

**GOVERNMENT OF SAMOA
LAND TRANSPORT AUTHORITY
SAMOA PILOT PROGRAM FOR CLIMATE RESILIENCE**



**ENHANCING THE CLIMATE RESILIENCE OF THE
UPOLU WEST COAST ROAD**

Environmental Code of Practice (ECOP)



Land Transport
Authority



Report Prepared for:

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Date Issued: July 2012

Revision: B

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Abbreviations

AP	Affected Person(s)/Affected Party(ies)
CEP	Contractor's Environmental Plan
COEPs	Samoa Codes of Environmental Practice
CEAR	Comprehensive Environmental Assessment Report
CI	Compliance Inspector
CRWCR	Enhancing Climate Resilience of West Coast Road
DC	Development Consent
DCA	Development Consent Application
EA	Environmental Assessment
EIA	Environmental Impact Assessment
ECOP	Environmental Code of Practice
EMP	Environmental Management Plan
GRM	Grievance Redress Mechanism
IPA	Isikuki Punivalu & Associates Limited
LTA	Land Transport Authority
LMD	Land Management Division
MNRE	Ministry of Natural Resources & Environment
MWTI	Ministry of Works, Transport & Infrastructure
PCM	Project Component Manager
PPCR	Pilot Programme for Climate Resilience
PSC	Project Supervision Consultant
PSE	Project Supervising Engineer
PUMA	Planning and Urban Management Agency
PUM Act	Planning and Urban Management Act 2004
PUM Regs	Planning and Urban Management (Environmental Impact Assessment) Regulations 2007
SE	Site Engineer
TMP	Traffic Management Plan
WB	World Bank
WCR	West Coast Road

1 INTENT OF THE ECOP

This Environmental Code of Practice (ECOP) has been prepared to define methods and/or procedures to be followed by consultants, designers and contractors for the avoidance or mitigation of adverse environmental effects that may arise out of the West Coast Road Rehabilitation and Drainage Improvement project. This ECOP recognizes the need to additionally comply with the provisions of the Planning and Urban Management Act 2004 and Samoa Codes of Environmental Practice to ensure environmental protection from constructional, operational and post-constructional impacts of the project.

2 PROJECT OVERVIEW

The proposed road rehabilitation and drainage improvement construction works will have the following features:

- Reconstruction of the existing two-lane road including pavement raising and strengthening;
- Poor surface condition – overlay existing surface with new 150mm crushed stone base course on a geotextile fabric where appropriate, with a 50mm thick asphaltic concrete surface;
- Fair surface condition – overlay existing surface with a 50mm asphaltic concrete surface; and
- Good surface condition – patch any distressed areas and apply a single seal surface dressing.
- Maximum total width of the road to be constructed is 7m total;
- Lane width is 3.5m total (3.5 x 2);
- Maximum shoulder width is 1.5m (1.5 x 2) paved with 150mm crushed stone base course and double bituminous surface treatment;
- Design for speeds of 60km/hr;
- Intersections/interchanges with other roads designed to international standards;
- Replacement of damaged culverts and installation of additional ones;
- Drainage works at 26 sites requiring no easements;
- Drainage works at 25 sites with easements required;
- Traffic safety features such as illumination, speed humps, pedestrian crossing, road signs, road marking and road furniture.

Most of the proposed works will be accommodated within the existing road reserve, which extends up to 20 metres of the existing road alignment. Some works will take place outside the road reserve for the establishment of drainage easements.

The rehabilitation works will entail certain earthworks particularly in the modification of grades. However as a guideline, earthworks will be minimized in order to keep the environmental impact to a minimum.

The proposed road traverses a generally flat terrain, and no specific risks are foreseen with the upgrading of the road section aside from possible land acquisition for drainage easements, disruption of traffic and disturbance to the adjoining areas. Possible impacts have been identified in section 4 of the Environmental Assessment Report for the proposed upgrade and rehabilitation of West Coast Road. This Environmental Code of Practice (ECOP) is to create a template for the planning, design, construction and operational phase of the project and to enable the consent holder (LTA) and consent authority (MNRE-PUMA) at lodgement stage to manage the environmental elements, including any adverse environmental effects of the project.

In accordance with Samoan Government's *Planning and Urban Management Act 2004* and the *Planning and Urban Management (Environment Impact Assessment) Regulations 2007*, the Project is required to prepare a Comprehensive Environmental Assessment report including an Environmental Management Plan (EMP). Subsequently, an EMP was developed for this project which has now been converted to an ECOP upon request from the World Bank. According to the PUM Act 2004, LTA must obtain a Development Consent (DC) from the MNRE-PUMA and comply with environmental management tools detailed in the ECOP.

The EA of the proposed Upolu West Coast Road upgrade and rehabilitation project concludes that the construction impacts will be minor, reversible and manageable if the mitigation measures as given in the ECOP are properly implemented. The ECOP is based on the type, extent and duration of the identified environmental impacts. The ECOP must be prepared in both English and Samoan translation (to be done by LTA) and drafted to be in accordance with the Samoa Codes of Environmental Practice (COEPs) and best practices detailed in the *World Bank's Safeguard Policies*. The effective implementation of the ECOP will be audited as part of the Grant conditions. In this regard, the LTA (the Implementing Agency) will guide the design and supervision engineers and contractors on the implementation of the ECOP.

Prior to implementation of the project, and upon completion of the detailed design, the ECOP will be reviewed by the LTA to ensure that it complies with the proposed design and any additional changes made at the final design stage (e.g. location, scale, source of materials, safety, etc.) and which have impacts on the environment are reflected in the ECOP. The ECOP is the tool that will be used by LTA and MNRE in conjunction with the approved development consent (DC) conditions to monitor and ensure environmental compliance during the construction phase.

All copies of the ECOP must be numbered and a register kept of all those parties holding copies. Should the ECOP need updating, the new information will be supplied to all registered copy holders and acknowledgement slip sent to ensure that copies are current.

The following subsections discuss the ECOP specific to this project to enhance the climate resilience of West Coast Road and adapting and compiling relevant sections from the EMP prepared by BECA for the WCR Drainage Improvement project¹ and EMP for the WCR Rehabilitation works.²

¹ Beca International Consultants Ltd (2010): West Coast Road – Environmental Management Plan (Draft). July 2010. pp 2 – 15.

2.1 Bid and Contract Documents

The findings and proposed mitigation measures have been compiled into ECOP and it summarizes all the anticipated environmental impacts and its associated mitigation measures during the design, construction and operational phases. It makes reference to the relevant law and contract documents, approximate location, timeframe, mitigation costs, and the responsibility for its implementation and supervision.

The recommendations and proposed mitigation measures will be attached to the Project Bidding Documents and subsequently the Contractor's contracts. The total costs for environmental mitigation is estimated at US\$127,496. This amount is only a rough initial estimate and will be refined and adjusted during the detailed design stage. However, many of the mitigation measures will be incorporated as part of the standard design and construction practices and as such their costs will be included in the construction costs.

2.2 Design/Pre-Construction Phase

Experience shows that inadequate application of the ECOP by the contractor may occur due to the weak linkages of the ECOP with the contract documents. The ECOP is a part of the work program and as such it must be addressed by the contractor and carried out as required.

In the Bid and Contract section, "Special Conditions of Contract", the Project Supervision Consultant (PSC) of the LTA will, prior to the tender being called, will revise and update the ECOP. The ECOP will form part of the Bid and Contract document and it will be used by the contractor to cost his compliance with the ECOP.

For the bid evaluation and selection of contractor, the contractor will be required to provide a short statement that confirms:

- The ECOP conditions have been costed into the bid price;
- The contractor has experience of working with an ECOP;
- The contractor has a qualified and experienced person on their team who will be responsible for the environmental compliance requirements of the ECOP.

3 ROAD PLANNING AND DESIGN PHASE

3.1 General

This section details the factors to be considered during project preparation to avoid/address environmental concerns through modifications in project design and incorporation of

² Beca International Consultants Ltd (2003): Environmental Management Plan – West Coast Road Rehabilitation. July 2003. pp 2 – 22.

mitigation measures. Guidelines specified in the COEP 2: *Road Planning, Design and Construction* for project preparation are to be followed in conjunction with the measures suggested as part of this ECOP.

3.1.1 Protection of Sensitive and Ecologically Important Areas

The following are suggested measures to be included in the design should any sensitive or ecologically significant areas are potentially affected:

- Identify environmentally sensitive or ecologically fragile area (if any);
- Ensure construction personnel are aware of locations and importance of the sensitive areas and avoid disturbing them;
- If the proposed construction is located close to these areas, take necessary measures to avoid/minimize disturbance.

3.1.2 Sustainable Environmental Design and Road Maintenance

The following mitigative measures can be considered to minimise and avoid soil erosion from proposed excavation works:

- Sufficient road camber(5-8% cross fall) to drain the rainwater flows away from the road;
- Installation of suitable drainage structures, longitudinal and cross-drainage (side-drains, culverts and sufficient turnout) areas along the entire road;
- Proper handling and discharge of cross water flows from bridges and culverts.

3.1.3 Climate Change and Natural Hazards

The following measures are recommended to be considered in the design to increase the resilience of WCR to impacts of climate change and natural hazards.

- Any new or replacement structures will be constructed to a design standard that improves the climate resilience of the WCR road infrastructure network.
- To ensure that the existing drains and culverts are large enough, and in the right place, to clear flood waters quickly.

3.1.4 Road Safety

Road accidents have a substantial impact on the community and this can be reduced through proper attention and incorporation of safety in the design. The LTA will ensure that all safety aspects of the road are integrated into the project design and implemented during the construction phase. During project preparation a road safety audit was done to identify the engineering issues to be addressed on the project. This information will be used by the design engineers to ensure the design is as safe as practicable including community requirements presented during public and stakeholder consultations. The basic requirement for road safety is under COEP 12. The following measures are concerns specific to the WCR which need to be considered.

- Proper signs and road marking along the entire WCR;
- Use of cat's eye retro-reflective safety device for road marking;
- New paved road shoulders, pull-off bays, police traffic check points and bus stops in selected areas of the roads; e.g. through villages, and near markets, schools and other community facilities;

- Design bus stops to be practical, functional and safe with sufficient turn out area;
- Police traffic check points with sufficient turn out area;
- Ensure that speed humps and pedestrian crossings, speed limit signage and other safety signage are included in the design;
- Speed humps near schools, hospitals and markets and designed according to technical specifications;
- Enforcement of road speed limits and legal axle loading of heavy vehicles through use of weighbridges;
- Enforcement of mandatory use of bus stops and pull-off bays i.e. issue fines to bus owners and vehicle owners when they stop on the road;
- Safety instructions for the construction activities in the contract documents;
- Ensure occupational health and safety requirements are in place on construction sites in work camps;
- Include the installation of lights and cautionary signs in hazardous areas.
- Ensure sufficient visibility along the road section according to standard specifications.

3.1.5 Affected Lands and Properties

No displacement of people will be required for the proposed Project. The proposed rehabilitation works will be carried out along the existing road alignment and within the right of way. The only potential impact is from permanent easement for drainage. Measures to minimise the social impact of any necessary land acquisition and compensation of loss of crops include:

- Ensure works will be restricted to the existing 20m road reserve;
- Ensure project impacts and proposed mitigation measures have been discussed in advance with the affected communities;
- Consult with specific landowners affected by drainage easements, conduct route survey and identify all land needed for drainage easements including trees, plants, structures or other items that will be affected;
- Agree on drainage alignment and obtain consent from landowners before finalizing designs;
- Prepare a Land Acquisition and Resettlement Action Plan (LARAP) for acquiring land for drainage easements. Consult with the Land Management Division of the MNRE to establish process for taking of land for drainage easements and compensation;
- Deposit survey plan with MNRE for proclamation, registration of drainage easements;
- Pay compensation to all affected landowners.

3.1.6 Utility Services

To avoid disruption to services such as electricity, telecommunication and water supply to communities along the project route, the design must consider:

- Identify all power, water supply and telecommunication systems which will likely be interrupted by the works.
- Discussions with all utility providers about the impacts of the project and options available;
- Establishment of a Utilities Coordinating Committee;

- Relocation of services that will be adversely affected by the road works;
- Official designation of space within the road reserve for drainage, water pipes, electricity and telecommunication lines, minimum ground cover and marking of road boundary to identify underground services;
- Utility road crossing trench placed at every 100 metres or at any appropriate distance determined by the design consultant.
- Prepare a draft utilities and telecommunications reprovisioning plan (to be updated with contractor) to minimize interruption to power, water supply and telecommunications.

3.1.7 Cultural Heritage Site

The following precautions must be considered to avoid disturbance of tombs and village pools located close to the road reserve or as yet undiscovered archaeologically valuable artefacts.

- Project shall not disturb any cultural heritage site designated by the government or by the international agencies, such as UNESCO, and shall avoid any monuments of cultural or historical importance;
- Realign the existing road reserve to ensure that cultural heritage sites are not affected by the project;
- Install protective measures at the boundary with proposed works.

3.1.8 Social or Community Concerns

To maximize the community's benefits during the construction stage and in order to secure their support of the project, the following measures are recommended to be considered in the planning and design phase.

- As part of the continuing community consultation and public disclosure, advise the local community of project plans in advance of construction, and involve them in planning, as necessary;
- Avoid or minimize disturbances near living areas when possible;
- Control run-off and manage sediments near houses, buildings, garden and plantation areas;
- Give priority for the hiring of people from the host communities and provide training to those without skills on road construction. Screening and hiring of local workers from the host villages shall be done through the Sui o le Nuu or village mayor;
- Include women and other community groups in project activities, particularly environmental monitoring. Conduct orientation and training on the mitigation measures so the local community can become effective partners in ECOP implementation and monitoring;
- Damage caused by Contractor on private properties, community facilities shall be immediately repaired and compensated by the Contractor if needed;
- To avoid stresses on resources and infrastructure of nearby communities and prevent antagonism between residents and workers, the contractor will provide temporary worksite facilities such as health care and eating space;
- Establish a Grievance Redress Mechanism (GRM) that allows local people to raise grievances arising from the construction process; and

- Land acquisition for drainage easements and compensation will be discussed with the affected communities, including identification of the land to be acquired, trees and plant or other affected by the road reconstruction and rehabilitation, and compensation requirements. LTA will discuss measures with affected property owners and work with MNRE-LMD to implement land acquisition process for drainage easements and provide compensation as described in the LARF.

4 CONSTRUCTION PHASE

Subsequent to the awarding of the contract and before the commencing construction works, the contractor will need to incorporate the mitigating measures in the ECOP and the conditions of development consent, that will be attached to the Bid and Contract documents.

During the construction phase, the contractor will work according to the requirements of the ECOP and conditions of the development consent. Supervision and monitoring will be undertaken as follows:

- The contractor has the initial responsibility for implementing the ECOP as per the works contract;
- The Project Supervising Engineer (PSE) will direct the contractor with regard to compliance with the ECOP;
- The LTA will carry out independent monitoring of the work and can issue Defect Notices to the PSE who will transmit these to the contractor;
- The contractor will have his own representative on site, the Site Engineer (SE), who will be responsible for implementing the contract and complying with the ECOP.

Following the selection of the contractor, the contractor together with the SE will meet the Project Supervising Consultant on-site. If the plan is appropriate and implementable, the PSC will advise the PSE that the contractor can now commence works.

4.1.1 Air Quality and Dust Control (COEP 2)

Dust Control

- The Contractor shall undertake dust control measures following prolonged dry periods, where earth has been exposed, by spraying water onto the dry earth area. Water used for dust control shall be collected either from rain storage tanks or local watercourses. The Contractor shall have a watering truck available for use at all times. All care shall be taken to ensure excess water does not find its way to waterways.
- Any stockpiles shall be grassed where practicable.
- All surfaces shall be constructed to their final design requirements as quickly as practicable.
- Covers shall be used where practicable on small areas that may generate dust.
- Materials, such as gravel, that do not produce dust, will be used as a cover where practicable.
- Hydrocarbons shall not be used as a method of dust control.

Vehicle Emissions / Smoke or Noxious Air Pollutants

- All vehicles and machinery shall be operated in a safe manner including the use of effective exhaust systems.
- Waste materials are to be removed from the site and not burnt.

4.1.2 Water Quality and Hydrology (COEP 11 and COEP 13)

Works within a Watercourse

- Disturbance of watercourses shall be minimized. Excavation or disturbance of the bed of any waterway shall not occur unless required as part of construction.
- Exposed surfaces in close proximity to watercourses (within 20 metres) shall be minimized and re-vegetated or sealed as soon as practicable.
- Weather conditions should be taken into account in programming earthworks.

Use of Heavy Machinery in or close to Watercourses or the Coastal Margin

- All earthworks shall be constructed in accordance with COEP 13 and in such a way as to prevent or minimize accelerated erosion, accelerated sedimentation and disturbance. This applies to all work carried out on land, or in the water, where natural sediment will be disturbed.
- Use of construction machinery in watercourses shall occur in accordance with COEP 11 so as to minimize the clearance of vegetation, minimize the release of sediment to the downstream environment and ensure sediment traps are in place prior to works in such areas commencing.
- The contractor shall utilize equipment of an appropriate nature and scale relevant for the physical activity required and not utilize heavy machinery where a less intrusive approach is better suited.

Earthworks Programme

The contractor shall provide measures that will ensure the protection and conservation of the environment and provide for the construction of work in terms of agreed programmes, methods and procedures that will prevent or mitigate against erosion. The contractor shall employ such temporary measures as are necessary to prevent or mitigate impacts caused by erosion or siltation of any natural watercourse in addition to permanent drainage or erosion control systems that are detailed in the contract documents.

All contract project work shall be undertaken with a conscious approach to the need for preventing or minimising erosion of any exposed earth surface. In addition to permanent drainage or erosion control systems that are required to be constructed, temporary measures to prevent erosion are to be implemented whenever these are clearly necessary to mitigate impacts of the erosion of exposed surfaces.

The contractor shall programme the works to demonstrate that the sequence of operations involving drainage installation, earthworks, drainage facilities, erosion protection measures and re-vegetation are implemented to minimise the period over which earth surfaces are exposed to the potential for erosion.

On no account will the contractor be permitted to extend earthworks including vegetation clearing and topsoil stripping 500 metres beyond concurrent pavement construction and re-vegetation works without the approval of the engineer.

Silt Traps and Silt Ponds

Throughout the construction of the work, the contractor shall install silt traps in all temporary and permanent drains where work is occurring in or within 30 metres of such drains or other watercourses. Silt traps shall be constructed of appropriate materials as detailed and / or as specified by the Project Engineer.

Silt traps shall be maintained in sufficient operating condition throughout the construction work. Material periodically cleaned from such silt traps and drains shall be transported and disposed of in waste disposal areas established as detailed and specified in accordance with COEPs 11 and 13.

The contractor shall identify the need for, construct and maintain silt traps in accordance with design documents, provided by the Project Supervision Consultant engineer, and where necessary manage the impacts of silt runoff and discharge. A sediment control plan shall be included in the contractor's work. In the event of any unforeseen discharge, the sediment control plan and the ECOP shall be reviewed and, where it is considered necessary, amended to better manage the control of silt.

The following forms the key approach to silt control during construction either within or immediately adjacent to watercourses:

- A sediment trap will be placed downstream of the site where construction work is due to take place, prior to the work commencing to intercept flow from disturbed surfaces, particularly the bed of the watercourse during silt excavation or rubbish removal;
- The contractor shall install silt fences;
- The disposal of material that is periodically cleaned from silt traps or ponds shall be specified to ensure that it does not re-enter any natural watercourses or the marine environment;
- Throughout the construction period and if necessary the maintenance period, the discharge of silt laden water from construction sites to natural watercourses shall be minimised. In ecologically sensitive areas and along any foreshore, untreated discharge must be prevented;
- A cut-off bund or ditch will be constructed to intercept stormwater flow from any disturbed surfaces and the water directed to a silt pond if required;
- Where discharge from catch, bench, toe and road side drains is relatively low in volume and discharge over a grassed area is impracticable, silt fences shall be utilised to prevent or minimise the discharge of silt laden water to natural watercourses;
- For high volumes of discharge, silt retention ponds shall be used to prevent or minimise the discharge of silt laden water;
- Silt traps and ponds shall be utilised throughout the construction period and if necessary silt ponds shall be operational throughout the contract maintenance period. At the completion of construction works or the maintenance period as applicable, silt

traps shall be cleaned out and removed to allow natural flow of the watercourse and ponds filled to suit surrounding topography and levels.

- Where cut-off bunds, ditches or silt traps are required, details of these will be provided to the LTA.

4.1.3 Climate Change and Coastal Hazards

The following measures must be considered to mitigate adverse impacts of climate change and coastal hazards upon construction works:

- Where earthworks are required within identified hazard zones, suitable erosion and sediment control measures will be implemented.
- Provide culverts and drainage ditches to facilitate the overland flow of stormwater and reduce flooding.

4.1.4 Socio-Economic Impacts

The objective is to minimise social disturbance and maximise community benefits from the project during construction works. Measures to achieve this objective are:

- Advise the local community of project plans in advance of the construction, and seek their views;
- Avoid or minimize disturbances near living areas;
- Control run-off and manage sediments near garden and community areas;
- Arrange employment and training for local people;
- Include women and other community groups in project activities.

The projected disturbances in the communities are minor and temporary, and the Contractor will make appropriate arrangements during the construction period. The general practice is that Contractors employ workers from the communities. The village leaders will be consulted when recruiting workers for the Contractors.

4.1.5 Noise Control and Vibration

During the road construction works, heavy machinery will be used, and although these activities may be intermittent and localized, they nevertheless contribute tremendous amounts of sustained noise during equipment operation. The permitted noise levels must not exceed the following limits presented in the *PUMA Planning Policy: Noise Standards 2006*:

Land use category/ Description of area	Maximum Noise (dBA) at the Boundary of the Receiving Property		
	Day* 0700-1800 hours	Evening 1800- 2200 hours	Night 2200-0700 hours
Mainly residential area	50-54	44-48	39-43

Note: *On Sundays and public holidays between 0700 and 1800 hours the evening noise limit applies.

A number of mitigating measures to minimize impacts of excessive noise and vibration can be done by the contractor during the conduct of his work as follows:

- Controls over the timing of activities;

- Normal hours for earthworks are between 8.00am to 5.00pm from Monday to Saturday. General construction work hours are between 7.00am to 6.00pm from Monday to Saturday. No work shall occur on public holidays or Sundays except for emergency works as approved by LTA and PUMA.
- Operations that cannot be reasonably undertaken or completed in normal working hours can be undertaken outside normal working hours subject to providing notice to the occupiers which are alongside and within 100m of the location of the intended operation and must be approved by LTA and MNRE-PUMA. The notice to undertake such works need to be given not less than 5 working days before the commencement and shall include reference to the location, nature, proposed timing and duration of works.
- Use modern and well maintained equipment (with mufflers where appropriate);
- Carry out noise construction activities during normal working hours;
- Advise schools, hospitals, churches, etc. when there will be unusual or unavoidable noise.

4.1.6 Traffic (COEP 12)

Traffic management during construction shall be in accordance with COEP 12 – Traffic Control During Construction. The following provides a summary of the key procedures that shall apply to the contractor, and in addition, the contractor shall prepare a Traffic Management Plan (TMP) in accordance with the requirements of the contract.

Pre-Construction Warning of Works

Advance warning of work to road users and adjacent land users through the use of road signage, stating the date that work is due to start and the approximate length of time that work is occurring on or immediately adjacent to the road. Advance warning shall be a minimum of 5 working days before commencement.

Signage and Access

Advance warning of work to road users and adjacent land users through the use

- All traffic signs used for the warning or direction of traffic at road work sites shall comply with the requirements of the LTA and appropriate traffic regulations. Home-made signs shall not be used.
- Advance warning signs during construction are to be placed beside the road to warn approaching traffic about events where contract personnel will be near or on the road. As a guide, signs should be placed in advance of the site in a position where they can be seen for at least 60 metres by oncoming traffic in an urban area and at least 90 metres in a 60km/hr zone.
- Safe access for vehicles and pedestrians shall be provided by the contractor at all times during construction when work affects access ways. Safe access shall be provided through the use of appropriate signage and traffic cones to clearly direct road users of traffic.
- Traffic cones shall be used to warn and slow down traffic approaching the work areas. They should be placed along the centre-line or shoulder of the road as appropriate. Where this is insufficient, the cones can also be placed on the other side of the carriageway in order to narrow the effective carriageway width, and slow oncoming

traffic. Cones are essential if the work site requires through traffic to deviate from the normal line of travel. In such cases, the cones should be used to taper traffic to their desired position.

Health, Safety and Efficiency

- The contractor shall ensure that a safe work site is provided for the public and site personnel at all times and in all conditions.
- All personnel engaged in construction related activities on or adjacent to any road shall wear reflective red jackets while on the construction work site.
- Appropriate traffic management shall be implemented to manage traffic flow past the site.
- Unless otherwise provided for in the form of temporary deviations and the like, all roads shall have at least one lane open for the passage of traffic at all time. Where one-way traffic lines are required, the contractor shall ensure that the personnel be positioned at each end of any one-lane section of road equipped with stop / go paddles to provide instructions to passing vehicles. Where personnel directing the traffic are not inter-visible, they shall be equipped with radio telephones in good working order.
- Should lane closures be required, they shall be organized by the contractor in consultation with and with the approval of the LTA.

Traffic Management Plan

The contractor shall prepare a Traffic Management Plan (TMP) for each work site. The TMP shall be approved by the project engineer on behalf of the LTA prior to construction work at such sites commencing.

4.1.7 Landscape

It is not possible to prevent the presence of a road from affecting the surrounding landscape. Even maintenance and rehabilitation works can change the appearance of a road, for example through the use of vegetation and shaping of the roadside. It is therefore recommended that the following mitigation measures be implemented to protect the landscape of the project area:

- The retention and preservation of existing road boundary vegetation;
- The replacement of lost trees and scrub habitat through proposed road boundary planting.

4.1.8 Visual Amenity

The adoption of the following mitigation measures will minimize impacts on visual amenity of the area during construction works:

- Consideration of location and design for temporary construction camp site and stockpiling;
- Use of temporary screens (e.g. coloured hoardings) to screen views of work.

4.1.9 Cultural and Heritage Sites

There are two tomb sites and village pools at Vaitele, Tuanai, Afega, Faleasiu and Utualii villages amongst others that are located close to the road reserve and are potentially

affected by road construction works. The following measures are to be implemented to prevent adverse impacts on these cultural sites:

- Erect a low retaining wall or protective barrier at the road boundary to ensure no effects on the sites;
- Should any potential items be located, the LTA supervision consultant will immediately be contacted and work will be temporarily stopped in that area;
- If the supervision consultant determines that the item is of potential significance, an officer from the MNRE will be invited to inspect the site and work will be stopped to allow time for inspection;
- Until MNRE has responded to this invitation, work will not recommence in this location until agreement has been reached between MNRE and LTA as to any required mitigation measures, which may include structured excavation.

4.1.10 Freshwater Ecosystems

Impacts on freshwater ecosystems and mangrove wetland areas at Fasitootai/Vailuutai border, Nofaalii, Nono'a, Lotoso'a and Malie villages amongst others, shall be minimised by adapting the following mitigation measures:

- There should be no disposal of construction wastes, no stockpiling of construction materials, fuel, lubricants near wetlands and construction camp should not be located in coastal hazard zones;
- Where possible, whenever culverts are being removed, and where there is evidence of siltation, the bulk of silt will be removed by excavator and placed clear of watercourses, rather than be allowed to flow downstream.
- Construction activities near freshwater sources must be carried out during periods of dry weather.

4.1.11 Coastal Ecosystems

The following actions will be taken to avoid any adverse impacts on the coast and at areas where the project road extends directly adjacent a few meters from the sea at Alamutu, Lotoso'a, Salepou'e, Nono'a, Malua, Utualii, Tufulele, Faleasiu, Fasitootai and Nofaalii villages amongst others.

- No fuel, lubricants or hazardous substances will be stored within 10 metres of the mean high tide mark.
- No material will be tipped into the sea, or allowed to enter the sea, unless expressly approved by MNRE and LTA.
- Should coastal defence works be required, these will be constructed in accordance with COEP 10.

4.1.12 Waste Management

To manage waste, it is essential that contamination from solid wastes and sewage is avoided. Suggested measures are:

- Contain all stored wastes within construction sites;
- Properly dispose of all used fuel and lubricant oils in environmentally sound manner, either by recycling or for other use such as fuel for hot mix plant, etc.

- Crush, burn and bury all inorganic solid waste in MNRE approved solid waste disposal area or transfer and dispose at Tafaigata landfill;
- Remove all disabled machinery from the project area;
- Use above-water table pit latrines or composting toilets or portable toilets at construction sites;
- Compost all green or organic wastes or use as animal food.

4.1.13 Safety and Health

Refer also to 8.4.6, Traffic (COEP 12), Health, Safety and Efficiency. Occupational health and safety risks of road works can be limited by clearly defining procedures for handling construction materials, conducting tests, paving, operating heavy equipment, etc. Specific equipment and training may be needed to implement measures outlined below:

- Ensure all occupational health and safety requirements are in place on construction sites and in work camps;
- Understand the use of personal protection equipment (PPE) and processes for obtaining relevant PPE;
- Install lights and cautionary signs in hazardous areas;
- Establish temporary pedestrian access, crossing and bus stops away from the site with proper signage installed;
- Ensure safety and inspection procedures;
- Safe handling of toxic materials and other hazardous substances; and
- Penalties for violation of rules and regulations

General health and safety awareness for construction workers will include:

- Introduction to health and safety issues in construction sites;
- Education on basic hygiene practices to minimize spread of tropical diseases;
- HIV/AIDS and STD awareness, including information on methods of transmission and protection measures;
- Prohibition of drugs and alcohol on construction sites; and
- Availability of medical assistance in emergency or non-emergency situations and availability of other health-related assistance.

4.1.14 Quarry and Borrow Areas

The guidelines below should be followed in order to minimise impacts associated with the operation of borrow areas:

- Must be in accordance with COEP 8;
- All of the required environmental approvals (i.e. Quarry permit from MNRE-LMD) should be secured and extraction and rehabilitation activities consistent with the COEP-8, Quarry Development and Operations and requirements of PUMA and/or consent conditions to be carried out;
- Prior to the operation of the borrow areas, the contractor should submit to the LTA Project Component Manager, PUMA Compliance Inspector and Project Supervision Consultant (PSC) the following:

- A plan indicating the location of the proposed extraction site as well as rehabilitation measures to be implemented for the borrow areas and access roads upon project completion;
- A dust management plan which shall include schedule for spraying water on access road and schedule of the equipment to be used;
- A schedule of regular dust suppression on all unpaved access roads during the construction period, particularly in sections where critical receptors, such as settlements, are located;
- Location map of stockpiles which should be away from watercourses to avoid obstruction of flow and siltation;
- Cover on haul trucks to minimise dust emission and material spillage;
- Plan to undertake regular maintenance and repair of access roads to their original condition whenever necessary.

4.1.15 Grievance Redress Mechanism

The following Grievance Redress Mechanism (GRM) procedure must be followed to address any social or environmental issues that may arise during the construction period.

- Affected Person (AP) to file a formal complaint with the LTA Project Component Manager (Mr. Michael Anderson, direct phone line – 32176, email address – michael.anderson@lta.gov.ws) if major i.e. related to land issues or damage caused by contractor machinery or with the Project Supervision Consultant (PSC) if minor issue;
- The PSC will record and register complaint and consult with the Contractor and Environmental, Health and Safety Personnel for a solution who will also keep a complaints register;
- The PSC is to respond within 24 hours of lodging the complaint;
- The PSC must respond with a resolution to the AP within 48 hours;
- For substantial complaints the same process applies as above, but the time to respond for discussions and meetings with the complainant to reach a resolution must be within 7 days;
- Note that for land issues, the timeframe for discussion and meetings may be more than 7 days;
- The LTA Project Component Manager (PCM) will maintain register of complaints and duplicate given to the AP;
- If complaint is dismissed, the AP will be informed of their rights to take their complaint to the next level;
- If AP is not satisfied with LTA decision, they may file a written complaint with the MNRE, PUMA division, at ground floor of the Tuiatua Tupua Tamasese building at Sogi, telephone – 23800, or directly contact the Assistant Chief Executive Officer – Mr. Tagaloa Jude Kohlhase, email address – jude.kohlhase@mnre.gov.ws, or Principal Sustainable Development Officer – Ms. Ferila Brown, email address – ferila.brown@mnre.gov.ws or Inspector Officer – Mr. John Sitagata, email address – john.sitagata@mnre.gov.ws;
- The timeframe for response via email to MNRE, PUMA is within 2 working days and via correspondence within 5 working days. However, the timeframe for responding with a resolution varies and dependent on the level of difficulty of the complaint;

- If AP is not satisfied with MNRE, PUMA decision, they may take their grievance to the judicial system at their own cost, however, if the Court shows that LTA have been negligent, AP may seek costs.

5 SITE DE-COMMISSIONING PHASE

5.1.1 Site Tidy-Up

To minimise ongoing impacts after construction is completed, the contractor will be responsible for the proper decommissioning of the temporary construction sites. Suggested measures to achieve this objective are:

- Rake or loosen all compacted ground surfaces;
- Implement re-vegetation/rehabilitation of the sites including construction camp and involving where possible, local women's/community groups.

6 OPERATION PHASE

The inputs in this section were enhanced through proper public consultation done on 7 February 2012 at Tooa Salamasina Hall.

6.1.1 Traffic and Public Safety

During operation, the following road safety features are recommended:

- Proper signs and road marking along the entire WCR;
- Use of cat's eye retroreflective safety device for road marking;
- Measures to slow the traffic e.g. installation of speed humps at selected locations i.e. near schools, hospitals, public spaces etc.;
- Bus stop turn out bays that allow the passengers to get in and out of the bus safely;
- Enforcement of road speed limits and legal axle loading of heavy vehicles through use of weighbridges;
- Enforcement of mandatory use of bus stops and pull-off bays i.e. issue fines to bus owners and vehicle owners when they stop on the road.
- Dust suppression sealing;
- Improvements in road signage and pavement markings;
- Trim and remove trees or tree branches causing a hazard to traffic and pedestrians safety; and
- Attention to road accident black spots.

6.1.2 Road Maintenance

During operation of the road, the following features are recommended:

- Routine maintenance (grading, grass cutting, drain clearing, pothole patching and shoulder repairs) to be undertaken on a regular basis;

- Seasonal maintenance such as flood repairs, emergency maintenance to reinstate roads after major failures, and the regular upkeep of safety features and road signs will be undertaken as necessary;
- Major maintenance that include resurfacing and repairs are typically scheduled over periods of several years.

7 INSTITUTIONAL ARRANGEMENTS FOR ENVIRONMENTAL CODE OF PRACTICE IMPLEMENTATION, MONITORING, REPORTING, TRAINING AND CAPACITY BUILDING

7.1 Institutional Arrangements and Reporting

To ensure that the proposed mitigation measures will be implemented by the contractor/s during the construction stage, the design engineering consultant will undertake the following:

- Clearly define in the tender and contract documents the contractor's obligation to undertake and implement environmental mitigation measures as summarized in the Environmental Code of Practice matrix attached as Appendix A. The same shall be appended in Contract Specifications.
- The cost for the recommended environmental mitigation measures will, where possible, be itemized as cost items in the Bill of Quantities (BOQ). Such allocation of a cost item to specific environmental mitigation measure will be crucial to assure their actual implementation. During procurement or bidding, the bidders will be specifically instructed to include these cost items as line items in the BOQ to form part of their financial bids; and
- Explicitly require the contractor to recruit an environmental, health and safety personnel who will be specifically responsible in handling environmental issues of the project.

The contractor will be responsible for the implementation of environmental mitigation measures during construction and shall employ an environment, health and safety (EHS) personnel who will supervise implementation of the contractor's environmental responsibilities as stipulated in the contract and liaise with the PUMA and LTA on such matters. Likewise, the EHS personnel will also be responsible for health and safety aspects of work sites and shall submit monthly reports to LTA and PUMA on the status of implementation of mitigation measures, including complaints received and actions taken as well as other environmental issues relating to the project. The contractor, in coordination with the project supervision consultant (PSC), shall set up a grievance redress committee that will deal with any complaints during project implementation.

Also, during project implementation, the PUMA CI with the assistance of the PSC shall monitor the compliance of the contractor in accordance with the ECOP provisions. The PUMA shall submit copies of monthly compliance report to LTA describing the status of implementation of environmental mitigation measures by the contractors. Included in the

report are additional mitigation measures that may need to be implemented, incidents of non-compliance with development consent conditions, complaints received from local residents, NGOs, etc. and ways and means by which, they were addressed or settled.

It is advisable that the PSC shall employ an environment specialist (with civil engineering/environmental management background) to assist the PUMA CI in monitoring the progress of the construction on its environmental aspect. The PSC, through its environment specialist, shall provide hands-on training to the PUMA throughout various stages of the construction. The PSC shall also assist the PUMA in preparing monitoring reports regarding the performance of the contractors in terms of compliance with the relevant national environmental regulations, quality standards and the implementation of environmental specifications in accordance with the contract provisions. Terms of reference for the environmental specialist shall be drawn-up by the design engineering consultants for the road project.

During project implementation, the LTA, through the PCM, will report to the WB every 3 months on the progress of the project based on the monitoring reports submitted by the PUMA/PSC and the contractor.

Upon project completion and subsequent acceptance by the LTA, the same will be responsible for the operation and maintenance of the project road. Routine and random environmental monitoring will be undertaken by PUMA to assess compliance with the required mitigation measures and applicable environmental laws and regulations.

Table 1 summarizes the various institutional responsibilities for the implementation of the ECOP at various stages of the project road rehabilitation.

7.2 Cost Estimate

The estimated cost for implementing the mitigation measures and monitoring plan necessary in the Upolu WCR rehabilitation project is provided in the Table 2 below. The costs during construction shall be part of the contractor's civil works package. While the costs associated in assisting the PUMA Inspector Officer in the implementation of the ECOP and conducting relevant environmental training shall be included in the construction supervision cost.

7.3 Implementation Schedule

The environmental measures are determined during the detailed design phase when the environmental assessment is undertaken. These measures will then form part of work items for the project. In addition, the other environmental activities related to road rehabilitation are presented in the succeeding Table 3 below.

Table 1: Responsibilities for Implementing the Environmental Code of Practice

Project Stage	Responsible Organization	Responsibilities	
Detailed Design	LTA with the design engineering consultant	Incorporate mitigation measures into engineering design and technical specifications	
	LTA and PUMA-MNRE	Review and approve environmental mitigation and management measures	
	LTA	Allocate appropriate budget to undertake environmental monitoring and capacity building for LTA staff and contractors	
Construction	Contractor (through its EHS representative) with assistance of PSC	Implement required environmental measures and submit monthly reports to LTA PCM and PUMA regarding status of such implementation Set up a grievance redress committee in coordination with the PSC	
	LTA PCM with assistance of PUMA CI	Supervise contractor's implementation of environmental measures on a daily basis. Enforce contractual requirements	
	PUMA CI and PSC	Audit construction phase through environmental inspections and collect monitoring data. Submit monthly reports to LTA and MNRE.	
	PSC	Assist the contractor in the formulation of a grievance redress committee. Provide awareness/training to workers and technology transfer to the contractor.	
	PUMA CI and PSC	Ensure compliance with Government legal requirements during construction. Review complicated issues arising from the Project.	
	LTA	Submit monthly progress reports to WB	
	MNRE and MOH	Undertake periodic monitoring of the project	
	Operation	PUMA Compliance Inspector/LTA Maintenance Engineer	Undertake routine environmental monitoring and prepare corresponding reports.

7.4 Institutional Strengthening

The current institutional arrangement that provides for environmental management, sustainable development and infrastructure works is not effectively integrated. The MNRE typically has staff and systems in place to manage land and environmental issues in Samoa. However, there is a significant shortage in professional staff in MNRE, with hands-on, practical experience, training and knowledge in environmental management specifically in infrastructure and road projects.

The current institutional structure of the LTA does not provide for an environmental engineer to oversee environmental aspects of all land transport developments and activities to be in accordance with the Samoa COEPs and local environmental regulations and policies. Moreover, the role of MWTI to monitor and regulate the activities of the LTA to ensure compliance with statutory obligations is pending formalization by Cabinet. MWTI presently does not have any policies developed to regulate land transport activities.

Table 2: Summary of Estimated Costs for ECOP Implementation

Item	Estimated Total Cost (US\$)	Costs Covered By
International Environmental Specialist (one person for 6 person- months \$16,666/month)	99,996	Project Design and Supervision Consultancy
National EHS personnel (one person for 12 months @ \$1,500/month)	18,000	Contractor
Environmental Management capacity building program/training to be undertaken by the PSC	5,000	Project Design and Supervision Consultancy
Environmental impact monitoring (allow \$1,000/quarter)	4,000	Project Design and Supervision Consultancy
Mitigation measures (included in project costs)	To be determined during detailed design as part of project design costs	Contractor
Development Consent and Environmental Permits	500	LTA

The tools and guidelines developed to provide environmental assessment and monitoring procedures for road works and associated activities such as the Samoa Codes of Environmental Practice (COEPs) is seriously underutilised, overlooked and requires review for it to be relevant to the Samoan context. Furthermore, proper training of all stakeholders from the public and private sector is needed. The COEPs were developed with the assistance of consultants and was adopted by Samoa under the WB's SIAM-2 project. PUMA has undertaken trainings for staff and local contractors but it has not been effective due to low attendance and turnover of agency staff. Also, some of the codes need to be reviewed and made applicable and relevant to the local Samoan environmental, social, political and economic context. There are new codes that need to be developed such as sand mining and reclamation to provide for prevailing activities that are causing significant impacts on the environment. Furthermore, a user's guide needs to be prepared for the COEPs both in English and Samoan language to ensure that it can be easily applied and comprehended by all levels of the Samoan community leading to the enhancement and promotion of environmental management awareness and education.

Moreover, as identified above, with reference to the capacity of the MNRE, LTA and MWTI staff in environmental management of road projects, often the problem is the incorporation of the requirements for environmental mitigation and monitoring in the contract documents even though the ECOP was adequately prepared. Because of this, it becomes difficult to enforce the needed environmental mitigating measures in projects, particularly due to lack of reference of these items in the project contract. It is important that this item be adequately emphasized on the role of the MNRE-PUMA Compliance Inspector, LTA PCM and MWTI Roads Manager for compliance by the contractor.

Table 3: Implementation Schedule

Project Phase	Issue	Schedule
Detailed Design	Inclusion of engineering measures to improve slope stability in erosion/flood prone areas along the project corridor	
Prior to commencement of construction activities	PUMA inspector (with assistance from PSC) to review and approve contractor's method statements	Once
Upon mobilization of PSC	Training for LTA, PUMA-MNRE, LMD-MNRE, MWTI (hands-on training will also be provided by the PSC during monitoring of the performance of contractors)	Once
During Construction	Monitoring	Refer to Appendix D
During Construction	Reporting: <ul style="list-style-type: none"> • Contractor to PSC/PUMA inspector • PSC/PUMA inspector to LTA/PUM Board • LTA (through PCM) to WB 	Monthly Monthly Quarterly
During Operation	Monitoring	Refer to Appendix D

As part of the TOR of the EA/ECOP and Capacity Building Contract, a comprehensive training program must be formulated and implemented in line with institutional building and capacity building of staff from various agencies dealing with environmental regulations and control, especially the PUMA CI and Land Management Officer, MNRE. The topics that should be covered in the training must cover environmental management and related issues relevant to the road construction sector in Samoa and those covered in the COEPs such as: COEP 2 – Road Planning, Design and Construction; COEP 3 – Consultation; COEP 5 – Construction Camps; COEP 6 – Road Construction Erosion Control; COEP 7 – Slope Stability; COEP 8 – Quarry Development and Operations; COEP 9 – Gravel Extraction; COEP 11 – Drainage; COEP 12 – Traffic Control During Construction; and COEP 13 – Earthworks.

On this note, the assistance of an environmental specialist (either international or local) will be useful. The matter of capability and capacity building on the part of the PUMA CI, Land Management Officer, LTA Engineers (Contract, Construction, Maintenance and Quality Control) should form part of the proposed Terms of Reference of the environment specialist who will conduct the training and orientation for contractors. The following are the basic scope of the environment specialist among others:

- Review prevailing government regulations in Samoa and WB guidelines governing the assessment and management of environmental impacts of road projects;
- Identify the procedural tasks required to be performed by PUMA CI, Land Management Officer, LTA Engineers to meet the requirements of these regulations and guidelines;
- Assess the capacity of the MNRE and LTA and determine the training needs to respond to the requirements in conducting environmental monitoring and implementation of mitigation measures of road projects;
- Prepare a short-term staff training prospectus and associated materials to meet immediate needs;
- Undertake training workshops that will include the following topics:
 - Establishment of baseline data at the start of the project for reckoning project environmental impacts;
 - Preparation of ECOPs and incorporation of mitigating measures in contract documents and specifications for Consulting Services and Works contracts;
 - Procedures for monitoring the implementation of mitigating measures including target parameters, frequency, responsibilities and means of monitoring;
 - Health and safety procedures in project implementation.

A typical MNRE/LTA/MWTI staff training will consist of lecture-type presentation of the general procedure and requirements for effective environmental monitoring. This will be followed by a more detailed on-the-job and hands-on training at the construction site where the trainees will participate in the activities of the environment specialist/construction supervision staff in reviewing the contractor's reports, periodic monitoring inspections, and deliberation of environmental issues involving the contractor and the project stakeholders, and finally the accomplishment of environmental reports. The field trainings should coincide with peak work activity at the site to provide a first hand observation of the following environmental issues:

- Erosion and slope stability issues;
- Discharges to water bodies;
- Disturbance on biodiversity;
- Dust suppression;
- Exhaust emissions;
- Noise abatement measures;
- Protection against oil spillage;
- Waste management;
- Quarry, borrow pits and asphalt plant operations;
- Site health and safety, sanitary facilities, etc.;
- Public safety, traffic management, child safety, etc.;
- Documentation in dealing with public complaints and conflict resolution.