Environmental Assessment Report

Initial Environmental Examination
Project Number: 38183
July 2007

Samoa: Power Sector Expansion Project

Prepared by Tonkin & Taylor Ltd, New Zealand for the Electric Power Corporation.

ABBREVIATIONS

ADB	–	Asian Development Bank
EIA	–	Environmental Impact Assessment
EMMP	–	Environmental Management and Monitoring Plan
EPC	–	Electric Power Corporation
ESU	–	Environment and Social Unit
IEE	–	Initial Environmental Examination
MNREM	–	Ministry of Natural Resources, Environment and Meteorology
PEAR	–	Preliminary Environmental Assessment Report
PUMA	–	Planning and Urban Management Agency
SE	–	supervising engineer
SIEE	–	Summary Initial Environmental Examination
TA	–	technical assistance

WEIGHTS AND MEASURES

km	–	kilometer
km^2	–	square kilometer
kV	–	kilovolt
meter	–	m
mm	–	millimeter

A. INTRODUCTION

1. Purpose and Scope

1. This report is the Initial Environmental Examination (IEE) of the proposed subproject identified as the Hospital Feeder extension. It is one of the subprojects identified for the future expansion of the electrical power system on the Samoan islands of Upolu and Savai'i as a result of work undertaken for the Asian Development Bank (ADB) over the period November 2006–May 2007.

2. The project proponent is the Electric Power Corporation (EPC) which will implement the construction and operation of the power lines. EPC is a government-controlled corporation with headquarters located in Apia, Samoa with the following contact information:

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3. The subproject is one of several projects identified under ADB TA 4791,[1] to support the Government's strategy to develop cost and efficiency improvements in the power sector. The subproject will form one of the components of the least-cost development plan for the power sector, and has been given a high priority by the Government. The subproject is consistent with the Power Sector Roadmap developed and adopted by the Government in 2004 (Strategy for the Development of Samoa [SDS] 2002) which establishes the strategic long-term development of the power sector to achieve EPC's corporate goals.

4. The objectives of the summary IEE (SIEE) are to determine the state of the environment in the subproject area, identify the key environmental issues associated with the subproject, recommend appropriate mitigation measures, and develop an environmental management and monitoring plan.

2. Methodology

5. The IEE is prepared in accordance with the guidelines for undertaking Environmental Impact Assessment (EIA) in Samoa, prepared by the Government of Samoa, Ministry of Natural Resources, Environment and Meteorology (MNREM). The IEE was also carried out according to ADB's *Environmental Policy* (2002), and *Environmental Assessment Guidelines* (2003), in particular the "Guidelines of Environmental Assessment of Sector Loans, Operations Manual Section F1 on Environmental Considerations in ADB Operations."

6. The Planning and Urban Management Act (2004), has been enacted while the Draft Planning and Urban Management (Environmental Impact Assessment) Regulations is expected to be approved by the Cabinet in mid-2007. The draft regulation sets out the basic process for environmental impact assessment in Samoa. There are two main steps in the environmental assessment of a development proposal: (i) the Preliminary Environmental Assessment Report (PEAR), and (ii) a full EIA, which is undertaken if PEAR recommends that EIA is warranted.

[1] ADB. 2006. *Technical Assistance to the Independent State of Samoa for Preparing the Power Sector Expansion Program.* Manila (approved 25 May for $750,000).

Both the PEAR and EIA are reviewed by the Sustainable Development Officers of the Planning and Urban Management Agency (PUMA), while the EIA (if required) is also open for public comment and a public hearing, before a final recommendation is made to the Minister.

7. Data gathering and assessment of the key environmental issues was undertaken using a Rapid Environmental Assessment (REA) methodology. This methodology comprised:

(i) review of the Power System Planning Report, (ADB, 2007)
(ii) meeting with the project stakeholders and stakeholder representatives
(iii) identifying environmental issues which need to be addressed by the project
(iv) gathering primary environmental data from a field reconnaissance

B. DESCRIPTION OF THE PROJECT

1. Need for the Project

8. Power demand is growing rapidly in Samoa and in the capital Apia, on the main island of Upolu. This has been growing at a rate of 6% annually (Nippon Koei, 2003). This growth is affecting both generation and transmission line capacity with many of the transmission line feeder systems now operating beyond their designed capacity. The majority of feeder systems are designed to operate at 6.6 kilovolts (kV) while other feeders operate at 22 kV and major systems at 33 kV. A Transmission Plan (ADB, 2007) has been developed to address concerns over system circuit overloading and security of supply. The studies evaluated system losses, voltage drops and circuit loadings for the existing systems in 2006 and compared them to the proposed demands for 2011 and 2016.

9. The Transmission Plan identified the 6.6 kV Hospital feeder as having significant problems. This feeder is experiencing both voltage and loading problems with overloads of over 30% forecast by 2011, while the voltage drop will increase from 11% in 2006 to nearly 20% in 2016, If this continues the feeder would be 70% overloaded by 2016. Furthermore feeder losses of 6% of generated power in 2006 will increase to nearly 11% by 2016. Accordingly, the Hospital feeder has been given a priority within the Transmission Plan for upgrading as one of the recommended sub-projects within the Power Sector Expansion Programme which is being funded by the ADB under TA 4791. The subproject will upgrade the feeder by series of works to address these problems; this includes provision of new transformers and laying of an underground cable which will increase the capacity of the feeder from 6.6 kV to 22 kV.

2. Description of the Project

10. The project is located in the urban and central business districts of Apia—the capital of Samoa—on the island of Upolu.

11. The subproject will upgrade the 6.9 kilometers (km)-long Hospital feeder line which supplies power from the Tanugamanono Diesel Power station to the Apia town centre and then terminates at Mulinuu Point. The existing 6.6 kV feeder line is carried on overhead wooden poles which have been fitted to accommodate a 22 kV system. The majority of the work will require the retro-fitting of the feeder with new transformers so as accommodate the change from 6.6 kV to 22 kV. As the Hospital feeder also runs close to the Vaitele 22 kV feeder, which is currently lightly loaded, this will be connected to the Hospital feeder line to supplement supply. Part of the transfer power line from the Vaitele feeder to the Hospital feeder will require a new 800 meter (m) underground cable to be laid within the centre of Apia from Togafuafua village to Saleufi village. The underground cable is considered to reduce risks from cyclones

that already hit the country several times, and which expected to increase in frequency and intensity in future.

12. The technical study shows that the scope of the subproject extends from the southernmost transformer in Vaea Street to Mulinu'u Point and consists of the following components.

(i) Additional step-up transformer capacity from 6.6kV to 22kV to be provided at the Tanugamanono Power station;
(ii) Replacement of nine (9) transformers on the overhead section of the Hospital Feeder from Fugalei St to Mulinu'u Point to enable this to operate at 22kV;
(iii) Conversion of the Hospital Feeder in Salvalolo Road and Vaea St to a 22kV, 800 m long underground cable;
(iv) Replacement of nine (9) transformers on the overhead branch along Saleufi St and other short branches off the cable route to 22kV.

13. The section of existing overhead feeder in Savalalo Road and Vaea Street is to be replaced by an underground cable. The cable could be installed by either trenching or direct burial or by emplacing conduit with directional drilling. The trenching method has advantages in that the thermal capacity of the cable is higher, and the risk of damage to the cable during laying is lower. The area in which the cable is to be installed is prone to flooding. All transformers, joints, fuses and switchgear will be mounted on poles above the highest flood level.

14. The subproject has been estimated to cost US1.04 million and is scheduled for the commissioning in quarter 4 of 2007.

C. DESCRIPTION OF THE ENVIRONMENT

1. Physical Resources

15. The subproject is located in the northern Upolu foothills within the Apia area. The soils are derived from Salani Volcanics and mainly include alluvial and organic deposits. The existing feeder site is located within an easement and this will be re-used. The easement is situated alongside the main road which also contains the road drainage system.

16. Samoa's climate is tropical with abundant rainfall throughout most of the year. Apia records 2,956 millimeters (mm) of rainfall annually (Samoa Meteorological Division, 2007). The rainy season normally starts in October and finishes in April, when 69% of rainfall occurs while the drier season normally starts in May and finishes in September and records 31% of the annual rainfall. January is the wettest month with 489 mm recorded on average while August records the least rainfall with 113 mm. During the dry season, both islands of Upolu and Savai'i are affected by the southeast trade winds with south facing areas receiving more rainfall during the dry season.

17. Apia experiences an average of 2,230 hours of sunshine annually with sunshine being inversely related to rainfall, with August recording 219 hours of sunshine while January records 149 hours. Temperature varies little and the mean temperature ranges from 27.4 to 26.1^{o}C. Annual average relative humidity is 82%. Tropical cyclones may occur from October to May, and can be particularly destructive, as demonstrated by Cyclone Val which in 1992 defoliated 90% of the island and destroyed half the islands coconut palms. Cyclones of this proportion have profound effects on the island's economy, but are normally rare. It is possible that this may

change with more permanency developing in shifts in the Southern Oscillation Index and the El Niño effect.

18. The likelihood of climate-related risks in Samoa has been evaluated for both present and future conditions by Hay (2006) to reflect the influence of global warming. The risks evaluated are extreme rainfall events (both 6-hourly and daily), drought, high sea levels, extreme winds and extreme high air and water temperatures. Currently an extreme wind gust of 70 knot (kt) at Apia has a return period of 75 years. This will reduce to approximately 40 years by 2050. There is relatively high confidence in projections of maximum air temperature. A maximum air temperature of 34^{o}C is currently well in excess of a 100-year event. By 2050, it will likely have a return period of 40 years.

19. While the Pacific is one of the most tectonically active areas in the world, Samoa is relatively free of earthquakes with most earthquakes occurring in an area of plate subduction located in the Tonga trench about 200 km south west of Samoa.

2. Biological Environment

20. Samoa being an island demonstrates low species biodiversity. Biodiversity includes : (i) 13 species of terrestrial mammals, three of which are native; (ii) 35 species of land birds are recorded of which 8 are endemic; (iii) 19 species of land snails; and (iv) 21 species of butterflies of which two are endemic. It is estimated that over 700 vascular plants found in Samoa are native while around the same amount were introduced. Many of the endemic species are under threat from habitat alteration especially forest clearing. Much of the introduced plants in the form of ornamental and gardening plants are found around the project site. As the subproject is located within an extensively altered urban and peri-urban area it will not affect any significant environmental resources, species or habitats.

3. Human and Economic Development (Socioeconomic profile)

21. The population of Samoa at the latest census in 2001 was 176,710, with 133,886 living on Upolu and 42,824 on Savai'i. Over the period 1991 to 2001, the population of Upolu grew by 1.4% per annum. The population of the Apia urban area grew by 1.3% per annum and that of North West Upolu by 2.6% per annum.

22. The subproject site includes the central Apia Urban area which is mainly occupied by businesses. The total population of Togafuafua and Saleufi villages where the underground cable will be laid is approximately 1,013 people.

23. Samoa's economy is small and continues to rely heavily on external assistance in the form of grants and soft loans, but is also helped by large remittances from Samoans living overseas, primarily in Australia, New Zealand and the United States. The Gross Domestic Product (GDP) of Samoa is estimated at $1.13 billion and has grown at an average rate of 3.75% over the past 5 years. The annual growth rates in GDP for 2003, 2004 and 2005 were 3.5%, 3.7% and 5.1%, respectively and the medium-term outlook projects economic growth at between 3–4% per annum.

24. The country has a clear vision for economic and social development (SDS for 2005–2007) which is based on a review of the financial situation that was completed in January 2005. The strategy that has evolved from this review aims to constrain the annual overall budget

deficit to no more than 3.5% of GDP and to maintain annual inflation rates at less than 3.0% to maintain stable economic conditions.

25. Samoa and in particular Apia has one of the highest quality of life values in the Pacific area for access to potable water, medical and educational facilities.

26. While land ownership consists of a mixture of customary and private land, the subproject is located within an easement and no land acquisition or compensation will be required.

27. No cultural areas of archaeological significance are located within the subproject area.

D. SCREENING OF ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

28. The subproject will upgrade the 6.6 kV hospital feeder line to a 22 kV system by retro-fitting the existing feeder that is already partly fitted out to accommodate a 22 kV system. The work will be carried out using the existing poles and within the existing easement. Apart from trenching and safety issues associated with the underground cable there are few other environmental issues.

29. Since the natural terrestrial environment of the project area has already been significantly altered and disturbed by conversion to a township with roads, drains, homes and business buildings, the subproject will not cause any significant impacts to the existing environment nor will it affect any environmentally significant areas.

30. The underground cabling will not affect any of the major streams within the Apia area since the underground cabling will be entrenched within the existing road reserve. Apart from limited disturbance during construction there will be no long term effects on water quality.

31. No land acquisition nor resettlement requirements will be required since the underground cable will utilise the existing road reserve.

32. No major sites of archaeological, cultural or historic significance are present in the area.

33. The environmental impacts that have been identified for the pre-construction, construction and operation phases are detailed below. These are also shown in an Environmental Management and Monitoring Plan (EMMP) matrix in Annex 1.

1. Environmental Impacts and Mitigation Measures Needed during the Design/Pre-Construction Phase

34. A buried underground 22 kV cable will pose safety issues should the cable be damaged by unsuspecting excavation. This is mainly caused by the cable warning locators being lost. The cable will need to be supplied so as to meet Australian and New Zealand Standards for the design, supply and installation of underground cables. Production of PCBs[2] has now been banned in most countries and it will be phased-out in 2025, therefore equipment (transformers) procured under the loan will not contain PCBs. Procurement of new transformers will specify that PCB should not be used and only non-PCB coolant such as hydrocarbon mineral oil will be

[2] Polychlorinated Biphenyls (PCB) are mixtures of man-made chemicals and due to their non-flammability, chemical stability and high boiling point have been used extensively as insulators. PCB's are highly stable, toxic and persistent chemicals. Their manufacture, processing and use has now been banned in many countries. (*USEPA web page on PCBs)*.

used. During transformer replacement process, if presence of PCB in the existing transformers is confirmed, EPC will adopt best industry practices with regard to handling of hazardous materials, implement it within its already existing work and safety handling procedures, and will recommend the appropriate disposal of these equipments in accordance with the applicable Australian and New Zealand standards. These requirements will need to be carried into the tender documents so that the contractor will complete all the work that is required to meet safety issues especially where the cable leaves and enters the ground, laying the cable in the trench and marking the location of the cable. The Design Engineer will be responsible for ensuring that the relevant Australian and New Zealand underground cable standards are quoted for design, supply and construction.

35. The Design Engineer will also need to assess the costs and benefits accruing from a re-evaluation of design strength criteria for the power poles with regard to possible increases in wind velocity brought about from climate change. Burying the cable will also mitigate these concerns.

2. Environmental Impacts and Mitigation Measures Needed during Construction

36. Environmental impacts identified during construction are limited in size and are temporary. The scale of the works is relatively minor and the project areas proximity to the work force means that no construction camps are required.

37. Trenching of the cable will pose a risk to already installed underground services. These may be cables for telephone and electricity or these may be piped services for water. The Supervising Engineer (SE) should determine the situation with regard to the location of underground cables and services prior to letting the contract. During construction, the SE will pass this information to the contractor so that the risk of damage to underground cables and services is minimized. At the completion of construction EPC will develop a plot of the location of the underground cable so that this is retained as a layer within the Apia geographic Information System (GIS).

38. The trenching work will require machines to undertake the excavations. Noise from the machines will be a particular problem within residential areas and the contractor should not work machinery before 0700 hrs and after 1900 hrs. Noise should not exceed 55 dBA during the daytime and if permitted to work at night this should not exceed 45 dBA, measured at the boundary of residential areas operation. Operators and workers within the critical noise envelope are to be provided with hearing protection. The contractor and the SE will be responsible for monitoring this requirement.

39. Construction activities and particularly the excavation of a trench alongside the roadway in one of the busiest areas within central Apia will pose safety issues to traffic and pedestrians. All trenches that have been opened will require to be defined by barrier tapes and warning signs erected at both ends of the construction area. Traffic may need to be controlled and directed around the construction site. Disruptions will occur when the trench will block access to shops and houses. All households and businesses that will be affected by the trenching will need to be properly informed before trenching commences. The contractor and the SE will be responsible for implementing this requirement.

40. The project components are small, and erosion resulting from construction is not considered to be a significant issue. During heavy rainfall, most of the Apia urban area including

the proposed area for trenching will be flooded. Therefore, trenching must take into careful consideration the period of construction to be outside the main rainy season of January to March, otherwise, pumps will be needed to ensure the flooding along the main road will not impact the dug trenches or delay construction. Care will need to be taken during trenching that any water pumped out of the trench has first been allowed to settle to remove sediments before pumping and that any water diverted by the trench is not allowed to overflow into drainage ways. Construction activities should plan for as much sediment as possible being retained within the trench so as to avoid any possible blockages to the existing drains The contractor and the SE will be responsible for implementing this requirement.

41. Fuel and other lubricants will need to be stored at the construction sites. Best industry practice will be required to ensure that accidental spills and discharge to the soil and aquatic environments are prevented. Any fuel (including drums and tanks, if any) should be placed at least 20 m away from waterways and no equipment is to be refuelled within this distance. Handling of fuel and lubricants should only be undertaken by trained personnel. In addition, machinery will be properly maintained and all waste oil and oil filters must be disposed of to meet best industry practice. This will be the contractor's responsibility.

42. At the completion of work, the contractor will be required to rehabilitate and clean up all work sites. This includes repairing damage to pavements, roads, and drainage systems. All waste is to be removed from the sites. The contractor and the SE will be responsible for implementing this requirement.

3. Environmental Impacts and Mitigation Measures Needed during Operation

43. Once buried the location of the 22 kV underground cable will need to be clearly identified by above ground permanent markers that will warn of the dangers of the underground cable. The markers are to meet Australian and New Zealand standards for the installation of underground cables. The markers are to warn that any construction or digging in the vicinity of the cable is to be first checked with EPC. Signs that also meet these standards will also need to be placed on all overhead power poles warning of the attendant electrical hazards. EPC will also need to put signs so as to advise the community about the location and associated dangers of the underground cable and of the overhead feeder line.

E. INSTITUTIONAL REQUIREMENTS AND ENVIRONMENTAL MONITORING PROGRAMME

44. For this core subproject, a table summarizing the Environmental Management and Monitoring Plan (EMMP) has been developed and is attached as Annex 1. The EMMP addresses the impacts and mitigation measures that have been identified, and outlines the requirements and responsibilities of the various persons or agencies that need to be addressed during design/pre-construction, construction and operation. The EMMP will be incorporated into the bidding documents and subsequently included in the contractors' contract to ensure that EMMP requirements are actually addressed by the contractor at the time of construction.

45. The following institutions and organization have been identified as having responsibilities for implementing the EMMP:

(i) PUMA who has the overall responsibility for environmental compliance.
(ii) EPC who are the project owners and operate the electricity generation and transmission distribution systems, and responsible for environmental and social impacts mitigation.

(iii) The contractor who will be responsible for complying with the EMMP during construction.

46. The PUMA EIA is legislated under the Planning and Urban Management Act. Current practice is to submit the findings of a PEAR to PUMA as part of Development Consent Application. PUMA will need to approve the IEE (which is equal to PEAR) and issue Development Consent Approval (with conditions) before project construction may commence.

47. **The Electric Power Corporation of Samoa (EPC).** EPC presently has an Environment Officer. In implementing a sector project, particularly for the preparation of IEE of the following subprojects and supervision of EMMP implementation, the institutional capacity within EPC will need to be strengthened. Therefore, an Environment and Social Unit (ESU) will be set up within EPC. The unit will consist of three persons that will be responsible for environmental management, land acquisition/resettlement, and public relations/consultation. ESU will be responsible in IEE preparation of the subprojects, as well as supervision of the EMMP implementation by the contractor through regular observation and spot checks of construction-related activities, and hence will be responsible for environmental compliance requirements. The ESU will ensure that the EMMP will be adequately prepared, attached to the bidding documents, and included in the contractor's contract. Capacity building will be included as part of the Project, where an international environment management consultant (EMC) hired under the project implementation consultants will train the ESU staff. Training will be given in environmental management of the Project, and involved them in overall activities of the international consultant through learning by doing. EPC will also appoint a Project Engineer who will supervise the implementation of the design details and a Site Engineer to supervise the field construction activities which includes daily liaison with the contractor during construction.

48. Until the capacity of ESU is adequately strengthened, the tasks of environmental management including monitoring activities will be undertaken by the EMC to be hired under the project implementation arrangements. The consultant costs will be funded as part of the loan. Tasks of the EMC will include: (i) assist PMU in incorporating EMMP into the tender documents, to ensure that environmental mitigation measures are adequately addressed; (ii) carry out monthly inspections and audit the implementation of the EMMP through regular observation and spot checks of construction-related activities; (iii) analyze and evaluate reports submitted by the contractor on EMMP compliance and make recommendations on these to the ESU within EPC; (iv) to build environmental capacity within the EPC by undertaking on-the-job training to ESU staff and involve them in the environmental management activities affecting transfer of knowledge and skills to ESU staff; and (v) undertake overall environmental management of the sector project.

49. During construction, day-to-day supervision of the EMMP will be undertaken by the contractor, while the ESU and the Supervising Engineer will have overall site supervision responsibilities for ensuring that the contractor is meeting the EMMP requirements. Compliance monitoring to ensure that the EMMP conditions are being met will be the responsibility of the EMC and Environment Officer of the ESU.

50. During operation, ESU on behalf of EPC will undertake regular project site monitoring. This will not only help ensure efficient operation of the core subproject , but can also be used to conduct regular community meetings, to monitor community concerns, thus helping to identify community concerns as early as possible and prevent unnecessary surprises such as community actions that may prevent access or incur damage to the project site.

51. **The contractor.** The Contractor's responsibilities include; prior to construction commencement, addressing the outline EMMP and developing it into a detailed EMMP (when detailed engineering design becomes available) that amplifies the conditions established in the EMMP and identifies persons who will be responsible for undertaking the work within the contractor's team. It will include a monitoring plan and a reporting program. Once the detailed EMMP has been approved, the contractor can mobilize to site and commence the work.

52. The contractor will prepare a quarterly compliance report which will be submitted to PMU. EPC will submit the report to PUMA and ADB in the project's quarterly progress report prepared to meet the ADB loan requirements. PMU will have a duty to immediately report to EPC if any serious environmental breach has occurred during construction and operation.

F. PUBLIC CONSULTATION

53. The subproject will be located within the Government land along the main road. Therefore no consultations on land tenure issues were required as Government endorsement has already been given for the project. As part of the preparations for the IEE, consultations with the planning and design team as well as the resettlement team were done to ascertain the level of engagement with the general public that is needed.

54. During the IEE preparation, some public consultations—particularly with property owners and business operators who reside quite near the main road—were undertaken. For instance, two individuals who were consulted represent a private company (Radio Polynesia Ltd.) and a government agency (Samoa's Ministry of Telecommunications and Information Technology) along the Savalalo Road. The nature of the work to be carried out, the reasons underpinning it and the likely environmental impacts during construction were explained to them during the consultations. There were no concerns regarding the negative effects of such construction on community life and economic activities because the construction of underground transmission line will be within existing rights-of-way (road reserve). One family near the start of the feeder line, however, expressed concerns about the disruption to traffic and possible damage to water pipes. No concern related to land was expressed. Several lessees in buildings parallel to the proposed line (e.g., ACE Hardware and Samoa Builders Ltd; taxi stand opposite Lucky's Foodtown) pointed out that as long as it does no damage to existing services (water, especially), there should be no concern on the activity. Construction of transmission line is generally aimed at bringing benefits to surrounding communities through better energy supply. Brief public consultations showed a support for the subproject. The population recognizes the need to accept limited nuisances as a result from the construction works, and understand that implementation would be hindered significantly without a good mutual cooperation. The general context within which this is taking place is one wherein other activities, i.e., road, drainage and general infrastructure improvements works are being carried out, including along the location of the hospital feeder road in preparation for the South Pacific Games. Roadsides are continually being repaired for new footpaths, streetlights in street corners, road widening etc.

55. A public awareness program needs to be undertaken from the onset of the project to adequately inform the general public on the proposed project as well as explanations on the underground cabling benefits. This will be implemented by the EPC as the project proponent.

56. Further public consultation will be done for the affected stakeholders prior to the construction phase on the planned construction and potential impacts for access to their businesses and homes. A construction plan will need to be completed that is agreeable to all parties in terms of minimising the blocking of access for businesses and homes whilst the

construction is underway. This will need to be incorporated in the tender documents for the approved contractor to implement.

57. Public notices will need to be made during the construction on any road blockages during construction to minimize traffic congestion. This can be incorporated as part of the contractor's responsibilities.

G. FINDINGS AND RECOMMENDATIONS

58. The project will improve the Hospital feeder by upgrading this from 6.6 kV to 22 kV to meet future rapidly growing demand in the Apia central business area. The use of underground cabling will minimise the risks of regular maintenance costs for the overhead lines from regular damage during cyclones and heavy winds situations while further improving the safety of the general public from possible overhead line faults. The project is consistent with the EPC's long-term goal to relocate main power lines to underground cabling for public safety and to reduce maintenance costs.

59. The project will have few impacts and all of these can be satisfactorily managed. An EMMP is attached that establishes the compliance conditions. During pre-construction, EPC will be required to include the mitigation measures in the design, while during construction both the contractor and EPC Supervising Engineer will have monitoring responsibilities. The EMMP conditions are to be carried across to the contract documents and are to be addressed by the contractor, this will be EPC's responsibility.

60. EPC has limited abilities to implement environmental management of projects during preparation as well as implementation. Therefore, the Project will include strengthening of the EPC by establishing an Environmental and Social Unit.

H. CONCLUSIONS

61. The Project is classified as Category B. All impacts can be satisfactorily mitigated and an EMMP has been prepared that contains practical and realizable mitigation measures. The SIEE concludes that there will be no significant impact to the environment from the proposed core sub-project. All impacts that have been identified can be satisfactorily addressed and mitigated.

62. The IEE concludes that adverse environmental impacts arising from the location, design, construction and operation and maintenance of the proposed hospital feeder can be minimized to insignificant levels. Therefore, a full EIA is not considered warranted.

REFERENCES

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Samoa Meteorology Division, Ministry of Natural Resources, Environment and Meteorology (MNREM), *www.mnrem.gov.ws*

ANNEX 1

ENVIRONMENTAL MANAGEMENT AND MONITORING PLAN

	IMPACT MITIGATION				IMPACT MONITORING			
Project Activity	Potential Environmental Impact	Proposed Mitigation Measure	Implementing Responsibility	Mitigation Cost	Parameter to be monitored	Frequency and means of Verification	Monitoring responsibility	Monitoring Cost
PRE-CONSTRUCTION								
Underground cable safety requirements incorporated in design	Cable damage may cause: a. Electrocution and loss of life. b. Power outage and loss of revenue	a. Cable to be designed and installed so as to meet Australian and New Zealand Standard for installation and protection of underground cables. b. Requirement carried into tender specifications	Design Engineer and EPC-ESU	Cost included in design	Structural and location design drawings	a. Once, verify structural and location design.	Project Engineer and EPC-ESU	Cost met by EPC in project design budget
Climate proofing in structural design	Unexpected and costly failure of feeder systems	a. use underground cable. b. consider cost-benefit of up-grading design criteria to accommodate possible changes in wind strength.	Design Engineer and EPC-ESU	Cost included in design	Structural and location design drawings	a. Once, verify structural and location design.	Project Engineer and EPC-ESU	Cost met by EPC in project design budget
Use of PCB for electrical insulation	PCB is highly persistent and toxic insulating material.	Contract is to specify that PCB will not be supplied in any new electrical equipment.	Design Engineer	Cost included in design	Contract documents, and Procedure/ manual	Once, verify contracts and, handling procedure	Contract supervisor and EPC-ESU	Met by EPC
CONSTRUCTION								
Trenching activities breaking underground cables	Disruption to other utility providers from broken cables and services.	a. Establish location of cables before trenching commences. b. Plot location of buried cable in GIS system.	a. Design Engineer b. Contractor and Supervising Engineer (SE)	Costed by contractor and cost carried into contract	Disruptions to cables and other services.	a. weekly b. reports from other cable and service providers	a and b: SE, EPC-ESU	Included as part of contract monitoring cost of $50,000
Noise from construction equipment, especially trenching machinery	a. Nuisance to surrounding communities b. Worker health hazard	a. Equipment fitted with approved sound suppression equipment and maintained b. noisy equipment not to operate between 0700hrs and 1900 hrs unless machinery can meet the 45 dBA noise standard specified.	a. Contractor and Supervising Engineer b. Contractor and	Costed by contractor and cost carried into contract	a. Noise not to exceed 55dBA at the boundary of community areas during daytime and 45	Spot checks and weekly inspections for: a. Noise levels in	a and b: Contractor a and b: SE, EPC-ESU	Included as part of contract monitoring cost of $50,000

	IMPACT MITIGATION				IMPACT MONITORING			
Project Activity	Potential Environmental Impact	Proposed Mitigation Measure	Implementing Responsibility	Mitigation Cost	Parameter to be monitored	Frequency and means of Verification	Monitoring responsibility	Monitoring Cost
		b. Operators provided with ear protection	Supervising Engineer		dBA at night. b. Noise not to exceed 60 dbA at the boundary of the workplace	residential and workplace areas b. Hearing protection provided		
Trench being flooded	Water quality issues from sediment released to natural waterways	a. Arrange pump out of the trench so that intake is located above settling sediment or ensure that sediment has time to settle. b. Plan trench opening so that trench does not intercept runoff flows. c. plan trenching after the rainy season (Nov-March)	a and b. Contractor and SE.	Costed by contractor and cost carried into contract	Natural waterways are not affected by sediment deposits	Spot checks and weekly inspections for a and b	a and b contractor and SE	Included as part of contract monitoring cost of $50,000.
Construction activities posing risks to traffic and pedestrians	a. Traffic hazards b. Hazards to pedestrians	a. Erect warning signs before work areas b. demarcate construction boundaries with barrier tape. c. Undertake traffic control as required d. advise householders and shopowners whose access may be jeopardised.	a, b, c and d. Contractor	Costed by contractor and cost carried into contract	Pedestrian and traffic accidents	Spot checks and weekly inspections for a and b	a and b contractor and SE	Included as part of contract monitoring cost of $50,000.
Prevention of spills	Pollution of soil and water	Any fuel (refueling) should be at least 20 m away from waterways, handling by trained personnel, all waste oil must be disposed of to meet best industry practice.	Contractor	Cost included in design	Contract document, and specification	Weekly, field practices	Project Engineer and EPC-ESU	Met by EPC
Clearance and rehabilitation of sites	Maintenance of environmental values	a. All solid waste to be removed from sites and disposed in approved landfills. b. all contaminated soil to be removed. c. all sites to be rehabilitated and restored to original condition.	a, b, and c. Contractor	Costed by contractor and cost carried into contract	Sites cleared, waste removed and all access ways, footpaths restored	To be included as part of Final Inspection before payment made.	a, b, and contractor and SE	Included as part of contract monitoring cost of $50,000.

	IMPACT MITIGATION				IMPACT MONITORING			
Project Activity	Potential Environmental Impact	Proposed Mitigation Measure	Implementing Responsibility	Mitigation Cost	Parameter to be monitored	Frequency and means of Verification	Monitoring responsibility	Monitoring Cost
OPERATION								
Community safety issues	Electrocution from: a. Underground cables b. overhead cables	a. Locations of underground cables shown so as to meet Australian and New Zealand standards for installing underground cables. b. Warning signs erected for overhead cables c. Implement community safety awareness programs	a, b, and c: EPC Safety Officer	EPC Operations Cost	Accident reports	Annually. EPC safety records	a, b, and c EPC Safety Officer	EPC Operations Cost

ESU = Environmental and Social Unit, EPC = Electric Power Corporation of Samoa, GIS = Geographic Information System, PCB = Polychlorinated Biphenyls, SE = Supervising Engineer

Annex 2: List of Persons and Organisations Consulted

Name	Organisation	Position	Contact Details
Mua'ausa Joseph Siegfried Walter	Electric Power Corporation (EPC)	General Manager	Tel 65401; 26286 Joseph.Walter@Samoa.ws
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Sale Faletolu	EPC	Environmental Coordinator (Environmental Counterpart)	Tel 65413
Nomeneta Saili	EPC	GIS Officer	Tel 65419
Alex Webster	EPC	AYAD GIS/MIS	Tel 65423
Eiko Fuimaono	Planning and Urban Management Agency (PUMA)	Senior Planning Officer	Tel 23986
John Crimston	Tonkin and Taylor	ADB TA 38183 Team Leader	Email: jcrimston@tonkin.co.nz
Tom Tinai	Tinai Gordon and Associates	Team Engineer (Local Counterpart)	Tel: 22906
Murray Ellis		Electrical Engineer	Email: murray@dialogue.co.nz
Corey Keil	Radio Polynesia Ltd. Samoa's Ministry of Telecommunications and Information Technology ACE Hardware Samoa Builders Ltd		