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ATTACHMENT 3

Tasi Mane - Suai Supply Base

Strategic Environmental Management Plan

DRAFT

301012-01504-EN-REP-0004

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SECRETARIA DE ESTADO DOS RECURSOS NATURAIS DRAFT STRATEGIC ENVIRONMENTAL IMPACT ASSESSMENT PLAN

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301012-01504 – TASI MANE PROJECT ENVIRONMENTAL IMPACT ASSESSMENT

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A	Issued for Internal Review	_____	_____	_____	22 Nov 2011	_____	_____
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1. INTRODUCTION

1.1 Project Proponent

The proponent for the Tasi Mane project ('the project') is the [Secretaria De Estado Dos Recursos Naturais \(SERN\)](#) or Secretary of State for Natural Resources, a division of the [Government of Timor-Leste \(GoTL\)](#).

1.2 Project Overview

The Tasi Mane project (project) comprises three petroleum infrastructure clusters along the southern coast of Timor-Leste. The GoTL, through SERN, proposes to establish a supply base industry at Suai, a refinery and petrochemical industries at Betano (Manufahi District), and an LNG plant at Beaço (Viqueque District) along the southern coast.

The project forms part of the government's strategic vision for the economy to secure new commercial and industrial activities, and will provide modern infrastructure and facilities.

This document only relates to the development of the supply base at Suai.

The area of Suai, in the Cova Lima district, is intended to become an industry base for Timor-Leste and provide a focal point for services, logistics, fabrications and human resources. The primary purpose of the supply base is to support the offshore exploration and development of petroleum, although, it will provide (generally) indirect support to the proposed oil and gas industry developments at Betano and Beaço.

The components of the development at Suai are:

- Supply base, including sea port, warehouse logistics area, offices and fuel storage facilities.
- Industrial estates.
- New settlement development: Nova Suai.
- Suai Airport upgrade.
- Crocodile reserves.

1.3 Purpose of the Environmental Management Plan

An [environmental management plan \(EMP\)](#) is required to be submitted with the [environmental impact statement \(EIS\)](#) to support an environmental licence application in accordance with the Decree Law 5/2011 on environmental licensing.

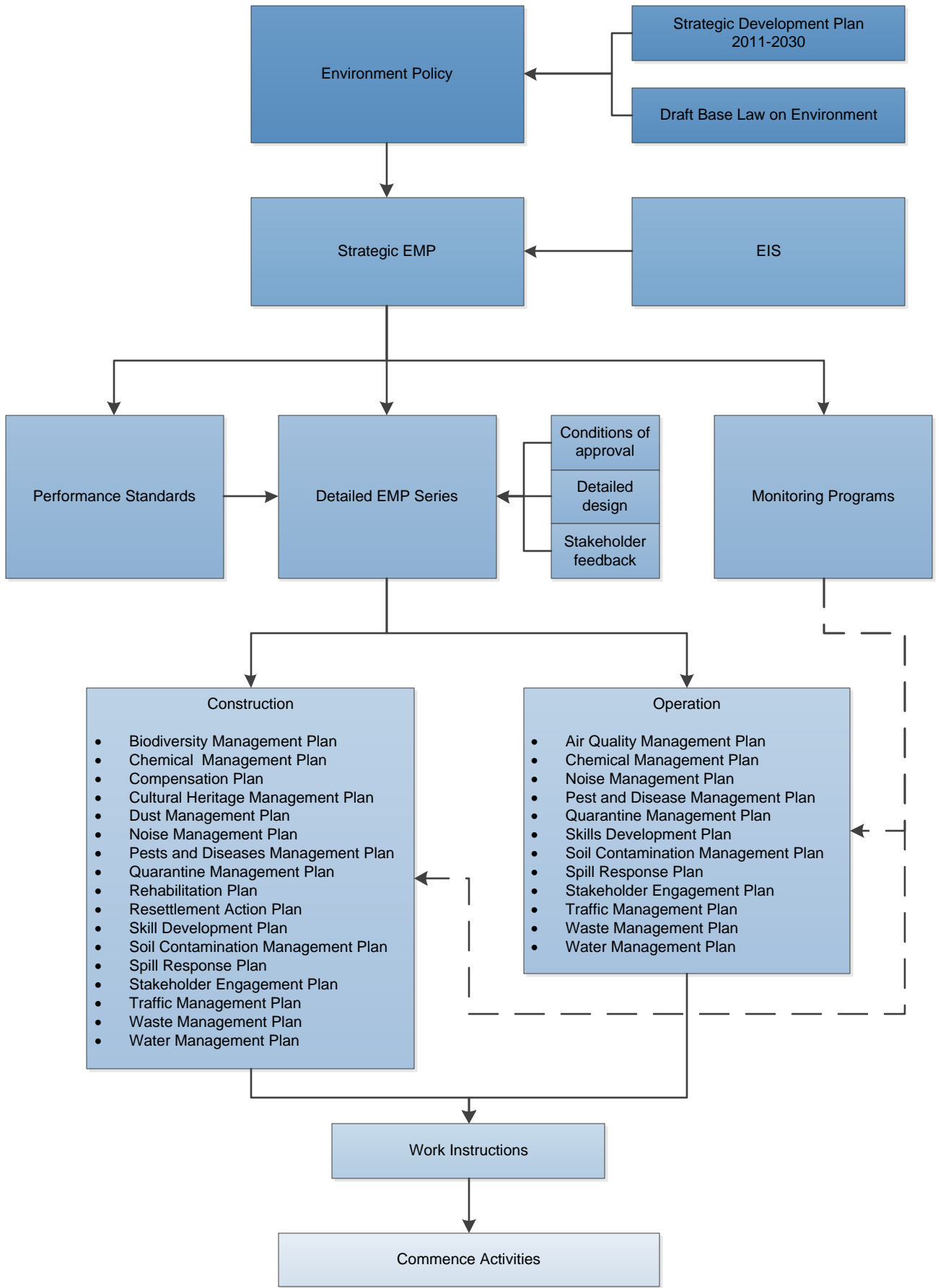


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The purpose of the EIS is to determine the baseline conditions for the physical, biological and social environment at the Suai development area, identify the likely environmental and social impacts associated with the project and prescribe the measures to avoid, manage and mitigate potential adverse impacts. This EIS also identifies further work required for each environmental aspect. This further work, and more detailed assessment, will influence the number and type of sub-plans required for the project.

An environmental management plan typically flows from the EIS and continues through the life of the project. An EMP consolidates all the management and mitigation measures which can be given statutory effect through formal approval. Figure F051 shows the EMP development process and its interaction with the EIS.

In the absence of a detailed project description, a strategic EMP (this document) has been prepared which outlines the overarching environmental and social management impacts, describes the objectives for the project, collates the mitigation measures resulting from the impact assessment process described in the EIS and identifies the monitoring, responsibility and reporting requirements. The strategic EMP will then form the basis for detailed EMP's required prior to construction and operation of the project. The detailed EMP's will be site and activity specific and will set out the specific tasks to be implemented by the project staff and contractors.



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Creator: Courtney Wheeler
 PLOT DATE AND TIME: 19 Mar 2012, 5:07 PM

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	REV	DATE	REVISION DESCRIPTION	DRN	CHK	DES	ENG	APPD	CUST	PROJECT: 301012-001504	



Figure F051
 Environmental management flowchart



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2. IMPLEMENTATION OF ENVIRONMENTAL MANAGEMENT

2.1 Land Use and Visual Amenity

Impact	The development of the project will cause a visual change to the landscape as a result of the introduction of an industrial development into a rural setting. However, the undulating topography of the site combined with the existing dense vegetation would be expected to mitigate this impact to some extent. The clearing of vegetation, construction earthworks and permanent infrastructure is likely to generate the greatest visual impact.
Objectives	<ul style="list-style-type: none"> • Locate and design facilities to minimize visual impact. • Avoid or minimize the loss of agricultural land. • Avoid areas of steep terrain.
Avoidance, management and mitigation measures	<ul style="list-style-type: none"> • Retain existing vegetation as much as possible. • Reduce, as far as is practicable, the cleared areas needed to construct and operate the project. • Restore existing vegetation to its previous or an improved condition, prior to removal. • Undertake tree screening along the borders of the cleared areas of the project using fast growing dense vegetation. • Adopt a sensitive lighting approach to reduce light spill. Measures may include providing directional or shielded lighting, minimizing light pole elevations, purchasing lower lux rating lights, motion sensors and timers.
Monitoring	<ul style="list-style-type: none"> • Monitor the number of complaints regarding visual amenity and investigate accordingly. • Compliance audits to be undertaken during construction and operation.
Responsibilities	<ul style="list-style-type: none"> • The Construction Contractor Environmental Manager will be responsible for ensuring the monitoring and auditing of the EMP is carried out. • The Construction Contractor Supervisor will be responsible for ensuring the implementation of the avoidance, management and mitigation measures in the EMP.
Reporting	<ul style="list-style-type: none"> • Construction Contractor Environmental Manager will provide monthly updates to the Construction Contractor Supervisor on routine monitoring and auditing results.



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	<ul style="list-style-type: none">• Construction Contractor Supervisor to provide SERN with periodic updates on routine monitoring and audit results.
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2.2 Geology and Soils

Impact	<p>Impacts can be minimised and the need for rehabilitation reduced, by implementing management measures that prevent the:</p> <ul style="list-style-type: none"> • Loss of soil quality. • Soil erosion. • Land instability and slope failure. • Disturbance of acid sulfate soils. • Soil contamination.
Objectives	<ul style="list-style-type: none"> • Minimize soil loss and erosion. • Avoid or minimize use of sites with sodic or acid sulfate soils. • Maintain the integrity and environmental values of the geology and soils.
Avoidance, management and mitigation measures	<ul style="list-style-type: none"> • Ensure erosion control structures are used during construction and designed for storm events. • Install appropriate sediment controls, such as erosion berms, drains and sediment traps, to collect runoff and sediment from the work sites and prevent sediment entering watercourses. • Where practicable, ensure construction traffic uses formed access tracks to minimize soil disturbance. • Ensure formed access tracks are covered with a compacted trafficable base (e.g., road base). • Install temporary culvert or pipes where access roads cross drainage lines and continuity of flow is required. • Store construction material away from watercourses, with suitable control structures, to avoid being washed away. • Appropriate slope stability structures must be installed on slopes during construction. • Protect slopes that are susceptible to slope failure from mass movement or landslides by preventing excess loading and by preparing and stabilizing soils prior to construction in the area. • Carry out soil surveys to identify areas of potential slope failure. • Direct drainage around work sites to natural drainage lines. • Ensure stormwater runoff is treated prior to discharge from the work site, which may include use of sediment and litter traps, sedimentation ponds, wetlands, grassed swales and oil separators (for target areas such as car



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	<p>parks.</p> <ul style="list-style-type: none"> • Ensure chemical and fuel storage areas are purpose built, above ground on hardstand areas and within containment bunds. • Ensure spill prevention and response plans are in place. • As far as practicable, refuel vehicles and equipment at dedicated refueling areas. • Ensure spill response kits are onsite and maintained. • Implement inductions to ensure the workforce has knowledge of correct use of refueling systems and chemicals. • Implement appropriate construction methods in order to avoid acid sulfate soil formation. • If acid sulfate soils are exposed, treat or dispose of appropriately. If acid sulfate soils are to remain in situ, then cap the soil with a clean source material. • Lightly scarify or shallow rip compacted construction soil surfaces to aid water infiltration. • Treat exposed soil areas, which are exposed for prolonged periods or have been identified as problem soils, (e.g., erosive, dispersive) with chemical surface stabilisers or physical alternatives (crushed rock). • Stockpile topsoil in designated areas for later reuse. Topsoil stockpiles must be separated from subsoil stockpiles and located close to where the topsoil originated. • Stabilize topsoil stockpiles to prevent erosion and maintain integrity when stored for long periods of time. • Rehabilitate disturbed bare soils by respreading topsoil and revegetating soon as practicable after construction is completed.
Monitoring	<ul style="list-style-type: none"> • Monitor watercourses upstream and downstream of construction work sites to ensure water quality is maintained. • Regularly inspect erosion and sediment control measures during construction and immediately after a potentially damaging weather event to ensure its effectiveness. • Inspect drainage lines and areas of concentrated water flow to assess whether erosion is occurring and whether remedial action is required. • Regularly inspect soil stabilization techniques during construction and immediately after a potentially damaging weather event to ensure its effectiveness.



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	<ul style="list-style-type: none">• Undertake monthly visual integrity inspections of fuel and chemical storage facilities for breaches of containment or spills.• Compliance audits to be undertaken during construction and operation.
Responsibilities	<ul style="list-style-type: none">• The Construction Contractor Environmental Manager will be responsible for ensuring the monitoring and auditing of the EMP is carried out.• The Construction Contractor Supervisor will be responsible for ensuring the implementation of the avoidance, management and mitigation measures in the EMP.
Reporting	<ul style="list-style-type: none">• Construction Contractor Environmental Manager will provide monthly updates to the Construction Contractor Supervisor on routine monitoring and auditing results.• Construction Contractor Supervisor to provide SERN with periodic updates on routine monitoring and audit results.



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2.3 Air Quality

Impact	<p>Construction of the project will generate emissions to air primarily in the form of fugitive dust. Dust emissions not only affect the environment, but can also affect human health due to the inhalation of fine particulate matter.</p> <ul style="list-style-type: none"> • Operation of the project is likely to affect air quality due to fuel combustion in electricity generation and, vehicle and equipment use.
Objectives	<ul style="list-style-type: none"> • Minimize the impacts of air quality to the environment and on the health, welfare and amenity of people and land uses.
Avoidance, management and mitigation measures	<ul style="list-style-type: none"> • Establish appropriate environmental buffer zones between dust sources and sensitive receptors. • Control dust generation using suitable dust suppression techniques such as watering. • Ensure adequate water is stored onsite or is available for dust suppression. • Minimise areas of cleared land exposed at any one time. • Treat exposed soil areas, which are exposed for prolonged periods or have been identified as problem soils (e.g., erosive, dispersive), with chemical surface stabilisers (wetting agents) or physical alternatives (crushed rock). • Reinstate cleared areas as soon as practicable after construction. • Where practicable, ensure construction traffic uses formed access tracks to minimize soil disturbance. • Ensure formed access tracks are covered with a compacted trafficable base (e.g., road base). • Restrict hours in which construction is permitted. • Limit vehicle speeds onsite to minimize dust generation. • Maintain fit for purpose vehicles and equipment with appropriate emission control devices (e.g., vehicle exhaust system, filters). • Regularly service vehicles and equipment to maintain optimum vehicle emission levels. • Communicate plans and status of construction activities to stakeholders. • Appoint a principal contact person for community queries. • Ensure third party complaints are recorded and actioned.
Monitoring	<ul style="list-style-type: none"> • Undertake visual monitoring of the construction site during potential dust



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	<p>generating activities.</p> <ul style="list-style-type: none"> • Undertake monthly visual monitoring of dust deposition on vegetation upwind and downwind (of the prevailing wind) surrounding the construction site. • Continuously monitor ambient pollutants, particulate matter and deposited dust to assess compliance levels. • Monitor meteorological conditions. • Undertake monthly inspections on emission control devices to ensure they are fitted and working correctly. • Monitor the number and nature of complaints regarding dust and air quality and investigate accordingly. • Compliance audits will be undertaken during construction and operation.
Responsibilities	<ul style="list-style-type: none"> • The Construction Contractor Environmental Manager will be responsible for ensuring the monitoring and auditing of the EMP is carried out. • The Construction Contractor Supervisor will be responsible for ensuring the implementation of the avoidance, management and mitigation measures in the EMP.
Reporting	<ul style="list-style-type: none"> • Construction Contractor Environmental Manager will provide monthly updates to the Construction Contractor Supervisor on routine monitoring and auditing results. • Construction Contractor Supervisor to provide SERN with periodic updates on routine monitoring and audit results.



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2.4 Noise

Impact	Excessive noise emissions are expected from the construction and operational activities of the project, reducing the amenity of the surrounding community. Construction noise impacts are expected to have tonal, modulated and/or impulsive characteristics from piling and excavation activities. Operational noise is expected to have tonality and vibration characteristics resulting from ongoing activities at the supply base, industrial estate and airport.
Objectives	<ul style="list-style-type: none"> • Minimize adverse impacts of noise emanating from the project on the health, welfare and amenity of people. • Avoid adverse noise impacts to farm animals and native fauna.
Avoidance, management and mitigation measures	<ul style="list-style-type: none"> • Establish appropriate environmental buffer zones between noise sources and sensitive receptors. • Restrict hours in which construction is permitted. • Schedule noisy activities to less sensitive times allowing for periods of respite. • Provide noise barriers where required. • The equipment used for construction must be the quietest reasonably available. • Fit noise suppression devices to equipment where required. • Service equipment in accordance with manufacturer’s specification to ensure they are maintained in a good working order. • Install alternative noise movement/reversing warning systems for equipment and vehicles that will operate for extended periods, during sensitive times or in close proximity to sensitive sites. • Communicate plans and status of construction activities to stakeholders. • Appoint a principal contact person for community queries. • Ensure third party complaints are recorded and actioned.
Monitoring	<ul style="list-style-type: none"> • Undertake compliance noise monitoring at each identified sensitive receptor. • Undertake quantitative noise monitoring at the source of a noise complaint. • Compliance audits will be undertaken during construction and operation.
Responsibilities	<ul style="list-style-type: none"> • The Construction Contractor Environmental Manager will be responsible



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	<p>for ensuring the monitoring and auditing of the EMP is carried out.</p> <ul style="list-style-type: none">• The Construction Contractor Supervisor will be responsible for ensuring the implementation of the avoidance, management and mitigation measures in the EMP.
Reporting	<ul style="list-style-type: none">• Construction Contractor Environmental Manager will provide monthly updates to the Construction Contractor Supervisor on routine monitoring and auditing results.• Construction Contractor Supervisor to provide SERN with periodic updates on routine monitoring and audit results.



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2.5 Surface Water

Impact	Reduction in water quality and alteration to water flow is likely during construction and operational activities as a result of erosion, potential flooding, impediment to existing channel migration and stormwater runoff. The Suai site is located at the downstream end of the catchment between two sizeable watercourses Rio Raiketán (to the east) and Rio Kamanasa (to the west).
Objectives	Protect the quality and quantity of surrounding surface water from the impacts of the project.
Avoidance, management and mitigation measures	<ul style="list-style-type: none"> • Flood protection measures, such as flood levees and diversion channels, may be required to prevent inundation of the project site by flood waters. • Ensure diversion structures and storage dams, if required, are sited away from environmentally sensitive areas. • Establish appropriate environmental buffer zones between infrastructure and nearby channels to minimize the risk of erosion. • Ensure erosion control structures are used during construction and designed for storm events. • Install appropriate sediment controls, such as erosion berms, drains and sediment traps, to collect runoff and sediment from the work sites and prevent sediment entering watercourses. • Store construction material away from watercourses, with suitable control structures, to avoid being washed away. • Direct drainage around the work sites to natural drainage lines. • Ensure stormwater runoff is treated prior to discharge from the work site, which may include use of sediment and litter traps, sedimentation ponds, wetlands, grassed swales and oil separators (for target areas such as car parks). • Rehabilitate disturbed bare soils as soon as practicable after construction is completed. Avoid riparian vegetation clearance where practicable. Where clearance cannot be avoided, reinstate and revegetate bed and banks of watercourses as quickly as practicable after construction. • Do not store chemicals near watercourses. • Ensure refueling areas for construction equipment are well away from watercourses. • Ensure wastewater streams are directed to the wastewater treatment plant to ensure discharges offsite meet the applicable water quality standards for



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	<p>either aquatic or marine environments.</p> <ul style="list-style-type: none"> • Ensure the potential extraction of water from nearby surface waters protects the flow regime, particularly during low flow periods. • Determine baseline water qualities of watercourses potentially affected by the project.
Monitoring	<ul style="list-style-type: none"> • Monitor watercourses upstream and downstream of construction work sites to ensure water quality is maintained. • Monitor the effectiveness of flood protection measures regularly during construction and immediately after a significant rainfall event. • Inspect erosion and sediment control structures for their integrity and effectiveness regularly during construction and immediately after a significant rainfall event. • Monitor stormwater discharge from work sites to ensure impacts to water quality are prevented. • Inspect drainage lines and areas of concentrated water flow to assess whether erosion is occurring and whether remedial action is required. • Compliance audits to be undertaken during construction and operation.
Responsibilities	<ul style="list-style-type: none"> • The Construction Contractor Environmental Manager will be responsible for ensuring the monitoring and auditing of the EMP is carried out. • The Construction Contractor Supervisor will be responsible for ensuring the implementation of the avoidance, management and mitigation measures in the EMP.
Reporting	<ul style="list-style-type: none"> • Construction Contractor Environmental Manager will provide monthly updates to the Construction Contractor Supervisor on routine monitoring and auditing results. • Construction Contractor Supervisor to provide SERN with periodic updates on routine monitoring and audits results.



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2.6 Hydrogeology

Impact	<p>Construction and operation of the Suai development has the potential to adversely affect groundwater and could potentially result in changes to groundwater quality. groundwater flow patterns, groundwater recharge and discharge areas and site dependent changes to surficial hydrology and water quality. Likely sources of the groundwater impacts include:</p> <ul style="list-style-type: none"> • Construction and operation of surface facilities. • Disposal of process water. • Leachate from solid waste disposal (e.g., containment of wastes). • Accidental spills or releases of chemicals and fuels.
Objectives	<ul style="list-style-type: none"> • Protect existing beneficial users of groundwater. • Maintain groundwater quality. • Minimise disruption to groundwater discharge and recharge areas and groundwater flow paths during construction.
Avoidance, management and mitigation measures	<ul style="list-style-type: none"> • Ensure groundwater is not extracted for use during construction. • If groundwater is intercepted, direct to sedimentation ponds. • Ensure chemical and fuel storage areas are purpose built, above ground on hardstand and within containment bunds. • Ensure spill prevention and response plans are in place. • As far as practicable, refuel vehicles and equipment at dedicated refueling areas. • Ensure spill response kits are onsite and maintained. • Implement inductions to ensure the workforce has knowledge of correct use of refueling systems and chemicals. • Install groundwater monitoring bore(s) to establish a baseline of groundwater levels and quality prior to construction.
Monitoring	<ul style="list-style-type: none"> • Quarterly groundwater monitoring to assess quality against baseline levels. • Undertake monthly visual integrity inspections of fuel, chemical and waste storage facilities for breaches of containment or spills. • Compliance audits to be undertaken during construction and operation.
Responsibilities	<ul style="list-style-type: none"> • The Construction Contractor Environmental Manager will be responsible for ensuring the monitoring and auditing of the EMP is carried out. • The Construction Contractor Supervisor will be responsible for ensuring the implementation of the avoidance, management and mitigation



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	measures in the EMP.
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2.7 Terrestrial Biodiversity

Impact	<p>Potential environmental impacts to terrestrial flora and fauna, and habitat values as a result of construction and operations include:</p> <ul style="list-style-type: none"> • Loss of individuals of IUCN listed species; <i>Santalum album</i> (Sandalwood) <i>Pterocarpus indicus</i> (Rosewood), both valuable timber trees; • Loss of floristic biodiversity that has not been documented; • Secondary weed invasion after clearing, particularly Siam Weed and Cogon Grass; • Loss of forest and tree cover; • Loss of important mangrove habitat; • Loss of agricultural land and subsistence gardens; • Loss of food crops and estates e.g. coconuts, bananas; • Loss of timber for fuel source; • Loss of cash crops e.g. Teak, Rosewood and Sandalwood; and • Loss of fauna habitat, specifically important habitat for species of conservation significance. • Increased noise disturbance to fauna species. • Changes to fauna habitat and assemblages. • Changes to conservation significant fauna. • Increased potential of vehicle strike due to construction and operational vehicles. • Increased erosion potential and sedimentation due to soil disturbance.
Objectives	<ul style="list-style-type: none"> • Protect IUCN Red Listed species (both flora and fauna) from adverse impacts. • Ensure impacts on other terrestrial flora and fauna, and habitat values are minimised and/or mitigated.
Avoidance, management and mitigation measures	<ul style="list-style-type: none"> • Site project infrastructure to avoid key habitat areas. • Retain native vegetation wherever possible, specifically mangrove communities and Sheoak trees thought to be important habitat for the Yellow-crested Cockatoo (IUCN Red List species). • Clearly identify the project footprint area of the project, including access roads and buffer areas prior to the commencement of works. • Use temporary fencing, flagging, signage or other delineation to clearly



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	<p>identify vegetation to be retained.</p> <ul style="list-style-type: none"> • Clear vegetation in a sequential manner to encourage fauna to move out of the project area and into adjacent vegetation. • Avoid vegetation clearing activities in periods of high rainfall to reduce soil erosion and sediment runoff. • Fell trees in the direction of the work site or into existing cleared areas. • Collect and relocate tree logs to existing vegetation areas to enhance habitat quality. • Mulch cleared vegetation and stockpile in existing cleared areas. • Spread mulched material on erosion prone areas or rehabilitated areas. • Ensure all vehicles, machinery, plant equipment and materials which have entered a known weed infested areas are washed down at a dedicated onsite washdown location to remove all soil and vegetative material from cabins, trays and under carriages. • All equipment, machinery and materials entering Timor-Leste from overseas will be inspected to ensure quarantine standards are met. • Use appropriate techniques to remove weed infestations where possible. Avoid use of herbicides in and adjacent to areas with surface water.
Monitoring	<ul style="list-style-type: none"> • Undertake daily monitoring of vegetation clearing activities to ensure buffer areas are not compromised. • Ongoing monitoring and control of disturbed areas to minimize the emergence of weeds. • Compliance audits will be undertaken during construction and operation.
Responsibilities	<ul style="list-style-type: none"> • The Construction Contractor Environmental Manager will be responsible for ensuring the monitoring and auditing of the EMP is carried out. • The Construction Contractor Supervisor will be responsible for ensuring the implementation of the avoidance, management and mitigation measures in the EMP.
Reporting	<ul style="list-style-type: none"> • Construction Contractor Environmental Manager will provide monthly updates to the Construction Contractor Supervisor on routine monitoring and auditing results. • Construction Contractor Supervisor to provide SERN with periodic updates on routine monitoring and audit results.



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2.8 Marine Biodiversity

Impact	<p>The construction and operation of the Suai Supply Base has the potential to adversely affect the marine environment and could potentially result in one or more of the following:</p> <ul style="list-style-type: none"> • Changes in local hydrodynamics and coastal processes (sediment transport). • Changes in water quality. • Changes in sediment quality. • Direct and indirect changes in benthic habitats and infaunal communities. • Changes in fisheries resources <p>Likely sources of marine environmental impacts include:</p> <ul style="list-style-type: none"> • The construction and physical presence of new marine structures. • Sediment disturbance by construction and port operation activities. • Spills, discharges and runoff associated with construction and port operation activities. • Operation of the desalination plant. • Operation of the wastewater treatment plant. • The introduction of marine invasive species.
Objectives	<ul style="list-style-type: none"> • Protect IUCN Red Listed marine biodiversity from adverse impacts. • Ensure impacts on other marine flora and fauna are minimised and/or mitigated. • Ensure impacts on coastal landscape values are minimised, and mitigated, including the prevention of coastal erosion.
Avoidance, management and mitigation measures	<ul style="list-style-type: none"> • Vessels will be fitted with differential GPS to ensure there is no direct impact outside the work site. • All vessels will be required to have in place a Shipboard Oil Pollution Emergency Plan. • Mooring and anchoring activities will only occur at designated sites. • Navigation aids will be used to identify the designated mooring and anchoring sites. • Maintain fauna (marine mammals) exclusion zones where required. • Vessels will not approach marine mammals. • Time dredging and disposal operations to avoid key lifecycle stages for



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	<p>local biota.</p> <ul style="list-style-type: none"> • Select appropriate dredge plant and dredging methods, including utilization of suspension reduction technologies where practicable. • Implement a 'No Overflow' policy during dredge loading. • Minimise dredging volume through careful planning and avoidance of excessive deepening. • Carefully select disposal sites to maintain the natural dynamics of the marine system and minimise material transport costs. • Ensure adequate reception facilities are provided to receive ship wastes. • Ensure site runoff from the tank farm is controlled within a containment bund. • Ensure all jetties are fully bunded with drainage to a sump which can be pumped to the wastewater treatment plant where required. No oily residues will be washed from ships into port waters. • Any onshore maintenance work will avoid pollution of waters from chemical and biological residues. • Ensure PSCs have first response capabilities. • Ensure spill prevention and response plans are in place. • Ensure spill response kits are on site and maintained. • Ensure the location of desalinisation plant outlet is situated in an area of high turbulence and water movement to optimise dilution and dispersal of the discharge. All wastewater will be treated via the wastewater treatment plant. • Ensure human contact is excluded within 100 m of the wastewater treatment plant outlet and shellfish collection excluded within 500 m. • Prohibit or control certain antifoulant coatings <(tributyl tin)>. • Contain and control the disposal of all antifoulant residues and waste. • Remove vessels and movable structures from the water for cleaning and maintenance wherever practicable.
Monitoring	<ul style="list-style-type: none"> • Monitor water quality monitoring within the harbour area. Measurements should include the levels of dissolved oxygen and nutrients (particularly organic nitrogen and phosphorus compounds). Monitoring may also include phytoplankton sampling. • Monitor water quality and benthic communities in the vicinity of the wastewater treatment and desalination plant outlets. • Weekly checks of jetty sump to maintain adequate capacity.



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	<ul style="list-style-type: none">• Monitor de-chlorination and toxicity of the wastewater treatment plant discharge if a chlorination disinfection process is used.
Responsibilities	<ul style="list-style-type: none">• The Construction Contractor Environmental Manager will be responsible for ensuring the monitoring and auditing of the EMP is carried out.• The Construction Contractor Supervisor will be responsible for ensuring the implementation of the avoidance, management and mitigation measures in the EMP.
Reporting	<ul style="list-style-type: none">• Construction Contractor Environmental Manager will provide monthly updates to the Construction Contractor Supervisor on routine monitoring and auditing results.• Construction Contractor Supervisor to provide SERN with periodic updates on routine monitoring and audit results.



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2.9 Social and Economic Values

Impact	<p>The potential socio-economic impacts (both positive and negative) from the Suai supply base include:</p> <ul style="list-style-type: none"> • Employment creation. • Skills development. • Creation of economic opportunities. • Physical displacement. • Loss of land crops and natural resources including fishing and potable water. • Loss of commercial trees. • Disturbance and/or loss of access to sacred sites and scattered graves. • Reduced mobility due to loss of road network interlinking grazing area and water sources. • Population influx. • Increased pressure on government to deliver on infrastructure service and administrative demands set by the project. • Community health and safety. • Improvement of basic services and infrastructure. • Conflict affecting construction and operation of the supply base. • The supply base development exacerbating gender equality issues in the study area.
Objectives	<ul style="list-style-type: none"> • Project specific goals and objectives are to be determined subsequent to the stakeholder consultation program.
Avoidance, management and mitigation measures	<ul style="list-style-type: none"> • Undertake a skills audit and identify relevant training programs to optimize local employment. • Develop and implement a Skills Development Plan to deliver trained people, education programs for local children and advice on long term sustainable farming practices. • Ensure the demobilisation of construction personnel is coordinated with the mobilisation of the operations team as much as possible. • Ensure employment opportunities are open, transparent, non-discriminatory and aligned with community needs.



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	<ul style="list-style-type: none"> • Ensure local vocational institutes offer curriculum appropriate for a skilled labour workforce. • Ensure royalties and taxes from the project are used efficiently and transparently. • Ensure local businesses providing goods and services are used as much as possible. • Develop a Resettlement Action Plan (RAP) to address <ul style="list-style-type: none"> ○ Involuntary relocation of all affected households and associated assets. ○ Loss of crops and natural resources for all affected households. ○ Compensation for loss of natural resources, agricultural fields and commercial trees. • Consult regularly with local fishermen to minimise impacts on their existing fishing activities and to optimise local opportunities generated by these facilities. • Enclose sacred sites and graves to avoid disturbance where possible. If disturbance is unavoidable, the project will consult with affected parties to find culturally appropriate solutions. • Ensure alternate roads and paths are established for the local community prior to project commencement. • Ensure safety buffer zones from activities posing unacceptable risks to villages and the local community. • Ensure consultation with the local community encourages free speech for all.
Monitoring	<ul style="list-style-type: none"> • Undertake internal and external monitoring of the social management measures at regular intervals. • Compliance audits will be undertaken during construction and operation.
Responsibilities	<ul style="list-style-type: none"> • The Construction Contractor Environmental Manager will be responsible for ensuring the monitoring and auditing of the EMP is carried out. • The Construction Contractor Supervisor will be responsible for ensuring the implementation of the avoidance, management and mitigation measures in the EMP.
Reporting	<ul style="list-style-type: none"> • Construction Contractor Environmental Manager will provide monthly updates to the Construction Contractor Supervisor on routine monitoring, waste records and auditing results. • Construction Contractor Supervisor to provide SERN with periodic updates



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	on routine monitoring and audit results.
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2.10 Land Transport

Impact	<p>A number of impacts on the land transport network are expected for both the construction and operational phases of the project:</p> <ul style="list-style-type: none"> • Deterioration of road condition due to significant increase in daily movements of heavy vehicles. • Deterioration of roads from significant increase in daily movements of light vehicles. • Reduction in safety for other road users around the Suai Market location. • Change in road safety for pedestrians in the study area. • Impact on existing intersections. • Introduction of new intersections. • Local road network management in Nova Suai. • Associated air and noise quality impacts.
Objectives	<ul style="list-style-type: none"> • To manage construction and operational traffic and transport issues such that potential impacts on the community and the operation of the road network are minimized. • Ensure community traffic needs are met during all phases of project implementation.
Avoidance, management and mitigation measures	<ul style="list-style-type: none"> • Upgrade key roads used for construction and operation traffic. The surfaces should be adequate to withstand the multiple construction phases and should reflect accepted design standards. • Pedestrian crossing points and controls will be provided for the most visible and obvious pedestrian routes at key locations where there is significant heavy vehicle traffic, including Suai market, school areas, commercial locations and community facilities. • Roads will be designed to include the requisite level of drainage that does not otherwise impact negatively on existing drainage features or properties. • Appropriate lighting should be provided on key links where there is likely to be significant traffic flow at night. • Clear bilingual signage should be provided on appropriate routes noting the presence of heavy vehicles. • Heavy vehicles movement will be restricted to key routes only and will avoid travel on local roads, where possible. • Traffic management controls will be provided or upgraded to ensure road



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	<p>and pedestrian safety and improve traffic flow.</p> <ul style="list-style-type: none"> • Regular maintenance of pavement and drainage features should be undertaken during construction and repaired as required. • Strict speed limits should be introduced for construction and operation vehicles. • Dedicated areas for motorcycle parking should be provided away from the proposed heavy vehicle routes through Suai market.
Monitoring	<ul style="list-style-type: none"> • Regularly inspect pavement and drainage features to ensure adequacy. • Conduct a road safety audit on the design of the road network improvements to highlight whether improvements could be made. • Compliance audits will be undertaken during construction and operation.
Responsibilities	<ul style="list-style-type: none"> • The Construction Contractor Environmental Manager will be responsible for ensuring the monitoring and auditing of the EMP is carried out. • The Construction Contractor Supervisor will be responsible for ensuring the implementation of the avoidance, management and mitigation measures in the EMP.
Reporting	<ul style="list-style-type: none"> • Construction Contractor Environmental Manager will provide monthly updates to the Construction Contractor Supervisor on routine monitoring, waste records and auditing results. • Construction Contractor Supervisor to provide SERN with periodic updates on routine monitoring and audit results.



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2.11 Waste Management

Impact	<ul style="list-style-type: none"> Throughout the Project's life, including site preparation, construction, operation and decommissioning, a variety of waste streams and products are likely to be generated.
Objectives	<ul style="list-style-type: none"> Use resources efficiently, reducing the intensity of materials used and implementing programs for the reduction and re-use of waste Ensure wastes do not adversely affect water resources or lead to land contamination. To manage waste in accordance with the principles of reuse, reduce and recycle.
Avoidance, management and mitigation measures	<ul style="list-style-type: none"> Consider alternative products, i.e., substituting raw materials with less hazardous or toxic materials, and substituting materials for more environmentally friendly options. Use good housekeeping and operating practices, including inventory control. Use strict segregation processes to prevent the co-mingling of water and waste streams. Use low-sulfur diesel-powered equipment, where practicable. Ensure equipment is maintained in accordance with manufacturer's specifications. Clear the smallest construction footprint possible, therefore reducing the generation of greenwaste, topsoil, spoil, overburden, ASS and greenhouse gases. Identify reuse opportunities and assess which materials could potentially be recycled. Identify market demands for waste streams in the vicinity of Suai (i.e., reuse of concrete to build roads). Install dedicated skip bins for designated wastes around the construction site. Establish a waste management area in close proximity to the Suai development area. Ensure the waste management area is located in an area free of geotechnical, hydrogeological and topographical risks. The waste management area should also not be within a conservation area or in close



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	<p>proximity to the airport.</p> <ul style="list-style-type: none"> • Ensure the waste management area includes a designated area for sorting and segregating wastes, a high-temperature incinerator, an engineered landfill, a wastewater treatment plant and an industrial shredder. • Undertake incineration to reduce disposal volumes. • Design the engineered landfill to take all non-hazardous and hazardous waste generated at the Suai development area. • Use the industrial shredder to shred and de-bead tyres and crush drums so that there is available landfill capacity during construction and operations. • Store wastes in a manner that prevents co-mingling or contact between incompatible wastes (e.g., acids and alkalis). • Store wastes that allows for the inspection of containers, i.e., to monitor any potential leaks or spills. • Store chemicals, fuel, paint and adhesives in appropriately sized drums and on hard standing surfaces. • All chemicals will be stored with MSDS's. • Locate spill kits near liquid waste storage areas. • Cover domestic waste storage bins. • Train all employees in spill response.
Monitoring	<ul style="list-style-type: none"> • Conduct periodic inspections of waste storage areas to ensure compliance with safety standards. • Record and report all wastes generated from the project. • Regularly conduct visual inspections of the waste management area. • Compliance audits will be undertaken during construction and operation..
Responsibilities	<ul style="list-style-type: none"> • The Construction Contractor Environmental Manager will be responsible for ensuring the monitoring and auditing of the EMP is carried out. • The Construction Contractor Supervisor will be responsible for ensuring the implementation of the avoidance, management and mitigation measures in the EMP.
Reporting	<ul style="list-style-type: none"> • Construction Contractor Environmental Manager will provide monthly updates to the Construction Contractor Supervisor on routine monitoring, waste records and auditing results. • Construction Contractor Supervisor to provide SERN with periodic updates on routine monitoring and audits result.