

# 7 Environmental management

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This chapter describes how the proposal would be managed to reduce potential environmental impacts throughout detailed design, construction and operation. A framework for managing the potential impacts is provided with reference to environmental management plans and relevant RTA QA specifications. A summary of site-specific environmental safeguards is provided as detailed in Chapter 6 and the licence and/or approval requirements required prior to construction are also listed.

## 7.1 Environmental management plans

A construction environmental management plan (CEMP) would be developed prior to construction by the contractor in accordance with relevant RTA QA specifications and guidelines including:

- G36 – Environmental Protection (Management System)
- G38 – Soil and Water Management (Soil and Water Plan)
- G40 – Clearing and Grubbing
- QA R178 – Vegetation

The CEMP would describe the contractor's system for minimising and managing environmental risks associated with the construction of the proposal. The objectives of the CEMP are to:

- Provide a description of the proposal, including construction staging.
- Provide certainty of delivery of the prescribed environmental outcomes during all phases of the proposal construction.
- Implement a system for compliance with all applicable requirements, obligations and commitments for the proposal including:
  - Relevant legislative requirements.
  - Licences, approvals and/or permits needed to construct the proposal.
  - Environmental management recommendations outlined in this REF.
  - The RTA's requirements including technical criteria.
- Develop, implement and monitor measures that minimise pollution and optimise resource use.

Procedures, checklists, forms and other components of the environmental management system would be developed as part of the CEMP. These would include:

- Environmental site inspection checklists.
- Environmental inspection reports (for minor issues).
- Environmental incident reports (for major issues).
- Environmental improvement notices.
- Environmental action registers.
- Environmental monitoring reports.
- Audit reports.
- Non-compliance reports.
- Complaints management procedure.

## 7.2 Summary of safeguards and management measures

Environmental safeguards outlined in this document would be incorporated into the detailed design, construction and operation of the proposal. These safeguards would minimise any potential adverse impacts arising from the proposed works on the surrounding environment. All safeguards described in this would be incorporated into the contractor's environmental management plan (CEMP). These are summarised in Table 7.1.

**Table 7.1: Summary of site specific environmental safeguards**

Impact	Environmental safeguard
Landform, geology and soils	<ul style="list-style-type: none"> <li>• In accordance with the preliminary erosion and sedimentation assessment undertaken, an RTA registered soil conservation consultant would be engaged during the detailed design to assist in the preparation of an erosion and sedimentation management report (ESMR) incorporating specifications outlined in Landcom's Managing Urban Stormwater – Soils and Construction Volume I (Landcom 2004) and DECCW's Managing Urban Stormwater – Soils and Construction Volume 2D: Main Road Construction (DECCW 2008).</li> <li>• An acid sulfate soils management plan (ASSMP) would be developed and implemented to mitigate for potential impacts associated with acid sulfate soils, with particular reference to the proposed excavations below the water table for drainage structures on the Omega Flat floodplain. The ASSMP would be prepared in accordance with the RTA's Guideline for the Management of Acid Sulfate Materials (RTA 2005).</li> <li>• Driven piles would be used for bridge foundations where possible to reduce oxidisation of potentially acid sulfate soils to reduce the risk of contamination to Werri Lagoon (SEPP 14 Wetland).</li> <li>• The ESMR would incorporate appropriate mitigation measures to minimise the potential for sediment laden stormwater discharge to flow into the SEPP14 wetland at Werri Lagoon.</li> <li>• Widening of the existing slip zone in the vicinity of Mount Pleasant would ensure that the grade of the existing batter slope is maintained and not steepened. The functionality of the existing subsoil drainage network at this location would also be maintained in the new drainage works to ensure the ongoing stability of the slip zone.</li> <li>• Careful consideration would be given to the proposal, where it would interfere with all sub soil drainage networks associated with the existing highway. Investigation during detailed design would ensure that the functionality of existing drainage would be incorporated into the proposal.</li> <li>• Consideration would be given to the potential reuse of material removed during construction such as rock for scour protection and the most appropriate removal technique to maximise reuse opportunity.</li> <li>• All stockpiles sites would be designed, established, operated and decommissioned in accordance with the RTA's Stockpile Management Procedures 2001.</li> </ul>

Impact	Environmental safeguard
Landform, geology and soils	<ul style="list-style-type: none"> <li>● Stockpiles would not be established on slopes greater than 2h:1v.</li> <li>● Stockpiled materials would be stored away from drainage lines.</li> <li>● The stripping of topsoil and stockpiling of surplus material would not be undertaken during heavy periods of rainfall.</li> <li>● Vegetation clearance and soil disturbance would be limited to those areas required for construction purposes.</li> <li>● Where possible, disturbed areas would be progressively restored to their pre-works shape at the completion of works.</li> <li>● Compacted hardstand surfaces would be established where practicable at entry / exit points to worksites.</li> </ul>
Hydrology, water quality and groundwater	<ul style="list-style-type: none"> <li>● The ESCP identified above would identify ongoing monitoring requirements to manage potential water quality impacts during construction in accordance with the water quality criteria outlined in the EPL. The monitoring program would also document the requirements for water quality monitoring of pre-loading water discharge and dewatering activities.</li> <li>● In addition the water quality monitoring program identified in the ESCP, visual monitoring of water quality in all waterways would also be undertaken during and 24 hours after periods of rainfall, and records kept and provided at anytime upon request.</li> <li>● A dewatering management plan detailing process for dewatering and proposed treatment of potentially acidic groundwater prior to discharge would be prepared in the event that dewatering is required for the proposal.</li> <li>● Ongoing groundwater monitoring would be undertaken through the detail design using existing piezometers to determine if the design needs to incorporate measures to maintain the flow of groundwater.</li> <li>● Consultation would be undertaken with I&amp;I NSW during the detailed design of the proposal with regard to potential aquifer conductivity impacts associated with the use of wick drains during pre-loading that, particularly during construction in the Omega Flat area. Consultation would also consider the interaction of the proposal with the existing bore existing embankment on the western end of the Gerringong Bends.</li> <li>● Maintenance and checking of the erosion and sedimentation controls would be undertaken on a regular basis and records kept and provided at anytime upon request. Sediment would be cleared from behind barriers on a regular basis and all controls would be managed in order to work effectively at all times.</li> <li>● Any material transported onto pavement surfaces would be swept and removed at the end of each working day.</li> <li>● Hardstand material or rumble grids would be implemented at entry and exit points to minimise the tracking of soil and particulates onto pavement surfaces.</li> </ul>

Impact	Environmental safeguard
Hydrology, water quality and groundwater	<ul style="list-style-type: none"> <li>• Where runoff is concentrated (eg cut-off drains, V-drains), scour protection and/or concrete lining would be constructed to minimise erosion and sedimentation impacts.</li> <li>• On the uphill slope above the top of each cut batter, a cut-off drainage channel would be constructed to minimise erosion and sedimentation impacts.</li> <li>• Where possible, disturbed areas would be progressively restored to their pre-works shape at the completion of works.</li> <li>• Batters would be stabilised with local native grasses (and/or sterile exotic grasses) and/or local native shrubs in accordance with the landscaping plan, and geotextile fabrics would be applied when needed.</li> <li>• The proposal would be undertaken in accordance with RTA's Water Policy and Code of Practice for Water Management (1999).</li> <li>• Temporary stormwater control devices or erosion and sedimentation controls would be implemented at stormwater drains to prevent sediment-laden runoff entering the local stormwater system.</li> <li>• Should any spillage occur during construction the RTA's Regional Environmental Officer, Southern Region, would be contacted immediately, and contaminants would be immediately contained, removed, treated (if necessary) and disposed of in accordance with DECCW requirements.</li> <li>• Pavement drainage would be incorporated into the proposal to capture and treat runoff this would include permanent spill and sedimentation basins for the treatment of pavement runoff and spill control during operation. Consideration to the appropriate location and sizing would be given during detailed design and would be representative of the sensitivity of the identified receiving environment.</li> <li>• Careful consideration would be given to all areas of the proposal, where it would interfere with all sub soil drainage networks associated with the existing highway. Investigation during detailed design would ensure that the functionality of existing drainage would be incorporated into the proposal.</li> <li>• An incident emergency spill plan would be developed and incorporated in the CEMP. This would include measures to avoid spillages of fuels, chemicals, and fluids into any waterways. All personnel would be made aware of these measures. An emergency spill kit would be kept on-site at all times.</li> <li>• Where practicable, all fuels, chemicals, and liquids would be stored at least 50 m away from any waterways or drainage lines and would be stored within an impervious bunded area within the compound sites.</li> <li>• Appropriate sediment controls would be installed adjacent to waterways and drainage lines to separate clean and dirty water, and to filter dirty water prior to discharge to drainage lines.</li> </ul>

Impact	Environmental safeguard
Hydrology, water quality and groundwater	<ul style="list-style-type: none"> <li>• All sedimentation control structures would be removed only after adequate stabilisation of disturbed surfaces is achieved.</li> <li>• Culvert extensions would be positioned to ensure that water discharges do not cause backwaters and/or erosion and sedimentation problems.</li> <li>• All culverts and drainage structures would be designed in accordance with the RTA's Road Design Guide.</li> <li>• Any stormwater generated from construction processes would be contained on-site and/or treated using a DECCW certified process prior to its disposal. The release of dirty water into waterways would be prohibited.</li> <li>• Any on-site concrete works would be undertaken in accordance with the DECCW Environmental Best Management Practice Guideline for Concreting Contractors (2002).</li> <li>• The maintenance of machinery would be undertaken within impervious bunded areas within the compound sites.</li> <li>• Vehicle washdowns and/or cement washouts would be undertaken within compound site(s) in a designated bunded area with an impervious surface, or undertaken off site in an appropriately controlled area.</li> <li>• Creek bed and bank stabilisation works would be completed immediately after completion of culvert works.</li> <li>• Sediment fencing would be placed to surround all access tracks and working areas.</li> </ul>
Terrestrial ecology	<p><i>Flora</i></p> <ul style="list-style-type: none"> <li>• A vegetation management plan (VMP) would be prepared prior to construction detailing measures to minimise impacts to areas of conservation significance and native flora. The VMP would also detail appropriate management for the potential habitat of threatened plant species adjacent to the proposed upgrade. The VMP would be integrated with the landscape plan for the proposal and be developed during the detailed design.</li> <li>• Vegetation removed would be chipped / mulched on site and used in revegetation works within the study area</li> <li>• If additional vegetation is to be removed, the proposed variation of scope would be referred to the RTA's senior environmental officer (SEO) to determine if additional impact assessment is required.</li> <li>• Rather than removing whole trees, lopping of branches would be undertaken where possible to retain fauna habitat.</li> <li>• Fauna passage along creeklines including Ooaree Creek and the Crooked River would be maintained during construction and operation.</li> <li>• Vegetation clearing would be restricted to those areas where it is necessary. Where clearing does occur, the area would be fenced with highly visible temporary fencing to ensure that clearing does not extend beyond the area necessary.</li> </ul>

Impact	Environmental safeguard
Terrestrial ecology	<p data-bbox="539 271 603 300"><i>Flora</i></p> <ul data-bbox="539 315 1356 1294" style="list-style-type: none"> <li>• Disturbance would be minimised wherever possible to stream banks and streambeds. This may be more easily achieved with some bridges, but would be impossible in the case of culverts.</li> <li>• All ancillary infrastructure facilities required for construction, such as concrete batching plants and site compounds would be sited in cleared or otherwise disturbed areas away from waterways and other sensitive areas.</li> <li>• Stockpiling of materials on adjacent native vegetation would be avoided.</li> <li>• General construction activities would be managed to appropriately store waste material and/or contaminants away from adjacent native habitats.</li> <li>• Prominent local landscape species would be used for revegetation in accordance with the landscaping plan to be developed during detailed design.</li> <li>• A weed management strategy would be implemented within the road reserve, to be incorporated into the VMP to control weeds at their point of source (ie the area of clearing) including: <ul data-bbox="603 981 1356 1294" style="list-style-type: none"> <li>- Control of drainage that may facilitate the distribution of weed seeds or high levels of nutrients.</li> <li>- Monitoring and control by an appropriately qualified person experienced in weed management of weed populations that establish on disturbed areas.</li> <li>- Training for site personnel on the identification of noxious weeds such as Alligator Weed and the appropriate management of noxious weeds in accordance with the requirements of Kiama Municipal Council.</li> </ul> </li> </ul> <p data-bbox="539 1305 612 1335"><i>Fauna</i></p> <ul data-bbox="539 1350 1356 1807" style="list-style-type: none"> <li>• The design would carefully consider location and type of plant species for the verges and median strip so that they do not attract fauna species to locations that have the potential to conflict with highway traffic.</li> <li>• Clearance and disturbance of fauna habitat would be minimised, particularly hollow-bearing trees and other habitat features where fauna may be sheltering.</li> <li>• Clearing of habitat vegetation would follow the RTA requirements for fauna rescue on highway projects and include the relocation of rescued fauna and wildlife specialists in the process.</li> <li>• An ecologist with experience in fauna handling would be present during habitat removal.</li> </ul>

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Terrestrial ecology	<p data-bbox="539 271 612 300"><i>Fauna</i></p> <ul style="list-style-type: none"> <li data-bbox="539 315 1361 546">● Hollow bearing trees would be left standing a minimum of 24 hours to allow resident fauna the chance to relocate. Ecologists would undertake appropriate surveys eg spotlighting and stag watching at night to determine that the habitat is not being used at the time of further clearing / habitat removal. During this time the ecologist may set traps to capture resident animals if habitat is known to be occupied.</li> <li data-bbox="539 562 1361 757">● Fell habitat trees as carefully as possible. If possible use swivelling heads so the habitat trees can be lowered to the ground with minimal impact. Request contractors to roll or lift limbs that may be obscuring hollows or fauna. An ecologist is to guide the clearing contractors as to limbs containing or potentially containing hollows.</li> <li data-bbox="539 772 1361 904">● Ecologist would inspect all hollows once tree has been felled for signs of wildlife. Ecologist to guide clearing contractors to expose and turn felled hollow bearing limbs (these may spear into the ground and obscure the hollow entrance when felled).</li> <li data-bbox="539 920 1361 1048">● Hollows potentially supporting fauna can either be cut, or, if there is a risk of injury (animals can be cut in two) the logs can be left on the ground and rechecked the following day or placed on the edge of adjoining habitat.</li> <li data-bbox="539 1064 1361 1227">● Ecologist would capture animals that emerge from hollows of felled trees. Animals are to be inspected for injury. The animals would be placed in cloth bags and transferred to a suitable holding location to await release (nocturnal fauna should be released at dusk).</li> <li data-bbox="539 1243 1361 1301">● Relocate hollows, coarse woody debris and bush rock to adjacent land if appropriate.</li> </ul>
Aquatic ecology	<ul style="list-style-type: none"> <li data-bbox="539 1323 1361 1576">● The detailed design of drainage structures would take into consideration the guidelines for the design and construction of waterway crossings to maintain fish passage outlined in 'Guidelines and Policies for Aquatic Habitat Management and Fish Conservation' (Smith and Pollard 1999) and 'Why do Fish Need to Cross the Road? Fish Passage Requirements for Waterway Crossings' (Fairfull and Witheridge 2003). These include: <ul style="list-style-type: none"> <li data-bbox="603 1592 1361 1653">- Crossing structures appropriate for the size and type of watercourse.</li> <li data-bbox="603 1668 1361 1704">- Preferred crossing designs.</li> <li data-bbox="603 1720 1361 1756">- Maintenance of fish passage throughout construction.</li> <li data-bbox="603 1771 1361 1807">- Preservation of spawning grounds.</li> <li data-bbox="603 1823 1361 1859">- Minimisation of disturbance to and removal of snags.</li> <li data-bbox="603 1874 1361 1910">- Minimisation of disturbance to channel upstream and downstream of the crossing.</li> <li data-bbox="603 1926 1361 1951">- Habitat rehabilitation.</li> </ul> </li> </ul>

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Aquatic ecology	<ul style="list-style-type: none"> <li>• An acid sulfate soils management plan (ASSMP) would be developed and implemented to mitigate for potential impacts associated with acid sulfate soils, with particular reference to the proposed excavations below the water table for drainage structures on the Omega Flat floodplain.</li> <li>• To negate the loss of aquatic habitat and biota from the proposed waterway realignments equivalent biotic assemblages would be restored in the realigned reaches. The rehabilitation program would consider (but not be limited to): <ul style="list-style-type: none"> <li>- Restoration of the natural creek geomorphology. For example: <ul style="list-style-type: none"> <li>o A meandering channel to reduce velocity and scour during high flow events.</li> <li>o Natural bed forms, such as an alternating sequence of pools, riffles and runs.</li> </ul> </li> <li>- Establishment of a complete and broad riparian habitat including removal of exotic species.</li> <li>- Stabilised channel bank and bed and the protection of exposed soil until riparian vegetation is completely established.</li> <li>- The introduction of engineered log jams to create pooling sections and submerged woody debris (see Brooks et al. 2004).</li> </ul> </li> <li>• Consultation with DECCW and I&amp;I NSW would be undertaken during detailed design with regard to the proposed creek realignments.</li> <li>• Positive identifications of Alligator Weed within the construction area would be reported to the Kiama Municipal Council. In such an event, heavy machinery would be regularly inspected to ensure that species is not spread to new areas.</li> <li>• Where large woody debris is encountered and interferes with construction, lopping would be considered the first management response. If this does not resolve the problem relocation of the debris would be considered and removal would only be adopted as a last resort.</li> <li>• Water used during construction would not be sourced from waterways within the study area and consideration would be given to other sources, such as local town water and the Gerroa treated effluent irrigation scheme.</li> </ul>



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Cultural heritage	<p data-bbox="539 271 662 300"><i>Aboriginal</i></p> <ul style="list-style-type: none"> <li data-bbox="539 315 1348 450">● Aboriginal stakeholders would continue to have the opportunity to actively participate in an on-going consultation program regarding the management of Aboriginal cultural heritage within the proposal areas.</li> <li data-bbox="539 461 1348 689">● A cultural heritage assessment would be conducted of any additional areas situated outside of the currently defined study area, which may be subject to construction impact and have not previously been assessed. This assessment would include the conduct of surface archaeological survey where and if warranted by the presence of an effective degree of ground surface exposure.</li> <li data-bbox="539 701 1348 835">● A systematic program of archaeological test excavation would be conducted across all PASAs identified within the proposal area. A section 87 permit (AHIP) has been obtained from DECCW as a prerequisite to the conduct of this program.</li> <li data-bbox="539 846 1348 1075">● Where the destruction (including 'salvage') of known Aboriginal objects or confirmed archaeological deposits is anticipated as part of the direct impact of proposal, application would be made to DECCW for a section 90 consent (AHIP) to undertake such impact. No impact can occur to Aboriginal objects prior to the receipt of the AHIP, and any impact must be consistent with the provisions of the AHIP.</li> <li data-bbox="539 1086 1348 1283">● In the event that the conduct of geotechnical testing is required within known sites or PASAs prior to the provision of relevant section 90 consents (AHIP), then the feasibility of conducting the proposed actions, and the necessity for compliance with various protocols would be the subject of liaison between the RTA and DECCW.</li> <li data-bbox="539 1294 1348 1395">● RTA protocols would be adopted and followed in the event that proposal involves the unanticipated discovery of Aboriginal objects or suspected human remains.</li> <li data-bbox="539 1406 1348 1962">● With regard to the management of mature fig trees within the proposal area: <ul style="list-style-type: none"> <li data-bbox="603 1473 1348 1541">- Wherever feasible, direct impact to mature fig trees would be avoided.</li> <li data-bbox="603 1552 1348 1653">- The continued and sustainable health of near or adjacent trees would be considered in the detailed design of the upgrade.</li> <li data-bbox="603 1664 1348 1962">- In cases where direct impact to mature fig trees is unavoidable: <ul style="list-style-type: none"> <li data-bbox="667 1731 1348 1832">○ Wherever feasible, trees with reduced health, condition or vigour are impacted in preference to examples displaying good condition, health and vigour.</li> <li data-bbox="667 1843 1348 1962">○ Establish a management and impact mitigation program in consultation with the AFG. This action is relevant to the anticipated removal of the fig trees at Rose Valley Road.</li> </ul> </li> </ul> </li> </ul>

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Cultural heritage	<p><i>Aboriginal</i></p> <ul style="list-style-type: none"> <li>- Consultation with Aboriginal stakeholder groups would be conducted with regard to all incidences of anticipated impact to mature fig trees.</li> <li>• An appropriate means of commemorating the traditional Aboriginal culture of the country being traversed by the upgrade would be considered eg the incorporation of plaques or information displays where and as feasible. This may take the form of signage, adopted nomenclature for built structures or wayside stops, the use of motifs in any incorporated artwork, or the erection of commemorative markers and/or monuments. The development, source material, and approval of any such proposal would be the subject of continuing consultation with Aboriginal stakeholders.</li> </ul> <p><i>Non-Aboriginal</i></p> <ul style="list-style-type: none"> <li>• There are expected to be some impacts to locally significant items of non-Aboriginal heritage as a result of the proposal and an excavation permit would be applied for under section 140 of the <i>Heritage Act</i>.</li> <li>• Where feasible, direct impact to known sites and features with assessed heritage significance would be avoided, and where not feasible, that impact would be minimised and mitigated.</li> <li>• Consideration would be given to reducing the extent of the cuts required adjacent to Aorangi (H34) and the dry stone wall (H36), with the objectives of avoiding or reducing the extent of direct impact (including the loss of mature garden plantings at Aorangi), and the width of the required easement and consequential property acquisition.</li> <li>• The boundary of the upgrade easement would be defined so that land acquisition is minimised in the area of the following sites: <ul style="list-style-type: none"> <li>- H31 (site of Harding tenant farm)</li> <li>- H32 (former Toolijooa Public School)</li> <li>- H34 (Aorangi)</li> <li>- H36 (dry stone wall)</li> <li>- H38 (Renfrew Park)</li> <li>- H40 (former Omega Public School)</li> <li>- H42 (site of original Homeleigh).</li> </ul> </li> <li>• Temporary fencing would be erected between the following sites / features and the zone of construction activity, for the duration of construction works. Fencing around trees would include a radius around the stem that includes the canopy. The fenced off areas would be identified as 'no go' areas for vehicles, and exclude materials storage or the conduct of ground surface disturbance: <ul style="list-style-type: none"> <li>- H31 (site of Harding tenant farm).</li> <li>- Trees to be retained along the northern boundary of Aorangi (H34).</li> </ul> </li> </ul>

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Cultural heritage	<p data-bbox="539 271 724 300"><i>Non-Aboriginal</i></p> <ul style="list-style-type: none"> <li data-bbox="603 315 959 344">- The dry stone wall (H36).</li> <li data-bbox="603 356 1273 421">- The portion of the Renfrew Park front enclosure not subject to impact (H38).</li> <li data-bbox="603 432 1278 497">- The portion of the Homeleigh archaeological site not subject to impact (H42).</li> <li data-bbox="544 508 1294 573">• An archival record would be prepared of the following sites prior to the commencement of construction impact: <ul style="list-style-type: none"> <li data-bbox="603 584 1347 745">- The front formal garden of Aorangi (H34) if it is determined that significant plantings will be directly impacted (the recording of non impacted portions of the garden can be at a lesser detail and are required to provide a context for the impacted items).</li> <li data-bbox="603 757 1353 822">- The agricultural dry stone wall (H36), if it is determined that the wall will be directly impacted.</li> <li data-bbox="603 833 1318 862">- The front grounds and enclosure of Renfrew Park (H38).</li> <li data-bbox="603 873 1353 969">- The 1940s highway remnant (H41), consideration would be given to conducting a cross sectional excavation as part of this recording.</li> <li data-bbox="603 981 1273 1010">- The site of the original Homeleigh homestead (H42).</li> <li data-bbox="603 1021 1098 1050">- The Innisfail driveway entrance (H43).</li> </ul> </li> <li data-bbox="544 1061 1342 1323">• A program of archaeological test excavation, and where warranted, subsequent archaeological salvage excavation, would be conducted at relevant locations within the area of impact at sites H32 (former Toolijooa Public School), and H42 (site of the original Homeleigh homestead). The scope of excavations at H42 may extend beyond the area of impact, depending on the management objectives of the program and the need to clarify the nature and extent of the site.</li> <li data-bbox="544 1335 1342 1704">• With regard to site H37 (site of Omega Stationmasters residence), disturbance to the deposit would avoided below a depth of around 100 cm. If the area is required for ancillary activities (not associated with significant ground disturbance), then additional hard stand gravels would be applied to protect any remaining archaeological deposits. In the event that excavations below a depth of 100 cm are anticipated and unavoidable, then an archaeological test excavation would be conducted with approval from Heritage Branch, to ascertain the nature, significance and management requirements of any potentially occurring archaeological deposits.</li> <li data-bbox="544 1715 1278 1812">• With regard to the Renfrew Park property (H38), it is recommended that the following actions be undertaken in addition to the archival record outlined above.</li> <li data-bbox="544 1823 1273 1852">• Ensure that the palm tree remains undisturbed and viable.</li> </ul>

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Cultural heritage	<p data-bbox="539 271 724 300"><i>Non-Aboriginal</i></p> <ul style="list-style-type: none"> <li data-bbox="539 315 1359 645">• Develop and instigate, in consultation with the landowner and a heritage garden specialist, a landscaping plan for the remaining portion of the homestead front enclosure. The objective of the plan would be to integrate the upgrade batter and easement requirements with the redevelopment of the homestead frontage. Subject to owner and Kiama Municipal Council heritage requirements, it is recommended that the plan seek to retain the palm tree, to re-establish the formal and symmetrical garden schema, and to reposition the existing entrance posts and gateway in a new location along the central axis.</li> <li data-bbox="539 658 1359 752">• Integrate the retained fig tree on the west side of the highway with any planned, northbound exit, gateway installation for the Gerringong area.</li> <li data-bbox="539 766 1359 994">• With regard to site H39 (1940s highway remnant north of Renfrew Park), impact to this feature would be minimised where feasible, and adjacent landscaping and other treatments within the easement adjacent to the site would take into account the desirability of maintaining the ability of the public to view the feature either from the road during travel, and/or via a pedestrian path.</li> <li data-bbox="539 1008 1359 1294">• With regard to the Innisfail property entrance feature (site H43), and in addition to the archival record outlined above, the following actions would be conducted subject to agreement by stakeholders: <ul style="list-style-type: none"> <li data-bbox="600 1146 1209 1176">- The feature would be appropriately dismantled.</li> <li data-bbox="600 1189 1043 1218">- Temporarily stored (if necessary).</li> <li data-bbox="600 1232 1289 1294">- Re-installed, and restored to its original form, at a new entrance location along the Innisfail property driveway.</li> </ul> </li> <li data-bbox="539 1308 1359 1505">• A program of revegetation along the proposal and associated works would be conducted with the aim of mitigating the impact to the cultural values of the immediate and larger surrounding landscape. Prominent local landscape species would be used for revegetation in accordance with the landscaping plan to be developed during detailed design.</li> <li data-bbox="539 1518 1359 1644">- RTA protocols would be adopted and followed in the event that proposal related disturbance involves the unanticipated discovery of non - Aboriginal artefacts (relics) or suspected human remains.</li> <li data-bbox="539 1657 1359 1821">• A copy of this report would be provided to Heritage Branch, Department of Planning, as part of the approvals process. Following publication of the REF, a copy of this report would be lodged with the Gerringong and District Historical Society and the Berry and District Historical Society, for their information.</li> </ul>

Impact	Environmental safeguard
Traffic	<p data-bbox="539 271 695 300"><i>Construction</i></p> <ul style="list-style-type: none"> <li data-bbox="539 315 1361 510">• A detailed traffic management plan (TMP) would be prepared as part of the CEMP. The TMP would include the guidelines, general requirements and procedures to be used when activities or areas of work have a potential impact on existing traffic arrangements. The TMP would be submitted in stages to reflect the progress of work and would: <ul style="list-style-type: none"> <li data-bbox="603 524 1262 584">- Identify the traffic management requirements during construction.</li> <li data-bbox="603 598 1278 658">- Describe the general approach and procedures to be adopted when producing specific traffic control plans.</li> <li data-bbox="603 672 1294 732">- Ensure the continuous, safe and efficient movement of traffic for both the public and construction workers.</li> <li data-bbox="603 745 1070 775">- Maintain the capacity of local roads.</li> <li data-bbox="603 788 1262 848">- Provide an 80 km/h construction zone speed where possible.</li> <li data-bbox="603 862 1302 891">- Minimise delays and disruptions are kept to a minimum.</li> <li data-bbox="603 904 1299 965">- Minimise impacts on existing Princes Highway and local traffic.</li> <li data-bbox="603 978 1331 1039">- Provide access to local roads and properties, including the use of temporary turn-around bays.</li> <li data-bbox="603 1052 1161 1081">- Provide temporary works and traffic signals.</li> <li data-bbox="603 1095 1249 1155">- Determine the number and width of traffic lanes in operation.</li> <li data-bbox="603 1169 1246 1198">- Identify traffic barrier requirements and placement.</li> <li data-bbox="603 1211 1214 1240">- Public transport, pedestrian and bicycle facilities.</li> <li data-bbox="603 1254 1334 1314">- Include methods for implementing the traffic management plan.</li> <li data-bbox="603 1328 1222 1357">- Include methods for minimising road user delays.</li> <li data-bbox="603 1370 887 1400">- Provide signposting.</li> <li data-bbox="603 1413 999 1442">- Road closures, including Fem.</li> <li data-bbox="603 1456 1321 1485">- Street during construction of the new railway overbridge.</li> </ul> </li> <li data-bbox="539 1498 1310 1621">• Construction methods and staging would be designed to minimise road closures, subject to other proposal constraints and ensure that disruption to the existing traffic is maintained within acceptable levels.</li> <li data-bbox="539 1635 1315 1758">• Traffic diversions or stages would include lane and shoulder closures on either the existing, temporary or new pavements. Road occupancy licences would be obtained for each type of construction work involving closures.</li> <li data-bbox="539 1771 1347 1872">• Provide traffic management measures during the closure of Fem Street, such as temporary traffic lights, to improve the performance of the off ramp approaches</li> <li data-bbox="539 1886 1289 1984">• Ensure the Belinda Street closure is undertaken following completion of the construction of the Fem Street bridge to provide sufficient.</li> </ul>

Impact	Environmental safeguard
Traffic	<p><i>Operation</i></p> <ul style="list-style-type: none"> <li>• Traffic monitoring would be undertaken for the Princes Highway and key local roads in Gerringong including Belinda Street and Fern Street. Traffic volumes would be assessed against those predicted.</li> </ul>
Noise and vibration	<p><i>Operational noise</i></p> <ul style="list-style-type: none"> <li>• Noise attenuation would be considered during detailed design to reduce road traffic noise levels at the residential properties located immediately to the east of the railway line adjacent to the Princes Highway. Possible attenuation could include a noise barrier, or mound, or combination of both, which would be investigated in more detail during detail design.</li> <li>• In addition to the noise attenuation, architectural treatments would be considered at the detailed design stage for properties where appropriate eg for isolated properties where a noise barrier would not be feasible. Depending on the level of impact, architectural treatments may include provision of fresh air ventilation, sealing of wall vents, upgraded window and door seals and upgraded windows and doors for more heavily impacted residences.</li> <li>• A low noise road surface such as open graded asphalt or stone mastic asphalt, would be considered as an alternative to architectural treatments for properties within Gerringong and may reduce the size and scale of the noise attenuation required. This option would be subject to a cost benefit analysis during detailed design.</li> </ul> <p><i>Construction noise</i></p> <ul style="list-style-type: none"> <li>• A noise and vibration management plan would be developed prior to construction as part of the CEMP and outline noise mitigation and management measures for the construction period. The contractor would be required to demonstrate best practicable means and include noise mitigation measures in the construction management plan including but not limited to those outlined below.</li> <li>• Works that would be undertaken outside the DECCW standard working hours would be in accordance with the DECCW Interim Construction Noise Guideline (DECC 2009) and the procedure contained in the RTA's Environmental Noise Management Manual 2001, "Practice Note vii – Roadworks Outside of Normal Working Hours".</li> <li>• Where noise attenuation is identified, it would be constructed early where feasible to maximise the benefits during construction.</li> <li>• Induction and training would be provided to staff and sub-contractors outlining their responsibilities with regard to noise.</li> <li>• Temporary barriers would be installed for stationary noisy equipment.</li> </ul>

Impact	Environmental safeguard
Noise and vibration	<p data-bbox="544 271 767 300"><i>Construction noise</i></p> <ul data-bbox="544 315 1353 943" style="list-style-type: none"> <li data-bbox="544 315 1353 412">• All plant items would be properly maintained and operated according to manufacturers' recommendations in such a manner as to avoid causing excessive noise.</li> <li data-bbox="544 427 1315 456">• All pneumatic tools would be fitted with silencers or mufflers.</li> <li data-bbox="544 472 1315 600">• Appropriate consideration of the use of penetrating cone fracture (PCF) techniques or the use of expansive grouts for rock breakage where blasting is required in close proximity to residents.</li> <li data-bbox="544 616 1353 680">• Any compressors brought on to site would be silenced or sound reduced models fitted with acoustic enclosures.</li> <li data-bbox="544 696 1305 757">• Affected property owners would be consulted and informed prior to works being carried out.</li> <li data-bbox="544 772 1257 833">• Develop a procedure for dealing with and responding to complaints.</li> <li data-bbox="544 848 1353 943">• Noise monitoring would be undertaken at sensitive locations for any excessive noise or noise complaints being assessed with appropriate action taken.</li> </ul> <p data-bbox="544 958 767 987"><i>Construction noise</i></p> <p data-bbox="544 1003 807 1032"><i>At residential locations</i></p> <ul data-bbox="544 1048 1353 1989" style="list-style-type: none"> <li data-bbox="544 1048 1331 1108">• Respite periods would be provided for any activities that result in impulsive or tonal noise generation.</li> <li data-bbox="544 1124 1305 1220">• Timing and duration of noisy construction activities would be considered and opportunities to reduce their noise impact identified.</li> <li data-bbox="544 1236 1353 1301">• Vehicle movements would be minimised outside normal daytime working hours.</li> <li data-bbox="544 1317 1273 1377">• Site access points and roads would be selected away from residences where feasible.</li> <li data-bbox="544 1393 1321 1453">• Noise source controls would be applied to reduce noise from plant and equipment.</li> <li data-bbox="544 1469 1353 1529">• Acoustic performance would be considered when selecting plant and equipment.</li> <li data-bbox="544 1545 1353 1641">• All equipment would be operated and maintained in the correct manner (ie engine covers are in place, rattling components are tightened).</li> <li data-bbox="544 1657 1331 1718">• Noisy activities would be combined to reduce their impact and duration where feasible.</li> <li data-bbox="544 1733 1289 1794">• Distances between noisy plant items and sensitive receivers would be offset where possible.</li> <li data-bbox="544 1809 1257 1839">• Equipment would be oriented away from sensitive areas.</li> <li data-bbox="544 1854 1219 1883">• Equipment would be switched off during break times.</li> <li data-bbox="544 1899 1331 1989">• Work compounds, parking areas, equipment and material stockpiles would be placed away from noise sensitive locations (where practical).</li> </ul>

Impact	Environmental safeguard
	<p><i>Construction noise</i></p> <p><i>At residential locations</i></p> <ul style="list-style-type: none"> <li>• Loading and unloading would be carried out away from sensitive areas where practicable.</li> <li>• Where possible, portable enclosures would be used around fixed plant producing high noise levels, or operations conducted in close proximity to residences. This may apply to compressors, generators or similar plant items located outside a particular residence for an extended period of time.</li> <li>• Where variable pitch reversing alarms are fitted to plant, they would be required to be set on the lowest safe level, and where practicable, endeavour to provide drive-through facilities to minimise utilisation of reverse warning devices. The use of broad-band reversing alarms is strongly recommended.</li> </ul> <p><i>Construction vibration</i></p> <ul style="list-style-type: none"> <li>• Where vibration intensive equipment is used at distances up to 100 m from residential properties, prior notification would be given to residents and vibration monitoring would be undertaken. In addition, any properties deemed at risk of vibration damage would be inspected prior to construction commencement.</li> </ul>
Air quality	<p>An air quality management plan (AQMP) would be developed as part of the CEMP. The general principles of the AQMP would incorporate recommendations on sediment and erosion control and the control of windblown dust provided by the DECCW (Managing Urban Stormwater, Soils and Construction, Volume 2D Main Road Construction, 2008) and Landcom (Managing Urban Stormwater, Soils and Construction, Volume 1, Edition 4) and at a minimum include:</p> <ul style="list-style-type: none"> <li>• Stabilisation of all disturbed areas as soon as practicable to prevent or minimise windblown dust.</li> <li>• Dampening of all unsealed trafficable areas during working hours to minimise windblown or traffic generated dust emissions.</li> <li>• Use of water sprays, sprinklers and water carts to adequately dampen stockpiles, work areas and exposed soils to prevent the emission of dust from the site.</li> <li>• Maintenance of stockpiles and handling areas to minimise windblown or traffic generated dust. Areas that may be inaccessible by water carts would be kept in a condition which minimised windblown or traffic generated dust using other means.</li> <li>• Maintenance of dust control equipment to maintain operability at all times with the exception of shutdowns required for maintenance.</li> <li>• Maintenance of construction equipment in accordance with the manufacturer's guidelines to ensure exhaust emissions comply with the requirements of the <i>POEO Act</i> and other relevant legislative and best practice requirements.</li> </ul>



Impact	Environmental safeguard
Air quality	<ul style="list-style-type: none"> <li>• Regular removal of silt from behind filter fences and other erosion control structures to avoid generating dust.</li> <li>• Trucks entering and leaving the site would be well maintained in accordance with the manufacturer's specification to comply with all relevant regulations. Fines may be imposed on vehicles that do not comply with smoke emission standards. Truck movement would be controlled on-site and restricted to designated roadways. Truck wheel washes or other appropriate dust removal procedures would be installed to minimise transport of dust off-site.</li> <li>• If necessary, modification of construction scheduling during periods of high wind.</li> <li>• Watering / revegetating of stockpiles and exposed areas.</li> <li>• Dust monitoring would be carried out at sensitive receptors during construction to determine compliance with dust deposition goals currently noted by DECCW.</li> </ul>
Urban design	<p><i>General</i></p> <ul style="list-style-type: none"> <li>• Apply the proposed urban design strategy and concept plan developed for the proposal (refer to Appendix K).</li> <li>• Reduce the physical impacts of the upgrade works to the minimum required to achieve the proposal objectives.</li> <li>• Replace at a minimum any tree and or large shrub plantings lost as part of the upgrade works.</li> <li>• Integrate new vegetation with the existing landscape character by using culturally relevant species.</li> <li>• Ensure that long-term integration of the upgrade into the existing landscape character is successful by selecting the appropriate footprint, blending the infrastructure with the surrounding landscape and ensuring the restoration of usable around the infrastructure.</li> <li>• Design retaining wall structures, cut embankments and fill slopes and bridges and associated elements in accordance with the urban design strategy (refer to Appendix K).</li> <li>• Engage adjacent land owners in assessing if early works mitigation (eg landscape plantings) can be achieved to help reduce impacts of the upgrade.</li> </ul> <p><i>Cut slopes</i></p> <ul style="list-style-type: none"> <li>• Where high strength rock exists, use of the natural rock is the best solution for stabilisation.</li> <li>• In low strength, highly erodible batters, stabilisation with vegetation in accordance with the landscaping plan to be developed during detailed design is desirable. Plantings are generally possible on slopes with a maximum of 2.5h:1v in circumstances where aspect and ground material permits.</li> <li>• Consideration would be given to low strength rock being terraced (space permitting) with bench widths of approximately four metres, providing improved areas for planting and vegetation to establish.</li> </ul>

Impact	Environmental safeguard
Urban design	<p data-bbox="544 237 659 271"><i>Fill slopes</i></p> <ul data-bbox="544 282 1350 981" style="list-style-type: none"> <li data-bbox="544 282 1350 479">• Fill slopes would be blended into the adjacent contouring of the land by varying the slope range and feather-out to integrate with the existing grade. Slopes would vary between 2h:1v and 5h:1v to allow for best transition of the proposed upgrade into the landscape context. This would be dependent on available space and consultation with adjacent landowners.</li> <li data-bbox="544 495 1350 658">• As the upgrade would be adjacent to pastoral landscapes along the majority of the route, consideration would be given to flattening embankments as part of the upgrade works to allow more subtle blending with the landscape, and return it to its former landscape use.</li> <li data-bbox="544 674 1350 871">• Where possible, cut and fill formations would be achieved with natural' transitions, gently rounded out at both the top and bottom. Flattened embankments and less step cuts would be considered to enable improved integration of slopes and batters with the surrounding landscape. Additional land impacted at construction can be returned to former use once established.</li> <li data-bbox="544 887 1350 981">• The use of shotcrete would be minimised where possible. If shotcrete is required for stabilisation, it would be applied in accordance with the RTA Shotcrete Guidelines (2005).</li> </ul> <p data-bbox="544 992 775 1025"><i>Retaining structures</i></p> <ul data-bbox="544 1037 1350 1487" style="list-style-type: none"> <li data-bbox="544 1037 1350 1200">• Retaining walls would be limited in their application and aesthetic to maintain the local and regional rural characteristic. Where retaining walls are required, they would be coordinated with other proposal elements, including safety barriers, noise walls and light poles.</li> <li data-bbox="544 1216 1350 1310">• All retaining wall cladding panels or form work would match the panel size proportions of the associated noise walls and other urban infrastructure elements.</li> <li data-bbox="544 1326 1350 1487">• Where practicable retaining walls would provide a minimum of 1.5 m at the base of the wall for screen planting. The footings of the walls would be designed to maximise the area for soil at the base of these walls and integrate a waterproof membrane to prevent leaching and staining to wall face.</li> </ul> <p data-bbox="544 1498 735 1532"><i>Bridge elements</i></p> <ul data-bbox="544 1543 1350 1968" style="list-style-type: none"> <li data-bbox="544 1543 1350 1740">• New bridges would be designed to be simple, clean structures that are fully integrated with the rest of the highway corridor works. Minimum deck depths would be used and railing systems should be utilised on the parapets to reduce the visual mass of the structure. The joints in the superstructure would be integrated with the parapet.</li> <li data-bbox="544 1756 1350 1816">• Lighting would be integrated to reinforce the dimensions of the bridge elements.</li> <li data-bbox="544 1832 1350 1892">• Parapet ends would generally extend beyond abutments to ensure that the bridge is connected into its context.</li> <li data-bbox="544 1908 1350 1968">• Where practicable abutment treatments to either side of the bridge structures would be consistent.</li> </ul>

Impact	Environmental safeguard
Urban design	<p><i>Bridge elements</i></p> <ul style="list-style-type: none"> <li>• Bridges would be designed to be simple elements within the landscape and not as gateway or iconic elements. The physical bulk of these large infrastructure items would be reduced in favour of a slim superstructure and parapet detail. Essential is the integration of the bridge deck and the adjacent abutment.</li> </ul> <p><i>Town entrances and exits</i></p> <ul style="list-style-type: none"> <li>• Appropriate cultural plantings and use of local materials would be utilised in developing a gateway that connects the town with this access point.</li> <li>• A gateway design at Rose Valley interchange would be developed in conjunction with Kiama Municipal Council, the local community and the RTA. The landscape design outcome would be subtle and integrated with the adjacent landscape context and design elements (embankments, retaining walls and bridges).</li> <li>• Signature cultural plantings would be used to provide a visual connection to the landscape patterns within the town. This would include the use of either or both Moreton Bay Fig trees and/ or Norfolk Island Pine trees</li> </ul> <p><i>Landscaping</i></p> <ul style="list-style-type: none"> <li>• Broad scale application of screening planting to the highway corridor would reinforce the upgraded corridor rather than provide an integrated solution. The reinforcement of the traditional cultural planting patterns in the landscape would be more sympathetic with the landscape context and provide an integrated solution for the upgrade</li> <li>• Prominent local landscape species would be used for revegetation in accordance with the landscaping plan to be developed during detailed design.</li> <li>• The design would conform to the landscape design objectives as outlined in the RTA's Landscape Guideline (2008).</li> <li>• With the consent of land owners ribbons of planting would extend perpendicular to the highway into the landscape where creek crossings and fence lines are located to reinforce cultural use of the land. Planting would be used to reinforce existing lines of vegetation, eg Fern Street Casuarina Avenue and would be developed in accordance with the landscaping plan during detailed design.</li> </ul> <p><i>Potential noise attenuation</i></p> <ul style="list-style-type: none"> <li>• To minimise potential visual impacts, a key design objective during detail design would be to develop and design a solution which integrates with the surrounding environment. This would be achieved by applying an integrated design approach, involving all design disciplines to achieve predefined urban design objectives and design principles, and in consultation with identified stakeholders.</li> </ul>

Impact	Environmental safeguard
Socio-economics	<p data-bbox="544 271 778 300"><i>During construction</i></p> <ul data-bbox="544 315 1353 1809" style="list-style-type: none"> <li data-bbox="544 315 1353 450">• The community would be kept informed by providing regular information and updates such as: <ul data-bbox="600 394 1353 674" style="list-style-type: none"> <li data-bbox="600 394 1353 450">- Letter box drops, media releases, and/or community updates.</li> <li data-bbox="600 461 1353 528">- An internet site established and maintained for the duration of the proposal.</li> <li data-bbox="600 539 1353 573">- Variable message signs.</li> <li data-bbox="600 584 1353 674">- Targeted consultation with affected individuals or groups including the Gerringong Chamber of Commerce, Kiama Municipal Council and local tourism promoters.</li> </ul> </li> <li data-bbox="544 685 1353 842">• Information would be provided to the community including: <ul data-bbox="600 730 1353 842" style="list-style-type: none"> <li data-bbox="600 730 1353 763">- Changes to access and traffic conditions.</li> <li data-bbox="600 775 1353 808">- Details of future works programs.</li> <li data-bbox="600 819 1353 842">- General construction progress.</li> </ul> </li> <li data-bbox="544 853 1353 954">• Visual, air quality and noise and vibration management plans would be developed prior to construction to manage amenity impacts.</li> <li data-bbox="544 965 1353 1021">• Traffic impacts would be managed through the preparation of a detailed traffic management plan to include construction staging.</li> <li data-bbox="544 1032 1353 1167">• Construction methods and staging would be designed to minimise road closures, subject to other proposal constraints. Staged construction would be allowed so that disruption to the existing traffic is maintained within acceptable levels.</li> <li data-bbox="544 1178 1353 1279">• Adequate signage would be provided to ensure that drivers are aware of how to access Gerringong town centre and Gerroa during the temporary closure of Fern Street.</li> <li data-bbox="544 1290 1353 1447">• The RTA would continue to consult with the community (Gerringong Chamber of Commerce, Kiama Municipal Council, local tourism promoters and where appropriate other community members) as it determines mitigation measures for the impact of the temporary closure of Fern Street.</li> <li data-bbox="544 1458 1353 1559">• Land would be acquired in accordance with the RTA Land Acquisition Policy (and under the terms of the <i>Land Acquisition (Just Terms Compensation) Act 1991</i>).</li> <li data-bbox="544 1570 1353 1693">• Property access would be maintained and provided throughout construction and operation. Should temporary or alternative property access be required this would be provided in consultation with the affected landowner(s).</li> <li data-bbox="544 1704 1353 1809">• Ancillary services, such as accommodation, catering and office supplies, would be locally sourced where possible and cost effective.</li> </ul> <p data-bbox="544 1816 746 1845"><i>During operation</i></p> <ul data-bbox="544 1861 1353 1989" style="list-style-type: none"> <li data-bbox="544 1861 1353 1989">• A strategy would be developed to provide appropriate signage on the Princes Highway on approach to Gerringong and near to interchanges to identify Gerringong and Gerroa as stopping destinations.</li> </ul>

Impact	Environmental safeguard
Socio-economics	<p><i>During operation</i></p> <ul style="list-style-type: none"> <li>In addition to strategies developed by the RTA, community and business groups may choose to develop further strategies, such as increasing promotion of tourism in the area and further enhancing the streetscape.</li> </ul>
Land use	<ul style="list-style-type: none"> <li>All acquisition would be undertaken in accordance with the <i>Land Acquisition (Just Terms Compensation) Act, 1991</i> and RTA's Land Acquisition Policy.</li> </ul>
Waste	<ul style="list-style-type: none"> <li>A resource and waste management plan (RWMP) would be prepared in accordance with RTA QA Specifications and the RTA's Waste Minimisation and Management Guidelines, 1998 prior to any construction activities commencing and would include the following factors: <ul style="list-style-type: none"> <li>Quantity and classification of excavated material generated as a result of the proposal.</li> <li>Disposal strategies for each type of material.</li> <li>Details of how waste would be stored and treated on site.</li> <li>Identification of all non-recyclable waste.</li> <li>Identification of strategies to 'reduce, reuse and recycle'.</li> <li>Identification of available recycling facilities on and off site.</li> <li>Identification of suitable methods and routes to transport waste.</li> <li>Procedures and disposal arrangements for unsuitable excavated material.</li> </ul> </li> <li>The RWMP would include the following to avoid polluted runoff entering waterways: <ul style="list-style-type: none"> <li>Regular inspections of work practices.</li> <li>Training of staff in correct handling, storage, transport and disposal of hazardous substances eg fuels used for construction equipment.</li> <li>Surface water quality monitoring. In accordance with the EPL water quality criteria.</li> </ul> </li> </ul> <p>The following specific waste minimisation and impact mitigation measures would be implemented in addition to the RWMP:</p> <ul style="list-style-type: none"> <li>Reuse of materials on-site would have priority over recycling. Where recycling is more feasible, it would be carried out in accordance with the NSW Government's Waste Avoidance and Resource Recovery Strategy 2003.</li> <li>Green waste that could not be re-used during revegetation works would be transported to an appropriate waste depot for recycling. Non-weed species would be mulched for on-site reuse wherever possible, in preference to transportation off-site.</li> <li>Any noxious weeds identified would be disposed of in accordance with the requirements of the Illawarra District Noxious Weeds Authority (IDNWA) for the disposal of noxious weeds.</li> </ul>

Impact	Environmental safeguard
Waste	<ul style="list-style-type: none"> <li>• Any disposal of non-recyclable waste would be in accordance with the Protection of the Environment Operations Act and DECCW's Waste Classification Guidelines: Part 1 Classifying Waste (DECCW 2009).</li> <li>• Excavated material that is not suitable for on-site reuse or recycling, such as contaminated material would be transported to a site that may legally accept that material for reuse or disposal.</li> <li>• The appropriate licences and approvals would be obtained from DECCW prior to the disposal of any contaminated waste generated by the proposal, and the operators of the appropriate disposal site would be notified in advance.</li> <li>• At the end of the construction period, any unused fuel, oils and chemicals would be removed from the site.</li> <li>• Materials would be sourced so as not to result in the creation of excess waste where practicable.</li> <li>• Any waste oil generated during maintenance would be disposed of at an approved disposal site or recycling facility.</li> <li>• Concrete delivery trucks would be directed to wash out within a specified washdown bay, which would be appropriately bunded, within the confines of the site compound or return to the batching plant before washing out.</li> <li>• Portable, self-contained toilet and washroom facilities would be provided on site which would, if not connected to town sewer, be regularly emptied and serviced by the contractor providing them.</li> <li>• Putrescible and other waste such as chemical waste, not able to be recycled, would be regularly collected and disposed of at an appropriate disposal site.</li> <li>• No burning of cleared vegetation or other material would be allowed. It would be recycled where feasible or otherwise disposed of at an appropriate site.</li> <li>• Secure rubbish bins, with lockable lids would be provided on site, which would be regularly emptied by the supplying contractor.</li> <li>• Any rubbish loads being transported from the site for disposal would be covered to prevent the spread of waste.</li> <li>• The works site would be left tidy and rubbish free on completion of the proposal.</li> </ul>
Greenhouse gasses and sustainability	<p><i>Operations</i></p> <ul style="list-style-type: none"> <li>• Innovative technologies would be considered for integration into the design to power traffic management systems or lighting (eg photovoltaic panels).</li> </ul>

Impact	Environmental safeguard
Greenhouse gasses and sustainability	<p data-bbox="544 271 699 300"><i>Construction</i></p> <ul style="list-style-type: none"> <li data-bbox="544 315 1342 510">● Consideration would be given to the procurement process and the preferential selection of materials with higher recycled content (eg recycled aggregate in concrete) and lower embodied energy. The whole life cycle of materials would be considered including extraction, manufacture, transport to site, related waste and tipping.</li> <li data-bbox="544 526 1310 622">● Materials would also be selected based on availability of local resources in order to minimise the energy requirements over the life of these materials.</li> <li data-bbox="544 638 1342 833">● The construction fleet would be comprised of vehicles and construction plant / equipment with high fuel efficiency and low GHG intensive fuel such as biofuels (eg biodiesel, ethanol). Construction plant / equipment would be maintained to reduce energy efficiency losses associated with damaged / unmaintained equipment.</li> <li data-bbox="544 848 1326 1012">● Green site offices would be installed, considering passive design strategies such as orientation, natural ventilation and user-operable environments (eg shading and operable windows) to reduce energy loads. Purchase of green power would be considered for proposal related activities.</li> <li data-bbox="544 1028 1342 1491">● A conservational approach would be taken to water management including: <ul style="list-style-type: none"> <li data-bbox="600 1102 1294 1198">- Consideration of the use of recycled water during construction, sourced from the Gerroa treated effluent irrigation scheme.</li> <li data-bbox="600 1214 1342 1274">- Use of dust suppressor additives to reduce evaporation and attract more dust particles to save water.</li> <li data-bbox="600 1290 1134 1319">- Water harvesting from construction sites.</li> <li data-bbox="600 1335 943 1364">- Bio-swales to treat runoff.</li> <li data-bbox="600 1379 847 1408">- Sediment basins.</li> <li data-bbox="600 1424 1134 1453">- Spill containment at appropriate locations.</li> <li data-bbox="600 1469 1182 1498">- Appropriate infrastructure and culvert design.</li> </ul> </li> <li data-bbox="544 1507 1310 1568">● Recycling programs would be implemented in site offices and for construction waste.</li> <li data-bbox="544 1583 1326 1747">● The RTA would hold a sustainability workshop with the design and construction teams in the early detailed design stages to identify proposal-specific opportunities for emission reduction, resource conservation and sustainability initiatives (through technologies and innovation).</li> <li data-bbox="544 1762 1294 1823">● Drainage infrastructure would be upgraded to accommodate projected increases in rainfall.</li> <li data-bbox="544 1839 1310 1921">● Structural expansion joints in concrete would be designed to withstand temperature increases predicted over the proposal design life.</li> </ul>

Impact	Environmental safeguard
Greenhouse gasses and sustainability	<ul style="list-style-type: none"> <li>● Review specifications for protective coatings and update them if necessary so that they can meet the changed conditions.</li> <li>● Increased maintenance regimes would be considered where appropriate to maintain bridges and bituminous pavement and formation.</li> </ul>
Ancillary infrastructure	<ul style="list-style-type: none"> <li>● Sites are to be located on residues of land purchased for the road works where such residues are available and suitable.</li> <li>● Sites are to have sufficient area to permit the storage of topsoil and the movement of scrapers.</li> <li>● Wherever practicable sites are to be separated from creeks or watercourses by at least 50 m conditional upon the provision of adequate erosion and sedimentation controls. Where 50 m separation is not possible they would be sited subject to investigation of appropriate controls.</li> <li>● Sites are to have low conservation significance for flora and fauna.</li> <li>● Sites are not be of Aboriginal or non-Aboriginal heritage significance.</li> <li>● Sites are to be already cleared of native vegetation.</li> <li>● Sites are not to be located within 200 m of, or drain directly to, SEPP 14 Wetlands.</li> <li>● Batching plant sites are to be located so as to facilitate effective transport of concrete and asphalt to the worksites and to allow efficient access for constituent materials</li> <li>● Batching plant sites are to be relatively level and have sufficient area to permit effective operation, preferably at least one hectare.</li> <li>● Wherever possible sites are to be separated from the nearest residence by at least 200 m unless it can be demonstrated that there would be no adverse noise, visual and air quality impacts.</li> <li>● Batching plant sites must be above the 20 ARI flood level unless a contingency plan to manage flooding issues is prepared and implemented.</li> <li>● Sites are to be selected so that the operation of the plant does not impact on the land use of adjacent properties current at the time the plant is established.</li> <li>● Concrete batching sites are to have at least town water and power supply. Asphalt batching plants are to have at least power supply.</li> <li>● Concrete batching sites are to have a 'first flush' capability to minimise the risk of alkaline water runoff.</li> <li>● Where practicable operational road maintenance stockpile sites would be stabilised through revegetation.</li> <li>● Stockpile sites would be managed in accordance with the RTA's Stockpile Site Management Procedure (RTA, 2001).</li> </ul>



### 7.3 Licensing and approvals

The following licences and approvals would be required for the proposal:

Requirement	Timing
The proposal is classified a scheduled activity under clause 35 of schedule 1 of the <i>POEO Act</i> because the combined length is over five kilometres. The proposal would therefore require an EPL. DECCW have prepared a "Model EPL" and this would be utilised to guide design and construction through the preparation of tender documentation prior to obtaining an EPL for the proposal. The Model EPL is included in Appendix D.	Prior to commencement of construction.
In accordance with section 87 (1) of the <i>NPW Act</i> , approval from the Director General of DECCW – Parks Services Division has been obtained to excavate archaeological sites and relics prior to conducting a subsurface testing program.	Obtained, requirements of the permit to be adhered to for the duration of the subsurface testing program. A copy of the permit is included in Appendix C.
Approval under section 90 (2) of the <i>NPW Act</i> would be obtained for a 'consent to destroy' permit for any identified archaeological sites or remains found during the subsurface testing and during construction.	Prior to removal or destruction of any artefacts.
An excavation permit would need to be applied for under section 140 of the <i>Heritage Act</i> prior to the disturbance of any non-Aboriginal relics.	Prior to disturbance.
Should water for the proposal need to be drawn from any waterways and used, a licence under section 10, or a permit under section 18F of the <i>Water Act</i> may be required from NSW DECCW, Office of Water.	Prior to any water extraction.
Road Occupancy Licences would be obtained for each type of construction work involving closures in accordance with the <i>Roads Act 1993</i>	Prior to road closures.
Contractor and the RTA are obliged to notify DECCW when a "pollution incident" occurs that causes or threatens "material harm" to the environment	If an incident occurs.