

Operation and Maintenance

G

PART G

TABLE OF CONTENTS

G	Operation and Maintenance	FEB 98
G1	Operation and Maintenance	G-1
	Goal	G-1
	Principles	G-1
G2	Operation and Maintenance Process	G-2
	Overview of the Operation and Maintenance Process	G-2
G3	Operation and Maintenance Procedures	G-2
	Road Planning and Design Context	G-2
	Corridor Management Plan	G-3
	Minimising Disturbance	G-3
	Drainage/Stormwater	G-4
	Erosion and Sediment Control	G-5
	Vegetation Management	G-6
	Fauna Conservation	G-7
	Hygiene	G-8
	Long Term Maintenance Sites	G-8
	Maintenance and Operation Marking	G-9
	Disposal of Material	G-9
	Rubbish and Abandoned Vehicles	G-10
	Graffiti	G-10
G4	Emergency Procedures	G-10
	Flooding	G-10
	Landslides	G-11
	Accidents	G-11
	Access Clearing	G-12
	Detours	G-13
	Emergency Environmental Protection	G-13
	Rehabilitation	G-14
	Contingency Planning	G-14



OPERATION AND MAINTENANCE

G1 Operation and Maintenance

Goal

Maintain and operate roads within the wet tropics region in a manner which reflects the economic, social, cultural and environmental values identified in the planning, design and construction phases.

Principles

Operation and maintenance of roads in the wet tropics region should be based on the following principles:

- Ensure the operation and maintenance of roads is consistent with the environmental recommendations of the Planning EMP and Environmental Design Report.
- Major maintenance activities (eg. shoulder widening, culvert replacement etc.) should be subject to and in accordance with the recommendations of a suitable level of environmental impact assessment and planning.
- Minimise disturbance to flora and fauna communities by protecting and promoting the growth and regrowth of native flora.
- Decrease the concentration of water and minimise the effects of scouring, erosion and sedimentation.
- Utilise effective rehabilitation techniques to minimise the impacts of vegetation removal, erosion and sedimentation on the wet tropics environment.

- Minimise habitat fragmentation and disturbance by facilitating fauna movement and, in closed canopy forests, promoting canopy closure.
- Maintenance activities should be consistent with the visual quality and recreation opportunities of the particular road corridor.
- Eliminate the introduction and spread of weeds through materials and equipment hygiene.
- Disposal of excess or waste (including landslide) materials at appropriate sites.
- Litter, abandoned vehicles and graffiti are to be removed promptly to maintain roadside appearances.
- Response to emergency events such as flooding, land slips and accidents is to consider the long term environmental ramifications and be in accordance with previously determined contingency plans.
- Detours necessary for maintenance or emergency purposes should only be constructed if their potential environmental impacts have been considered and will not be significant or long term.
- Areas disturbed by emergency events or activities associated with the incident are to be rehabilitated immediately.
- Vegetation management should aim to minimise the need for ongoing mowing/slashing and weed control, and to maximise cover by native locally occurring species.

G1

- Contingency plans are to be prepared for the majority of emergency situations and supervisors, road workers and contractors are to be familiar with the procedures outlined in these plans.

G2 Operation and Maintenance Process

Overview of the Operation and Maintenance Process

G2

The environmental aspects of the operation and maintenance process are set out in section four. Essentially the operation and maintenance process involves:

- **Routine and Emergency Maintenance:** The EMP (Maintenance) is prepared by the maintenance contractor to meet the environmental requirements as set out in maintenance contracts, the Environmental Design Report and the Corridor Management Plan. Note that for older roads the preparation of the EMP (Maintenance) will need to identify and consider relevant natural, cultural and social values which need to be protected.
- **Road Upgrading:** Often road maintenance can involve significant works (such as shoulder widening, culvert replacement and landslide repair). For older roads where there is no recent environmental planning it is important to identify and consider relevant natural, cultural and social values which need to be protected. Importantly, this may require planning and design environmental processes.

G3 Operation and Maintenance Procedures

Road Planning and Design Context

The desired outcome is to ensure that operations and maintenance is undertaken in accordance with the environmental factors established during the Planning and Design Phases.

The Planning and Design Phases will produce and involve a detailed investigation and design to ensure that the impact of the works are minimised.

However, if the various environmental controls are not conveyed to the maintenance supervisors and the maintenance contractor then inadvertently actions may be taken which have an adverse impact. The Environmental Design Report will set out the significant environmental controls and issues on any particular section of road.

This should be referred to so that the environmental controls can be listed on any maintenance works order when it is issued.

Best Practice Guidelines:

Ensure that the Environmental Design Report is referred to before preparing an EMP (Maintenance) and undertaking maintenance works.

The EMP (Maintenance) should identify the various environmental controls along a route so that these can be incorporated into any maintenance works orders.

Corridor Management Plan

The desired outcome is for a corridor management plan to be developed and implemented for each state-controlled road (or other major road) which passes through the Wet Tropics World Heritage Area.

The need for a Corridor Management Plan has been identified for roads which have traverse natural habitats with significant conservation value.

There are three aims for the corridor management plans:

- to identify particular conservation values along the road corridor which need consideration during operation and maintenance activities;
- to communicate the environmental protection requirements for particular operation and maintenance tasks; and
- to identify particular design elements which mitigate environmental impacts (eg. fauna culverts etc.)

Each Corridor Management Plan should include a strip map presenting the most significant conservation values along the route.

Note: This section has been prepared on a trial basis only. It is envisaged that a number of Corridor Management Plans will be developed for several existing key state-controlled roads and their efficacy evaluated.

Best Practice Guidelines:

Each Corridor Management Plan should include brief sections on:

- known natural and cultural values along the route;
- particular design aspects; and

- guidelines for anticipated operation and maintenance activities.

The operation and maintenance aspects which should be included are:

- maintenance of verges;
- maintenance of batters;
- vegetation maintenance (weed control, mowing/slashing and revegetation);
- maintenance of drainage structures (particularly where they function as fauna culverts);
- storage and stockpiles of maintenance materials;
- landslips; and
- removal of excess material and vegetation.

For each of the above aspects the plan should include:

- Objective;
- Performance Requirement;
- Monitoring; and
- Corrective Action.

Minimising Disturbance

The desired outcome is for maintenance and the ongoing operation of roads to have no disturbance of surrounding natural or rehabilitating areas.

Disturbance to flora and fauna communities within the wet tropics region can result in long term impacts. Where rare and threatened species of plants and animals are associated, a stressed environment can retard reproduction and hence population numbers.

When undertaking maintenance and management works, it is essential that disturbance to native vegetation is minimised. One potential outcome of disturbance is increased weed growth which can out compete native plants.

Best Practice Guidelines:

Choose the type and size of machinery for both the type of job to be performed and the area the activity is in to minimise environmental impacts eg., overly large machinery may unnecessarily damage vegetation.

G3

Aim to eradicate weed growth through promotion of natural vegetation cover and canopy shading and/or the implementation of slashing or chemical treatment.

Avoid mowing areas dominated by growing native trees and shrubs.

Identify all revegetation works by 'pegging' the area with stakes so as to avoid disturbance by maintenance activities such as mowing.

Consider selective pruning/clearing to meet sight distance requirements on corners instead of wholesale clearing. Try to allow tree saplings to grow up to provide canopy which then can be seen 'under' in the branch free truck zone.

Mow only what is essential for road and fire safety.

Maintenance works should avoid disturbing stable land and vegetation communities.

Drainage/Stormwater

The desired outcome is to ensure the ongoing operation of drainage structures and to control erosion and sedimentation.

Effective drainage works should act to remove storm water runoff from the road surface and the road corridor in general. The interception of flowing water and ground water towards the road surface and fragile areas adjacent to the road surface is considered essential to reduce the impacts water can have on the road surface, pavements and the surrounding areas.

Given the high rainfall in the wet tropics region, lack of maintenance and management of drainage works can cause substantial impacts. Within many areas of the Wet Tropic Areas, major erosion and sedimentation problems can result from ineffective drainage practices. These problems are exacerbated in areas which are characterised by high rainfall and steep terrain. Hence, sustainable operation practices such as effective management of drainage works can assist in protecting the values of the region.

Best Practice Guidelines:

Reduce the flow of water across the road surface by ensuring that drainage works are not inhibited by grass growth, silt deposition, windrows or debris left after construction works.

Conduct stabilising and revegetation works along the bed and banks of bridges and approaches to causeways.

Avoid ponded water in table drains by frequently providing drainage turn outs. Maintain the lining of table drains to avoid erosion by using stone, concrete, bitumen or other appropriate materials.

Repair table drains where erosion is undermining the drain lining, the road surface itself or adjacent batters by lining the drain with a durable material.

Monitor the effectiveness of batter drains on steep gradients during heavy rain periods and if scouring or erosion is occurring decrease the gradient or the velocity of the water or provide non scourable drain lining.

Monitor siltation and erosion in diversion drains particularly in areas with low gradient. Maintain drains to ensure effective drainage. Minimise disturbance to vegetation around drains.

Maintain catch drains by regularly monitoring for obstructions and any scourings. Maintain revegetation works on the banks of catch drains to avoid erosion and siltation into the catch drain itself.

Maintain culverts by regularly clearing debris and growth from small culverts not used for fauna movement. These culverts should be checked and monitored after heavy rainfall, forest fires and seasons when trees shed leaves. Debris screens may reduce the problem of culvert blockage, yet accumulation of debris on these screens should be regularly checked. Mechanical and hydraulic equipment may need to be used if the barrel of the culvert is blocked.

Maintenance and management of dual purpose culverts which facilitate fauna movement should be undertaken regularly. Monitoring of these culverts should identify the frequency of their use by fauna. Vegetation around the inlet and outlets of the culvert should remain in a natural state to attract fauna. Large obstructions such as logs, branches, severe erosion and ponded water should be removed or positioned in such a way that allows fauna movement through the culvert whilst maintaining cover for fauna movements.

Regularly remove debris and litter from the gutters and drains of bridges to ensure adequate drainage. Monitor contraction and

expansion joints to ensure they are free from silt and other materials. Remove debris collected against the piers of the bridge. Maintain vegetation around the footing of the bridge to attract fauna movement whilst maintaining an area for water movement as well.

Manage subsoil drains by ensuring effective seepage is occurring in outlets. Remove debris, growth and siltation from outlets and monitor subsoil drains for blockages by identifying and repairing water seepage above the location of the drain. Flushing subsoil drains can help remove blockages.

Pavement, batters and culverts associated with floodways require routine maintenance and monitoring for blockages, erosion, sedimentation and stabilisation. Regular inspection is required during and after flooding to ensure the floodway is safe for traffic, giving consideration to deep holes and surface damage resulting from flooding. Repairs of floodway due to flood damage is required immediately after floods to ensure driver safety. Debris should be cleared from upstream channels leading into the floodway and warning signs should be repaired if damaged or altered. Deposition on floodway with sand and gravel from dry water ways should be removed after flooding to enhance the traction of vehicles on the road surface.

Regular culvert blockages due to siltation may indicate problems uphill with inadequate cover and high rates of erosion.

Erosion and Sediment Control

The desired outcome is firstly to have regular maintenance of permanent erosion and sediment control structures and secondly to implement erosion and sediment control measures for maintenance activities involving soil disturbance.

G3

Maintenance of vegetation cover on all areas of the road corridor can greatly assist with erosion control. The extent of erosion and sedimentation within road corridors depends on a number of factors such as the efficiency of the drainage system to capture, control and dispose of water, reduce water velocity, alterations to natural drainage patterns and the area's physical characteristics such as terrain and rainfall.

Unstable, disturbed and exposed materials along the road corridor are all vulnerable to erosion. Management works such as revegetation and stabilisation techniques can assist greatly in controlling erosion and sedimentation.

G3

Best Practice Guidelines:

The EMP (Maintenance) should set out the ongoing requirements to maintain erosion and sediment control guidelines.

Ensure that runoff from outside the maintenance area is either being diverted to stable areas or directed to cross-drainage culverts at non-erosive velocities.

Check contour and diversion drains within the maintenance zone to ensure runoff is being removed from the site at non-erosive velocities.

Check for evidence of erosion on cut and fill batters, at the inlets and outlets of open drains and culverts and in watercourses downslope of the works.

Replace clogged and blocked sediment traps such as sediment fences to ensure effectiveness.

Ensure scuppers and downpipes on bridges are kept clean and free of debris and sediment.

Stage maintenance schedules to minimise the area exposed to erosion damage.

Consider closing unsealed roads during the wet season. Reopening once the road

surface has drained and dried can substantially reduce damage which may create sedimentation and erosion.

Remove and dispose of deposited sediment and silt from sedimentation basins in a safe and environmentally sound manner that ensures the silt does not re-enter the 'system'. It is generally inappropriate to simply shovel debris to the surrounding area. It should be removed.

Remove sediment build-up from energy dissipators in a manner as described above.

Maintain erosion and sediment control structures to ensure environmental performance.

Vegetation Management

The desired outcome is to maintain and manage roadside vegetation in adjoining areas in such a way to provide for driver safety whilst maintaining the conservation and presentation values of the vegetation.

Vegetation along the road corridor plays a number of important roles. Most importantly, appropriate roadside vegetation provides habitat for native fauna. The presentation, scenic and recreational values of vegetation within the wet tropics region are also considered to be significant.

Vegetation should be maintained and managed so that line of sight and visibility ensures driver safety. Vegetation maintenance also ensures safe fire breaks and that drainage systems are effectively working. This results in a conflict between the issues of road safety and the issues of flora conservation which ideally should be balanced.

Major weeds and undesirable plants in the wet tropics region are listed in Appendix 4.

Best Practice Guidelines:

The EMP (Maintenance) should identify requirements for ongoing vegetation management during maintenance.

Undertake vegetation clearing practices which retains as much existing native vegetation and regrowth as possible. Areas of importance should be identified prior to field operations.

Pruned material may be dispersed in adjacent bush.

Epiphytes should be left on site.

Areas of wildlife habitat connectivity should be identified in maintenance procedures and work orders.

Undertake maintenance and management works with the appropriate type and minimum size of machine for the job at hand.

Minimise disturbance to canopy vegetation while undertaking maintenance works as canopy connectivity is important to arboreal animals.

Pruning should be carried out with the conservation value and natural form of the tree or plant in mind.

Fire should not be used to maintain areas requiring vegetation removal except in accordance with prescribed burning regimes undertaken by the relevant appropriate authority.

Clearing of existing vegetation for hazard management and clearance for sight distance should be selective and take into account the nature of the hazard, sight, distance, roadside values, traffic and road characteristics, accident record and the conservation values of the site.

Where private land holders are concerned, allow for fire breaks on neighbouring properties, where possible, as they tend to be already cleared. Where this is not possible locate fire breaks on areas of the road reserve that are currently cleared.

Herbicide use should be undertaken by trained staff and be limited to control of vegetation where mechanical methods are non-economical or impracticable. Only non-residual herbicides should be used. Consideration should be given to ensure the herbicide will not be mobilised by rain, runoff or wind, and alter watercourses.

Establish priorities for weed management by relating the extent of weed infestation in an area, to the ecological values and sensitivity of roadside and adjoining vegetation. Review success of weed eradication program.

Consider leaving fallen tree trunks, branches as near as practicable in place in certain areas as fauna habitat where this does not impede drainage. This has to be balanced with the presentation impact of "dead trees" along the road verges. Standing dead timber may also be valuable habitat.

Any pruning undertaken should involve clean cuts which leave structurally sound vegetation. Do not 'push back' vegetation with the loader bucket.

Fauna Conservation

The desired outcome is to minimise the impacts on fauna of the ongoing use and maintenance of roads.

The general management and maintenance of the road corridor can have a number of impacts on fauna communities. Vegetation is often removed due to blocked drainage systems, line of sight visibility concerns and general driver safety. As a result, the attraction for fauna to safely move through culverts and other structures declines. Also, the ability for arboreal fauna to move across the road corridor is decreased as a result of canopy and roadside clearing which provides for driver safety.



Other driver safety features such as guard rails and fire breaks can also restrict fauna movement into adjoining habitat.

Best Practice Guidelines:

The EMP (Maintenance) should include strip maps which can be readily and easily referred to by maintenance inspectors prior to undertaking maintenance works. Reference to such information will ensure that relevant fauna management requirements are incorporated into maintenance plans. Maintenance instructions with regard to fauna can then be conveyed in the filed comments section of a works order.

G3

Existing inventory of culverts should be amended to identify which culverts are specifically designed as fauna crossings. This may incorporate an outline of specific maintenance requirements of fauna culverts.

Ensure that fish ladders remain functional.

Hygiene

The desired outcome is to ensure maintenance and operation of roads does not introduce weeds, pathogens or non-endemic fauna to natural habitats.

This pertains mainly to maintenance on unsealed road or repairs on sealed road where importation of material is required. All machinery and imported material should be free from contaminants when repairs are undertaken. The standard maintenance trucks and vehicles which conduct minor repairs and standard maintenance activities will not require wash down unless they have left the road corridor or have been working in unsealed areas.

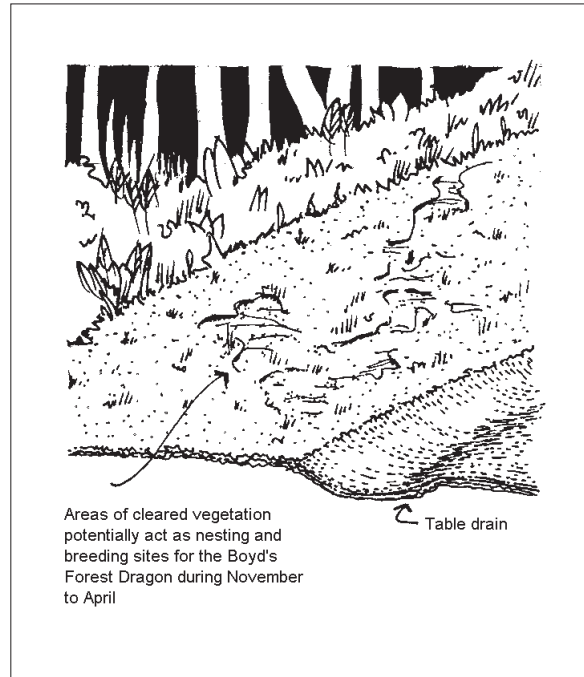


Figure 54 Consider Maintenance Impacts

Best Practice Guidelines:

Wash down machinery which is used for importing materials or has come from unsealed areas.

Mowing equipment is to be thoroughly cleaned eg., tractors, slashers, mowers, whipper snippers etc. It is recommended that equipment is washed down in the areas in which they have just completed the job.

Ensure imported materials are free of contaminants.

Long Term Maintenance Sites

The desired outcome is to minimise the environmental impact of any necessary long term maintenance sites in natural areas.

Depots are required to conform to the *Environmental Protection Act*. Other long term maintenance sites (such as gravel storage sites etc) need to be managed to

minimise their environmental impacts. Inclusion of wash down facilities, drainage, erosion and sediment controls, chemical and waste storage in new and existing depots are required. Potential exists for concentrated build up of chemical, waste and biological contaminants unless appropriate facilities and controls are in place.

Best Practice Guidelines:

Ensure all drainage, erosion and sedimentation devices are monitored and maintained.

Ensure regular maintenance of wash down bays.

Ensure storage facilities and bunding are in place and maintained.

Ensure all requirements of the *Environmental Protection Act, Workplace, Health and Safety Act*, and Local Government laws.

Wash down machinery, vehicles and their compounds on a regular basis (once a week).

Maintain sites to ensure that no weed infestations occur.

Maintenance and Operation Marking

The desired outcome is to ensure maintenance and operations markings on roadsides are not visually obtrusive.

Markings for accident reference points, defects and services are usually marked on the road or guide posts or markers just off the edge of the road. The defects points markings on the side of the road are temporary and are removed during repair.

Best Practice Guidelines:

Do not mark batters or cuttings or trees with any permanent markings as it is aesthetically damaging.

Do not cut symbols in or mark trees for maintenance purposes.

Disposal of Material

The desired outcome is ensure excess road maintenance landslide materials are disposed of with a minimum of environmental impact.

G3

No rubbish is to be left within the boundaries of the Wet Tropics World Heritage Area. All waste should be taken to an approved disposal site. If there are minor amounts of fill, disposal by spreading spoil onto disturbed areas such as batters may be acceptable. Any chemicals, waste or broken parts from machinery should be disposed of offsite in an approved manner. Plastic bags, grease cartridges and chemicals have significant impacts within the wet tropics region. Old tyres and parts are unsightly. All should be disposed of outside the area in approved dumps.

Best Practice Guidelines:

Cart all waste to approved disposal areas.

Minor amounts of excess fill or cut material (less than 1 m³) may be disposed of on site by spreading into depressions or stockpiling for later use.

Any surplus amounts of excess fill (more than 1m³) should be carted away to approved areas.

Rubbish and Abandoned Vehicles

The desired outcome is to maintain roads without rubbish and abandoned vehicles along the roadside.

Good community relations may be induced by a deliberate, planned and sustained effort to establish and maintain mutual respect and understanding. The road owner is most likely to promote good public relations if it achieves and maintains an adequate standard of road and roadside maintenance.

G4

Best Practice Guidelines:

Maintain roadside appearance through the regular removal of rubbish and abandoned vehicles.

Identify and encourage local communities and school groups to become involved in local roadside litter control programs.

Encourage/support existing pollution reduction and clean up programs such as Clean Up Australia Day and Keep Australia Beautiful Tidy Towns awards.

Provide rubbish collection services at busy rest areas. Incorporate recycling principles.

Contractors should pick up rubbish prior to moving.

Graffiti

The desired outcome is to ensure that graffiti is promptly removed.

Exposed rock in cuttings, fences, culverts, bridges, guardrails and any other objects which can be spray painted, carved, painted or drawn on often are. This results in deterioration of the natural aesthetic quality of the roadside.

Best Practice Guidelines:

Remove all graffiti from road furniture, exposed surfaces such as rock, culverts and trees.

Apply anti-graffiti treatments to DMR standards. In the Wet Tropics World Heritage Area ensure any chemicals used are approved by the Wet Tropics Management Authority before use. Cleaning solution should be disposed of outside the area.

When washing the graffiti and chemicals off ensure as much dilution as possible of the chemicals.

Take care not to cause erosion paths on batter/cuttings with high pressure water jets.

G4 Emergency Procedures

Flooding

The desired outcome is to check and reinstate environmental protection measures after flooding events.

As the name suggests the wet tropics region enjoys a high annual rainfall and as a result frequent flooding can occur which damages the roads to varying degrees. The class, type and function of the road will determine response time and types of repairs performed. A highway which is cut due to a culvert or part of the formation being washed away may require temporary drainage or bridging structures to allow essential traffic through and then immediate repair to its former status. A forestry track or road where time is not of great importance or the another route can be used, may result in the road being repaired when it is convenient to the Road Owner.

Best Practice Guidelines:

Clear roads of debris as soon as possible to avoid damage to road verges caused by vehicles skirting around obstructions.

Repair physical damage to the road corridor so it is safe for traffic.

Plan to clear debris from culverts and drainage lines as quickly as possible.

Check all drainage structures for structural, foundation and erosion damage and assess the urgency of repair.

Inspect all erosion and sedimentation damage along with road and plan to repair these defects. Immediate action should be taken if more rain is predicted/imminent, to repair major erosion problems which may affect the integrity of the road formation stability.

Immediate action should be taken if the erosion is causing degradation in environmentally sensitive areas.

Landslides

The desired outcome is reduce the potential for ongoing environmental impacts in managing landslides.

Landslides and slips may occur in cuts or fills for a variety of reasons. Quite often heavy rain will result in batter slips. Most of these tend to be minor slips that involve only a small area of the batter face (less than 25 m²).

To maintain batter stability the condition of drains should be regularly inspected to ensure that water does not pond above batters or flow over batters.

Once a slip has occurred disposal of the resultant excess material will need to be addressed. Maintenance supervisors should identify sites that will be available to dispose of excess material. Pushing material over the batters is generally not the preferred option.

Best Practice Guidelines:

Exercise care during the clearing of an earthslip off the road so that the earth is not pushed over the downhill side of the road. In natural areas, material may only be pushed over the side in extreme emergencies and with the approval of the relevant land manager.

The EMP (Maintenance) for each road should identify an appropriate disposal site(s) for all earthslip material eg., old quarries, borrow pits or other degraded sites.

Try to minimise impacts to the trunks and root systems of surrounding vegetation.

Avoid soil being pushed up against the trunks of trees, onto tracks or undisturbed vegetation thereby obstructing the process of reopening the road.

Investigate the cause of the slip so that future incidents can be avoided.

Revegetate exposed soil areas (both the slip face and the disposed of material) immediately. As a minimum, spray with a hydromulch mix with high levels of binder.

Accidents

The desired outcome is to minimise environmental impacts resulting from accidents.

Road accidents may involve hazardous goods with resultant spillage. Usually the response to these accidents will be handled by emergency services, such as the fire brigade.

The role of the road authority through the maintenance gangs may be to assist in the final clean up of the spillage including disposal of sand bags, pumping out sumps etc. The disposal of any waste from a spill should be handled in accordance with Workplace, Health and Safety regulation and disposed of in an approved manner.



Best Practice Guidelines:

Spills from road accidents should immediately be contained or banded and recovered and/or stabilised as quickly as possible and disposed of in an appropriate manner outside the Wet Tropics World Heritage Area.

Washing spills to the surrounding environment is not appropriate.

All wastes and debris should be disposed of at licensed waste disposal areas.

G4

Access Clearing

The desired outcome is to minimise the clearing of new access tracks for maintenance or emergency response, and where they are essential to minimise their environmental impacts.

Access tracks are used in engineering works for temporary construction roads and permanent low traffic maintenance roads. These tracks generally follow the natural contour of the land with construction usually consisting of minimum earthworks and bridging. The track should be located to minimise both short and long term soil and vegetation disturbance, while giving appropriate consideration to the intended purpose of the track.

Track grades should be less than 15% however, short sections steeper than this may be required. If a permanent track sealing may be necessary above 15% grade.

Best Practice Guidelines:

The EMP (Maintenance) should evaluate the necessity for any access tracks, undertake an assessment of the route and determine environmental protection measures.

Minimise the use of temporary access tracks where there are no prudent or feasible alternatives. They should be rehabilitated on completion of works.

Design tracks to minimise erosion and vegetation disturbance. Temporary tracks should preferably be located in areas designed for future clearing.

Avoid steep grades, areas of dense timber and gullies and creek crossings.

Provide cross drainage at regular intervals through the use of whoa-boys.

Prevent unauthorised access down the track by providing secure gates.

Revegetate batters and drains as soon as construction is complete.

On removal of temporary tracks revegetate the area.

For permanent access tracks, establish a maintenance program considering the following points:

- inspect all tracks at least annually and following heavy traffic usage or exceptionally heavy rainfall, especially if culvert crossings are used;
- restrict destruction of vegetation to the removal of excess regrowth preferably by slashing or spraying;
- do not remove any more timber and scrub than is necessary to maintain safety on the track. Fell timber rather than bulldozing. Where possible, stumps should be left intact, especially above cut batters and adjacent to drainage lines;
- avoid unnecessary grading or blading maintenance (this usually requires the provision for adequate training of maintenance personnel);

- leave material slumping from cut batters untouched if it does not unduly restrict the operating width of the trail. If it is necessary to remove material, take care to avoid undercutting the toe of the batter;
- encourage effective outfall drainage by removing any windrows along the outside edge of the trail;
- the location, spacing and size of cross banks should be reviewed when developing a maintenance program. An appropriate cross bank spacing will be indicated by the distance water runs on track before rilling commences;
- do not dispose of timber, scrub, soil or debris along drainage lines or within flood prone areas; and
- fencing should be installed and maintained, as required, to control unauthorised traffic or material dumping, especially if public safety problems can occur as a result of such unauthorised activities.

Detours

The desired outcome is to ensure minimal environmental impacts from detours.

Detours may be required to enable repair of slip failures or at culvert failures. As far as practicable the detour should be contained within the existing formation by restricting the road width down to the absolute minimum required for the traffic lanes. Consideration should be given to having the road operating with one lane only open using traffic signals.

Closure of the road may also be an option until at least one lane of traffic can be accommodated on the existing formation.

Construction of a detour may be considered if it is in an area already degraded by clearing operations. Before any detour is constructed off the existing formation, approval of the Wet Tropics Management Authority and the relevant landholder would be required in the World Heritage Area. (See Figures 1 and 2)

Best Practice Guidelines:

As far as possible construct detours on the existing road formation.

Consider using one lane detours controlled by traffic signals to reduce the width.

Detours off the existing formation should be restricted to previously cleared and degraded areas.

Consider closing the road until one lane detour can be constructed on the existing formation.

In the World Heritage Area approval of the Wet Tropics Management Authority and the relevant land holder will be required to construct off road detours.

Rehabilitate any detours as soon as they are no longer required.

Seek expert local assistance in minimising the impact of any detours.

Emergency Environmental Protection

The desired outcome is undertake appropriate and timely procedures and documentation where environmental harm has or may have occurred as a result of an incident.

A large number of emergencies that occur on the roads can be predicted. The only uncertainty is the exact location along the route that the incident will take place.



It is important to have in place procedures and agreements on how the emergency will be handled with the relevant authorities. Incidents that may cause environmental harm are:

- disposal of excess material from road slips;
- disposal of waste/spills for road accident;
- disposal of fallen timber from storms; and
- construction of temporary road detours.

G4

Best Practice Guidelines:

Develop general procedures that deal with the various emergencies likely to occur along the road corridor.

Identify and reach an agreement with the various authorities for disposal points for the excess fill materials.

Identify and reach an agreement with the various authorities for hazardous chemical disposal.

Rehabilitation

The desired outcome is firstly to appropriately maintain areas being rehabilitated and secondly to minimise the need for ongoing maintenance (such as mowing and herbicide application) through rehabilitation.

The rapid revegetation of disturbed sites following emergency repairs is an essential element to prevent erosion and runoff. Because of the need to have adequate supplies of appropriate seeds available, a contingency plan will need to be in place to ensure revegetation contractors are able to respond quickly.

Best Practice Guidelines:

Revegetation of exposed soils areas should be undertaken immediately after an emergency involving disturbance.

Consider having an annual contract for emergency revegetation treatment of disturbed areas.

Contingency Planning

The desired outcome is to have contingency planning in place to ensure predictable emergencies have environmental protection measures documented.

Contingency planning should be undertaken that also as far as practicable, ensures approvals are in place and plans are prepared to handle most emergency situations. This will cover aspects such as disposal of excess materials, methods of slip repair, methods of traffic control and revegetation treatments of work sites.

Identify possible detour/access route contingencies for particular problem spots.

Best Practice Guidelines:

Include contingency plans for the various emergencies likely to occur on any particular route in the EMP (Maintenance).

Identify areas for disposal of excess material and the treatment of the site including sediment control and revegetation.

Prepare likely slip repair plans for the minor slips based on the known geology along the route.

Prepare rehabilitation plans for revegetation treatment of work sites. ■