

SUMMARY INITIAL ENVIRONMENTAL EXAMINATION

**SANITATION AND DRAINAGE PROJECT
IN THE
INDEPENDENT STATE OF SAMOA**

October 2003

ABBREVIATIONS

ADB	–	Asian Development Bank
BOD	–	biochemical oxygen demand
CBA	–	central business area
DEC	–	Division of Environment and Conservation
DLSE	–	Department of Lands, Survey and Environment
EIA	–	Environmental Impact Assessment
EMP	–	environmental management plan
ERP	–	environmentally responsible procurement
IEE	–	initial environmental examination
NGO		nongovernment organization
O&M	–	operation and maintenance
PMT	–	Project Management Team
PPMS	–	project performance management system
PUMA	–	Planning and Urban Management Agency
SIEE	–	Summary Initial Environment Examination
SWA	–	Samoa Water Authority
TA	–	technical assistance
WWTP	–	wastewater treatment plant

WEIGHTS AND MEASURES

m ³	–	cubic meter
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NOTE

- (i) In this report, "\$" refers to US dollars.

SUMMARY INITIAL ENVIRONMENTAL EXAMINATION

A. Introduction

1. This summary initial environmental examination (SIEE) represents the findings of an IEE that was carried out during the preparation of the proposed Samoa Sanitation and Drainage Project and the review completed by the Loan Fact-Finding Mission. The Asian Development Bank (ADB) assisted in preparing the Project through a technical assistance grant.¹ The Project addresses urgent sanitation, wastewater, and drainage needs for the urban area of Apia, Samoa, with the objective of improving the environment and public health of the area. The IEE was completed in accordance with the *Environmental Assessment Requirements of the Asian Development Bank* and ADB's *Environmental Assessment Guidelines (2003)* and confirmed the Project's classification in environment category nonsensitive B under the guidelines. The environmental assessment also conformed to the preliminary environmental assessment report requirements of the Government of Samoa Draft Guidelines on Environmental Impact Assessment.²

2. Environmental issues such as (i) alternative technological approaches, alternative siting of facilities; (ii) potential impacts during planning and design, construction, and facility operations; (iii) mitigation measures; and (iv) monitoring and institutional measures were considered. The IEE was undertaken principally through visual surveys, and review of existing data and their evaluation.

B. Description of the Project

3. Apia, Samoa, particularly the central area, shows typical signs of inadequate planning and infrastructure provision for environmental protection associated with urban areas. The quality of near shore marine water and urban stream water in the Apia area has been significantly degraded as a result of inadequate sanitation and wastewater management systems. Most wastewater is now treated in individual systems such as cesspools and septic systems before it is discharged to drainage channels (open channels and streams), soil, and groundwater.³ Flooding is a frequent problem due to high rainfall and an inadequate drainage system that is compounded by land filling, blocking of drains, and lack of town planning. Flooding after heavy rain is intensified and foul water flooding poses a public health risk due to septage and latrine wastes being released to the surface environment. The objective of the proposed project is to improve drainage, wastewater, and sanitation management in Apia.

4. The Project has three components: (i) drainage, (ii) wastewater management and sanitation, and (iii) capacity building. The project outputs include (i) improved floodways; (ii) rehabilitated existing drains; (iii) water gauges installed for flood monitoring; (iv) design, construction, and operation of a wastewater collection and treatment system; (v) utility-managed individual sanitation systems; and (vi) strengthened institutions and legislative frameworks for wastewater management, drainage, urban management, and environmental monitoring.

¹ ADB. 2002. *Implementation of the Urban Planning and Management Strategy*. Manila

² These guidelines were developed in 1998, but have not been promulgated.

³ There are a few, mostly poorly operating package plants at some business centers and Government complexes, with the facilities for the National Provident Fund Building and Lotemau business centers being the notable exceptions.

1. Drainage for the Gasegase and Asaga Catchments (Component A)

5. Component A will be directed toward mitigating the effects of flooding in the Gasegase River, Asaga stream bypass, and Fugalei stream area located to the southwest of the central business area (CBA) and providing data to allow development of a broader drainage management plan that will guide future improvements. The component focuses on rehabilitating the floodway (440 meters [m]) in the Fugalei River downstream of the Fugalei Street Bridge to the confluence with the Gasegase stream (860 m) in Asaga stream bypass and (1,550 m) in the Gasegase River. Accumulated waste in the mangroves lining the Gasegase River to its mouth in Vaiusu Bay will be removed. Upstream of Fugalei Street Bridge in the Fugalei stream (1,350 m) and north of Viatele Road of Asaga stream bypass (1,075 m), the existing storm drains will be cleaned, rubbish and silt removed, and survey levels established. Water gauging stations will be installed in the project area and other catchments to monitor flood flows and provide data for hydraulic modeling and further drainage design. Topographical and cadastral surveys will be undertaken to establish correct levels in the floodplain and low-lying area, hydraulic modeling of flood flows, and design and implementation of the civil works. Pumps that can be mounted on trucks will be provided to allow releasing floodwaters from constrained drainage ways. These pumps also will provide emergency pumping capability and minimize any potential health hazard in areas where foul water may accumulate .

1. Wastewater Management and Sanitation Infrastructure for Apia (Component B)

6. Component B addresses urgently needed wastewater and sanitation infrastructure in urban Apia. There are three subcomponents:

- (i) **Individual system rehabilitation and septage collection and treatment program.** Samoa Water Authority (SWA) will implement an operation and maintenance (O&M) program for individual systems that will include rehabilitation of systems in the low-lying areas and regular pumping-out of all individual systems in greater Apia. A detailed sanitary survey at the start of the Project will determine specific rehabilitation needs, define rehabilitation standards, prioritize rehabilitation activities (within low-lying areas), and identify appropriate pumping-out intervals. SWA will manage private sector O&M contracts for delivery of individual sanitation system services. The program will be funded by a sanitation surcharge on all Greater Apia water bills. Up to 500 households will be included in the rehabilitation program and all of Greater Apia's 8,000 households will be provided septage collection services. The project will provide two 10.0 cubic meter (m³) vacuum trucks for this service. Septage will be disposed of in lined lagoons at the Tafa'igata landfill and in a pilot waste-to-energy anaerobic digester that is being developed through a Government-private sector partnership.⁴
- (ii) **Central business area (CBA) wastewater collection and treatment system.** The wastewater system includes 4.3 kilometers (km) of sewers and a wastewater treatment plant (WWTP) with an average capacity of 950 m³/day. The WWTP will be designed to secondary treatment standards and include disinfection. Effluent disposal will be to adjoining subsurface infiltration galleries. This WWTP also serves several priority special needs areas (hospital, Malifa school, Fugalei market), which

⁴ This project is facilitated by Sustainable Project Management, a nongovernment organization that promotes public-private partnerships. The digester is not yet operational and energy not yet determined.

make up approximately 450 m³/day of the indicated capacity. Biosolids (sludge) from the WWTP will undergo treatment at the WWTP with final disposal at the Tafa'igata landfill. This system will serve approximately 110 business and Government customers.

- (iii) **Special needs areas wastewater treatment.** A number of areas with particularly significant pollutant sources or requiring special consideration for improved wastewater management were prioritized for inclusion under the Project. They are the National Hospital, Malifa School Compound, Fugalei Market area, and the commercial area from Mulivai Stream to Vaisigano Stream along the Main Beach Road. The total wastewater flow for these facilities is estimated at 450 m³/day. These areas will be directly connected to the CBA scheme, with size of sewers connecting these facilities to the CBA collection system to allow additional connections in the future.⁵ Approximately 2.5 km of sewers will be constructed to connect these systems to the WWTP. The Project includes an allocation for additional special needs areas based on criteria to be developed during the detailed design phase, which may be addressed through a range of technical options.

2. Capacity Building (Component C)

7. Component C will provide capacity building in technical and management areas as well as community awareness programs. Capacity building will focus on SWA and Planning and Urban Management Agency (PUMA) with targeted capacity building for Ministry of Works, Fisheries Department, Ministry of Agriculture, and Ministry of Health. Capacity building will be provided in several technical and utility management areas.

The Project is described in further detail in the report and recommendation to the President. Figure 1 shows the project area and key component locations.⁶

C. Description of the Environment

8. Samoa over the past two decades has made strong progress in economic and social development. The Strategy for the Economic Development of Samoa 2002-2004⁷ continues the Government emphasis on macroeconomic stability, public sector efficiency and reform, improved education and health standards, better urban planning and management including provision of infrastructure, and a strong private sector.

1. Human and Economic Development

9. Samoa's stable political environment combined with vigorous economic growth and inclusive social development strategies has helped Samoa achieve its country development goals. With a human development index of 0.590, the country rates well on the achievement of social development goals. Adult literacy rates for both genders (96%) and gross enrollment rates in primary (94%) and secondary (70%) levels are high by Pacific developing member country standards. Infant mortality (22 per 1,000 births), under-5 mortality (35 per 1,000 births),

⁵ The Government has no immediate plans for such connections, however, additional capacity is warranted, as an expanded centralized system is likely to increase as management capacity increases and such expansion becomes affordable.

⁶ The sanitary landfill location is too distant to show on the detail map. A separate location map will be prepared for the final environmental management plan.

⁷ Government of Samoa, January 2002. *Strategy for the Economic Development of Samoa*.

and maternal mortality (4 per 100,000 births) rate among three lowest in the Pacific region. A large majority of the population (90%) have access to potable water. There is strong concern for environmental issues, with the new legislation, Planning and Urban Management Bill (PUMA Bill) that deals with the biophysical environment as well as the social and economic environment drafted in 2002 and expected to be enacted in the second half of 2003.⁸ Real gross domestic product (GDP) was 6.5% in 2001 compared with 6.9% in 2000. The strong economic growth has been attributed to the development of commerce, public administration, hotels and restaurants, transportation and communications, construction, and fisheries. The strong economic growth is concentrated in the Apia area, particularly the CBA. Government offices are also concentrated in this area.

2. Physical and Ecological Environment

10. The climate of Samoa is characterized by a distinctive wet season from November to April and a dry season from May to October where mean monthly rainfall averages only 150 millimeter (mm) per month. Average annual rainfall is approximately 2,500 mm for Apia and approximately 5,500 mm at the top of the catchment that drains to Apia. Loss by evaporation and evapotranspiration average 1,800 mm per year. The annual average temperature is 26°C. on the coastal plain. The predominant wind is from the southwest, and from May to October winds come approximately 80% of the time from this direction. Winds in the wet season are usually from the northwest.

11. In the Apia area, the soils are referred to as the Fusi-Mutiotele association characterized by coral limestone sands with a high water table. Alluvial gravel beds are present as relics from alluvial riverbeds. Soils of the Vaiusu Bay area are described as Loga sandy clay and peaty sand of high salt content and alkaline to neutral pH. They are difficult to drain, are unsuitable for agriculture, and sustain primarily mangrove development.

12. In the Apia town area including the CBA, the flora and fauna have been substantially modified by the expansion of urban development and by the introduction of exotic plants and animals since the establishment of Apia. Many of the introduced plants have naturalized over time and are considered an essential part of the Samoan way of life, as they are used as garlands, as an integral component of ceremonies, and for a range of decorative purposes. Of importance in the Apia town area is the presence of a number of large trees (*Ficus benghalensis* or *Pulu* and *Terminalia catappa*) that grace the Beach Road area and discrete locations throughout town. Mangroves dominate the coastline of Vaiusu Bay. Land filling and indiscriminate waste disposal have degraded these mangroves in the urban area.

13. The quality of near shore marine water and urban stream water in the Apia area has been significantly degraded as a result of inadequate sanitation and wastewater management systems. Water quality monitoring data, which is only intermittently collected, shows sewage contamination as evidenced by low dissolved oxygen saturation, high biochemical oxygen demand, high total nitrogen concentrations, and high indicator bacteria concentrations. Urban drains are often choked with litter and vegetation, emit foul smells (indicating anaerobic conditions), and contain floating oils and sewage. Drains and natural watercourses are contaminated with sewage and occasionally industrial waste. Recent testing for persistent organic pollutants and toxic substances shows high levels of the heavy metals chromium and

⁸ Prepared with assistance under ADB. 2002. *Implementation of the Urban Planning and Management Strategy*. Manila.

nickel in parts of Vaiusu Bay.⁹ The source of the contaminants (e.g., anthropogenic, or natural, chromium tends to be high in volcanic soils) and their form (e.g., Chromium VI, which is toxic vs Chromium III) has not been determined so these data must be considered with that in mind. Nevertheless, the contaminants should be considered, particularly with regard to erosion and sedimentation control. These monitoring efforts are infrequently carried out and usually result from externally funded activities, including previous ADB-supported TA.¹⁰

14. While Samoa is rich in cultural heritage, no historical or cultural sites of particular significance and vulnerability are in the project area. There are historical and cultural sites within the greater urban Apia area, e.g., historic monuments and tombs on Mulinuu Peninsula, but these are far from the project construction activities.

D. Forecasting Environmental Impacts and Mitigation Measures

1. Consideration of Alternatives

15. Without the Project, water quality will continue to deteriorate since individual systems cannot effectively treat wastewater, given the population density, hydrologic conditions, soil conditions, etc. With the Project, living conditions and aquatic environmental quality in the Apia urban area will be improved.

16. In the project preparation and numerous previous studies, a number of alternative wastewater collection and treatment schemes were considered. Many involved large-scale schemes with varying levels of treatment, which were generally considered unaffordable (to Government and consumers) and technically beyond the capacity of the country. Some also had environmental concerns associated with ocean outfalls. The proposed solution combines a least cost approach to secondary treatment through the use of a prefabricated package WWTP that includes disinfection plus the use of an infiltration gallery, maximizing the use of the adjoining wetlands to provide additional environmental protection.

2. Potential Impacts and Mitigation Measures

17. Potential impacts due to design and siting were carefully considered in evaluating alternatives that led to the project design. Poor siting can lead to water quality impacts, odor, and aesthetic concerns. Selecting for the WWTP a site previously in industrial use has mitigated these concerns. The site is in an area where groundwater is not a water source and of sufficient size to provide a buffer zone to adjacent properties. Similarly, the proposed pumping station site is a site of one of the currently marginal functioning Government septic tank and effluent treatment plants. In both cases, additional landscaping will be incorporated into the detailed design to further mitigate potential siting concerns. The small-scale plant allows the use of an infiltration gallery that does not directly discharge to the marine environment and takes advantage of the additional buffering capacity provided by the mangroves through nutrient uptake. This site also provides flexibility for long-term expansion, as it can accommodate a larger plant and effluent can be addressed either through expansion of the infiltration gallery and

⁹ Water sampling at the runoff drains from the Mobil bulk fuel storage in Sogi, Vaiusu Bay, also indicates the presence of petroleum hydrocarbons. The impact of the petroleum hydrocarbons on the health of the mangroves and aquatic ecosystems is unknown in this location. Given that the proposed WWTP site has also been used for petroleum, testing for pollutants in and adjoining the site including the adjoining mangroves in Vaiusu Bay should be undertaken and is recommended as part of the environmental monitoring plan in Section 5 of the IEE.

¹⁰ ADB. 1995. *Integrated Urban Development Projects*. Manila; and ADB. 1998. *Evaluation of Sewage Treatment Options*. Manila.

use of constructed wetlands, or an advanced treatment and extended outfall, depending on detailed design at that time. Septage sludge lagoons will be sited at the current sanitary landfill, which is far (several kilometers) from populations. Current septage lagoons are located at the landfill and no complaints have been received. The project lagoons will have greater capacity and will be lined.

18. Potential impacts during construction — erosion, sedimentation, traffic disruption, and noise — are those typically expected for any construction. They will be mitigated by standard engineering practices and proper construction methods. Typical mitigation measures will be dry season construction, placement of erosion control material, use of silt fences, and limited construction work hours. Drainage rehabilitation may involve temporary disruption of flows during construction, but these should be limited to a matter of hours and can be managed by careful construction planning and only partial flow redirection within existing channels.

19. Potential operational concerns are odor, water quality impacts (particularly from emergency discharges), and aesthetic concerns. The appropriate siting, selection of minimal odor technologies, odor control measures, design for effluent discharge via infiltration gallery, and capacity building programs to support proper O&M mitigate operational concerns. Discharge of the WWTP effluent into a subsurface infiltration gallery at a site adjacent to mangroves after secondary treatment and disinfection avoids negative marine impacts through the additional nutrient removal and buffering capacity of natural wetlands.

20. The overall Government strategy for drainage and wastewater management is to avoid land acquisition. The Project follows this approach. Nevertheless, preliminary design indicates that some limited land acquisition involving up to three landowners (1.6 hectares) may be necessary for drainage. This level of land acquisition is considered insignificant by ADB's policy on involuntary resettlement and only a short resettlement plan is required. The Government has agreed that if any significant land acquisition or resettlement becomes necessary in the course of the Project, it will notify ADB. In all cases, the Government will ensure that such land acquisition is carried out in accordance with all applicable laws and regulations of the Borrower, and ADB's policy on involuntary resettlement. No land acquisition is required for other components as Government land will be used for the WWTP, sewer, and septage treatment lagoons. Appendix 1 gives the short resettlement plan.

21. Natural disasters and other emergency situations, such as power outages, can result in damage to facilities during construction that could cause further environmental concerns. The EMP (Appendix 2) will include an emergency response plan to address such potential emergency situations.

E. Institutional Requirements and Environmental Monitoring Plan

1. Institutional Setting and Requirements

22. There are few promulgated environmental legislation and environmental standards in Samoa. The table gives a summary of relevant laws. They focus on natural resource environmental issues and do not address pollution control or include specific standards or guidelines. Environmental impact assessment (EIA) guidelines and requirements have been developed, but remain in draft form. The Government continues to use these guidelines even though they lack legal force. Nevertheless, to support their use and encourage enactment of these guidelines, the Project will require that a Government EIA be prepared during the detailed design phase in accordance with these guidelines. The capacity building component will assist

in developing environmental legal frameworks, including those for ambient water quality and wastewater discharge guidelines and standards. A number of internationally recognized environmental standards are available, including the World Health Organization and the South Pacific Regional Environmental Programme. The latter water quality standards, or others at least as stringent, will be used for project monitoring.

Summary of Relevant Legislation

Legislation	Scope of Act	Responsible Agency
Lands, Surveys and Environment Act 1989	To ensure and promote the conservation and protection of natural resources and environment of Samoa	Division of Environment and Conservation, Ministry of Environment and Natural Resources
Fisheries Act 1988	To promote the protection and preservation of the marine environment	Fisheries Division
Watershed Management Regulations 1992	To protect and manage the five identified water management areas in Samoa	Forestry Division
Village Fono Act 1989	Recognizes traditional management systems for managing villages	Ministry of Internal Affairs
Sewerage Regulations 1993	To regulate the control and use of sewers	Samoa Water Authority

Source: Division of Environment and Conservation, DLSE (2000).

2. Monitoring

23. Preliminary environmental monitoring programs, for all environmental media have been developed and will be finalized during detailed design. A baseline water-quality monitoring program needs to be implemented to demonstrate the positive effect of the project as well as monitor sediment loadings and turbidity during construction. Key monitoring points will include the upstream locations and outlets for the Gasegase, Asaga, and Mulivai Stream and the Vaisigano River. The Mulivai Streams just downstream of the national hospital will also be a key monitoring point as will Vaiusu Bay, particularly near the WWTP. Additional sampling points will be identified during the detailed design phase and finalization of the project performance monitoring system (PPMS). Parameters to be included in water quality monitoring are Turbidity, Suspended solids, Electrical Conductivity, pH, Dissolved oxygen, Temperature, Total Coliforms (and/or enterococci in marine waters), *Escherichia coli* (or enterococci in marine waters), Total Nitrogen, and Total Phosphorus. Other nonproject-specific contaminants such as heavy metals may be included, cost permitting.

24. Sampling frequency will be determined during detailed design, but will be not less than quarterly until facility commissioning is completed. An appropriate long-term monitoring schedule will be determined based on the evaluation of data collected to that time and institutional capacity.

25. Biological monitoring will also be carried out. Aquatic species diversity will be assessed through the establishment of transect-based monitoring sites. Monitoring programs will cover the assessment of species diversity for fish, corals, and shellfish; other key species as determined by the baseline survey and practicable; and flora at a minimum of two sites in Apia Harbour and two sites in Vaiusu Bay. Transect monitoring will be carried out at 6-month

intervals, timed to include a representative dry season and wet season (January and July). Recommended survey intervals during construction and operations are every 6 months. The required survey intervals will be finalized during detailed design.

3. Reporting

26. Monthly reporting to the Project Management Team (PMT) on the PPMS will be carried out on the implementation of project monitoring activities and results. The results will be used in a feedback loop to allow the PMT, project steering committee, and contractors to modify project implementation activities where required.

27. A quarterly report on monitoring activities will be prepared and made available for public viewing through the community liaison office.

28. The environmental monitoring report, including assessment of the implementation of the EMP, will be submitted to ADB with the regular project progress reports.

4. Public Participation

29. Public participation was a key part of the development of the urban planning and management strategy from which this Project emerged. Stakeholder consultations on urban environmental strategies have been undertaken since 2000.¹¹ The consultations included three focused group discussions between 13 and 7 July 2001 and two workshops in July 2001. Participants were from all four districts of greater urban Apia and included representatives from traditional leaders, women's committees, *au maga*, (untitled men that serve traditional leaders), and village mayors. Nongovernment organizations (NGOs) were also consulted, the most recent consultation being that conducted as part of the Fact-Finding Mission in February-March 2003. The issues and needs for urban sanitation and drainage were also raised by the community as part of the Participatory Assessment on Hardship that was undertaken through ADB assistance.¹² The Government is continuing consultations as part of its preloan preparations. The IEE describes completed and planned public participation activities, agency responsibilities, staffing needs, and monitoring programs. These include establishing or enhancing existing community relations offices to disseminate information on the monitoring results. In addition, involvement of the community and NGOs in monitoring will be encouraged.

F. Findings and Recommendations

1. Findings

30. The Project will have no significant negative environmental impacts. With the improved sanitation and drainage facilities, the overall environmental effect of the Project is positive. The reduced discharge of untreated and partially treated sewage improve in water quality in near shore marine waters and urban streams. Public health will also improve.

31. Environmental mitigation measures have been formulated and incorporated into the project design, including the PPMS and EMP.

¹¹ Some of these have been supported through ADB 2002. *Technical Assistance to Samoa for Capacity Building for Urban Planning and Management*. Manila; and ADB 2002. *Implementation of the Urban Planning and Management Strategy*. Manila.

¹² ADB. 2001. *Consultative Workshops on Poverty Reduction Strategies in Selected Pacific Developing Member Countries*. Manila.

32. Minor impacts from construction-related issues that could occur without mitigation include (i) sedimentation from excavation and drain clearing activities, (ii) vegetation disturbance from drain and floodway widening, (iii) noise from construction equipment, (iv) traffic congestion due to the movement and use of construction equipment, and (v) waste generation.

33. Minor impacts from operation-related issues that could result without mitigation include (i) infrequent operational odor from the WWTP and pumping station; and (ii) potential infiltration gallery overflow situations from WWTP malfunction or backflows from the pumping station due to malfunction or pipe blockage.

34. Mitigation measures to address all potential impacts, even minor ones, have been incorporated into project design. All potential impacts are mitigated by standard engineering and construction practices and thus require no unusual measures or effort to address.

35. Positive environmental and social impacts include (i) cleaner and more efficient drainage system, (ii) improved flood monitoring, (iii) improved water quality in drains and coastal receiving waters, (iv) improved health conditions for Apia residents, (v) expanded institution capacity to manage drainage and sanitation issues including sludge and septage management, (vi) employment for public and private sector operators.

2. Recommendations

36. Based on the findings, the following recommendations are made for inclusion in the ongoing preparation and implementation of the Project.

37. To comply with the Government of Samoa draft guidelines on EIA and to ensure that (i) IEE design assumptions remain valid; (ii) appropriate design standards, mitigation measures, and monitoring systems are put in place for the Project; and the project EMP is updated based on detailed design; a Government EIA should be completed in accordance with Government guidance.

38. Baseline environmental surveys including water quality and biological surveys should be carried out and monitoring continued throughout the project and as a regular part of environmental management.

39. The feasibility of incorporating the participation of a community organization or NGO in the environmental monitoring program should be assessed.

G. Conclusions

40. The overall effect of the Project is positive and should result in a much improved ambient water quality and urban environment. There are no significant negative environmental impacts that are not easily mitigated by the measures incorporated in the design, including required construction controls.

41. To comply with the Government of Samoa draft guidelines on EIA and to ensure that (i) IEE design assumptions remain valid; (ii) appropriate design standards, mitigation measures, and monitoring systems are put in place for the Project; and the project EMP is updated based on detailed design; a Government environmental assessment should be completed in accordance with Government guidance.

SHORT RESETTLEMENT AND LAND ACQUISITION PLAN

A. Scope of Land Acquisition

1. It is the Government's strategy to avoid land acquisition and resettlement for all drainage and urban services and that approach has been followed in this Project. Nevertheless, the preliminary design indicates that limited land acquisition may be necessary for the drainage component. Potentially affected is low-lying, undeveloped land along natural stream floodways in the urban area. The land is unproductive and has no structures. Landowners in this area hold legal titles and are not considered vulnerable by economic status, gender, or minority status. The assessment also considered the potential need for sewer alignment changes based on detailed design and determined that any reasonable shift could involve less than five landowners and only subsurface land use.

2. Given the small number of affected persons (less than five households) and that no structures, sources of livelihood, or productive lands are affected, this level of land acquisition is considered insignificant by the *policy on involuntary resettlement of the Asian Development Bank (ADB)* and its *Handbook on Resettlement, A Guide to Good Practice*.

B. Policy Framework and Entitlements

3. The Government of Samoa's well-established procedures for taking lands consider both traditional land tenure systems and compensation. Grievance procedures are well articulated in the relevant Act and are consistent with ADB policy and guidance.

C. Implementation Arrangements

1. Institutional Framework

4. The Department of Lands, Survey and Environment (DLSE) is closely involved in the Project through its Planning and Urban Management Agency (PUMA), which will facilitate timely coordination of land acquisition needs. The project management team will coordinate the detailed design with PUMA and DLSE to ensure that land acquisition follows applicable Government laws and regulations, ADB policies, and this short resettlement plan.

2. Resettlement Budget and Financing

5. The national Government will fully finance land acquisition by 100%. A budget of \$0.26 million (ST790,000) has been allocated.

3. Implementation Schedule

6. The Government will undertake preliminary consultations with potentially affected landowners as part of its ongoing preloan preparations and not later than loan effectiveness. Detailed discussions will begin after detailed design has determined which, if any, landowners will be affected and to what extent. Design will be completed by the third quarter of 2004.

D. Monitoring and Evaluation

7. Monitoring and evaluation will be mainstreamed into the overall project implementation-monitoring program, and quarterly reports will confirm the number of affected persons and status of the land acquisition process.

PRELIMINARY ENVIRONMENTAL MANAGEMENT PLAN

A. Introduction

1. The objectives of the environmental management plan (EMP) are to outline institutional requirements and management, and monitoring measures that will be undertaken to ensure that environmental values are protected and enhanced through mitigation measures and that these are monitored and reported in an efficient and effective manner. This EMP necessarily repeats information in the initial environmental examination (IEE) and summary IEE (SIEE), as it is intended to be a stand-alone document. The Map shows the project area and location of all project components except the septage lagoon and landfill, which are too far to include on the map. The final EMP, which will be completed during the final design will incorporate an appropriate scaled map showing these latter subcomponents.

2. Each contractor for works completed under the Project will be required to submit a contract-specific EMP that reflects the particular work and the specific methods and locations for the mitigation measures. The contract EMPs will identify specific responsible agencies and, in the case of contractors, persons and appropriate contact information.

B. Summary of Potential Impacts and Planned Mitigation Measures

3. Potential impacts are described in detail in the IEE and the SIEE. They are summarized in Table 2.1. Narrative descriptions of mitigation measures (Table A2.2) will be included in the final EMP.

Table A2.1: Summary of Key Environmental Impacts and Mitigation Measures

Project Phase	Air		Water		Land	
	Impact	Mitigation Measures ^a	Impact	Mitigation Measure ^a	Impact	Mitigation Measure ^a
Construction ^b	Dust	<ul style="list-style-type: none"> Covering of fill transport vehicles Water spraying Minimization of on-site material storage 	<ul style="list-style-type: none"> Erosion and sedimentation Stream flow disruption 	<ul style="list-style-type: none"> Erosion control Sedimentation controls Construction scheduling Monitoring <p>Limiting any 1 disruption time to hours, limiting to within stream changes</p>	Vegetation removal	<ul style="list-style-type: none"> Minimize removal Replanting
	Noise and traffic	<ul style="list-style-type: none"> Careful construction scheduling Site sound barriers Proper O&M of equipment 			Land acquisition (1-3 landowners)	<ul style="list-style-type: none"> Short resettlement plan^c in accordance with ADB policies
Operational	Odor	<ul style="list-style-type: none"> Engineering controls Buffer zones Odor control O&M capacity building 	<ul style="list-style-type: none"> Localized pollution from emergency discharges 	<ul style="list-style-type: none"> Controls Buffer zones Odor control O&M capacity building 	Generation of refuse	<ul style="list-style-type: none"> Timely clean-up Landfill disposal Testing and disposal at landfill or other based on testing
	Corrosive gas damage to sewers	<ul style="list-style-type: none"> Appropriate design 	Overflows and bypasses	<ul style="list-style-type: none"> Standby equipment Proper O&M Appropriate design 	Drainage dredge material disposal	<ul style="list-style-type: none"> Sludge and septage disposal Sampling and analysis Septage treatment in lined ponds or digester at the landfill Disposal in lined lagoons and at sanitary landfill
						<ul style="list-style-type: none"> Appropriate design O&M capacity building and training

ADB=Asian Development Bank, O&M=operation and maintenance.

^a Listed measures are indicative: comprehensive suite of mitigation measures has been developed and will be incorporated into all contract specifications.

^b Includes siting issues.

^c Appendix 1 gives the short resettlement plan.

^d Overall effect to receiving water quality is positive with reductions in a number of sewage-related contaminants as well as some reduction in sediment loadings in floodwaters since more runoff will be contained in lined channels. Wastewater treatment plant (WWTP) effluent discharge to infiltration gallery eliminates the need for ocean outfall; siting adjacent to wetlands provides for natural buffering effect to marine waters in the event of overflows.

C. Environmental Monitoring

4. A baseline water quality-monitoring program needs to be implemented to demonstrate the positive effect of the project as well as to monitor sediment loadings and turbidity during construction. Key monitoring points will include the outlets for the Gasegase, Asaga, and Mulivai streams and the Vaisigano River. The Mulivai stream just downstream of the national hospital will also be a key monitoring point as will Vaiusu Bay, particularly near the WWTP. Specific locations will be detailed on a map of an appropriate scale in the final EMP. Monitoring parameters will include sewage-related parameters and, for construction monitoring, erosion- and sedimentation-related parameters, e.g., turbidity and suspended solids (Table A2.3).

D. Public Consultation

5. Public participation was a key part of the development of the urban planning and management strategy from which this Project emerged. The Government is continuing consultations as part of its preloan preparations. The Project includes developing community awareness programs, including enhancing existing community relations offices to disseminate information on the monitoring results. Through public meetings, radio, television and newspaper articles, the community liaison office will inform the community on project implementation and progress. The office will be a link between the Ministry of Internal Affairs (MIA) and the Project. Members of the community who wish to provide input to the project will do so via the community liaison officer. In addition, involvement of community and nongovernment organizations in monitoring will be encouraged.

E. Implementation Arrangements

1. Institutional Responsibilities

6. The implementing agencies, the Ministry of Works (MOW), Samoa Water Authority (SWA), and the Planning and Urban Management Agency (PUMA), under the supervision and guidance of the project steering committee and project management team (PMT) will all have roles in implementing the EMP. The Fisheries Department will assist in environmental monitoring through biological monitoring in marine waters near the project area. The Division of Environment and Conservation (DEC) with the Ministry of Natural Resources and Environment will assist in flora monitoring. Table A2.4 summarizes the roles of the involved agencies. The project implementation assistance consultancy will advise and assist the implementing agencies (Table A2.5). The project capacity building program includes activities to support the environmentally sound implementation of the Project, including implementing the EMP, and long-term environmental management.

2. EMP Implementation Monitoring and Review

7. Monthly reports on the PPMS will be submitted to the PMT during implementation of project monitoring activities and results. The results will be used in a feedback loop to allow the PMT, project steering committee, and contractors to modify project implementation activities where required.

8. A quarterly report on monitoring activities will be prepared and made available for public viewing through the community liaison office (Figure 2.1).

9. The environmental monitoring report, including assessment of the implementation of the EMP, will be submitted to the Asian Development Bank (ADB) with the regular project progress reports.

3. Environmental Responsible Procurement Plan

10. An environmentally responsible procurement (ERP) plan will be incorporated into the detailed design and will be a requirement of the contractor-specific EMP. The ERP plan will consider total environmental costs based on life-cycle evaluation. Contractors' environmental performance will be a specific element of performance guarantees, and penalties will be applied if contractors fail to implement the EMP.

4. Cost Estimates

11. Since most mitigation measures are inherent in standard engineering and construction, their costs are included in the design and construction estimates. Contractors will be required to include monitoring costs in their bids. Final cost estimates will be included in the EMP after detailed design.

Table A2.2: Summary of Mitigation Measures

Project Stage	Project Activity	Potential Environmental Impacts	Proposed Mitigation Measures	Institutional Responsibilities	Cost Estimates
Pre-Construction	Siting	Odor, traffic, aesthetics, water quality	Site analysis (completed) landscaped buffer zones proper O&M; design to secondary treatment	PMT, SWA, MOW	Inherent to design costs
	Design	Odor, water quality degradation, aesthetics	Design to secondary treatment; use of infiltration gallery for effluent disposal; landscaped buffer zones simple O&M; O&M capacity building		
Construction	Sewer and drainage facilities construction	Dust	<ul style="list-style-type: none"> Covering fill transport vehicles Water spraying Minimizing on-site material storage 	PMT, SWA, MOW, PUMA	Inherent to construction contract costs
Erosion and sedimentation		<ul style="list-style-type: none"> Erosion controls (temporary grassing, covering exposed areas with jute netting or similar runoff diversion, etc.) Covering fill stockpiles Sedimentation controls (erosion control measures plus silt fences) Construction scheduling Monitoring 			
Vegetation removal		<ul style="list-style-type: none"> Minimize removal Replanting 			
Noise and traffic		<ul style="list-style-type: none"> Careful construction scheduling Site sound barriers Proper O&M of equipment 	PUMA SWA – for wastewater and sanitation construction		
Land acquisition (1-3 landowners)		<ul style="list-style-type: none"> Acquisition according to Government laws; short resettlement plan in accordance with ADB policies 	MOW – for drainage construction		

Project Stage	Project Activity	Potential Environmental Impacts	Proposed Mitigation Measures	Institutional Responsibilities	Cost Estimates
Operation and maintenance	WWTP and pump station operations	<p>Odor</p> <p>Localized pollution from emergency discharges Overflows and bypasses</p> <p>Sludge disposal</p> <p>Corrosive gas damage to sewers</p>	<ul style="list-style-type: none"> • Engineering controls • Buffer zones • Odor control • O&M capacity building • Proper O&M • O&M capacity building • Appropriate design capacity • Standby equipment • Sampling and analysis • Disposal in lined lagoons and at sanitary landfill or NGO-sponsored waste-to-energy digester • For WWTP sludge treatment at plant • Appropriate design 	SWA, PUMA	To be determined in final design – included in cost estimates of WWTP

ADB=Asian Development Bank, NGO=nongovernment organization, O&M=operation and maintenance, PMT=Project Management Team, PUMA= Planning and Urban Management Agency, SWA=Samoa Water Authority
WWTP=wastewater treatment plant.

Table A2.3: Summary of Monitoring Requirements

Phase	Mitigation Measure	Parameters to be Monitored	Location ^a	Frequency	Responsible Agencies	Cost ^b (\$'000s)
Pre-Construction	Appropriate siting	Sewage parameters ^c	Urban Stream mouths	Quarterly	Samoa Water Authority	20.0
	Adequate design		Urban stream near hospital Vaiusu Bay Apia Harbor Vaiusu Bay Apia Harbor	Every 6 months to include wet and dry seasons	Planning and Urban Management Agency Fisheries Department and DEC	5.0
Construction	Erosion and sedimentation controls	Suspended solids Turbidity Visual observations	Immediately upstream and downstream of area of construction ^d	During rains	Contractor SWA PMT	Included in bid price
Operation and Maintenance		Sewage parameters	Urban stream mouths Urban stream near Hospital Vaiusu Bay Apia Harbor	Quarterly For ambient water quality	SWA PUMA	8.0 per annum
			WWTP influent and effluent	Daily	SWA	
		Flora and fauna baseline surveys	Apia Harbor Vaiusu Bay	To be determined	Fisheries Department	

SWA=Samoa Water Authority, PMT=Project Management Team, PUMA=Planning and Urban Management Agency, MOW=Ministry of Works, WWTP=wastewater treatment plant

^a Areas are shown on the Map, but the final environmental management plan (EMP) will show detailed sample locations on a figure of appropriate scale.

^b Estimates to be finalized during detailed design.

^c Sewage parameters include, but are not limited to, biochemical oxygen demand (BOD), coliforms, other indicator bacteria, suspended solids, turbidity, pH, conductivity, total nitrogen, total phosphorus.

^d Contractor will designate specific locations and schedule for construction areas, subject to the approval of SWA and PMT.

Table A2.4: Key EMP Roles and Responsibilities

Agency	Role	Task and Responsibilities
Project Steering Committee through supervision of the PMT	Coordinate and supervise project activities; clarify policy matters	<ul style="list-style-type: none"> • Ensure monitoring activities are assessed and any required changes to the monitoring plan implemented • Ensure that the EMP is implemented in a timely and effective manner in accordance with agreed-upon timeframes and outcomes • Ensure regular input of data to the project performance management system (PPMS) • Regularly report to ADB.
MOW	Project management of physical construction works for drainage works	<ul style="list-style-type: none"> • Ensure contractors are conforming to environment protection parameters as specified in works implementation contracts, the PPMS and any planning permits issued under the PUMA Act
SWA	<p>Ambient water quality monitoring</p> <p>Supervision of construction and commissioning of wastewater management and sanitation works</p>	<ul style="list-style-type: none"> • Undertake ambient water and wastewater quality sampling, testing, and monitoring activities; oversee contractor's environmental monitoring (this may involve analysis of contractor-collected samples, paid by the contractor) • Ensure contractors are conforming to environment protection parameters as specified in works implementation contracts, the PPMS, and any planning permits issued under the PUMA Act
PUMA	<p>Undertake EIA with assistance of implementation assistance consultants</p> <p>Oversight of environmental quality monitoring</p> <p>Building codes and related sanitation and wastewater regulations</p>	<ul style="list-style-type: none"> • Monitor implementation of physical mitigation measures, including adherence to EMP and planning permits • Provide EIA advice and contract guidelines to implementing agencies and contractors • With PMT, ensure community liaison activities are implemented, including land issues addressed • Coordinate environmental monitoring of project activities and review monitoring reports. • Under the technical assistance, prepare updated building codes • Under loan capacity building activities, develop wastewater management and environmental legislation and regulations
Fisheries Department	Fauna surveys	<ul style="list-style-type: none"> • Undertake fauna survey and monitoring of marine resources in Vaiusu Bay and Apia Harbor
DEC	Flora surveys	<ul style="list-style-type: none"> • Undertake flora survey and monitoring of terrestrial resources in Vaiusu Bay • Assist in community education and awareness program
Ministry of Internal Affairs	Coordinate community liaison	<ul style="list-style-type: none"> • Ensure liaison between the village and family <i>matai</i> • Monitor and make known community views to Project and Government.

ADB=Asian Development Bank, EIA=Environmental Impact Assessment, EMP=Environmental Management Plan, MOW=Ministry of Works, PMT=Project Management Team, PPMS=Project Performance Management System, PUMA=Planning and Urban Management Agency, SWA=Samoa Water Authority.

Table A2.5: Summary of Institutional Strengthening and Training ^a

Strengthening Activity	Agency	Strengthening Program	Schedule ^b
Project implementation assistance	SWA MOW PUMA	<ul style="list-style-type: none"> • Prepare EIA (assist) • Prepare a project performance monitoring system (PPMS) • Review and assess project designs, drawings, and the bid documents • Provide training and on-the-job guidance on the above items • Develop proposals to improve public awareness of the Project • Prepare detailed environmental monitoring program to meet needs of project EIA, recommended as well as long-term monitoring requirements • Review and revise environmental master plan based on detailed design • Develop implementation plan for a wastewater flow and quality monitoring program • Provide training for monitoring program 	Q2 2004-2 2006
Loan capacity building (institutional strengthening)	SWA MOW MOH Fisheries	<ul style="list-style-type: none"> • Identify training needs and develop relevant programs for wastewater management and sanitation • Develop wastewater management and sanitation O&M procedures and program • Establish performance monitoring program • Establish receiving water and wastewater quality monitoring programs • Establish necessary laboratory upgrades and training program • Develop water and environmental quality monitoring programs (PUMA, MOH, and MOA) • Review and develop water quality standards (PUMA) • Review and revise environmental impact assessment guidelines and implementing regulations (PUMA) • Establish necessary laboratory upgrades and training program (MOH and MOA) • Establish performance monitoring program (PUMA and MOW) • Establish environmental health outcomes monitoring program (MOH) • Consult with community to develop principles for community involvement, a participative framework and mechanisms for community awareness and education • Develop and implement community 	

		awareness performance indicators and monitoring program	
Twinning Arrangement	SWA	<ul style="list-style-type: none"> • Provide intermittent on-site support and distance support for 3 years to cover general wastewater utility management and operations and maintenance 	Q3 2005– Q4 2008
TA – Capacity Building	PUMA	<ul style="list-style-type: none"> • Review water quality monitoring data and environmental implications • Evaluate social customs, norms, practices affecting wastewater discharge • Undertake legislative drafting for wastewater management and sanitation • Facilitate community public meetings on drainage/wastewater issues • Assist with the development of media strategies for affected communities 	Q2 2004 – Q2 2005

EIA=Environmental Impact Assessment, SWA=Samoa Water Authority, MOW=Ministry of Works, PUMA=Planning and Urban Management Agency, MOH=Ministry of Health, O&M=operation and maintenance, MOA=Ministry of Agriculture, TA=technical assistance

^a Indicative activities of support to EMP of the Project are given, but since all activities relate to successful performance of SWA and MOW, all support the environmental performance of the Project. Refer also to terms of reference for respective consultant's TOR and the Report and Recommendation of the President.

^b Detailed schedule to be determined during respective contract negotiations.

Figure 2.1: Scheduling and Reporting

Activity	Year 1				Year 2				Year 3				Year 4				Year 5			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Mitigation Measures																				
Monitoring and Reporting	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Capacity Building																				
Twinning Arrangement																				
Technical assistance																				

^a Intermittent, as construction activity and facility commissioning warrant.