



Technical Assistance Consultant's Report

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Samoa: Institutional Strengthening for Drainage and Wastewater Management (Financed by the Japan Special Fund)

Prepared by: Kellogg Brown & Root Pty Ltd

For: Asian Development Bank

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Asian Development Bank

INSTITUTIONAL STRENGTHENING FOR DRAINAGE AND WASTEWATER MANAGEMENT

Final Report – Executive Summary

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Limitations Statement

The sole purpose of this report and the associated services performed by Kellogg Brown & Root Pty Ltd (KBR) is to develop a report on an event in accordance with the scope of services set out in the contract between KBR and the Asian Development Bank ('the Client') for the TA 4229-SAM Institutional Strengthening for Drainage and Wastewater Management.

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Revision History

Revision	Date	Comment	Signatures		
			Originated by	Checked by	Authorised by
0	29 March 2007	Issued for approval	SB	RDH	CAS

Abbreviations

CBA	Central business area
DWWMP	Drainage and Wastewater Management Plans
EIA	Environmental Impact Assessment
GIS	Geographical Information System
GoS	Government of Samoa
IPA	Isikuki Punivalu and Associates Limited
KBR	Kellogg Brown & Root Pty Ltd
LSE	Land, Survey and Environment Act
MoF	Ministry of Finance
MoH	Ministry of Health
MNREM	Ministry of Natural Resources, Environment and Meteorology
MWTI	Ministry of Works Transport and Infrastructure
PUM	Planning and Urban Management
PUMA	Planning and Urban Management Agency
SMP	Sustainable Management Plan
SPG	South Pacific Games
SSDP	Samoa Sanitation and Drainage Project
SWA	Samoa Water Authority
TA	Technical Assistance

Executive Summary

KBR in association with IPA were appointed to carry out TA 4229-SAM: Institutional Strengthening for Drainage and Wastewater Management and have completed the Interim Phase of the Technical Assistance (TA) in conjunction with the Planning and Urban Management Authority (PUMA). The executing agency for this TA is the Ministry of Finance (MoF) with the implementing agency (IA) being PUMA. It was a requirement to also deliver TA to other key agencies involved with drainage and wastewater including the Samoa Water Authority (SWA), Ministry of Works Transport and Infrastructure (MWTI) and the Ministry of Natural Resources Environment and Meteorology (MNREM). The main objective of the TA was to strengthen the policy, procedural and legislative base of key agencies involved in the water and sanitation services as well as strengthen urban management and planning capacity generally.

This final report covers all of the TA outputs which relate to the development of *'Drainage and Wastewater Management Plans'* (Component A) and *'Planning and Regulation'* (Component B) which relate to drainage and wastewater management for the urban area of Apia, Samoa. The overall scope of the TA is as follows:

- identifying priority flood areas on the Apia floodplain in the context of a total catchment management approach
- examining options and alternatives to alleviate localised flooding and wastewater impacts including examination of the preferred options
- liaising with local villages as to flooding and wastewater problems and the likelihood of access over land for drainage rehabilitation and maintenance
- assessing existing problems of constructing septic toilets and pit latrines in low lying flood prone areas and setting new affordable and pragmatic building standards
- developing a legislative regime to ensure, amongst other matters, connection to the central business area (CBA) sewerage scheme and permits for the discharge of industrial wastewater
- working with key stakeholders to develop new procedures and processes to ensure the New Planning and Urban Management Bill (now PUM Act) is institutionalised and operational.

There are seven TA outputs, three in Component A and four in Component B each of which has been summarised separately.

COMPONENT A: DRAINAGE AND WASTEWATER MANAGEMENT PLANS

Following an assessment of the main priority areas for flooding, drainage and wastewater within the Apia urban area, discussions with the Government of Samoa (GoS) and Samoa Sanitation and Drainage Project (SSDP) two distinct plans were prepared during the course of this TA, namely:

- Drainage Management and Wastewater Management Plans – have been developed which identify priority drainage and wastewater areas, preliminary sewerage master plan areas, structural drainage solutions and modelled flood levels (1 in 20 and 100 year return periods). Other issues associated with the overall management of drainage and wastewater within the Apia urban area priority areas have also been examined.
- Sustainable Management Plan (SMP) – has been developed under the legislative provisions of the PUM Act, 2004, with the draft SMP containing development standards, land use and development guidance specific to drainage, flooding and wastewater issues.

These plans fulfil the technical output requirements of Component A of the TA. During the development of plans a number of Ministries within the GoS such as PUMA, MWTI and SWA helped in the development of these plans. This facilitated the capacity building and training requirements of the TA. Other specific technical outputs within Component A relate to an assessment of the current water quality data and associated environmental implications, along with the development of general training and community awareness program development.

Drainage and Wastewater Management Plans

Drainage Areas

The following eight priority drainage areas were identified during the course of development of the 'Drainage and Wastewater Management Plans' (DWWMPs). These areas have been ranked in descending order of flooding and drainage risk including:

1. the Gasegase-Fugalei-Asaga System (Gasegase catchment)
2. the Savalalo Street-Convent Street System (Apia CBA)
3. the Lotopa-Pasega area drainage system (Gasegase and Fuluasou catchment)
4. Talimatau-Tulaele area (SPG Authority Sport Complex at Tuanaimato West - Fuluasou catchment)
5. the Mulivai River channel works (Mulivai catchment)
6. the Vaisigano River channel works (Vaisigano catchment)
7. the Matautu-Fagali'i drainage system (Vaivase catchment)
8. Avele-Vailima area (Vaisigano catchment).

Part of the Drainage Management Plan for these priority areas identifies future drainage investment projects and also management of drainage and flooding issues within the Apia urban area. Regardless, it is considered that an up to date drainage master plan should be developed

for the Apia urban area and also a drainage design manual which can be used across GoS Ministries and specifically MWTI.

Key finding: we recommend an ongoing works program to address the priority drainage areas and also the development of a 'Drainage Master Plan' and 'Drainage Design Manual' which can be used for the Apia urban area.

Wastewater Areas

Whilst the CBA area is going to be included in the SSDP sewer network other priority wastewater areas have been identified in conjunction with SSDP staff and through previous studies and reports. These areas have been ranked in descending order in terms of environmental and public health risk and are indicated as follows:

1. the properties located along Beach road either side of the Apia CBA this can be considered to be the 'beachside strip' which runs east of CBA to the Vaisigano River boundary. This area adjoins the Apia CBA which will be sewerred
2. low lying area behind the Apia CBA strip which extends along Beach Road, identified within the SSDP project boundary
3. the Fungalei market area and general surrounds
4. the National Hospital which has a relatively large discharge volume of wastewater from the existing on-site package plant
5. the Vaitele Industrial area which has a number of commercial properties and also existing industrial uses
6. commercial area which is south of Convent Street along Vaea Street generally as far as the Fugalei Market area
7. the Malifa school compound located between Ifiifi Street and Falealili Street towards the southern boundary of Vaitele Street
8. Maluafoli School which is the smaller school compound located towards the north of the Malifa School.

Area 1, Area 3 and Area 4 should be connected to the SSDP sewerage system which will service the core CBA and, in the case of the low lying Area 2, subject to an improvement of on-site sanitation systems by SSDP. Following the implementation of the SSDP sewerage scheme any future expansion of the sewer network should include servicing this low lying area. Overall the type of system to be developed across Apia will depend upon the outcomes from the SSDP D&C contract currently being tendered.

A preliminary sewerage master plan has been developed with an indication of the number of residents (and also an estimate of the number of office workers who will be in the areas during the day). These estimates and, indicative sewerage scheme areas and associated wastewater volume generation rates, should be viewed as a preliminary only and will require further detailing during sewerage scheme expansion studies.

Key finding: we recommend completion of the CBA area and main hospital as the first stage of the SSDP sewerage scheme with the next staging of works to follow the concept sewerage master plan. Following development of the SSDP sewerage scheme for the CBA area a detailed sewerage master plan should be developed in conjunction with the Apia urban area Town Plan which is being developed by in house PUMA officers.

Sustainable Management Plan (SMP)

A draft SMP has been prepared based upon a catchment management approach with an emphasis on improving the development and land use planning issues within the urban context which have a major affect on drainage, flooding and wastewater impacts. The SMP targets five priority physical areas within the catchment including:

1. land adjoining rivers and streams in the upper, middle and lower catchment
2. lands identified as being flood prone lands (based on 1 in 100 year flood level)
3. lands that fall within the jurisdiction of the SWA in the lower catchment in terms of sewage and sanitation management
4. lands that fall within the ambit of the eight specific drainage areas as considered as a priority for remedial action by the government as well as other stakeholders so as to mitigate the impacts of poor drainage, wastewater and flooding
5. land that falls outside the above specific areas.

The draft SMP is currently being assessed by the Planning Board which has been established under the PUM Act and will be considered for use by PUMA officers as a guideline note. The note will aid in PUMA's assessment of developments and also how future SMPs will be drafted.

Key finding: we recommend adoption of the SMP by the PUMA Planning Board as a 'planning tool' to help guide development regarding wastewater and drainage management issues.

Assessment of the current water quality data

An assessment of the previous environmental samples which have been obtained from the natural streams, manmade drains and near shore locations within and around the Apia urban area was completed. Sampling events have occurred during 1993, 2004 and also recently in June 2006 by the SSDP as part of the baseline monitoring data collection for the project environment impact assessment (EIA) component.

Results from these sampling events generally indicate high bacteriological counts including E coli and Total Coliforms, high turbidity and suspended solid loads, especially within streams which drain the urban areas of Apia such as the Fugalei and Asaga Streams. These exhibit the highest pollutant concentrations of sampled sites. The water quality data indicates that gross pollution of the watercourses is most likely due to non-point source pollutants and septic tank base flows into the drains and streams around the urban area with other impacts into Vaiusu Bay primarily due to sediment and nutrient loading.

The main contributing factor for environmental impacts on receiving waters around Apia has been identified as land use issues and a lack of regulatory enforcement for effective and

efficient septic tank system construction and operation. A lack of planning and regulation, coupled with the fact that septic tank and soak pit/absorption trench systems do not operate efficiently within alluvial floodplains with high groundwater levels, have caused these impacts.

Key finding: we recommend use of the SMP for guiding development occurring in areas which may affect the environmental values of the freshwater and marine environments. We promote use of the powers within the PUM Act to regulate development which causes a significant impact upon the environment.

COMPONENT B: PLANNING AND REGULATION

Following a legislative review of Western Samoa laws which relate to drainage and wastewater management and an institutional assessment of PUMA and other GoS ministries, the following tasks were completed as required by Component B of the TA:

- Legislative and policy review of all laws which relate to drainage and wastewater management within Western Samoa followed by the development and refinement of the Sewerage Regulations, the Drainage and Road Reserve Regulations and the Trade Waste guidelines.
- Identification of specific mechanisms within the PUM Act which relate to the management of drainage and wastewater within the urban context. This was followed by identification of how these mechanisms can be used by PUMA officers during development approval and the planning process.
- Installation of GIS software and identification of effective methods of using this software during daily PUMA office operations and granting development approvals.
- Review of on-site building standards followed by recommendations regarding changes to the National Building Code (NBC) of Samoa.

Completion of these specific outputs also helped to identify some of the main issues which PUMA face in daily operations and how potential future technical assistance programs may benefit the agency.

Legislation Development

A thorough review of the existing Samoan legislation was completed for issues surrounding wastewater and sanitation along with ongoing consultation with the office of the Attorney General and other key stakeholders. Following this review a model wastewater and sewerage regulation, drainage regulation, road reserve regulation and also trade & industrial wastewater policy was drafted for consideration by the GoS. One of the key findings following review and development of this legislation was:

It appears that the most appropriate legislation to introduce the drainage, treatment of wastewater and a new sewerage system as proposed by the SSDP would be the Samoa Water Authority Act 2003 and the existing 'Draft Sewerage Regulations 1993' with modifications.

Other findings indicate MNREM to be the most appropriate Ministry, in conjunction with Ministry of Health (MoH), to be involved with the regulation of discharges from the proposed sewerage system with a review of any EIA should be completed by PUMA as part of the development application process. Regulatory provisions already exist for this function within the existing PUM Act, Land, Survey and Environment (LSE) Act and MoH. Over the longer term the GoS may consider rationalising these regulatory provisions into an 'Environmental Protection Act'.

Key finding: we recommend adoption of the Sewerage Regulations and Guidelines, the Road and Drainage Regulations and associated changes to the SWA Act in order to help establish and guide the construction and operation of the SWA (SSDP) Sewerage Scheme. We recommend further consideration and clarification of the regulatory roles and responsibilities into an Environmental Protection Act.

PLANNING AND GIS

A number of the regulatory planning issues have been addressed within the SMP with an emphasis on drainage, wastewater and sanitation. By using the SMP developed within Component A of this TA as a planning based tool regulatory, land use and development planning associated with drainage, wastewater and sanitation within Apia can be managed by PUMA. The GIS has been developed and installed to include a number of flood and wastewater layers identifying the priority areas for regulation and planning purposes.

Key finding: we recommend adoption of the SMP to help guide PUMA in areas of development activities which will be influenced by drainage, flooding and wastewater impacts. We also promote adoption of the GIS layers developed for PUMA for flooding and use of these layers for development control.

REVISED BUILDING CODE

The NBC for Samoa 1992 was reviewed for on-site treatment systems and its' applicability specifically within the low lying areas of Apia which are affected by high groundwater levels and frequent flooding. The specific section of the NBC which relates to on-site treatment systems, specifically privy pit and septic tank systems is Section DF2.1. From a review of the code, survey results and previous reports design specifications for the construction of masonry septic tanks is considered generally satisfactory.

It is anticipated that the following alterations to the NBC would bring it into line with current septic tank systems and also the proposed SSDP program of upgrading the on-site systems within the low lying areas of Apia:

- Due to the limited number of pit latrine and 'dry' systems now in Samoa removal of the following sections in the NBC and referral to these as separate guidelines
 - latrines for areas where there is no piped water supply
 - pit latrines.
- Alteration of the NBC to refer properties with more than 15 residents to be connected to either
 - the new SSDP sewerage scheme (if in gazetted area)
 - a sewage treatment package plant, or
 - some on-site treatment system which has been designed by an engineer.
- Inclusion within the NBC of a maintenance guidance note which can be used by the owner of the septic tank.
- Due to one of the proposed SSDP programs being installation of prefabricated septic tanks in the low lying areas of Apia (environmental improvement area) referral to the Australian/New Zealand Standard AS/NZS 1546.1:1998 to allow for this contingency.
- Provision for the construction of mound, or evapo-transpiration systems, which treat resulting effluent generated from septic tanks can be identified by referencing AS/NZS 1547:200 On-site domestic-wastewater management.

It is also important to note that provision for the connection of existing to the new SSDP sewer network has been allowed for in the draft '*Wastewater and Sewerage Regulation 2006*' in the form of a gazetted sewer area. On-site improvements can occur within an environmental improvement area which corresponds to the low-lying areas of Apia under the provisions of the regulation.

Key finding: we recommend specific adoption of changes to the NBC as identified above.