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PHILIPPINE SANITATION ALLIANCE

FINAL REPORT

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PHILIPPINE SANITATION ALLIANCE

FINAL REPORT

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LIST OF ACRONYMS

ABR	Anaerobic baffled reactor
BORDA	Bremen Overseas Research and Development Association
CREBA	Chamber of Real Estate and Builders' Associations
DENR	Department of Environment and Natural Resources
DILG	Department of the Interior and Local Government
DOH	Department of Health
ECO-Asia	Environmental Cooperation-Asia Project (USAID)
HUDCC	Housing and Urban Development Coordination Council
KBA	Key biodiversity area
LCP	League of Cities of the Philippines
LGU	Local government unit
LINAW	Local Initiatives for Affordable Wastewater Treatment
NSSMP	National Sewerage and Septage Management Program
O&M	Operation and maintenance
PSA	Philippine Sanitation Alliance (USAID)
PWRF-SP	Philippine Water Revolving Fund Support Program (USAID)
SWAPP	Solid Waste Management Association of the Philippines
TWG	Technical working group
USAID	United States Agency for International Development
WACS	Waste assessment and characterization study
WTP	Wastewater treatment facility

I. EXECUTIVE SUMMARY

The United States Agency for International Development (USAID) Philippine Sanitation Alliance (PSA) was a four-year program that worked with public and private sector partners to reduce public health risks, protect biodiversity and other natural resources by developing and implementing stakeholder-driven sanitation initiatives. The PSA leveraged substantial private and public sector investments in sanitation, increased capacity of local governments and water districts to address sanitation challenges, and increased public awareness and demand for improved sanitation services and willingness to pay user fees. The project made a substantial impact on the sanitation sector in the Philippines by raising the profile of sanitation among the national and local governments and by demonstrating that sanitation improvements can be financed and maintained by medium-sized cities outside Metro Manila. The project also facilitated and participated in an active national policy dialogue that supported the development of the National Sewerage and Septage Management Program (NSSMP) and celebration of the UN International Year of Sanitation and Global Handwashing Day in many cities.

During four years of implementation (October 2007-September 2011), the PSA worked with its partners to provide more than 1.4 million people with access to improved sanitation, leveraged more than $4 million in cash and in kind investments in sanitation infrastructure and activities, assisted partners in building 45 wastewater treatment facilities, and trained more than 5,900 people. The project met or exceeded all ten of its performance indicator targets.

The Dumaguete septage treatment plant has been operating since 2010 and user fees are being collected through the water bills. It is the first city-wide septage management system in the country that is funded and run by the local government unit (LGU) and water district. City officials attribute much of the success of the program to the effective promotion campaign that was done with PSA assistance. Septage management ordinances were approved by city councils of Calamba, Davao and Los Baños, but only the Calamba ordinance was signed by the mayor. The other two are pending review and approval by the newly-elected mayors. Cagayan de Oro and Zamboanga Cities developed terms of reference for private sector participation in septage management.

For the housing sector, the PSA worked with Gawad Kalinga to build anaerobic baffled reactors (ABRs) in 9 villages that serve over 1200 people. Since 2009, all Gawad Kalinga villages have ABRs rather than individual septic tanks. PSA also assisted partners in developing systems for hospitals, commercial centers, public markets and slaughterhouses.

In partnership with Rotary, the PSA implemented two multi-year projects: the San Fernando City Sewerage and Septage Management Project and the Pasig River Improvement Project. In San Fernando, a septage management ordinance was passed, a septage treatment facility is under construction, a promotion campaign was conducted and two onsite sewage treatment EcoTanks were installed. In Sta. Ana, a wastewater treatment plant was built for the public market, solid waste management programs were implemented for the market and six barangays, two hygiene promotion ordinances were passed, hygiene promotion activities and restroom repairs were conducted in the market and a public school.

In health and hygiene, PSA partner Sta. Rosa City implemented effective campaigns to promote handwashing among school children and mothers with children under 5 years of age and measured the impacts of the campaigns. The city also passed an ordinance requiring soap and handwashing facilities in all public restrooms. Barangay 876 in Sta. Ana, Manila enacted a similar ordinance. These ordinances are the first of their kind in the country.

Lessons learned include the value of motivating partners to implement sanitation improvements using their own funds, developing projects in an integrated fashion – including policies, infrastructure and

promotions – and achieving full cost recovery through user fees. Effective promotion campaigns were critical to ensuring public cooperation and willingness to pay for sanitation services. The project was able to be flexible in its activities, focusing resources on those partners that were very active and forging new partnerships with those where results were more likely. Exchange visits by mayors, city councilors and water district managers were very useful in spurring project development. The two USAID-Rotary projects implemented by the PSA achieved substantial results, but were found to be too ambitious in scope and complexity given the readiness and expectations of all the partners involved.

II. PROJECT DESCRIPTION

The USAID PSA was a four-year project that worked with public and private sector partners to reduce public health risks, protect biodiversity and other natural resources by developing low-cost, sustainable wastewater treatment systems and the policies and promotion campaigns needed to make them effective. The PSA leveraged substantial private and public sector investments in sanitation, increased capacity of local governments and water districts to address sanitation challenges, and increased public awareness and demand for improved sanitation services and willingness to pay user fees.

AECOM International Development, a USAID grantee, implemented the PSA from October 1, 2007 to September 30, 2011. The project was funded by the USAID Global Development Alliance and the USAID/Philippines mission. The PSA expanded upon two previous projects: Phase 1 and 2 of the Local Initiatives for Affordable Wastewater Treatment (LINAW), which was implemented by AECOM from 2003 to 2007.

A. GOAL AND OBJECTIVES

Goal:

- Protect biodiversity in key biodiversity areas (KBAs)[1] and reduce public health risks by promoting proper hygiene and reducing the amount of pollution discharged into the environment.

Objectives:

- Work with public and private sector partners to demonstrate that affordable wastewater treatment systems can be implemented in subdivisions and low-cost urban housing developments;
- Provide technical assistance to commercial establishments such as hospitals, hotels, markets and slaughterhouses to develop sewage treatment facilities using appropriate, low-maintenance technologies; and
- Improve sanitation and hygiene practices and willingness to pay for improved sanitation services through effective promotion campaigns.
- Provide technical assistance to national associations, such as the Local Water Utilities Administration (LWUA) and the League of Cities of the Philippines (LCP), to replicate the PSA approach throughout the country and to establish the institutional capacity for continuing this assistance; and
- Strengthen governance to reduce threats to biodiversity.

The PSA focused on three private sector areas: housing, hotels and restaurants, and hospitals and worked with cities and water districts. See the list of partners below.

[1] While biodiversity protection was a goal of the project, the strategy to achieve this was to reduce pollution flowing to water bodies from domestic wastewater, which is the major source of organic pollution in many key water bodies. This is explained further in the section on biodiversity (Section IV. F).

B. PARTNERS

The following table lists the partner organizations that were involved in the PSA project.

Table 1. PSA Partner Organizations

Private Sector		
Private Companies		
• Coca-Cola Philippines	• C TRADE	• Max's Restaurants
National Associations		
• Chamber of Real Estate and Builders' Associations (CREBA)	• Philippine Hospital Association • League of Cities of the Philippines	• Hotel and Restaurant Association of the Philippines
Non-Governmental Organizations		
• Bremen Overseas Research and Development Association (BORDA)	• The Blacksmith Institute • Rotary International • Lola Grande Foundation	• Gawad Kalinga • Solid Waste Management Association of the Philippines
Philippine Local Governments and Water Districts		
• Calbayog City • Cagayan de Oro City • Calamba Water District • Davao City Water District	• Dumaguete City • Laguna Water District • Metro Cebu Water District • Metro Naga Water District	• Meycauayan City • Muntinlupa City • Sta. Rosa City • Zambaonga City
Other Government/Donor		
• Department of Natural Resources (DENR) • Department of Health (DOH) • Department of the Interior and Local Government (DILG)	• World Bank Water and Sanitation Program (WSP) and Program for Sustainable Sanitation in East Asia (SuSEA) • Philippine Ecological Sanitation Network (PEN)	• Mindanao Economic Development Council (MEDCo) • Housing and Urban Development Coordination Council (HUDCC)

C. APPROACH

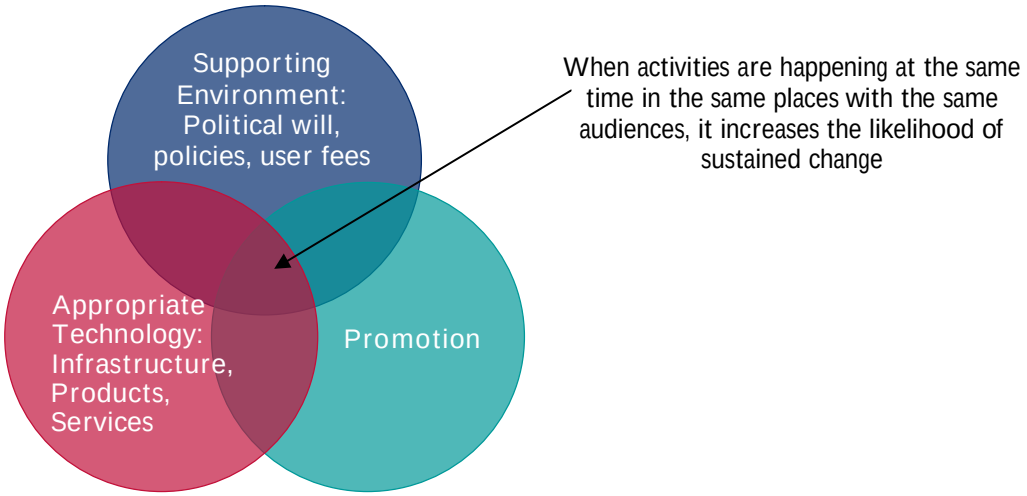
The PSA approach was to provide technical assistance for public and private sector partners to develop, finance, operate and maintain wastewater and septage treatment facilities and promote improved hygiene practices. The project followed the USAID Global Development Alliance's focus on developing public-private alliances to mobilize the ideas, efforts and resources of governments, businesses, and civil society to increase economic growth, protect the environment and improve public health. Three sectors were selected to engage with private business partners: housing, hotels and restaurants, and hospitals. The PSA was stakeholder-driven and participatory, ensuring rapid replication of appropriate sanitation solutions by leveraging private-sector platforms, promoting appropriate technologies and collaborating on finance, promotion and policy reform.

AECOM staff and consultants worked with cities to create technical working groups (TWGs) and worked with a team leader to organize a stakeholder workshop to develop action plans with short, medium and long term priorities. Most of the cities chose to start with a small, easy intervention first such as a treatment facility for the public market and other point sources (including privately owned sources such as hotels and restaurants, hospitals and housing developments), then move up to city-wide septage

management, and then in the future plan to build a sewerage system and address the needs of informal settlers without proper toilet facilities.

Putting city ordinances in place and implementing effective promotion campaigns were key measures needed for the projects to be successful and sustainable. The following figure shows how the three areas need to come together in order to achieve sustainable results. It is included in the USAID 10-Step Promotion Toolkit, which was developed by the USAID Environmental Cooperation-Asia (ECO-Asia) program, a regional program based in the Regional Development Mission/Asia in Bangkok. The toolkit guides city and water district partners to develop a comprehensive and very effective promotion program to change behavior.

Figure 1. Achieving Sustainable Results



The PSA was demand-driven: it provided technical assistance to the cities, water districts and private sector partners that requested help in developing wastewater treatment facilities. However, priority was given to the partners that demonstrated the most capacity to fund and develop the treatment facilities.

The PSA recognized the important role that women, as household managers, play in sanitation and hygiene. The project encouraged city partners to include women in the technical working groups that plan and make decisions on project activities and focused on mothers and barangay health workers to promote hygiene. The project encouraged women to attend project workshops and training activities, and reported project indicator results disaggregated by gender.

III. RESULTS

The project successfully met or surpassed all of its 10 indicator targets. A description of these indicators and process for data collection and reporting can be found in the project monitoring and evaluation plan. The project started with six indicators and four were added during the course of the project when additional funds and activities were added. A summary of the results is presented below. Annex A contains results for fiscal year (FY) 2011 and Annex B contains results broken down by each of the four years of the project.

A. Summary of Results

The following table summarizes the PSA project's results for each of its ten indicators.

Table 2. Summary of Results

Indicator	Project Target	Results
1. Number of people in target areas with access to improved sanitation facilities as a result of USG assistance (disaggregated by gender).	1,240,000	658,507 Men 757,876 Women 1,416,383 Total
2. Number of feasibility and special studies/plans prepared	14	16
3. Amount of non-USAID financing mobilized for sanitation projects and facilities.	$3,700,000	$4,182,575
4. Number of people trained in environmental law, enforcement, public participation, and cleaner production policies, strategies, skills and techniques, disaggregated by gender.	1500	1,681 Men 1,334 Women 3,015 Total
5. Number of people trained in child health and nutrition through USG-supported health area programs.*	1500	1,114 Men 1,800 Women 2,914 Total
6. Increase in the percentage of mothers of children under five who can cite at least 2 measures to prevent diarrhea.	25%	40.6%
7. Increase in the percentage of students who, while at school, observably wash their hands with soap and clean water after using the toilet to prevent diarrhea.	25%	31.4%
8. Number of pollution and urban environment policies, laws, agreements or regulations implemented as a result of USG assistance.	6	12
9. Number of hygiene-related policies, laws, agreements or regulations implemented as a result of USG assistance.	2	3
10. Number of wastewater treatment projects developed by PSA partners that reduce pollution to levels that meet the government's effluent standards.	10	10

B. Details of Results

1. Number of People with Improved Access to Sanitation

The PSA assisted its partners in developing and securing financing for 45 projects, which are expected to provide 1,416,383 people with access to improved sanitation once all the facilities are constructed and operating. As of September 30, 2011, the city-wide septage management projects were not yet completed, so the actual number of people with access to improved sanitation was quite small, only 28,936, which were for onsite treatment facilities for housing projects, slaughterhouses, public markets, etc. The remaining 1,387,447 people are expected to have improved access over the next few months and years as the septage management systems, which PSA helped to develop and secure financing, get completed. PSA partners experienced delays in completing septage management programs by the end of the project due to the elections in May 2010 and other competing priorities in the cities and water districts. Another factor was that a great deal of PSA staff time, specifically that of the Chief of Party, was spent on developing, launching and implementing two USAID-Rotary projects, both of which required more time

than planned. This left less time for facilitating the septage management programs. The septage management programs included in the reported figure include:

- San Fernando City – The treatment facility is under construction and is expected to be completed by the end of 2011. The septage management ordinance with user fee was passed;
- Zamboanga City – The septage management ordinance with user fee was passed and several private companies already have treatment facilities. The city has completed its terms of reference to contract several of these companies to collect and treat the septage;
- Metro Naga Water District – The Naga City council is deliberating on the septage management ordinance. MNWD completed the detailed engineering design for the treatment facility, has begun acquiring the lot, has allocated P40 million for the project and plans to borrow the rest of the funds needed;
- Laguna Water District – The municipal council of Los Baños has approved the septage management ordinance, identified a site for the LWD to use to build a treatment facility, and initiated negotiations with the owner of the lot. LWD will enter into a build-operate-transfer arrangement with a private company as soon as the land is purchased.
- Cagayan de Oro City – The city council drafted a septage management ordinance that has gone through two public hearings and is in the final stages of approval by the city council. A private company will be contracted to provide the treatment and collection services. The city council has informally deliberated on the terms and conditions of an unsolicited proposal submitted by a private investor.

A complete list of the number of people reported for each project is contained in Annex C.

2. Number of Feasibility and Special Studies/Plans Prepared

The PSA prepared city action plans generated during stakeholder workshops and refined by the technical working groups, initial engineering designs for wastewater treatment plants (WTPs) and septage treatment plants, and operation and maintenance (O&M) manuals. The following 16 documents were prepared.

Table 3. Special Studies/Plans Prepared

Number	Quarter	Special Study/Plan
1	Q3	Meycauayan City Action Plan
2	Q3	Sta. Rosa City Action Plan
3	Q3	Zamboanga City Action Plan
4	Q4	Cagayan de Oro City Action Plan
5	Q7	Zamboanga City Public Market Initial Engineering Design
6	Q8	Dumaguete City Septage Treatment Facility O&M Manual
7	Q8	PS Farms Biodigester O&M Manual
8	Q8	Sta. Ana Public Market WTP Initial Engineering Design
9	Q12	EcoTank Initial Engineering Designs (3 sites)
10	Q12	San Fernando Septage Treatment Facility Initial Engineering Design (5 files)
11	Q12	Metro Naga Septage Treatment Facility Initial Engineering Design
12	Q12	Sta. Rosa City Public Market WTP Initial Engineering Design
13	Q12	Calamba Water District Action Plan

Number	Quarter	Special Study/Plan
14	Q14	Sta. Ana Public Market WTP O&M Plan
15	Q16	San Fernando Septage Treatment Facility Expansion Design (3 files)
16	Q16	San Fernando Septage Treatment Facility O&M Manual

3. Amount of Non-USAID Funding Mobilized

PSA leveraged external funding from several sources, such as LGUs, water districts and private companies for the construction of wastewater treatment facilities and sanitation-related activities. Because these partners paid the capital costs of the treatment facilities, they had a high level of ownership and commitment to properly operate and maintain them. The USAID-Rotary project did pay some of the capital costs of facilities built in San Fernando and Manila, but both cities contributed substantial amounts in kind and/or in cash. All partners participated in capacity building activities such as workshops and training, and many did the detailed engineering and oversaw construction of the facilities. The breakdown of the $4,182,575 leveraged is shown below.

Table 4. Summary of Funds Mobilized

Source	Amount	Source	Amount
Private Sector	$ 1,696,306.70	Cash	$ 3,973,009.38
Public Sector	$ 2,486,269.10	In Kind	$ 209,566.42
Total	$ 4,182,575.80	Total	$ 4,182,575.80

The four largest projects were:

- C TRADE biogas systems for three farms in Batangas Province - Amount: $620,000
- San Fernando, La Union purchase of land as site for the septage treatment facility, fence and road construction - Amount: $437,330
- El Nido Public Market Wastewater Treatment Facility - Amount: $304,115
- Laguna Provincial Hospital Wastewater Treatment Facility - Amount: $212,765

All the amounts reported are supported by leverage forms signed by a representative of the partner organization.

4. Number of People Trained in Environmental Policies, Strategies, Skills and Techniques

Over the course of the four year project, the PSA trained 3,015 people in environmental policies, strategies, skills and techniques. About 44% of the participants were women (compared to 37% in FY10, 34% in FY09 and 29% in FY08). Training included stakeholders from the public and private sectors. Training sessions included stakeholder workshops; septage management workshops; promotion campaign workshops; training for barangay health workers on septage management promotion campaigns; and technical/financial workshops for LGUs, the health sector, hotel and restaurant sector, and hospital sector.

5. Number of People Trained in Child Health and Nutrition

The PSA and its partners trained 2,914 people, 62% of whom were women, in child health and nutrition. In collaboration with the City of Sta. Rosa, the PSA organized a handwashing event and a training workshop on handwashing promotion focused on mothers with children aged 5 and below in the three barangays with the highest incidence of diarrhea. In collaboration with Union Galva Steel Inc., Department of Education, local government units of Cagayan de Oro, GTZ and the Fit for School program, the PSA helped organize a handwashing demonstration and promotion event and donation of six

handwashing stations at Kamakawan Elementary School. In Sta. Ana, Manila and Iloilo, school children and teachers were taught proper handwashing technique and the importance of using soap.

6. Increase in the Percentage of Mothers Who Can Cite Ways to Prevent Diarrhea

In 2010, the PSA assisted the government of Sta. Rosa City in conducted a promotion campaign targeting mothers of children under five three barangays that had the highest incidence of diarrhea. A baseline survey was done, and a promotion campaign on handwashing was conducted. Results of the post-campaign survey showed that a large number (82.6%) of target mothers could cite two or more ways to preventing diarrhea, an increase of 40.6 percentage points from the pre-campaign data.

7. Increase in the Percentage of Students Who Wash Their Hands with Soap

In August 2011, the City of Sta. Rosa, the Department of Education and PSA jointly launched a promotion campaign on handwashing in Tagapo Elementary School. A survey was done prior to the campaign that showed that only about 12% of the students washed their hands with soap after using the toilet and before eating during recess. Following the provision of soap and implementation of the campaign, another survey was done that showed an increase of 31.4 percentage points from the baseline data.

8. Number of Environmental Policies Implemented

With technical assistance from the PSA, partner cities and barangays implemented existing environmental policies or developed, passed and began implementation of new policies. Three of the new ordinances were for septage management, and six were for solid waste management in support of the USAID-Rotary Pasig River Improvement Project. Three were implementation of existing policies. The 12 policies are listed below. The project also played an important role in national policy dialogues such as the second National Sanitation Summit, UN International Year of Sanitation, second East Asian Ministerial Conference on Sanitation and Hygiene (EASAN-2), Global Handwashing Day, and a sanitation dialogue organized by the Philippine Ecological Sanitation Network (PEN) and representatives from the 15th Congress. PSA's involvement led to some significant milestones, such as the NSSMP and more focus on septage management and the importance of effective promotion campaigns to achieve lasting results.

Table 5. Environmental Policies Implemented

Number of Policies	Quarter	Environmental Policy Implemented
1	Q3	Clean Water Act implemented by Sta. Rosa City and Calbayog City
1	Q4	Muntinlupa City implemented water pollution ordinance
1	Q8	Zamboanga City passed and began implementation of a septage management ordinance
1	Q9	Calamba City passed and began implementation of a septage management and sewerage ordinance
1	Q12	Dumaguete City implemented septage management ordinance
1	Q13	San Fernando City passed and began implementation of a septage management and sewerage ordinance (revision of its Sanitation Code)
6	Q16	Six Sta. Ana barangays passed and began implementation of solid waste management ordinances
12		

9. Number of Hygiene-Related Policies Implemented

With technical assistance from the PSA, LGUs passed and began implementation of three new ordinances. To reduce diarrhea in their community, Barangay 876 in Sta. Ana, Manila enacted a landmark ordinance requiring soap and proper handwashing facilities in all public restrooms in Quarter 12. The City of Sta. Rosa enacted a similar ordinance in Quarter 13 as part of its efforts to improve the health of its citizens. As far as the staff of the PSA are aware, these are the first such ordinances of their kind in the Philippines. Another barangay in Sta. Ana, Barangay 885, enacted an ordinance to support the community-led total sanitation initiative introduced by the USAID-Rotary Pasig River Improvement Project. The ordinance prohibits defecation and urination in public.

10. Number of Wastewater Treatment Projects That Reduce Pollution to Acceptable Levels

Laboratory tests showed that ten of the wastewater treatment plants built with PSA technical assistance produced effluent that meets the government's discharge standards (50 mg of biochemical oxygen demand or BOD for Class C bodies of water). The names of the projects are listed in the table below.

Table 6. Wastewater Treatment Projects that Reduce Pollution to Acceptable Levels

Number	Quarter	Project
1	Q8	Lorma Hospital WTP
2	Q10	Sta. Rosa City Community Hospital WTP
3	Q12	Zamboanga City Slaughterhouse WTP
4	Q12	Sta. Cruz Provincial Hospital WTP
5	Q13	JP Rizal Hospital WTP
6	Q14	El Nido Public Market WTP
7	Q14	Dumaguete Septage Treatment Facility
8	Q16	SOS Children's Home Cocopeat System
9	Q16	San Fernando EcoTank
10	Q16	Sta. Ana Public Market WTP

IV. ACTIVITY HIGHLIGHTS

The PSA project has undertaken numerous activities with its partners to achieve the results summarized above, mainly focusing on assisting its partners to develop on-site wastewater treatment facilities, city-wide septage management programs and hygiene promotion activities. PSA staff and consultants also promoted improved sanitation by organizing study tours, local and national training sessions and workshops and giving presentations at other organizations' conferences and workshops. Below are highlights of these activities.

A. On-Site Wastewater Treatment

As described above, the PSA's approach with its partner cities was to conduct a stakeholder workshop and develop an action plan. For many partner cities (including those that participated in the LINAW project), the action plan first focused on cleaning up city-owned sources of pollution before developing a city-wide septage management program. Therefore, the PSA assisted many cities in developing on-site treatment facilities for various point sources, including city-owned markets, slaughterhouses and hospitals. The PSA focused on three private sector groups:

- Housing developments
- Hospitals
- Hotels/restaurants

The PSA continued the relationship that the LINAW project had with BORDA, which was to refer its partners to BORDA. BORDA would submit a proposal to the public or private sector partner, and the partner would compare it with other options and select the option they thought was best for them. The PSA staff and consultants provided technical assistance and objective advice to its partners in reviewing various options and developing the projects. The LINAW project brought representatives from its four original city partners to Indonesia in 2004 to visit BORDA's projects there. The cities were very interested in replicating their systems in the Philippines, so LINAW encouraged BORDA to open an office in the Philippines, which they did. Many of the projects facilitated by the PSA were designed by BORDA.

The PSA project provided technical assistance to public and private sector partners to develop 45 wastewater treatment projects, and provided continued assistance to the LINAW partners, which developed an additional 6 projects. See Annex D for a list of the projects and Annex E for a map showing the location of the projects, which are summarized in the table below.

Table 7. Summary of PSA-Assisted Wastewater Treatment Projects

Category	Number of Projects
Low-cost housing	16
Hospitals	6
Commercial centers (restaurants)	3
Public markets	5
Slaughterhouses	6
Septage treatment facilities	4
Others (Capitol building, schools, hog farm)	4
Total	45

Most of the low-cost housing systems were built in 13 Gawad Kalinga villages, with 32 anaerobic baffled reactors and 1 wetland constructed. Of the four septage treatment facilities, the San Fernando City, La Union facility is under construction and is expected to be completed by the end of 2011. The other three have secured financing and are under development. More details are provided below.

To facilitate the development of more wastewater treatment facilities, the PSA conducted a training course from December 2007 to mid-2008 for representatives of seven service providers entitled "Short Training Course for Engineers on Appropriate Wastewater Treatment Systems and Approaches." It was conducted one day a week for 8 weeks. The participants were provided with information on various technology options, how to prepare designs and evaluate and select sites, estimate costs, and plan for operations and maintenance. The PSA conducted site visits and led the participants through a practical exercise of designing prototypes.

1. Housing Developments

The PSA organized a technology/finance workshop for the housing sector to present options that partners can choose from in developing their priority projects. Entitled "Affordable Wastewater Treatment Technologies for Community Builders," it was held April 29-30, 2008 and was organized in partnership

with HUDCC. Speakers shared best practices and technology design approaches in managing domestic wastewater in the housing sector. The first day focused on technology and the experiences of partners in designing and operating wastewater treatment projects. The second day focused on financing that partners can tap to fund their projects, followed by site visits to existing facilities. The group recommended that key officials have a small roundtable discussion to determine what steps should be taken to address the issues raised during the workshop. Following several consultation meetings with the participating government agencies, the PSA organized the roundtable discussion, which was held on March 4, 2011 with representatives from DOH, DILG, Housing and Land Use Regulatory Board (HLURB) and HUDCC.[2]

The roundtable resulted in a general consensus that existing regulations are adequate and amendments are not needed. However, there is a need for greater awareness of the regulations, affordable solutions and better enforcement. There were suggestions to review the guidelines for BP220 to add clarifications, and create a policy to require wastewater treatment facilities for group housing. The overarching recommendations of the roundtable were that existing policies are sufficient, but enforcement and monitoring of compliance is the main challenge. Developers and LGUs need to be given:

- Information on sanitation and treatment requirements required by law;
- Information about low-cost sanitation technologies and options; and
- Technical support for LGUs to monitor developers.

The five key national regulatory agencies (DENR, DILG, DOH, HLURB, and HUDCC) should enter into an MOA outlining:

- Each agency's commitment to compliance with sanitation requirements outlined in national laws; and
- Each agency's roles and responsibilities.

During its four years of implementation, the PSA project encouraged its city government partners to enforce the requirement that all housing developers include proper sanitation systems in their building plans before they approve them. Several cities have said they have done so. The PSA also provided information on wastewater treatment options to members of the Chamber of Real Estate and Builders' Associations (CREBA) through workshops and publications.

The 16 low-cost housing projects include 16 Gawad Kalinga projects and two for a relocation site in Calbayog, Samar that were implemented in collaboration with the US Naval Construction Regiment, Armed Forces of the Philippines and Calbayog City Government. The team built a wastewater system to serve about 440 people at the Greenland relocation site. The wastewater treatment system includes an anaerobic baffled reactor that reduces about 70% of the pollution from the sewage and a secondary treatment system, which utilizes cocopeat as a filtration medium. The wastewater is collected through an innovative condominial sewer system, which utilizes shared sewer laterals to minimize the installation cost and operational requirements.

PSA has supported the Green Kalinga project of Gawad Kalinga by providing technical assistance on proper wastewater treatment, including training and on-site assistance. As a result, Gawad Kalinga has built anaerobic baffled reactors (ABRs) instead of septic tanks for all of its new villages since 2009. ABRs provide a much higher level of treatment than septic tanks and cost the same amount for a typical

[2] The DENR representative was not able to attend, but a consultation meeting was held with DENR officials to prepare for the roundtable.

GK village. The PSA has documented and reported the results for 13 such villages, which include 32 ABRs, one constructed wetland, and serve about 1880 people.

2. Hospitals

For the hospital sector, the PSA partnered with the Philippine Hospital Association to organize the Appropriate Technologies and Financing Options for Hospital Wastewater Management Workshop on August 12, 2008. Hospital administrators, presidents and owners, together with other stakeholders, developed action plans for treating their wastewater during the workshop. The workshop featured two case studies from Iloilo Doctor's Hospital and St. Luke's Medical Center. During the break-out group discussions, the participants identified the top three issues as: the need for an information campaign on technologies and the Clean Water Act, technologies appropriate for small spaces, and funding prioritization of local governments and hospitals. Two site visits were conducted to St. Luke's Medical Center and the University of Sto. Tomas Hospital, which both have wastewater treatment systems.

The PSA has provided assistance to Region IV-A of the Department of Health, which has built wastewater treatment plants for two hospitals in Calamba and Laguna and is working to build wastewater treatment plants for all of its hospitals in the region. Lorma Medical Center and Colleges, a private entity located in La Union Province, built a wastewater treatment plant with technical assistance from the PSA in late 2008.

In 2008, the PSA assisted the City of Santa Rosa City in the development of a low-cost, low-maintenance wastewater treatment facility for the Sta. Rosa Community Hospital. The construction of the treatment plant started in 2008 and was inaugurated in April 2009. In her speech during the groundbreaking, Sta. Rosa Mayor Arlene Arcillas underscored the importance of not just focusing on the need to clean up each individual house but also taking care of the overall environment as it affects everyone. She thanked USAID for being a strong partner of the city in its drive to protect the environment and prevent widespread pollution and stated her support for the objectives of the project and her commitment to ensure the proper implementation of the Clean Water Act in Sta. Rosa.

Sta. Rosa Mayor Arcillas and city officials during the groundbreaking for the Community Hospital Wastewater Treatment Facility

3. Hotels/Restaurants

The PSA partnered with the Hotel and Restaurant Association of the Philippines to organize a workshop on October 3, 2008 entitled "Appropriate Technologies and Financing Options for Hotel and Restaurant Wastewater Management." The workshop aimed to increase the number of hotels and restaurants that incorporate full sewage treatment into their operations. The audience included about 100 hotel and restaurant owners and engineering staff, and officials from the Department of Tourism (DOT) and DENR who came from the provinces and Metro Manila. Small group sessions focused on the barriers and proposed solutions for putting up a wastewater treatment facility. The participants recommended the following solutions to the barriers identified: conduct information campaigns through seminars and exhibits and a Pasig River tour on July 2, 2009; inclusion of wastewater management in the hotel and restaurant college curriculum; upload information on appropriate low-cost technologies on the Hotel and Restaurant Association of the Philippines (HRAP) website; hold dialogues with water service providers regarding the environmental fee being charged; stronger enforcement of wastewater regulations; and lobby Congress for funding. On October 4, several participants joined site visits to wastewater treatment facilities at Puregold in Quezon City and Century Park Sheraton Hotel.

PSA partners have developed on-site wastewater treatment facilities for commercial centers mainly consisting of restaurants in Calbayog, Iloilo and Zamboanga Cities.

B. Septage Management

In line with the Clean Water Act requirement for LGUs and water utilities to develop septage management programs, the PSA has promoted the development of these programs by providing technical assistance and conducting study tours and training. Although proper management of septage has a small impact on public health, the environment and protection of biodiversity, it is a good first step for many cities to address the complex and expensive sanitation issues that they face.

Many of the septic tanks in use do not comply with the design standards contained in numerous national laws such as the Sanitation Code of 1975 and the Revised National Plumbing Code of 1999, which require the tank bottom to be fully sealed, the tank to have at least two chambers, and access ports for desludging. The Sanitation Code Implementing Rules and Regulations (Chapter XVII) also requires that septic tanks be inspected annually and desludged when solids fill 50% of the tank volume. Outside Metro Manila, Alabel Municipality and Dumaguete City, regular septic tank desludging is not commonly practiced.

The PSA and its partners gathered data on septic tanks and desludging through house to house surveys in several cities. As part of the USAID-Rotary project in San Fernando City, the PSA trained plumbers and engineers who then observed the septic tanks and drainage systems of 100 residential homes. They found that about 30% of the septic tanks had an access port, 83% were properly located beside the house (not under it), and more than half did not have proper piping systems. In four other areas, trained volunteers asked residents what kind of septic tank they think they have if they remember desludging it within the past 5 years. The results are presented in the table below.

Table 8. San Fernando City Survey Results

Area	Properly Designed Septic Tank (%)	Desludged within Past Five Years (%)
Calamba City	36%	0.06%
Cordova Municipality	7%	24%
Los Baños	35%	12%
Zamboanga City	24%	23%

To promote septage management, the PSA provided technical assistance to seven local governments and water districts: Calamba Water District, Davao City Water District, Dumaguete City, Cagayan de Oro City, Laguna Water District, Metro Cebu Water District, Metro Naga Water District, San Fernando City, and Zamboanga City. The PSA also trained Local Water Utility Administration (LWUA) staff to provide technical assistance and information through their cluster supervisors, annual conferences, and other meetings. PSA staff and consultants have also made presentations and provided information during LWUA's national and regional conferences, and encouraged LWUA to create a septage management office. AECOM also stressed the importance of developing partnerships between water districts and local governments by sharing the experience of Dumaguete (where an effective partnership exists) and Zamboanga City, which is currently developing a partnership with the local water district.

The PSA also partnered with the USAID Philippine Water Revolving Fund Support Program (PWRF-SP) to conduct a Water District Septage Management Training Program that trained representatives of Iloilo City, Bacolod City, and Roxas City. The sessions featured PWRF-SP's business model and PSA's experience with local ordinances and promotion campaigns. The activities were formalized in an MOU signed by all parties. Another round of trainings was held in Davao (for Mindanao water districts), Cebu (for Visayas water districts) and Manila (for Luzon water districts) in August and September 2009. Over 30 water districts from around the country benefitted from the training.

The PSA's experience shows the important role that local policies, participation of stakeholders, and promotion campaigns have played in developing septage management programs.

1. Policies

The development of local septage management ordinances have been a useful way to engage the local government decision makers in deciding how the program should be structured, funded and implemented. The ordinances mandate that all new septic tanks follow proper design criteria and are desludged on a regular basis (every 3-5 years). Most of the ordinances include a user fee and penalties for non-compliance, as well as the creation of a septage management council or committee to oversee implementation of the program. Public hearings on the draft ordinances have given citizens and opportunity to voice their opinion on the program and user fee. Local septage management ordinances have been passed by PSA partners Calamba, Dumaguete, San Fernando (La Union), and Zamboanga Cities, in addition to Marikina City with assistance from ECO-Asia.

2. Participation

A participatory approach has been critical for the successful development of the septage management projects assisted by the PSA. In each city, this was done by creating a TWG made up of representatives from the city government, water district, business, civil society, academe and urban poor and women's groups if possible. The group organized a stakeholder's workshop with 80-100 representatives from these sectors to discuss and understand the issue and develop a simple action plan with short, medium and long-term activities and identified those responsible to lead implementation. Most TWGs created a policy committee to develop the septage management ordinance, a promotion committee to develop a promotion campaign, and a technical committee to build a treatment facility and buy collection trucks, or bid out these services to the private sector. Throughout the process, various meetings, training sessions and workshops were held with members of the stakeholder groups. Some of these members also participated in site visits, study tours and training sessions to learn about low-cost treatment technologies and successful approaches to septage management. The Philippine experience was shared through regional exchanges to Cambodia, Sri Lanka and Vietnam through the USAID ECO-Asia Program.

3. Promotions

Often neglected or done poorly, promotion campaigns are critical to the success of septage management programs. The PSA's approach in the Philippines improved over time with experience and inputs from experts. The USAID ECO-Asia program developed a toolkit that has been used throughout the region to develop promotion campaigns that are effective, measurable, behaviour change-focused and innovative. The toolkit was placed online and is currently being revised. PSA consultants assisted partner cities and water districts in using the toolkit to develop and implement campaigns to promote septage management. The main focus was on increasing cooperation with the desludging program and willingness to pay user fees. This was especially important when cities held public hearings on their septage management ordinances.

4. Dumaguete City

The Dumaguete City Government, in partnership with the Dumaguete City Water District, has developed the first locally funded citywide septage management program in the Philippines. The program is deemed a success by the local government. This success is attributed to the participatory process that was used, and the focus on local policy and promotions in addition to the infrastructure and services. Dumaguete received technical assistance from the USAID LINAW project (phase 1 and phase 2) and the PSA project. It was inaugurated on April 22, 2010 in celebration of Earth Day.

- Collects septage from 22,000 households and 2,500 businesses once every five years, vacuum trucks bring septage to treatment facility
- Low-cost, low-maintenance septage treatment facility using lagoons and a constructed wetland
- Capital costs for facility and 6 vacuum trucks: about $580,000, O&M costs about $70,000/year
- Will achieve full cost recovery in about 5 years through user fees
- User fee is added onto the monthly water bill, about 5 US cents for every cubic meter of water used, or about $1 per month for the average household
- Partnership between city government and water utility (50-50 sharing of costs)
- Promotions campaign included fliers mailed with water bills, press conferences, articles in local newspapers, and discussions on local television and radio.
- Lessons learned being shared with many visitors from other LGUs and organizations.


Dumaguete septage treatment facility; worker at the final polishing pond following the constructed wetland.

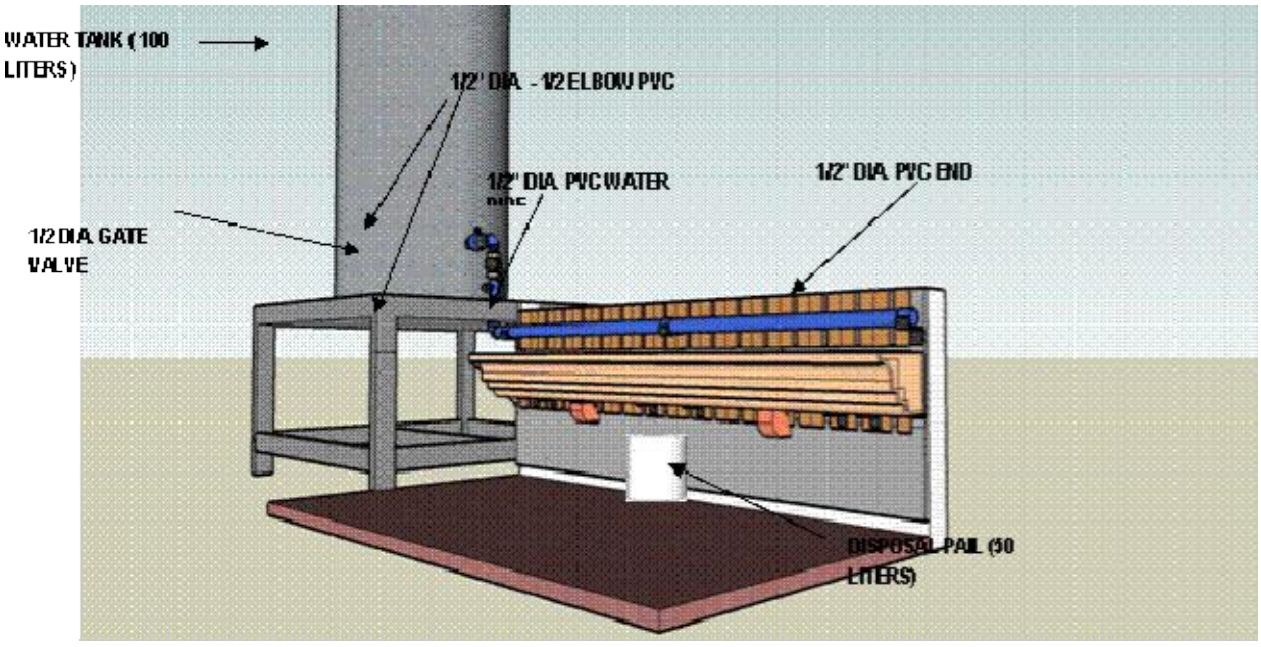
5. Cagayan de Oro City

Cagayan de Oro City, with assistance from PSA, has developed a septage management program in which a private company will be contracted to provide the treatment and collection services. The city council has informally deliberated on the terms and conditions of the unsolicited proposal submitted by a private investor.

The estimated capital expenditure to construct the treatment plant and purchase equipment including collection trucks is P45 million. A user fee will be collected by the Cagayan de Oro Water District based on water consumed. It will be remitted to the city and used to pay the private investor. Based on this scheme, the TWG drafted an ordinance which is expected to be approved by the city council soon. The ordinance spells out in general terms the desludging process, user fee collection, how the treatment facility will be established, administration of the program and penalties for every violation. A public hearing was conducted and the ordinance has been finalized. To encourage cooperation of the residents in the desludging activity and acceptance of the user fee, the city government recently mobilized the barangay health workers to help in the promotion campaign. Brochures, comics and posters were printed and distributed.

The city, with the assistance of PSA, also collaborated with other private sector groups to promote hand washing among students. Union Galva Steel Inc., a private company with a branch in CDO donated six communal hand washing stations to the Kamakawan Elementary School in CDO. The German Technical Cooperation (GTZ) Fit for School program assisted in identifying the school and mobilized the parent-teacher association (PTA) to cost share in the form of labor to completely install the hand washing stations. The facilities were formally turned over to the school in July 2010. The design of the facilities is shown in Figure 2 below.

Figure 2. Classroom-Type Design of Handwashing Station



Inauguration of the handwashing station at Kamakawan Elementary School.

6. Calamba Water District

In August 2009, Calamba Water District and the PSA signed a Memorandum of Understanding (MOU) to develop a comprehensive plan to address the problem the city has had with water-borne disease outbreaks. There are two components of the comprehensive plan: 1) construction of a sewerage system for the communities within a 6-meter radius of Bucal Spring; and 2) development of a septage management program (SMP) for the communities beyond the 60-meter radius.

The CWD technical working group designed a mechanized sewerage system to treat the domestic wastewater coming from residents of an informal settlement area in Barangay Bucal, presumed to be polluting the spring that is the main water source of the city. A septage treatment facility will be built using constructed wetlands designed in partnership with Chia Nan University (CNU) in Taiwan and the regional USAID ECO-Asia Program. The septage treatment facility and collection trucks will cost the water district a total of P66 million while the land will be donated by the city government. The program will benefit a total of 200,752 residents.

PSA led a stakeholders' workshop to develop an action plan for these projects and conducted series of information campaigns to raise awareness among the residents of the need for a comprehensive solution to sanitation issues in the city. Following the 10-Step Promotion Program Toolkit, the team examined the issues that may need to be addressed before pursuing the program. The team identified the main problems of Calamba residents regarding sanitation and gathered data that would facilitate project development and strategy formulation. The survey results played a vital role in ensuring that the proposed SMP and sewerage system are initiatives that people find valuable and choose to support.

The city council passed the Calamba City Sewerage and Septage Management Ordinance on December 1, 2009. The ordinance requires that all those located within a 60 meter radius of the Bucal Spring must connect to the sewerage system that will be developed by the water district. It also provides the city a legal framework for the establishment of the SMP. The ordinance also mandates the installation of pre-treatment equipment, use of proper septic tank design and regular desludging of septic tanks every five years once the treatment facility is built. Certain penalties will be imposed depending on the number of violations incurred by the household or commercial establishment. Subsequent to the passage of the ordinance, the TWG, with the assistance of PSA consultants, drafted the implementing rules and

regulations (IRR) which were later approved by the council after thorough review by the city's legal advisors.

A groundbreaking ceremony for the sewerage treatment facility was held on September 28, 2010 with water district officials and the city mayor expressing their full support and appreciation for the project. The detailed design for the septage treatment facility has been completed and the WD is now ready to implement the project in 2012.

7. Metro Cebu Water District

Five LGUs in Metro Cebu have committed to implement their respective septage management programs in partnership with the Metro Cebu Water District. Between 2009 to 2011, the PSA worked with the USAID PWRF-SP to support the Metropolitan Cebu Water District (MCWD) in developing a septage management program. The PSA conducted several promotion campaign workshops on promotion to help MCWD get support from different stakeholders including the LGUs, academe, civic-oriented groups, and others to develop a comprehensive septage management program in all areas covered by its service.

The PSA also provided technical assistance to LGUs in developing septage management ordinances and determining the kind of program applicable to them. Cebu City and Cordova Municipality have drafted ordinances. Trainings were also conducted for barangay health workers of Cordova Municipality to talk about the benefits and importance of septage management and minimize resistance to the program. Cordova is the host of one of the septage treatment facilities to be built by MCWD. PSA Chief of Party Lisa Lumbao made presentations to the legislative councils of Cebu City, Lapu-Lapu, Cordova, Mandaue and Talisay to help them identify the kind of program best suitable to their needs and situation. The PSA also facilitated a site visit for representatives of the LGUs to the USAID-assisted septage treatment facility in Dumaguete City in February 2011.

8. Laguna Water District

With assistance from the PSA, the Laguna Water District of Los Baños, Laguna developed a septage management program for four local governments within its service area. These include Bay, Calauan, Los Baños, and Victoria. Implementation of the program will be in two phases. One will be built first to service Los Baños and Bay, and a smaller one will be constructed later to service Calauan and Victoria. The Los Baños LGU will donate property for the first treatment plant. The LGU has identified an appropriate site and initiated negotiations with the owner in early September. The Calauan-Victoria facility will be built near a resettlement area in Calauan to also service the new resettlement site.

The water district intends to implement the program through a build operate and transfer (BOT) scheme as private investors have indicated willingness to participate in the program. The costs of site development and a mechanized treatment facility will be approximately P54 million while the two collection trucks will cost roughly P12 million or a total of P66 million. About 135,290 people will benefit from Phase 1 implementation.

The PSA assisted the TWG, composed of LGU representatives, water district staff, some members of Rotary and University of the Philippines Los Baños officers, in the design of the facility and promotion campaign. The water district also participated in the Multiple Recipient Water Operators Partnership project of ECO-Asia, which gave its staff the opportunity to join the trainings conducted by Indah Water Konsortium of Malaysia, the country's septage and sewerage services provider.

Water district officers and staff and eight members of the Los Baños municipal council visited the septage treatment facilities of the cities of Bayawan and Dumaguete in September 2009. The visit encouraged the council members to pass a similar septage management ordinance requiring households to regularly

desludge their septic tanks every five years. The ordinance is now ready for final approval by the Mayor. Some members of the host barangay and the Los Baños mayor, vice-mayor and other officers visited the Dagat-dagatan treatment facility of Maynilad in March 2011.

Los Baños Mayor Genuino, Vice-Mayor Sumangil and LWD General Manager Tabanao during their visit to the Dagat-dagatan septage treatment facility of Maynilad in Navotas City

9. Metro Naga Water District

The PSA assisted the Metro Naga Water District (MNWD) in developing a metro-wide septage management program. The MNWD has completed the detailed engineering design for the treatment facility and is now in the process of acquiring the lot for the facility. The project, estimated to cost P78 million consisting of land cost, construction and purchase of at least two vacuum trucks, will be funded from the water district's internal funds and borrowing from either LWUA or Bank of the Philippine Islands, a private bank which has offered the lowest interest rate to the MNWD. Under Phase 1 of implementation, the project will provide septic tank desludging services to MNWD customers, or approximately 210,000 people. Phase 2 will cover the rest of the residents of Naga City and four other neighboring municipalities that are within the service area of MNWD namely: Calabanga, Camaligan, Gainza, and Magarao.

The treatment facility will use a mechanized receiving system and lagoons for treatment. It is expected to begin operations in mid-2012. The construction of the treatment facility was delayed because of the local elections held in 2010. The MNWD could not then secure a locational clearance needed for the development of the originally proposed site of the treatment plant. This resulted in new negotiations for alternative sites. During the latter part of 2010, the WD and the city government found seven possible sites inside Naga City. After initial discussions between the owners and MNWD, PSA consultants assisted the TWG in validating the technical feasibility of the new sites and thereafter shortlisted three. A cost benefit analysis was conducted for each of the three sites which became the basis of the WD board to decide on and approve the best alternative.

The TWG, composed of representatives from the five LGUs and the private sector, has conducted aggressive consultation and promotion campaigns to inform, educate, and gain the approval of stakeholders particularly on the collection of the user fee. Through a series of Save the Watershed Seminars, more than 400 health workers from the different LGUs within its service area have been trained to explain the program to members of households. The seminars provided the health workers an opportunity to discuss environmental programs on watershed protection, wastewater management (including the septage management program), solid waste management, and climate change.

The head of the City Council Environment Committee has completed the Naga City Ordinance for Septage Management, which is now being deliberated on by the city council. It has to go through two more council hearings before approval. This ordinance will be used as template for the other four LGUs involved in the program for their respective ordinances.

The water district has appropriated funds for the program every year since 2009 and to date has a total allocated amount of P40 million.

10. Davao City Water District

A one-day workshop on septage management, organized by the Davao City Water District with support from the USAID PSA project, was held on Thursday 14th August, 2008. The workshop was attended by 129 people from various government agencies, private companies, universities, local non-government organizations and other donor-funded projects. During the small group discussions, the participants prepared inputs for a septage management program, including regulation, transportation and collection, treatment and disposal and institutional arrangements. The following day, a smaller group met to consolidate the workshop outputs and prioritize the next steps.

The Davao City Council approved, on third reading, a septage management ordinance in May 2010 and submitted it to the Mayor (then Rudy Duterte) for signature. The ordinance should have lapsed into law 15 days from submission of the legislative council without veto from the chief executive. However, the newly elected mayor said she and her staff would like to review the ordinance first before it is put into effect. The TWG of the city will assist the executive body in reviewing and revising it as needed. Thereafter, it will formulate the implementing rules and regulations of the ordinance which will contain accreditation guidelines for all registering septage service providers. The current draft of the ordinance provides for any entity, including the City and the Davao City Water District (DCWD), to put up a septage treatment facility that will service the desludgers of the city. It also calls for the creation of the Environmental Services Section under the City Health Office which will be tasked to maintain a databank and lead the enforcement of the city ordinance.

C. HYGIENE PROMOTION

To reduce the incidence of diarrhea, the PSA assisted its partners in using the 10-Step Promotion Toolkit to develop comprehensive campaigns to promote proper hygiene practices. The main focus was encouraging handwashing with soap. This was done through awareness raising activities in many partner cities. In Quezon City, Sta. Ana, Manila, and Sta. Rosa, Laguna, local promotion teams developed and implemented an integrated hygiene promotion program and measured the results. Before implementing the campaigns, the teams had to ensure that soap and clean water were available in the target areas. Success was measured by comparing baseline survey data with post-campaign surveys. The target was an increase in the percentage of school children who wash their hands after using the toilet or the percentage of mothers of children under five who can cite at least two measures for preventing diarrhea. To measure the knowledge indicator (mothers), the team used a simple multiple choice questionnaire that also included questions about their handwashing behavior. To measure the observed behavior indicator (school children washing their hands), the teams used a simple, one-page observation checklist before the start of the program (to establish the baseline), and at the end. The research and survey work was done by LGU staff, health workers and Rotarian volunteers. Details on the Sta. Rosa activities are at the end of this section, and details on the Sta. Ana and Quezon City activities are in the USAID-Rotary grants section.

1. Global Handwashing Day and International Year of Sanitation

The first ever Global Handwashing Day (GHD) was held on October 15, 2008. PSA supported several successful events: simultaneous celebrations were held in the cities of Makati, Sta. Rosa, Meycauayan, Iloilo, and San Fernando (La Union), Muntinlupa, Malaybalay/Cagayan de Oro and in Basco, Batanes on October 15, while Marikina and Quezon Cities held their celebrations on October 16. The GHD brought together civic organizations, LGUs, national agencies and private sector business for the campaign. School children were taught proper handwashing with soap and clean water, particularly before eating and after using the toilet, as one of the most effective and inexpensive ways to prevent diarrhea and respiratory diseases. DOH and city officials, together with representatives from PSA, reiterated the importance of handwashing with soap as each gave an inspirational message to the school children and guests. They asked the children to be the agents of behavioral change by taking the proper handwashing training home to their families and friends. Schools were likewise urged to put soap in their bathrooms. Each city came up with different campaign materials like songs, mascots and games to make handwashing a fun activity for the children. The Lions Club in Sta. Rosa suggested a very novel idea to the city council by asking the members to pass an ordinance requiring all public schools, restaurants and buildings to put soap in their bathrooms to be used by the general public. With assistance from the PSA, the council drafted and passed the ordinance (see details below).

The United Nations named 2008 the International Year of Sanitation (IYS) and PSA participated in the national launch in Mandaluyong City. The event, held in February, was also attended by PSA alliance partners. The IYS launch kicked off a year of national and local events spearheaded and organized by members of the PEN, which is lead by DOH. PSA staff and consultants were active members of the PEN and assisted in organizing a press conference and other activities.

2. Sta. Rosa City

Sta. Rosa City's handwashing campaign started in 2009 with the celebration of Earth Day on April 22 at the Coca Cola Bottling plant. US Ambassador Kristie Kenney, Coca-Cola Bottling Plant Philippines (CCBPI) CEO David Lyons, Sta. Rosa City Mayor Arlene Arcillas-Nazareno, other officials, and a group of small children and their mothers attended the event. During the WASH (water, sanitation and hygiene) Day, a mascot dressed as Captain WASH taught the children proper handwashing and the officials did a handwashing demonstration with the children. The children and their mothers all came from three barangays that had the highest number of diarrhea cases: Caingin, Sinalhan and Tagapo. They had a combined total of 633 cases of diarrhea in 2009.

PSA and the city government formed a promotions team that conducted a baseline survey, prepared a promotion plan, and trained barangay health workers and midwives to implement an effective campaign targeting mothers with children under five years of age. The objective was to increase the percentage of mothers who could cite at least two ways to prevent diarrhea by at least 25% after the promotions campaign. The post-campaign survey showed that 82.6% of target mothers could now cite two or more ways to prevent diarrhea, an increase of 40.6 percentage points from the baseline data. Likewise, the number of target mothers who could cite handwashing as one of the most effective ways to prevent diarrhea increased by 37.6 percentage points to an awareness level of 70.6%.

The success of the promotion campaign encouraged the City to implement a city-wide handwashing program to cover all barangays, restaurants and schools. In addition, the City Council passed an ordinance on October 11, 2010 requiring all public restrooms to provide soap and water for handwashing. This is the first such ordinance passed by a city in the Philippines. Owners of establishments found violating the ordinance may be fined from P1,500 to P5,000 or slapped with imprisonment from three to six months.

In August 2011, the City of Sta. Rosa, the Department of Education and PSA jointly launched a promotion campaign on handwashing in Tagapo Elementary School. A survey was done prior to the campaign that showed that only about 12% of the students washed their hands with soap after using the toilet and before eating during recess. Then mothers belonging to the Parent-Teachers' Association were trained on soap-making. The soap they produced was distributed to all public elementary schools. On August 20, more than 1,000 pupils from Grade 1 to 6 attended a Water, Sanitation and Hygiene (WASH) Day event where they learned about the importance of proper handwashing in preventing diseases and telling others about proper handwashing using clean water and soap. A group of students performed a skit on the importance of washing hands with soap. A comic book on proper handwashing created by the Santa Rosa Promotion Team and funded by the PSA was distributed after the program. After the campaign, another survey was done that showed an increase of 31.4 percentage points from the baseline data. The city plans to continue this effort by promoting handwashing in all public elementary schools.

Grade 6 pupils of Tagapo Elementary School dramatized the importance of proper handwashing (City of Sta. Rosa, City Information Office)

D. USAID-ROTARY GRANT PROJECTS

The PSA implemented two projects as part of the USAID-Rotary International Water Collaboration, which is supporting water and sanitation initiatives in the Dominican Republic, Ghana and the Philippines.

1. San Fernando City Septage Management and Sewerage Project

City officials and citizens of San Fernando City, La Union, have undertaken several sanitation projects over the past several years due to their concerns about the effects of water pollution on their health and the economy. A sampling of drinking water wells showed that 56 of 59 wells were contaminated with coliform bacteria, endangering large sectors of the City. Under the USAID ECO-Asia project, the city had begun making plans to develop a city-wide septage management program. The current cost of desludging septic tanks is one of the highest in the country as septage is transported to Baguio City for proper treatment. Because of the cost and distance, improper septage disposal onto land or into waterways is common. This leads to increased pollution of the environment, which impacts fisheries, economic opportunities and health.

On January 19, 2010, a memorandum of agreement (MOA) between the Rotary Club of San Fernando (L.U.), Inc., the City of San Fernando and the USAID Philippine Sanitation Alliance was signed for the 18-month USAID-Rotary Sewerage and Septage Management Project. During the signing ceremony, statements of commitment were read from the Department of Health, the Environmental Management

Bureau of the Department of Environment and Natural Resources, the local water district, and the barangay association of the city. The project included three main components:

- A city-wide septage management program to properly maintain septic tanks;
- Simple sewerage systems for two urban poor neighborhoods and one beach cottage development; and
- Improved local policies and an effective promotion campaign to encourage compliance.

The project was supported by six interns provided by the International Centre for Sustainable Cities. They served in teams of two for six months each and provided coordination and technical assistance for the project. Within the city government, the City Environment and Natural Resources Office led implementation on the project.

A TWG was formed for the project, made up of the following:

- Regulatory Committee – drafted the amendment to the Sanitation Code of San Fernando City, facilitated passage;
- Promotion Committee – conducted a baseline assessment, promotion campaign, post-project assessment and measured impact; and
- Infrastructure Committee – recommended technologies for the treatment facility, construction and terms of reference for septage collection by the private sector.

Sanitation, Sewerage and Septage Management Symposium

On March 16 and 17, 2010, the Philippine Sanitation Alliance, in conjunction with the San Fernando City government and the Rotary Club of San Fernando (LU), Inc., convened a Region 1 Sanitation, Sewerage and Septage Management Symposium. The event attracted 144 registered guests from the region and included sanitary inspectors, engineers, city environment officers and private sector service providers. Also in attendance were 32 graduating engineering students from St. Louis College in San Fernando City. An exhibit hall was provided where products and services for the sanitation sector were displayed and demonstrated. The two-day event culminated in a city tour, which included visits to sanitation projects including the wastewater treatment system for the public market, the EcoSan village, the Lorma Hospital wastewater treatment plant, and the site of the proposed city's septage treatment facility. A major output of the event was a workshop where teams from eight of the region's largest cities developed sanitation action plans. The symposium was funded in part by the USAID-Rotary San Fernando City Sewerage and Septage Management Project, with additional support from exhibitor and registration fees.

Septage Management Ordinance

San Fernando City is one of the few cities in the country that has a Sanitation Code. However, the TWG decided that it should be amended to include septage management provisions. The Regulatory Committee worked with the City Council to draft an ordinance, which included a wastewater management fee to be added onto the Real Property Tax bill. In other cities the fee is added onto the water bill, but the local water district only covers about 16% of the population, eliminating this option. The amount of the fee was contested during a public hearing on the draft ordinance, but the City Council believed the fee was justified to fund the service and improve water quality, health and the economy of the city. City Ordinance 2010-014 was passed in December 2010.

The ordinance – amending chapter 16 of the city's sanitation code – requires every septic tank in the City of San Fernando to be desludged on a five year schedule, the contracting out of the desludging task to

private desludger(s), and proper treatment and disposal of the collected septage. A Wastewater Management Fee will be charged at the following annual rates, beginning January 2012:

1. Residential building: Six Hundred Pesos (PhP600.00)
2. Commercial Establishments (excluding malls): One Thousand Pesos (PhP1,000.00)
3. Malls and Institutions: One Thousand Five Hundred Pesos (PhP1,500.00)
4. Industrial: Two Thousand Pesos (PhP2,000.00)

The fee will be added onto the Real Property Tax (RPT) bill. The desludging schedule will be made public in the barangays as soon as it is drafted, so that residents and establishments will know in which year/month they can expect their septic tanks to be desludged. Septic tank owners will also be able to request an "out-of-schedule" desludging by contacting the City Environment and Natural Resources Office (CENRO) and paying a one-time fee to the City Treasurer's Office in the amount of:

1. Eight Hundred Pesos (PhP800.00) per household
2. Three Thousand Five Hundred Pesos (PhP3500.00) per commercial establishment

The ordinance includes a penalty of P5000 for violations.

Septage Treatment Facility

PSA technical staff worked with the City Engineer to design a septage treatment facility that will process 30 cubic meters of septage per day. It is located in Barangay Dallangayan Oeste on a lot that the city purchased.

The facility is currently under construction and has the following features:

- Screens. These will remove the larger, non-biodegradable solids that are often found in septage.
- Equalization/settling tank. This is a site-built concrete tank that will allow the heavier solids to settle and the fat, oil and grease to rise to the top of the water column for separation and easy disposal.
- Anaerobic baffled reactor (ABR). A concrete tank that provides anaerobic digestion and removal of suspended solids through a series of baffled compartments in a site-built concrete tank.
- Upflow anaerobic sludge blanket (UASB).
- Series of lagoons. Two facultative ponds and two maturation ponds will reduce the BOD level substantially, and one aerobic pond will polish the wastewater.
- Sludge drying bed. Accumulated sludge from the equalization/settling tank and the ABR will be transferred to the sludge drying bed, where the biosolids are dewatered and stabilized for reuse as soil amendments.
- Disinfection. A simple dosing pump/chlorinator will be used for the final disinfection of the effluent.

The system is designed to meet DENR's Class C discharge requirements for surface waters: less than 50 mg/l BOD and less than 50 mg/l total suspended solids (TSS). A gravel filter or constructed wetland may be added later to further treat the wastewater.

Congressman Victor Ortega provided funding to construct the first two lagoons. Funding from the USAID-Rotary program was used to hire a contractor to build the rest of the facility, including an administration building and a well to provide water for the building's sinks and toilets. Construction is

expected to be finished in December 2011. After construction is finished, the city government plans to build a road for the vacuum trucks to access the site. The city also plans to expand the facility to treat all the septage generated by the city, estimated to be about 50 cubic meters per day, plus septage from neighboring LGUs that have expressed interest.

The PSA submitted an Environmental Screening Report to USAID. The updated Environmental Monitoring and Mitigation Plan (EMMP) is in Annex F. The PSA also prepared and gave the city an Environmental Health and Safety Plan for the septage treatment facility construction project. The CENRO and City Safety Officer visited the site regularly to check on compliance.

The Infrastructure Committee drafted a terms of reference for a private contractor to perform septage collection services using vacuum trucks. The City government is currently reviewing the draft and will issue it to the public soon.

Septage lagoon under construction

Sewerage Systems using EcoTanks

Three EcoTanks were imported from Thailand to demonstrate simple sewerage systems in urban poor areas. The EcoTank is an anaerobic treatment tank combined with an anaerobic filter. Two of the EcoTanks were donated by CITYNET (http://www.citynet-ap.org), the United Nations Institute for Training and Research (UNITAR), and the Prince Albert II of Monaco Foundation. The PSA provided technical support for this program and Rotary provided funds for installation costs and to purchase one tank. The city paid for transportation and custom costs to bring the tanks from Manila to San Fernando, as well as land and labor and equipment for the installation. On May 18 to 21, 2010, representatives of Premier Products, Ltd., of Thailand, the manufacturer of EcoTanks, visited the city. During the visit, several potential project sites were evaluated. The mayor, city environment officer and PSA staff Dave Robbins also visited Premier Products facilities in Thailand to learn more about the EcoTanks. Three sites were eventually selected: Barangay Poro, to serve about 280 people, Barangay Catbangan, to serve about 190 people, and the San Francisco Beach Shed area, where 55 beach sheds will be connected to an EcoTank system. For the two barangays, an interceptor sewer transports septic tank effluent to the EcoTank, which is built underground. The Poro system was installed during the first quarter of 2011 and has been operating well following correction of some problems with the pipes. The Poro tank is producing effluent that meets the government's standards for biochemical oxygen demand (BOD). The

Catbangan tank has been installed, and a gravel filter is currently being constructed to provide additional treatment of the wastewater. The city plans to install a secondary treatment system for the San Francisco beach shed tank as well. Before the tank is installed, the city will sign an MOA with DENR for co-management and coordinate with the beach shed owners and Committee for Tourism.

Transporting the EcoTanks to San Fernando

Promotions

Baseline Data. This project pilot tested a novel approach for gathering baseline data about the technical aspects of septic tanks, greywater and pit toilets in San Fernando by using rapid technical assessments. First, the team recruited a group of 30 civil engineers and licensed plumbers and trained them how to properly evaluate sanitary facilities at the household level from a technical point of view. They were taught how to evaluate things like accessibility, desludgability, setback issues between wells and septic tanks, proper and improper pit toilets, effluent drainage and greywater discharge. After the training they were given an exam and those who passed were awarded a professional credential called "Certified Sanitary Site Inspector." The barangay health workers (BHWs) were then trained to conduct knowledge, attitudes and practices (KAP)-style surveys along with the technical assessment. After the training, 15 teams of three each were mobilized. The teams, led by a BHW and including one engineer and one plumber, went into the communities and performed the assessments.

The training program can be found at: http://sfluseptage.blogspot.com/2009/12/technical-assessments-site.html

The results of the survey showed the number of readily accessible and currently desludgable septic tanks was much lower than originally estimated after considering access to the septic tank by the septage truck and desludgability through proper access ports in the tanks. This led to a decision to phase in the septage program, which will be more cost-effective and practical for the city in the long run. It was also surprising to learn that only 7% of houses plumb their greywater into the septic tank, which is the proper method. The remainder allow greywater to simply discharge either by ponding around the home or flowing untreated to the nearest storm drain or sewer. Greywater is a major source of organic pollution and can cause nuisances and health hazards. This would not have been discovered without engaging technical experts to help with the assessments.

Promotion Plan. Previous surveys showed that a) most people prefer to get information from door to door outreach programs, and b) that most people rank high or highest the trust they place in BHWs for information on sanitation. Therefore, the focus of the promotion plan will be door to door outreach led by BHWs. The promotion plan can be found at: http://sfluseptage.blogspot.com/2009/12/effective-promotions-campaigns.html

As the trained BHWs go home to home in the barangay doing their regular tasks, they will be looking also at sanitation issues related to wastewater, septic tanks, greywater and pit toilets. If they see greywater ponding by the home and children playing in it for example, they can educate the homeowner or residents on different strategies for solving this problem. Many times the solution is easy and cheap, and results in real and measurable improvements.

Campaign. The Promotions Committee conducted a training of trainers on October 21, 2010 for 29 midwives, 9 sanitary inspectors and 6 BHWs on how to promote septage management. They practiced relaying the messages during an interactive role playing session. These trainers then conducted 10 training sessions for the 350 BHWs in San Fernando. They gave them each two colored posters, one with a health message and one with a septic tank desludging message, to show to the household members. They also gave them brochures to hand out to each family (10,000 were printed using PSA funds). The CENRO also conducted 12 orientation meetings of barangay captains and BHWs, which reached about 600 people.

The mayor spoke about the planned septage management program in a radio program on December 7, 2010, several articles were published in newspapers, magazines and online about the program, and several radio stations reported on it, many following a press conference held on April 14, 2011. The Rotary Club of San Fernando, La Union made several presentations to other Rotary Clubs. The CENRO mailed letters and brochures to 400 large companies in the city and BHWs distributed 6,000 brochures to small commercial establishments. The PSA funded the printing of an additional 10,000 brochures for households and 10,000 comics focused on the environmental fee.

Post-Campaign Survey. A post-campaign survey was conducted in September 2011 among 100 households in 15 barangays to determine any change from the baseline survey conducted in 2010. Thirty BHWs were dispatched to the 15 areas and did a random survey. The results showed that 10 percent of households have desludged their septic tanks since the survey was done. This is an increase of 250 percent as compared with the 4 percent who said they desludged two years ago. A bigger portion, 61 percent, had never desludged at all; 18 percent said they desludged between 3-5 years ago and the remaining 18 percent, more than five years ago.

The majority of those who desludged within the past year said they had heard of the importance of emptying their septic tanks through the promotion campaign delivered by the BHWs.

Most of the respondents expressed willingness to pay the P600 users fee to be collected from households annually, citing that this is much cheaper than the average fees collected by private desludgers.

Overall, most residents interviewed for the survey are already aware that they need to empty their septic tanks every five years to avoid overflowing and subsequently, contaminate groundwater.

Lessons Learned

Overall, the project was successful. However, more PSA staff time was required than was anticipated and numerous delays caused the project to exceed the planned end date. The delay in starting construction of the septage treatment plant occurred mainly because it took some time for the project steering committee to make a decision, and then the selected proposal was found to be deficient. Following additional technical assistance from the PSA, a qualified contractor was selected. Additional delays occurred due to usually rainy weather.

The EcoTanks were included in the project because they fit with the scope and were offered at the same time the project was being developed. However, the PSA technical expert and city government staff who evaluated them did not fully understand the treatment capability of the EcoTanks. Therefore, the first tank was installed without secondary treatment. The laboratory test done on the effluent showed that it did pass the government's standards for BOD, but given what we now know about the design it seems clear that secondary treatment is needed. The city plans to include secondary treatment with the second and third tanks. In addition, PSA technical staff should have been more involved during the installation of the first tank to prevent some piping problems that had to be fixed later. Although the PSA tried to arrange a visit during the installation, the city staff did not coordinate this properly.

Having interns assist with the project was very helpful. This is a good model that could be replicated in other cities where city government staff is too busy with their regular work load to spend as much time as is required for projects such as this. Having short-term interns is a good way to provide extra assistance. However, the government staff often did not give the interns enough authority to do necessary tasks, such as request information from other government offices.

The mayor and his staff were very cooperative, as were the Rotarians involved in the project. However, as stated above, there were too many delays in implementation on the part of the city and Rotary. One very helpful practice was having a weekly call that usually included the PSA Chief of Party, one or two staff from the CENRO office, and the interns. Occasionally others would join as well. During these calls, the Chief of Party would review a list of tasks by component and after the call send the updated list to the participants. This helped keep the project on track and move things along in between meetings in San Fernando. The meetings that were held in San Fernando were very well attended, with several Rotarians, many city government staff and often the mayor in attendance. City councilors and other stakeholders attended on occasion. This was due to good preparations by city government staff.

2. Pasig River System Improvement Project

Rapid population growth brought about by industrialization and urbanization of Metro Manila has resulted in poor sanitation and pollution of the Pasig River. Trash, solid waste and oil slicks have contributed to its unpleasant odor and dark colored water. Compounding the problem is a general lack of awareness about sanitation and hygiene, and inadequate infrastructure. The PSA project and Rotary International Districts 3810 and 3780 addressed these issues through the USAID-Rotary Pasig River Improvement Project. The project aimed to improve the state of the Pasig River by undertaking wastewater treatment, solid waste management, hygiene promotion and related activities in Manila and Quezon City and provide models for others along the Pasig River system to follow to achieve wide-scale sanitation improvements. The project originally planned to work in Paco and Sta. Ana in Manila and in

Baesa in Quezon City, but during implementation shifted to Sta. Ana in Manila and Del Monte and Damayan in Quezon City (explained further below).

The project began with the following objectives and ways to measure success[3]:

1. Improve wastewater management in the Sta. Ana Public Market by building a wastewater treatment plant (WTP) with effluent below 50 mg/l BOD (biochemical oxygen demand);
2. Grease reduction in Sta. Ana and Paco Public Markets and development of a monitoring plan;
3. Improve solid waste management in Sta. Ana and the Paco Public Markets and estimate the amount of solid waste being properly managed at the end of the project by comparing the post-project waste assessment to the baseline assessment;
4. Reduce open defecation and urination in six barangays in Sta. Ana and assess any change in the frequency of open defecation and urination;
5. Improve hygiene in two elementary schools and the church in Sta. Ana and measure presence of soap and water in the bathrooms, increase in the percentage of school children who wash their hands with soap after using the toilet and improvement in the restrooms in the schools;
6. Increase the Baesa community's cooperation with and acceptance of the Maynilad wastewater treatment plant and compare focus group discussion results from the beginning of the project with those done at the end;
7. Improve the management of solid waste in Baesa and measure the amount of solid waste being properly managed; and
8. Increase the number of sewerage connections in Paco and report the number of customers who agree to have a sewerage connection installed.

During implementation, Paco was dropped and the Quezon City component shifted to Damayan and Del Monte Barangays. Planned solid waste management activities at the Paco Public Market were cancelled because of problems encountered during the first few weeks of implementation that made it unwise to continue. The resources for this were shifted to solid waste management in six barangays of Sta. Ana, to complement and strengthen the other work being done there. Planned promotion of sewerage connections in Paco were cancelled because the USAID ECO-Asia project decided to undertake this work instead.

In Quezon City, the project partners signed an MOU with Barangay Baesa to do solid waste management and community development work in support of Maynilad Water's planned construction of a sewage treatment plant. After substantial preparatory work with the community and barangay staff, the barangay captain decided to withdraw from the project. Therefore, the project team transferred the project to Barangays Damayan and Del Monte in support of Maynilad Water's planned construction of a sewage treatment plant in Damayan.

In Manila, Rotary District 3810 contracted the Lola Grande Foundation to implement project activities in Sta. Ana and contracted the Solid Waste Management Association of the Philippines (SWAPP) to develop solid waste management programs for the Sta. Ana Public Market and six barangays. In Quezon City, Rotary District 3780 contracted the Mother Earth Foundation (MEF) to implement project activities in Quezon City.

The outcome of each objective as of September 30, 2011 was as follows:

[3] These were included in the Rotary Foundation grant application, which was approved by the Foundation and USAID in November 2009.

1. Wastewater treatment at the Sta. Ana public market: A low-cost, low-maintenance WTP was built and a laboratory test done in September 2011 showed that the effluent was below 50 mg/l BOD. Project funds were also used to build a system to reuse the treated water to flush toilets in the market's restrooms to mitigate water shortages that were causing conflict between informal settlers living in the market, vendors and market staff.
2. Grease reduction at the market: At the Sta. Ana market, trainings on proper grease management were conducted and 10 grease traps were donated to 15 market stall owners who produce grease from cooking food. The venders also underwent training on how to maintain their grease traps. However as of September 30, 2011, the grease traps were not operating properly because they were not properly designed. Lola Grande Foundation is exploring ways of remedying this problem.
3. Solid waste management in Sta. Ana and the Paco Public Market: A Solid Waste Management Committee was formed, a management plan was developed and implemented, and the amount of trash going to the landfill was reduced by about 60%. No work was done in the Paco Public Market as explained above. Instead, SWAPP worked with the six barangays to create committees and develop a management plan. All six barangays passed ordinances requiring proper management and the amount of waste going to the landfill was reduced by about 1,835 kg per day.
4. Reduce open defecation in Sta. Ana: Several meetings with officials and residents of six barangays were held on the dangers of open defecation on health and the effect of public urination on tourism. A group of about 90 community members decided that these practices should be stopped. Barangay 885 passed an ordinance prohibiting urinating and defecating in public places and five of the six barangays pledged to make public toilets available. The change in the frequency of these practices was not measured.
5. Improve hygiene in two elementary schools and the church in Sta. Ana: The project fixed water supply problems and repaired sinks and toilets in the school's restrooms, conducted a soap making training that produced a year's supply of soap, and provided the students with hygiene kits containing soap, toothpaste, and toothbrushes. The children learned proper handwashing with soap and teachers were trained. The increase in the percentage of school children who wash their hands with soap after using the toilet was not measured properly. The project conducted several meetings with officials and residents of six barangays on the importance of handwashing with soap and Barangay 876 passed an ordinance requiring a handwashing station with soap in all public restrooms. Hygiene promotion was not conducted at the church because Rotary District 3810 decided not to fund any repairs of the public restrooms belonging to the church.
6. Increase Baesa's acceptance of wastewater treatment plant: After Barangay Baesa withdrew, MEF worked with Barangay Damayan, which issued a resolution supporting the project and stating that no one in the community opposed it. Developed a mechanism for future coordination in which any resident can complain to the barangay and Maynilad will send a representative to address the issue.
7. Improve solid waste management in Baesa: MEF worked with Barangays Damayan and Del Monte to develop solid waste management ordinances and 10-year plans, hired 12 eco-aides to collect segregated waste

The Manila and Quezon City activities are described below.

Manila Component

The Manila component of the project was managed by Rotary International District 3810 and the PSA and implemented by the Lola Grande Foundation and SWAPP. The main results are listed below.

Results

1. Construction and successful operation of a wastewater treatment plant at the Sta. Ana Public Market, which is being operated by two city engineering office staff who have been trained and given an operations and maintenance manual.
2. Construction and successful operation of a wastewater reuse system at the market that routes the treated wastewater from the WTP for reuse in the restrooms (for toilet flushing) and general cleaning near the garbage area. Therefore, the water consumption costs of the market are reduced. A plumber was also hired to repair the sinks, faucets and toilets in the market's restrooms.
3. Proper solid waste management in the market that includes collecting and composting the biodegradable and organic wastes and collecting recyclable and reusable items that are kept in a materials recovery facility (MRF). The compost was used to grow ornamental plants, flowers, vegetables and herbs. Volunteers made bags, coin purses, jewelry and other useful items from discarded materials. The Solid Waste Management Committee oversaw these efforts, which reduced the amount of trash going to the landfill by about 60%. The Committee conducted a waste assessment and characterization study (WACS) and formulated a 3-year solid waste management plan.
4. Improved solid waste management in Sta. Ana, with one barangay (number 885) practicing 100% segregation at source and segregated collection. Six barangay waste management committees conducted WACS, developed a solid waste management plan and passed ordinances mandating proper segregation and a "no segregation, no collection" policy. These efforts have reduced the amount of waste going to the landfill by about 1,835 kg per day.
5. Improved sanitation and hygiene for students at the Sta. Ana Elementary school. The project fixed water supply problems and repaired sinks and toilets in the school's restrooms, conducted a soap making training that produced a year's supply of soap, and provided the students with hygiene kits containing soap, toothpaste, and toothbrushes. The children learned proper handwashing with soap and teachers were trained.
6. Improved sanitation and hygiene for Sta. Ana. The project conducted several meetings with officials and residents of six barangays on the importance of handwashing with soap and the dangers of open defecation on health. Barangay 876 passed an ordinance requiring a handwashing station with soap in all public restrooms, and Barangay 885 passed an ordinance prohibiting urinating and defecating in public places. All six barangays are planning to build additional public toilets and urinals and discussions are planned regarding the informal settlers living at the public market and their use of the public market's restrooms.

Launching. On January 13, 2010, the Manila component of the USAID-Rotary Pasig River Improvement Project was launched in Sta. Ana, Manila on board the Pasig River Ferry. While cruising down the historic river, project partners signed two Memoranda of Understanding (MOUs) to help improve the state of the Pasig River by undertaking wastewater treatment, solid waste management, hygiene promotion and related sanitation activities in Paco and Sta. Ana in Manila. The Manila project partners included the USAID Philippine Sanitation Alliance, Rotary International District 3810, City of Manila, and Metro Manila Development Authority. Two NGOs, Lola Grande Foundation for Women and Children, Inc., and Solid Waste Management Association of the Philippines, implemented various project activities. The launch was graced by Acting USAID Mission Director Elzadia Washington; Regional Rotary Foundation Coordinator and Past District Governor Melito Salazar; a representative of City of Manila Mayor Alfredo S. Lim; and MMDA General Manager Robert Nacianceno. PSA Chief of Party Lisa Lumbao presented the project components, and a joint Statement of Commitment to cooperate was made by representatives of Sta. Ana Barangays 873, 876, 879, 884, 885 and 889, PLAN International Philippines, Public Market Vendors' Associations, Church of our Lady of the Abandoned, and schools in Sta. Ana and Paco.

Wastewater Treatment. When tourists disembarked from the Pasig River Ferry at the Sta. Ana station to go on a walking tour of the district's Spanish-era houses and historic church, they immediately saw, and smelled, the public market. In an effort to clean up the area and reduce pollution going into the river, USAID-Rotary Pasig River project constructed a wastewater treatment plant. The facility allows the market to comply with the Clean Water Act by treating polluted water from the market stalls and toilets before it is discharged to the adjacent Pasig River. Construction of the facility began in March 2010 with P3.1 million in funding from the USAID-Rotary H_2O Alliance for construction materials, technical assistance from the PSA, and in-kind contributions from MMDA and the City of Manila. PSA Engineer Lito Santos designed the facility and oversaw the construction, city engineers provided technical assistance, and MMDA provided construction workers and equipment.

A water reuse system was built to pipe the treated water to the market's restrooms where it is used for flushing toilets and cleaning. The project also repaired broken fixtures in the restrooms and provided grease traps to market vendors preparing cooked food to reduce the amount of grease entering the treatment plant. The vendors were trained in proper grease management and worked with SWAPP to develop a grease management plan.

The facility was inaugurated on September 16, 2010 in the presence of more than 100 community members and project supporters. Manila Mayor Alfredo S. Lim, MMDA Chairman Francis N. Tolentino, Chief of USAID's Department of Energy and Environment Rolf Anderson, and Past Rotary International Director Rafael G. Hechanova participated in a ribbon cutting ceremony. They gave brief messages about the importance of the project in restoring the historic river and complying with the 2009 Supreme Court ruling to clean up Manila Bay, and they expressed hope that it will be replicated in other areas of Metro Manila. Many attendees were interested in how the wastewater facility functions using low-cost, low-maintenance technology. It makes use of naturally occurring bacteria to break down the pollutants in the wastewater. The costs of construction, monthly operation and maintenance were considerably less than that of a conventional wastewater treatment plant that requires chemicals and substantial energy inputs. Similar designs have been used in public markets in Dumaguete, Muntinlupa, and San Fernando, La Union with technical assistance from USAID.

In 2011, a mural was designed and placed on the side of the plant to describe the treatment process to those who visit the market (see Figure 3 below). Five staff from the City of Manila Engineering Office were trained in the day-to-day tasks required to operate and maintain the facility to keep it in good working order. Both the city and MMDA are proud of this achievement and plan to replicate it in other markets.

Solid Waste Management. Solid waste management was an important component of the Pasig River project to achieve comprehensive and sustainable impact in Sta. Ana. To protect the public market wastewater treatment plant from getting clogged up with garbage, the solid waste needed to be properly managed. And solid waste management was needed in the rest of the community to improve the environment for the residents, support cultural heritage tourism and protect the Pasig River from pollution.

SWAPP worked with the Sta. Ana Public Market Vendor's Association to develop a successful solid waste management program. SWAPP facilitated the creation of a Solid Waste Management Committee, which was trained on how to conduct a baseline WACS. They conducted the study with SWAPP's supervision in July and October of 2010 and measured the amount and type of waste produced by 67 of the market's 241 business establishments. The study showed that segregation was not being done, but recyclable wastes such as bottles, plastics, metals, paper/cartons and rubber were taken out of the garbage and sold to junkshops or itinerant buyers. A few burned their yard/kitchen/animal waste. The contractor of the City of Manila, Leonel Waste Management Services, collected the market waste every morning

Figure 3. Sta. Ana Public Market Wastewater Treatment Plant Mural

from the market depository at the back of the building. Although the garbage truck has a sign saying "No Segregation, No Collection," the waste was mostly mixed.

The WACS generated baseline data on the sources of waste in the Sta. Ana Market. It yielded the following results:

- The biggest waste generators per stall were the buco vendors, averaging 104 kg/day/stall. For the five buco vendors in the market, this totaled 520 kg per day of buco shells and husks;
- The section that generated the most waste was the vegetable section, estimated at 693 kg/day;
- Total waste generation in the market was about 2,488 kg per day. Most were biodegradables (97% or 2,416 kg/day), followed by recyclables (2.42% or 60 kg/day), and residuals (12 kg per day or 0.49%).

SWAPP trained the SWM Committee in source segregation, composting, recycling, MRF establishment and promotion campaigns. SWAPP brought the committee members to three other markets to learn about their best practices. The committee developed a solid waste management plan that included its vision, mission, goals, objectives, strategies and implementation plan. They presented it to the vendors' association and market master for comment. The SWM Committee also prepared a one-year information, education and communication plan and conducted a campaign on the importance of waste segregation and cleanliness per section. They held meetings and one-on-one stall visits to distribute flyers and put up posters encouraging waste segregation.

Because most of the waste was biodegradable, they focused on small-scale composting. This allowed them to divert about 60% of the biodegradable waste from the landfill. They also made costume jewelry from magazines and formulated market rules and regulations focusing on solid waste management.

The committee members have been a positive influence on the Sta. Ana community and their success and contagious enthusiasm led the Department of Science and Technology (DOST) to provide funds and technical assistance for an accelerated vinegar production project using coconut water as the main ingredient, and an urban gardening project using hydroponics to grow vegetables. The project was presented during SWAPP's annual conference in November 2010 and the SWM Committee Chairperson, Yolly Sahagun, was interviewed by many media companies and visited by students interested in the SWM activities. Additionally, the committee was officially certified as a Rotary Community Corps which links volunteers with the committee for added impact.

The market improvements will be sustained with a partnership with Unilever, a manufacturing company located on the Pasig River near Sta. Ana. Lola Grande Foundation has met with Unilever management to discuss the partnership, which may include the construction of a better MRF, purchase of trash cans, and expansion of the livelihood activities that make use of segregated garbage.

Shredder used to prepare compost


Workers chopping waste for compost

The second phase of SWAPP's work focused on six barangays in Sta. Ana that surround the public market: Barangays 873, 876, 879, 884, 885 and 889. SWAPP facilitated the creation of six barangay solid waste management committees (with barangay resolutions supporting the creation of the committees). The committee members were trained and then conducted a WACS in June and July of 2010. They analyzed waste from 53 sources including residential homes, food establishments, general stores, institutions, service centers and three special waste generators. The waste was 38% biodegradable, 31% recyclable and 30% residual. Total generation was estimated at 3,944 kg per day.

SWAPP conducted a series of trainings, workshops and a study tour to capacitate the barangay SWM committees, focusing on source segregation, composting and recycling, MRF establishment and promotion campaigns. SWAPP used a participatory approach to develop a solid waste management plan for the six barangays. All six barangays passed ordinances mandating proper segregation and a "no segregation, no collection" policy. SWAPP also conducted a solid waste orientation for the Sta. Ana Elementary School Parent-Teacher Association of 3,980 people on Aug. 8-15, 2011. SWAPP and the committee members conducted a post-WACS in August 2011. The study showed that the amount of waste going to the landfill was reduced by about 1,835 kg per day compared to the baseline figure. There could be several reasons for this decline, such as streamlined operations (for establishments) fewer purchases of disposable items (for residential generators). It could also mean that the waste sources are reusing and reducing more of their generated wastes because of the solid waste management program. Interviews with members of the BSWMCs showed that about 30% to 80% of the residents and establishments within the 6 covered barangays were segregating their wastes. Barangay 885 was practicing 100% segregation at source and segregated collection in August and September 2011.

Barangay committee members sort and weigh waste during the baseline WACS

Community Sanitation. This component of the project focused on promoting handwashing with soap and decreasing open defecation and urination in the Sta. Ana community. The handwashing effort started with Sta. Ana Elementary School students and then expanded to the community.

At the beginning of the project, Lola Grande worked with teachers at Sta. Ana Elementary School (SAES) to develop a promotion campaign plan to increase the number of students who wash their hands with soap after using the restroom. During the initial meetings, the teachers said before any campaign could be done, the project would need to address the lack of running water, broken faucets and toilets and missing stall doors in the school's restrooms. Project funds were therefore used to hire a plumber to conduct repairs, and Manila Water Company was asked to help fix the pipes so water would reach the upper floors of the school. The repairs spanned from February to April 2011 while school was in session. However, upgrades in infrastructure needed to be supplemented with hygiene and sanitation promotion campaigns with relevant parties, including parents, teachers, administrators, maintenance staff and students. Therefore, project staff conducted consultation meetings with maintenance staff, parents and administrators to identify issues, challenges, and possible solutions and create an action plan to promote proper hygiene and sanitation within SAES.

Once the restrooms were repaired, volunteers from Rotary conducted a baseline survey to measure the number of students who washed their hands with soap after using the restroom. Then the team worked with SAES to organize a WASH (Water, Sanitation, Hygiene) Day on July 8, 2011. Approximately 2,400 students ranging from kinder to sixth grade participated in handwashing demonstrations and sang a handwashing song. The project team distributed hygiene kits inclusive of soap, a toothbrush and a year's supply of toothpaste to each student in the morning sections. The team also placed fliers about handwashing in the school's restrooms.

A post-campaign survey was done to measure the number of students who wash their hands with soap after using the toilet and the results were compared to the baseline. Unfortunately, the increase following the promotion campaign was marginal – only about a 1% increase. The reason for this was inconsistency in the time and locations between the baseline survey and the post-campaign survey, as well as broken fixtures and lack of water in the surveyed restrooms during the post-survey. In addition, the team was not able do as much campaigning and reinforcing with the children and school staff as planned. The team conducted very effective focus group discussions with teachers and maintenance staff and received their buy-in to encourage everyone (teachers, administrators/janitors, students and parents alike) to work together to maintain the newly repaired restrooms through a system of constant checking and immediate rewards and punishments for those caught destroying school property or improper usage of the

restrooms. However, a new principal arrived and opposed the project, so these gains could not be built on and continued.

http://www.inquirer.net/wp-content/u...7/wash_day.jpg

Sylvia Lichauco-De Leon (Commission on Filipino Overseas-Technical Consultant) and Lisa Lumbao (USAID-Chief Party) show children how to clean their hands during the WASH (Water, Sanitation, Hygiene) Day celebration by USAID at the Santa Ana Elementary School in Manila.

To reduce diarrhea in their community, Barangay 876 in Sta. Ana, Manila enacted a landmark ordinance requiring soap and proper handwashing facilities in all public restrooms. The first of its kind in the country, the ordinance carries a penalty of P100 for the first offense, P500 for the second offense and P1,000 or imprisonment for 3 to 6 days at the court's discretion for the third offense. Passage of the ordinance coincided with the inauguration of the Sta. Ana Public Market Wastewater Treatment Plant in September 2010, both of which aim to safeguard public health and the environment. To address the community's questions and concerns about the ordinance, a public forum was held in late September 2010. It was attended by community members, vendors and representatives from neighboring commercial establishments such as Red Ribbon and St. Mary's Academy.

To reduce the practice of open defecation and urination in public places, the project partnered with Plan International to implement community-led total sanitation (CLTS) in Sta. Ana. Most applications of CLTS are done in rural communities where it may be easier to enforce community decisions and norms. The aim of CLTS is to get the community to acknowledge that the practices are taking place, be disgusted once they realize that flies transmit feces from the human waste to their food and drink, and collectively decide to eliminate open defecation.

In Sta. Ana, Lola Grande organized an initial meeting on August 19, 2011 with barangay leaders and Transport Operators and Drivers Association (TODA) officers to introduce CLTS and get their views. They were at first skeptical and did not immediately acknowledge that open defecation is happening in the community, except for one barangay that has many informal settlers at the back of the market. The TODA officers did acknowledge that open urination is happening because there is no place for them to urinate during the course of their work. At the end of the meeting, the officers agreed to conduct a triggering activity involving the community members, including those suspected of defecating and urinating in public. The officers also agreed to take pictures of open defecation and urination activities, and to try fabricating temporary urinals from used plastic containers (called EcoPee).

On August 24, 2011, Lola Grande organized a community consultation attended by about 90 community members, barangay leaders and TODA members. They presented pictures of open defecation and open urination from the barangays and identified the areas where the photos were taken. PLAN International presented a series of cause-effect videos of open defecation. PLAN then demonstrated how flies transfer the feces to food and drinks using a volunteer from the audience and a bottle of water. After PLAN's presentation, the participants were handed stickers symbolizing feces and urine and they were asked to stick these onto a Sta. Ana map to show where open defecation and urination were happening. The activity ended with participants expressing their acceptance of the fact that these unsanitary activities are indeed happening in the community and they vowed to help eradicate this problem. The barangays identified a few action points that can be useful in addressing this problem.

On September 13, 2011 the actions points were summarized and a workshop was conducted on the formulation of barangay ordinances on open defecation and urination. The workshop was attended by the barangay chairmen/women and council members who are involved in the Clean and Green, Beautification, Health, and Peace and Order Committees. Lola Grande presented a sample ordinance from Quezon City and discussed the salient points of the ordinance as well as the implementing rules and regulations. Five out of six barangays agreed to pass an ordinance similar to that of Quezon City. A proposal on how to address the open defecation issue was the primary concern of the activity. The barangays agreed to identify or build public toilets, while the Pasig River project committed to donate a urinal for each barangay that passes and ordinance and makes a public toilet accessible free of charge in their area. Lola Grande agreed to help the barangays encourage indigent families to use the public toilets through meetings and consultations. Once the public toilets and urinals are available, more community meetings should be held to discuss whether they are being used and if not, how to encourage their use and discourage open defecation and urination.

Participants placing stickers on the map (left); demonstrating how feces get transferred to people using a human hair to represent a fly (right).

Quezon City Component

The Quezon City component of the project was managed by Rotary International District 3780 and the PSA and implemented by the Mother Earth Foundation. The main results are listed below.

Launching. Barangay Baesa hosted the launching of the Baesa portion of the USAID-Rotary Pasig River System Improvement Project on January 8, 2010. The project will work to improve the state of the Pasig River by undertaking wastewater treatment, solid waste management, hygiene promotion and related activities in Paco and Sta. Ana, Manila and in Baesa, Quezon City. The following signed a Memorandum of Understanding (MOU) during the launch: Rotary International District 3780, AECOM International Development (implementer of the USAID Philippine Sanitation Alliance project), Maynilad Water Services, Inc., and Barangay Baesa. Quezon City Vice-Mayor Herbert Bautista, City Councilor Bernadette Herrera-Dy, USAID officer Jose Dulce, and members of the Rotary Community Corps of Baesa were also present to grace the occasion.

The USAID-Rotary project committee selected Mother Earth Foundation to implement the project. MEF conducted several trainings and consultation meetings, and then the Barangay Captain said he was no longer interested in participating in the project. Therefore, the project committee decided to shift the project to Del Monte, Quezon City. MEF has since conducted many consultation meetings, trainings and promotion campaign activities there. They are actively involving schools and churches.

Wastewater Treatment

1. Barangay Damayan passed a resolution supporting Maynilad's Sewage Treatment Plant for the Del Monte Catchment and stating that no one in the community opposed it. (Initially there was opposition, so MEF conducted several consultation meetings so that Maynilad officials could explain the project better and answer questions.)
2. Created a mechanism for coordination between the barangay officials, the community and Maynilad to address any future issue that may arise.

Solid Waste Management. For each of the two barangays, MEF conducted a WACS and a series of trainings and public consultations on solid waste management. They created two volunteer groups from within the community itself, the Solid Waste Monitoring Volunteers (every street) and the Solid Waste Education Volunteers, which was tasked to help in the dissemination of information on Ecological Solid Waste Management (ESWM). MWF conducted barangay-wide information and education campaigns, including a series of multi-sectoral trainings on ESWM for civil society groups, church, businesses, and school; intensive house-to-house campaign covering all households in the barangay; and produced printed materials and staged events. The process used was consultative and participatory. The beneficiaries were very active in the drafting of their solid waste plans and in involving all the other stakeholders in the implementation of the plans. The following results were achieved:

1. Approved solid waste management ordinances and 10 year plans for the two partner barangays.
2. 100% coverage for collection of segregated waste in the two barangays.
3. 97% coverage for collection of biodegradable waste.
4. Established a temporary transfer station for Damayan and a materials recovery facility for Del Monte.
5. Employment for 12 former informal waste pickers who now serve as eco-aides and waste collectors and earn at least P3,000 a month (7 in Damayan, 5 in Del Monte).
6. Waste diversion of at least 40% of food waste, and an additional 38% of recyclable waste through house to house collection of segregated waste by the 12 workers.
7. Sustainability of solid waste management programs through financial incentives from the Quezon City Government (currently negotiating with the city to release P230,000 for Damayan and P170,000 for Del Monte).

8. Establishment of a model school on ecological waste management in Cong. Reynaldo Calalay Mem. Elementary School (CRACMES)
    a. Integration of solid waste management in the curriculum and formulation of policies (plastic-free school, strict implementation of segregation in the classroom, etc.)
    b. Innovative programs like "Basura Mo, School Supplies Ko," which encourages students to segregate. The school was able to collect P3,000 to P6,000 worth of recyclable wastes per week and used the funds to purchase school supplies.
    c. Policies that support the barangay solid waste management program (e.g., requiring parents to attend a seminar before they can get their child's report card, etc.)
    d. Establishment of a Mother Earth Kids' Club and support for the club's activities inlcuding "Ilog Ko, Babantayan Ko" (River Watch), "Bantay Palengke" (Market Watch) in which the students issue friendly reminders to people throwing garbage in the river or on the ground in the market.
    e. CRACMES is now a finalist to the National Search for Eco-Friendly Schools of the Department of Environment and Natural Resources.
9. Project was also presented in the 7th International Zero Waste Conference in Brazil as a success story in the Philippines, and project activities were featured in 3 issues of Mother Earth's newsletter, which is distributed to 1000 local government units and schools in the country.

Hygiene Promotion

a. Integrated hygiene and sanitation concepts in the curriculum through teacher training, fixed water leaks and increased consumption of water.
b. Maynilad Water built a handwashing station at the school, which was launched during a celebration of Global Handwashing Day on October 18, 2010 attended by over 300 students.
c. Increased number of students washing their hands with soap during direct observation for a particular time (9am-10am) from 6 before the project started to 71 students in February 2011 (increase from 1% to 13%).

Lessons Learned

The USAID-Rotary Pasig River Improvement Project was quite challenging to implement. The main lesson learned was that it was too ambitious in scope given the readiness and past experience of the partners involved. However, the results achieved were quite substantial for the amount of money that was spent, and many of the activities are continuing past the end of the project. Flexibility and perseverance were the keys to this success. The project was able to shift from things that weren't going to work to those where better results could be achieved. Communication among the partners was sometimes difficult and resulted in delays.

E. Environmental Compliance

The PSA submitted two environmental screening reports (ESRs) to USAID that were subsequently reviewed, revised and approved. These were for the San Fernando septage treatment facility and the Sta. Ana Public Market treatment facility. The San Fernando facility is still under construction and is expected to be completed by the end of 2011. The Environmental Monitoring and Mitigation Plan for the septage treatment facility is contained in Annex F. The Sta. Ana facility was constructed in FY10, and the Environmental Monitoring and Mitigation Plan is contained in Annex G.

F. Biodiversity Conservation

The USAID Forestry & Biodiversity 119 Report recognizes sanitation as a major threat to marine and freshwater biodiversity in the Philippines. As untreated wastewater effluent from cities and towns, intensive animal husbandry operations, and industry is discharged into rivers, lakes, and coastal waters, habitat quality of fish, corals, and other flora and fauna dependent on clean water is severely degraded, thereby limiting the diversity of life the ecosystem can support. USAID/Philippines Strategy for 2005-2009 recommended the promotion of low-cost affordable wastewater treatment systems in critical coastal areas to reduce coastal and marine resources degradation and conserve biodiversity. Degraded water quality, as measured by indicators of biochemical oxygen demand (BOD), nutrients, and solids, are directly linked to negative trends in biodiversity indices.

Six PSA partners were located near key biodiversity areas (KBAs). The PSA contributed toward conservation of biodiversity in KBAs and protection of public health by (1) assisting public and private sector partners to build wastewater treatment facilities to reduce the amount of pollution entering water bodies that flow into KBAs; (2) assisting cities to develop city-wide action plans with short, medium and long term actions that, once fully implemented, will significantly reduce the amount of pollution entering water bodies that flow into KBAs; and (3) scaling up both private and public pilots to a nationwide scale through national associations to have a larger impact on biodiversity and health throughout the country. The following table lists the six partners, the KBA and trigger species.

Table 9. PSA Partners Contributing to Protection of KBAs

PSA Partners	Key Biodiversity Area	Trigger Species
Zamboanga City	Sulu Archepelego	Sea turtles and reef fishes
Cagayan de Oro City	Bohol Sea	Cetaceans and whale sharks
	Macalajar-Gingoog-Butuan Bays	Sea turtles
C TRADE	Taal Volcano Protected Landscape	4 endemic restricted range trigger species: 1.*Hydrophis semperi* (sea snake); 2. *Gobiopterus stellatus* (fish); 3. *Rhinogobius flavoventris* (fish); 4. *Sardinella tawilis* (fish)
Metro Cebu	Olongo	Sea birds
	Danajon Bank	Reef fishes, mangroves, corals
Davao City	Davao Gulf	Cetaceans (humpback whales)
	Eastern part of Mindanao	Mangroves
Sta. Rosa City	Laguna de Bay*	None identified yet, more research will be done

*Candidate KBA

As described above, Zamboanga City built wastewater treatment facilities for its public slaughterhouse and the Paseo del Mar Commercial Center and developed a septage management program. Cagayan de Oro City also developed a septage management program. C TRADE developed biogas projects for three piggeries that formerly polluted Taal Lake. Metro Cebu Water District and Davao City Water District have begun developing septage management programs. Sta. Rosa City built a wastewater treatment plant for its public hospital.

G. National Replication

The PSA participated in national and international conferences to advance the sanitation agenda and scale up its efforts nationwide. It also worked with several national organizations to encourage replication of sanitation improvement initiatives. These included the LCP, LWUA, PAWD, Philippine Hospital Association, Hotel and Restaurant Association, CREBA, DOH, and Philippine Ecological Sanitation

Network (PEN). Some of these activities are described in the sections above. Highlights of others are presented below.

1. PSA Spreads Information through the League of Cities of the Philippines

The League of Cities of the Philippines, a PSA partner, held its 2nd LCP National Convention of Cities on February 17-19, 2009 in Mandaluyong City. It was attended by hundreds of participants from LCP's 120 member cities and featured numerous booths. PSA shared information at a booth shared with Envirokonsult, a partner company, and PSA Project Manager Lisa Lumbao made a presentation during the plenary session. The PSA and LCP organized a technology-finance workshop for LGUs on March 4-6, 2009 in Dumaguete City. Entitled "Appropriate Technologies and Financing Options for Wastewater Management," the workshop aimed to assist LGUs in implementing the Clean Water Act. Ninety-two participants from LGUs, water districts, and LCP learned about technology and financing options for low-cost wastewater management. Resource speakers shared best practices and technology design approaches in managing domestic wastewater, including case studies and hands on estimates of project parameters for project design and financing, making cost estimates, and strategies for cost recovery. A highlight of the workshop was the site visits to the city's public market treatment plant, the constructed wetlands at Mapa GK Village Tanjay, Bayawan and the Silliman University Medical Center's wastewater treatment plant.

2. Second National Sanitation Summit

The PSA project participated in the 2nd National Sanitation Summit, held July 9 to 10, 2008 at the Asian Development Bank in Manila, by sponsoring the participation of city government and water district staff from Cagayan de Oro, Calbayog, Dumaguete and Zamboanga, and handing out information materials at an exhibit booth. The summit focused on the institutional issues related to the poor state of sanitation in the Philippines, and commitments were made to develop water safety plans, septage management plans and drinking water quality management committees. More than 200 participants, representing water service providers, LGUs, national government agencies, nongovernmental organizations, donors and other experts, discussed the linkage between recent outbreaks of water-borne diseases and the need for water utilities to develop water safety plans and start providing sanitation services to prevent future outbreaks.

3. PSA Participates in East Asia Ministerial Conference on Sanitation

PSA staff provided assistance in the planning and implementation of the second East Asian Ministerial Conference on Sanitation and Hygiene (EASAN-2) held in Manila January 27 to 29, 2010. The PSA worked with PWRF and Metropolitan Waterworks and Sewerage System (MWSS) on the documentation and communication committee, and assisted in developing the technical program. PSA consultants Jay Tecson and Nene Narvaez facilitated breakout sessions and provided support to the press coverage. Information on PSA and its work on septage management was provided in an exhibit during the whole conference. Several PSA partner cities like Dumaguete City and Marikina City were cited during the session on septage management. The PSA and USAID/Philippines were also invited to attend the luncheon meeting for donor agencies on the third day. The next EASAN conference will be held in Indonesia in 2012.

4. PSA Supports Crafting the National Promotion Program for Sustainable Sanitation

Under the auspices of DOH, a one and half day workshop on the National Sustainable Sanitation Promotion Program was conducted at the World Bank office in Manila on February 3 and 4, 2010. The workshop was meant to contextualize and integrate results of the National Sustainable Sanitation Plan (NSSP) with the task of doing a promotion program to support the NSSP. Clear objectives and targets were identified and an outline for the framework was developed, which will be subjected to a finalization consultation workshop in mid-March.

Participants included stakeholders from government, NGOs, donor agencies, and DOH consultants. The activity was supported by the Sustainable Sanitation in East Asia (SuSEA) program of the World Bank with the Department of Health. PSA provided facilitation support and provided inputs from its extensive promotion work. PSA has also suggested the use of the 10-step promotion toolkit as a process for assisting local stakeholders develop their individual promotion campaigns. The final draft is set to be submitted and approved by DOH by the end of April.

The PSA also conducted training for DOH staff throughout the country. A training workshop for sanitary engineers was held on September 23-25, 2008. Entitled "National Consultation and Training for Sanitary Engineers on Appropriate Wastewater Treatment and Other Issues," the training focused on the role of sanitary engineers in implementing the Clean Water Act. The event brought together 132 representatives from DOH offices nationwide and from the central office. In small groups, they identified the issues and problems they normally encounter in the discharge of their duties and developed a list of new roles to address the issues. PSA consultants also gave presentations at other DOH trainings and workshops.

5. PSA Lined Up as Mentor for Resource Pool for Sustainable Sanitation

On March 8-12, 2010 in Tagaytay City, a workshop was held to prepare for a Training of Trainers on Sustainable Sanitation course that will be offered to sanitary inspectors, sanitation professionals and practitioners with support from the Department of Health, Center for Advanced Philippine Studies, World Bank, and the Stockholm Environment Institute. PSA consultant Jay Tecson participated in the Tagaytay workshop, finalized the list of topics for the training course, drafted the syllabi of selected topics that will be useful for the Basic or Advanced Training Course on Sustainable Sanitation and developed an oath of commitment signed by the Charter Trainers on sustainable sanitation. The training included mentoring and coaching methods as part of the basics of adult teaching and learning, delivery methods, and style.

6. Sanitation Dialogue Kicks Off Preparation for Sanitation Legislative Agenda

On August 18, 2010, PSA-supported the PEN in cooperation with representatives from the 15th Congress conducted a 1-day Sanitation Dialogue in Manila to assist in the discussion and crafting of the sanitation legislative agenda for the 15th Congress. The dialogue was spearheaded by DOH and participated in by other PEN members and institutional partners. The first sanitation dialogue talked about proposing a national sustainable sanitation act (NSSA), creation of a sanitation bureau under DOH, creation of sanitation boards, streamlining of functions of sanitation-related agencies, and financing for the NSSA. The proposed act will cover human excreta management, domestic wastewater management, primacy of public health, emergency sanitation, and sanitation in schools. Several representatives from the 15th Congress expressed interest in authoring the proposed bill and supporting the bill during deliberation in Congress. Succeeding meetings will focus on fine-tuning the proposed sanitation bill and ramping information-dissemination activities on sanitation in congress. The first sanitation dialogue meeting was hosted by the Local Government Academy.

V. LESSONS LEARNED AND RECOMMENDATIONS

The PSA met or exceeded all ten of its indicator targets because of the effective approach that was employed. It engaged its partners in a way that motivated them to implement sanitation improvements using their own funds, develop projects in an integrated fashion – including policies, infrastructure and promotions – and achieve full cost recovery through user fees. By spending their own funds for infrastructure, they were much more inclined to build things that were suited to their needs and to operate and maintain them sustainably. The project was able to be flexible in its activities, focusing resources on those partners that were very active and forging new partnerships with those where results were more likely. This flexibility resulted from the way the project was designed and managed, both by AECOM and

USAID. Like most development projects, the PSA found that achieving results on the ground often takes much longer than anticipated.

The PSA's experience with promotions was especially enlightening. With assistance from consultant Lynne Cogswell, the project introduced its partners to the 10-Step Promotion Toolkit to develop effective campaigns. When done right following the toolkit, these campaigns can ensure the success of projects that require public support, cooperation and/or behavior change. The PSA's partners didn't have the time and resources required to follow the toolkit very closely, but they still benefitted from researching their audience, pretesting their materials and measuring the impact of the campaign. Future projects should incorporate effective promotions as a key component, but it would be useful to scale down the toolkit to better match the capacity and time available in most cases.

LGUs, water districts and private companies can accomplish substantial sanitation improvements if they are motivated, informed and assisted. To build on the PSA's results, donors could provide similar kinds of technical assistance, and try to build the capacity of national organizations to provide this on a continuous basis. Two possibilities are the LCP and the Philippine Association of Water Districts (PAWD). The challenge is finding a way of financing the assistance and finding the right people to provide the assistance. The PSA did try to do this with LCP but did not succeed due to many changes in their staff.

Exchange visits to see successful projects are an excellent way to spur action and replication. It is especially useful for decision makers (mayors, general managers, city councilors) to join these trips so they can better understand sanitation improvement options that are new to them. However, it is important to stress that many options should be considered before making a decision. There is a real need for technical experts to provide objective information to decision makers about sanitation technologies. The national government can explore ways to facilitate this, perhaps developing an accreditation program similar to the one that the National Water Resources Board has developed. Universities can also play an important role in providing objective technical advice.

To scale up the development of septage management and sewerage projects nationwide, LWUA and PAWD should continue to provide training for water districts on how to develop and finance projects. The National Economic Development Authority (NEDA) should approve the National Sewerage and Septage Management Program (NSSMP), which includes a 40% national government cost share for sewerage projects and a nationwide training and promotion campaign focusing on mayors and water district decision makers. If done effectively, this could substantially raise the profile of sanitation and increase the number of people with access to improved sanitation to levels that will make a real impact on the public health, environment and economy of the Philippines.

ANNEX A. FY2011 RESULTS

Indicator	FY11 Results	FY11 Target	Cumulative Results (Years 1-4)	Project Target
1. Number of people in target areas with access to improved sanitation facilities as a result of USG assistance (disaggregated by gender).	472,652 Men 506,215 Women 978,867 Total	582,834	658,507 Men 757,876 Women 1,416,383 Total	1,240,000
2. Number of feasibility and special studies/plans prepared	3	1	16	14
3. Amount of non-USAID financing mobilized for sanitation projects and facilities.	$2,452,271	$308,326	$4,182,575	$3,700,000
4. Number of people trained in environmental law, enforcement, public participation, and cleaner production policies, strategies, skills and techniques, disaggregated by gender.	410 Men 240 Women 773 Total	-	1,214 Men 951 Women 2,535 Total	1500
5. Number of people trained in child health and nutrition through USG-supported health area programs.*	652 Men 958 Women 1,610 Total	196	1,114 Men 1,800 Women 2,914 Total	1500
6. Increase in the percentage of mothers of children under five who can cite at least 2 measures to prevent diarrhea.	-	-	40.6%	25%
7. Increase in the percentage of students who, while at school, observably wash their hands with soap and clean water after using the toilet to prevent diarrhea.	31.4%	25%	31.4%	25%
8. Number of pollution and urban environment policies, laws, agreements or regulations implemented as a result of USG assistance.	7	1	12	6
9. Number of hygiene-related policies, laws, agreements or regulations implemented as a result of USG assistance.	2	1	3	2
10. Number of wastewater treatment projects developed by PSA partners that reduce pollution to levels that meet the government's effluent standards.	6	6	10	10

ANNEX B. RESULTS BY YEAR

Indicator	FY08 Results	FY09 Results	FY10 Results	FY11 Results	Cumulative Results	Project Target
1. Number of people in target areas with access to improved sanitation facilities as a result of USG assistance (disaggregated by gender).	5,641 Men 11,525 Women 17,166 Total	120,656 Men 179,577 Women 300,233 Total	59,558 Men 60,559 Women 120,117 Total	472,652 Men 506,215 Women 978,867 Total	658,507 Men 757,876 Women 1,416,383 Total	1,240,000
2. Number of feasibility and special studies/plans prepared	4	4	5	3	16	14
3. Amount of non-USAID financing mobilized for sanitation projects and facilities.	$407,365	$2,410,297	$632,817	$2,452,271	$4,182,575	$3,700,000
4. Number of people trained in environmental law, enforcement, public participation, and cleaner production policies, strategies, skills and techniques, disaggregated by gender.	737 Men 300 Women 1037 Total	345 Men 180 Women 525 Total	410 Men 240 Women 650 Total	189 Men 614 Women 803 Total	1,681 Men 1,334 Women 3,015 Total	1500
5. Number of people trained in child health and nutrition through USG-supported health area programs.	-	44 Men 143 Women 187 Total	418 Men 699 Women 1,117 Total	652 Men 958 Women 1,610 Total	1,114 Men 1,800 Women 2,914 Total	1500
6. Increase in the percentage of mothers of children under five who can cite at least 2 measures to prevent diarrhea.	-	-	40.6%	-	40.6%	25%
7. Increase in the percentage of students who, while at school, observably wash their hands with soap and clean water after using the toilet to prevent diarrhea.	-	-	-	31.4%	31.4%	25%
8. Number of pollution and urban environment policies, laws, agreements or regulations implemented as a result of USG assistance.	2	1	2	7	12	6
9. Number of hygiene-related policies, laws, agreements or regulations implemented as a result of USG assistance.	-	0	1	2	3	2
10. Number of wastewater treatment projects developed by PSA partners that reduce pollution to levels that meet the government's effluent standards.	-	1	3	6	10	10

ANNEX C. NUMBER OF PEOPLE WITH ACCESS TO IMPROVED SANITATION

Quarter	Project	Type of Treatment Plant	Status	Male	Female	Total
Q3	Calbayog Health Clinic	Wastewater Treatment Plant	operational	24	56	80
Q3	Calbayog Greenland Relocation Community	ABR	operational	90	210	300
Q3	Santa Cruz, Laguna Slaughterhouse	Wastewater Treatment Plant	operational	28	22	50
Q4	Calbayog Slaughterhouse	Wastewater Treatment Plant	operational	28	10	38
Q4	Calbayog commercial establishments	Wastewater Treatment Plant	operational	70	148	218
Q4	Zamboanga City Public Market	Wastewater Treatment Plant	not yet built	5,401	11,079	16,480
Q5	San Fernando, LU Lorma Hospital & College	Wastewater Treatment Plant	operational	1,557	2,908	4,465
Q5	Batangas C TRADE partners (3 farms)	Biogas Treatment Plants	operational	106	88	194
Q6	GK-Sitio Pajo and Pagbilao, Quezon Province	ABRs	operational	102	178	280
Q6	Nagcarlan, Laguna Slaughterhouse	Wastewater Treatment Plant	operational	71	0	71
Q6	Antipolo, Rizal VR Abbatoir	Wastewater Treatment Plant	operational	25	7	32
Q6	Iloilo Mission Hospital	Wastewater Treatment Plant	operational	600	733	1,333
Q7	Guihulngan, Negros Public Market	Wastewater Treatment Plant	operational	699	933	1,632
Q7	Sorsogon New Public Market	Wastewater Treatment Plant	operational	1,251	5,351	6,602
Q7	Laguna Provincial Hospital	Wastewater Treatment Plant	operational	640	541	1,181
Q7	Zamboanguita, Negros Slaughterhouse	Wastewater Treatment Plant	operational	5	0	5
Q7	Iloilo Slaughterhouse	Wastewater Treatment Plant	operational	52	66	118
Q8	Calbayog Greenland sewerage	ABR	operational	66	74	140
Q8	Manjuyod, Negros Public Market	Wastewater Treatment Plant	operational	59	256	315
Q8	Bohol Provincial Capital	Wastewater Treatment Plant	operational	252	200	452
Q8	Zamboanga City Slaughterhouse	Wastewater Treatment Plant	operational	163	13	176
Q8	GK - Lucena, Quezon Province	ABR	operational	45	55	100
Q8	Laguna Dr. J. Rizal Memorial Hospital	Wastewater Treatment Plant	operational	216	417	633
Q8	El Nido Municipal Public Market	ABR with Reed Bed	operational	1,938	3,550	5,488
Q8	Zamboanga City Septage Management	Septage Treatment Plants	in development	111,274	160,051	271,325

Quarter	Project	Type of Treatment Plant	Status	Male	Female	Total
Q8	GK - Tripura Village (250), KLM Amparo (500), Quezon City (QC)	ABR	operational	300	450	750
Q8	Sta. Rosa City Public Market	Wastewater Treatment Plant	not yet built	1,235	3,706	4,941
Q9	GK-Mauban Quezon Province	ABR	operational	33	47	80
Q9	GK-Ayusan Tiaong, Quezon Province	ABR	operational	39	91	130
Q9	GK-Colgate Palmolive – Sitio Pajo QC	ABR	operational	78	182	260
Q9	GK-Mayao Crossing, Quezon Province	ABR	operational	24	56	80
Q9	GK-Sagip Kapamilya, Infanta Quezon Prov.	ABR	operational	45	60	105
Q10	GK-Tayabas Quezon Province	ABR	operational	20	30	50
Q10	GK-Sariaya Quezon Province	ABR	operational	40	60	100
Q10	GK-Alabat Quezon Province	ABR	operational	60	90	150
Q10	GK-Lumad, Batasan Hills QC	ABR	operational	63	117	180
Q11	San Fernando, La Union	Septage Treatment Plant	under construction	59,086	59,671	118,757
Q11	Sustainable Project Mgmt – Smokey Mountain, Manila	ABR	operational	40	110	150
Q12	GK - Nestle Malarayat, Batangas	ABR	operational	30	45	75
Q13	Sta. Ana Public Market, Manila	Wastewater Treatment Plant	operational	196	552	748
Q14	Plazuela de Iloilo (restaurants/commercial center)	Wastewater Treatment Plant	operational	587	588	1,175
Q15	Ateneo de Manila University, Quezon City	Wastewater Treatment Plant	operational	600	400	1,000
Q16	San Fernando LU Eco-Tanks (3)	Primary Sewage Treatment	one operational, two in development	305	365	670
Q16	Maynilad - Del Monte, QC	Wastewater Treatment Plant	in development	13,150	13,850	27,000
Q16	Metro Naga Water District	Septage Treatment Plant	in development	84,000	126,000	210,000
Q16	City Gov't. of Cagayan De Oro	Septage Treatment Plant	in development	307,522	295,462	602,984
Q16	Laguna Water District	Septage Treatment Plant	in development	66,292	68,998	135,290
Total				658,507	757,876	1,416,383

ABR-anaerobic baffled reactor
GK-Gawad Kalinga

ANNEX D. PSA-SUPPORTED INFRASTRUCTURE PROJECTS

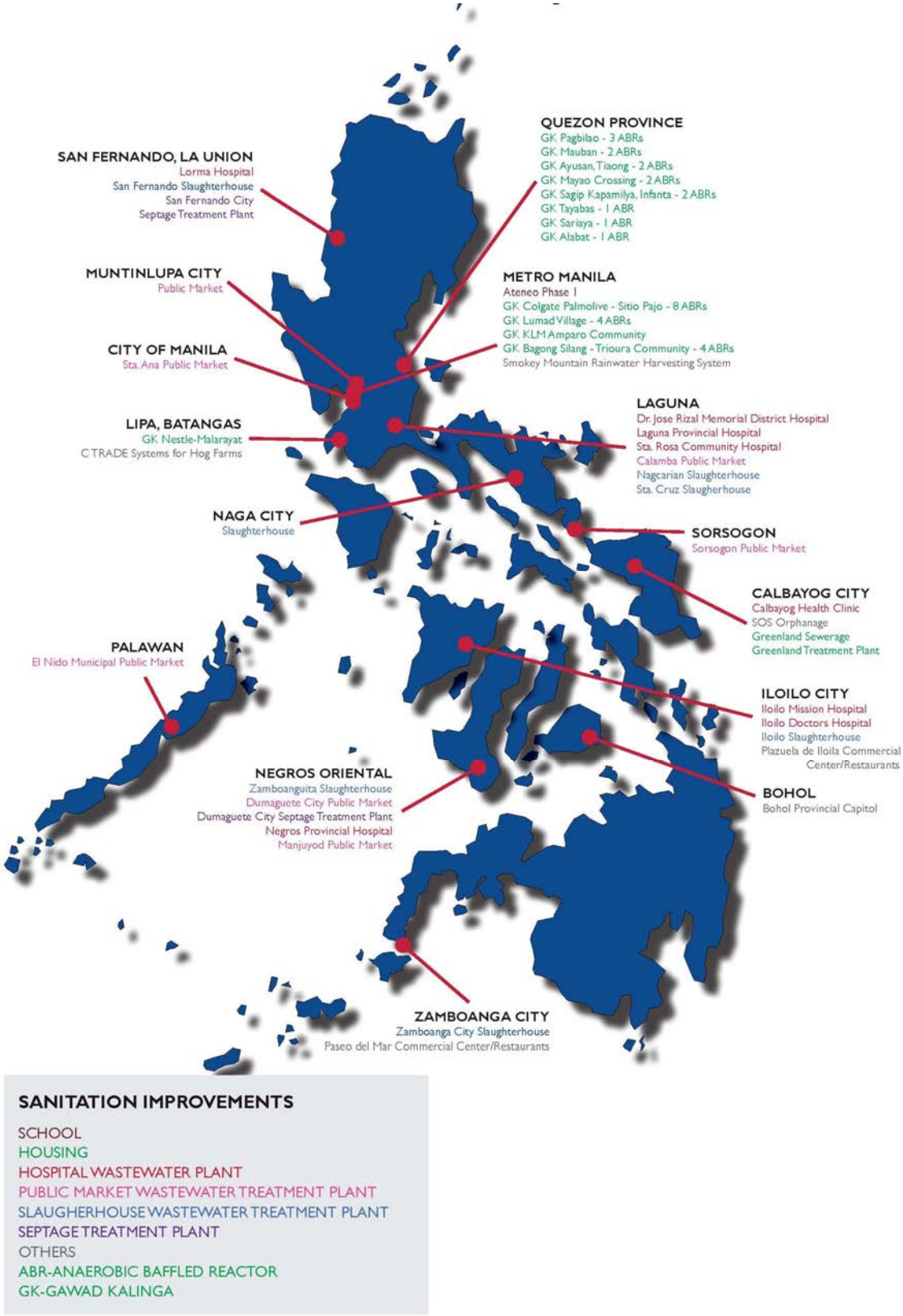
Location	Project Name	Cost ($)	Cost (P)	No. of People*	No. of Projects
Low-Cost Housing					16
Calbayog City	Greenland Relocation Community - ABR	$36,145	P1,500,000	300	1
Calbayog City	Greenland Sewerage - ABR	$27,034	P1,297,620	140	1
San Fernando City, La Union	EcoTanks (two urban poor communities and one beach shed development)	$6,395	P274,985	670	1
Gawad Kalinga Projects					
Quezon Province	Pagbilao - 3 ABRs	$2,263	P106,371	180	1
Quezon City Metro Manila	Colgate Palmolive-Sitio Pajo - 8 ABRs	$5,873	P272,449	360	1
Quezon City Metro Manila	Lumad Village - 4 ABRs	$1,844	P84,140	180	1
Quezon City Metro Manila	KLM Amparo Community - ABR			500	1
Quezon City Metro Manila	Bagong Silang - Tripura Community - 4 ABRs	$1,844	P84,140	250	1
Quezon Province	Mauban - 2 ABRs	$1,705	P79,095	80	1
Quezon Province	Ayusan, Tiaong - 2 ABRs	$1,705	P79,095	130	1
Quezon Province	Mayao Crossing - 2 ABRs	$1,705	P79,095	80	1
Quezon Province	Sagip Kapamilya, Infanta - 2 ABRs	$1,705	P79,095	105	1
Quezon Province	Tayabas, Quezon - 1 ABR	$1,186	P54,165	50	1
Quezon Province	Sariaya, Quezon -1 ABR	$1,715	P78,324	100	1
Quezon Province	Alabat, Quezon -1 ABR	$1,715	P78,324	150	1
Lipa, Batangas	Nestle – Malarayat -1 ABR	$1,401	P61,331	75	1
Hospitals					7
Calbayog City	Health Clinic - WTP	$6,024	P250,000	80	1
Iloilo City	Iloilo Mission Hospital - WTP	$136,840	P6,502,625	1333	1

Location	Project Name	Cost ($)	Cost (P)	No. of People*	No. of Projects
Laguna	Dr. Jose Rizal Memorial District Hospital - WTP	$148,936	P7,000,000	633	1
Laguna	Laguna Provincial Hospital - WTP	$212,766	P10,000,000	1181	1
Sta. Rosa City	Sta. Rosa City Community Hospital - WTP	$122,864	P5,000,000	1296	1
San Fernando, La Union	Lorma Hospital - WTP	$37,500	P1,800,000	500	1
Negros Oriental	Negros Provincial Hospital - WTP	$191,852	P8,900,000		1
Commercial Centers					3
Calbayog City	Commercial establishments - WTP	$63,478	P2,800,000	218	1
Iloilo City	Plazuela de Iloilo commercial center/restaurants - WTP	$100,365	P4,394,000	1175	1
Zamboanga City	Commercial center/restaurants at Paseo del Mar – ABR	$4,073	P172,918	1267	1
Public Markets					5
Calamba City	Calamba City Public Market - WTP	$172,727	P7,562,000		1
Negros Oriental	Manjuyod Public Market - WTP	$42,163	P1,725,000	315	1
Palawan	El Nido Municipal Public Market - ABR with Reed Bed	$304,115	P14,399,845	5488	1
Sorsogon City	Sorsogon City Public Market - WTP	$161,020	P7,567,930	790	1
Sta. Ana, Metro Manila	Sta. Ana Public Market - WTP	$121,656	P5,109,569	748	1
Slaughterhouses					6
Iloilo City	Iloilo Slaughterhouse - WTP	$10,468	P492,000	118	1
Laguna	Nagcarlan Slaughterhouse - WTP	$36,883	P1,733,501	71	1
Laguna	Sta. Cruz Slaughterhouse - WTP	$43,373	P2,700,000	50	1
San Fernando City	San Fernando City Slaughterhouse - WTP	$78,215	P3,459,461		1
Negros Occidental	Zamboanguita Slaughterhouse - WTP	$17,363	P816,050	5	1
Zamboanga City	Zamboanga City Slaughterhouse - WTP	$99,149	P4,600,000	176	1
Septage Treatment					5
Zamboanga City	Septage Management Program			271,325	1
San Fernando City, La Union	Septage Treatment Facility	$482,786	P20,051,220	118,757	1

Location	Project Name	Cost ($)	Cost (P)	No. of People*	No. of Projects
Metro Naga Water District	Septage Treatment Facility**			210,000	1
Laguna Water District	Septage Treatment Facility** (preparatory expenses)	$14,114	P609,027	135,290	1
Cagayan De Oro City	Septage Treatment Facility** (preparatory expenses)	$11,872	P512,257	602,984	1
Others					4
Bohol	Bohol Provincial Capitol - WTP	$45,833	P2,200,000	452	1
Batangas	C TRADE biogas systems for three hog farms	$620,000	P27,000,000	194	1
Quezon City, Metro Manila	Ateneo University-Phase 1 - WTP	$145,833	P7,000,000	1,000	1
Manila, Metro Manila	Smokey Mountain Rainwater Collection - WTP and Urban Garden Project	$2,480	P113,832	150	1
Total		$3,528,984			46

* Number of people with access to improved sanitation
** approved financing in place, but facility not yet constructed
ABR-anaerobic baffled reactor

ANNEX E. MAP OF PSA PROJECTS



ANNEX F. ENVIRONMENTAL MONITORING AND MITIGATION PLAN FOR THE SAN FERNANDO CITY SEPTAGE TREATMENT FACILITY

Potential Impact	Mitigation Measure	Objective of Mitigation Measure	Authority Responsible		Monitoring Methodology	Indicator/ Frequency	Status
			Application	Monitoring			
Non-compliance with government regulations on construction and design standards	Secure necessary government-issued building permit	Achieve construction and design compliance with government regulations	San Fernando City Engineering and Environment and Natural Resources Office (CENRO)	Weekly inspection and final construction inspection and certification	Document date of acquiring permit, and file the permit with PSA	Permit obtained/Single event	CENRO office needs to submit required documents to the engineering office
Non-compliance with government regulations on construction and design standards	Secure approval from licensed engineer for the design of the wastewater treatment system	Achieve construction and design compliance with government regulations	PSA, Private contractor with oversight by San Fernando City Engineer's Office	Construction grade drawings obtained prior to construction	Document the approval and file with PSA	Approval obtained/Single event	City Engineer Balanon approved the design
Non-compliance with government environmental regulations and environmental damage	Secure required environmental clearance from DENR and/or other relevant agencies	Achieve environmental compliance with government authorities	CENRO	Permits obtained prior to discharge	Document date of acquiring ECC, and file with PSA	ECC obtained/Single event	CENRO has applied for a certificate of non compliance from DENR (ECC not required)
Septage treatment system failure, environmental damage, and/or risks to human health and safety	Develop an O&M plan and training program for the operator(s) of the wastewater treatment facility	Facilitate proper operation and maintenance actions to sustain long-term operation of the facility	PSA, San Fernando City Engineering and CENRO	Training conducted 1 month prior to STP completion. Submit final O&M plan during commissioning Follow up with training through commissioning	File the plan with PSA	Plan completed, training conducted /At least 3 training sessions	O&M plan completed. Training could not be done because the system is still under construction

Potential Impact	Mitigation Measure	Objective of Mitigation Measure	Authority Responsible		Monitoring Methodology	Indicator/ Frequency	Status
			Application	Monitoring			
Disruption in traffic patterns during construction may cause accidents and/or damage to construction works	Mark construction areas and direct traffic with appropriate markers and individuals around construction site Ensure that the site is secure and bystanders are kept away from the construction works and road access during construction activities	Minimize disturbance to construction area delineated with stakes and markers	Private contractor	Private contractor's safety officer shall be on-site during construction to monitor. The City safety officer and CENRO will visit the site weekly to monitor. Issues will be addressed as they arise	Inspect and verify that proper traffic control measures are implemented Weekly monitoring visits Document the occurrence of accidents	Number of violations in adherence to traffic control measures/Daily Number and nature of traffic accidents at construction site/Weekly Number of violations observed during inspections/Daily	No violations observed/recorded No accidents or violations observed
Injury to skin and eyes from chemical application and handling of releasing agents, tank sealants, glues, primers, and other toxic substances during setting of forms and scaffolds, applying tank sealant, and installing equipment and plumbing	Training provided by PSA to ensure proper handling, use, and application Provide and train workers in the proper use of PPE	Prevent injury, illness and contamination to workers Minimize the number of accidents	Private contractor	Private contractor's safety officer shall be on-site during construction to monitor. The City safety officer and CENRO will visit the site weekly to monitor.	Document the delivery of safety training and PPE for each worker Document the occurrence of accidents Weekly monitoring visits	Number and nature of accidents/Daily Number of safety violations observed during inspections/Daily	No accidents or violations observed
Injury to skin and eyes from application of tank sealants in confined spaces	PSA staff will train private contractor staff on proper confined space entry procedures. Private contractor will be responsible for continued training and special staff instruction prior to application of sealants Provide and train workers in the proper use of PPE	Prevent injury, illness and contamination to workers Minimize the number of accidents	Private contractor	Private contractor's safety officer shall be on-site during construction to monitor. The City safety officer and CENRO will visit the site weekly to monitor.	Document the delivery of safety training and PPE for each worker Document the occurrence of accidents Weekly monitoring visits	Number and nature of accidents/Daily Number of safety violations observed during inspections/Daily	No accidents or violations observed

Potential Impact	Mitigation Measure	Objective of Mitigation Measure	Authority Responsible		Monitoring Methodology	Indicator/ Frequency	Status
			Application	Monitoring			
Injury to workers from improper handling of heavy equipment and materials (such as concrete) during concrete cutting, excavation, concrete pouring, and installing plumbing.	PSA staff will train private contractor staff on on proper lifting procedures, equipment handling procedures and the use of PPE.. Private contractor will be responsible for continued training. Provide and train workers in the proper use of PPE Private contractor provide PPE to workers	Prevent injury to workers Minimize the number of accidents	Private contractor	Private contractor safety officer shall be on-site during construction to monitor. The City safety officer and CENRO will visit the site weekly to monitor	Document the delivery of safety training and PPE for each worker Document the occurrence of accidents Weekly monitoring visits	Number and nature of accidents/Daily Number of safety violations observed during inspections/Daily	No accidents or violations observed
Hazards associated with working in confined spaces after wastewater tank is in place	Restrict and control worker entry to tank Implement stringent entry procedures for confined spaces Prior to construction of the tank, PSA will provide contractor with training on confined space entry procedures.	Minimize health and safety risks associated with confined spaces	Private contractor	Private contractor safety officer shall be on-site during construction to monitor. The City safety officer and CENRO will visit the site weekly to monitor	Document the delivery of safety training and PPE for each worker Document the occurrence of accidents Weekly monitoring visits	Number of workers entering and working in tank/Daily Number and nature of accidents/Daily Number of safety violations observed during inspections/Daily	No accidents or violations observed
Potential risk of drowning during and after filling of tank	PSA will provide training of both contractor and San Fernando City staff on proper filling procedures and activity around tank to prevent drowning hazards. San Fernando City should adopt procedures as part of normal standard operating procedures	Minimize risk of drowning	Private contractor	Private contractor safety officer shall be on-site during construction to monitor. The City safety officer and CENRO will visit the site weekly to monitor	Document the delivery of safety training and PPE for each worker Document the occurrence of accidents Weekly monitoring visits	Number and nature of accidents/Daily Number of safety violations observed during inspections/Daily	No accidents or violations observed

Potential Impact	Mitigation Measure	Objective of Mitigation Measure	Authority Responsible		Monitoring Methodology	Indicator/ Frequency	Status
			Application	Monitoring			
Excessive noise and dust from construction activity	Proper planning of construction works and consultation with local authorities on preferable schedule of activities that will create dust, noise, and disrupt traffic patterns.	Minimize disturbance to the local community	Private contractor	Private contractor safety officer shall be on-site during construction to monitor. The City safety officer and CENRO will visit the site weekly to monitor	Track issues and complaints Weekly monitoring visits	Number of complaints registered/ Weekly	No complaints received
Excessive dust from truck activity during construction	PSA train private contractor on using water to spray down the dirt for dust abatement and during excavation and trucking of spoils. Daily application of water to minimize dust, where appropriate Train workers in the proper use of PPE Provide PPE	Minimize health impacts from dust	Private contractor	The private contractor safety officer will determine when spraying is required and monitor. The City safety officer and CENRO will visit the site weekly to monitor	Weekly monitoring visits.		No problems with dust observed
Excessive emissions from truck activity during construction	Inspect and maintain vehicles to ensure they are running smoothly and efficiently Trucks and motorized equipment will not be permitted to idle their engines for more than 10 minutes at the project location.	Minimize health impacts from truck and heavy machinery emissions	Private contractor	Private contractor safety officer shall be on-site during construction to monitor. The City safety officer and CENRO will visit the site weekly to monitor.	Weekly monitoring visits	Number of vehicles and equipment maintained/ Weekly Number of complaints about emissions registered/ Weekly	No complaints received

Potential Impact	Mitigation Measure	Objective of Mitigation Measure	Authority Responsible		Monitoring Methodology	Indicator/ Frequency	Status
			Application	Monitoring			
Excessive noise from truck activity during construction	Trucks will be required not to idle their engines for more than 10 minutes. Train workers in the proper use of personal protective equipment (PPE) to protect against noise Provide PPE for worker protection against noise	Minimize disturbance from noise	Private contractor safety officer and City safety officer.	Private contractor safety officer shall be on-site during construction to monitor. The City safety officer and CENRO will visit the site weekly to monitor	Weekly monitoring visits	Time schedule of operation and construction/ Daily Number of vehicles and equipment maintained/ Weekly Number of complaints about noise registered- Weekly	Contractor was not observed idling truck engines. No complaints received.
Construction works and stockpiling of spoils during excavation degrades quality of landscape and aesthetics	Proper cleanup and control of construction site Remove excess spoils from excavation area as needed Proper disposal of waste	Minimize degradation to landscape and aesthetics	Private contractor	Private contractor safety officer shall be on-site during construction to monitor. The City safety officer and CENRO will visit the site weekly to monitor	Weekly monitoring visits	Number of areas in need of improvement/ Daily Number of areas improved and type of improvements made/Daily	No problems observed
Erosion of soils after site disturbance	Plant with native grasses after construction	Minimize erosion	City government	San Fernando City CENRO	Inspect to verify planting is done	Check site and re-plant as needed as routine O&M/ Monthly	Construction is still ongoing

ANNEX G. ENVIRONMENTAL MONITORING AND MITIGATION PLAN FOR THE STA. ANA PUBLIC MARKET WASTEWATER TREATMENT FACILITY

Potential Impact	Mitigation Measure	Objective of Mitigation Measure	Authority Responsible		Monitoring Methodology	Indicator/ Frequency	Status
			Application	Monitoring			
Non-compliance with government regulations on construction and design standards	Secure necessary government-issued construction permit(s)	Achieve construction and design compliance with government regulations	City of Manila Engineer	Weekly inspection and final construction inspection and certification	Document date of acquiring permit, and file the permit with PSA	Permit obtained/Single event	PSA has a copy of the building permit for the market, and one for the WTP
Non-compliance with government regulations on construction and design standards	Secure approval from licensed engineer for the design of the wastewater treatment system	Achieve construction and design compliance with government regulations	City of Manila Staff	Construction grade drawings obtained prior to construction commences	Document the approval and file with PSA	Approval obtained/Single event	PSA has a copy of the structural design signed by City Engineers
Non-compliance with government environmental regulations and environmental damage	Secure required environmental clearance from DENR and/or other relevant agencies	Achieve environmental compliance with government authorities	City of Manila Staff	Permits obtained prior to discharge	Document date of acquiring ECC, and file with PSA	ECC obtained/Single event	Have obtained a Certificate of Non-Coverage, which DENR has decided to issue for public markets instead of ECCs
Wastewater system failure, environmental damage, and/or risks to human health and safety	Develop an O&M plan and training program for the operator(s) of the wastewater treatment facility	Facilitate proper operations and management actions to sustain long term operation of the facility	PSA Project Engineer, City of Manila Staff	Training conducted one month prior to STP completion. Submit final O&M plan during commissioning. Follow up with training program through commissioning and at least three months after turnover.	File the plan with PSA	Plan completed, training conducted /At least 3 training sessions	Developed an O&M plan with checklist

Potential Impact	Mitigation Measure	Objective of Mitigation Measure	Authority Responsible		Monitoring Methodology	Indicator/ Frequency	Status
			Application	Monitoring			
Disruption in traffic patterns during construction may cause accidents and/or damage to construction works	Mark construction areas and direct traffic with appropriate markers and individuals around construction site. They will ensure that the site is secure and bystanders are kept away from the construction works and road access during construction activities.	Minimize disturbance to construction area delineated with stakes and markers	MMDA and Sta. Ana Market safety officers	Both safety officers shall be on-site during construction to monitor. Issues will be addressed as they arise.	Inspect and verify that proper traffic control measures are implemented Conduct traffic safety inspections. Document the occurrence of accidents	Number of violations in adherence to traffic control measures/Daily Number and nature of traffic accidents at construction site/Weekly Number of violations observed during inspections/Daily	No traffic accidents occurred and traffic was not disrupted. Two safety officers and the MMDA workers directed vehicles to stay away from the construction area. The garbage truck was still able to pass through to collect garbage on a daily basis. Vehicles were still able to park.
Injury to skin and eyes from chemical application and handling of releasing agents, tank sealants, glues, primers, and other toxic substances during setting of forms and scaffolds, applying tank sealant, and installing equipment and plumbing	Oversight and training provided by construction management to ensure proper handling, use, and application Train workers in the proper use of PPE (provided by MMDA) Ensure workers follow proper handling requirements on safety data sheets for bituminous materials Provide PPE	Prevent injury, illness and contamination to workers Minimize the number of accidents	MMDA Project Manager and MMDA safety officer	Daily safety meetings and special staff instruction prior to use of chemicals.	Document the delivery of safety training and PPE for each worker Document the occurrence of accidents Conduct safety inspections	Number and nature of accidents/Daily Number of safety violations observed during inspections/Daily	Safety meetings were held and the foreman ensured that the workers wore closed-toed shoes and hard hats and those handling chemicals wore gloves.

Potential Impact	Mitigation Measure	Objective of Mitigation Measure	Authority Responsible		Monitoring Methodology	Indicator/ Frequency	Status
			Application	Monitoring			
Injury to skin and eyes from application of tank sealants in confined spaces	PSA staff will train MMDA staff on proper confined space entry procedures. MMDA will be responsible for continued training and special staff instruction prior to application of sealants. Train workers in the proper use of PPE Ensure workers follow proper handling requirements on safety data sheets for bituminous materials Provide PPE to workers	Prevent injury, illness and contamination to workers Minimize the number of accidents	MMDA staff and safety officer, and PSA staff	Daily safety meetings and oversight. Both safety officers shall be on-site during construction to monitor.	Document the delivery of safety training and PPE for each worker Document the occurrence of accidents Conduct safety inspections	Number and nature of accidents/Daily Number of safety violations observed during inspections/Daily	PSA conducted training. Safety officers were on site. Before any worker entered the tank, it was opened to allow gas to escape before any worker entered the tank. Workers who entered the tank wore face masks. No accidents or injuries occurred.
Injury to workers from improper handling of heavy equipment and materials (such as concrete) during concrete cutting, excavation, concrete pouring, and installing electrical equipment and plumbing, and testing equipment	Daily safety meetings on proper lifting procedures, equipment handling procedures and the use of PPC. MMDA provide PPE to workers	Prevent injury to workers Minimize the number of accidents	MMDA Project Manager and MMDA safety officer	Both safety officers shall be on-site during construction to monitor.	Document the delivery of safety training and PPE for each worker Document the occurrence of accidents Conduct safety inspections	Number and nature of accidents/Daily Number of safety violations observed during inspections/Daily	PPE: MMDA provided each worker with a hard hat and Rotary bought 6 sets of gloves, but they were not good quality and wore out quickly. Rotary bought 3 sets of rubber boots. They also wore out quickly. Some workers brought their own gloves. Workers bought their own shoes. No open-toed flip flops were allowed to be worn by the workers at the site.

Potential Impact	Mitigation Measure	Objective of Mitigation Measure	Authority Responsible		Monitoring Methodology	Indicator/ Frequency	Status
			Application	Monitoring			
Injury to workers from improper installation and/or testing of electrical equipment, wires, and conduits	Installation of electrical equipment by licensed electrician Mount equipment to tank walls or floor PSA staff will train MMDA project manager and safety officer on proper electrical safety procedures including Lock Out/Tag Out procedures. Provide PPE	Prevent injury to workers Minimize the number of accidents Control dust and noise	MMDA Project Manager, City of Manila staff, safety officers, PSA staff	Both safety officers shall be on-site during construction to monitor.	Document the delivery of safety training and PPE for each worker Document the occurrence of accidents Conduct safety inspections	Number and nature of accidents/Daily Number of safety violations observed during inspections/Daily	PSA conducted training and gave printed information on safety, and oversaw the installation of the electrical equipment and did on-site training.
Hazards associated with working in confined spaces after wastewater tank is in place	Restrict and control worker entry to tank Implement stringent entry procedures for confined spaces Prior to construction of the tank, PSA will provide MMDA with confined space entry procedures.	Minimize health and safety risks associated with confined spaces	MMDA Project Manager and safety officer, City of Manila staff, PSA	Both safety officers shall be on-site during construction to monitor.	Maintain a log of worker entry to tank Document the delivery of safety training and PPE for each worker Document the occurrence of accidents Conduct safety inspections	Number of workers entering and working in tank/Daily Number and nature of accidents/Daily Number of safety violations observed during inspections/Daily	PSA provided training and the tank was opened and allowed to vent gases before anyone entered. No incidents or accidents occurred. No log was maintained.

Potential Impact	Mitigation Measure	Objective of Mitigation Measure	Authority Responsible		Monitoring Methodology	Indicator/ Frequency	Status
			Application	Monitoring			
Potential risk of drowning during and after filling of tank	PSA will provide training of both MMDA and city of Manila staff on proper filling procedures and activity around tank to prevent drowning hazards. City of Manila should adopt procedures as part of normal standard operating procedures	Minimize risk of drowning	MMDA Project Manager, City of Manila Staff, PSA Staff	Both safety officers shall be on-site during construction to monitor.	Maintain a log of worker entry to tank Document the delivery of safety training and PPE for each worker Document the occurrence of accidents Conduct safety inspections	Number and nature of accidents/Daily Number of safety violations observed during inspections/Daily	A fence was installed to restrict access to the tanks. A lock was placed on the door in October 2010 to prevent unauthorized people to go up the stairs and gain access to the tanks. No accidents have occurred as of 9-30-11. No log was maintained.
Excessive noise and dust from construction activity	Proper planning of construction works and consultation with local authorities on schedule of activities that will create dust, noise, and disrupt traffic. Construction only during daylight hours will be allowed. Market venders have been informed of the activities. Use of plastic sheeting and Sakolyn will help keep dust from entering the market	Minimize disturbance to market vendors, shoppers, and the local community	MMDA staff	Both safety officers shall be on-site during construction to monitor.	Track issues and complaints Conduct and document meetings with local representatives; Document issues raised	Number of complaints registered/Weekly	There was noise during concrete pouring and excavation. No work was done after 6 p.m. Dust was not present.

Potential Impact	Mitigation Measure	Objective of Mitigation Measure	Authority Responsible		Monitoring Methodology	Indicator/ Frequency	Status
			Application	Monitoring			
Excessive dust from truck activity during construction	PSA train MMDA on using water to spray down the dirt for dust abatement and during excavation and trucking of spoils. Daily application of water to minimize dust, where appropriate Set limits of time of construction operations to occur each day Train workers in the proper use of PPE Provide PPE	Minimize health impacts from dust	MMDA staff, PSA staff	The safety officer will determine when spraying is required and monitor	Document time and schedule of construction activity		The excavated soil was damp so there was no need to put water on it.
Excessive emissions from truck activity during construction	Set limits of time of construction operations to occur each day Inspect and maintain vehicles to ensure they are running smoothly and efficiently Trucks and motorized equipment will not be permitted to idle their engines for more than 10 minutes. Trucks will be required to park off site while waiting to perform their tasks.	Minimize health impacts from truck and heavy machinery emissions	MMDA Project manager and MMDA safety officer	Both safety officers shall be on-site during construction to monitor.	Inspect vehicles weekly and maintain as necessary	Number of vehicles and equipment maintained/Weekly Number of complaints about emissions registered/Weekly	The excavator/back hoe was turned off when not in use. One truck with a faulty starter was left running for 1-2 hours on a daily basis for 2 months (the driver was worried it wouldn't start again if he turned it off while waiting).

Potential Impact	Mitigation Measure	Objective of Mitigation Measure	Authority Responsible		Monitoring Methodology	Indicator/ Frequency	Status
			Application	Monitoring			
Excessive noise from truck activity during construction	Trucks will be required to park off site, not idle their engines for more than 10 minutes. Set limits of time of construction operations to occur each day Train workers in the proper use of personal protective equipment (PPE) to protect against noise Provide PPE for worker protection against noise	Minimize disturbance from noise	MMDA Project Manager and MMDA Staff.	Both safety officers shall be on-site during construction to monitor.	Document time and schedule of construction activity Inspect vehicles weekly and maintain as necessary Inspect and document integrity of plastic seal at back entrance of market	Time schedule of operation and construction/Daily Number of vehicles and equipment maintained/Weekly Number of complaints about noise registered/Weekly	Construction was done 5 days a week, 9 a.m.-4 p.m. 2 dump trucks and back hoe were used during the first 3 weeks. The drivers inspected the vehicles, however, MMDA did not have funds to do repairs. Plastic seal was not put at the back of the market because there were too many people going in and out.
Construction works and stockpiling of spoils during excavation degrades quality of landscape and aesthetics	Proper cleanup and control of construction site Remove spoils daily from excavation area Proper disposal of waste and unused equipment	Minimize degradation to landscape and aesthetics	MMDA Project Manager and safety officer.	Both safety officers shall be on-site during construction to monitor.	Inspect construction site and document problems and improvements made Conduct and document meetings with local representatives; document issues raised	Number of areas in need of improvement/Daily Number of areas improved and type of improvements made/Daily	Spoils were piled at the back of the temporary warehouse. A fence was placed around the pile to keep children away from it. It was removed in September and brought to a hospital that needed fill.
Accumulation of sludge in treatment plant impacts upon effluent quality	Monitor and remove sludge via vacuum truck when sludge depth in anaerobic tank at 1/3rd total depth	Improvement of effluent quality	City of Manila	City of Manila	Probe with sludge judge	Sludge depth - Monthly monitoring.	
Sludge removed from facility is not brought to proper treatment facility for treatment	Manifest system – Insure all septage loads are properly recorded and tracked with receipt.	To minimize the potential for illegal sludge dumping	Manila Water	Manila Water	Manifest and receipt tracking	Receipt collected every time sludge is removed	

Potential Impact	Mitigation Measure	Objective of Mitigation Measure	Authority Responsible		Monitoring Methodology	Indicator/ Frequency	Status
			Application	Monitoring			
Too many non-biodegradable solids from operations in the market flow to the wastewater treatment system	Installation and maintenance of proper solids trash trap	Minimize the amount of non-biodegradable solids that enter the treatment plant	City of Manila	City of Manila	Daily operation and maintenance	Accumulation of sludge. Monitoring monthly	PSA has conducted training on solids removal for the market staff assigned and assisted in developing a solid waste management plan for the market. Biodegradable waste is being composted and recyclable and reusable waste is being collected
Too much grease is accumulating in the treatment plant	Install correct grease trap, verify it is plumbed correctly, train on proper use, clean daily.	Keep grease out of the treatment plant	City of Manila	City of Manila	Fats, oil and grease test	FOG test, quarterly.	A grease management plan was developed. Vendors were trained and 10 grease traps were installed. However, they are not working well due to poor design. Lola Grande Foundation is trying to have them retrofitted.