefits in terms of reducing construction noise impacts</li> <li>• development of an induction program on reducing construction noise.</li> </ul> <p>All buildings and structures which could potentially be subject to structural damage from excessive ground vibration would be surveyed prior to the start of construction and on completion where this is considered necessary.</p> <p>Identify control types, location and timing for</p>	<p>Develop, implement, monitor and audit Construction Environmental Management Plan (and associated Noise and Vibration Management Plan).</p> <p>Construction relating to surface activities and haulage activities would be limited to NSW Department of Environment and Conservation standard hours of construction (7 am to 6 pm Monday to Friday and 8 am to 12 pm on Saturday, with no work on Sunday or public holidays) or as identified in the Noise and Vibration Management Plan.</p> <p>If any activity needs to be undertaken outside the normal work hours the Department of Environment and Conservation and local residents would be consulted about the timing and duration prior to the work commencing.</p> <p>Additional noise attenuation measure may be required for equipment used during off-peak construction periods, depending on the nature and location of the work.</p> <p>Noise barriers required for the operational phase of the proposal would be constructed, <i>where possible</i> at the beginning of the construction process to provide additional noise protection.</p> <p>Standard noise treatments such as the provision of noise barriers, equipment enclosures, the use of silencers and regular equipment maintenance would be used to control noise from construction activities.</p> <p>Use of innovative technologies such as perimeter sawing, use of circular saw or diamond wire, water jet cutting, line drilling and splitting, ripping with excavators and gridding would be considered where construction noise and</p>	<p>Maintenance of controls.</p>

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	<p>implementation. Integrate requirements of approvals, licenses and/or permits. Integrate construction requirements into tender documents.</p>	<p>vibration may be an issue. Monitoring would be conducted during construction activities where there is considered to be potential for complaints regarding vibration which may exceed human disturbance criteria.</p>	
<b>Documentation</b>	<p>Design and Construction contract documents would include:</p> <ul style="list-style-type: none"> <li>• NSW RTA QA Specification G36 (with integration of Queensland and Commonwealth legislative requirements)</li> <li>• one copy of each environmental approval, permit and or licences</li> <li>• integrated requirements for each specific Sub Plan</li> </ul> <p>Construction Environmental Management Plan to be developed and certified</p>	<p>Operational Environmental Management Plan to be developed and certified</p>	