Tuvalu Coastal Adaptation Project

Environmental and Social Management Plan

Disclaimer

This Environmental and Social Management Plan has been prepared for the submission of the proposal to the Green Climate Fund for the purposes of assisting in the assessment of the potential environmental and social impacts of the proposal. This Environmental and Social Management Plan has been prepared prior to undertaking an Environmental and Social Impact Assessment. Normally, an Environmental and Social Management Plan would be prepared following baseline studies and then the subsequent impact assessment contained within the Environmental and Social Impact Assessment (or commonly known as an Environmental Impact Assessment (EIA)) and would form the basis for the construction and operational environmental and social management plans.

As no Environmental and Social Impact Assessment have been undertaken for the projects, this Environmental and Social Management Plan has been prepared solely on the author's experience with projects of this nature and in consideration of international good practice for these types of projects. Accordingly, the Environmental and Social Management Plan will be subject to change following the preparation of the Environmental and Social Impact Assessment/s.

Assumptions

The following assumptions have been made in the preparation of this Environmental and Social Management Plan:

1. all components of the proposal will have an Environmental and Social Impact Assessment/s prepared prior to the construction and operation of the specific project components;
2. none of the projects will require the displacement of people;
3. that the information contained in the relevant reports relied up to prepare this Environmental and Social Management Plan including:
    a. AECOM (June 2015), Tuvalu Coastal Protection Scope Definition; report prepared for the World Bank;
    b. Japan International Cooperation Agency, Kokusai Kogyo Co., Ltd and Fisheries Engineering Co., Ltd (Jan 2011), *The Study for Assessment of Ecosystem, Coastal Erosion and Protection/Rehabilitation of Damaged Area in Tuvalu*, report prepared for the Government of Tuvalu's Ministry of Foreign Affairs, Environment, Trade, Labour and Tourism; and
    c. McCue, J (May 2014), Increasing Resilience of Coastal Areas and Community Settlements to Climate Change: Coastal Options and Feasibility Report – Nukufetau and Nanumea, report prepared for Sustainable Sea, Australian Aid, NAPA Tuvalu, United Nations Development Programme and the Government of Tuvalu

    are correct and accurate in their information;
4. none of the projects will be conducted in sensitive locations including coral reef systems and seagrass areas;
5. the dredging will not result in changes to hydrodynamic processes, increased erosion and deposition and/or water quality;
6. appropriate modelling will be conducted prior to the final design of any hard coastal protection infrastructure to ensure the infrastructure will not have significant impacts on coastal hydrodynamics and processes;
7. appropriate erosion and sediment control will be undertaken during all stages of the projects;
8. acid sulfate soils will be managed effectively if found during construction; and
9. there will be no release of pollution and/or chemicals as a result of the projects.

Environmental and Social Management Plan for Tuvalu Coastal Adaptation Project

1. This document is an Environmental and Social Management Plan (ESMP) for the "Tuvalu Coastal Adaptation Project" submitted to the Green Climate Fund for funding. The project will provide highly needed coastal protection infrastructure, both in the form of hard and soft infrastructure to protect the people of Tuvalu in the face of climate change, increasing sea level rise and impacts from more severe cyclones.

Governing Legislation

2. The legislative and policy basis for the provision of the coastal protection infrastructure projects comes under a number of piece of legislation (in alphabetical order only rather than by importance) including but not limited to the:

   a) *Conservation Areas Act 1999*;

   b) *Constitution of Tuvalu 1986* (Cap 1);

   c) *Crown Acquisition of Land Act* (Cap 24);

   d) *Environmental Protection Act 2008* (Cap 30.25);

   e) *Falekaupule Act 1997*;

   f) *Foreshore and Land Reclamation Act* (Cap 26);

   g) *Marine Resources Act 2006*;

   h) *Marine Zones Act 1983* (Cap 24A);

   i) *Native Lands Act* (Cap 22); and

   j) *Wildlife Conservation Act* (Cap 47).

Environment Protection Act

3. Environmental management and the requirement for an environmental impact assessment are controlled by the *Environment Protection Act 2008.* The Department of Environment (DoE) administers the Act and Regulations. Specifically, Part 5 of the Act (sections 17 and 18) sets out the process and procedures for the undertaking of an Environmental Impact Assessment (EIA).

4. The *Environmental Protection Regulations 2014* provides the regulatory management of EIA in the Tuvalu. It provides for the undertaking of preliminary environmental assessment report (PEAR) or EIA. All projects must comply with the legislation and regulations. Under Regulation 4, the Minister determines what projects should have either a PEAR or EIA. Pursuant to Schedule 1 (9) public works that require either a PEAR or EIA include (d) soil erosion, beach erosion and siltation control; and (k), seawalls/land reclamation. Regulation 5 exempts *routine maintenance* of for example, seawalls; however this project involves the construction of for example, seawalls, which is not routine maintenance.

Overview - Institutional Requirements for the Environmental and Social Management Plan

5. As the project will be funded by the Green Climate Fund through the UNDP, all works (including but not limited to civil and construction contractors) must adhere to the outcomes of the ESIA (once prepared) and this or a modified ESMP (following an ESIA) including complying with the appropriate avoidance and mitigation measures. The ESIA and this or a modified ESMP will be assessed for each project by the DoE and UNDP prior to any works being undertaken. The ESMP identifies potential risks to the environment and social matters from the projects and outlines strategies for managing those risks and minimising undesirable environmental and social impacts.

6. The DoE will be responsible for the supervision of the ESMP. The UNDP with gain the endorsement of the DoE and will ensure the ESMP is adequate and followed. The supervising engineer will ensure timely remedial actions are taken by the contractor where necessary.

Objectives of the Environmental and Social Management Plan

7. An ESMP is a management tool used to assist in minimising the impact to the environment and reach a set of environmental objectives. To ensure the environmental objectives of the projects are met, this

ESMP will be used by the contractor to structure and control the environmental management safeguards that are required to avoid or mitigate adverse effects on the environment.

8. The environmental and social objectives of the projects are to:

   a) Construct hard and soft coastal protection infrastructure that

      i) reduces coastal erosion;

      ii) increases resilience against storm surge during cyclone events;

      iii) increases resilience against sea flooding during king tides usually in February and March annually;

      iv) provide safety against sea level rise;

   b) provide training to local staff;

   c) provide scholarships for students wishing to undertake graduate and postgraduate studies in environmental science/management and climate change;

   d) encourage good management practices through planning, commitment and continuous improvement of environmental practices;

   e) comply with all applicable laws, regulations and standards for the protection of the environment; and

   f) adopt the best practicable means available to prevent or minimise environmental impact.

   g) describe all monitoring procedures required to identify impacts on the environment; and

   h) provide an overview of the obligations of DoE and UNDP staff and contractors in regard to environmental obligations.

9. The ESMP will be updated from time to time by the contractor in consultation with the UNDP staff and DoE to incorporate changes in the detailed design phase of the projects.

General Management Structure and Responsibilities

10. The UNDP and DoE are accountable for the provision of specialist advice on environmental issues to the contractor and for environmental monitoring and reporting. The DoE will assess the environmental performance of the contractor in charge of construction throughout the project and ensure compliance with the ESMP.

11. The DoE will be responsible for monitoring the implementation of the ESMP by relevant supervisory staff during construction. During operations the contractor will be accountable for implementation of the ESMP. Contractors working on the projects have accountability for preventing or minimising environmental and social impacts.

Administration

12. The DoE will be responsible for the revision or updates of this document during the course of work. It is the responsibility of the person to whom the document is issued to ensure it is updated.

13. The site supervisor will be responsible for daily environmental inspections of the construction site. The DoE will cross check these inspections by undertaking monthly audits.

14. The contractor will maintain and keep all administrative and environmental records which would include a log of complaints together with records of any measures taken to mitigate the cause of the complaints.

15. The contractor will be responsible for the day to day compliance of the ESMP.

16. DoE will be the implementing agency and will be responsible for the implementation and compliance with the ESMP via the contractor. The ESMP will be part of any tender documentation.

17. The Supervising Engineer/Project Manager will supervise the contractor, while the DoE will be responsible for environment and social issues.

Public Consultation and Environmental and Social Disclosure

18. The projects are designed to improve protection from sea level rise and cyclonic events. A number of proposed coastal protection areas have been established; however, during site selection, the project will ensure there are no resettlement issues. The ESIAs will also include public consultation as part of their stakeholder engagement plan and this information will be included in any modified ESMP.

19. The projects were discussed with DoE and the Office of the Prime Minister's staff. While no on ground consultation has been undertaken at this time, it is expected that consultation with affected communities will be undertaken when the detail design of the projects are available by DoE. It is anticipated that based on the communities' needs, the projects will be fully accepted.

20. The UNDP and DoE will develop and release Community Flyers on a regular basis to provide interested stakeholders with an update on the construction status of the projects. A publicised telephone number will be maintained throughout the construction of all projects to serve as a point of contact for enquiries, concerns and complaints. All enquiries, concerns and complaints will be recorded on a register and the appropriate manager will be informed. All material must be published in both Tuvaluan and English.

21. Where there is a community issue raised, the following information will be recorded:

    a) time, date and nature of enquiry, complaint or concern;

    b) type of communication (eg telephone, letter, personal contact);

    c) name, contact address and contact number;

    d) response and investigation undertaken as a result of the enquiry, complaint or concern; and

    e) actions taken and name of the person taking action.

22. Some enquiries, complaints and concerns may require an extended period to address. The complainant(s) will be kept informed of progress towards rectifying the concern. All enquiries, complaints and concerns will be investigated and a response given to the complainant in a timely manner.

23. A nominated contractor staff will be responsible for undertaking a review of all enquiries, complaints and concerns and ensuring progress toward resolution of each matter.

Site Supervisor

24. The site supervisor is responsible for ensuring compliance with the ESMP. The site supervisor will provide advice on effective environmental management of the project to the UNDP Staff, DoE and engineers and all construction site personnel. The site supervisor is to also ensure the environmental awareness of project personnel is maintained through appropriate training. A compliance report on mitigation measures will be submitted by the UNDP to DOE for the civil contractor. An independent review of the compliance may be undertaken during construction and post construction where deemed necessary.

Environmental Procedures and Site and Activity-Specific Work Plans/Instructions

25. Environmental procedures provide a written method describing how the management objectives for a particular environmental element are to be obtained. They contain the necessary detail to be site or activity-specific and are required to be followed for all construction works. Site and activity-specific work plans and instructions are to be issued through the following methods:

Environmental and Incident Reporting

26. Any incidents, including non-conformances to the procedures of the ESMP are to be recorded using an Incident Record and the details entered into a register. For any incident that causes or has the potential to cause material or serious environmental harm, the site supervisor shall notify DoE as soon as possible. The contractor must cease work until remediation has been completed as per the approval of DoE.

Daily and Weekly Environmental Inspection Checklists

27. A daily environmental checklist is to be completed at each work site by the relevant site supervisor and maintained within a register. The completed checklist is forwarded to DoE for review and follow-up if

any issues are identified. A weekly environmental checklist is to be completed and will include reference to any issues identified in the daily checklists completed by the Site Supervisors.

Corrective Actions

28. Any non-conformances to the ESMP are to be noted in weekly environmental inspections and logged into the register. Depending on the severity of the non- conformance, the site supervisor may specify a corrective action on the weekly site inspection report. The progress of all corrective actions will be tracked using the register. Any non-conformances and the issue of corrective actions are to be advised to DoE.

Complaints Register

29. A complaints register will be established to record any concerns raised by the community during construction. Any complaint will be advised to the UNDP and DoE within 24 hours of receiving the complaint. The complaint will be investigated and following the investigation, if it relates to a significant incident, the matter will be referred to the UNDP for commentary and/or advice.

Review and Auditing

30. The ESMP and its procedures are to be reviewed at least two month by UNDP staff and DoE. The objective of the review is to update the document to reflect knowledge gained during the course of construction operations and to reflect new knowledge and changed community standards (values). Any changes are to be developed and implemented in consultation with UNDP Staff and DoE. When an update is made, all site personnel are to be made aware of the revision immediately through a tool box meeting.

Training of Contractors

31. The main contractor has the responsibility for ensuring systems are in place so that relevant employees, contractors and sub-contractors are aware of the environmental and social requirements for construction, including the ESMP.

32. All construction personnel will attend an induction which covers health, safety, environment and cultural requirements.

33. All staff and contractors engaged in any activity with the potential to cause serious environmental harm (e.g. handling of hazardous materials) will receive task specific environmental training.

Key Environmental and Social Indicators

34. This section identifies the Key Environmental and Social Indicators identified for the project and outlines respective management objectives, potential impacts, control activities and the environmental performance criteria against which these indicators will be judged (i.e. auditable). This section further addresses the need for monitoring and reporting of environmental performance with the aim of communicating the success and failures of control procedures, distinguish issues which require rectification and identify measures which will provide continuous improvement in the processes by which the projects are managed.

Water Quality

35. The projects involve the construction of coastal protection infrastructure to reduce inundation of the islands of Tuvalu as well as reducing coastal erosion.

36. On Funafuti, the domestic sewage (fecal and non-fecal wastewater) is currently seeping into the groundwater, either untreated or only after simple treatment or being moved into coastal waters. The JICA study found that nitrogen and phosphorous concentrations are higher than water quality criteria and threshold values of eutrophication near the coast on lagoon side, raising concerns about the influence of eutrophication, although the chlorophyll-a concentration was ≤0.05µg/l or 0.1 to 0.2µg/l in the overall for the area, suggesting that eutrophication has not reached a level where it influences the growth of coral. .

37. The coastal protection infrastructure will result in the movement of sediment during construction into the marine environment. While it is assumed that none of the coastal protection infrastructure will be constructed in protected and/or pristine environments, there is a necessity to maintain appropriate water quality standards within these environments when undertaking the construction of the coastal protection infrastructure.

38. The construction of coastal protection infrastructure could also result in changes to small and medium scale hydrodynamic processes that could result in changes to water quality within specific locations. Prior to final design and construction, it will be necessary to undertake modelling to ensure that any impacts are mitigated.

39. Separately, there is the potential for the release of acid sulfate soils into the marine environment should they be disturbed during the construction of coastal protection infrastructure.

Performance Criteria

40. The following performance criteria are set for the construction of the projects:

    a) no significant decrease in water quality of the coastal marine environment as a result of construction activities;

    b) no significant decrease in water quality as a result of dredging activities;

    c) no overflow during dredging activities;

    d) no significant decrease in the quality and quantity of surface water as a result of construction activities in proximity to the projects;

    e) water quality shall conform to any approval conditions stipulated by UNDP, DoE and/or other government departments, or in the absence of such conditions follow a ‘no worsening’ methodology;

    f) no offsite impact will occur through the release of sediment into the marine environment; and

    g) effective implementation of site-specific Erosion, Drainage and Sediment Control Plan (EDSCP).

41. By following the management measures set out in the ESMP, the construction of coastal protection infrastructure will not have a significant impact on water quality across the broader area.

Monitoring

42. A standardised water quality monitoring program has been developed for the projects. The program is subject to review and update at least every two months from the date of issue. The site supervisor will be required to conduct a daily visual inspection for acid sulfate soil release and turbidity within or adjacent to their work area as a part of the daily site inspection checklist.

Reporting

43. All water quality monitoring results and/or incidents will be tabulated and reported as outlined in the ESMP. The DoE must be notified immediately in the event of any suspected instances of material or serious environmental harm, or if a determined level with respect to water quality is exceeded.

Table 1: Water Quality Management Measures

Issue	Control Activity (and Source)	Action Timing	Responsibility	Monitoring and Reporting
W1: Elevated turbidity in coastal environments.	W1.1: Develop and implement a site specific Erosion, Drainage and Sediment Control Plan (EDSCP) to address drainage control, sediment and erosion controls and stockpiling of materials including soil during construction of all components of the project. EDSCP measures to be inspected regularly to ensure all devices are functioning effectively.	Pre Earthworks	Site Supervisor	Initial set up and then as required with reporting to DoE and UNDP
	W1.2: Designated areas for storage of fuels, oils, chemicals or other hazardous liquids should have compacted impermeable bases and be surrounded by a bund to contain any spillage.	Entire construction phase	All Personnel	Weekly with reporting to DoE and UNDP
	W1.3: Conduct regular surface water quality monitoring in location where the groundwater is likely to be impacted including assessing the changes to marine water quality in terms of salinity, nitrates, phosphate and other potential pollutants.	Entire construction phase	Site Supervisor	Twice weekly with reporting to DoE and UNDP
	W1.4: Schedule works in stages to ensure that disturbed terrestrial and littoral zone areas are revegetated and stabilised progressively and as soon as practicable after completion of works.	No works during wet season	Site Supervisor and DoE	Maintain records
	W1.5: Construction materials will not be stockpiled in proximity to the recharge locations and or the coastal environment that may allow for release into the marine environment. Construction equipment will be removed from in proximity to the coastal environment at the end of each working day or if heavy rainfall is predicted.	Entire construction phase	Site Supervisor	Maintain daily records
	W1.6 Minimise the release of clays and very fine silts into the coastal environment through the installation of sediment basins, rock checks and sediment fences in appropriate places as outlined in the EDSCPs.	Entire construction phase	Site Supervisor	Maintain daily records
	W1.7 Disturbance of vegetation to be limited to that required for construction works	Entire construction phase	All Personnel	Weekly with reporting to DoE and UNDP

Issue	Control Activity (and Source)	Action Timing	Responsibility	Monitoring and Reporting
W2: Increase of gross pollutants, hydrocarbons, metals and other chemical pollutants into the marine environment.	W2.1: Reuse suitable water runoff from site to supplement construction water supply.	All phases	All Personnel	Weekly with reporting to DoE and UNDP
	W2.2: Designated areas for storage of fuels, oils, chemicals or other hazardous liquids should: 1. Have compacted impermeable bases; and 2. Surrounded by a bund to contain any spillage.	All phases	All Personnel	Weekly with reporting to DoE and UNDP
	W2.3: Check all vehicles, equipment and material storage areas daily for possible fuel, oil and chemical leaks.	All phases	All Personnel	Daily and maintain records
	W2.4: Rubbish and waste materials to be placed in suitable facilities to ensure that they do not enter the coastal environment. Ensure all absorbent material is placed in contaminant bags prior to removal.	All phases	All Personnel	Weekly reporting to DoE and UNDP
	W2.5: Minimise the use of herbicides and use only biodegradable herbicides that have minimal impact on water quality and fauna.	All phases	All personnel	Maintain records
W3: Elevated turbidity in marine environments	W3.1 Conduct dredging with no overflow to ensure limited impacts from turbidity from dredging	All dredging phase	All Personnel	Weekly with reporting to DoE and UNDP
	W3.2 Conduct water quality monitoring (based on appropriate baseline data) and monitor immediately prior to, during and following the dredging campaign. Monitoring should include pH, turbidity, light, sediment deposition, total suspended solids, Chlorophyll *a*, total and dissolved metals across the depth profile	All dredging phase	All Personnel	Daily and maintain records
	W3.3 Conduct dredging during periods when corals are not spawning, seagrasses (if present) are not growing and propagating, and during nesting seasons for turtles (if present)	All dredging phase	All Personnel	Maintain records

Erosion, Drainage and Sediment Control

44. Tuvalu consists of three reef islands and six true atolls, whose highest point above the sea is five metres. Early geological investigations of the Tuvalu were driven by the debate over concepts relating to the long-term development of mid-ocean coral atolls and Dawin's subsidence theory. Drilling exploration at Funafuti from 1896 to 1898 resulted in 340 m long cores comprising shallow-water carbonates (over 500 metres deep) over a basement volcanic material. Phosphatic limestones have also been observed in Tuvalu.

45. The geology of Funafuti, including its lagoonal sediments, reefs, submarine topography, stratigraphy and deep structure and composition were described in some detail following three coral reef boring expeditions mounted by the Royal Society in 1896, 1897 and 1898, and a fourth visit by Professor Agassiz of Harvard in 1899.

46. Numerous climate change reports have discussed the growing of mangroves on Tuvalu including an FAO report that indicated that Funafuti has got a small mangrove swamp inside the main islet; some other inland mangroves also occur on Niutao and Nanumanga. Mangroves in Vaitupu which are cut off from the sea reach six metres in height. The total area of mangroves is estimated at 40 hectares. The main true mangrove species found in this archipelago are *Lumnitzera littorea* and *Rhizophora stylosa*.

47. While no mangroves have been observed previously in locations where the projects are to be undertaken (mangroves grow in other locations in Tuvalu), there is the limited potential that acid sulfate soils occur. To ensure that acid sulfate soils are not exposed, it is prudent to assume there is the potential (albeit unlikely) for acid sulfate soils and/or potential acid sulfate soils to occur as would normally be observed in areas of mangrove.

48. Deposits of acid sulfate soils are commonly found less than five metres ASL, particularly in low-lying coastal areas which is where all the projects will occur. Mangroves, salt marshes, floodplains, swamps, wetlands, estuaries and brackish or tidal lakes are ideal areas for ASS formation and therefore there is the potential for it to observe in the two project locations.

49. Mitigative controls could potentially be required for the management of acid sulfate soils and/or potential acid sulfate soils during any excavation works due to their locations close to coastal areas. Acid sulfate soils are naturally occurring soils, sediments or organic substrates that are formed under waterlogged conditions. Deposits of acid sulfate soils are commonly found in less than five metres ASL, particularly in low-lying coastal areas. Mangroves, salt marshes, floodplains, swamps, wetlands, estuaries and brackish or tidal lakes are ideal areas for acid sulfate soil formation. The presence of acid sulfate soils may not be obvious on the soil surface as they are often buried beneath layers of more recently deposited soils and sediments of alluvial or aeolian origin. These soils contain iron sulfide minerals (predominantly as the mineral pyrite) or their oxidation products. In an undisturbed state below the water table, acid sulfate soils are benign. However if the soils are drained, excavated or exposed to air by a lowering of the water table, the sulfides react with oxygen to form sulfuric acid. The release of this sulfuric acid from the soil can in turn release iron, aluminium and other heavy metals (particularly arsenic) within the soil. Once mobilised, the acid and metals can create a variety of adverse impacts including killing vegetation, seeping into and acidifying groundwater and water bodies, killing fish and other aquatic organisms and degrading concrete and steel structures to the point of failure.

50. Prior to any excavation, sediments should be tested for their presence of ASS or PASS using a simple acid test analysis. Sampling should be undertaken consistent with that proposed by the Queensland Acid Sulfate Soils Investigation Team as described in Ahern *et al* (1998) and laboratory analysis consistent with Ahern *et al* (2004). If the analysis proves positive, the sediment can be treated by a range of techniques including but not limited to liming the sediment. The contractor should refer to management measures provided by for example by Dear *et al* (2002) to mitigate the impacts. Of critical importance for ground water quality especially as this is one of the sources of water in Tuvalu, one of the most significant impacts is via infiltration into the water table from an acid sulfate soils stockpiling/treatment area. To reduce this impact, a compacted clay liner should be developed including where possible limed clay although this may reduce the efficiency of compaction and hence increase the permeability of the liner. Every effort should be made to ensure there is no direct or residual impact following treatment.

Performance Criteria

51. The following performance criteria are set for the construction of the projects:

    a. no build-up of sediment in the coastal marine environment and or groundwater as a result of construction activities;

    b. no degradation of water quality on or off site of all projects;

    c. all water exiting the project area and/or into groundwater systems is to have passed through best practice erosion, drainage and sediment controls;

    d. no changes to coastal and marine processes from dredging;

    e. no changes to existing erosion or sediment deposition regimes from the taking of sediment from the coastal zone;

    f. ensure no release of acid sulfate soils if they are present; and

    g. effective implementation of site-specific EDSCP.

52. By following the management measures set out in the ESMP, construction activities of the projects will not have a significant impact as a result of sedimentation across the broader area.

Monitoring

53. A standardised sediment control monitoring program has been developed for the projects. The program is subject to review and update at least every two months from the date of issue. The site supervisor will be required to:

    a. conduct site inspections on a weekly basis or after rainfall events exceeding 20mm in a 24 hour period;

    b. develop a site-specific checklist to document non-conformances to this ESMP or any applicable EDSCPs; and

    c. communicate the results of inspections and/or water quality testing to the Site Supervisor and ensure that any issues associated with control failures are rapidly rectified and processes are put in place to ensure that similar failures are not repeated.

54. It is the responsibility of the site supervisor to:

    a. conduct daily inspections of EDS control measures as part of the Daily Check Procedure; and

    b. consult DoE and UNDP staff when a non-conformance is suspected and amend accordingly.

Reporting

55. All sediment and erosion control monitoring results and/or incidents will be tabulated and reported as outlined in the ESMP. The DoE must be notified immediately in the event of any suspected instances of material or serious environmental harm, or if a determined level with respect to erosion and sediment control is exceeded.

Table 2: Erosion, Drainage, Sediment Control Measures

Issue	Control Activity (and Source)	Action Timing	Responsibility	Monitoring and Reporting
E1: Loss of soil material and sedimentation to the marine environment and/or groundwater systems from site due to earthwork activities	E1.1: Develop and implement an EDSCP for any surface works, embankments and excavation work, water crossings and stormwater pathways.	Entire construction phase	All Personnel	Maintain records
	E1.2: Ensure that erosion and sediment control devices are installed, inspected and maintained as required.	Entire construction phase	All Personnel	Maintain records
	E1.3: Schedule/stage works to minimise cleared areas and exposed soils at all times.	Pre and during construction	Site Supervisor	Maintain records
	E1.4: Incorporate the design and location of temporary and permanent EDSC measures for all exposed areas and along the littoral zone. These shall be implemented prior to pre-construction activities and shall remain onsite during work	Pre and during construction	Site Supervisor	Maintain records
	E1.5: Schedule/stage proposed works to ensure that major vegetation disturbance and earthworks are carried out during periods of lower rainfall and wind speeds.	Pre and during construction	Site Supervisor	Maintain records
	E1.6: Strip and stockpile topsoil for use during revegetation.	Pre and during construction	Site Supervisor	Maintain records
	E1.7: Schedule/stage works to minimise the duration of stockpiling topsoil material	During construction	All Personnel	Maintain records
	E1.8: Locate stockpile areas away from sensitive locations.	Pre and during construction	Site Supervisor	Maintain records
	E1.9: Design stormwater management measures to reduce flow velocities and avoid concentrating runoff.	Pre and during construction	Site Supervisor	Maintain records

Issue	Control Activity (and Source)	Action Timing	Responsibility	Monitoring and Reporting
	E1.10: Include check dams in drainage lines where necessary to reduce flow velocities and provide some filtration of sediment.	Pre and during construction	Site Supervisor	Maintain records
	E1.11: Mulching shall be used as a form of erosion and sediment control (dependent on site selection), include extra sediment fencing during high rainfall.	During construction	All Personnel	Maintain records
	E1.12: Bunding shall be used around sensitive/dangerous goods as necessary.	During construction	All Personnel	Maintain records
	E1.14: Grassed buffer strips shall be incorporated where necessary during construction to reduce water velocity were applicable.	During construction	Site Supervisor	Maintain records
	E1.15: Silt curtain to be installed to protect from increased sediment loads.	During construction	Contractors	Maintain records
	E1.16: Excess sediment in all erosion and sediment control structures (eg. Sediment basins, check dams) shall be removed when necessary to allow for adequate holding capacity.	During construction	Contractors	Maintain records
E2: Soil contamination	E2.1: If contamination such as acid sulfate soils is uncovered or suspected (outside of the project footprints), undertake a Stage 1 preliminary site contamination investigation. The contractor should cease work if previously unidentified contamination is encountered and activate management procedures and obtain advice/permits/approval (as required).	Entire construction phase	All Personnel	Daily and maintain records
	E2.2: Adherence to best practice for the removal and disposal of contaminated soil/ material from site (if required), including contaminated soil within the project footprints.	Entire construction phase	All Personnel	Daily and maintain records
	E2.3: Drainage control measures to ensure runoff does not contact contaminated areas (including contaminated material within the project foot prints) and is directed/diverted to stable areas for release.	Entire construction phase	All Personnel	Daily and maintain records

Issue	Control Activity (and Source)	Action Timing	Responsibility	Monitoring and Reporting
	E2.4: Avoid importing fill that may result in site contamination and lacks accompanying certification/documentation. Where fill is not available through on site cut, it must be tested in accordance with geotechnical specifications.	Entire construction phase	All Personnel	Daily and maintain records
E3 Changes in hydrodynamic processes as a result of dredging	E3.1 Ensure no increased erosion of deposition occurs as a result of dredging	All dredging phase	All Personnel	Weekly with reporting to DoE and UNDP
	E3.1 Ensure no long term changes in hydrodynamic processes as a result of dredging	All dredging phase	All Personnel	Weekly with reporting to DoE and UNDP

Noise and Vibration

56. All construction activities have the potential to cause noise nuisance. Vibration disturbance to nearby residents and sensitive habitats is likely to be caused through the use of vibrating equipment. Blasting is not required to be undertaken as part of this project. Further, the dumping of rock for the coastal protection infrastructure will be excessive both terrestrially and more so in the marine environment.

57. It is assumed that there are no sensitive receptors in proximity to the projects.

58. Contractors involved in construction activities should be familiar with methods of controlling noisy machines and alternative construction procedures as contained within specific Tuvalu legislation or in its absence, international good practice may be used if the legislation has not been enacted.

59. The detail, typical equipment sound power levels, provides advice on project supervision and gives guidance noise reduction. Potential noise sources during dredging and construction may include:

    a. excavation equipment for all aspects of the projects;

    b. dredging noise;

    c. dumping of rock or the filling of sand bags;

    d. delivery vehicles; and

    e. power tools and compressors.

Performance Criteria

60. The following performance criteria are set for the construction of the projects:

    a. noise from construction activities must not cause an environmental nuisance at any noise sensitive place;

    b. undertake measures at all times to assist in minimising the noise associated with construction activities;

    c. no damage to off-site property caused by vibration from construction and operation activities;

    d. no impact to marine species as a result of dredging and/or the construction of the coastal protection infrastructure; and

    e. corrective action to respond to complaints is to occur within 48 hours.

Monitoring

61. A standardised noise monitoring program has been developed for the projects. The program is subject to review and update at least every two months from the date of issue. Importantly, the site supervisor will:

    a. ensure equipment and machinery is regularly maintained and appropriately operated; and

    b. carry out potentially noisy construction activities during daylight hours only; i.e. 7am -5pm.

Reporting

62. All noise monitoring results and/or incidents will be tabulated and reported as outlined in the ESMP. The DoE must be notified immediately in the event of any suspected instances of material or serious environmental harm, or if a determined level with respect to noise is exceeded.

Table 3: Noise and Vibration Management Measures

Issue	Control Activity (and Source)	Action Timing	Responsibility	Monitoring and Reporting
N1: Increased noise levels	N1.1: Select plant and equipment and specific design work practices to ensure that noise emissions are minimised during construction and operation including all pumping equipment.	All phases	Contractor	Maintain records
	N1.2: Specific noise reduction devices such as silencers, mufflers and/or acoustic rock breaking heads shall be installed as appropriate to site plant and equipment.	Pre and during construction	Contractor	Maintain records
	N1.3 Minimise the need for and limit the emissions as far as practicable if noise generating construction works are to be carried out outside of the hours: 7am-5pm (Mon - Fri).	Construction phase	All Personnel	Daily and maintain records
	N1.4: Consultation with nearby residents in advance of construction activities particularly if noise generating construction activities are to be carried out outside of the hours: 7am-5pm (Mon - Fri) and 7am-3pm (Sat).	Construction phase	All Personnel	Daily and maintain records
	N1.5 The use of substitution control strategies shall be implemented, whereby excessive noise generating equipment items onsite are replaced with other alternatives.	Construction phase	All Personnel	Daily and maintain records
	N1.6 Provide temporary construction noise barriers in the form of solid hoardings where there may be an impact on specific residents.	Construction phase	Site Supervisor	Daily and maintain records
	N1.7 All incidents complaints and non-compliances related to noise shall be reported in accordance with the site incident reporting procedures and summarised in the register.	Construction phase	Site Supervisor	Maintain records
	N1.8 The contractor should conduct employee and operator training to improve awareness of the need to minimise excessive noise in work practices through implementation of measures.	Pre and during construction	Contractor	Maintain records
N2. Vibration due to construction	N2.1: Identify properties, structures and habitat locations that will be sensitive to vibration impacts resulting from construction and operation of the projects.	Pre and during construction	Contractor	Maintain records
	N2.2: Design to give due regard to temporary and permanent mitigation measures for noise and vibration from construction and operational vibration impacts.	Pre-construction	Contractor	Maintain records

Issue	Control Activity (and Source)	Action Timing	Responsibility	Monitoring and Reporting
	N2.3: All incidents, complaints and con-compliances related to vibration shall be reported in accordance with the site incident reporting procedures and summarised in the register.	Construction phase	Site Supervisor	Maintain records
	N2.4: During construction, standard measure shall be taken to locate and protect underground services from construction and operational vibration impacts	Construction phase	Site Supervisor	Maintain records

Air Quality

63. All construction activities have the potential to cause air quality nuisance, particularly when dumping rock on soft sediments.

64. Vibration disturbance to nearby residents is likely to be caused through the use of vibrating rollers, graders and construction traffic. Blasting is not required to be undertaken as part of this project.

65. It is assumed that there are no sensitive receptors in proximity to the projects.

66. Contractors involved in construction and operation activities should be familiar with methods minimising the impacts of deleterious air quality and alternative construction procedures as contained in the Tuvalu legislation.

Performance Criteria

67. The following performance criteria are set for the construction of the projects:

    a. release of dust/particle matter must not cause an environmental nuisance;

    b. undertake measures at all times to assist in minimising the air quality impacts associated with construction and operation activities; and

    c. corrective action to respond to complaints is to occur within 48 hours.

Monitoring

68. A standardised air monitoring program has been developed for the projects. The program is subject to review and update at least every two months from the date of issue. Importantly, the site supervisor will:

    a. ensure all stockpiles are covered so as to not allow dust to generate; and

    b. the requirement for dust suppression will be visually observed by all personnel daily and by DoE and UNDP staff when undertaking routine site inspections (minimum frequency of once per week).

Reporting

69. All air quality monitoring results and/or incidents will be tabulated and reported as outlined in the ESMP. The DoE must be notified immediately in the event of any suspected instances of material or serious environmental harm, or if a determined level with respect to air quality is exceeded.

Table 4: Air Quality Management Measures

Issue	Control Activity (and Source)	Action Timing	Responsibility	Monitoring and Reporting
A1: Increase in dust levels at sensitive locations	A1.1: Implement effective dust management measures in all areas during design, construction and operation.	Pre and during construction	All Personnel	Daily and maintain records
	A1.2: Install dust gauges at locations identified for construction lay down and stockpiling within the project footprints.	During construction	Site Supervisor	Daily and Weekly Reports
	A1.3: Manage dust/particulate matter generating activities to ensure that emissions do not cause an environmental nuisance at any sensitive locations	During construction	Site Supervisor	Daily and maintain records
	A1.4: Construction activities should minimising risks associated with climatic events.	During construction	Site Supervisor	Daily and maintain records
	A1.5: Implement scheduling/staging of proposed works to ensure major vegetation disturbance and earthworks are minimised.	Entire construction	Contractor	Daily and maintain records
	A1.6: Ensure that materials to be stockpiled onsite are not ordered and/or purchased until they are required for works.	Entire construction	Contractor	Daily and maintain records
	A1.7: Locate material stockpile areas as far as practicable from sensitive receptors.	During construction	Site Supervisor	Daily and maintain records
	A1.8: Source sufficient water of a suitable quality for dust suppression activities complying with any water restrictions.	During construction	Site Supervisor	Daily and maintain records
	A1.9: Schedule revegetation activities to ensure optimum survival of vegetation species.	During construction	Site Supervisor	Maintain records
	A1.10: Ensure an air quality management plan is developed and implemented.	Pre and during construction	Contractor	Maintain records
	A1.11: Rubbish skips and receptacles should be covered and located as far as practicable from sensitive locations.	During construction	Site Supervisor	Maintain records
	A1.12: Restrict speeds on access tracks.	During construction	Site Supervisor	Daily and maintain records
	A1.13: Cover loads of haul trucks and equipment and plant when not in use and in transit.	During construction	Site Supervisor	Daily and maintain records

Issue	Control Activity (and Source)	Action Timing	Responsibility	Monitoring and Reporting
A2. Increase in vehicle emissions (including odours and fumes)	A2.1 Ensure construction vehicles are switched off when not in use.	During construction	Site Supervisor	Daily and maintain records
	A2.2 Ensure only vehicles required to undertake works are operated onsite.	During construction	Site Supervisor	Daily and maintain records
	A2.3 Ensure all construction vehicles, plant and machinery are maintained and operated in accordance with design standards and specifications.	During construction	Site Supervisor	Daily and maintain records
	A2.4 Develop and implement an induction program for all site personnel, which includes as a minimum an outline of the minimum requirements for environmental management relating to the site.	Pre and during construction	Contractor	Daily and maintain records
	A2.5 Locate construction car park and vehicle/plant/equipment storage areas as far as practicable from sensitive locations.	During construction	Site Supervisor	Daily and maintain records
	A2.6 Direct exhaust emissions of mobile plant away from the ground.	During construction	Site Supervisor	Daily and maintain records
	A2.7 Rubbish skips and receptacles should be covered and located as far as practicable from sensitive locations.	During construction	Site Supervisor	Daily and maintain records

Flora and Fauna

70. It is assumed that the majority of the project areas have been previously disturbed although vegetation may still exist. Further, it is assumed that the coastal protection infrastructure will be located in areas that do not contain important marine habitats.

71. There are a number of important marine programs that exist in Tuvalu including the Pacific Oceanscape Framework.

72. Of the 442 marine species found in Tuvalu, 83 are listed to be threatened (one of which is endangered and 79 listed as vulnerable species). The JICA report indicated that there is approximately 50% coral cover within the area. These coral reefs provide coastal protection thru reducing wave fetch as well as supply sand to the region. The JICA report did not identify any specifically important habitats that are not consistently found across the whole of Tuvalu.

73. Contractors involved in construction activities should be familiar with methods minimising the impacts of clearing vegetation to minimise the footprints of all projects to that essential for the works and rehabilitate disturbed areas. By doing these activities, the projects should minimise the impact upon terrestrial and marine flora and fauna where ever practical.

Performance Criteria

74. The following performance criteria are set for the construction of the projects:

    a. no clearance of vegetation outside of the designated clearing boundaries;

    b. no death to native fauna as a result of clearing activities;

    c. no loss of important seagrass meadows;

    d. no deleterious impacts on marine habitats;

    e. no loss of important fisheries habitats;

    f. no impacts to important marine species during dredging;

    g. installation of a turtle exclusion device on the dredge;

    h. no introduction of *new* weed species as a result of construction activities;

    i. no increase in *existing* weed proliferation within or outside of the corridor as a result of construction activities; and

    j. successful establishment of rehabilitation works incorporating species native to the local area.

Monitoring

75. A flora and fauna monitoring program has been developed for the projects. The program is subject to review and update at least every two months from the date of issue. Importantly, the site supervisor will when undertaking clearing works, will compile a weekly report to DoE and UNDP staff outlining:

    a. any non-conformances to this ESMP;

    b. the areas that have been rehabilitated during the preceding week; and

    c. details of the corrective action undertaken.

Reporting

76. All flora and fauna monitoring results and/or incidents will be tabulated and reported as outlined in the ESMP. The DoE must be notified immediately in the event of any suspected instances of death to fauna and where vegetation if detrimental impacted.

Table 5: Flora and Fauna Management Measures

Issue	Control Activity (and Source)	Action Timing	Responsibility	Monitoring and Reporting
FF1. Marine habitat loss and disturbance of fauna	FF1.1 Limit vegetation clearing and minimise habitat disturbance through adequate protection and management of retained vegetation.	During construction	Site Supervisor	Daily and maintain records
	FF1.2: Minimise noise levels and lighting intrusion throughout construction in the vicinity of any sensitive locations.	During construction	Site Supervisor	Daily and maintain records
	FF1.3: Ensure that all site personnel are made aware of sensitive fauna/habitat areas and the requirements for the protection of these areas.	During construction	Contractor	Daily and maintain records
	FF1.4 Minimise disturbance to onsite fauna and recover and rescue any injured or orphaned fauna during construction.	During construction	Contractor	Daily and maintain records, report to DoE
	FF1.5 Conduct visual checks to inform of any megafauna in the path of vessel movement – alter speed and/or direction of travel to avoid interaction	All dredging phase	All Personnel	Weekly with reporting to DoE and UNDP
	FF1.6 Implement a marine megafauna exclusion zone (100 metres from dredge)	All dredging phase	All Personnel	Weekly with reporting to DoE and UNDP
	FF1.7 No dredging during for example, nesting seasons or during whale migration	All dredging phase	All Personnel	Weekly with reporting to DoE and UNDP
	FF1.8 Use a turtle exclusion device on dredge suction head	All dredging phase	All Personnel	Daily and maintain records
	FF 1.9 Conduct dredging during periods when corals are not spawning, seagrasses (if present) are not growing and propagating, and during nesting seasons for turtles (if present)	All dredging phase	All Personnel	Weekly with reporting to DoE and UNDP
	FF2.1: Implement an EDSCP to reduce the spread of weeds through erosion and sediment entering any waterways and therefore spreading.	Pre and during construction	Contractor	Maintain records

Issue	Control Activity (and Source)	Action Timing	Responsibility	Monitoring and Reporting
FF2. Introduced flora and weed species	FF2.2: Revegetate disturbed areas using native and locally endemic species that have high habitat value.	During construction	Site Supervisor	As required and maintain records
	FF2.3: Minimise disturbance to mature remnant vegetation, particularly canopy trees.	During construction	Site Supervisor	Daily and maintain records
	FF2.4: The removal of regrowth native trees should be minimised particularly where the width of a forest is narrow.	During construction	Site Supervisor	Daily and maintain records
	FF2.5: Small trees and shrubs shall be removed in preference to large trees.	During construction	Site Supervisor	Daily and maintain records
	FF2.6: Vegetation to be removed shall be clearly marked using paint or flagging tape.	During construction	Site Supervisor	Daily and maintain records
	FF2.7: Environmental weeds and noxious weeds within the project footprints shall be controlled.	During and post construction	Site Supervisor	Weekly and maintain records

Waste Management

77. The DoE advocate good waste management practice. The preferred waste management hierarchy and principles for achieving good waste management is as follows:

    a. waste avoidance(avoid using unnecessary material on the projects) ;

    b. waste re-use (re-use material and reduce disposing);

    c. waste recycling(recycle material such as cans, bottles, etc.; and

    d. waste disposal (all petruscible to be dumped at approved landfills).

78. The key waste streams generated during construction are likely to include additional rock, damaged sand bags although this is anticipated to be minimal. The wastes to be generated will mostly be vegetation-based and also include:

    a. the excavation wastes unsuitable for reuse during earthworks;

    b. wastes from construction equipment maintenance. Various heavy vehicles and construction equipment will be utilised for the duration of the construction phase. Liquid hazardous wastes from cleaning, repairing and maintenance of this equipment may be generated. Likewise leakage or spillage of fuels/oils within the site needs to be managed and disposed of appropriately;

    c. non-hazardous liquid wastes will be generated through the use of workers' facilities such as toilets; and

    d. general wastes including scrap materials and biodegradable wastes

79. Contractors involved in construction and operational activities should be familiar with methods minimising the impacts of clearing vegetation to minimise the footprint to that essential for the works and rehabilitate disturbed areas. By doing these activities, the projects should minimise the impact of waste generated by the project.

Performance Criteria

80. The following performance criteria are set for the construction of the projects:

    a. waste generation is minimised through the implementation of the waste hierarchy (avoidance, reduce, reuse, recycle);

    b. no litter will be observed within the project footprint or surrounds as a result of activities by site personnel;

    c. no waste to be disposed at sea during dredging activities;

    d. no complaints received regarding waste generation and management;

    e. any waste from on-site portable sanitary facilities will be sent off site for disposal by a waste licensed contractor; and

    f. waste oils obtained from the oil separator will be collected and disposed or recycled off-site, local oil companies or shipped for recycling.

Monitoring

81. A waste management monitoring program has been developed for the projects. The program is subject to review and update at least every two months from the date of issue.

Reporting

82. The DoE must be notified immediately in the event of any suspected instances of material or serious environmental harm, or if a determined level with respect to waste is exceeded.

Table 6: Waste Management Measures

Issue	Control Activity (and Source)	Action Timing	Responsibility	Monitoring and Reporting
WT1: Production of wastes and excessive use of resources	WT1.1: Preference shall be given to materials that can be used to construct the project that would reduce the direct and indirect waste generated.	Pre and during construction	Contractor	Maintain records
	WT1.2: Consideration shall be given to the use of recycled aggregates and fly-ash cement mixes for construction of the coastal protection infrastructure.	Pre and during construction	Contractor	Maintain records
	WT1.3: Daily waste practices shall be carried out unless these are delegated to the activities of external waste management bodies.	During construction	Site Supervisor	Daily and maintain records
	WT1.4: The use of construction materials shall be optimised and where possible a recycling policy adopted.	During construction	Site Supervisor	Weekly and maintain records
	WT1.5: Separate waste streams shall be maintained at all times i.e. general domestic waste, construction waste and contaminated waste. Specific areas on site shall be designated for the temporary management of the various waste streams. Adequate signage and colour coded bins will be used for each waste streams.	During construction	Site Supervisor	Weekly and maintain records
	WT1.6: Any contaminated waste shall be disposed of at an approved landfill.	During construction	Site Supervisor	Weekly and maintain records
	WT1.7: Recyclable waste (including oil and some construction waste) shall be collected separately and disposed of correctly.	During construction	Site Supervisor	Weekly and maintain records
	WT1.8: Waste sites shall be sufficiently covered daily to ensure that wildlife does not have access.	During construction	Site Supervisor	Daily
	WT1.9: Disposal of waste including all filters shall be carried out in accordance with the Government of Tuvalu requirements.	During construction	Site Supervisor	Weekly and maintain records
	WT1.10: Fuel and lubricant leakages from vehicles and plant shall be immediately rectified.	During construction	Site Supervisor	Daily and maintain records
	WT1.11: Where possible, concrete batching plants shall be centrally located to minimise the occurrence of concrete batching at individual construction locations.	Pre and during construction	Contractor	Maintain records
	WT1.12: Major maintenance and repairs shall be carried out off-site whenever practicable.	During construction	Site Supervisor	Weekly and maintain records

Issue	Control Activity (and Source)	Action Timing	Responsibility	Monitoring and Reporting
	WT1.13: Remnants of concrete shall not be left at any location along the corridor.	During Construction	Site Supervisor	Weekly and maintain records
	WT1.14: Disposal of trees shall be undertaken in accordance with one or more of the following methods: a. Left in place; b. Chipped and mulched; and c. Large trunk sections may be sold/passed on to a commercial mill.	During Construction	Site Supervisor	Weekly and maintain records
	WT1.15: Hydrocarbon wastes shall be stored in colour coded and labelled drums placed around fuelling depots.	During Construction	Site Supervisor	Daily and maintain records
	WT1.16: Where possible, fuel and chemical storage and handling shall be undertaken at central fuel and chemical storage facilities, such as petrol stations.	During Construction	Site Supervisor	Daily and maintain records
	WT1.17: On-site storage of fuel and chemicals shall be kept to a minimum.	During Construction	Contractor	Daily, maintain records and report any incidents
	WT1.18: Any waste oils and lubricants are to be collected and transported to recyclers or designated disposal sites as soon as possible.	During Construction	Site Supervisor	Daily and maintain records
	WT1.19: Any dangerous goods stored on site shall be stored in accordance with Tuvalu regulations.	During Construction	Contractor	Daily and maintain records

Chemical and Fuel Management

83. The key types of chemicals and fuels likely to be stored on-site during construction include but are not limited to diesel and unleaded petrol for the refuelling of plant equipment and generators.

84. If not handled, stored or used appropriately, contamination of land and the coastal marine environment and groundwater systems could occur. The accidental discharge of hazardous materials during construction activities is a potential risk to the local environment. Accordingly, all oil, grease, diesel, petrol and chemicals should be stored off site within a bunded area.

85. Potential activities which could result in spills are:

    a. use of machinery and vehicles – potential for fuels, oils and lubricant spills;

    b. transport, storage and handling of fuels, machinery oils, grease;

    c. transport, storage and handling of cement/asphalt(bitumen) and other construction materials; and

    d. Impacts associated with hazardous materials will primarily be associated with the storage and handling during the construction and operation phase.

Performance Criteria

86. The following performance criteria are set for the construction of the projects:

    a. ensure a Material Safety Data Sheet (MSDS) Register should be developed for all chemicals and fuels retained on site;

    b. handling and storage of hazardous material is in accordance with the relevant legislation and best management practices;

    c. all spills are reported to DoE within ***one hour*** of occurrence; and

    d. no spills enter the local estuarine and/or coastal environment; and

    e. prevent the uncontrolled release of oil, grease and diesel to the environment;

    f. no spills of hazardous materials;

    g. no chemical spills into the groundwater aquifers; and

    h. no contamination of land due to spills of hazardous materials.

Monitoring

87. A chemical and fuel management program has been developed for the projects. The program is subject to review and update at least every two months from the date of issue. Importantly, the site supervisor should:

    a. conducted daily chemical and fuel assessments as part of their daily check procedure;

    b. manage the selection, purchase, storage, handling and disposal of chemicals to ensure minimal environmental impact;

    c. regularly inspect equipment that uses fuel, lubricants and/or hydraulic fluid;

    d. develop procedures and install equipment to contain, minimise and recover spills; and

    e. provide staff with procedures and training in spill prevention and clean up.

Reporting

88. The DoE must be notified immediately in the event of any suspected instances of material or serious environmental harm, or if a determined level as a result of a chemical or fuel leak or spill.

Table 7: Chemical and Fuels Management Measures

Issue	Control Activity (and Source)	Action Timing	Responsibility	Monitoring and Reporting
C1 Poor management of chemicals and fuels	C1.1: Prepare spill management plan addressing measures	Pre-construction	Contractor	Maintain records and weekly reporting
	C1.2: Store and handle all chemicals, fuels, oils and potentially hazardous materials as specified in relevant standards and guidelines. All hazardous materials to be approved for use onsite. All hazardous materials and construction fuel will be stored in appropriate storage facilities (e.g. fuel and chemicals will be stored in a bunded area).	During Construction	Site Supervisor	Daily and maintain records
	C1.3: Hydrocarbon wastes shall be stored in colour coded and labelled drums placed around fuelling depots and disposed of.	During Construction	Site Supervisor	Daily and maintain records
	C1.4: Where possible, fuel and chemical storage and handling shall be undertaken at central fuel and chemical storage facilities, such as petrol stations/site depot.	During Construction	Site Supervisor	Daily and maintain records
	C1.5: Onsite storage of fuel and chemicals shall be kept to a minimum.	During Construction	Site Supervisor	Daily and maintain records
	C1.6: Emergency clean up kits for oil and chemical spills will be available onsite and in all large vehicles.	During Construction	Site Supervisor	Daily and maintain records
	C1.7: Refuelling activities to preferentially occur off site however if required onsite ensure refuelling activities occur in designated areas of the site where appropriate temporary protection measures have been designed/located and are no less than 20 metres from surface waters and drainage lines.	During Construction	Site Supervisor	Daily and maintain records

Emergency Response Plan

89. In the event of actions occurring, which may result in serious health, safety and environmental (catastrophic) damage, emergency response or contingency actions will be implemented as soon as possible to limit the extent of environmental damage.

90. It is assumed that there are residences located near the construction activities.

91. The contractor will need to incorporate construction emergency responses into the projects complying with the requirements under the Occupational, Health and Safety Policy of the contractor or the work related Government of Tuvalu legislation.

Performance Criteria

92. The following performance criteria are set for the construction of the projects:

    a. no incident of fire outbreak during construction;

    b. reduce the risk of fire by undertaking hot works within cleared locations;

    c. provide an immediate and effective response to incidents that represent a risk to public health, safety or the environment; and

    d. minimise environmental harm due to unforeseen incidents.

Monitoring

93. An emergency response monitoring program has been developed for the projects. The program is subject to review and update at least every two months from the date of issue. Importantly, visual inspections will be conducted by site supervisor daily with reporting to DoE and UNDP staff on a weekly basis (minimum) noting any non-conformances to this ESMP.

Reporting

94. The DoE and UNDP staff must be notified immediately in the event of any emergency, including fire or health related matter including those that have resulted in serious environmental harm.

Table 8: Emergency Management Measures

Issue	Control Activity (and Source)	Action Timing	Responsibility	Monitoring and Reporting
E1. Fire and Emergency management and prevention strategies implemented	E1.1: Flammable and combustible liquids bunding/storage areas to be designed in accordance with appropriate international standards	Pre and during construction	Contractor	Daily and maintain records
	E1.2: Fire extinguishers are to be available within all site vehicle	During construction	Contractor	Daily and maintain records
	E1.3: No open fires are permitted within the project area	During construction	Site Supervisor	Daily and maintain records
	E1.4: No cigarette butts are to be disposed of onto the ground throughout the project area, all smokers must carry a portable disposal bin to reduce the risk of a spot fire starting and general litter	During construction	All Personnel	Daily and maintain records
	E1.5: Any stockpiles of mulch are not to exceed two metres in height and width and must be turned regularly.	During construction	All Personnel	Daily and maintain records
	E1.6: Train all staff in emergency preparedness and response (cover health and safety at the work site)	During construction	Site Supervisor	Daily and maintain records
	E1.7: Check and replenish First Aid Kits	During construction	Site Supervisor	Daily and maintain records
	E1.8: Use of Personal Protection Equipment	During construction	All Personnel	Daily and maintain records

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