

Environmental Sub Plan

Soil and Water Management Sub plan

Appendix 6 to the OEMP

10 YEAR MAINTENANCE PERIOD

**PACIFIC HIGHWAY UPGRADE
BRUNSWICK HEADS TO YELGUN**

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1. Background

The Brunswick Heads to Yelgun Pacific Highway upgrade crosses a number of significant waterways including the Brunswick River and Marshall's Creek.

Water quality in these waterways is generally considered to be good but can be significantly affected during a rain event. A range of pollutants may arise from within the surrounding catchment including:

- sediment from unstable and unsealed areas
- oil and hydrocarbons from road surfaces
- chemicals and liquid pollutants (arising from spillage/incidents or chemical use on agricultural land)
- acid from acid soils
- nutrients (arising from organic matter, agricultural areas and fertiliser use).

2. Purpose and objectives

The objectives of this plan are:

- To identify the monitoring and maintenance requirements contained in the Project Approval, Deed and Environmental Documents.
- To define soil and water management principles, guidelines, intervention and stabilisation levels.
- To provide details of monitoring and maintenance procedures.

3. Environmental Aspects and Impacts

The aspects of maintenance that have the potential to cause impacts on soil and water are listed in Table 1. Referenced management documentation is located in the project Maintenance Manual.

Table 1: Aspects and Impacts

Maintenance Activities (Aspects)	Potential Impacts of maintenance activity	Management Documentation
Pit, V-drain, bridge scupper and culvert maintenance works including the removal of sediment	<ul style="list-style-type: none">• Sediment and debris release (pollution) in waterways• Blockage of stream flow	Activity Guideline AG14
Removal of debris from waterways, and excavations in drains	<ul style="list-style-type: none">• Disturbance of the creek bed and aquatic vegetation including mangroves• Damage or instability to creek banks• Blockage of water flows and fish movement• Damage to riparian (stream bank) vegetation• Potential Acid Sulphate Soil disturbance• Smothering of aquatic vegetation	Standard Operating Procedure E10 <i>Maintenance at Waterways</i> ; Sensitive Area Plans and Standard Operating Procedure E2 <i>Managing Acid Sulphate Soils</i> .
Maintenance of Gross Pollution Traps	<ul style="list-style-type: none">• Pollutants and debris block drainage path, and overflow the system or get reentrained in the water flow	Section 3 of this document
Basin maintenance including the removal of sediment and discharge	<ul style="list-style-type: none">• Pollution of watercourses arising from the release of polluted water• Disposal of sediment	Standard Operating Procedure E5 <i>Management of Spill</i>

of captured water		<i>Basins</i>
Excavation into previously capped contaminated soils site	<ul style="list-style-type: none"> • Release of contaminated soil resulting in occupational and environmental health issues 	Section 5.2 of this document
Herbicide application	<ul style="list-style-type: none"> • Release of herbicide into waterways and soils 	Standard Operating Procedure E5 <i>Management</i>
Storage of chemicals	<ul style="list-style-type: none"> • Release of chemicals into waterways and soils 	Section 6 of this document and Standard Operating Procedure E5 <i>Management</i>
Heavy Asphalt Patching, Remove and replace CRCP, Remove and replace linemarking.	<ul style="list-style-type: none"> • Release of chemicals/pollutants into waterways 	OEMP Section 4.4 and reference sub-contractor EMP.

3. Management of Water Quality Devices

A schedule of maintenance implementation is provided in Annexure F of the Maintenance Manual.

Post-construction water quality management includes the maintenance of the following permanent devices:

- Constructed stormwater wetlands
- Water Quality spill basins with oil spillage containment
- the Gross Pollution Trap and the Nutrient Removal Tank
- Waterways including grass swales, open drains and rock groynes (check dams).

Detailed design drawings of all these structures are included in the project As constructed Documentation of the Maintenance Manual.

3.1 Constructed Stormwater Wetlands

Some of the areas along the proposed alignment are considered to be environmentally sensitive. These sensitive areas are protected from stormwater runoff during the operation period by stormwater wetlands. These wetlands will provide additional security for the SEPP14 Coastal Wetlands and provide assurance that the low operational risks of accidental spills of hazardous materials from traffic will be effectively managed.

All stormwater wetlands contain a deeper sedimentation zone and a shallower macrophyte zone. Upstream of the wetlands the stormwater pits have grates to prevent gross pollutants from entering, and the full design flow is directed into the sediment zone to act as an accidental spillage containment basin. The spill containment zone will require inspection and possible maintenance as documented in SOP-E5 *Management of Spill Basins*. Reverse graded pipes are provided between the sediment zone and the macrophyte zone, and the pipes are sized to direct one year flow to the macrophyte zone.

An oil baffle inside the first flush basin cell prevents oil from entering the macrophyte zone.

Establishment of the stormwater wetlands will require management, maintenance and monitoring to ensure good coverage of macrophyte plant growth, particularly in the first three to six months.

Routine inspections will be undertaken to assess the condition and integrity of all constructed wetlands. Inspection items include the inlet, banks (stability), pits, grates, internal flow

bypassing within the macrophyte zones and macrophyte growth. The response to an identified maintenance issue will be initiated in accordance with the Maintenance Manual.

At times, it may be necessary to 'harvest' excess macrophyte growth. Guidelines that provide more information about this activity are the *Constructed Wetlands Manual* (DLWC, 1998), web reference: <http://www.bookshop.nsw.gov.au/pubdetails.jsp?publication=19>
Care should be taken to ensure that:

- some vegetation is left within and around the perimeter of the wetland to prevent scouring and retain aquatic fauna habitat
- infrastructure such as pipes, walls and grates are not damaged as a result of the use of heavy plant and equipment
- injury to fauna is avoided. The wetland should be inspected for the presence of fauna prior to maintenance works commencing
- removed vegetation will be managed as part of landscape maintenance. Refer also to Section 4.7 of Waste and Reuse Sub Plan in relation to vegetation waste.

The use of chemicals (eg herbicide) in and around constructed wetlands shall be avoided.

3.2 Water Quality Basins

In the EIS (SKM 1998) for the project it was considered sufficient that sheet flow pavement runoff water would be allowed to flow over the embankment into a grass lined channel and stream, where these are away from environmentally sensitive areas. However water quality spill basins have been provided wherever practically possible along the project alignment. A list of the location of all the water quality basins is detailed in the Standard Operating Procedure E5.

All water quality basins have a minimum volume of 60 cubic metres to intercept a 20,000 litre accidental liquid chemical spill.

Inspection and maintenance of Water Quality Basins is documented as Standard Operating Procedure SOP-E5 *Management of Spill Basins*.

Routine inspections will be undertaken to assess the condition and integrity of all basin components. The monitoring schedule is listed in Annexure F of the Maintenance Manual.

Shut off valves will remain operable at all times.

Where chemicals or other pollutants have been captured in a basin following a spill or incident, the procedure to be followed is documented in the Standard Operating Procedure SOP-E5.

3.3 GPT and Nutrient Removal Tank

The GPT device near the Rajah Road roundabout is provided by CDS P/L and will initially be serviced on a six monthly basis. Depending upon the amount of debris and rubbish material removed from the GPT device during servicing, this initial six monthly routine may be varied. Servicing will be by vacuum truck. The material removed by the vacuum truck will be disposed at a licensed waste disposal facility.

The nutrient removal tank located near the Rajah Road roundabout is a "StormFilter" product provided by Ingal Environmental Services. It consists of vaults that house rechargeable cartridges filled with a variety of filter media. The filter systems are installed in-line with storm drains. The StormFilter works by passing stormwater through media-filled cartridges, which trap particulates and adsorb materials such as dissolved metals and hydrocarbons.

The StormFilter will initially be inspected and serviced on a six monthly basis. It is envisaged that the cartridges within the tank will require replacing on an annual basis, but this routine will be reviewed depending upon their condition during the six monthly inspection, and the nutrient load in the incoming stormwater. Filter cartridge replacement should occur during dry weather and it may be necessary to plug the filter inlet pipe if base flows exist. Contact Ingal

Environmental Services for information on replacement cartridges. Disposal of used cartridges will be to a licensed waste disposal facility.

If a chemical spill has occurred in the area, and residue is captured inside the GPT or StormFilter contact the DEC for guidance in accordance with the Emergency Management Procedures.

The results of the routine service of these devices will be reported in the annual report to the RTA.

3.4 Waterways and Drainage Assets

Permanent drains have been designed to divert clean runoff away from cut and fill batters, and dirty water into pits and basins.

Rock groynes (permanent rock check dams) have been installed as velocity control structures in some open channels.

Drainage assets will be inspected to determine 'functionality', an assessment based on the extent of silting, rubbish, lining condition and the growth of vegetation. The inspection and any subsequent maintenance work will be undertaken in accordance with the following sections of the Maintenance Manual:

- Annexure N, Code of Maintenance Standards for drainage asset elements
- Standard Operating Procedure E10 *Maintenance at Waterways*

Bridges over watercourses will also be inspected to check for debris, vegetation, sediment, litter, scouring or damage to the structure. Reference is made the following parts of the Maintenance Manual:

- Standard Operating Procedure E10 *Maintenance at Waterways*
- AG-14 V-Drain and Bridge Scupper Cleaning
- Annexure N, Code of Maintenance Standards for bridge asset elements

Maintenance work will be planned to minimise the potential for bank and vegetation disturbance. This will involve:

- restricting and controlling access ie one access point only
- selecting appropriately sized plant and equipment
- implementing erosion and sediment control measures
- undertaking temporary and permanent stabilisation of disturbed areas
- communicating agreed work methods to all personnel involved.

All rubbish (litter and debris) will be removed from the watercourse in an environmentally acceptable manner. Disposal will be in accordance with the Waste and Reuse Management Sub Plan.

The use of chemicals (eg herbicide) in and around creeks and waterbodies should be avoided due to the potential impact on aquatic species such as frogs, lizards and water birds that may use these areas.

It should be noted that mangroves and seagrasses are protected flora species and must not be damaged or removed without a permit from the Department of Primary Industries (DPI) (Fisheries). Prior to works involving 'filling' or 'reclamation' (removal of sediment) in or near a waterway the DPI Fisheries Officer should be contacted.

4 Water Quality Monitoring

4.1 Water Quality Monitoring

Monitoring will be undertaken to assess post construction water quality associated with the road system.

Monitoring will be undertaken at the locations described in Table 2 which are the same as the construction-stage monitoring locations. The frequency of monitoring is detailed in Standard Operating Procedure SOP-E01 *Water Quality Monitoring* located in the project Maintenance Manual.

Table 2: Water quality monitoring locations

Site ID	Monitoring Location
W1	Downstream cell of Wetland W44.4
W2	Downstream cell of Wetland W44.6
W3	Upstream cell of Wetland B
W4	Downstream cell of Wetland B
W5	Downstream cell of Wetland W47.5
W6	Downstream cell of Wetland W48.9

The water quality parameters that will be tested in the field at each site are:

- pH
- Salinity/conductivity
- Dissolved oxygen
- Turbidity/TSS
- Temperature
- Visible oil and grease.

Refer to the standard operating procedure for more information on monitoring procedures. The following details will be recorded at the time of the monitoring:

- any activities noted to be occurring within the catchment that could affect water quality
- any aspect of the immediate environment that could affect water quality eg scouring/stability of batters, drains etc

Laboratory analysis will be undertaken by an accredited laboratory with a certified quality assurance plan.

Where relevant, data collected by the BR Oyster Growers Committee is to be used for long term monitoring.

5. Management of Soils

5.1 Erosion and Sediment Control

Where signs of erosion are observed, appropriate erosion and/or sediment controls will be put in place until the affected area can be stabilised to prevent such erosion. Refer to Maintenance Manual for intervention levels.

Where maintenance works:

- result in the disturbance or exposure of soil
 - result in the removal of ground cover vegetation
 - require stockpiling of material
 - change drainage pathways or
 - are in close proximity to a drain, waterway, wetland or other sensitive area
- an Erosion and Sediment Control Plan (ESCP) will be prepared by the Maintenance team leader and implemented.

The ESCP will include details of:

- the staging and timing of the works
- the location of waterways, retained vegetation and restricted access areas
- the location of all temporary and permanent erosion and sediment controls including fences, windrows, catch drains and basins
- any bunding that may be required in the waterway. (DPI (Fisheries) must be contacted where bunding is required and fish passage or water flow will be blocked)
- the location of stockpiles and details of controls above and below the stockpile
- any dewatering activities
- temporary crossings, access roads or work platforms
- site rehabilitation requirements eg hand seeding with a cover crop, hydromulching/hydroseeding, planting or stabilisation with jute mesh or similar product.

Erosion control options include:

- preventing clean runoff flowing onto disturbed areas
- slowing the velocity of runoff water to prevent scouring
- minimising catchment areas and slopes
- maintaining permanent drains
- revegetating all disturbed areas.

Sediment control options include:

- installing temporary controls such as sediment fences
- preventing turbid runoff leaving the site until it is of acceptable quality by diverting it into sediment basins
- managing sediment basins
- maintaining vegetation buffer strips.

Temporary erosion and sediment controls will be regularly inspected and maintained in a good and operable condition until all disturbed areas are stable.

Accumulated sediment will be removed from controls (eg behind sediment fences) on a regular basis and disposed of in an acceptable location away from drainage lines and watercourses.

Once the area is stable (ie no potential for further erosion) all temporary erosion and sediment controls will be removed. Controls should be reused and should only be disposed of if damaged.

5.2 Contaminated Soils at the former Cattle tick Dip Site

Soils contaminated by the use of the former Hainsville Cattle Tick Dip site have been capped and contained by the Pacific Highway upgrade. The site is indicated in the Sensitive Area Plans, contained in the OEMP.

The site of the original dip and former holding yards are all covered by the new embankment, in some cases up to 12 metres deep and capped by concrete road pavement. A marker layer of green coloured geotextile separates the upgrade embankment fill with the in-situ material. It is recommended that the area be left undisturbed.

Background documents concerning site investigations of the site are listed as follows:

- Robert Carr & Associates (2004) *Contaminated Site Assessment*, Duplication of Brunswick Heads Bypass and Upgrade of the Pacific Highway Brunswick River to Yelgun.
- Robert Carr & Associates (2004) *Addendum to Contaminated Soils Site Assessment*, Duplication of Brunswick Heads Bypass and Upgrade of the Pacific Highway Brunswick River to Yelgun.
- Responsive Environmental Solutions (2005) *Remediation Action Plan, Hainsville Cattle Tick Dip Site*, for Abigroup, Pacific Highway Upgrade, Brunswick Heads to Yelgun

- Abigroup (2007) *Validation Report Hainsville Cattle Tick Dip Site*, Brunswick Heads to Yelgun Pacific Highway Upgrade.

6. Fuel and Chemical Stores

All liquid chemicals, fuels and oils must be stored in a suitable secondary containment bund located and protected to minimise the impact of any spillage or contamination on or around the site. The sizing of bunds as secondary containment is detailed in the Standard Operating Procedure SOP-E4 *Environmental Management of Storage Areas*.

Inspections and maintenance of storage areas will be undertaken to ensure they continue to function effectively and without impact on the environment.

Refer to the SOP-E4 in the Maintenance Manual for more information on the management of storage areas. During the operational phase the Maintenance Manager will consult with the Brunswick Heads Fire Brigade about the nature of emergency response to the storage areas.

7. Acid Sulphate Soil (ASS) Disturbance

When exposed to the air, potential acid sulphate soil (PASS) has the potential to produce acid which can flow into drains and creek lines. This can result in a change in water quality and cause fish kills.

Some potential acid sulphate soils are located close to the surface but can extend several metres under ground. Refer to the ASS Risk Maps at the end of this Plan.

Maintenance works will be planned and implemented so that they do not result in an impact on the environment as a result of acid sulphate soil disturbance. Refer to the standard operating procedure E2 in Annexure K of the Maintenance Manual for more information.

A 'minimal change' philosophy will be adopted to current ASS regimes, drainage and flow patterns by:

- Maintaining wider, shallow drains instead of deeper, excavated drains
- Minimising excavation to shallow surface zones
- Avoiding the over-excavation of drains and waterways during maintenance (NOTE: approval is required from DPI(Fisheries) for works involving dredging and/or reclamation)
- Preventing surface water ponding
- Installing appropriate lime barrier systems to reduce acid discharges.

Soil testing to determine ASS levels may be required. For the neutralization of ASS soils, medium/fine aglime will be used. Dolomitic aglime and magnesium blend aglime will not be used. Limestone or marble aggregate may also be used (eg wrapped in geofabric) to establish lime barriers in flow paths.

8. Flooding and Landslip

Following a flood event:

- basins, wetlands and pollutant traps will be inspected to assess their integrity and capacity
- litter and debris will be removed from track racks and interceptors and disposed of
- major waterways will be inspected for damage, stability and the presence of debris
- grass swales and filter strips will be inspected for damage.

The occurrence of a landslip or significant settlement event would result in both traffic and soil management issues. In the event of such an occurrence:

- the movement of soil into any nearby waterway, wetland or nature reserve would be prevented (eg. by constructing a drain or berm, installing sediment controls etc) and;
- action would be taken to control water flow through and around the affected area.

Some routine inspections and maintenance will be undertaken after heavy rain or flood events. Refer to the Maintenance Manual for these.

For maintenance work in and around waterways, refer to Standard Operating Procedure E10, in the Maintenance Manual.

9. Communication and Reporting

Communication processes including consultation with government agencies and the community is addressed in Section 3.3 of the OEMP. A quarterly report will be prepared for the RTA in accordance with Section 3.3.1 of the OEMP.

10. Evaluation and Review

The effectiveness of soil and water maintenance and monitoring activities will be assessed based on:

- water quality monitoring results
- the outcome of inspections and audits by Abigroup
- the completion of records including inspection sheets
- compliance with maintenance response times
- compliance with approval conditions and project requirements.

10.1 Auditing and Inspection Procedures

Auditing and Inspection Procedures are addressed in Section 4.2 of the OEMP.

11. Emergency Response Procedures

Details of emergency response procedures, incident management and investigations are provided in the OEMP, Standard Operating Procedure M2 and the Maintenance Manual.