



# **Operational Environmental Management Plan**

## **Soil and Water Management Sub Plan**

### **Bonville Pacific Highway Upgrade**

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## 1 Background

The Bonville Pacific Highway Upgrade extends from Perrys Road near Raleigh to Lyons Road north of Bonville. The highway traverses three major watercourses listed in the table below and shown in Figure 1.1.

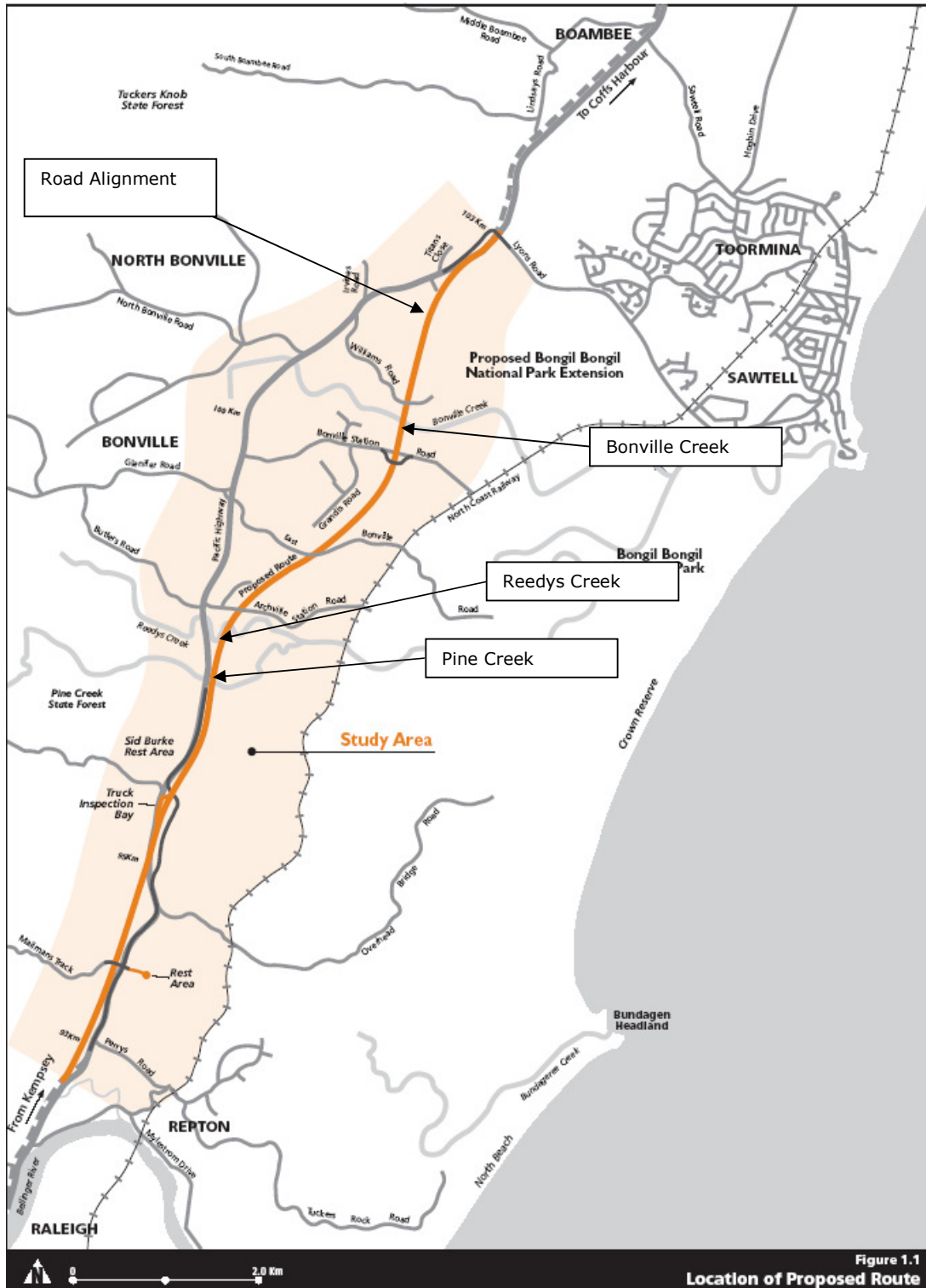
**Table 1.1:** Details of Major Watercourses

Name / Description	Approximate Road Station	Area (ha)	Approximate Slope at Highway (%)	Comments
Pine Creek	96200	3785	1.0	This catchment is relatively large and extends to the mountain ranges well into the national park. This watercourse forms a confluence with Reedys Creek immediately downstream of the highway alignment.
Reedys Creek	96700	276	0.5	This catchment contributes to the smallest of the three waterway crossings which forms a confluence with Pine Creek immediately downstream of the highway alignment.
Bonville Creek	99800	3614	0.7	This catchment contributes to the largest of the three waterway crossings.

As the highway lies approximately 4km from the coast there are also several existing wetland areas situated on the low-lying land to the east of the highway. These wetland areas are identified in the Sensitive Area Plans.

The water quality in both Bonville and Pine Creeks has been described as good with low pollution levels, where Reedys Creek is subject to pollutants generated within the catchment area and may be described as mildly polluted. The waterways are not highly eroded. Bonville Creek is tidal through the project area.

**Figure 1.1** Main watercourses



Water quality in these waterways is generally considered to be good but can be 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"> <li>• Sediment and debris release (pollution) in waterways</li> <li>• Blockage of stream flow</li> </ul>	Standard Operating Procedure 713 <i>Maintenance at Waterways</i>
Removal of debris from waterways, and excavations in drains	<ul style="list-style-type: none"> <li>• Disturbance of the creek bed and aquatic vegetation including mangroves</li> <li>• Damage or instability to creek banks</li> <li>• Blockage of water flows and fish movement</li> </ul>	Standard Operating Procedure 713 <i>Maintenance at Waterways</i> ;

	<ul style="list-style-type: none"> <li>• Damage to riparian (stream bank) vegetation</li> <li>• Potential Acid Sulfate Soil disturbance</li> <li>• Smothering of aquatic vegetation</li> </ul>	Sensitive Area Plans and Standard Operating Procedure 702 <i>Managing Acid Sulfate Soils</i> .
Maintenance of Gross Pollution Traps	<ul style="list-style-type: none"> <li>• Pollutants and debris block drainage path, and overflow the system or get retrained in the water flow</li> </ul>	Section 4 of this document
Basin maintenance including the removal of sediment and discharge of captured water	<ul style="list-style-type: none"> <li>• Pollution of watercourses arising from the release of polluted water</li> <li>• Disposal of sediment</li> </ul>	Standard Operating Procedure 706 <i>Management of Spill Basins</i>
Herbicide application	<ul style="list-style-type: none"> <li>• Release of herbicide into waterways and soils</li> </ul>	Standard Operating Procedure 701 <i>Weed Control</i>
Storage of chemicals	<ul style="list-style-type: none"> <li>• Release of chemicals into waterways and soils</li> </ul>	Section 6 of this document and Standard Operating Procedure 701 <i>Weed Control</i>
Heavy Asphalt Patching, Remove and replace CRCP, Remove and replace linemarking.	<ul style="list-style-type: none"> <li>• Release of chemicals/pollutants into waterways</li> </ul>	OEMP Section 4.3 and reference sub-contractor EMP.

## 4 Management of Water Quality Devices

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 Traps;
- waterways including grass swales, open drains and rock groynes (check dams).

When removing sediment from basins ensure that rain is not forecast.

Ensure that any wastewaters located in the basin that require removal prior to maintenance are collected by water cart or the like and used either as a water source in dust suppression or the like. These wastewaters are not to be discharged to sensitive areas or to watercourses or places where they may enter a watercourse.

Remove sediment / silts and limit disturbance. Ensure any silts are removed from the area as soon as practicable and not left in a place where they will enter watercourses.

#### **4.1 Constructed 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 constructed wetlands. These wetlands will provide additional security for the SEPP14 Coastal Wetlands and other environmentally sensitive areas and minimise the operational risk of accidental spills of hazardous materials from traffic will be effectively managed.

All constructed wetlands contain a spill containment zone, a deeper sediment 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-BBS-PC-BU-706 *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 constructed 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.

## **4.2 Water Quality Basins**

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 BBS-PC-BU-706.

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

Inspection and maintenance of Water Quality Basins is documented as Standard Operating Procedure SOP-BBS-PC-BU-706 *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 Appendix 12 of the Maintenance Manual.

Inspections will also be undertaken following significant rainfall events (over 100mm in any given day).

Low flow pipes were not installed and therefore there are no shut off valves incorporated into the basins.

Wooden baffles have been installed on each of the basins to ensure that hydrocarbon-based spills (eg oils or greases) or spill which floats on water will remain within the basin, behind the baffle. These spills can be collected by use of absorbent/spill material.

In the event of a chemical spill which is water soluble (i.e. it will mix within the water column), ensure that as much of the spill is contained as possible. Consider bunding / trapping as much of the spill as possible within drainage lines and within the basin. Suggested measures could include placing caps on the end of the overflow pipes to provide additional containment. Collection of this material will be through a licensed liquid waste transporter. Incident response is to be in accordance with section 4.3 of the OEMP.

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-BBS-PC-BU-706 *Management of Spill Basins*.

### **4.3 Gross Pollutant Trap**

Special conditions have been imposed on the water quality treatment for the runoff from the heavy vehicle inspection bay. An oil separator equal to "Humeceptor" Model STC 7 has been installed in the median area between the heavy vehicle inspection bay and the northbound lane. The "Humeceptor" Model STC 7 will capture floating oil up to 1000 litres.

The Humeceptor 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 of at a licensed waste disposal facility.

If a chemical spill has occurred in the area, and residue is captured inside the GPT contact DECC 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.

### **4.4 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:

- Code of Maintenance Standards for drainage asset elements;
- **Standard Operating Procedure SOP-BBS-PC-BU-713** *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 BBS-PC-BU-713 *Maintenance at Waterways*;
- AG-14 V-Drain and Bridge Scupper Cleaning;
- Annexure N, Code of Maintenance Standards or 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 water bodies 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 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.

## **5 Water Quality Monitoring**

### **5.1 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-BBS-PC-BU-711 *Water Quality Monitoring* located in the project Maintenance Manual.

**Table 2: Water quality monitoring locations**

Site ID	Monitoring Location
W1	Bonville Creek upstream
W2	Bonville Creek downstream
W3	Pine Creek upstream
W4	Pine Creek downstream
W5	Reedy’s Creek upstream
W6	Reedy’s Creek downstream

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.

Samples will either be collected by bottle and sent to a NATA accredited laboratory for analysis, or some parameters may be sampled through use of a water quality meter used in the field. In the event that field testing is carried out staff carrying out this monitoring will be trained in the use of the water quality probe and in sampling locations and methods.

Analysis will however, always occur in the laboratory for determination of TSS.

The monitoring results will be assessed against the recommended trigger levels detailed within the ANZECC Water Quality Guidelines. Trigger values are fundamental to using the ANZECC guidelines. The trigger values for different indicators of water quality may be given as a threshold value or as a range of

desirable values. Trigger values are conservative assessment levels, not 'pass/fail' compliance criteria.

The environmental value is aquatic ecosystems.

In accordance with the ANZECC guidelines, where an indicator is below the threshold value or within the desirable range for its trigger value in a particular waterway, the risk to the protection of the environmental value is low. Where an indicator is higher than the threshold value or outside the desirable **range** for its trigger value in a particular waterway, there may be a risk that the environmental value will not be protected. This may 'trigger' either:

- immediate action to address the likely causes of the value not being met, or
- further investigation to determine whether the trigger value is too conservative for local conditions, or the local conditions influence the ambient levels and toxicity of the contaminant of concern.

Where concerns are identified, the results will be discussed with relevant staff and the Soil Conservationist. Where the cause of the exceedance can be identified and it is related to an activity occurring on the project, action will be taken to rectify the problem. This may involve:

- ❖ providing additional environmental controls;
- ❖ consulting the Soil Conservationist and/or EMR for advice;
- ❖ refining this SWMSP;
- ❖ reviewing site management practices or work methods;
- ❖ referring to specialist advice regarding ASS remediation; and
- ❖ providing further training to personnel and sub-contractors.

## **Groundwater Quality**

Groundwater levels are dependent on landuse, local topographic features, soil and geological conditions, water levels in watercourses and waterbodies, rainfall and evapo-transpiration rates.

The EIS found that there is a small risk of adverse impacts on groundwater from acid sulfate soils. The development of the ASS Management Plan during construction and the use of coffer dams around areas of excavation, ensured that impacts were minimised (in accordance with the EIS). The EIS also found that in areas of cut, the groundwater levels would not be depressed to any great extent during construction.

Sampling will continue during the operational phase to be taken and analysed by a National Association of Testing Authorities (NATA) certified laboratory for the following elements:

- pH
- EC

- Salinity
- NTU
- Dissolved oxygen

The monitoring results will be assessed against the recommended trigger levels detailed within the ANZECC Water Quality Guidelines. Trigger values are fundamental to using the ANZECC guidelines.

In accordance with the ANZECC guidelines, where an indicator is below the threshold value or within the desirable range for its trigger value in a particular waterway, the risk to the protection of the environmental value is low. Where an indicator is higher than the threshold value or outside the desirable range for its trigger value in a particular waterway, there may be a risk that the environmental value will not be protected. This may 'trigger' either:

- immediate action to address the likely causes of the value not being met, or
- further investigation to determine whether the trigger value is too conservative for local conditions, or the local conditions influence the ambient levels and toxicity of the contaminant of concern.

In the event that a variation of 2m or more in groundwater depth is obtained in comparison to the depths obtained groundwater levels measured in Table 3, contingency measures should be implemented. These contingency measures would include:

- Inspect the site and operations
- Sample groundwater levels and/or water quality
- Review monitoring records
- Recommend mitigating strategies to minimise impact
- Review frequency of monitoring strategy.

**Table 3 – bore heights and depths**

BORE LICENCE		<b>PUMPING HEIGHT</b>	<b>NON-PUMPING HEIGHT</b>	<b>BORE DEPTH (*)</b>
	30BL184429 (Bore 1A)	34.10m	36.68m	50m
	30BL184430 (Bore 1B)	28.6m	32.20m	45m
	30BL184432 (Bore 3)	34.7m	34.39m	39m
	30BL184435 (Bore 2A)	27.07m	41.15m	50m
	30BL184436 (Bore 2B)	43.04m	56.79m	68m

(\*) Measured from top of bore casing

## **6 Management of Soils**

### **6.1 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.

## **6.2 Contaminated Soils**

There were no contaminated sites identified along or adjacent to the project alignment.

## **7 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-BBS-PC-BU-703 *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.

## **8 Acid Sulfate Soil (ASS) Disturbance**

When exposed to the air, potential acid sulfate 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 sulfate soils are located close to the surface but can extend several meters 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 sulfate soil disturbance. Refer to the Standard Operating Procedure 712 in Annexure 7 of the OEMP 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 neutralisation 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.

## **9 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 713 Maintenance Manual.

## **10 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.

## **11 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.

### **11.1 Auditing and Inspection Procedures**

Auditing and Inspection Procedures are addressed in the OEMP.

## **12 Emergency Response Procedures**

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