Ministry of Public Works and Transport

Golf Course and Coates Valley Interchange

Environmental and Social Management Plan

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PREAMBLE

The Ministry of Public Works and Transport (MoPWT) is proposing to construct an interchange in the Manzini Golf Course area opposite Coates Valley in Manzini.

It is mandatory, through the Environmental Management Act of 2002, that such projects be subjected to an environmental assessment prior to implementation. This document is an Environmental and Social Management Plan (ESMP), formulated after an ESIA was carried out for the proposed project. The ESMP details the activities required to be carried out prior to, during, and after construction of the road. Although it is part of the ESIA report for the project, the ESMP is being presented here as a stand-alone document in compliance with SEA regulations.

This ESMP is a legal document, and the proponent is obligated by law to implement it. This document ensures that appropriate monitoring of the mitigation plan is carried out, and that mitigation measures are actually implemented. Environmentalists from the **Supervision Consultant** will officially monitor the implementation of this plan by the proponent, and will prepare and submit compliance reports to the Swaziland Environment Authority at the times stipulated in the SEA Compliance Certificate for the Project. The environmentalists will be responsible for resolving any environmental disputes that may arise from implementation of the project, and the consultant's decision in such cases shall be final.

1. INTRODUCTION/SCOPE OF THE ESMP

1.1 Legal

Legislation relevant to the implementation of this ESMP is embodied in: The Environmental Management Act of 2002, The Swaziland Environment Authority Act of 1992, The Swaziland National Trust Commission Act of 1/1971, The Natural Resources Act of 1974, The Factories, Machinery and Construction Works Act of 1972, The Forests Preservation Act No. 28 of 1910, The Plant Protection Act of 1958, The Noxious Weed Act No.19 of 1926, The Game Act of 1953 (as Amended in 1993), The Wild Bird Protection Act of 1914, The Mining Act of 1960, The Roads and Outspans Act of 1931, The Acquisition of Land and Property Act of 1961, The Water Act of 2003, The Protection of Fresh Water Fish Act of 1937, The Flora Protection Act of 2000, The Swazi Areas Act, no39 of 1910, and The Occupational Health and Safety Act (OHSA), 2000.

1.2 Compliance

Of particular relevance to the project is the awarding of an Environment Compliance Certificate (ECC) to the proponent by the SEA. The certificate permits the proponent to proceed with the development. In order for the SEA to issue the certificate, the proponent must present, for review, an Environmental Impact Assessment Report and its associated Comprehensive Mitigation Plan, to the SEA. As per SEA requirements, the ESIA and ESMP reports are being presented separately as stand-alone documents. This particular document is the corresponding ESMP for the project. Since this ESMP is a legal document, the proponent is obligated by law to implement it.

2. PROJECT DESCRIPTION

2.1 Project Description

The Ministry of Public Works and Transport (MoPWT) is proposing to construct an interchange in the Manzini Golf Course area opposite Coates Valley in Manzini.

2.2 Proposed Activities on Site

Implementation of the project is to occur in three stages, whereby activities will be:
The interchange starts at the Manzini traffic circle, with a service road that will link the MR-3 with Central Distributor Road on the left hand side (LHS) of the MR-3.

It extends along the MR-3 up to km 0 + 600, while extending northwards along Central Distributor Road to the Madonsa Township access road.

<u>Pre/Construction</u>

During the pre – construction and construction stages of the project, the following physical operations will be carried out:

- The interchange will be pegged. Negotiations for compensation and relocation of infrastructure will be initiated at this stage.

- The contractor's site offices for construction supervisors will be set up. Access roads, office structures, electricity and water will be installed. The location of this site will be the prerogative of the contractor.

- The interchange will be cleared of vegetation, and topsoil will be stockpiled, and where necessary, blasting will take place and slopes will be cut.

- Construction materials will be hauled from source to the interchange, and unsuitable materials hauled to designated spoil areas.

- The pavement layers will be laid, and bridge structures will be constructed.

- The interchange surfaces will be bitumenized and all drainage lines concreted.

- Road furniture such as bus bays, road signs, pedestrian crossings, fencing, etc., will be installed.

- Rehabilitation will be carried out, where exposed surfaces will be rehabilitated and thereafter the interchange will be commissioned for operation.

- The Contractor's site structures, spoil areas, and borrow pits, will be decommissioned, and the sites rehabilitated.

Operational Phase

- Maintenance will be the major activity at operation. This is referred to as "after care". For one year following commissioning, the contactor will carry out all repair work at his expense as part of the contract.

- After the one year period, the Roads Department will take over maintenance, which involves grass cutting, replacement of damaged road signs and structures, as well as periodic layering of asphalt every six years or so.

2.3 Project Implementers

The proponent for the project is **MoPWT.** The contractor is yet to be appointed. Independent Environmentalists who will monitor the implementation of this CMP are from **The Supervision Consultants.**

2.4 Standards

The overall standard that will be applied during mitigation is the international ISO 14000 Environmental Management Standard. The Erosion Control Criteria and Land Rehabilitation Criteria of USEPA (United States Environmental Protection Agency) will compliment this.

Mitigation will also make use of the following guidelines, which serve as policy for the Government of Swaziland:

- Hydrological Criteria for the Control of Erosion
- Criteria for Rehabilitation of Land Disturbed by Construction Activities
- Swaziland Government, Ministry of Public Works and Transport, Roads and Bridges Design Standards, Updated September 1997.
- SATCC, Draft Code of Practice for the Geometric Design of Trunk Roads, September 1998.

3. SUMMARY OF IMPACTS

Impacts identified as potentially significant in the ESIA report are summarized here in order to enable the provision of mitigation. These are:

POSITIVE	NEGATIVE
• Improved Traffic Flow • Employment Opportunities • Entrepreneurial Opportunities • Opportunities for Training	• Impact on Land Owners, Social Conflict • Loss of Biodiversity, Water Pollution • Soil Erosion, Workers and Public Health • Aesthetics and Air Quality

4. PRECIS OF MITIGATION

The key personnel responsible for the implementing the ESMP are:

4.1 Environmental Compliance Officer (ECO)

The Ministry of Public Works and Transport must elect an independent environmentalist to ensure that all work conducted is environmentally acceptable and adheres to all aspects of the ESMP in general. The ECO, being knowledgeable about SEA requirements for monitoring ESMP's will act as the SEA liaison in the project, in the sense that all matters requiring SEA approval or consideration will be reported to the SEA through the ECO. The ECO must therefore be aware of all environmental obligations of the Contractor and of all areas of environmental concern at all times. Due to the involved nature of this position, the ECO will ideally be a full time employee and must be located on site. But because of the specialized nature of the environmental specialist, and that the qualifications required of the ECO are quite high, it is not likely that the contractor can employ such an expert on a full time basis for the project. Rather a monitoring budget line is used to secure the services of a reputable consultant who would also prepare monitoring reports on behalf of the proponent. The budget is to provide for travel, site visits, and meetings with the proponent, Interested/Affected Parties (IaP's) and contractor, communication and preparation of the monitoring reports.

4.2 The Proponent (MoPWT)

The proponent is advised by the ECO on environmental aspects of the project. The proponent must be aware of importance of the environment and ensure that the contractor who is carrying out the project on his behalf, acts in an environmentally acceptable manner. MoPWT will also be tasked with ensuring that all governmental/non governmental agencies are aware of their specific roles and responsibilities as per the recommendations of the ESMP, to ensure effectiveness and compliance. Such organizations or agencies involve, the essential services providers (Swaziland Water Services Corporation, Swaziland Posts and Telecommunications, Corporation, Swaziland Electricity Company, Fire and Emergency Services), the various government ministries, e.t.c, and NGO's, e.g., Yonge Nawe, NERCHA.

4.3 The Resident Engineer (RE)

The Resident Engineer (RE) is the one who will be responsible for supervising all construction works and monitoring activities of the contractor. His role will include:

- Produce a Photographic Record / Inventory prior to commencement of construction.
- Run a Site Diary to record events and daily activities in ESMP implementation
- Issue Site Instructions to the Contractor, as and when required (requested by the ECO), where the ESMP has been contravened or with regards to more specific issues arising which are not addressed in the ESMP
- Forward copies of all records, site diary, site instructions and other data collected, in terms of the ESMP, to the ECO on a fortnightly basis (i.e. every two weeks)

- Keep an up-to-data Site Visitors Register
- Keep a Complaints & Claims Register, including a record of follow up action.

4.4 The Contractor (CO)

Is on the forefront of environmental damage by nature of his activities. The ESMP is to guide his actions so as to cause minimal damage to the environment. As it is unlikely that the contractor can monitor his own activities, the ECO will be required to monitor all contractor's activities. In order to ensure that the contractor is committed to this, and generally ensure that the nation, through the SEA, does not find itself left with an environmental disaster due to bad faith, the SEA will not issue the certificate for the project until there is proof of commitment by the contractor as evidenced by inclusion of the ESMP in the Tender Documents.

4.5 The Worker (WO)

It is crucial that all workers on site are aware of their environmental responsibilities and understand the environmental impacts of their actions. Site induction must include an environmental code of conduct that must be adhered to at all times, e.g., no killing of animal (even snakes), no hunting of birds – an illegal activity in Swaziland. Because the actions of workers tend to mirror that of the contractor who supervises them, the contractor will act in an environmentally responsible manner, and will actively encourage the workers to do the same.

4.6 The Swaziland Environment Authority (SEA)

The Swaziland Environment Authority (SEA) is responsible for enforcing the ESMP, through periodic monitoring of environmental performance during the execution of the project. The main purpose of monitoring is to ensure that the prescribed mitigation measures / actions are carried out and to track the progress in implementation of the ESMP in achieving the stated objectives. This will be done by means of submitting the findings of the monitoring exercise in the form of Project Compliance Report (PCRs) by MoPWT to SEA.

Impact	Impact Description	Mitigation Measures	Implementing Authority	Timeframe	Monitoring Authority
1. Land Use Issues and Soil Impacts *Planning Phase*	*Loss of Land* Land owners will suffer permanent losses as land on the interchange will be expropriated.	• MoPWT to inform all land owners bordering the interchange of the plan to construct the Golf Course and Coates Valley Interchange.	MoPWT **	At Planning	ECO*
		• MoPWT to engage all land owners bordering the interchange to assure them that none of their land will be expropriated.	MoPWT	At Planning	ECO
		• MoPWT will ensure that the road designs do not encroach on lands outside the legal outspans.	MoPWT	At Planning	ECO
		• Where there is unforeseen encroachment, MoPWT will engage the affected land owner, engage a property valuator, and thereafter negotiate compensation as per the Roads and Outspans Act, and the Acquisition of Land and Property Act. MHUD Compensation Guidelines and AfDB Guidelines will be used.	MoPWT	At Planning	ECO
Land acquisition and preparation for construction of the Golf Course and Coates Valley Interchange.	*Land Use Change* The Interchange may cause conflict with the users of the traffic circle, the park, and the Golf Course.	• MoPWT will inform the Manzini Municipal Council of the plan to construct the Golf Course and Coates Valley Interchange, so as to ensure that the public using the Park and the golf course are aware of the imminent changes that might occur as a result of construction of the interchange in the vicinity of these public facilities.	MoPWT	At Planning	ECO
		• MoPWT will liaise with the Manzini Municipal Council to ensure that suitable land replacements are made to compensate for possible loss of land at the traffic circle, the park, and the golf course.	MoPWT	At Planning	ECO

*MoPWT – Ministry of Public Works and Transport; **ECO – Environmental Compliance Officer

Impact	Impact Description	Mitigation Measures	Authority	Timeframe	Monitoring Authority
1. Land Use Issues and Soil Impacts *Planning Phase* Land acquisition and preparation for construction of the Golf Course and Coates Valley Interchange.	*Impact on Access* The Interchange may cause conflict with the Coates Valley community and the Manzini Club because their access off the MR-3 may be permanently obliterated by the interchange.	• MoPWT will ensure that at the interchange is designed with the Municipal Council of Manzini on board, as the municipal accesses off MR-3 might have to be through new service roads to prevent slow turning local traffic from mingling with fast through traffic on the MR-3. • MoPWT will discuss the road designs, at their intersections with the MR-3 with all residential property owners and business owners, to ensure that the designs do not result in adverse effects on access to the roadside properties.	MoPWT + MCM*** MoPWT	At Planning At Planning	ECO ECO
	Impact on Structures The interchange directly affects some road-side structures including fencing.	• MoPWT will peg the interchange, in order for property owners and all other project-affected-people to be aware of the structures that will be expropriated by the interchange. • MoPWT will engage all owners of structures that need to be demolished. An independent property valuer will be engaged to ascertain the market value of all affected structures, as well as quantify losses in financial terms. • MoPWT will compensate all owners of structures fully without gender bias. Structures will be replaced in accordance with an agreed compensation program, before construction commences. Project-affected people are to be "better off than before the project'.	MoPWT MoPWT MoPWT	At Planning At Planning At Planning	ECO ECO ECO

***MCM-Municipal Council of Manzini

Impact	Impact Description	Mitigation Measures	Implementing Authority	Timeframe	Monitoring Authority
1. Land Use Issues and Soil Impacts *Construction Phase* Construction of the Golf Course and Coates Valley Interchange.	*Impact on Surrounding Land Uses* Offsite activities such as the site office/engineers camp, service yards, borrow pits, spoil sites, batching plants, quarries, will result in negative landuse changes in the communities, some of whom are on SNL.	• MoPWT will ensure that during the course of construction, the contractor seeks permission from land owners when wishing to establish the site office/engineers camp, service yards, borrow pits, spoil sites, batching plants, quarries, on their land, at which stage compensation arrangements will be made between the contractor and the land owners. • MoPWT will ensure that the Contractor, through site-specific Environmental Management Plans (EMPs) seeks environmental clearance from the SEA prior to establishment of his site office/engineers camp, service yards, borrow pits, spoil sites, batching plants, quarries, using the Guidelines in Section 6 of this ESMP.	MoPWT + Contractor MoPWT + Contractor	During Construction During Construction	ECO ECO
	Impact on Traffic Construction will be carried out under traffic, and this will impact on road users.	• Where construction will hinder traffic, the SABS 1200 DB-1989 Standardized Specification for Civil Engineering Construction Earthworks will be used as follows: - Where the works affect traffic to properties, the contractor will order a bypass as required. - Where the works affect traffic to properties, the contractor will so arrange that traffic will at all times have a free one lane access to at least half the width of the roadway.	Contractor	During Construction	ECO

Impact	Impact Description	Mitigation Measures	Implementing Authority	Timeframe	Monitoring Authority
	Impact on Traffic..cntd Construction will be carried out under traffic, and this will impact on road users.	- Where the works affect traffic to properties, the contractor will allow reasonable access to persons occupying properties that adjoin the works, and give reasonable notice, in writing, if access is closed for any period. • The contractor will co-operate with the users of the road by notifying all affected residents where his work will affect traffic, and will provide alternative detours around the disturbances.	Contractor Contractor	During Construction During Construction	ECO ECO
1. Land Use Issues and Soil Impacts *Construction Phase* Construction of the Golf Course and Coates Valley Interchange.	*Impact on Access to Private/Residential Properties* Soils, debris, and mud, may block accesses to residential properties.	• The contractor will not intentionally block access to any residential properties, and where this is inevitable, the contractor will spend as little time as possible in the affected area, and thereafter restore the access to a better one. • MoPWT and the Contractor will regularly meet with all the residential property owners along the road, at least weekly during the planning and construction phases of the development. • The Contractor and MoPWT will document all proceedings of such meetings, including resolutions made, and corrective actions undertaken by the MoPWT and Contractor to the satisfaction/dissatisfaction of the residential property owners.	Contractor Contractor Contractor	During Construction During Construction During Construction	ECO ECO ECO

Impact	Impact Description	Mitigation Measures	Implementing Authority	Timeframe	Monitoring Authority
1. Land Use Issues and Soil Impacts *Construction Phase* Construction of the Golf Course and Coates Valley Interchange.	*Impact on Access to Manzini Town* As road construction will take place under traffic, this will impact on access to the Manzini CBD.	• The Contractor will ensure that access by the public, both pedestrians and vehicular, to Manzini Town, is not hindered in any way, and where necessary, detour roads will be constructed to enhance the free movement of traffic.	Contractor	During Construction	ECO
		• The Contractor will ensure that a speed limit of 40km/h is specified for all vehicles using the interchange's roads, and proper signage will be put in a clear concise manner.	Contractor	During Construction	ECO
		• The Contractor will ensure that there are weekly meetings with the Municipal Council of Manzini, at least weekly during construction.	Contractor	During Construction	ECO
		• The Contractor will document all proceedings of such meetings including resolution made, and corrective actions undertaken, by the Contractor to the satisfaction/ dissatisfaction of the Municipality.	Contractor	During Construction	ECO
		• The Contractor will prepare a comprehensive Traffic Accommodation Plan that he will use to ensure that there is minimal hindrance to traffic using the interchange area during construction.	Contractor	During Construction	ECO
		• The Contractor will keep a Complaints Register which shall document all actions taken in addressing every complaint lodged with the Contractor.	Contractor	During Construction	ECO

Impact	Impact Description	Mitigation Measures	Implementing Authority	Timeframe	Monitoring Authority
1. Land Use Issues and Soil Impacts *Construction Phase* Construction of the Golf Course and Coates Valley Interchange.	*Soil Erosion* When vegetation cover is removed during clearance, topsoil will be exposed to the elements.	• The Contractor will ensure that during site clearance, special care is taken, where organic material will be stored separately from the topsoil and spoil material to ensure for the protection thereof. This topsoil will be re-used during the rehabilitation phase.	Contractor	During Construction	ECO
		• The Contractor will ensure that during construction, erosion in the steep sides of the Endlungula stream, will be prevented through the installation of cut-off berms, stone-pitched drains, as well as planting of vertiver grass and installation of gabion mats.	Contractor	During Construction	ECO
		• The Contractor will ensure that all reasonable precautions are taken to prevent damage to land adjacent to the project road from storm action. In addition to construction of diversion trenches, interference with surrounding vegetation will be minimized, and only vegetation that is directly in the way of construction operations will be removed after consultation with the environmentalist or design engineer.	Contractor	During Construction	ECO
		• The Contractor will ensure that during construction, borrow pits are progressively rehabilitated by filling with spoil material cut from the road prism, together with all dongas that have developed adjacent to the interchange.	Contractor	During Construction	ECO
		• The Contractor will ensure that any other disturbance is rehabilitated immediately according to the following criteria:	Contractor	During Construction	ECO

Impact	Impact Description	Mitigation Measures	Implementing Authority	Timeframe	Monitoring Authority
1. Land Use Issues and Soil Impacts *Construction Phase* Construction of the Golf Course and Coates Valley Interchange.	*Soil Erosion….Cntd* When vegetation cover is removed during clearance, topsoil will be exposed to the elements.	***Stockpiling*** - *topsoil (up to root depth), will be stripped and stored with as little compaction as possible, and only on non-wet days* - *stock piles will not exceed 2m in height* - *Stockpiles which are three (3) months older will be re-seeded* ***rehabilitation of disturbed land and vegetation with topsoil*** - *manual spreading of topsoil without compaction at least 50cm in depth during re-vegetation of disturbed land* - *chemical analysis of topsoil to determine the type and quantity of fertilizer to be applied for vigorous growth of grass* - *manual planting of grass runners like Cynodon dactylon, or any other indigenous seed mix in 10cm deep contoured rows, approximately 20cm apart* - *daily watering of the planted areas until growth is fully established* • Progressive rehabilitation, i.e., the grassing of exposed areas immediately after works is finished rather than leaving this process till the end of the project will be essential. Safeguards are: - *Only vegetation directly in the way of the construction is to be disturbed.* - *Leave natural drainage lines in an original as possibly state, but must be concreted and stone pitched.* - *Surface run-off be roughened with stone-cement mix to reduce water velocities.* A detailed Rehabilitation Plan is in Section 7 of this ESMP. • The Contractor will ensure that all dumps and stockpiles are arranged in such a way as not be exposed to the wind, and that all stockpiles are sprayed frequently with water.	Contractor Contractor Contractor Contractor	During Construction During Construction During Construction During Construction	ECO ECO ECO ECO

Impact	Impact Description	Mitigation Measures	Implementing Authority	Timeframe	Monitoring Authority
1. Land Use Issues and Soil Impacts *Construction Phase* Construction of the Golf Course and Coates Valley Interchange.	*Soil Erosion….Cntd* When vegetation cover is removed during clearance, topsoil will be exposed to the elements.	• The Contractor will ensure that all invasive/alien species, e.g., *Lantana camara* are actively removed and destroyed to avoid invasion. Procedures to remove invasive plants include: – *Isolated plants will be uprooted with a small hand pick* – *Uprooted plants left to rot.* – *In case of the larger-stemmed aliens found in the project area, chemical treatment of the cut stems will be necessary inorder to prevent re- growth.* • The Contractor will ensure that no invasive/alien species, e.g., *Lantana camara,* are used for rehabilitation purposes.	Contractor Contractor	During Construction During Construction	ECO ECO
	Soil Pollution During construction, oils generated by construction vehicle maintenance will likely be released to the environment, and almost without exception, the recipient of these hazardous oils is the soil.	• The Contractor will ensure that only one service yard is allowed to operate to avoid widespread discharges of waste oil. • The Contractor will seal all road surfaces with bitumen as early as practically possible, followed by progressive rehabilitation. For storm water management, sediment run-off that would normally cause problems will be managed with silt fences or staked straw bales, which will enable silt and sediment particles to be trapped while allowing the continued flow of water. • The Contractor will ensure that all oil storage areas are bunded, with an outlet that can be opened at the required time. Oil separators will be installed whenever vehicles will be serviced and maintained.	Contractor Contractor Contractor	During Construction During Construction During Construction	ECO ECO ECO

Impact	Impact Description	Mitigation Measures	Implementing Authority	Timeframe	Monitoring Authority
1. Land Use Issues and Soil Impacts *Construction Phase* Construction of the Golf Course and Coates Valley Interchange.	*Soil Pollution…Cntd* During construction, oils generated by construction vehicle maintenance will likely be released to the environment, and almost without exception, the recipient of these hazardous oils is the soil.	• In the event of accidental spillage, measures are to be undertaken, by the contractor, to remove wastes as soon as possible. Downstream water consumers will be alerted and alternative water supplies will be provided if required. Bioremediation will be carried out for all oil-contaminated soils using a competent service provider. • The Contractor will ensure that all oil bituminous products, hydraulics, batteries, etc, to be removed from site, are collected in sealable containers which must be emptied at least twice monthly at an approved facility by the fuel and oils supplier.	Contractor Contractor	During Construction During Construction	ECO ECO
1. Land Use Issues and Soil Impacts *Operational Phase* Operation and maintenance of the Golf Course-Coates Valley Interchange over its Life span.	*Soil Erosion* All construction areas such borrow pits and spoil sites that the road project will leave unrehabilitated will result in the generation of dust in the long-term, and will be a permanent eyesore.	• The Contractor will ensure that erosion is controlled by proper drainage, landscaping and rehabilitation. In regard to erosion, the specific problematic areas are the slopes, borrow pits and spoil sites. These will be rehabilitated as in Section 7 of this ESMP. • MoPWT will issue out annual maintenance contracts for the MR-3 road where deserving subcontractors will be given contracts not only to cut overgrown grass, but also to fix all eroded areas along the MR-3 corridor. This will be intergrated with the Golf Course and Coates Valley Interchange.	Contractor MoPWT	At Decommissioning TPL*	ECO ECO

Impact	Impact Description	Mitigation Measures	Implementing Authority	Timeframe	Monitoring Authority
1. Land Use Issues and Soil Impacts *Operational Phase* Operation and maintenance of the Golf Course-Coates Valley Interchange over its Life span.	*Soil Pollution* At operation, soils will be polluted by run-off from the interchange road surfaces carrying oils organic compounds and metals from vehicle exhaust particulates and abrasion.	• Drainage associated with the collection of run-off from the interchange should be properly managed by the Roads Department when the interchange is operational, to contain water run-off that may be contaminated, and in turn contaminate the soils or sediments at the receiving end, by hydrocarbons and metals. • MoPWT (Roads Department) will ensure that at all times, sediment run-off that normally carries hydrocarbons from the road and metals, is managed with silt fences or staked straw bales, which will enable silt and sediment particles to be trapped while allowing the continued flow of water.	Roads Dept Roads Dept	TPL TPL	ECO ECO
	Monitoring Without monitoring, the success of implementation of the Land Use and Soils mitigation can not be assessed.	• Monitoring of land use mitigation implementation will be part of the activities of environmental compliance monitoring for the project. The project will monitor compensation, permits, rehabilitation.	Contractor	During Construction	ECO
	Costs Implementation of Land Use and Soils mitigation will impact on the project budget.	• The Project will include in the overall budget the following items: Item — Cost Compensation for Structures = E500,000 Environmental Complaince Monitoring = E240,000 Rehabilitation Program =E2,000,000	MoPWT	Prior to Construction	ECO

Impact	Impact Description	Mitigation Measures	Implementing Authority	Timeframe	Monitoring Authority
2. Hydrological Impacts *Planning Phase* Preparation for construction of the Golf Course and Coates Valley Interchange.	*Impact of Floods and Water Drainage* Located on the side of the hill towards the low-lying areas of the traffic circle, the interchange will be prone to flooding.	• MoPWT will design all hydrological structures at the interchange on the basis of the 1:100-year flood event to minimize meteorological impacts such as flooding. • MoPWT will design of all culverts on the interchange such that they are of adequate size and resilient materials so as to withstand the occasional flash floods that are becoming common in the region. • MoPWT will design the drainage systems such that water flows freely from one side of culverts to the other without hindrance. • MoPWT will design the drainage system such that water is conveyed in a non-erosive way all the way down to the deposition areas on the receiving Endlungula Straem. • MoPWT will liaise with the roadside property owners at KM 0 to KM 0+600, in collaboration with SWSC and the Municipal Council of Manzini, so that the project causes a minimum or no destruction of water supply pipeline in the vicinity of the interchange	MoPWT MoPWT MoPWT MoPWT MoPWT	At Planning At Planning At Planning At Planning At Planning	ECO ECO ECO ECO ECO
	Impact on Water Supply Infrastructure The project will impact on water pipelines along the interchange.	• The project will liaise with SWSC, in order to identify all pipelines that cross the MR-3 at KM 0 to KM 0+600 and need to be relocated to outside the legal outspan of the interchange. • MoPWT will liaise with SWSC on possible colour coding of their pipelines for ease of future identification and sense of ownership.	MoPWT MoPWT + SWSC	At Planning At Planning	ECO ECO

Impact	Impact Description	Mitigation Measures	Implementing Authority	Timeframe	Monitoring Authority
2. Hydrological Impacts *Planning Phase* Preparation for construction of the Golf Course and Coates Valley Interchange.	*Impact on Ground Water* The Project will impact on ground water resources in the interchange	• In the wetland at the central portion of the interchange, project activities that will likely contaminate the ground water will be prohibited. • In the wetland at the central portion of the interchange, the project will design the interchange taking into cognizant the need to protect the road (through perforated drainage system) from groundwater, and the need to protect the ground water from pollution.	MoPWT MoPWT	At Planning At Planning	ECO ECO
2. Hydrological Impacts *Construction Phase* Construction of the Golf Course and Coates Valley Interchange.	*Disturbances in Catchment Areas* Excavations at the interchange will impact on the supply of water to downstream communities.	• The Contractor will ensure that no excavated material from the road is spoiled along drainage lines as this may cause social problems on downstream users of water emanating from catchment areas. • The contractor will ensure that no material stockpiles are placed along natural drainage lines as these may wash down the catchment areas and affect downstream communities. • Where water has been contaminated with silt or chemicals, the Contractor will clean up, replace or restore clean water supplies at his cost, to the affected communities.	Contractor Contractor Contractor	During Construction During Construction During Construction	ECO ECO ECO

Impact	Impact Description	Mitigation Measures	Implementing Authority	Timeframe	Monitoring Authority
2. Hydrological Impacts *Construction Phase* Construction of the Golf Course and Coates Valley Interchange.	*Impact on Water Pipelines* Construction will impact on water pipelines.	• Prior to construction, the contractor will request the SWSC to identify the organization's pipelines on the interchange, which shall then be relocated to outside the road reserve at the project cost.	Contractor	During Construction	ECO
		• The contractor will protect all pipes that cross the road by directing them through sleeves where they cross the road. This will also serve to protect the interchange roads against being excavated once maintenance problems arise at operational phase.	Contractor	During Construction	ECO
		• The contractor will place identification tags along the new pipeline routes to prevent disruptions during construction.	Contractor	During Construction	ECO
		• Where disruption will be inevitable, the Contractor will formally notify the Project-Affected-People at least 14 days in advance, and water storage tanks will be provided for use by those affected by the disruption.	Contractor	During Construction	ECO
		• The contractor will attend to disrupted pipelines timely, and at his cost, as soon as a complaint is received. Records of complaints and remedial actions shall be kept at the site office.	Contractor	During Construction	ECO
	Impact on Ground Water During construction, ground water may be over exploited and/or polluted.	• Construction works directly in the wetland at the interchange will be avoided, especially with regards to cement mixing, which will preferably be carried out off-site.	Contractor	During Construction	ECO
		• The contractor will install perforated underground water pipes at the wetlands so as to direct groundwater seepage away from the road.	Contractor	During Construction	ECO

Impact	Impact Description	Mitigation Measures	Implementing Authority	Timeframe	Monitoring Authority
2. Hydrological Impacts *Construction Phase* Construction of the Golf Course and Coates Valley Interchange.	*Impact of Construction Water on Local Rivers and Streams* Construction water will be required in copious amounts, and this will impact on water flows in rivers and streams.	• The Contractor will ensure that when planning for water supply, consideration is made with regards to the standards for water supply and sanitation works, i.e., the statutory storage capacity of 30 days.	Contractor	During Construction	ECO
		• The Contractor will secure adequate supplies of water for fire fighting purposes without affecting downstream water users and aquatic fauna in rivers.	Contractor	During Construction	ECO
		• The Contractor will ensure that there is no diversion of natural river courses affecting domestic water users and aquatic fauna, especially when working at the traffic circle area near the Endlungula Stream.	Contractor	During Construction	ECO
		• The Contractor will ensure that water required for dust control and other operations by the contractor will be taken out of the rivers only after consulting with authorities at the Natural Resources and Energy Ministry. When sourcing water from rivers and streams, there will be no abstraction of water without the necessary permit from the Department of Water Affairs.	Contractor	During Construction	ECO
		• Should the appointed contractor identify ground water as a source of construction water, he shall: - at his cost carry out yield investigations of the identified bore hole - seek a permit from the Geological Surveys Minerals and Mines Departments (GSMMD).	Contractor	During Construction	ECO

Impact	Impact Description	Mitigation Measures	Implementing Authority	Timeframe	Monitoring Authority
2. Hydrological Impacts *Construction Phase* Construction of the Golf Course and Coates Valley Interchange.	*Water Pollution by Cement and Explosives* Cement and explosives residues will be pollutants at river crossings and batching plants.	• Pollution during construction will be prevented at all cost. Most of this will be through prevention of working directly in water at river crossings, and by ensuring that no activity is allowed within 33m of the banks of any river or stream as per the Public Stream Bank Regulations.	Contractor	During Construction	ECO
		• Where working on the river crossing is inevitable, as in during construction near the Endlungula Stream, the contractor will minimize the time spent when working on the bridge sections of the road.	Contractor	During Construction	ECO
		• The contractor will not carry out cement mixing directly on the stream, but will use off-site pre-mixers, and only carry concrete to the section of the interchange being worked.	Contractor	During Construction	ECO
		• The contractor will set up his construction program such that work near the Endlungula Stream is timed so as to avoid summer rains. Batching plants will not be located in areas of high water tables or close to the stream. All batching will be carried out on concreted surfaces, and waste water will not be discharged into the open environment prior to settling ponds. The Contractor will prepare site-specific EMP's for all his batching plants, to include concrete waste management.	Contractor	During Construction	ECO

Impact	Impact Description	Mitigation Measures	Implementing Authority	Timeframe	Monitoring Authority
2. Hydrological Impacts *Construction Phase* Construction of the Golf Course and Coates Valley Interchange.	*Water Pollution by Oil Spills* Pollution of water due to run – off from service yards will be a problem if oils are not properly stored and disposed of.	• The Contractor will ensure that only one service yard is allowed to operate to avoid wide-spread discharges of waste oil onto the environment. Waste oil will be stored in sealable-labeled drums that can be returned to the oil/fuel supplier for recycling. • The Contractor will ensure that all spills are contained by spreading 0.5 m thick sand on the spill area, which can then be disposed or incinerated at the facility used by the oil/fuel supplier, alternatively, bunding with an opening that can be opened at the required time will be constructed. All spill containment facilities will have oil seperators. • The Contractor will ensure that all waste oil contaminated rags are kept in sealed drums and safely transported out of the site for proper treatment and disposal, while oil drums shall be stored above ground, over drip pads and under covering especially from direct sunlight. • Where pumps will be used to secure construction water, the contractor will avoid direct contact of diesel pumps of tankers with streams, but will use long PVC hoses instead where allowed.	Contractor Contractor Contractor Contractor	During Construction During Construction During Construction During Construction	ECO ECO ECO ECO
	Siltation Pollution of water due to run-off from all excavated areas on the interchange will be a problem during construction of the road.	• The Contractor will aim to complete the project in as short a construction period as possible. • Additionally the Contractor will remove silt from run-off by construction of 1m x 1m x1m silt retaining trenches near the discharge points of drainage channels. Levels of silt in the trenches will be monitored frequently, more so during the rainy season.	Contractor Contractor	During Construction During Construction	ECO ECO

Impact	Impact Description	Mitigation Measures	Implementing Authority	Timeframe	Monitoring Authority
2. Hydrological Impacts *Construction Phase* Construction of the Golf Course and Coates Valley Interchange.	*Sanitation* Pollution of the local stream with pathogens will lead to the spread of diseases if sanitary facilities are not provided.	• The Contractor will ensure that although the location of site offices for the road project will be his prerogative, still certain conditions must be met to avoid sanitation problems, the most important of which is to locate it no nearer than 33m from the public stream, as per the Public Stream Banks Regulations.	Contractor	Prior to Construction	ECO
		• The Contractor will ensure that as engineers, security and service personnel will occupy this site for the entire duration of construction, sanitation facilities will be carefully planned for in terms of adequacy, gender sensitivity, and availability of constant supply water.	Contractor	During Construction	ECO
		• The Contractor will not establish pit latrines on site. The site office will be equipped with concrete septic tanks and French drains.	Contractor	During Construction	ECO
		• The contractor will ensure that workers do not relieve themselves in surrounding bushes, but use toilet facilities that will be provided.	Contractor	During Construction	ECO
		• Where the contractor experiences accidental sewer pipelines disruption, he shall engage a service provider to remove the spill and dispose of it at an approved SWSC treatment facility.	Contractor	During Construction	ECO

Impact	Impact Description	Mitigation Measures	Implementing Authority	Timeframe	Monitoring Authority
2. Hydrological Impacts *Construction Phase* Construction of the Golf Course and Coates Valley Interchange.	*Siltation and Pollution* Exposed surfaces and toilet wastes will cause siltation and pollution.	• Prior to the handing over of the completed interchange to the Roads Department, the contractor will rip, disc, rehabilitate all detour roads, site offices, batching plants/service yards, borrow pits, spoil sites, etc. • The Contractor will ensure that grassing of all exposed areas is undertaken by a competent specialist familiar with landscaping techniques involving indigenous vegetation for all catchment areas exposed by construction, site offices, borrow pits, spoil sites and stockpile areas. • The Contractor will ensure that to prevent long-term pollution problems, all oil drums will be safely removed from site and transported to NORA recycling plants by oil suppliers. • The Contractor will ensure that all chemical toilets are removed from the site by owners of these businesses. Sewer will not be dumped in the rivers, but will be treated at the Nhlambeni SWSC facility.	Contractor Contractor Contractor Contractor	At Decommissioning At Decommissioning At Decommissioning At Decommissioning	ECO ECO ECO ECO
	Impervious Surfaces The interchange will be a barrier to storm water reception by the soil underneath.	• During rehabilitation, the Contractor will ensure that grassed swales are included on each side of the interchange. These will be incorporated in the landscape designs. • MoPWT will ensure that all the grassed swales or weirs for detention of water are maintained regularly.	Contractor MoPWT	At Decommissioning At Operational Stage	ECO ECO

Impact	Impact Description	Mitigation Measures	Implementing Authority	Timeframe	Monitoring Authority
2. Hydrological Impacts *Operational Phase* Operation and maintenance of the Golf Course and Coates Valley Interchange.	*Long-Term Maintenance* If there is no proper maintainance, all exposed areas will pollute water resources of the area.	• MoPWT (Roads Department) will ensure that proper maintenance of the interchange is carried out on a long-term basis. Maintenance, through annual tender involves, but is not restricted to: Roads- The need for the MoPWT to maintain this infrastructure to include the roadside grass which is essential for particulate retention and pollutant removal from run-off. Drainage- The need for the MoPWT to ensure that drainage lines are clear at all times, and that debris does not obstruct culverts and road-side drains. Routine maintenance will include the clearing of debris from all culverts and drainage channels.	MoPWT	At All Times At All Times At All Times	ECO ECO ECO
	Monitoring Without monitoring, the success of implementation of hydrological mitigation can not be assessed.	• Monitoring of hydrology mitigation implementation will be carried out regularly and reported to SEA through Project Compliance Reports (PCRs).	Contractor	During Construction	ECO
	Costs Implementation of the hydrology mitigation measures will have a cost component associated with it.	The Project will include in the overall budget the following items: Item — Cost Relocation of Water Pipelines = E1, 000,000 Rehabilitation Program = E2,000,000 Environmental Monitoring = E240, 000	Contractor	Prior to Construction At decoomissioning Annually	ECO ECO ECO

Impact	Impact Description	Mitigation Measures	Implementing Authority	Timeframe	Monitoring Authority
3. Biodiversity Impacts *Planning Phase* Preparation for construction of the Golf Course and Coates Valley Interchange.	*Loss of Vegetation* It is inevitable that the interchange must be cleared of vegetation in preparation for construction. This will lead to a loss of native vegetation.	• The project will employ restrictive means to reduce the spatial and temporal dimension of the impact by pegging the interchange, ensuring that that no structures and activities are planned for outside the interchange, and thereafter not delay road construction unnecessarily. • The project will work strictly within the interchange space, and prevent encroachment on virgin lands, and where this is unavoidable at the site office, borrow pit sites, spoil sites, etc., the project will prepare such site-specific EMPs for prior approval by SEA.	MoPWT MoPWT + Contractor	At Planning At Planning	ECO ECO
	Impact on Aquatic Habitats The interchange is located on the catchment of the Endlungula Stream. This will result in an irreversible negative impact on the aquatic habitats associated with the stream.	• The project will ensure that culverts of adequate size are designed so that water is allowed to flow unhindered from one side of the road to the other. • The project will not carry out any development within 33 m of the Endlungula stream as per the Public Stream Bank Regulations.	MoPWT MoPWT	At Planning At Planning	ECO ECO

Impact	Impact Description	Mitigation Measures	Implementing Authority	Timeframe	Monitoring Authority
3. Biodiversity Impacts *Planning Phase* Preparation for construction of the Golf Course and Coates Valley Interchange.	*Impact on Sensitive Wetland Habitats* The interchange area will cross a wetland, which is a sensitive area protected in Swaziland under the Ramsar Convention.	• Except at the river crossings, the project will not carry out any development within 33 m of any river, stream, or wetland, so as to protect the wetlands associated with the rivers and streams. • The project will ensure that the wetland is considered ecologically-sensitive by the project. This wetlands will be protected through adequate drainage with sub surface perforated pipes to drain water away from the road surface to the wetland areas on either side of the road. • Since wetlands thrive on either side of intrusions as long as the water flow across is not interrupted, the project will ensure that culverts of adequate size are designed so that water is allowed to flow unhindered from one side of the interchange to the other.	MoPWT MoPWT MoPWT	At Planning At Planning At Planning	ECO ECO ECO
	Impact on Terrestrial Plants Direct impacts on flora will arise from the need to permanently remove vegetation from the site.	• The contractor will treat all areas in the interchange as ecologically sensitive, and will not remove plants unless absolutely necessary. • At off-site areas such as borrow pits, the contractor will prepare a Method Statement detailing measures to prevent plant loss and fragmentation through an EMP that will be approved by the SEA prior to opening up such borrow pits.	Contractor Contractor	During Construction During Construction	ECO ECO

Impact	Impact Description	Mitigation Measures	Implementing Authority	Timeframe	Monitoring Authority
3. Biodiversity Impacts *Construction Phase* Construction of the Golf Course and Coates Valley Interchange.	*Loss of Protected Plant Species* The clearing and removal of vegetation for the widened road will impact on protected flora.	• The Contractor will peg the interchange to demarcate its boundaries, so as to enable identification of species within the road corridor that need protection such as *Anona senegalensis,* which will be marked with red tape.	Contractor	During Construction	ECO
		• Prior to construction, the Contractor will ensure that a qualified Botanist with horticultural experience is engaged, so that endangered species are translocated to nearby areas which will act as proxy sites for the rescued plant species, keeping in mind that rescued species have a high survival rate if transplanted to habitats similar to the area from which they are translocated, i.e., nearby areas.	Contractor	During Construction	ECO
		• The project will consult the Ministry of Tourism and Environmental Affairs, Forestry Department, prior to bush clearance, on to allow the herbarium to take plant specimens, where necessary. This will be extended to the Gene Bank as well. Genetic material from wild relatives of crop plants will also be collected.	Contractor	During Construction	ECO
		• As per the Forests Preservation Act, the project will not remove trees larger than 10cm in diameter, unless permission from the Ministry of Tourism and Environmental Affairs, Forestry Department, is obtained.	Contractor	During Construction	ECO

Impact	Impact Description	Mitigation Measures	Implementing Authority	Timeframe	Monitoring Authority
3. Biodiversity Impacts *Construction Phase* Construction of the Golf Course and Coates Valley Interchange.	*Loss of Medical Plants* Species of medicinal plants will be permanently removed from the interchange during construction.	• The Contractor will inform the local communities of his intention to clear the interchange vegetation in order for local traditional practitioners to harvest this resource prior to construction.	Contractor	During Construction	ECO
		• The use of heavy machinery to clear the interchange will be minimized; labor intensive clearing by locals will be preferred. All cleared plants will be available for communities to recover medicinal plants.	Contractor	During Construction	ECO
		• The contractor will ensure that construction workers do not take part in any activities that will affect the habitats such as collection of firewood or muthi.	Contractor	During Construction	ECO
		• Site clearance will be done mechanically. The use of fire is to be strictly avoided.	Contractor	During Construction	ECO
		• All tress greater than 10-cm in diameter will be cut to sizeable chunks and stockpiled on the side of the road to allow local communities to access them.	Contractor	During Construction	ECO
	Impact on Terrestrial Wildlife: Mammals The project is such that construction will clear vegetation, which acts as shelter for the animal species.	• To protect wildlife, the Contractor will ensure that site clearance outside the interchange is avoided, such that only vegetation in the way of construction activities can be cleared.	Contractor	During Construction	ECO
		• The Contractor will ensure that vegetation is not removed, except for the express purpose of construction.	Contractor	During Construction	ECO

Impact	Impact Description	Mitigation Measures	Implementing Authority	Timeframe	Monitoring Authority
3. Biodiversity Impacts *Construction Phase* Construction of the Golf Course and Coates Valley Interchange.	*Impact on Terrestrial Wildlife: Mammals….Cntd* The project is such that construction will clear vegetation, which acts as shelter for the animal species.	• Because fauna are likely to flee the site once clearing starts, this activity will be directional, starting from the east and proceeding towards the north western peripheries and forests, in order to allow mammals to migrate safely towards habitats that will offer protection from harm. • The contractor will ensure that workers do not poach on protected mammals. Such species include the legally-protected *Lepus saxatilis*, which is a poacher's favourite outside nature reserves.	Contractor Contractor	During Construction During Construction	ECO ECO
	Impact on Herpetofauna Likely impacts on herpetofauna species during construction would be the unnecessary clearing of off-site areas, resulting in the destruction of habitats for herpetofauna.	• The Contractor will ensure workers do not kill amphibians and reptiles, unless in defense of human safety. • The contractor will ensure that those herpetofauna that are too slow to flee are assisted. • Penalties accompanying the bridging of the Game Act will be clearly stated to contractors, who will educate his workforce on them during his weekly Toolbox Talks.	Contractor Contractor Contractor	During Construction During Construction During Construction	ECO ECO ECO
	Birdlife In the bushes associated with the wetland and the Endlungula Stream, active bird nesting sites are found.	• The contractor will time his work program to avoid working near active bird nesting sites until the chicks fledge, and will dissuade his workers from encroaching on the nesting sites. • The contractor will ensure that workers do not poach on birds, will educate his workforce on the Wildbird Protection Act, and will make works aware of the penalties associated with bridging the Act.	Contractor Contractor	During Construction During Construction	ECO ECO

Impact	Impact Description	Mitigation Measures	Implementing Authority	Timeframe	Monitoring Authority
3. Biodiversity Impacts *Construction Phase* Construction of the Golf Course and Coates Valley Interchange.	*Impact of Pollution on Sensitive Habitats* The road will cross wetlands, which are sensitive areas protected in Swaziland under the Ramsar Convention.	• No silt will be allowed to wash from the construction sites into the streams or wetland, and no stockpiled construction materials will be placed along natural drainage lines.	Contractor	During Construction	ECO
		• Because cement is expected to be used in large amounts, any contact with the local surface water resources will raise the pH of the water. As a result, no cement mixing will take place directly on the streams and wetland and direct work on water bodies will be carried out in the shortest time possible.	Contractor	During Construction	ECO
		• Apart from bridge construction, no construction activity will take place nearer than 30m from the stream, as per the Public Stream Banks Regulations.	Contractor	During Construction	ECO
	Impact on Alien/Invasive Species The project may introduce alien/invasive plants to the interchange	• The Contractor will ensure that his equipment is thouroughly cleaned/dusted before being imported to site, and also thouroughly cleaned/dusted when he takes it out of site to prevent propagation of alien plants seeds.	Contractor	During Construction	ECO
		• The contractor, as per the Noxious Weed Act, will actively destroy all alien species. Effective measures of destroying alien species are: - Isolated plants must be uprooted with a small hand pick. - Uprooted plants must be left to rot. - Chemical treatment of cut stems	Contractor	During Construction	ECO
		• The removal of alien/invasive plants species from the interchange will be carried out sustainably by ensuring that for every invasive/alien species removal, there is one or more indigenous plant that will replace it.	Contractor	During Construction	ECO

Impact	Impact Description	Mitigation Measures	Implementing Authority	Timeframe	Monitoring Authority
3. Biodiversity Impacts *Operational Phase* Operation and maintenance of the Golf Course and Coates Valley Interchange.	*Alien/Exotic Species* Alien/invasive/exotic species may be introduced to the corridor during rehabilitation.	• The Contractor, as per the Noxious Weed Act, will actively destroy all alien species that might be introduced during rehabilitation. Effective measures of destroying alien species are: - Isolated plants must be uprooted with a small hand pick. - Uprooted plants must be left to rot. - Chemical treatment of cut stems • The Proponent as per the Noxious Weed Act, will ensure that invasive species are destroyed at all times during road side refurbishment and maintenance. In the long-term, invasive plants removed will be promptly replaced by indigenous plants	Contractor MoPWT	At Decommissioning TPL	ECO ECO
	Animal Kills At operation, mammals such as dogs and chickens from the Mangwaneni Settlement will stray onto the interchange and be killed by fast moving traffic.	• Animal kills will be prevented through the use of fencing. This will be colour-coded to prevent the rampant theft of fencing along the national roads. • At operation, animal kills will be prevented by regular removal of overgrown grass on the interchange open spaces. This can be attained by including the MR-3 and interchange in the annual tendering of this service by the Ministry of Public Works and Transport.	Contractor Contractor	At Decommissioning At Operational Phase	ECO ECO

Impact	Impact Description	Mitigation Measures	Implementing Authority	Timefram	Monitoring Authority
3. Biodiversity Impacts *Operational Phase* Operation and maintenance of the Golf Course and Coates Valley Interchange.	*Monitoring* Unless the biodiversity mitigation implementation is monitored, the effectiveness of the biodiversity conservation program will not be known.	• As per the requirements of the SEA, this activity will be carried out regularly during construction and reported to the SEA through Project Compliance Reports (PCRs).	Contractor	During Construction	ECO
	Costs Transplants, alien species eradication, and biodiversity monitoring, will be part of the costs for the project.	Item — Cost • Pegging, Tagging, Relocating of Protected Plants = E100,000 • Rehabilitation Program = E2,000,000 • Removal of Alien Plants = E50,000 • Environmental Monitoring = E240, 000	Contractor MoPWT	Once off payment At Decommissioning During Construction	ECO ECO ECO ECO
4. Impacts On Air Quality, Aesthetics, Cultural And Archaeological Resources Planning Phase Preparation for construction of the Golf Course and Coates Valley Interchange.	*Impact on Aesthetics* The interchange will diminish the pre-development open space area in Manzini.	• MoPWT will liaise with the Municipal Council of Manzini on the design of the interchange so that it as much as possible retain its open space character and not be littered with imposing structures • In the designs, MoPWT will ensure that the interchange is properly landscaped, with the structures being of colours compatible with the natural surroundings.	MoPWT	At Planning At Planning	ECO ECO

Impact	Impact Description	Mitigation Measures	Implementing Authority	Timeframe	Monitoring Authority
4. Impacts On Air Quality, Aesthetics, Cultural And Archaeological Resources *Construction Phase* Construction of the Golf Course and Coates Valley Interchange.	*Impact of Emissions* The Contractor may burn wastes, and construction vehicles will emit gases as they move on and off the site.	• The Contractor will ensure that there is no burning of waste at the site office or at any area under construction. The Waste Regulations of 2000 forbid this activity. A Construction Waste Management Programme, which involves waste reduction, segregation and recycling, will be implemented. • The Contractor will ensure that there is minimal usage of construction vehicles in so far as pollution is concerned; well-maintained vehicles shall be used, and vehicles not in use shall have their engines turned off.	Contractor Contractor	During Construction During Construction	ECO ECO
	Impact of Particulates Clearing of vegetation and actual construction will result in increased dust levels from construction vehicles moving on and off construction sites.	• The Contractor will ensure that site clearance takes place only at areas earmarked for construction activities, and working on existing borrow pits and spoil sites will greatly reduce this impact. • The Contractor will use water carts for sprinkling water to reduce dust levels at the site, and accesses to spoil sites, borrow pits, and quarry sites. • The Contractor will ensure that material stockpiles are frequently sprayed with water, at least twice daily, or more frequently during windy days. • The Contractor will ensure that workers are provided with nose masks for breathing purposes at places where earth-works will be carried out. • Guidelines and official channels to be used by the contractor for registering dust complaints are well established in the construction industry. These guidelines are: - Construction activities will not be undertaken on weekends or at night (between 1700 and 0700hrs) - The contractor will respond promptly to complaints about the dust by documenting the location of the affected party, and identifying the source of the dust with the intention of implementing appropriate mitigation measures in consultation with the affected party.	Contractor Contractor Contractor Contractor Contractor	During Construction During Construction During Construction During Construction During Construction	ECO ECO ECO ECO ECO

Impact	Impact Description	Mitigation Measures	Implementing Authority	Timeframe	Monitoring Authority
4. Impacts On Air Quality, Aesthetics, Cultural And Archaeological Resources *Construction Phase* Construction of the Golf Course and Coates Valley Interchange.	*Impact of Noise* Increased vehicular traffic during construction is likely to increase the ambient noise levels.	• The contractor will comply with the Factories, Machinery and Construction Works Act of 1972 as applicable for construction works.	Contractor	During Construction	ECO
		• The contractor will minimize noise from heavy machinery by fitting them with noise suppression devices and ensuring that they are in good working order.	Contractor	During Construction	ECO
		• The contractor shall ensure that noise complaints from the nearby residential areas are attended to promptly in consultation with the affected party.	Contractor	During Construction	ECO
		• Guidelines and official channels to be used by the contractor for registering noise complaints are well established in the construction industry. These guidelines are: - Construction activities will not be undertaken on weekends or at night (between 1700 and 0700hrs) - The contractor will respond promptly to complaints about the noise by documenting the location of the affected party, and identifying the source of the noise with the intention of implementing appropriate mitigation measures in consultation with the affected party.	Contractor	During Construction	ECO
	Visual Impact of Construction Sites The establishment of site office structures, excavation at borrow pits and spoil sites, are likely to be visual eyesore.	• All active construction areas will be shielded using natural elements such as large trees and by using green nets or corrugated iron sheets, or siting these structures at hidden areas or areas far from residences.	Contractor	During Construction	ECO
		• The Contractor will ensure that progressive rehabilitation is carried out immediately the disturbing force is removed, and not left till the end of the construction period.	Contractor	During Construction	ECO

Impact	Impact Description	Mitigation Measures	Implementing Authority	Timeframe	Monitoring Authority
4. Impacts On Air Quality, Aesthetics, Cultural And Archaeological Resources *Construction Phase* Construction of the Golf Course and Coates Valley Interchange.	*Construction Waste* Construction will produce significant amounts of wastes which will litter the interchange.	• The Contractor will ensure a proper upkeep of construction sites with regards to solid waste disposal and keeping site offices clean rather than having equipments litter the roadside. • The contractor will prepare a Waste Management Programme as part of his Environmental Management Plan (EMP) prior to construction which will involve: - Collecting all waste to one temporary location. - Sorting waste into recyclables (bottles, plastics, paper) and non-recyclables. - Allowing recycling companies to collect their raw material, e.g. Swazi Paper Mills for paper, Ngwenya Glass for glass, the Buy Back Center for others. - Transport the non-recyclable waste by bakkie once a week to the nearby Manzini Landfill or a smaller facility at - The contractor must first seek approvals from the Municipal Council of Manzini for its use.	Contractor Contractor	During Construction During Construction	ECO ECO
4. Impacts On Air Quality, Aesthetics, Cultural And Archaeological Resources *Operational Phase* Operation and Maintenance of the Golf Course and Coates Valley Interchange.	*Aesthetic Impact* Excavated sites and temporary construction materials will be a visual eyesore if not rehabilitated.	• The contractor will ensure that all temporary structures used for the construction of site offices and campsites are decommissioned prior to handing over of this infrastructure to MoPWT. No waste material shall be left on site; useable panels will be packed for use by the contractor at future sites, concrete will be ripped and disposed off at a local builder's rubble site, and the site rehabilitated. • The contractor will ensure that cuttings from construction activities are re-soiled and seeded as soon as works in a section have been completed (progressive rehabilitation). At the end of construction, however, the contractor will ensure that all disturbed areas are rehabilitated. Specific areas are:	Contractor Contractor	At Decommisioning At Decommisioning	ECO ECO

Impact	Impact Description	Mitigation Measures	Implementing Authority	Timeframe	Monitoring Authority
4. Impacts On Air Quality, Aesthetics, Cultural And Archaeological Resources *Operational Phase* Operation and Maintenance of the Golf Course and Coates Valley Interchange.	*Aesthetic Impact….Cntd* Excavated sites and temporary construction materials will be a visual eyesore if not rehabilitated.	- Rehabilitate drainage lines affected by excavations. - Rehabilitate material management yard with reseeded topsoil. - Rehabilitate spill containment sites by ensuring that all oil, bituminous products, hydraulic fluids, batteries, etc., used during construction are removed from site. The manufacturers of such products have depots in Swaziland from where they can be shipped to incinerators in South Africa. - Flatten and grass all unsightly heaps generated from excavation - Rip, disc and rehabilitate all temporary construction lanes that are no longer needed. • A formal landscape plan incorporating photographic records of the site prior to construction shall be drawn up. • The contractor will ensure that rehabilitation is undertaken in the presence of a rehabilitation specialist familiar with appropriate plant and re-vegetation techniques, whereby exposed areas will be re-vegetated to a condition equal or better than the former one with naturally occurring vegetation, soon after construction activities have ceased.	Contractor Contractor Contractor	At Decommisioning At Decommisioning At Decommisioning	ECO ECO ECO
	Long-Term Aesthetic Impact: Landscapes Overgrown roadside grass will not only be aesthetically unpleasant, but will also lead to reduced sight distances and cause accidents	• MoWPT will tender professional landscaping and rehabilitation services annually to local contractors. • Through the annual tender, the infrastructure will be maintained by MoPWT to ensure that overgrown roadside grass is continuously cut and trimmed so as not only to make the interchange aesthetically pleasant, but also to increase sight distances and prevent accidents. •	MoPWT MoPWT	At Operation At Operation	ECO ECO

Impact	Impact Description	Mitigation Measures	Implementing Authority	Timeframe	Monitoring Authority
4. Impacts On Air Quality, Aesthetics, Cultural And Archaeological Resources *Operational Phase* Operation and Maintenance of the Golf Course and Coates Valley Interchange.	*Impact of Disused Borrow Pits and Spoil Sites* Borrow pits and spoil sites will result in the generation of dust in the long-term, and will be a permanent eyesore.	• MoPWT will show commitment to environmental sustainability, through the annual maintenance tender, by including, in the scope of works, all borrow pits and spoil sites that show erosion. • MoPWT commitment to environmental sustainability, through the annual maintenance tender, will include in the scope of works all erosion dongas in the road corridor.	MoPWT MoPWT	At Operation At Operation	ECO ECO
	Monitoring Monitoring of the mitigation implementation is an essential requirement for this project.	• It is only through compliance monitoring that the mitigation proposed can be effective. For major road projects, regular site visits by an independent qualified and experienced environmental consultant or an environmental compliance officer (ECO) attached to the construction supervision team can be effective means of monitoring. Two site visits per week, and the production of a compliance monitoring report every month must be part of the overall monitoring program for the project.	MoPWT	TPL	ECO
	Costs Implementation of the mitigation measures will have a cost component associated with it.	<u>Item</u> — <u>Cost</u> Environmental Monitoring = E240, 000 Maintenance Tender = E1m	Contractor Contractor	During Construction Annually	ECO ECO

Impact	Impact Description	Mitigation Measures	Implementing Authority	Timeframe	Monitoring Authority
5. Socio-Economic Impacts *Planning Phase* Preparation for construction of the Golf Course and Coates Valley Interchange.	*Impact on Private Properties (-)* The road will inundate private properties such as wall fences, gates, etc.	• MoPWT will engage all owners of properties and structures that are within the interchange legal outspans that need to be demolished. An independent property valuer will be engaged to ascertain the market value of all affected structures. • MoPWT will compensate all property owners fully. Structures affected by the interchange will be replaced in accordance with an agreed compensation program. • MoPWT and property owners will agree on compensation terms by signing letters of acceptance. Compensation will be effected prior to construction of the interchange. • Because the project-affected people are to be "better off than before the project', all losses of business income will be compensated for, including an additional 10% inconvenience fee.	MoPWT MoPWT MoPWT MoPWT	At Planning At Planning Prior to Construction Prior to Construction	ECO ECO ECO ECO
	Impact on Settlements (-) The interchange will be adjacent to the Mangwaneni informal settlement. Community fears are that it will encroach on the settlement.	• MoPWT will encourage the community to elect a Community Liaison Officer (CLO), who will be liaison person for the project. All matters related to the community will be brought to the project by the CLO. • MoPWT will ensure that the Mangwaneni settlement, through the CLO, have their fears allayed that the interchange will encroach on the settlement.	MoPWT MoPWT	At Planning At Planning	ECO ECO

Impact	Impact Description	Mitigation Measures	Implementing Authority	Timeframe	Monitoring Authority
5. Socio-Economic Impacts *Planning Phase* Preparation for construction of the Golf Course and Coates Valley Interchange.	*Impact on Women and Children (-)* The interchange will interfere with the traditional crossing points used by children, especially the bus bays and traditional foot paths used by domestic workers of Coates Valley.	• MoPWT will design the interchange to accommodate pedestrians whose footpaths are alongside the main carriage way. • MoPWT will engage the communities and local schools on how best the designs can accommodate existing positions of bus bays so that children do not have to travel far to catch busses for school.	MoPWT MoPWT	At Planning At Planning	ECO ECO
	Service Providers (-) Infrastructure may be interrupted or disrupted because electricity poles and telephone lines lean precariously close to the main carriage way, and water mains and sewer pipes are in the interchange.	• MoPWT will ensure that, as part of the planning process at detailed design stage, the SWSC, SPTC, and SEC, are notified of the intention to relocate all service infrastructure found within the interchange legal outspans, to minimize the impact on service infrastructure. • MoPWT will ensure that a relocation plan is drawn up with the service providers as to how the infrastructure is to be relocated with minimal disruption, and how the relocation exercise will cost the proponent.	MoPWT + SPTC + SEC + SWSC	At Planning At Planning	ECO ECO

Impact	Impact Description	Mitigation Measures	Implementing Authority	Timeframe	Monitoring Authority
5. Socio-Economic Impacts *Construction Phase* Construction of the Golf Course and Coates Valley Interchange.	*Impact on Traffic* Construction will be carried out under traffic. Especially at the proposed Coates Valley traffic circle, this will lead to a disturbance to access onto private properties and the Regional Administration offices.	. Because the road will be constructed in the presence of traffic, the inconvenience to motorists and regular users of the MR-3 and access roads during construction will be minimized through availability of temporary lanes and detour roads. • The Contractor will ensure that regular users of the roads in the interchange are notified before construction activities that are likely to disrupt traffic, and sound traffic management systems should be put in place to control traffic through the Contractor's Traffic Accommodation Plan. • The contractor will not intentionally block access to any private properties, and where this is inevitable, the contractor will spend as little time as possible in the affected area, and thereafter restore the access to a better one.	Contractor Contractor Contractor	During Construction During Construction During Construction	ECO ECO ECO
	Safety Risks on Site Increased speed and frequency of construction vehicles traveling through the interchange will lead to elevated danger to the public, and blasting could be a safety hazard which could damage surrounding structures	• Occupational health will be given top priority by the Contractor, who shall ensure that all staff are safe at all times, and will not be exposed to harmful substances at work. This will be ensured in the form of protective clothing e.g., gloves, overalls, boots, masks, goggles, hard hats, etc. • The contractor will comply with the Occupational Health and Safety Act (OHSA) in ensuring good workplace safety and health practices, including reporting, inspection and standards, all of which are essential in reducing the number of accidents, injuries, and illnesses on the job, as well as improving productivity.	Contractor Contractor	During Construction During Construction	ECO ECO

Impact	Impact Description	Mitigation Measures	Implementing Authority	Timeframe	Monitoring Authority
5. Socio-Economic Impacts *Construction Phase* Construction of the Golf Course and Coates Valley Interchange.	*Safety Risks Along Project Road: Prevention of Accidents….Cntd* The increased speed and frequency of construction vehicles traveling through the roadside communities will lead to elevated danger to the public, and blasting could be a safety hazard which could damage surrounding structures.	• As the construction site will have more than 20 employees, a safety representative, who shall head a safety committee, shall be present on site at all times.	Contractor	During Construction	ECO
		• As per the dictates of the Occupational Health and Safety Act, the construction sites shall be off-limits to the public, and visitors will be subjected to a site induction course before entering the site.	Contractor	During Construction	ECO
		• To assure that injuries and accidents at construction phase are kept at a minimum, the contractor will ensure that vehicles and other equipments used are in good working condition.	Contractor	During Construction	ECO
		• The Contractor will ensure that the speed limit during construction does not exceed 40 km/hr for all vehicles.	Contractor	During Construction	ECO
		• The Contractor will ensure that flagmen to control traffic are made highly visible through approved work kits.	Contractor	During Construction	ECO
		• The Contractor will educate workers on possible dangers of construction activities, and will provide safety and environmental awareness training for all the workforce of the project through his regular Toolbox Talks.	Contractor	During Construction	ECO
		• The Contractor will ensure that adequate signage and proper traffic management is provided at active sites in order to minimize traffic disruptions. The site will have strict speed restrictions, speed calming measures, and clear warning signs.	Contractor	During Construction	ECO
		• The contractor will comply with the following risk reduction actions in order to minimize blasting risks:	Contractor	During Construction	ECO

Impact	Impact Description	Mitigation Measures	Implementing Authority	Timeframe	Monitoring Authority
5. Socio-Economic Impacts *Construction Phase* Construction of the Golf Course and Coates Valley Interchange.	*Safety Risks on the Project: Prevention of Accidents….Cntd* The increased speed and frequency of construction vehicles traveling through the roadside communities will lead to elevated danger to the public, and blasting could be a safety hazard which could damage surrounding structures.	- Only a certified blaster will be allowed to carry out blasting operations. - Only magazine storage sites approved by the Geological Surveys Minerals and Mines Departments (GSMMD) can be used to store explosives. - Only blasting plans approved by the GSMMD and the SEA can be implemented. - Blasts will not take place within 500m of dwellings and homes. - Photographs of homesteads should be taken by the contractor before any blasting operations begin in the form of a Crack Survey. • The blanket statutory requirement is to have homesteads not nearer than 500m of any blast site, adequate warnings, sirens, clearing of workers and the public from the site, and clearing of the debris thereafter. • No quarrying will be carried out until permission from the GSMMD has been obtained by the Contractor, and the mine approvals obtained from the SEA. As it is the contractor who will choose a quarry to use, all quarry issues will be addressed at this stage. • The contractor will, following award of the tender, take out insurance cover for all construction related accidents to include property and public compensation related to site accidents, blasting and related quarry hazards. • The Contractor will prepare a detailed Emergency Preparedness Plan for the project, and will at all times station a Health and Safety Officer on site. • Emergency procedures that need to be set up by the contractor during construction involve preparedness to manage efficiently all types of emergencies through:	Contractor Contractor Contractor Contractor Contractor Contractor	During Construction During Construction During Construction During Construction During Construction During Construction	ECO ECO ECO ECO ECO ECO

Impact	Impact Description	Mitigation Measures	Implementing Authority	Timeframe	Monitoring Authority
5. Socio-Economic Impacts *Construction Phase* Construction of the Golf Course and Coates Valley Interchange.	*Prevention of Accidents….Cntd* The increased speed and frequency of construction vehicles traveling through the roadside communities will lead to elevated danger to the public, and blasting could be a safety hazard which could damage surrounding structures.	- training of at least one worker as an emergency officer. Currently WHO and MoH are involved in Emergency Preparedness and Response training. - regular emergency drills - setting up communication linkages with the nearest health facility, Pigg's Peak Government Hospital, Bulembu Clinic and the Pigg's Peak Swaziland National Fire and Emergency Station to respond to such situations. - availing reliable telephone and transport 24 hours a day to make these responses possible. - maintaining of all fire extinguishers, blankets, etc, on a regular basis, at all sites.	Contractor	During Construction	ECO
	Health Risks: STIs/HIV/AIDS/TB Public and worker's health hazard is inherent in road construction projects, including their associated construction camps, where congestion leading to poor sanitation, diseases and discomfort may occur.	• There shall be no campsite for the project in order to maximize employment from the local communities, as well as to avoid the establishment of a worker's compound that will house scores of young men who may facilitate relationships with local women with the accompanying risk of spreading HIV and other STI's. • An education program (possibly through information leaflets distributed in toilets, site office) should be initiated to inform workers and the local public of HIV/AIDS/STD's and the best defense against these. • An HIV/AIDS Awareness Program will be initiated at contractor's cost, to inform the local communities where road construction workers will mingle with, of Sexually Transmitted Diseases and HIV/AIDS and the best defence against this.	Contractor Contractor Contractor	During Construction During Construction During Construction	ECO ECO ECO

Impact	Impact Description	Mitigation Measures	Implementing Authority	Timeframe	Monitoring Authority
5. Socio-Economic Impacts *Construction Phase* Construction of the Golf Course and Coates Valley Interchange.	*Health Risks: STIs/HIV/AIDS/TB… Cnt'd* Public and worker's health hazard is inherent in road construction projects, including their associated construction camps, where congestion leading to poor sanitation, diseases and discomfort may occur.	• The Contractor will effect his Wellness Program of: - Providing subsidized meals to employees, to ensure that good health supplements the HIV/AIDS Program - Conducting VCT regularly and implementing peer education programs. - Provision of condoms - Celebrating non-commucable diseases days, e., Diabetes Week, in the communities.	Contractor	During Construction	ECO
		• The contractor will organize workshops, through NGO's such as FLAS on STD's/HIV/AIDS and any other related diseases to educate his workforce, and the community in which he works in at that particular stage of construction.	Contractor	During Construction	ECO
		• The contractor will ensure that his staff is supplied with condoms so as to minimize the rate of spread of HIV/AIDS, and that the site is not to be turned to a social or recreational facility.	Contractor	During Construction	ECO
		• The contractor will ensure that warnings in employment contracts stipulate that employees found guilty of irresponsible behavior, in so far as HIV/AIDS or any other social ill is concerned, will be warned and disciplined, with the possibility of dismissal if the disciplinary recommendation warrants it.	Contractor	During Construction	ECO
		• The contractor will implement a Wellness Program for his employees, including peer educators, Toolbox Talks, etc, and will regularly report on these activities monthly during the construction period.	Contractor	During Construction	

Impact	Impact Description	Mitigation Measures	Implementing Authority	Timeframe	Monitoring Authority
5. Socio-Economic Impacts *Construction Phase* Construction of the Golf Course and Coates Valley Interchange.	*Health Risk : Sanitation* Public and worker's health hazard is inherent in road construction projects, including their associated construction camps, where congestion leading to poor sanitation, diseases and discomfort may occur.	• The contractor will ensure that adequate sanitary facilities and ablutions are provided for construction worker's usage to avoid the use of open spaces and bushes to relieve themselves. The Contractor will engage local sanitation providers to enhance the positive benefits of the project. Male facilities will be separated from female facilities. • The contractor will ensure that toilets with standpipes are installed at strategic locations along construction sites on the project road. Pit latrines will not be allowed. • The contractor will ensure that toilets are enough for the workers and that high sanitary standards are practiced at all times. The contractor will ensure that his workforce is actively dissuaded from using the road-side bushes to defecate. As a result of this, along active construction sites along the road corridor, toilets will be placed at 50m intervals.	Contractor Contractor Contractor	During Construction During Construction During Construction	ECO ECO ECO
	Criminal Element The project will encourage migration, whereas job opportunities will be limited. This will breed crime in the project area.	• The Contractor will, through the CLOs to be chosen by the local communities, local authority, or chiefs, in the local communities, employ workers from the community where the interchange is located. This will reduce migration into the communities which would otherwise exacerbate crime. • The Contractor will engage the services of a reputable private security firm to deter thieves form stealing diesel, batteries, tyres, and construction materials.	Contractor Contractor	During Construction During Construction	ECO ECO

Impact	Impact Description	Mitigation Measures	Implementing Authority	Timeframe	Monitoring Authority
	Criminal Element ….Cntd The project will encourage migration, whereas job opportunities will be limited. This will breed crime in the project areas.	• The Contractor will ensure that there are clear communication channels with the nearby police stations at Manzini.	Contractor	During Construction	ECO
5. Socio-Economic Impacts *Construction Phase* Construction of the Golf Course and Coates Valley Interchange.	*Creation of Employment During Construction (+)* During construction, the impact on employment is definite, with 150 positions for skilled, semi-skilled, and unskilled workers anticipated in the construction team.	• The Contractor will publicly inform the local communities about the development and its location, so that community members may be first to benefit from the employment opportunities.	Contractor	During Construction	ECO
		• The contractor will publicize the number of people required for construction activities and type of positions available to minimize false hopes. Available jobs could be for cement mixers, truck drivers, bricklayers, plumbers, technicians, etc., and other repetitive non-physical works such as grassing for women.	Contractor	During Construction	ECO
		• The contractor will give first preference to qualifying Swazi nationals to avoid disputes were foreign nationals be seen to be occupying positions that locals qualify for.	Contractor	Du ring Construction	ECO
		• The Contractor will engage Community Liaison Officers (CLOs) to assist in the recruitment process with the approval of the traditional authority of that area.	Contractor	During Construction	ECO

Impact	Impact Description	Mitigation Measures	Implementing Authority	Timeframe	Monitoring Authority
5. Socio-Economic Impacts *Construction Phase* Construction of the Golf Course and Coates Valley Interchange.	*Creation of Entrepreneurial Opportunities during Construction (+)* During construction, certain aspects will be subcontracted formally to smaller business providing a specific service such as site office establishment, drainage, rehabilitation, road markings, paving, e.t.c.	• In order for Swazis to see the development as beneficial to themselves and their communities, the contractor will ensure that local and aspiring businesspersons are given first preference through out-sourcing of certain works so that the development does not seem exclusive to foreign engineers and companies.	Contractor	During Construction	ECO
		• In the interest of fairness, the contractor will publicize works to be outsourced. This could be sale and transport of construction materials, sale and erection of fencing, sign writing, drainage and kerbing, rehabilitation works, security.	Contractor	During Construction	ECO
		• The contractor is encouraged to subcontract a reasonable percentage of heavy haulage traffic trucks to be used to transport earthwork materials to local Swazi-owned companies.	Contractor	During Construction	ECO
		• The contractor will stipulate services that will be subcontracted to local Swazi-owned companies. These will include, but not be restricted to sign writing, infrastructure relocation, traffic control, surfacing, road painting, etc.	Contractor	During Construction	ECO
		• Repetitive non-physical tasks will be preferably subcontracted out to local Swazi-owned companies which employ women and physically-disabled citizens, e.g., gabion fence makers, gabion filling, grassing, fencing, drainage, walkways, blockwork, etc.	Contractor	During Construction	ECO
		• The contractor will encourage local women to sell food items to the workforce at tea time or lunch. However, high sanitary standards shall be enforced.	Contractor	During Construction	ECO

Impact	Impact Description	Mitigation Measures	Implementing Authority	Timeframe	Monitoring Authority
5. Socio-Economic Impacts *Construction Phase* Construction of the Golf Course and Coates Valley Interchange.	*Training (+)* During construction, a number of training opportunities will arise, notable in traffic control, where semi-skilled workers can be attached to the construction team and gain skills that can be used in future similar projects.	• The contractor will avail training opportunities to local community members when such opportunities arise; this may be in traffic control, road material sampling and testing (quality control, etc.). • Skills transfer will be enhanced by encouraging aspiring engineers, accountants, etc., to understudy the Contractor's permanent staff at contractor's cost. The contractor will report monthly on his progress on implementing the skills transfer program.	Contractor Contractor	During Construction During Construction	ECO ECO
5. Socio-Economic Impacts *Operational Phase* Operation and Maintenance of the Golf Course and Coates Valley Interchange.	*Access to Markets (+)* An improved MR-3 through the interchange will improve connectivity, and reduce travel times, and grow the economy.	• The project will speed up the design process, so that construction may commence, to enable access to markets making Swaziland to fully benefit from the bilateral trade agreements with South Africa and Mozambique.	MoPWT	Prior to Construction	ECO

Impact	Impact Description	Mitigation Measures	Implementing Authority	Timeframe	Monitoring Authority
5. Socio-Economic Impacts *Operational Phase* Operation and Maintenance of the Golf Course and Coates Valley Interchange.	*Pedestrian Accidents* One of the biggest hazards associated with roads is accidents. This is because the interchange, which will allow greater speeds, will translate to more severe accidents.	• As poor road signage is a contributing factor to traffic accidents, road signs and markings will be placed in such a manner that they are easily seen by motorists. MoPWT will ensure that in the annual maintenance contracts, these are included. • The maintenance contracts will also include monitoring and replacement where necessary of mandatory stop signs at all junctions, speed limit signage, etc., and will include overhead pedestrian bridges, rip rap structures, zebra crossings, and any other suitable traffic calming measures.	MoPWT MoPWT	Prior to Construction Prior to Construction	ECO ECO
	Other Traffic Accidents Other road accidents will be due to animal kills as a result of overgrown grass obstructing motorists sight-seeing distances, water puddles on the interchange.	• The impact will be minimized by the proper maintenance of the interchange in ensuring that grass is not allowed to grow tall and hide animals (obscure driver's visibility), and roadside waste that attracts dogs will be collected timely by maintenance contractors. • As water on the interchange's roads is also one of the causes of fatal accidents due to hydroplaning, the maintenance contract for the interchange and MR-3 will include the clearing of debris and sediment from road culverts that will be obstructed by road-side litter, that may be occasionally blocked after heavy rains.	MoPWT MoPWT	At End of Construction + TPL TPL	ECO ECO

Impact	Impact Description	Mitigation Measures	Implementing Authority	Timeframe	Monitoring Authority
5. Socio-Economic Impacts *Operational Phase* Operation and Maintenance of the Golf Course and Coates Valley Interchange.	*Monitoring* Without monitoring, the success of implementation of the socio-economic mitigations can not be assessed.	• MoPWT will ensure that monitoring of the socio-economic mitigation implementation is part of the activities of environmental compliance monitoring for the project. • The project will monitor the welfare of the affected persons throughout the duration of the project and ensuring participation and consultation of affected parties through independent valuers, discussing schooling needs, issuing written notifications of agreements, and when any unanticipated problems arise, up to post-relocation monitoring.	MoPWT MoPWT	TPL TPL	ECO ECO
	Costs Implementation of the socio-economic mitigations will impact on the project budget	• All compensation costs will be borne by the proponent. All construction costs will be borne by the Contractor, who is yet to be appointed. These include: Item — Cost Compensation for Structures = E1,000, 00 Relocation of SEC Lines = E1,000, 000 Relocation of SPTC Lines = E1,000, 000 Relocation of SWSC Pipes = E3,000,000 Contractor's Traffic Accommodation Plan =E100,000 HIV/AIDS Wellness Program =E1,000,000 Environmental Monitoring =E240,000 Bus bays, bus shelters, road signage, overhead bridges, will be part of the E400m cost of the project.	MoPWT MoPWT Contractor	Prior to Construction Prior to Construction During Construction	ECO ECO ECO

6. SYNOPSIS OF BORROW PITS AND SPOIL SITE

6.1 Purpose

These guidelines are to be used by the contractor once the need for a borrow pit or a spoil site arise. This is because it is the prerogative of the contractor to identify and use these sites.

6.2 Spoil Sites Environmental Guidelines

Environmental Precautions

Only areas that are not environmentally sensitive can be used to spoil unsuitable materials.

Environmentally-sensitive areas include protected areas (SNTC proclaimed), wetlands (*ematete/emacaphoti*), communal lands (*grazing- emadlelo*), local sports fields (unless the spoiling will improve such facilities), drainage lines, and no nearer than 33m on the verge of streams/rivers, and not on areas with high water tables in order to protect ground water.

Land Owner's Consent

Once a spoil site has been identified, land ownership must be ascertained, and agreements must be in place for use of any area as spoil site. If on SNL, the land owner is the local Umphakatsi. The agreement will bear the stamp of the local Umphakatsi and signed by the Chief or his/her designate.

If on TDL, the land owner's consent will be through a Lease Agreement or Deed of Sale.

Permits

The contractor will seek permission from land owners to deposit spoil material.

The contractor will prepare a brief, outlining haul routes, quantities, and other relevant information, to submit to SEA for approval

SEA Authorization

At the time of compilation and approval of the ESA/ CMP, spoil site had not been identified as the contractor had not been appointed. Hence the CMP states that "Upon identifying a spoil area, the Contractor will obtain the requite clearance from SEA", and that the Environmental Compliance Certificate conditions include prior authorization by SEA. In this regard:

- The Contractor must, as part of the EMP, prepare a Method Statement, detailing, among other things, nature of material to be spoiled, quantities to be deposited, duration, spatial extent, etc.
- Regardless of whether a land owner has given consent, the Contractor must categorize the project with SEA, and submit an EMP/IEE/EA/CMP as will be directed by SEA.

If a spoil site is used without SEA approval, SEA upon inspection may issue a Protection Order, close down the site, and impose fines to the Contractor (the fine for unauthorized spoil sites can be as high as E250, 000). Prison sentences can be imposed.

Spoiling

The contractor will make sure that spoil material is transported responsibly, and that soil and rocks do not spill on public roads.

The contractor will daily flatten and water spoil material, stockpiles of which will not exceed 2m in height.

Rehabilitation

The contractor will rehabilitate the spoil area through contouring and grassing as per the wishes of the land owner.

6.3 Borrow Pit Environmental Guidelines

SEA Authorization

Permits

The contractor will obtain a permit for removal of material from all identified borrow pits from the owner or authority in charge of the land. All royalties must be paid to Swazi Sands.

The contractor will inform the local chiefs and relevant traditional authorities of the plan to extract material from SNL sites. The contractor will obtain the requisite permit from the Department of Geological Surveys and Mines.

No borrow pit shall be opened until the contractor prepares a Method Statement that will include the extent and procedures for borrowing, and that the SEA, through an EMP, has approved the use of such a site for a pit.

Overburden

Any overburden excavated from borrow pits will be stockpiled and used for backfilling during rehabilitation.

When opening up new sections of borrow pits, allowance should be made for separate stockpiling of topsoil, overburden and borrow material. The Contractor will rip, stockpile, load and remove the seam material as when required.

Excavation

Excavation of borrow tends to destroy the vegetation around the site, especially if new sections of the borrow pits are cut on steep slopes. This will be avoided.
The contractor will improve and maintain all haul roads from the borrow pit.

The contractor will suppress dust using water carts during borrow pit excavations.

Rehabilitation

Borrow pits when no longer needed must be reshaped, contoured to blend with their immediate surroundings and drained. No borrow pit must be left as deep holes as they pose a danger to the community.

Progressive rehabilitation of borrow pits will minimize erosion, and to make this possible, topsoil stripped of new working sections is to be stockpiled. Stockpiles should not be placed in areas where run-off will be a problem. This also applies to topsoil, and sub-soil overburden.

The borrow pit should be excavated to a regular shape and width where possible. Progressive rehabilitation, i.e. the grassing of exposed areas immediately after works is finished rather than leaving this process till the end of the project will be essential. A landscape specialist may be required.

7. REHABILITATION PLAN

7.1 Hydrological Criteria for the Control of Erosion

Hydrological Criteria for the Control of Erosion are summarized below. A qualified specialist will prepare specifications for the detailed design in accordance with this criteria.

Structures	Hydrological criteria for the control of erosion
Catch water drains above cuts	Catch water drains will be constructed above cuts to prevent run-off from flowing across the cuts as follows: • The drains will be lined with stone pitching or concrete (depending on the availability of stone for this purpose). • Where the natural gradients where the slopes on which the drains are constructed is 1:3 or more gentle than 1:3, catch-water banks will be constructed immediately downstream of the catch-water drains (using the materials excavated from the drains). • Where the natural gradients of the slopes on which the drains are constructed exceed 1:3, stone-masony walls will be constructed immediately downstream of the drains (the walls will enable development of drains with the required capacity and will be more resistant to erosion than the catch-water banks). • Catch-water banks and slopes above the crest of the cuts will be vegetated to bind the soil and limit the potential for erosion, grass runners and mulch will be used on the steep slopes and hand sowing will be used on more gentle slopes. • The catch-water drains will be designed for the 1:20 year rainfall event.

	• The catch-water drains will be constructed before the developments of the cuts to limit the erosion of the cuts
Slope gradients of cuts	• Cuts will be steep to limit run-off across and, consequence, erosion of the face. • The slope gradients will be determined by geotechnical stability criteria – the gradient will range from 1:0.5 (for fine decomposed granite, with prevention of erosion being the key criterion) to 1:1.5 for mixed material (soil, stone and boulders, with prevention of boulders falling being the key criterion).
	• In general, the faces of cuts will be too steep to enable vegetation to be established on these faces – vegetation generally cannot be established on slopes with steeper gradients than 1:1.5. • Vegetation of steeps cuts is also not deemed desirable because the planting of the vegetation will disturb the surface of the cuts and create conditions conducive to the erosion of the surface of the cuts. • If there are any cut faces with more gentle gradients than 1:1.5, these cut faces will be rehabilitated using grass runners mulch.

Structures	Hydrological criteria for the control of erosion
Catch water drains above cuts	• Debri traps up to 3m wide will be constructed at the toe of cuts with slope gradients steeper than 1:1.5 to capture any material falling from the face and prevent these materials from blocking the cut drains. • The traps will be reinforced through the addition of cement to the soil layer (5% cement) to produce a soilcrete layer. This will facilitate clearing of debri from the debri trap without scouring and, consequently, creating a channel adjacent to the drainage channel.
Cut toe drains and mitre chutes	• Cut drains will be lined to prevent scouring stone-pitching or concrete (depending on the availability of stone for this purpose). • The drains will discharge water from the ends of cuts via mitre chutes. • Mitre cuts will be lined to prevent scouring with grass sod, stone-pitching, concrete or gabion mattresses depending on the velocity of flow. • Where protection of fill is required, a mitre bank will be constructed. • Depending on the topography and the natural drainage patterns at the point of natural drainage lines directly or indirectly via toe drains. • The cut toe drains and mitre chutes will be designed for the 1:5 year rainfall event.

Fill slope gradients	• Fill slope gradients will not be steeper than 1: 1.5 and will be more gently than 1:1.5, preferably at least 1:3, where possible to facilitate the establishment of vegetation on the slopes.
Fill toe drains	• Drains will be constructed along the toe of fills to direct flow into natural drainage lines. These drains will collect water from mitre chutes (from cut drains) and pipe chutes (from road berms). • The drains will be lined with stone-pitching, concrete or gabion mattresses depending on the velocity of flow. • Depending on the topography and natural drainage patterns at the point of discharge, the toe drains will discharge into natural drainage lines directly or indirectly via cross drains through fill. • The drains will be designed for the 1:5 year rainfall event.
Stockpiles and soil dumps	• Stockpiles of construction materials and spoil dumps will not be placed in a natural drainage lines. • At borrow-pit sites, stockpiles will be placed within the confines of the surface-water management infrastructure (canal and bunds) at these sites.

	• Within the borrow pit areas, stockpiles and dumps will be placed in areas where there are barriers to flow from the catchment. These barriers could include catch-water drains or fills. Where there are no barriers, bunded canals designed for the 1:5 year rainfall event will be constructed upstream of the stockpiles. Where the size of stockpiles and dumps exceed 500m^3, bunded canals must be constructed downstream to capture run-off from the 1:5 year rainfall event.

7.1 Hydrological Criteria for the Control of Erosion

Hydrological Criteria for the Control of Erosion are summarized below. A qualified specialist will prepare specifications for the detailed design in accordance with this criteria.

7.2 Criteria For Rehabilitation Of Land Disturbed By Construction Activities

Rehabilitation measures	Study Area	Criteria
Topsoil stripping	All areas disturbed by construction activities	• Topsoil is defined as the top layer of soil that can be mechanically removed to depth of 500mm without blasting. • Topsoil will be stripped from all areas to be disturbed by construction activities and stockpiled for use in the rehabilitation of disturbed land. • Careful attention will be paid to topsoil stripping and storage practices as follows: ➢ Topsoil will be stripped and stored with as little compaction as possible and not in wet weather (the clay content will lead to cementation if too much moisture is present); ➢ Topsoil stockpiles will not exceed 2m in height to prevent compaction and limit dispersion of dust from the stockpiles. ➢ Stockpiles which are likely to remain undisturbed for 1 months or more will be vegetated; ➢ Topsoil will be respread with as little compaction as possible; ➢ Land to which topsoil has been applied will be vegetated.
Rehabilitation measures	**Study Area**	**Criteria**
Landscaping	Roads	• Geotechnical stability will be the key criterion influencing the slope gradients. • Where geotechnical stability criteria allow, slope gradients should be at

		least 1:3 to facilitate the establishment of vegetation. • Where slope gradients are 1:1.5 or greater than 1:1.5 and are not protected by structural scour-protection measures, the slopes will be established by vegetation.
	Other disturbed land	• The disturbed land will be landscaped such that slope gradients are reduced to at least 1:3 and preferably 1:5.
Use of topsoil in the rehabilitation of land	Roads	• Topsoil is wasted on slope with gradients less than 1:2 as it will quickly be washed away by erosion or caused to slip off by gravity. • On slopes with a gradient of 1:2 or greater than 1:2, the layer of topsoil spread over the landscaped surface will be at least 200 mm and preferably 500 mm. • Topsoil will have to be spread manually on slopes with a gradient of less than 1:4. • Topsoil will be spread with as little compaction as possible.
	Other disturbed land	• For rehabilitation of cultivated land, the layer of topsoil spread over the landscaped surface will be at least500 mm. • For rehabilitation of grazing land and wilderness, the layer of topsoil spread over the landscaped surface will be at least 200 mm and preferably 500 mm.

		• Topsoil will have to be spread manually on slopes with gradient of less than 1:4. • Topsoil will be spread with as little compaction as possible.
Fertilizers to be applied	All areas disturbed by construction activities.	• Samples of different types of soil will be tested to determine the quantity and type of fertilizer required for vigorous growth of grass (most fertilizer companies offer this as a service).
Preparation of the bed for planting	All areas disturbed by construction activities	• Topsoil will be ripped to 100 mm. • Manual preparation of the bed is deemed desirable as it will create employment opportunities for the local communities. • The method of preparation of the bed depends on the method of planting. • Mechanical preparation of the seed bed will be constrained by steep slope gradients (less than 1:4).

11.2 Criteria For Rehabilitation Of Land Disturbed By Construction Activities…cont'd

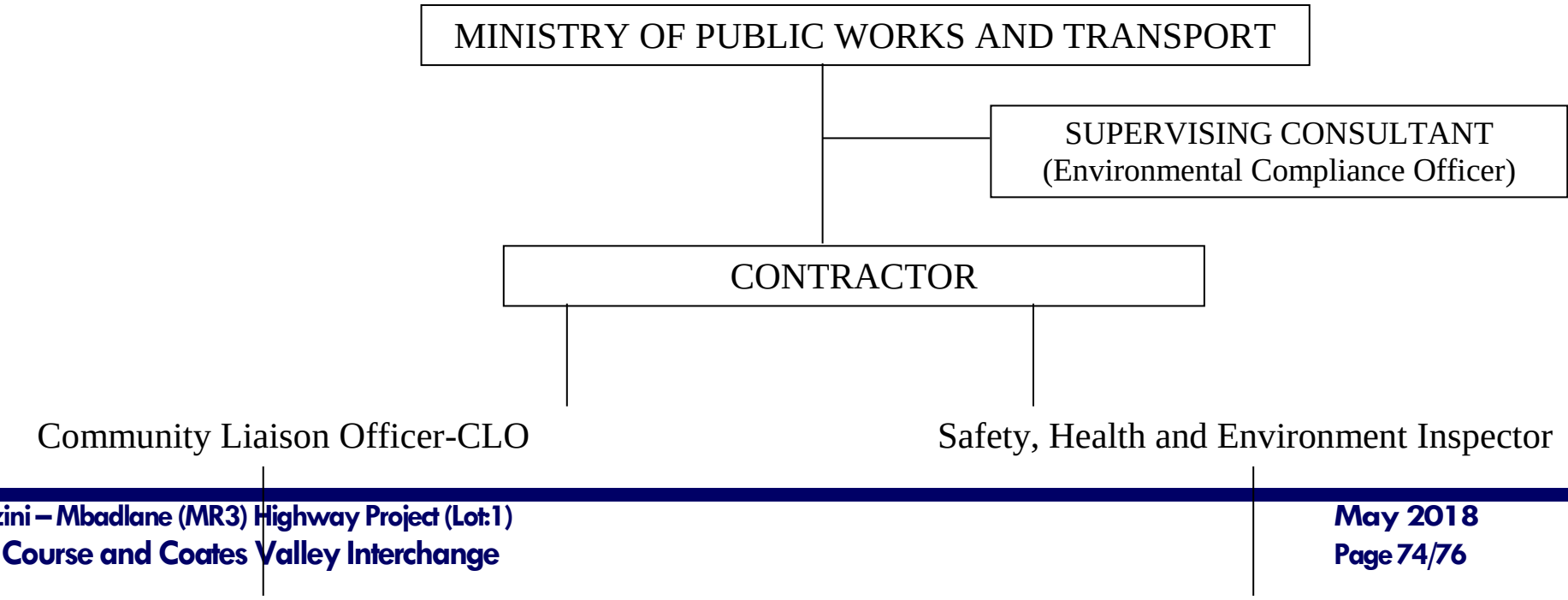
Rehabilitation measures	Study Area	Criteria
		• The grass and fertilizer slurry will include a mulch of grass cut from the

		surrounding veld, hen the grass is in seed, will also
		• be used – the mulch application rate should be 2 tons/ha. • An adhesive will be included in the moisture to prevent the seed and fertilizer from blowing, washing or slipping. Hand sowing – preferred manual option for more gentle sops (gradients of more than 1:3) • Trenches of the seeds will be cut approximately 10 cm deep along the contour at a spacing of approximately 300 mm. • The seeds and fertilizer will be broadcast into the trenches by hand and , then, the soil should be gently compacted using a garden rake or similar implement. • A mulch of grass cut from the surrounding veld, when the grass is in seed, will also be used – the mulch application rate should be 1 ton/ha. Mechanical sowing – alternative mechanical option for more gentle slopes (gradients of more than 1:3) • Fertilizer will be spread over the surface and then ploughed or disced in. • The surface will then be harrowed until fine seed bed has been prepared. • The seed will be broadcast and then rolled with an agricultural roller. • A mulch of grass cut from the surrounding veld, when the grass is in seed, will also be used – the mulch application rate should be 1 ton/ha.

Species to be planted	All disturbed areas	• Runners of *Cynodon dactylon* (kweek/star grass) should be used in grassland areas (areas which have not been disturbed by cultivation). • Runners of *Pennisetum clandestinum* (kikuyu) can be used in areas surrounded by cultivated land, they will not be used in grassland areas, particularly the Maguga valley and in relatively undisturbed areas. • The seed mix should contain a rapidly germinating annual commercial species which will act as a "nurse crop" – this will stabilise the soil rapidly and will then die out allowing for colonization of the vegetated area by indigenous species. *Eragrotis teff* (teff) is ideal for his purpose and should be applied at a rate of 0.5 kg/ha. • The seed mix should also contain perennial commercial species with a high seed viability. These species should not be invasive. The following species are recommended, each at an application rate of 1 kg/ha: *Cynodon dactylon* (star grass); *Chloris gayana* (Rhodes grass); *Cenchrus ciliaris* (Cenchrus); and *Digitaria eriantha* (smuts grass).
Irrigation	All planted areas	• Microspray irrigation should be used and the irrigation system could be linked to a water cart. • After planting (sowing of seeds and/or planting of runners), the planted areas will be irrigated on a daily basis until the seedling and/or runners have established. • Irrigation of established vegetation will only be required if rainfall is poor (less than 300 m/yr) and/or there is dieback of vegetation.

Maintenance	All planted areas	• Monitoring of plant development in revegetated area. The frequency of monitoring required varies according to the phase of plant establishment. . monitoring will be conducted on a weekly basis during the initial phase and can be done on a monthly basis and then a seasonal basis as the plants become established. • Vegetation will be re-established in areas where the vegetation cover has died back.

8. INSTITUTIONAL ARRAGEMENTS



COMMUNITY Local Authority Swaziland Environment Authority

The Ministry of Public Works and Transport will be the overall execution agent for the project. The contractor will be carrying out construction. The contractor will be supervised by the Supervision Consultant. All environmental matters will be reported on by the Supervision Consultant's Environmentalist. The Community Liaison Officer will represent the Community interests. The Municipal Council of Manzini will be the local authority.

9. IMPLEMENTATION SCHEDULES AND WORK PROGRAM

Various activities that require timing, cost and monitoring are scheduled as follows:

1. Construction: August 2018 – September 2020

2. Construction Monitoring: up until September 2020

3. Completion Report: October 2020

9. CONCLUSION

All the prepared mitigation measures have been presented in a manner to ensure that all the activities to be undertaken are conducted in an environmentally and socially acceptable manner. Regular monitoring and commitment by the various identified parties responsible for specific activities will ensure that all identified and non-identified issues are adequately addressed before environmental damage is done.