Capacity Building for Banjarmasin, Balikpapan, and Surakarta Wastewater System Expansion under the Sanitation Hibah

TECHNICAL REPORT

SMEC

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ACRONYMS

WHO	World Health Organization
AusAID	Australian Agency for International Development
GoI	Government of Indonesia
FOPIP	Financial And Operational Performance Improvement Plan
IndII	Indonesia Infrastructure Initiative
ISSDP	Indonesia Sanitation Sector Development Program
LG	Local Government
MPW	Ministry of Public Work
PAMSIMAS	Penyediaan Air Minum dan Sanitasi Berbasis Masyarakat
PDAM	Perusahaan Daerah Air Minum
PDPAL	Perusahaan Daerah Pengelolaan Air Limbah
SOP	Standard Operating Procedures
STP	Sewerage Treatment Plant
WSI	Water and Sanitation Initiative
WWTP	Wastewater Treatment Plant

EXECUTIVE SUMMARY

AECOM Indonesia has been assigned to deliver the services of capacity building for Banjarmasin, Balikpapan, and Surakarta Wastewater Expansion under the Indonesia Infrastructure Initiative (IndII) Water and Sanitation Hibah program. The technical assistance for capacity building is a key component of the sanitation hibah which is primarily targeted to develop adequate expertise and skills within the sewerage operations authorities of sanitation hibah cities. The developed expertise and skills will support a sustainable benefit of the sanitation hibah grant for the improvement of sanitation levels and reduction of environmental pollution in the served households and neighborhoods as final beneficiaries.

The capacity building for Banjarmasin, Balikpapan and Surakarta Wastewater Expansion program will consist of a program of technical, institutional, financial, construction management, construction supervision, and community development within 7.5 months of activities. The capacity building program has been started since 15 November 2010 and will end on 30 June 2011.

AECOM has mobilised the project team and established project offices in Banjarmasin, Balikpapan and Surakarta. All experts involved in this project have been fully mobilised and based in Banjarmasin City as the central activity of this project.

Within the initial phase of project implementation, AECOM project team has been assigned to perform assessment activities to benchmark the existing conditions of the sewerage operation, management, and project activities in Banjarmasin, Balikpapan and Surakarta. The activities were comprised of discussions, visual observation, documents review, field visit and works review to all related aspects of PDAM / PDPAL operations. The assessment also has been able to identify areas requiring support. The proposed capacity building activities have been divided into categories based on the fields of expertise involved in the project delivery.

In regard with the overall project implementation, AECOM has identified several issues and constraint to be considered in further project implementation. The identified issues and constraints will be considered in modifying the approach and methodology to deliver overall project services.

AECOM has identified the issue on lack of basic equipment and tools for the three sewerage systems operations. The basic equipment and tools are important to enable a proper and efficient sewerage operations and services. AECOM addresses the need for support in provision of the basic equipments and tools as part of capacity building effort.

In an effort to optimise the impact and sustainability of the capacity building program, AECOM has identified several adjustments and modifications recommended to adjust with the actual issues and constraints, needs and requirements, and condition of all subjects of capacity building.

CHAPTER 1: LOGICAL FRAMEWORK OF CAPACITY BUILDING

The well-operated and maintained sewerage services incorporate the standard best practices that implemented well within the related stakeholders. Bad performance of sewerage management services mostly originates from lack of stakeholders capacity to implement the standard best practices. The objective of this report is to verify the standard best practices that should be applied; to identify stakeholders involved; to assess the existing stakeholders' capacity in implementation of the practices; and to identify the gap between the standard best practices and the existing conditions in order to determine the areas requiring support for capacity building.

The components of performance aspects that are being the approaches comprised of:

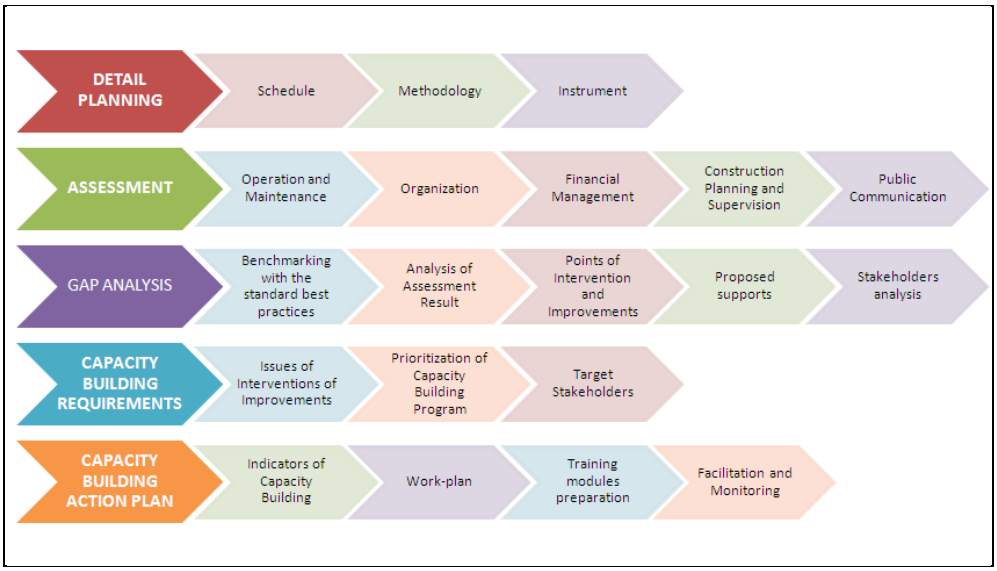
- Technical component for operation and maintenance
- Technical component for construction planning implementation and supervision (including bid and contract)
- Organisation component for Operation and Management
- Financial Component for Operations
- Public communication component for Management

The approaches of the capacity building requirements in this project are summarised in Figure 1.1.

Figure 1.1. Approaches of the Capacity Building Process

The logical framework of the capacity building process is presented in Figure 4.2.

Figure 1.2. Logical Framework of the Capacity Building Process



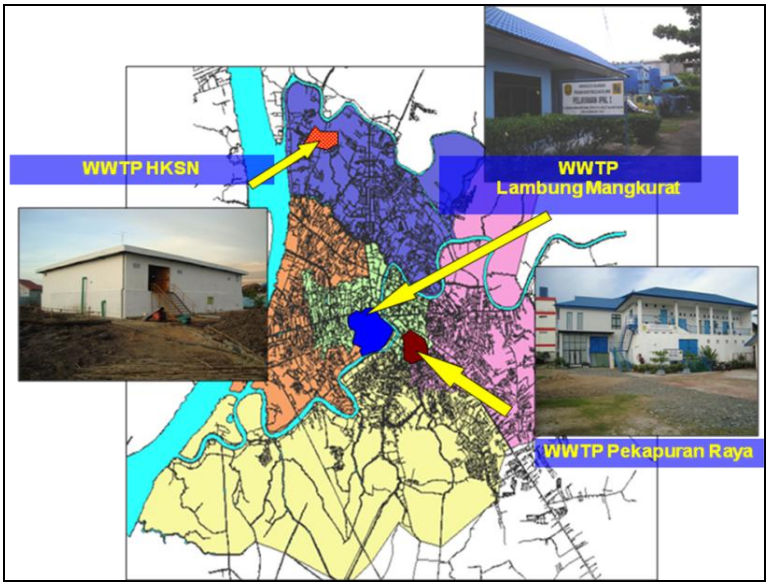
CHAPTER 2: ASSESSMENT OF COMPONENTS APPROACHED BASED ON TARGETED CITIES

2.1 BANJARMASIN CITY

2.1.1 Sewerage System and Operation

Banjarmasin city sewerage system is divided into 5 (five) service areas. The northern part of Banjarmasin sewerage system is managed by Hasan Basri (HKSN) Sewage Treatment Plant (STP) with its treatment capacity of 2,100 m3/day to take care of around 3,035 household connections (HC). The western part sewerage collection – comprised of 3,779 HC - is treated in the Pekapuran STP with treatment capacity of 2,500 m3/day. The third STP is Lambung Mangkurat which serves 1,298 HC in the centre of the city with total capacity of 500 m3/day. The two areas are under development, i.e. Basiri serves for southern part of Banjarmasin City and Bumi Mahatama. The Basiri sewerage system will have treatment capacity of 2,000 m3/day and will be commissioned soon. The Bumi Mahatama is developing the sewer connections. All STPs utilise Rotating Biological Contactor (RBC) as the treatment system. The Banjarmasin City sewerage system is managed by Banjarmasin City Wastewater Company (Perusahaan Daerah Pengelola Air Limbah – PDPAL).

Figure 2.1. Banjarmasin City Sewerage System Service Area



Hasan Basri (HKSN) Sewerage System

The HKSN RBC plant has a treatment capacity of 2000m3/d. It runs with only 2 of 4 trains in service. Even with this, there is insufficient load to the plant to cause any significant growth on the media. Major infiltration with very little actual sewage flow is suspected. No influent flow meter installed. Plant operators do not monitor the

plant performance regularly and have no daily log sheet due to unavailability of wastewater quality standard test kits. No manual operation available.

Adjacent on the site is a new RBC Plant of 3000m3/d capacity that has never been run.

Figure 2.2. HKSN RBC Plants 2000 m3/day (Left) & New RBC Plant 3,000 m3/day (Right)


A pump station and a couple of manholes were inspected near a school (SMP 3) and at a project still under construction. The pump station was inaccessible and the manhole was full of water, presumably groundwater.

Figure 2.3. Pump Station in HKSN Service Area

At another manhole, which was one of the manholes constructed of precast concrete components, the concrete manhole cover broke when a prybar was used to try to lift it. There was no rebar in the broken piece, indicating that the manhole covers are not properly made. Again the manhole was full of water. It is doubtful that the manhole has been constructed properly. Need to recommend design standards be implemented in all future DPU work throughout Indonesia.

Figure 2.4. Circular Manhole Construction in HKSN Service Area


A lot of PVC pipe was stored on the STP site – perhaps a couple of hundred 100mm pipes – and they are all destroyed from exposure to the sun. UV light from the sun causes a burning of the PVC, with the evaporation of some of the volatile components. As a result, the pipe becomes very brittle and unusable. An avoidable waste of resources.

Pekapuran Sewerage System

Pekapuran STP has a treatment capacity of 2500 m3/d and was built in year 2007. It is located in PDPAL headquarters. Effluent flows around the building and is filled with small black catfish. Disks have reasonable growth. No flow meter installed – effluent channel V-Notch weir corroded remains noted. Plant operators do not monitor the plant performance regularly and have no daily log sheet due to unavailability of wastewater quality standard test kits. The wastewater quality analysis (influent and effluent quality) is performed monthly by the South Kalimantan Department of Health's laboratory. No manual operation available.

Figure 2.5. Pekapuran STP

During the site assessment, some pumping stations were inspected. The drawdown test was performed in order to determine the actual pump flow capacity. Pumping stations inspected were Pump Station (PS) 1 and PS 3.

PS1 was opened and a drawdown test was conducted. The pump well was drawn down and the fill time measured to be 7 minutes for an estimated 7200 liters. Pumped drawdown time of 7200 liters was also 7 minutes, and the following fill time was again 7 minutes. The pump drawdown indicated that the pump flow capacity is 34 lps, while the inflow rate is 17 lps.

Figure 2.6. Pekapuran Service Area – Pumping Station 1


PS3 was opened and a drawdown test was conducted. The pump well was drawn down and the fill time measured to be 5 minutes for an estimated 2000 liters. Pumped drawdown time of 2000 liters was 53 seconds, and the following fill time was again 7 minutes. The pump drawdown indicated that the pump flow capacity is 37 lps, while the inflow rate is 6.7 lps.

Figure 2.7. Pekapuran Service Area – Pumping Station 3


PS and Manhole (MH) construction was noted to be cast in place reinforced concrete, and the quality of construction appeared to be very good. No leakage was noted into the structures inspected. MH and PS hatches were noted to be steel framed reinforced concrete, and their removal required significant effort by 2 men.

Figure 2.8. Pekapuran Service Area – Pumping Station and Manhole Construction


Lambung Mangkurat Sewerage System

The Lambung Mangkurat STP is designed for 500m3/d capacity and employing the RBC system. Disks have reasonable growth and evidence of sludge buildup in the first set of disks in the first basin. No inflow measurement. There are 9 (nine) Pump Stations in catchment, all run manually. Main station feeding to plant did not seem to run. Desludging is manual only. Flow routing is fixed, whereas flexibility would be advantageous for partial shutdowns and for load equalisation. Effluent can be and is filtered occasionally for reuse as park irrigation water in dry season. Plant is functional, and serves as the central point for sewer maintenance in the Central District. No basis of design. The daily log sheet and monitoring of the treatment plant's key parameter is not available, due to unavailability of wastewater analysis standard test kit. The wastewater quality analysis (influent and effluent quality) is performed monthly by the South Kalimantan Department of Health's laboratory. No manual operation available.

Figure 2.9. Lambung Mangkurat STP

A clogged sewer problem was visited. Efforts to clear the blockage in a short run from a MH to a PS inlet chamber were underway with a length of 25mm plastic pipe with a sharp wooden stick tied to the end. A vacuum tanker was mobilised to suck down the upstream manhole, just 5 m from the PS inlet junction box. Eventually the blockage was cleared after several hours of probing and attacking from both sides. Other than the vacuum truck, no maintenance equipment was observed. Later, it was seen that the district electrician does have a current meter to use when checking the PS power & controls.

Figure 2.10. Clogged Sewer in Lambung Mangkurat Service Area

Figure 2.11. Cutting through the blockage by manual method

Reviewing the Pumping Station in Lambung Mangkurat was performed during the assessment survey. The terminal of PS 9, was started but did not seem to be drawing the water down. The crew advised that one of the two pumps was broken and the single pump left may be clogged. This PS feeds the flow to the STP, so how flows are reaching the STP is a bit of a mystery.

Figure 2.12. Pumping Station 9 – Lambung Mangkurat Service Area


PS3 was inspected and a drawdown test run. PS3 is an upstream PS fed only by a limited gravity catchment. The drawdown test revealed a PS with a capacity of approx. 30 lps and an inflow of approx. 1 lps. The inflow appeared to be clean water, so was probably primarily infiltration but no way to check. 1 lps = 86 m3/d. It was noted that the pumping flow rate of 30 lps is equivalent to 2,580 m3/d, or 5 times the expected flow from the entire catchment. A quick calculation for the catchment of PS3 indicates a peak flow of no more than 100 m3/d, which says that the pumps at PS3 are oversised by approximately 25 times.

Figure 2.13. Pumping Station 3 – Lambung Mangkurat Service Area

Pump control for all PS is manual and at the local control center only. Level detectors in the PS appear to be on strings/cables in vertical pipes (floats or sensors), and are said to be for clean water use. All are non-functional at all PS in all areas.

Basiri and Bumi Mahatama Sewerage System

In order to expand the service area of the sewerage system in Banjarmasin City, Basiri and Bumi Mahatama Sewerage System are under construction. The Basiri Sewerage System coverage is for southern part of Banjarmasin City, with the treatment design capacity of 2,000 m3/day. The Bumi Mahatama development is mainly on installation of sewer pipe made of HDPE material.

Figure 2.14. Basiri RBC STP System and Service Area


Sewer laying activity in Bumi Mahatama Service Area is still under construction. Some issues should be assessed carefully in pipe laying construction. The issues are the level of sewer line to ensure the gravity flow of the sewage flows; the sand bedding; dewatering; and installation of supporting material in pipe laying - such as wood stiffness in order to avoid further settlement of the sewer line.

Figure 2.15. Bumi Mahatama Sewer Pipe Laying Activities



2.1.2 Institutional of Sewerage Services

Maintenance operation

Banjarmasin city is still lacking in maintenance operation. The low level of understanding and knowledge of the staff were caused by the insufficient number of trainings and workshops given to them. Moreover, the operators' duties are more on installment routines instead of maintenance ones. They have no knowledge on what to be done and/or checked during their works. The unmaintained tools lead to higher direct works expenses.

Staff, tools and equipments

- Insufficient number of tools and equipments in PDPAL Banjarmasin, such as laboratory and electric tools for pumping points maintenance.
- Lack of electrical experts to cover 5 service areas. There has been only one expert existing.
- The need to put the perfect man at the perfect place, and the wastewater treatment capacity building.

Coordination amongst related offices

The lack of coordination between PDPAL and Public Works Office (DPU). For example:

- The road coating works by DPU covered the PDPAL manholes.
- Pipes/channels installments tamper the roads.

Organisational structure

The organisational structure is seen to be sufficient to meet the company's mission externally, internally and on monitoring matters. Customer Relations division, which is expected to be able to serve in satisfactory manner such as handling complaints, is included in the structure. The organisational mechanism in handling the customers has been working relatively optimal though "one man show" has been performed. The financial loss suffered is due to the low income and the high operational expenses.

Banjarmasin city government has shown high commitment on wastewater treatment. On the other hand, community participation and interests on the treatment and instalments are considered to be low. Wastewater treatment is not considered to be a need and community feels that septic tank has been a perfect solution, which they do not have to pay monthly fee. Part of community also thinks that piping works will ruin

their yards and access. Another aspect to be considered is that there has been no holistic business planning.

Company culture

There is an assumption that there has been less attention given to PDPAL staff and this is the factor that causes low loyalty and spirit in their performance.

2.1.3 Financial Management of Sewerage Services

PDPAL was formally established in August 2006, but only began financial operations effective 1 January 2007. To be able to assess how far the performance PDPAL, then given the balance sheet and Profit and Loss from PPPAL began in 2007 and 2008. This data is over 2 years, but as information to describe the financial condition PDPAL at present.

Table-2.1: PDPAL BALANCE SHEET YEAR 2007-2008

Descriptions	31 Dec. 2008 (in million)	31 Dec. 2007 (in million)	Increase (Decrease)	
			Rp. (000)	%
Assets				
Current Assets	18,586	4,490	14,094	313.94
Fixed Assets	13,086	7,586	5,500	72.50
Other Assets	2,744	3,334	(589,772)	(17,69)
Total Assets	34,416	15,410	19,006	123.34
Obligations and Equity				
Short-term Obligations	66	27	39	147.02
Equity	34,351	15,383	18,967	123.30
Total Obligations and Equity	34,416	15,410	19,006	123.34

Source: Audited Financial Report, 2008

Table-2.2: PROFIT AND LOSS 2007-2008

DESCRIPTION	31 Des. 2008 (In million)	31 Des. 2007 (In million)	Increase (Decrease)	
			Rp (000)	%
Income	1,431	1,279	152	11,86
Direct Expense	1,541	850	691	81.23
Profit (Loss) Gross	(110)	429	(529)	(125.59)
Indirect Expense	1,346	896,635	449	50.13
Service Profit (Loss)	(1,456)	(467,518)	(988)	211.41
Out Service Income	424	39,160	384	980.54
Profit (Loss) before Tax	(1,033)	(428)	(604)	141.10
Income Tax				
Profit (Loss) Net	(1,033)	(428)	(604)	141.10

Source: Audited Financial Report, 2008

PDPAL was established on August 2006 and financially effective on 1 January 2007. On 2007 financial year, it began with Rp 4.9 billion, plus receivables of Rp 276 million. Fixed asset was worth Rp 5.4 billion. Cash balance and asset value were mostly in the form of separation budget of Rp 9.7 billion.

In 1 (one) year, or during 2007, PDPAL's wealth was increased to Rp. 15.4 billion. However, Rp 5 billion of the increment mostly came from the Local Government Investment (PMPD) used to build the core network and transmission.

Later in year 2008, PDPAL assets rose sharply to USD 34.4 billion. This increment comes from the PMPD for the year, worth Rp 20 billion. PMPD is also used for the development of primary and secondary network to the housing connection (HC) for new customers. Meanwhile, receipts in 2007 reached Rp 1.3 billion, slightly above the budgeted estimate of only Rp 1.22 billion. Receipts are partly derived from wastewater services and a small proportion coming from non-wastewater services such as, the operation of vacuum trucks. In 2008, revenues increased by approximately 14 percent to Rp 1.43 billion. The increase is relatively small considering the potential from prospective customers, who cannot as yet be served because of various constraints to increasing the number of subscribers.

As a new company incorporated in 2007, both short and long term obligations, was not large and the depreciation of fixed assets was still minimal. This happened in 2008 where there were not many significant changes for short-term and long-term liabilities. In 2007 PDPAL short-term liabilities were only $ 26.6 million. Although in 2008 there was an increment on short-term liabilities to 147%, but nominally it was about USD 66.8 million.

Although the obligations of the company were not large, waste processing operations require a fairly high cost of both direct costs associated with production, but also the indirect costs in the form of salaries and administrative costs. In 2007, total direct costs of about 68 percent of revenue, while indirect costs reaching 72 percent of revenue in the same year. With the amount of direct and indirect costs exceed 100 percent of revenues, in the first year of operation PDPAL already suffered losses of Rp. 428 million.

Financial loss in the first year can be understood as the number of subscribers as a source of income was still low, while the installation operations that were still "underutilised". But in 2008, PDPAL suffered even bigger losses that reached Rp 1.03 billion, or up to 140 percent. These losses were directly caused by the costs in which turned out to reach 107 percent of revenue and indirect costs that also reached 94% of revenue. Increased direct costs and are not directly reap greater losses because it was not compatible with the revenues that rose 14 percent only in year 2008.

With losses in consecutive years, and the benefit of increased revenue base was insufficient, it is deemed that potential losses will continue. Financial data for 2009 and 2010 are not as yet officially published, but according to sources from the Finance Department, PDPAL still suffered losses in both years. The same sources divulged that the losses were due to high operating costs, particularly heavy in power consumption, while the development of the number of subscribers was also not encouraging. In addition, collection ratio is poor, with most arrearages not collected.

2.1.4 Construction Activities, Management and Supervision

Banjarmasin city is one of the cities which have PDPAL as the local district company which organises the wastewater treatment management. Compared to WWTP, PDPAL has some advantages if we see it from the construction activity point of view. PDAM, established as Perusahaan Daerah or regional company, have within their organisation a separate PAL section governed by the organisation’s financial implementing rules and regulations. Banjarmasin PAL operations are not part of PDAM Banjarmasin. Rather, a separate and independent company (or PD) has been established, namely PDPAL Banjarmasin, to operate and manage city wastewater services. As an independent company, it has its own financial policies.

Banjarmasin already has four wastewater installations (Lambung Mangkurat, Basiri, Pekapuran Raya, and HKSN) and one wastewater installation is under construction (Bumi Mahatma). Related to these installations, Banjarmasin has an offsite system

network in which they connect pipes from the housing area to the wastewater installation area. All of their project are managed, constructed and supervised under PDPAL responsibility.

Table 2.1.4 List of PDPAL 2010 Construction Works

No	Item of Work	Contract		Duration (days)	Contractor	Funding Resources	Status (Under Construc -tion / Finished)
		number	Date				
1	Installation of wastewater pipe network ND 200 mm and ND 150 mm in Kompl. Herina Location and Around Komp. Surya Gemilang	605.3/33/VIII/LU-BT	August 31, 2010	90	CV. Ganjaran Sayuto	PMP/PDPAL	
2	Installation of wastewater pipe network ND 200 mm and ND 150 mm in Komp. Sudirapi, Komp. Buana Permai, Komp.AMD, and Komp. Abdi Persada.	605.3/37/VIII/LU-BT	August 31, 2010	90	CV. Ganjaran Sayuto	PMP/PDPAL	
3	Provisions and Installments of wastewater pipe network constructions ND 200 mm in Tata Banua Resident and Komp Perumahan National basirih	605.3/41/VIII/LU-BT	August 31, 2010	120	PT. Ganjaran Sayuto Putra	PMP/PDPAL	
4	RSPS, PS, and ND 300mm piping works in Tata Banua and HKSN.	605.3/45/VIII/LU-BT	August 31, 2010	120	PT. Chindra Santi Pratama	PMP/PDPAL	

No	Item of Work	Contract		Duration (days)	Contractor	Funding Resources	Status (Under Construc -tion / Finished)
		number	Date				
5	Provisions and installments of RBC 2 x 500m3/day and its supporting parts in HKSN (2009 continuation works)		April 14, 2010	120	PT. Prakarsa Enviro Indonesia	APBN	
6	Wastewater pipes bridge construction around HKSN		April 14, 2010	180	PT. TIrto Kamandan u	APBN	
7	STP Works 2000m3/day and supporting construction Works in Basirih		May 18, 2010	210	PT. Lidy's Artha Borneo	APBN	
8	PVC provisions and installments 200mm in diametres aroung Basirih		April 14, 2010	180	PT. TIrto Kamandan u	APBN	

Pre Construction Phase

As shown in table 2.1.4, PDPAL Banjarmasin has responsibility to deliver starting from the pre-construction phase, construction phase, until the project is handed over (finishing phase). As a local public company, Presidential Decree No. 80 year 2003 regulates all concerning with the project. Based on that decree, specifically Clause 10, setting up a Tender team tender is one of the important keys on this stage. It is done by PDPAL Banjarmasin based on PDPAL Director Memo. The condition of the member team can be read in the Clause 10 of Presidential Decree No. 80 year 2003. Base on the information, PDPAL use the public tendering process with prequalification system for this tender and follow this type of tender, Team has a task as follows as:

1. Pre-qualifications announcement
2. Pre-qualification documents preparation
3. Pre-qualifications documents submission

4. Pre-qualifications documents evaluation
5. Pre-qualifications reports
6. Pre-qualificaitons announcement
7. Pre-qualifications clarifications period
8. Invite qualified pre-qualifications applicants
9. Public tender documents collection
10. Tender information
11. Tender information and changes made reporting period
12. Tender documents submission
13. Open tender document
14. Tender documents evalution
15. Deciding the winner
16. Winner announcement
17. Clarifications period
18. Winner appointment
19. Contract signing

When the contract already signed, the next phase is the construction phase, the important phase, in which the quality of the structure will be from in this phase.

Construction Phase

When the phase reaches the Construction Phase, the director appoints the person who wills responsible about the project, called “Pimpinan Project / Project Manager”. In this situation, Technical Director also acts as a project manager for all of ongoing construction.

For construction phase, they are using 2 system of supervising:

- Construction Supervise by PDPAL (PDPAL Technical Person)
- Construction Supervise by consultant supervision (third party)

Construction Supervise by PDPAL

Construction activity supervise by PDPAL is under the responsibility of Technical Director PDPAL Banjarmasin. Their supervising team actually is the PDPAL Employer

with has technical background, not the special team appointed by Director for this project.

Supervision work need to be address to make sure that the execution building use the material as per technical specification and the building build as per drawing in the time frame. In the other word, supervision works need to be supervises by the person who understands about the system and the structure construct.

PDPAL also has some tool of supervised the work such as: 1) Daily report, 2) weekly report, 3) Cumulative of Weekly Report, 4) Monthly Report, and 5) Cumulative of monthly report. These tool / form reports explain about the work, the volume of work, number of work, condition of field, and equipment.

In 2010, some of project constructs parallels and the quality control procedure being done by the employee of PDPAL selves under direct supervisions of Technical Director. The quality control procedure is not clearly mentions in this project. The responsible person is Technical Director. Quality Assurance System is also not properly seen here, because the responsible person is also Technical Director. In the assessment period, we cannot find form related to the quality control, some test laboratories result, instruction letter, and as built drawing.

Construction Supervise by consultant supervision (Third Party)

PDPAL also hire professional consultant to assist PDPAL to manage some of construction activity. The professional consultant also awarded contract from tendering process based on Keppres no.80 in 2003.

The consultant suppose to be manage the project, supervise, control the quality, and report of project activities to the owner (PDPAL). The Project manager of consultant reports directly to Technical director PDPAL.

Consultant of PDPAL has a tool of supervised the work such as: 1) Daily report, 2) weekly report, 3) Cumulative of Weekly Report, 4) Monthly Report, and 5) Cumulative of monthly report.

In the assessment process, PDPAL cannot give accurate information about the report they should get from the consultant. Some of result test report were missing, and the completely report is daily, weekly and monthly report.

Post Construction Phase

Banjarmasin is the city with the height is 0.16 meter below the sea. Infiltration will be the main concern in this city. The effect of the infiltration will be the main focus in this city.

Some specification changing without any reason in the construction phase will be the disadvantages of PDPAL as the owner of the project. This can be found in Construction on 2011, such as:

- Threaded pipe used in the construction leads to difficult connection.
- Pre-cast Design of Inspection Chamber and Manhole uses pre-cast without reinforcement and without having pipes connected will be disadvantages
- Inspection chamber cover design that did not consider the water surface impermeability will give disadvantages.
- The external pressure will lead to infiltration and will cause pollution.
- Work methods, drawings and reports are hard to find. Project management and contractors do not take them into consideration.

2.1.5 Community Awareness and Public Campaign

Various methods and steps can be applied in order to increase public awareness and moreover for a self-help. The latter can be done by mobilising and involving community that in the end community is expected to be the agent of change. Direct involvement is seen to be effective to increase community participation. The process of understanding a message starting from receiving information (HEAR), observing the implementation (SEE) and ends by participating in the implementation (DO) are different on the effectiveness. This process is basically explaining the way people receive messages through different media and the message absorbance. Verbally delivered message can be easily ignored, yet if the message is delivered visually, curiosity is raised thus parts of the message is absorbed and finally by inviting the recipient of the message into physically involved, the messages delivered effectively as this will be remembered well.

Related to the wastewater services and public awareness campaign strategy, direct involvement is proposed. The sanitation awareness campaign aimed to change poor sanitation behaviors. Furthermore, community is expected to be the agents of change. Awareness campaigns will be done through putting messages on billboards, in the form of documentary movies where community will be the actors and act as themselves in their daily life with poor sanitation habits. By acting the poor sanitation behavior in the documentary, community then is assumed to be able to evaluate the harms they have done for themselves, others, the neighborhood and the future generations without even realising it.

The needs assessment will also try to identify effective strategy in raising the public awareness. The targets of the public awareness activities are not merely the community but also policy makers. During the needs assessment, discussions will be conducted to explore ideas and policies issued by the leading sector such as Bappeda and as well by other agencies. Capacity building given to Policy makers and/or

stakeholders closely related to wastewater matters is aimed to draw interests out of these groups.

As stakeholders associated with waste water problems, program capacity building must also provide awareness to the impact of the interests of stakeholders. Sustainable and simultaneous awareness require the involvement of policy makers and/or stakeholders and moreover from all members of the society.

Community Participation Sub-components and Campaign Strategy implementation Need Assessment carried out on two mutually supporting factors namely:

- **Internal factors**: the mechanisms and management systems of waste water services including how the mechanism is implemented and accepted by the customers.
- **External factors:** the level of satisfaction of the public, including the role of the society in supporting of the wastewater program.

The result of assessments in PD-PAL Banjarmasin are shown in the table below :

Table. 2.1.5. The Existing condition of wastewater services and public awareness campaign strategy

City	Existing condition	
	Internal	External
Banjarmasin	Method: Interview Questions: Customers Handling Structure and Mechanism Socialisation team of Customer Relations of PD-PAL Banjarmasin. Mayor decree on wastewater house connection installment. Mayor decree has been socialised by Camat and Lurah to potential customers. Sanitation Working Group of Pemko Banjarmasin whose members are from related offices including PD-PAL. Sanitation WG supports sanitation socialisation including those of PDPAL areas. Wastewater socialisation is done as network is about to be set up. Poor mechanism in handling customers complaints.	Method: Interview and Focused Group Discussion. Questions: Community Understanding on Wastewater Sanitation. Generally, community understands the danger of polluted environment Generally, community is informed that there is a Mayor decree regulating them to install the wastewater connections.

City	Existing condition	
	Internal	External
	Questions: Service Unit Staff Competence Low staff competency in giving service, socialising and community awareness-raising No trainings on staff capacity building, specifically on wastewater products social marketing.	Questions: Community response on wastewater house connection service Most community rejects it as they haven't understood the benefits. Most community has no idea on PD-PAL working performance. They think that it's a boat company.
	Questions: Staff composition and coordination within the Service Unit. There are 3 (three) staff consisting of: unit head, technical and connection unit, and administration. Each personnel work independently according to the job descriptions.	Questions: Community response on PD-PAL service system Unsolved technical and non-technical issues has worsen PD-PAL image and leads to community distrust against it. Service and Complaints Mechanism is not well informed to the community. High fee is not in accordance to the service given. Forced wastewater connection installments.
	Questions: Socialisation-Campaign Method Socialisation team does not have effective socialisation and campaign method Low capacity on products marketing owned by staff. There has been no socialisation budget Lack of coordination with Sanitation WG Socialisation is integrated into Sanitation WG activities yet it faces coordination and budgeting issues.	

2.2 BALIKPAPAN CITY

2.2.1 Sewerage System and Operation

The Balikpapan City Sewerage System is served by Margasari STP built in 2002 under Kalimantan Urban Development Project (KUDP) IBRD-Loan 3854- IND. The service coverage area is Kelurahan Margasari and Kelurahan Kampung Baru Tengah in Kecamatan Balikpapan Barat. The number of house connection is 1,085. The Margasari sewerage system is comprised of: sewer piping installation (including manholes and Inspection Chambers); Pumping Stations and Sewage Treatment Plant (STP). The STP capacity is 800 m3/day. The system utilised is Activated Sludge Extended Aeration System.

Figure 2.16. Margasari STP

The STP consists of the following:

- Inlet basin with manual bar screen in screen channel and submersible pump. This basin is sizeable – around 4m x 4m and 3-4m deep, but normally kept pumped down. Bar screen is submerged in inlet channel when the water level rises. The inlet basin is intended to serve also as an equalisation basin. We were told that the inlet basin is cleaned every two months and approximately 2 m3 of grit is removed at each cleaning.
- Aeration basin with 2 floating surface aerators - A/B is approx. 10m x 20m x 4m deep, for a total volume of around 800m3, and a nominal HRT of 24 hours which is typical for the extended aeration process.
- Gravity settling tank with no mechanical sludge removal, and no visible means for sludge return to the aeration basins. There must be a sludge return but it was not seen.
- Effluent disinfection chamber.
- Sludge beds of unknown/unclear purpose (no sludge was evident)
- Effluent holding tank. Effluent is apparently intended to supply water to fire hydrants within the catchment.
- Discharge to the adjacent drainage channel.

Figure 2.17. Gravity Settling Tank with no means of sludge return (Left) and Unclear purpose of Sludge Drying Bed (Right)


The plant has an active biomass, but very low concentration and appears to be very lowly loaded. Aerator operation is intermittent in order to conserve energy. Influent BOD is not measured. One effluent BOD result was known 11 mg/l based on sampling by 15 May 2010. The overall condition of the plant appears to be running accordance to its specifications. The two aerator motors show significant corrosion and probably are due for replacement. The plant operators seem to have some idea of how the plant is supposed to be run, but it is not clear how it was meant to function.

Flow comes to the plant from pumping stations. All of the 7 (seven) pumping stations are operated manually. From the schedule of operations described by the operators, the contents of each pump station are pumped to the treatment plant no more than a couple of times per day for 20 minutes, a total of 40 minutes per day. The pumps are Grundfos chopper pumps and apparently quite reliable. They have a capacity to pump approximately 25m3/hr, so the total flow to the STP may be as little as 20m3/d or as much as 140 m3/d, depending on the interpretation of how the system is normally operated. The pump stations are cleaned out every 2 months.

It was explained to the operators that it was not enough to run each pump station for just 20 minutes morning and evening. Such an approach leaves all but the most upstream pump stations full of sewage. In a line of 3 pump stations, with a flow pattern from 3 to 2 to 1 to the STP, the pump stations would need to be run as follows: first empty no.1, then no. 2, then no.1, then no. 3, then no. 2, then no. 1. This procedure would at least leave all pump stations empty at the end of the cycle, and would deliver as much as 2 x 6 x 20 m3/d = 240 m3/d if done twice a day. Eventually, such practices would be unnecessary as all pump stations should be run by automatic control based on the level of flows into each pump station.

A large portion of the service area is an unusual coastal residential area which is constructed above the water, on stilts of local hardwood. The sewer connections are therefore made by mounting the sewer pipes on the stilts between the water and the residences. The sewer lines are therefore totally visible. Approximately one third of the service area is represented by this community on stilts. The rest of the service area is just inland of this community on stilts.

For the system built on solid ground, pump stations and manholes were inspected and the pumping facilities tested. The manholes and the pump stations are cast in place reinforced concrete structures and appear to be very solid, with no evidence of infiltration. The pumps are not mounted on guide rails, so any maintenance on the pumps requires that an operator enter the pump station and manually remove the pump. Pump controls appear to be simple start/stop buttons. No indication of any level control, past or present was seen. PS and MH openings covers are cast concrete with steel channel sections around the edges. Very heavy and difficult to open. Cover lifting was accomplished using the utility truck lift. The utility truck also has a water tank and a pressure washer line, but these portions are no longer working. The lift at the back of the vehicle did work.

Figure 2.18. Pumping Station (Left) and Manhole built on Stilts of Local Hardwood (Right)


According to information shared from BAPPEDA Kota Balikpapan, the development sewerage system in Balikpapan has been an integrated part of the Balikpapan Sanitation Strategy. The Balikpapan Sanitation Strategy is incorporated the following aspects:

1. For water supply, there will be a new dam built to supplement the existing dam, at a location to the east of the existing dam, in a forest reserve. Funding for the dam will be by the Central Government, while funding for the transmission and distribution pipelines has not yet been determined.
2. For wastewater, two sites for new sewage treatment facilities have been designated, both to the east of town by the airport. Sewage development master planning is to take place by the end of 2011, supported by the Central Government. Due to the topography of Balikpapan, there will be multiple independent catchments, each to be served by a communal septic tank based on current planning. Each catchment will also require a pump station. Institutionally, the wastewater sector is under DKPP/PDAM/WWTP. However, in the future, the plan is to develop the WWTP into a PDPAL.
3. For solid waste, there is an existing landfill which receives an estimated 70% of the city's solid waste. The City policy is to implement according to the slogan: Reduce, Reuse, Recycle, to deal with increasing volumes of solid waste. The City has provided 1300 households with composters. Regulations are in place to support the development of Private-Public-Partnerships in dealing with solid waste issues.

4. For drainage, there is a Master Plan from 2004. The main goal of the master plan is to reduce the amount of flooding by improving the largest river that flows through the city. The improvements involve a 5-year program and an estimated budget of IDR 300 Billion.
5. The electronic files for the current Balikpapan Land Use Plan and Drainage Catchment Plan were provided by BAPPEDA. As the drainage and sewerage catchments will be virtually the same, the drainage catchment plan provides also a plan of the future catchment development for sewerage

2.2.2 Institutional of Sewerage Services

Operation maintenance

Balikpapan has more or less the same condition as those in Banjarmasin and Surakarta in terms of maintenance operations. Operators' lack of knowledge and skills is caused by the insufficient number of trainings and workshops received. Moreover, the operators' duties are more on installment routines instead of maintenance ones.

Staff, tools and equipments

Laboratory tools and equipments are not sufficient in Balikpapan. In addition to that, the number of staff is considered to inappropriate to perform wastewater treatment works. Thus, having more staff is a must in order to support improvements planned. Sub working units complement will affect the wastewater treatment working performance. Sub units meant are Socialisation/Human Relations, Service Complaints, Storage and Workshop, and Finance. These units then will be best managed directly under Wastewater Treatment Working Unit instead of under PDAM.

Coordination amongst related offices

Wastewater unit does not coordinate well with related offices. Overlaps often happen, for example the road construction by Public Works Office often be tampered by wastewater treatment pipes installation.

Organisational Structure

WWTP Margasari wastewater treatment unit does not add significant profits to PDAM Balikpapan. WWTP Surakarta, which is inside the PDAM organisation, is operationally and financially managed by PDAM Surakarta. WWTP Margasari, though also in PDAM Balikpapan organisational structure, is on the other hand as part of Balikpapan City

Government activities. 5% of income from water taps is claimed to be retribution to be paid to PAD. The expenses spent is budgeted and granted by BUD.

Institutional ambiguity also can be seen in WWTP Margasari operations. WWTP Margasari is not a Government-owned Local Company yet as a Technical Implementer Unit (UPT) under PDAM management as regulated on *Kepwali* no. 188 year 2005. Yet, the understanding of this UPT-WWTP is not as that of UPT as regulated on PP no. 41 year 2007 on Local Support Offices that defines UPT as a technical unit under an office (*dinas*) or bureau (*badan*). In reality, UPT- WWTP Margasari is managed by PDAM that is clearly not an office (*dinas*) or a bureau (*badan*).

High and continuous support from PEMDA *Kota* Balikpapan in giving grants to wastewater treatment unit is due to the fact that PEMDA has been receiving 5% retribution from watertaps profits. Community participation is not yet optimal as socialisation is hardly delivered. In addition to that, there has been no well-set business plannings.

2.2.3 Financial Management of Sewerage Services

WWTP Margasari is part of the management structure of the PDAM organisation. All WWTP assets are part of the total PDAM assets. WWTP Margasari does not manage its own finances. PDAM Finance Department oversees all financial operations of all departments of the organisation, including WWTP department, a technical operating section thereof. Thus, personnel salaries and all other WWTP operating expenses are paid by the PDAM.

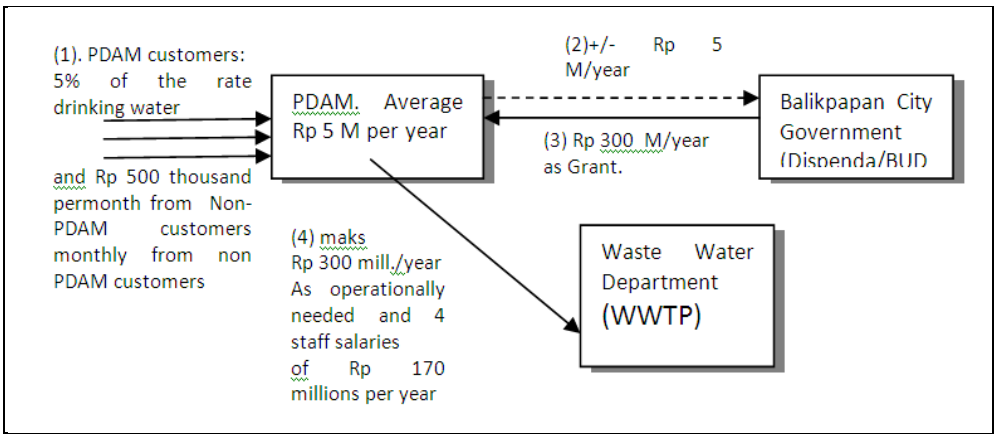
A significant aspect of WWTP Margasari financial operations is the payment of 'retribution fee' (levy) to the Balikpapan City Government. The payment comes as a wastewater levy in the form of 'in-lieu share' in return for the use of WWTP facilities acquired through KUDP, later transferred in full to PDAM. This financial relationship between PDAM Balikpapan and the City Government is explored below:

1. Levy Wastewater obtained from an average of 5% of the rate of drinking water. Therefore Wastewater Charges withdrawn by wastewater operations with drinking water withdrawal rates. Annual average of about Rp 5 billion. Besides, there are from non-PDAM customers are pulled apart and the amount of revenues averaged only Rp 500 thousand per month.
2. Money 5% of from water customer (excluding from non-subscribers) and non-taps customers are then deposited into the Local Revenue Department (Dinas Pendapatan Daerah) Balikpapan municWWTP government for further submitted to the Regional Treasurer (Bendahara Umum Daerah/BUD).
3. Then BUD Balikpapan MunicWWTPity submitted in the form of grant expenditures of Rp 150 million, two times a year or amount of Rp 300 million per year to the PDAM.

4. PDAM manage money USD 300 million was for operational purposes to the Department of Wastewater WWTP in accordance with the requirement not to exceed A$ 300 million per year. Also taps PDAM also bear the salaries of four employees at work for WWTP with an average of Rp 170 million per year.

The financial flow of WWTP operation is as follows:

Figure-2.18 : Financial Mechanism for WWTP Margasari Balikpapan



According to figures can be interpreted that:

1. Balikpapan MunicWWTPity obtain source revenue (PAD) of the Wastewater Charges the average of Rp 5 billion per year (can be larger than Rp 5 billion per year, depending on the income from the account of and accepted by the revenue).
2. Balikpapan MunicWWTPity through BUD expences only issue grants amounting to Rp 300 million to the PDAM for the operation of wastewater per year. Thus, local governments obtain the net proceeds from the wastewater of Rp 5 billion minus Rp 300 million for wastewater or Rp 4.7 billion (average).
3. Revenue amounted to Rp 300 million per year from the PDAM Balikpapan MunicWWTPity is spent on such rates WWTP no more than the grants received by PDAM (amounting to Rp 300 million per year).

The financial relationship between PDAM and City Government shows how profitable WWTP operations in Balikpapan can be to the latter party. At the current rate, the high revenue derived at 5 percent the average of the rate of drinking water service (not so much from the subscription revenues) provides good value added to the PAD. If the tariff or the subscriptions increase, the more advantageous the relationship will be to City Government.

However, such increase does not necessarily provide encouragement to PDAM to further develop its WWTP due to the following:

1. PDAM Finance provides the WWTP technical section the funds sufficient to cover only operational needs, not capital expenditures or development needs.

2. PDAM acts merely as collector of WWTP revenue for the City Government, and later as funds channel for the government grants to be used to cover the WWTP operational needs
3. The City Pemda (Regional Income Department) as the recipient of the wastewater levy acts merely as 'cashier'. City Government's role as cashier and PDAM Balikpapan's as recipient of levies for WWTP operations, makes a vast difference between the two, so that the former has no participation in strategising the future development of wastewater into reliable public services.

Based on the above, there are three parties involved in the 'running' the finances administration of WWTP in Balikpapan:

1. Party 1: Balikpapan City Government, which receives cash from PDAM as wastewater levy;
2. Party 2: PDAM, as a collector of WWTP revenue, part of which is to be passed on as levy to City Government, and as recipient of Balikpapan City grants to cover the operational requirements of WWTP, and
3. Party 3: WWTP technical implementation section, the WWTP operating unit.

2.2.4 Construction Activities, Management and Supervision

Balikpapan city has only one wastewater treatment plant called WWTP Margasari. WWTP Margasari is part of the management structure of the PDAM organisation. All WWTP assets are part of the total PDAM assets. Margasari WWTP does not manage its own finances. PDAM Finance Department oversees all financial operations of all departments of the organisation, including WWTP, a technical operating section thereof.

Because of this situation, it is very difficult to get the information about the construction activities, Management and supervision, because WWTP Margasari is not involve for one of it. From the pre-construction process until hand over project, WWTP Margasari is not involved.

WWTP margasari only ask the PDAM as his main organisation about his needed over the infrastructure or any others, and PDAM will deliver this task to Cipta Karya under PU (Public Work) for design and executed (project management) the construction, and when the construction finished, the PDAM will handed over to the WWTP Margasari. The WWTP Margasari Employee has no significant information over the project knowledge, project management, project supervision, because they are not involve when the project construct.

2.2.5 Community Awareness and Public Campaign

The result of assessments on wastewater services at Balikpapan are given in the table below:

Table. 2.1.6. The Existing condition of wastewater services and public awareness campaign strategy

City	Existing Condition	
	Internal	External
Balikpapan	Method: Interview Questions: Customers Service Mechanism and Structure PDAM wastewater unit is consisting of 5 core staff and operators. Wastewater unit has separated building from PDAM. 300 millions per year from MunicWWTP office is mainly for operational purposes and old unmaintained machineries. Sanitation WG is newly established to support wastewater unit and PDAM is part of that WG. Strategic planning on sanitation is still on draft yet it is confirmed that sanitation program, specifically wastewater program, is a priority.	Method: Interview and Focused Group Discussion. Questions: Community understanding on sanitation-wastewater. Generally, community understands the danger of polluted environment, yet habits defeat the understanding. Ineffective campaign for community awareness raising on the danger of waste for life and environment.
	Questions: Service Unit Staff Competency All staff is seniors yet weak on wastewater social marketing capacity. No trainings on wastewater social marketing capacity building.	Community response on wastewater house connection service Most community understands less on wastewater connection service thus they are reluctant to have the connection. Community does not prioritise, yet, wastewater house connection as it is easier to dump waste at the back of the house or under the stage house as it is free. There has been no law reinforcement that will fine those who dump waste untreated.

City	Existing Condition	
	Internal	External
	Questions: Staff composition and coordination within the Service unit. Limited number and capacity of the staff thus every duties are performed in team. Insufficient service system as service delivered based on requests and needs. The limited number of staff is not in accordance to the service area and moreover the lack of knowledge on wastewater social marketing. Most of wastewater staff are seniors and former heads of PDAM wáter taps units. It can be said that each staff is not competent in performing their works as they do not have enough capacities. This then results to all team performs all tasks.	Questions: Community response on wastewater service system Community understands that PDAM deals with water taps only and does not give service on wastewater treatment service. Most community expects better and more effective wastewater treatments and to include them as the wastewater actors.
	Questions: Socialisation-Campaign Method There has been no community awareness raising program design and effective wastewater service marketing strategy. One-way socialisation; no usage of effective facilitation media. Challenge on wastewater fee specifically to those of non PDAM subscribers. There has been no effective mechanism to be the community awareness raising program milestones.	

2.3 SURAKARTA CITY

2.3.1 Sewerage System and Operation

The off-site sewerage system in Surakarta is served by two services: Semanggi and Mojosongo STP. The sewerage system in this city is managed by PDAM Kota Surakarta. It serves total of 10,839 house connections. Semanggi STP had an initial capacity to treat 30 L/s (2,500 m3/day) capacity, but has been upgraded to 60 L/s (5,000 m3/day) in 2008. Total HC served by Semanggi STP is 6,000 expanded to 12,000. The Mojosongo STP has a capacity of 24 L/s (2,000 m3/day) serving 5,000 HC. The Mojosongo plant will be expanded to 50 L/s (4,000 m3/day) to serve up to 10,000 HC.

Water Laboratory facility is available at the PDAM Surakarta's office. The water laboratory is intended mainly on clean/ drinking water quality analysis, but performing analysis on some wastewater key parameters such as BOD, COD, TKN, and bacteriological test analyses. It was noticed that the BOD test is done without using a seed of active aerobic microbes, and it was suggested that the lab should try using a seed, as the results for influent samples appear to have very low values for BOD compared to COD. The lab director mentioned that the COD test, which requires digesting the sample with boiling acid, is a dangerous test for the lab, and that special equipment is needed to do this test safely.

The operating manual is available for Semanggi except for Mojosongo Plant. The operating manual comprehensively explains the system operation and maintenance, including trouble-shootings. The training on the SOP of operation and maintenance of the plant system is highly required. The operators in charge for operating and maintaining the plant are inadequate. Semanggi STP has only 2 (two) operators, while Mojosongo only has 1 (one) operator.

A meeting was held with the wastewater section. This section of PDAM includes 20 people. There are hopes to expand sewer service to serve commercial areas and the business district, but due to the cost of new sewerage, funding must be found for the planning, design and construction. It was reported that only 40% of the sewer customers pay their bills, and there is no penalty for not paying.

Semanggi Sewerage System

The plant consists of the following:

- Inlet channels with manual bar screen in screening followed by submersible pumps. The screening is by wire mesh and manually cleaned. The inlet channels are located in an excavated earthen basin which would also serve as overflow containment in the event of pump failure.

Figure 2.19. Semanggi STP – Inlet Channel with Manual Screen

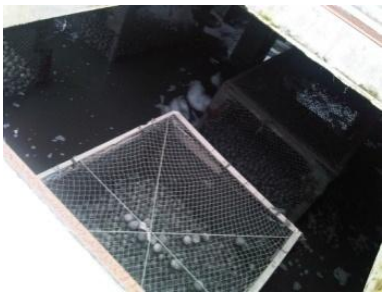
- Two aeration basins with 3 submersible aspirating aerators each. The aspirating aerators are 8.7 kW each. Each aeration basin is approx. 9m x 20m x 4m deep, for a total volume of around 1,440m3, and a nominal HRT of 6.6 hours which is typical for this type of treatment process.
- Gravity settling basin with a submerged lamella settling tubes, and no visible means for sludge return to the aeration basins. The settling tank is approximately 5m wide and 13 m long.

Figure 2.20. Semanggi STP –Gravity Settling Basin with Lamella Settler

- Sludge beds with overgrowth of local plants.
- Standby generator of 58 kW capacity. The generator is run weekly.
- Discharge is to an adjacent waterway, Kali Anyar

The Semanggi STP is not in very good condition. The main problem is that the the plastic balls which are supposed to provide surface area for microbial growth – are no longer contained in the wire cages in which they were installed. Most of the balls are loose and are very detrimental to the treatment process. These balls have gotten inside the volute of the submerged aspirating aerators and are interfering with the aspiration and also with the free movement of the pump impeller. And even if the balls are retrieved and placed in restored wire cages, it is not clear how the mixed liquor and will be caused to enter the cages containing the balls. This situation requires a study and a new solution to the expansion.

Figure 2.21. Semanggi STP – Loose Plastic Balls in Aeration basin



Mojosongo Sewerage System

The Mojosongo plant has a rated capacity of 24 lps, or 2,000 m3/d. The plant consists of the following:

- Inlet works with equalisation basin and V-notch weir for flow measurement. However, no flow records were available and it is expected that flow measurement and recording is not done routinely.
- Two facultative ponds, each with an area of approximately 1,600 m2 and a volume of approximately 5,000 m3. This gives a total detention time of 5 days for the two ponds. It was observed that the ponds have a healthy algal population, in spite of the fact that each pond is served by 4 surface aerators. Flow between the ponds and to the maturation pond was seen to have been properly designed.
- One large maturation/settling pond with an area of approximately 3,300 m2. This pond is also noticeably green and is seen to have methane bubbles breaking all over the surface.
- Discharge structure which releases the effluent to an adjacent waterway.

Figure 2.22. Mojosongo STP

No data was available regarding influent or effluent quality. However, the detention times are bare minimum for such ponds, assuming the inflow is as reported at 2,000 m3/d. Nonetheless, this plant appeared to be functioning well. The aerators are likely unnecessary, especially since they cannot be run at night due to noise complaints from the nearby residential community. During the day the aerators are unlikely to be of

any use, as the algae are producing enough oxygen to oversaturated the pond water with oxygen.

The pump station feeding into the ponds was visited, and opened. This PS did have submersible pumps installed on guide rails. However, operation of the pumps is manual, as all automatic functions have failed. Three pump stations feed into this one main pump station, and all three are operated manually for the same reason.

Figure 2.23. Mojosongo STP – Unused Sludge Drying Bed (Left) and Pumping Station (Right)

2.3.2 Institutional of Sewerage Services

Maintenance operations

Surakarta faces the same issue as Banjarmasin in terms of maintenance. Operators' lack of knowledge and skills was due to the low number of trainings and workshops taken. Moreover, maintenance operational standards are not set-up that then leads to minimum knowledge on the daily routines they should perform.

Staff, tools and Equipments

Surakarta's laboratory is in not well equipped. Skilled staff is highly needed and as well other staff with specific skills in order to be positioned in Planning, Human Relations/Socialisation, Complaints Handling, Network Maintenance, Workshop/Storage units in order to be able to undergo necessary improvements. Challenges will still be faced should it still be under PDAM management.

Coordination amongst related offices

Surakarta wastewater treatment unit does not coordinate with related offices. Workloads are often overlapped with other offices. For example, work constructions performed by Public Works Office were one on top of the manholes, or the damages made by Government Electric Provider (PLN) and Telecommunication Company on pipes installed earlier.

Organisational Structure

PDAM Surakarta functions to provide water taps and as well wastewater treatment services to fulfill Surakarta's health standards. Thus, within PDAM there are two units namely Water Taps Processing Installation (IPAM) and Wastewater Treatment Installation (WWTP). As regulated by *Perda No. 1/2004*, WWTP is in the PDAM organisational structure thus all policies made on liquid waste treatment are made by PDAM. All WWTP's improvement will be part of PDAM Strategic Planning and Policies. The policies made by PDAM have been concerning the water taps that continuously grows into 80%. Level of service given reaches 61.5% thus bigger investment for necessary improvement is needed, which is about Rp. 95.4 billions for the years coming till 2015. There have been no WWTP improvement planning. This means that WWTP is not considered being the "money maker" for PDAM. It is then hard to say that WWTP can be improved to be a public service provider for Surakarta wastewater treatment service provider.

The wastewater treatment unit causes reduction to PDAM profits. Based on the Company Income and Expenses analysis, specifically on the wastewater unit, it is highlighted that WWTP operational fees are getting higher while on the other hand there is no increment on customers' payments. PDAM wastewater unit performance will be sliding down if there's no strategic changes and evaluation done. This will lead to lesser interests from the company management to keep developing the wastewater as this unit has been seen as a burden financially.

There is low commitment from the local government on one hand and zero community participation on the other hand. Another aspect to be looked at is that there is no wastewater treatment business planning.

2.3.3 Financial Management of Sewerage Services

WWTP Surakarta is similar to WWTP Margasari in Balikpapan in as much as both function within their respective PDAMs. But there are differences in terms of the handling of WWTP revenue. Whereas WWTP Margasari operates as a 'surrogate' of Balikpapan City Government for levy (retribution) money, IPSAL Surakarta is part of mainstream revenue generation of the PDAM, with WWTP tariff revenue directly being used for WWTP operations. Furthermore, the tariff charged for WWTP service is separate from tariff charged for water service. Each service has its own tariff structure. WWTP tariffs start from RP 5,000 per month (for Household Type I) up to Rp 100,000 per month (for Commercial Type II).

The financial review of PDAM Surakarta showed combined financial reporting of WWTP and water supply operations. The 2008 and 2009 profit and loss statements aggregate revenues for both service operations, including revenues from operating a swimming pool and non-operational income source. The cost section provides a breakdown, segregating WWTP expenses from water and other expenditure items. Table 5 presents the income statements for the period 2008-09.

Table-2.1.7 : Profit (Loss) PDAM Surakarta 2008-2009 (Rp billion)

Item	2009	2008
Revenue		
-Water revenue	51.501	37.698
-Non-water revenue	3.492	3.524
-Swimming pool operation	577	547
Total Revenues	55.570	41.769
Direct Cost		
-Source	9.821	8.183
-Transmition & distribution	8.122	8.124
-Swimming pool operation	1.577	1.779
-Wastewater	1.253	1.142
-water Treatment Cost	2.571	2.253
Total Direct Cost	23.345	21.481
Gross Profit (Loss)	32.345	21.481
General Affairs Cost	26.723	30.027
Profit (Loss)	5.501	(9.740)
Other Income	183	260
Tax (PPh pasal 25)	-	-
Profit (Loss) after Tax	5.684	(9.480)

PDAM Surakarta has three revenue sources:

1. Water sales
2. Non-water (including wastewater) revenue
3. Revenue from swimming pool operation

Total revenue in 2008 amounted to Rp 41.769 billion. This increased by 33 percent to Rp 55.570 billion in 2009. The biggest increase came from drinking water sales by about 37 percent, equivalent to Rp 13.803 billion. Revenue from non-water slightly decreased, by less than 1 percent, or about Rp 32 million, from Rp 3.524 billion in 2009 to Rp 3.492 billion in 2009. Revenue derived from swimming pool operation only increased very slightly.

Costs directly related to operations are reported per PDAM cost center. Included are production cost, transmission and distribution cost, swimming pool operation, WWTP cost, and water treatment. The statements show that water production cost increased a mere Rp 1.638 billion against an increase in water sales at Rp 13.803 in the period. For wastewater operation, the cost increased by 10% or Rp 111 million even as revenue declined during the same period. The results reflect how much more lucrative water operation had been compared to that of wastewater, and that it was good business strategy to concentrate more efforts at furthering improvements in water supply, rather than in wastewater.

But PDAM is seen to be re-focusing especially with the sanitation grant earmarked to raise public awareness to and increase wastewater connections and revenue generation. But the increase in income must be accompanied by efficiency efforts in direct expenses and wastewater treatment.

2.3.4 Construction Activities, Management and Supervision

Surakarta city has two (2) Water Waste Treatment called WWTP Semanggi and WWTP Mojosongo. WWTP Semanggi and WWTP Mojosongo is part of the management structure of the PDAM organisation. Same with in Balikpapan, All WWTP assets are part of the total PDAM assets. PDAM Finance Department oversees all financial operations of all departments of the organisation, including WWTP, a technical operating section thereof.

Because of this situation, it is very difficult to get the information about the construction activities, Management and supervision, because WWTP is not involve for one of them. From the pre-construction process until hand over project, WWTP institutions is not involved of Project Management ask

WWTP Surakarta can request the needed to the PDAM as his main organisation about his needed over the infrastructure or any others, and PDAM will deliver this task to Cipta Karya under PU (Public Work) for design and executed (project management) the construction, and when the construction finished, the PDAM will handed over to the WWTP.

The WWTP Employee in Surakarta has no significant information over the project knowledge, project management, project supervision, because they are not involve when the project construct.

2.3.5 Community Awareness and Public Campaign

The result of assessments on wastewater services in Surakarta are given in the table below:

Table. 2.1.8. The Existing condition of wastewater services and public awareness campaign strategy

City	Existing Condition	
	Internal	External
Surakarta	Method: Interview Questions: Customers Handling Mechanism and Structure Wastewater Unit is part of PDAM and in the Water taps unit thus service is ineffective. Mechanism applied is the same as water tap. This ignores the fact that most community does not put wastewater treatment to be on the top of prioritisation list. Surakarta has Local Working Unit Team (SKPD) incorporated in the Sanitation WG and Wastewater Unit is part of that WG. Campaign programs will be done included in the strategic planning to raise community awareness.	Method: Interview and Focus group Discussion. Questions: Community understanding on sanitation-wastewater. Generally, community is aware that wastewater needs to be handled well, yet it takes better service mechanism. Community thinks that problems occured were that the service unit was not functioning and this resulted to distrusts out of community against the wastewater management. Many technical issues went unsolved, such as clogged channels, leakage on pipes and insufficient channels elevation. Communication problems between wastewater unit and community.
	Questions: Service Unit Staff Competency Low capability on wastewater products social marketing. No trainings on wastewater social marketing capacity building. Complaints handled by head of wastewater and if he's not available, issues are left unsolved and moreover there are not enough human resources to handle complaints.	Questions: Community Response on Wastewater Service System Community's opinions on wastewater service system: (i) Information and explanations on this service is highly needed (ii) awareness raising programs and socialisations are not maximums (iii) there has been no effective communications with the customers. Most community thinks that service mechanism and system needs to be improved.

City	Existing Condition	
	Internal	External
	Questions: Staf composition and coordination within Service Unit. PDAM consists of wastewater and water taps units with specific tasks: (1) New installments are done by service unit (2) Payments are handled by public desk (3) Billings are handled by Technical Director. Service unit team has got one operational car with three contracted staff paid according to minimum wage regulation. Higher costs maintenance is done by partners to cope with budgeting issues and will be paid on the next budgeting year plan.	
	Questions: Socialisation-Campaign Method Human resources are not sufficient to write and conduct community awareness raising programs in order to socialise wastewater service products. There has been no effective campaign method and strategies to generate community participation. One-way socialisation and has not used effective facilitation media. Low willingness of the customers to pay the wastewater treatment fee.	

CHAPTER 3: GAP ANALYSIS

3.1 STANDARD BEST PRACTICES IN SEWERAGE MANAGEMENT

3.1.1 Sewerage System and Operation

Sewerage system is the means to collect and transport the domestic sewage from residential and or commercial areas to sewage treatment plants or discharged water-body. The domestic waste comprised of black water from humans excreta; and grey water that made up from waterborne waste from the preparation and consumption of food and drink, dishwashing, bathing, showering, and general household cleaning and laundry.

In order to optimise the operation and maintenance of sewerage system, standard best practices of sewerage services should be established clearly. These include issues of operation and maintenance of the sewage collection system (holding tanks); the sewerage system (sewerage piping or lines, drains, manholes, pumping stations); and sewage treatment plants.

Best Practices on Operation and Maintenance of Sewerage System

a. Community Participatory

Operation and maintenance of sewage collection system incorporates the need of community participatory to manage their sewage disposal to the quality acceptable by the sewerage system. This standard has to be established to protect any damage on the down-stream equipments. The practices of operation and maintenance of the sewerage system include:

The empowerment of community participation in sewerage management includes the following issues:

- Emphasise do and don't to be putting in a sewer (oil and grease; sanitary pads; disposable nappies etc.)
- Encouragement on biodegradable and low phosphorous detergents
- Raising the awareness on the community participation in sewer maintenance, including avoiding any blocking in the household piping installation
- Publish the service area coverage of sewerage system to the community

b. Infiltrations and Inflows Management[1]

Inflow and infiltration or I & I are terms used to describe the ways that groundwater and storm water enter into dedicated wastewater or sanitary sewer systems. Dedicated wastewater or sanitary sewers are pipes located in the street or on easements that are designed strictly to transport wastewater from sanitary fixtures inside your house or place of business. Sanitary fixtures include toilets, sinks, bathtubs, showers and lavatories.

Inflow is storm water that enters into sanitary sewer systems at points of direct connection to the systems. Various sources contribute to the inflow, including footing/foundation drains, roof drains or leaders, downspouts, drains from window wells, outdoor basement stairwells, drains from driveways, groundwater/basement sump pumps, and even streams. These sources are typically improperly or illegally connected to sanitary sewer systems, via either direct connections or discharge into sinks or tubs that are directly connected to the sewer system. An improper connection lets water from sources other than sanitary fixtures and drains to enter the sanitary sewer system. That water should be entering the storm water sewer system or allowed to soak into the ground without entering the sanitary sewer system.

Improper connections can be made in either residential homes or businesses and can contribute a significant amount of water to sanitary sewer systems. Eight inch sanitary sewer pipes can adequately move the domestic wastewater flow from up to 200 homes, but only eight sump pumps operating at full capacity or six homes with downspouts connected to the sanitary sewer pipe will overload the capacity of the same eight inch sewer pipes. A single sump pump can contribute over 7,000 gallons of water to sanitary sewer systems in a 24 hour period, the equivalent of the average daily flow from 26 homes.

Infiltration is groundwater that enters sanitary sewer systems through cracks and/or leaks in the sanitary sewer pipes. Cracks or leaks in sanitary sewer pipes or manholes may be caused by age related deterioration, loose joints, poor design, installation or maintenance errors, damage or root infiltration. Groundwater can enter these cracks or leaks wherever sanitary sewer systems lie beneath water tables or the soil above the sewer systems becomes saturated. Often sewer pipes are installed beneath creeks or streams because they are the lowest point in the area and it is more expensive to install the pipe systems beneath a roadway. These sewer pipes are especially susceptible to infiltration when they crack or break and have been known to drain entire streams into sanitary sewer systems. Average sewer pipes are designed to last about 20-50 years, depending on what type of material is used. Often sanitary sewer system pipes along with the lateral pipes attached to households and businesses have gone much longer without inspection or repair and are likely to be cracked or damaged.

[1] http://www.globalw.com/support/inflow.html

Inflow and Infiltration water is called "clear water" (although it may be dirty) to distinguish it from normal sanitary sewage water in the sewer system.

Why is inflow and infiltration a problem?

Sanitary sewer systems are designed to carry wastewater from toilets, dishwashers, sinks, or showers in homes or businesses. Inflow and infiltration add clear water to sewer systems increasing the load on the systems. Clear water belongs in stormwater sewers or on the surface of the ground, and not in the sanitary sewers. A stormwater sewer is a pipe system designed to carry rainwater away. Stormwater sewers are normally much larger than sanitary sewer systems because they are designed to carry much larger amounts of water. Drainage ditches also act the same way in many neighborhoods. When clear water enters sanitary sewer systems, it must be transported and treated like sanitary waste water. During dry weather the impact of inflow and infiltration can vary from minimal impact to a significant portion of the sewer pipe flow. Wet weather magnifies existing inflow and infiltration sources. As a rain or snow melt event begins the inflow and infiltration sources start filling the sanitary sewer systems with clear water, eventually filling the sewer systems to capacity. Once the sanitary sewer systems have reached capacity or becomes overloaded, wastewater flows at much higher water level than normal and if sanitary fixtures or drains are below this overload level, water will flow backward through the sanitary sewer pipe, flooding basements or households and causing manholes to pop open releasing wastewater onto the street.

Overflow occurrences put public health at risk and violate state and federal environmental regulations. Sanitary sewer overflows release wastewater and potential pathogens onto streets, into waterways, and basements increasing potential health risks. As wastewater overflows into creeks, rivers, lakes, and streams it contaminates all bodies of water fed by the waterways and all creatures/plants coming in contact with the polluted water. Sewer overflows also contribute to beach advisories and closures due to contamination.

Many communities are likely to experience at least a few overflows in their sanitary sewer systems, but older communities located downstream from these overloaded sewer systems will experience the most overflows and basement backups because of their low location in the watershed. The sanitary sewer systems in these older communities not only carry their own wastewater and inflow an infiltration, they also receive the wastewater flow from the upstream neighboring community’s sewer systems. The network of integrated sewer collection system pipes throughout a regional service area makes it essential for all municWWTPities to collaborate on and share responsibility for developing and implementing long-term solutions to the inflow and infiltration problem.

Inflow and infiltration reduce the ability of sanitary sewer systems and treatment facilities to transport and treat domestic and industrial wastewater. As a result of the

inflow and infiltration, wastewater treatment processes are disrupted and poorly treated wastewater is discharged to the environment.

There are various costs associated with inflow and infiltration including sanitary sewer system overflow, with wastewater treatment and transportation facilities, and funding opportunities. Overflow costs are associated with road and waterway cleanup and the potential for fines if the overflow problem is not corrected. Additionally, sewer system backups into basements or households can result in litigation and potential liabilities for the responsible city or agency. Eventually, new homes or businesses may not be allowed to connect to the sanitary sewer system if the inflow and infiltration issues are not corrected, increasing costs to residents as a new sanitary sewer systems are installed or potentially lowering housing values due to the inability to develop land for future growth.

Inflow and infiltration costs water treatment facilities and consumers large amounts of money in water treatment operating expenses. All water entering a water treatment facility must be treated as wastewater causing an increase in operating costs proportional to the amount of clean water entering the sanitary sewer system due to inflow and infiltration. For example, the Metro Plant in St. Paul, Minnesota typically receives 200 million gallons a day (mgd) of wastewater from its sanitary sewer systems. During a rainstorm the load on the sewer systems can triple to 700 mgd or more. Costs associated with processing the added clean water from inflow and infiltration are eventually passed back to the consumer in the form of rate increases. By reducing inflow and infiltration capital and operating costs can be lowered. Minimising inflow and infiltration can also increase the lifetime-capacity of a treatment facility and wastewater transportation system. The pumps that are involved with wastewater treatment and transport operate 24 hours a day seven days a week; however they must work harder as the sewer system's water level load increases. This puts an unneeded strain on the pumps and shortens the life expectancy of these expensive pumps.

Other costs include the city or agency failing to meet federal or state guidelines and causing the community to become ineligible for low interest loans from grant or revolving fund opportunities. Often state water boards will provide funding opportunities to a city or agency; however they will be tied to some related criteria. In this case the funding opportunities would be tied to the number of sanitary sewer system overflow incidences in the city or agency's area.

History and scope of the inflow and infiltration problem

Inflow and infiltration problems are difficult to resolve because of the enormity of the infrastructure in place. It is estimated that there are approximately 4.0 billion feet of sanitary sewer pipe in the United States and more being installed daily. This estimate does not include "combined sewer systems" that serve as both storm and sanitary sewer system. If these sewer systems were laid end-to-end, they would represent about 290 parallel pipelines that would stretch from New York to California. Most

sewer pipe inventory for older cities pre-dates World War II, were installed with materials that are well beyond their expected service life and using methods of construction that are not state of the art. Many old neighborhoods have "combined sewer systems", which were designed before wastewater treatment plants existed. These combined sewer systems are typically routed to the wastewater treatment plants for processing. Due to their nature many of these sewer systems experience overflows during storm events. In response to this many cities and agencies are retrofitting or redesigning their systems to better meet the EPA requirements and the load their community places on the sewer systems.

The EPA requires any regulated agency with a NPDES permit to eliminate all wastewater overflows that reach the waters of the United States. The ability to achieve such a goal is virtually impossible for a large majority of cities and agencies, since inflow and infiltration cannot be completely stopped. Initial efforts, in the 1970's, to reduce inflow and infiltration in sanitary sewer systems were, typically, unsuccessful, in spite of substantial funding from the EPA's Construction Grants Program. Most inflow and infiltration control programs were reduced to emergency programs, in the late 1980's, that tried to resolve isolated issues in the sanitary sewer systems. During this time period several major sanitary sewer systems were evaluated in cities such as Nashville, Atlanta, and Houston. These evaluations raised public interest in the repair and replacement of sanitary sewer system infrastructure. Additionally new and better sewer system technologies allowed for reduction or elimination of inflow and infiltration sources.

Public interest in sanitary sewer systems has also been aroused by the project growth estimates of many metropolitan areas. Growth projections are used to predict and plan for wastewater flows through the sanitary sewer systems and wastewater treatment plants. Typically the sewer systems and treatment plants are designed using national standards for average and peak flows of wastewater through the sewer systems.

If the inflow and infiltration levels were not reduced or eliminated, projecting their contribution to the sanitary sewer systems show that cities and agencies would be required to make significant investments in relief sewer systems and pumping stations. However it is not feasible to add capacity to transport and treat the clear water introduced by inflow and infiltration. Wastewater treatment infrastructure is an expensive investment for a community. Additionally most of the existing wastewater treatment plants would not be able to treat the additional flow of an ever increasing clear water problem because of space constraints at the wastewater treatment sites.

How can the inflow and infiltration problem be solved?

The reduction and control of inflow and infiltration in sanitary sewer systems should be considered with regard to a disciplined, long-term monitoring and maintenance program. The first step to resolving any inflow and infiltration problems is determining how significant the problem is. Typically a sanitary sewer system evaluation is

performed to assess the system. An evaluation of the sewer system will determine the quantity of inflow and infiltration, determine their sources and provide guidance to determine a cost effective corrective action plan.

As with most situations you can't manage what you can't measure and the first step to managing the inflow and infiltration issue is to measure the extent of problem. To quantify the inflow and infiltration into a sanitary sewer system means a significant attempt to locate and record information that relating to a variety of issues including but not limited to observed overflows, measured or observed surcharges, reported bypasses, customer backup complaints, and chronic maintenance activities. The information should be obtained from different places including maintenance records, sewer maps, complaint records, assorted department files, work orders, past studies, engineering reports, and interviews with personnel who are responsible for maintenance and management of the sanitary sewer system. A large amount of information can be found using these sources as well as others. Once the data has been found it must be recorded and displayed in a way that will show possible relations between overflows, bypasses and other related factors such as capacity models, rainfall records, maintenance activities, and reported backups. If electronic maps of the sanitary sewer system are available, they should also be used to confirm the result of the data findings.

Once the data has been researched and correlations found the city or agency must establish sewer flow monitoring points at various locations within the system. Typically sanitary sewer systems can be broken down into associated watersheds. Then those watersheds can be separated into basins and if necessary sub-basins.

Flow monitoring instrumentation must be placed in sanitary sewer systems at locations appropriate to obtain the data desired. To measure wastewater flows through the sanitary sewer system it is important to select the appropriate flow meter. Many types of flow monitoring instrumentation are available and pricing varies accordingly. Simple instruments like a flow probe measure water velocity and depth but do not record data. This type of instrument is good for spot flow checks or random checks of permanently installed flow meters. Often long term flow measurements can be made using simple water level recorders. In this case only water level is recorded then the data is exported into a spreadsheet and the data can be processed through an equation or lookup table that cross references water level to flow for that particular site. The advantage of water level recorders is that they are relatively inexpensive and multiple units can be purchased with a moderate investment to monitor the water level (flow) throughout the sanitary sewer system. Alternatively more sophisticated flow meters can output, display, and record flow information directly. Often these instruments also have output that can trigger wastewater samplers or other devices. These instruments are typically a larger investment, but have greater monitoring abilities.

The following "rules-of-thumb" may be used to determine a monitoring and evaluation strategy to adequately measure amount of inflow and infiltration in a sanitary sewer system. These parameters vary depending on the overall city or agency goals.

- One flow meter for every 30,000 – 50,000 feet of sanitary sewer pipe
- The flow meter recording should be set at 15-minute intervals
- Flow meter capable of measuring surcharges
- One rain gauge for every 2-4 flow meters
- Minimum monitoring period – 45 days with 60 days being optimal
- Measurement of between 6-8 separate rainfall events
- The system should be monitored during a period of high seasonal groundwater

Once the flow monitoring data has been collected it should be carefully evaluated. Adjustments to account for periodic flow profiling at the monitoring site, errors associated with grease or deposits on the sensors, drift of the depth recordings, and downtimes related to flow meter malfunction. The corrected data should be tabulated and analysed to make comparisons between the measured inflow and infiltration and the corresponding rainfall intensity. Data under surcharge conditions should be avoided for analysis purposes. The analysis will provide two essential parameters that are used to quantify the inflow and infiltration problem. The first parameter is a comparison between different basins so that basins can be prioritised for future studies and potential inflow and infiltration reduction. The second parameter is information that will be useful if subsequent relief or replacement sewer systems are necessary to reduce or eliminate overflow or bypass conditions.

Basins can be ranked in a range of ways. Rankings might include unit inflow or infiltration rates such as gallons/day/foot, mgd/1,000', gpd/inch-mile of pipe, mgd/acre, etc. By changing the raw flow data into a measured unit rate, comparisons may be made between basins as well as comparisons relating factors such as general age of the sanitary sewer system, frequency of reported overflows, etc.

In addition to flow monitoring there are other tests that a city or agency can use to identify sources of inflow and infiltration. These tests include dye and smoke testing and visual inspection. Smoke and dye testing work by introducing either dye or smoke into the sanitary sewer system and determining where it comes out. Visual inspection can be done with remote television monitoring devices and used to look for cracks or other damage in a sewer pipe.

Once a source of inflow and infiltration has been discovered the city or agency will take appropriate action to resolve the problem, including fixing or replacing damaged or leaky sewer pipes and notifying property owners of improper connections. Periodically the city or agency must monitor and measure their sanitary sewer system to maintain the integrity of the system and determine new sources of inflow and infiltration. Continuous monitoring is also beneficial to the cities and agencies so

appropriate cost increases can be applied to communities/basins that are heavy contributors to inflow and infiltration into the sanitary sewer system.

Maintenance Activities of Sewerage System

The activities incorporated in the maintenance of sewerage system are preventive maintenance; corrective maintenance and emergency maintenance. In the system in which preventive maintenance is not implemented, increased operational cost commonly occurred.

Preventive Maintenance

Preventive maintenances are routine scheduled activities performed over the assets. This activity of maintenance can extend the equipment lifetime, reduces overall maintenance costs and increases system reliability.

Corrective maintenance

The corrective maintenance relates to the repairs and replacement of the assets or equipments after it fails. It is commonly applied for non-critical assets and when preventive maintenance cannot be scheduled.

Emergency Maintenance

Another form of corrective maintenance that applied to critical asset that failed and producing risk to human health and environment is called emergency maintenance. Appropriate maintenance planning should be established by the sewerage system owner and manager, it will include:

- An initial operational review on the sewerage system. This will facilitate the site-map , design and construction of the sewerage system
- Scheduling of routine inspections
- Scheduling of routine maintenance
- Scheduling of emergency maintenance
- Good practice of reporting and record keeping
- Establishment of Standard Operating procedures for maintenance activities
- Regular training for maintenance staffs

Maintenance of Sewer

Sewer maintenance is mostly related to the regular inspection on the leakage potential, overflows, and blockage on sewer line. Some methods on the sewer maintenance are blockage removal by rodding; chemical cleaning and or utilising cutting tools for reducing root infestation; and sewer flushing to remove accumulated sediment. The provision of Standard Operating Procedure (SOP) and rudimentary tools for sewer maintenance is important tool for good maintenance of the sewer system.

Maintenance of Pumping Stations

Pumping station maintenance becomes key issue on the sewerage system, as failure in this asset may impact the overall operation of the sewerage system. The maintenance and regular inspection methods of pumping stations comprise of:

- Inspection on the instrumentation such as level switches
- Pump drawn-down test
- Inspection of manholes construction
- Regular cleaning of pump stations from debris and other blocking materials
- Checking of valves and penstocks
- Inspection of mechanical and electrical devices

Maintenance of Sewage Treatment Plants

The reliability of any sewage treatment plants is depending upon how the plant being operated and maintained. The most significant issues are:

- The availability of reliable and informative operating manual books of the installed system plant,
- Availability of skilled operator staffs to operate and maintain the system,
- Monitoring and record keeping.

The reliable operating manual books should consist of the minimum data and information as per follows:

- Basic design of the installed system
- Process description
- Equipments detail specifications including their operating manual books
- Process Flow Diagram
- Piping and Instrumentation Diagram

- Isometric Piping Diagram
- Single line diagram of the Control Panel
- Trouble shootings
- Safety procedures
- Procedure of plant maintenance and operation
- Daily log sheet form

Availability of sufficient numbers of skilled operator has to be prepared. Operators' training must be performed after plant commissioning or after installation of other new plant modifications. It will cover the training on process description, procedures of operation and maintenance, chemicals preparation, plant trouble shootings, how to fill in the log sheet etc.

Monitoring and record keeping relate with daily analysis of plant's performance. It is performed by utilising the basic wastewater tool kits such as pH meter, Dissolved Oxygen (DO) meter, Sludge Volume Index (SVI) to identify sludge characteristic, and COD meter. Good monitoring and record keeping lead to early warning on any plant's performance deviation.

3.1.2 Institutional of Sewerage Services

Maintenance operation

Ideal condition

Knowledge on tools and equipments thus there will be more effective and efficient works.

Staff, tools and equipments

Ideal condition

Complete tools and equipments and sufficient number of staff to smoothly deliver the services.

Coordination amongst related offices

Ideal condition

Harmonius coordination amongst related offices in planning and developing programs to be conducted.

Organisational Structure

Ideal condition

Wastewater Treatment Unit is to deliver public services and to give profits to the company. Profesional working attitudes, satisfying customers, efficient peformances and piling up profits to cover production costs are highly needed for future house connections network development.

Company Culture

Ideal condition

High loyalty and working spirits must be owned by staff.

3.1.3 Financial Management of Sewerage Services

Financial aspect is crucial to wastewater management and expansion as it describes the management, mechanism and the sustainability of the wastewater management. Financial aspect analysis assesses the financial management pattern, financial recovery, planning and subsidised model applied. Those are the financial management system in wastewater operation and expansion.

Follows are to be discussed in order to review the financial aspects:

1. Financial management system in terms of how the wastewater management to be implemented
2. Local companies, in attempt to identify whether WWTP is government owned or independent and
3. Transaction aspect, that tries to find out how this wastewater service transaction system has been operating and the policies that regulate it
4. Financial endurance, that is how to maintain wastewater service financially

In trying to identify the needs on wastewater sanitation expansion runs in, it is necessary to study the normative aspect of management performances in WWTP, specifically on the management and regulation aspects on wastewater management.

WWTP is an installation system that processes household and human waste out of the residents. Up to now, there has been no specific law regulating the wastewater management. Wastewater management is mentioned on Government Regulation (PP) No 16 year 2005 on Water Supply System (WSS) that is an integrated under clause 2 on

drinking water supply. This regulation states requirements in wastewater supply specifically in cities and moreover on highly populated areas (article 16.3).

Though sanitation is part of WSS, the above-mentioned regulation does not describe the management and the running of WWTP. This is contradictory to that of WSS which its management is explained (PP 16/2005, article 37.3).

The integration of wastewater management and WSS mentioned in the regulation is more on the planning and does not talk about the wastewater management in terms of whether the wastewater plants are in the forms of Local or National Government Owned Business Unit such as Perusahaan Umum Daerah (Perumda) or Pedrusahaan Daerah (PD), nor whether it should be managed as part of PDAM as has been practiced.

Related to wastewater management, the nature of WWTP treatment service transactions needs to be evaluated. WWTP has been operating as what WSS service has in which an amount of money or fee is asked to the consumers. This mechanism requires the plants or companies to give service accordingly (article 4.6, Act no. 8 year 1999 on Consumers Protection). It is then important to evaluate whether PDs has served the consumers accordingly.

Consumers and service provider transaction system is extremely important. If billing the consumers has been practiced by PDs, this means it is merely a business like any other business where consumers need not to pay if the service provided is far from what's expected. The law that regulates the transaction between the consumers and wastewater treatment service provider can be read on Law no. 28 year 2009 on Local Tax and Retribution. According to this law, wastewater management service is categorised into what's called Wastewater Retribution (article 121). This article mentioned that wastewater retribution management is a public service and provided by local government unless it is provided by Local Government Owned Business Unit (BUMD). Based on that, the billings that have been practiced by PDPAL Banjarmasin, WWTP Balikpapan and Surakarta do not fall under the Wastewater Retribution as regulated above.

As its establishment goal, PD (and wastewater management) is to serve public and to get profits. The profits sources are:

1. Direct income increment
2. Expense efficiency, and
3. Optimising assets (indirect income)

The endurance and sustainability of PD management highly depends on those three. Among those three, direct income increment is an independent variable that becomes the main subject to be raised. This can be done by:

1. Expanding the service, in terms of getting more consumers; and
2. Increasing the tariff fee

Tariff fee increment can turn into a blunder, thus the amount of fee should fit the consumer's level of economy. The fee determined by PDs then has got to be approved by the local council as regulated by Law number 25 year 2009 on Public Service.

Sanitation grant funded by AusAid is implemented by connecting pipes to more houses in order to get more consumers. For a better implementation, it is necessary to develop the management and financial capacities to keep the financial endurance and expand the wastewater management through local government owned plants or companies.

A crucial challenge then occurs. The inter-house wastewater has not been successful to show whether this will give advantage to the consumers or not. This then leads o the fact that not all individuals or bodies are willing to have pipes installed for their wastewater. Moreover, the fee does not match to the advantage received.

After taking accounts to what has been presented in the earlier parts, then we come up with criteria in order to be able to determine the financial management capacity building needs for further expansion.

The criteria in sewerage management are as follow:

1. Revenue. Revenue will be depended on how The congruence between the fee and the advantage received by the consumers, how much the optimisation of fee, what formula that will be used, how far market potential or how much potentially o subscribers per year, and the level of willingness to connect.
2. Performance. Performance means clues that are showing the expected outputs that are like: Ratio of direct expense against the income and Ratio of indirect expense against the income and profitability.
3. Local Government Commitment. Wastewater is one of local government commitment. So that its commitments are very important to show how wastewater management runs to serve people and keep water protection from pollutions. The local government commitments can be expressed financially in two ways : grant and investment (Penyertaan Modal Pemerintah daerah/PMPD).
4. Planning. Planning covers how far community involves as constumer in sewerage system to keep life quality through waste water management and how far the operator of sewerage has a plan to keep a prime services to people and develop sewerage system that can serve urban area.
5. Law or Regulations. However there is no a specific law regarding waste water, there are some related laws are: Law no. 5 year 1962 regarding Local Companies (Perusahaan Daerah), Law no. 8 year 1999 on Consumers Protection, Law no. 28 year 2009 on Local Tax and Retribution, and Law no. 25 year 2009 on Public Service

3.1.4 Construction Activities, Management and Supervision

Construction Management and Supervision is performed in order to maintain constructions made, to be consistent with drawing plans, to have quality materials as specified technically and to be able to finish the works as set-up on the milestones and more importantly according to the contract signed.

Construction Management is strategy made on the managerial position where it tries to put the management and project in order on the macro level.

Project supervision is a field work activity where field supervisor is to monitor the project implementation so that the construction works run as planned. Should there be any changes made, they have to be approved by authorised personnels.

Pre Construction Phase

PDPAL Banjarmasin is a local company and to provide services and materials as regulated by Keppres no.80 year 2003.

Before delivering the tender announcement, a committee is formed as the amount of project worth more than Rp.50.000.000,00 and as regulated by Presidential Decree no 80year 2003. That decree mentions the DOs and DON'Ts in conducting tender.

The tender process, based on no. 80 year 2003, PDPAL has been performing lawfully tender preparations, requirements and till the contract signing phase as explained earlier.

Balikpapan and Surakarta, however, needs staff capacity building on how tenders conducted. This should be taken into consideration as WWTP's vision is to becoming PDPAL and should they have reach that point, they need know the DOs and DON'Ts in conducting tender.

Construction Phase

The importance factor in the construction phase as follows as:

- Perform daily supervision of the works on site to ensure quality as specified in drawings and specifications
- Weekly reporting of progress and activities of each site and any technical and quality issues
- Check invoices submitted by contractors and certify payment
- Take over the preparation of As-Built drawings
- Attend regular meetings among owner (PDPAL), consultant (if any), and contractor

When undertaking the construction supervision services it is proposed that one Field engineer will supervise some covering area. Where this is not possible due to the proximity of the sites to one and other, additional supervisors will be used. It is envisaged that the Resident Engineers will oversee all the sites within a district.

Review of Contractor's Program

Early in the construction period the contractors are required to submit their detailed construction programs, identifying the sequences and duration of operations and detailing equipment and labour provisions. Many problems in construction contracts can be traced back to the contractor's failure to mobilise the necessary equipment in a timely way and/or their failure to permit access to the various parts of the site in a timely way

Supervision of Construction

We believe that the key technical aspects of construction supervision will lie with maintaining high construction standards through the contractor's deployment of appropriately skilled management and labour with materials of a quality that meets the specification and that are placed correctly.

The site supervision team will undertake the tasks normally associated with administering construction contracts as follows:

- Improving and keeping a daily record
- Measuring the works completed
- Providing supplementary and amended construction drawings
- Reviewing and approving the contractor's drawings
- Monitoring the arrival of materials on site and their use
- Monitoring the contractor's adherence to the conditions of contract, the technical specifications and other contractual obligations
- Monitoring of quality assurance testing
- Monitoring the contractor's progress and reviewing the contractor's program
- Recording the activity of all major items of equipment
- Keeping records of the contractor's staff and labour complement
- Inspection of manufacture and factory testing and certification
- Inspections prior to, and preparation of, completion and maintenance certificates
- Checking and certifying for payment the contractor's substantial work

General Supervision of Construction

It is in the nature of construction supervision that the site staff's programme is largely determined by the contractor's activities. Nevertheless, we believe that the supervisory staff should not simply react to the contractor's programme and works in progress, but rather should anticipate the contractor's activities and potential problems. In particular, there is a need to analyse the contractor's programme and methodology so that weaknesses or possible contentious activities can be identified in advance and discussed with the contractor and the client. The aim is, of course, to avoid delays, claims and increases in cost

Site Meeting With Contractor

Site meetings form a regular feature of the construction supervision activities. Important matters such as progress of the works, monthly measurement and payment certificates, procurement of materials, availability of plant and equipment, claims, etc., may be discussed, highlighting whenever necessary potential problems areas for appropriate action. Particular attention will be paid to potential environmental problems and proposed means of overcoming these.

Issues of Site Instructions

After a contract commence, it is inevitable that instructions will be issued to the contractors on such matters as confirmation of dimensions, minor variations of details, rejection of poor workmanship, works to be carried out under day works etc. These instructions would be issued by the site supervision staff, subject to a pre-determined level of authority. A full record of issued site instructions will be maintained. Instructions likely to substantially increase the cost of the works will not be given without prior written authorisation.

Modifications to Specifications and Design and Administrative Orders

Where the need for an administrative order is identified we will prepare a short note for review by identifying:

- The reason for the proposed variation
- Likely financial impact
- Likely impact on completion dates

In order to speed up the decision, the discussion shall be followed by 3 (three) parties, the consultant will prepare the modification and submit to PDPAL for approval following with administrative order.

Material Quality Control

Testing materials will be an important part of the site activities, both in respect of acceptability and suitability for the approved method of construction. We anticipate most testing will be undertaken on site.

Material produced on site (e.g. concrete), together with constituent materials such as sand and gravel, will be tested on site or in an outside approved laboratory under the overall direction of the site supervision team. Certificates of quality for manufactured or processed materials, such as cement, would be obtained from the contractor to ensure that these materials comply with the requirements of specification.

Concrete mix designs will be developed by the contractor for approval by the Engineer's representative.

i. Quality Control Measurement

Quality control in typically involves insuring compliance with minimum standards of material and workmanship in order to ensure the performance of the facility according to the design. These minimum standards are contained in the specifications, for the purpose of insuring compliance, random samples and statistical methods are commonly used as the basis for accepting or rejecting work completed and batches of materials. Procedures for this quality control practice are described as traditional quality control practices instead of total quality control due to the existing local resources.

Total quality control is difficult to apply, particular in construction. The unique nature of each facility, the variability in the workforce, the multitude of contractors and the cost of making necessary investments in education and procedures make programs of total quality control in construction difficult. Nevertheless, a commitment to improved quality even without endorsing the goal of zero defects can pay real dividends to organisations.

A traditional quality control practice is the notion of an acceptable quality level which is a allowable fraction of defective items. Materials obtained from suppliers or work performed by an organisation is inspected and passed as acceptable if the estimated defective percentage is within the acceptable quality level. Problems with materials or goods are corrected after delivery of the product.

The approach on quality control will be based on Quality Control by Statistical Method. Ideally a quality control program is to test all materials and work on a particular facility. For example, non-destructive hammer test or destructive test as crushing test or core sampling inspection of concretes can be used throughout a facility. Exhaustive or 100% testing of all materials and work by inspectors can be exceedingly expensive. As a result, small samples are used to establish the basis of accepting or rejecting a particular work item or shipment of materials. Statistical methods are used to interpret the results of test on a small sample to reach a conclusion concerning the acceptability of an entire *lot* or batch of materials or work products.

ii. Measurable Progress Indicator

The progress indicators were designed to be measurable through a previous project progress trend in a weekly basis as a unit of sampling. Initially the progress indicator of contractor performance based on S-Curve, but change it to the milestone system in order to be more understandable for the local contractors.

Progress Payment and Measurement

Following the general practice the Resident Engineer will liaise with the Contractor's agent to agree work carried out to issue interim payment certificates for the work completed on a regular basis. Payment certificates will take into consideration such matters as measured work completed, site instructions if applicable for the purpose of payments, administrative orders, day-work, materials on site, advance payments and retentions. A measurement book would be maintained as a record of work done.

Issuance of Certificate of Substantial |Completion (CSC)

The substantial completion certificates are issued for completion of the whole works but not including the period of maintenance which note a list of initial defects and outstanding minor work.

3.1.5 Community Awareness and Public Campaign

Needs Assessment will be undertaken to identify the GAPS constraints / obstacles that are likely to exist between the ideal and the existing conditions. Later, after needs assessment is conducted to PDPAL Banjarmasin and Balikpapan and that of Surakarta as the service providers and community is the recipient of the service, it is expected that the internal and external factors that hinder the ideal achievement can be identified. The low service to the community is the indication of low management capacity of the wastewater treatment service providers.

The overall results from GAPS analysis then will determine the actions to be taken to strengthen the capacity of the wastewater treatment service providers. The point of intervention and improvement according to gaps analysis well be shown at part 7.2. GAP Analysis.

3.2 GAP ANALYSIS

3.2.1 Sewerage System and Operation

TARGETED CITIES	STANDARD BEST PRACTICES	ASSESSMENT RESULTS	POINTS OF INTERVENTIONS AND IMPROVEMENTS	PROPOSED SUPPORTS
Banjarmasin				
	Routine Maintenance	Pumping stations operate manually, due to unavailability of instrumentation Broken and clogged pump Unavailability of spare parts Unavailability of schedule of routine maintenance	SOP of maintenance is not applied. Routine inspection & maintenance; monitoring and record keeping on sewerage system are not performed well	• Provision of SOP for routine maintenance • Provision of training on routine maintenance
	Infiltration and Inflow Management	High Infiltration due to high water table and suspected leaks in sewer piping system Poor monitoring and data recording on flows in sewer lines	Construction of manholes, sewer piping and pumping stations Monitoring and data recording	• Training on design, construction, operation and maintenance of Sewer • Installation of flow meters and rain gauge along the sewer lines

TARGETED CITIES	STANDARD BEST PRACTICES	ASSESSMENT RESULTS	POINTS OF INTERVENTIONS AND IMPROVEMENTS	PROPOSED SUPPORTS
	Maintenance of Sewer and Pumping Stations	Unavailability of spare parts for pumps and instrumentation Clogged sewer Oversize pumps	Lack of routine maintenance schedule Lack of tools for maintenance Improper design of pumping station Pump repairs and replacement Instrumentation repair and replacement	• Provision of SOP for Routine Maintenance • Provision of training on design, operation and maintenance of sewer system • Provision of tools for sewer maintenance • Provision of spare parts
	Maintenance of Sewage Treatment Plants (STP)	Flows data is not properly recorded Low biomass growth Plants' daily performance data is not properly monitored and recorded Insufficient number of operators	Importance of installation of proper flow meter Prevention of infiltration in sewer lines Lack of capacity on proper operation and maintenance of system Unavailability of tool kits for daily wastewater analysis data recording STP management review	• Installation of flow meter for sewer lines and at inlet point of STP • Training on design, operation and maintenance of Sewer System • Training on design, operation and maintenance of Sewage Treatment Plant (STP) • Provision of SOP for STP Operation and Maintenance • Provision of basic tool kits for daily wastewater quality analysis • Improvement on organisation management chart

TARGETED CITIES	STANDARD BEST PRACTICES	ASSESSMENT RESULTS	POINTS OF INTERVENTIONS AND IMPROVEMENTS	PROPOSED SUPPORTS
Balikpapan				
	Routine Maintenance	Pumping stations operate manually, due to unavailability of instrumentation Unavailability of spare parts Unavailability of schedule of routine maintenance	SOP of maintenance is not applied. Routine inspection & maintenance; monitoring and record keeping on sewerage system are not performed well	• Provision of SOP for routine maintenance • Provision of training on routine maintenance
	Maintenance of Sewer and Pumping Stations	Unavailability of spare parts for pumps and instrumentation	Lack of routine maintenance schedule Lack of tools for maintenance Instrumentation repairs and replacement	• Provision of SOP for Routine Maintenance • Provision of training on design, operation and maintenance of sewer system • Provision of tools for sewer maintenance • Provision of spare parts

TARGETED CITIES	STANDARD BEST PRACTICES	ASSESSMENT RESULTS	POINTS OF INTERVENTIONS AND IMPROVEMENTS	PROPOSED SUPPORTS
	Maintenance of Sewage Treatment Plants (STP)	Flows data is not properly recorded Low biomass growth Plants' daily performance data is not properly monitored and recorded Insufficient number of operators Aerators work intermittently No means of sludge return Sludge drying bed is not working well	Importance of installation of proper flow meter Lack of capacity on proper operation and maintenance of system Unavailability of tool kits for daily wastewater analysis data recording STP management review	• Installation of flow meter for sewer lines and at inlet point of STP • Provision of SOP for STP Operation and Maintenance • System • Training on design, operation and maintenance of Sewage Treatment Plant (STP) • Provision of basic tool kits for daily wastewater quality analysis • Improvement on organisation management chart
Surakarta				
	Routine Maintenance	Pumping stations operate manually, due to unavailability of instrumentation Unavailability of spare parts Unavailability of schedule of routine maintenance	SOP of maintenance is not applied. Routine inspection & maintenance; monitoring and record keeping on sewerage system are not performed well	• Provision of SOP for routine maintenance • Provision of training on routine maintenance

TARGETED CITIES	STANDARD BEST PRACTICES	ASSESSMENT RESULTS	POINTS OF INTERVENTIONS AND IMPROVEMENTS	PROPOSED SUPPORTS
	Maintenance of Sewer and Pumping Stations	Unavailability of spare parts for pumps and instrumentation	Lack of routine maintenance schedule Lack of tools for maintenance Instrumentation repairs and replacement	• Provision of SOP for Routine Maintenance • Provision of training on design, operation and maintenance of sewer system • Provision of tools for sewer maintenance • Provision of spare parts
	Maintenance of Sewage Treatment Plants (STP)	Flows data is not properly recorded Low biomass growth Plants' daily performance data is not properly monitored and recorded Insufficient number of operators Aerators work intermittently No means of sludge return Sludge drying bed is not working well Attached growth system is not working well due to loosen media from the cages	Importance of installation of proper flow meter Lack of capacity on proper operation and maintenance of system Unavailability of tool kits for daily wastewater analysis data recording STP management review	• Installation of flow meter for sewer lines and at inlet point of STP • Provision of SOP for STP Operation and Maintenance • Training on design, operation and maintenance of Sewage Treatment Plant (STP) • Provision of basic tool kits for daily wastewater quality analysis • Improvement on organisation management chart

3.2.2 Institutional of Sewerage Services

TARGETED CITIES	STANDARD BEST PRACTICES	ASSESSMENTS RESULTS	POINT OF INTERVENTIONS AND IMPROVEMENT	PROPOSED SUPPORTS
Banjarmasin	Maintenance Operation	lacking in maintenance operation. The low level of understanding and knowledge of the staff were caused by the insufficient number of trainings and workshops given to them. Moreover, the operators' duties are more on installment routines instead of maintenance ones. They have no knowledge on what to be done and/or checked during their works. The unmaintained tools lead to higher direct works expenses	Knowledge on equipments and tools thus effective and efficient works are performed.	Establish Standard Operational Procedure, conduct trainings and workshops for staff Conduct necessary courses and trainings to support fieldworks Enroll them in Diklat Sanitasi Cipta Karya di Bekasi, and if necessary send staff to higher level of education. Check list can be applied to operators and as well position staff in accordance to their education (the right man on the right place)
	Staff, tools and equipments	Insufficient number of tools and equipments in PDPAL Banjarmasin, such as laboratory and electric tools for pumping points maintenance. Lack of electrical experts to cover 5 service areas. There has been only one expert existing. The need to put the perfect man at the perfect place, and the wastewater treatment capacity building.	Complete tools and equipments and sufficient number of staff for smooth operation.	Conduct trainings and workshops for all staff, continuous education and training on sanitations conducted by Departemen Cipta Karya in Bekasi Complete tools and equipments to support fieldworks, tighter recruits selections based on the skills. Put more desks on finance and network maintenance on technical issues

TARGETED CITIES	STANDARD BEST PRACTICES	ASSESSMENTS RESULTS	POINT OF INTERVENTIONS AND IMPROVEMENT	PROPOSED SUPPORTS
	Coordination amongst related offices	The lack of coordination between PDPAL and Public Works Office (DPU).	Coordination amongst related offices exist so that harmonious program plannings and developments done.	The existence of PDPAL liaison officer to bridge it with Public Works office Actively coordinate with Public Works office on city planning Make a city master plan integrated to all related offices such Public Works and Electric Company.
	Organisational Structure	The organisational structure is seen to be sufficient to meet the company's mission externally, internally and on monitoring matters. Customer Relations division, which is expected to be able to serve in satisfactory manner such as handling complaints, is included in the structure. The organisational mechanism in handling the customers has been working relatively optimal though "one man show" has been performed. The financial loss suffered is due to the low income and the high operational expenses. Banjarmasin city government has shown high commitment on wastewater treatment. On the other hand, community participation and interests on the treatment and instalments are considered to be low. Wastewater treatment is not considered to be a need and community feels that septic	Wastewater Treatment Unit is to deliver public services and to give profits to the company. Profesional working attitudes, satisfying customers, efficient peformances and piling up profits to cover production costs are highly needed for future house connections network development.	Improved financial system and socialisation programs must be leveraged through involving community fully in trainings. Short-term and long-term business plannings. More units to be established such as Human Relations or Pumping Unit. More professional management system.

TARGETED CITIES	STANDARD BEST PRACTICES	ASSESSMENTS RESULTS	POINT OF INTERVENTIONS AND IMPROVEMENT	PROPOSED SUPPORTS
		tank has been a perfect solution, which they do not have to pay monthly feee. Part of community also thinks that piping works will ruin their yards and access. Another aspect to be considered is that there has been no holistic business planning.		
	Company culture	There is an assumption that there has been less attention given to PDPAL staff and this is the factor that causes low loyalty and spirit in their performance.	High loyalty and working spirits must be owned by staff	Organisational capacity trainings. Tighter staff recruitments. Improved management.
Kota Balikpapan	Operation maintenance	Operators' lack of knowledge and skills is caused by the insufficient number of trainings and workshops received. Moreover, the operators' duties are more on installment routines instead of maintenance ones.	Knowledge on equipments and tools thus effective and efficient works are performed.	Establish Standard Operational Procedure, conduct trainings and workshops for staff Conduct necessary courses and trainings to support fieldworks Enroll them in Diklat Sanitasi Cipta Karya di Bekasi, and if necessary send staff to higher level of education. Check list can be applied to operators and as well position staff in accordance to their education (the right man on the right place)

TARGETED CITIES	STANDARD BEST PRACTICES	ASSESSMENTS RESULTS	POINT OF INTERVENTIONS AND IMPROVEMENT	PROPOSED SUPPORTS
	Staff, tools and equipments	Laboratory tools and equipments are not sufficient in Balikpapan. In addition to that, the number of staff is considered to inappropriate to perform wastewater treatment works. Thus, having more staff is a must in order to support improvements planned. Sub working units complement will affect the wastewater treatment working performance. Sub units meant are Socialisation/Human Relations, Service Complaints, Storage and Workshop, and Finance. These units then will be best managed directly under Wastewater Treatment Working Unit instead of under PDAM.	Complete tools and equipments and sufficient number of staff for smooth operation.	Conduct trainings and workshops for all staff, continuous education and training on sanitations conducted by Departemen Cipta Karya in Bekasi tighter recruits selections based on the skills Tools and equipment completion.
	Coordination amongst related offices	Wastewater unit does not coordinate well with related offices. Overlaps often happen, for example the road construction by Public Works Office often be tampered by wastewater treatment pipes installation.	Coordination amongst related offices exist so that harmonious program plannings and developments done.	The existence of PDPAL liaison officer to bridge it with Public Works office such as coordination meeting on digging plans monthly coordinated by Public Works office. Forming a Utility Office that coordinates and implement plannings.

TARGETED CITIES	STANDARD BEST PRACTICES	ASSESSMENTS RESULTS	POINT OF INTERVENTIONS AND IMPROVEMENT	PROPOSED SUPPORTS
	Organisational Structure	WWTP Margasari wastewater treatment unit does not add significant profits to PDAM Balikpapan. WWTP Surakarta, which is inside the PDAM organisation, is operationally and financially managed by PDAM Surakarta. WWTP Margasari, though also in PDAM Balikpapan organisational structure, is on the other hand as part of Balikpapan City Government activities. 5% of income from water taps is claimed to be retribution to be paid to PAD. The expenses spent is budgeted and granted by BUD. Instituional ambiguity also can be seen in WWTP Margasari operations. WWTP Margasari is not a Government-owned Local Company yet as a Technical Implementer Unit (UPT) under PDAM management as regulated on *Kepwali* no. 188 year 2005. Yet, the understanding of this UPT-WWTP is not as that of UPT as regulated on PP no. 41 year 2007 on Local Support Offices that defines UPT as a technical unit under an office (*dinas*) or bureau (*badan*). In reality, UPT- WWTP Margasari is managed by PDAM that is clearly not an office (*dinas*) or a bureau (*badan*).	Wastewater Treatment Unit is to deliver public services and to give profits to the company. Profesional working attitudes, satisfying customers, efficient peformances and piling up profits to cover production costs are highly needed for future house connections network development.	Socialisation programs thus there will be "Willingness to connect" increment Well-planned wastewater business planning. In order to be improved and to avoid institutional ambiguity and furthermore is on continuous grant, wastewater needs to be BLUD.

TARGETED CITIES	STANDARD BEST PRACTICES	ASSESSMENTS RESULTS	POINT OF INTERVENTIONS AND IMPROVEMENT	PROPOSED SUPPORTS
		High and continuous support from PEMDA *Kota* Balikpapan in giving grants to wastewater treatment unit is due to the fact that PEMDA has been receiving 5% retribution from watertaps profits. Community participation is not yet optimal as socialisation is hardly delivered. In addition to that, there has been no well-set business plannings.		
Surakarta City	Maintenance Operation	Operators' lack of knowledge and skills was due to the low number of trainings and workshops taken. Moreover, maintenance operational standards are not set-up that then leads to minimum knowledge on the daily routines they should peform.	Knowledge on equipments and tools thus effective and efficient works are performed.	Establish Standard Operational Procedure, conduct trainings and workshops for staff Conduct necessary courses and trainings to support fieldworks Enroll them in Diklat Sanitasi Cipta Karya di Bekasi, and if necessary send staff to higher level of education.

TARGETED CITIES	STANDARD BEST PRACTICES	ASSESSMENTS RESULTS	POINT OF INTERVENTIONS AND IMPROVEMENT	PROPOSED SUPPORTS
	Staff, tools and Equipments	Surakarta's laboratory is in not well equipped. Skilled staff is highly needed and as well other staff with specific skills in order to be positioned in Planning, Human Relations/Socialisation, Complaints Handling, Network Maintenance, Workshop/Storage units in order to be able to undergo necessary improvements. Challenges will still be faced should it still be under PDAM management.	Complete tools and equipments and sufficient number of staff for smooth operation.	Check list can be applied to operators and as well position staff in accordance to their education (the right man on the right place) Conduct trainings and workshops for all staff, continuous education and training on sanitations conducted by Departemen Cipta Karya in Bekasi tighter recruits selections based on the skills Tools and equipment completion.
	Coordination amongst related offices	Surakarta wastewater treatment unit does not coordinate with related offices. Workloads are often overlapped with other offices. For example, work constructions performed by Public Works Office were one on top of the manholes, or the damages made by Government Electric Provider (PLN) and Telecommunication Company on pipes installed earlier.	Coordination among related offices exist so that harmonious program plannings and developments done.	The existence of PDPAL liaison officer to bridge it with Public Works office Active coordination with Public Works, such as coordination meeting on digging plans monthly coordinated by Public Works office. Forming a Utility Office that coordinates and implement plannings.

TARGETED CITIES	STANDARD BEST PRACTICES	ASSESSMENTS RESULTS	POINT OF INTERVENTIONS AND IMPROVEMENT	PROPOSED SUPPORTS
	Organisational Structure	WWTP is in the PDAM organisational structure thus all policies made on liquid waste treatment are made by PDAM. All WWTP's improvement will be part of PDAM Strategic Planning and Policies. The policies made by PDAM have been concerning the water taps. There have been no WWTP improvement plannings. This means that WWTP is not considered being the "money maker" for PDAM. It is then hard to say that WWTP can be improved to be a public service provider for Surakarta wastewater treatment service provider. The wastewater treatment unit causes reduction to PDAM profits. The wastewater treatment unit causes reduction to PDAM profits. There is low commitment from the local government on one hand and zero community participation on the other hand. Another aspect to be looked at is that there is no wastewater treatment business planning.	Wastewater Treatment Unit is to deliver public services and to give profits to the company. Profesional working attitudes, satisfying customers, efficient peformances and piling up profits to cover production costs are highly needed for future house connections network development.	Increasing socialisation program. Wastewater business planning preparation and unit additions. The wastewater unit needs to be a BLUD in order to be free of becoming PDAM burden.

3.2.3 Financial Management of Sewerage Services

TARGETED CITIES	STANDARD BEST PRACTICES	ASSESSMENT RESULTS	POINTS OF INTERVENTIONS AND IMPROVEMENTS	PROPOSED SUPPORTS (for 3 cities)
BANJARMASIN	<u>REVENUE</u> 1. The congruence between the tariff and the advantage received by the consumers. 2. The increment of tariff 3. The tariff formulas 4. The level of market development or the subscribers per year 5. The level of willingness to connect <u>PERFORMANCE</u> A ratio of direct expenses to income A ratio indirect expenses to income	1. 25% of the drinking bills is not equivalent to the services given and consider to be unfair 2. Well running for PDAM customers but still trouble for non-PDAM 3. No formula that leads to unaccountability. 4. Slow and low 5. Low In2007, a ratio = 0.68. In 2008, a ratio = 1.07 In 2007, a ratio = 0.72. In 2008, a ratio = 0.94	1. Need formulating a reasonable tariff formula for for customer (PDAM and non-PDAM) 2. Speed up in getting more subscribers 3. Enhancing consumers appreciation to the wastewater treatment service Due to waste water treatment and indirect expenses are is high cost excess more than revenue, WWTP will make losses. WWTP financially is unhealthy and above all that need close relationship with local government in regards PDPAL sustainability	Increased capacity at tariff formulation in accordance with the rights and obligations of consumers and WWTP managers. The tariff formula should follow existing legislation, including provisions for subsidisation and sharing of authority with local governments as a necessity. The current service charge has no legal basis and rational calculation.

TARGETED CITIES	STANDARD BEST PRACTICES	ASSESSMENT RESULTS	POINTS OF INTERVENTIONS AND IMPROVEMENTS	PROPOSED SUPPORTS (for 3 cities)
	PROFIT (LOSS) Profit (Loss) Why profit (Loss) LOCAL GOV. Local government commitments to give grants and PMPD PLANNING People involvement Business Plan Respond for claims	In2007 losses Rp o.428 M. In 2008 losses Rp 1.02 M. Increasing of losses 140% High cost for operation and indirect expenses Strong commitment for PMPD and promising to give PMPD for 5 year later. But not for grants. Weak involvement Having a business plan Responsive enough	Need a commitment to give grants for specific needs for sewerage development. So that need to show how to plan grants for next period. Need enhancing a relation between PDPAL and customers and a relation development for new customers in planning participative , especially in case of housing connection network development Need socialisation of laws and regulations related sewerage system and rethinking whether to change PD to be BLU.	Increase in tariff collection rate, especially the method, strategy and manner of implementing these in order to increase the revenue base Increasing capacity of the board of trustees and local government officials in terms of developing mechanisms for WWTP investments either through local government capital participation (PMPD), regional grant, or capital expenditure to help the sustainability of WWTP in the future. Capacity building in business development, including content related to the development of relationships with customers and customer complaints servicing. Capacity improvement in accounting systems and capital development techniques Increased capacity in planning, especially the development of community participation in improving wastewater treatment services.

TARGETED CITIES	STANDARD BEST PRACTICES	ASSESSMENT RESULTS	POINTS OF INTERVENTIONS AND IMPROVEMENTS	PROPOSED SUPPORTS (for 3 cities)
BALIKPAPAN	LAWS AND REG.s Law 5/1962 on Local State Company Law 8/1999 on Costumer Protection Law 18/2009 on Local taxes and Levies Law 25/2008 on Public Services REVENUE 1.The congruence between the tariff and the advantage received by the consumers.	if losses continually, It violets of law Deviate article 4.b an 4.g that tariff is not conforming with services level. It doesn't conform with levy system Not yet stipulate a minimum standard services and people participation in planning, The tariff in average 5% of drinking bill is not only for wastewater, but also for drainage, and grey water. This means service charge, not public charge. This is inconsistent with local government regulation. For non-PDAM customers are being constrained	Focusing on waste water treatment and reasonable retribution To develop a model how to increase levy (retribution) collecting To develop a reasonable retribution tariff and non-discrimination. Need to develop a new WWTP. Enhancing of socialisation and funded by APBD	Increasing capacity at understanding the laws and regulations related to public service in the field of wastewater treatment, and the introduction of BLU as an option in wastewater treatment services delivery.

TARGETED CITIES	STANDARD BEST PRACTICES	ASSESSMENT RESULTS	POINTS OF INTERVENTIONS AND IMPROVEMENTS	PROPOSED SUPPORTS (for 3 cities)
	The increment of tariff	No clear formula		
	The tariff formulas	The amount of customers = 1.085 HC plus Indii's grant that will become out of capacity.		
	The level of market development or the subscribers per year	Being constrained and need more socialisation	BLU is an option to be considered to solve the problem of grant.	
	The level of willingness to connect	Not available, non-PD	Need enhancing a relation between WWTP and customers and planning participative approach in case of new network development	
	PERFORMANCE			
	A ratio of direct expenses to income	Not available, non-PD	Need socialisation of laws and regulations related sewerage system and rethinking whether to change PD to be BLU.	
	A ratio indirect expenses to income	Not available, non-PD	Need to recalculate the tariff to conform with operational cost and willingness to pay of customers.	
	PROFIT (LOSS)		To develop a method how to increase collection for non-PDAM.	
	Profit (Loss)	Not available, non-PD		

TARGETED CITIES	STANDARD BEST PRACTICES	ASSESSMENT RESULTS	POINTS OF INTERVENTIONS AND IMPROVEMENTS	PROPOSED SUPPORTS (for 3 cities)
SURAKARTA	Why profit (Loss)	Committed to give grants for operation cost. But this grants will violet to regulation that grant cannot be given many times	Evaluation of tariff and introduce a new concept of tariff. Preparation for a new investment of WWTP and marketing strategy for extension plan.-	
	LOCAL GOV. Local government commitments to give grants and PMPD	Weak involvement	Enhancing of socialisation that is funded by APBD	
	PLANNING People involvement Business Plan Respond for claims	No business plan, non-PD Responsive enough	Make efficiency	
	LAWS AND REG.s Law 5/1962 on Local State Company	-		

TARGETED CITIES	STANDARD BEST PRACTICES	ASSESSMENT RESULTS	POINTS OF INTERVENTIONS AND IMPROVEMENTS	PROPOSED SUPPORTS (for 3 cities)
	Law 8/1999 on Costumer Protection Law 18/2009 on Local taxes and Levies Law 25/2008 on Public Services <u>REVENUE</u> 1.The congruence between the tariff and the advantage received by the consumers. 2.The increment of tariff 3.The tariff formulas 4.The level of market development or the subscribers per year 5.The level of willingness to connect	Deviate article 4.b an 4.g that tariff is not conforming with services level. It doesn't conform with levy system Not yet stipulate a minimum standard services and people participation in planning, More reasonable tariff, but tariff is still low enough. It works, but for non-PDAM customers are being constrained. Unclear formula At last, the number of customers are 10.840 HC, but the increasing runs slow.	Need enhancing a relation between WWTP and customers and planning participative approach in case of new network development Need socialisation of laws and regulations related sewerage system and rethinking whether to change PD to be BLU.	

TARGETED CITIES	STANDARD BEST PRACTICES	ASSESSMENT RESULTS	POINTS OF INTERVENTIONS AND IMPROVEMENTS	PROPOSED SUPPORTS (for 3 cities)
	PERFORMANCE A ratio of direct expenses to income A ratio indirect expenses to income PROFIT (LOSS) Profit (Loss) Why profit (Loss) LOCAL GOV. Local government commitments to give grants and PMPD PLANNING People involvement Business Plan Respond for claims	Still being constrained and less consolidation. 0.36 in 2008 Not available, non-PD Not-available, Non-PD Not-available, non-PD Not available, non-PD Not so strong Yes for water, but not for waste water Responsive enough		

TARGETED CITIES	STANDARD BEST PRACTICES	ASSESSMENT RESULTS	POINTS OF INTERVENTIONS AND IMPROVEMENTS	PROPOSED SUPPORTS (for 3 cities)
	LAWS AND REG.s Law 5/1962 on Local State Company Law 8/1999 on Costumer Protection Law 18/2009 on Local taxes and Levies Law 25/2008 on Public Services	-Deviate article 4.b an 4.g that tariff is not conforming with services level. It doesn't conform with levy system Not yet stipulate a minimum standard services and people participation in planning,		

3.2.4 Construction Activities, Management and Supervision

TARGETED CITIES	STANDARD BEST PRACTICES	ASSESSMENT RESULTS	POINTS OF INTERVENTIONS AND IMPROVEMENTS	PROPOSED SUPPORTS (for 3 cities)
BANJARMASIN	Project Management and Administration	Leak of knowledge for Project Management and Project Administration	Understand of Project Management and Administration	Introduce in training the Project Management and Project Administration. How to control the project
	Quality Control Plan	Work just base on DED No working permit Leaks of reporting	The supervisor does not have any detail references. The knowledge for construction is very limited. Not enough equipment to works	Knowledge of construction; Drawing for Construction Approval Material Permit of work Reporting system Tools for use in quality
	Method of work	The contractor does not have any method of work at site. The supervise not understand which the important thing for method of work	Method of work related to the permit of work. Consider the safety of work	Improving the method of work related the condition of site. Improving the supervisor to understand the method and the impact.

TARGETED CITIES	STANDARD BEST PRACTICES	ASSESSMENT RESULTS	POINTS OF INTERVENTIONS AND IMPROVEMENTS	PROPOSED SUPPORTS (for 3 cities)
	Preparation, Logistic, Mobilisation and Demobilisation	Poor condition for preparation, logistic, mobilisation and demobilisation	No preparation for work. Shortage of material Changed of man-power	How to prepare the project. Supply chain refers to the logistic for material which not ready in local. Maintain the man-power.
	Tools and Equipment for Maintenance	Limited quantity of tools and equipment for maintenance. Limited Knowledge of pipes network and system	Limitation of Budget Special tools or equipment with the skill man.	Improving the tools and equipment for Maintenance. Improving the knowledge of system pipes networking
	Monitoring of effluent quality from each unit operation	Monitoring only on the final discharge	The unit operations do not have any sampling points. Limited sampling testing equipment	Introduction the proper monitoring methods. Assistance on identifying the sampling points on the existing unit operation.
BALIKPAPAN AND SURAKARTA	Project Management and Administration			Introduce in training the Project Administration. How to control the project
	Quality Control Plan			Introduce the right method for Quality control Plan

TARGETED CITIES	STANDARD BEST PRACTICES	ASSESSMENT RESULTS	POINTS OF INTERVENTIONS AND IMPROVEMENTS	PROPOSED SUPPORTS (for 3 cities)
	Method of work			Improving the method of work related the condition of site. Improving the supervisor to understand the method and the impact.
	Preparation, Logistic, Mobilisation and Demobilisation			Introducing how to prepare the project. Supply chain refers to the logistic for material which not ready in local. Maintain the man-power.
	Tools and Equipment for Maintenance	Limited quantity of tools and equipment for maintenance. Limited Knowledge of pipes network and system Limited manpower & Skill Man	Limitation of Budget Special tools or equipment with the skill man.	Improving the tools and equipment for Maintenance. Improving the knowledge of system pipes networking Workshop for how to use the tools and equipment
	Monitoring of effluent quality from each unit operation	Monitoring only on the final discharge	The unit operations do not have any sampling points. Limited sampling testing equipment	Introduction the proper monitoring methods. Assistance on identifying the sampling points on the existing unit operation.

3.2.5 Community Awareness and Public Campaign

TARGETED CITIES	STANDARD BEST PRACTICES	ASSESSMENT RESULTS	POINTS OF INTERVENTIONS AND IMPROVEMENTS	PROPOSED SUPPORTS (for 3 cities)
Banjarmasin	Having (i) Customers data-base system, (ii) Effective service mechanism and (iii) mechanism and procedure and strategy on handling complaints	Weak service mechanism and system	Establish : (i) Customers data-base system (ii) Customers service mechanism and system (iii) Procedure, mechanism and strategy in handling complaints	In Class Training, on the job (in and out class), facilitations
	Having socialisation programs and wastewater service product social marketing	Low capacity of the staff in planning socialisation programs and effective wastewater products marketing	Deciding socialisation and marketing program standards that will be the reference in delivering effective Community awareness raising program and campaign	In Class Training, on the job (in and out class), facilitations
	The staffs own capacity in communicating wastewater program to potential customers	Effective communication skill	Staff is trained on effective communication	In Class Training, on the job (in and out class), facilitations

TARGETED CITIES	STANDARD BEST PRACTICES	ASSESSMENT RESULTS	POINTS OF INTERVENTIONS AND IMPROVEMENTS	PROPOSED SUPPORTS (for 3 cities)
Balikpapan	Having (i) Customers data-base system, (ii) Effective service mechanism and (iii) mechanism and procedure and strategy on handling complaints	Low capacity in setting up effective service standards	Establish : (i) Customers data-base system (ii) Customers service mechanism and system (iii) Procedure, mechanism and strategy in handling complaints	In Class Training, on the job (in and out class), facilitations
	Having effective socialisation program and marketing on wastewater products services	Low capacity of the staff in planning socialisation programs and effective wastewater products marketing	Establishment of effective marketing programs and models and the implementation of effective campaign programs	In Class Training, on the job (in and out class), facilitations
Surakarta	Increment on customers service system and procedures.	Weak implementation on customers service system	Establishment of effective service procedure and operational standards.	In Class Training, on the job (in and out class), facilitations
	Increment on complaints handling strategy and system	Ineffective problems handling	Improved system and performance in handling complaints through appropriate mechanism.	On the job training and facilitations
	Having programs for social marketing on wastewater service products:	Low capacity of the staff in setting up effective social marketing on wastewater product services	Effective social marketing Community awareness raising programs and campaign implementations.	In Class Training, on the job (in and out class), facilitations

3.3 STAKEHOLDERS ANALYSIS

Stakeholders involved in wastewater treatment in Surakarta, Banjarmasin and Balikpapan are:

3.3.1 Sewerage Operator

Surakarta :

- Wastewater treatment is done by PDAM
- Plannings and development are done by PDAM
- Management expenses are financed by PDAM.
- Operational on wastewater is managed by PDAM
- PDAM director is to answer to Mayor

Banjarmasin :

- Wastewater treatmen is done by PDPAL
- Plannings and development are done by PDPAL
- Management expenses are financed by PDPAL
- PDPAL director is to answer to Mayor

Balikpapan :

- Wastewater treatment is done by PDAM
- Plannings and development are done by PDAM
- Management expenses are financed by PDAM
- PDAM director is to answer to Mayor

3.3.2 Local Government Project Implementation Agency

There are a number of related offices dealing with wastewater treatment in each city, namely Public Works Office (DPU) Cipta Karya/Sanitation sub Office, Health Office, Education and Culture Office, BPLHD/BPLH.

The responsibilities of each of the above-mentioned offices are:

a. Public Works Office (DPU) Cipta Karya/Sanitation sub Office
    - Responsible technically for wastewater treatment system
    - Responsible for technicall supervisings

b. Health Office
   - Responsible for community's health
   - Responsible for any contagious disease related to the impacts of pollution

c. Education Office
   - Responsible for educating the community and as well raising the community awareness on health, yet concerning only with students at schools.
   - Responsible for teaching health to students at schools.

d. BPLHD / BPLH
   - Responsable for delivering information on rules and local government regulations on environment to community and local government offices.
   - Responsable for monitoring the local environment

e. Bappeda
   - Responsible for sanitation constructions planning (specifically on wastewater)
   - Responsible for monitoring and evaluating the sanitation construction works being implemented.

Followings are those who are responsible in executing wastewater infrastructure works:

i. PDPAL, as an operator, is responsible for:
   - Managing them professionaly, effectively, efficiently and moreover having them profitable.

ii. Local contractors, as implementers, are responsible for:
   - Constructing them as agreed standards and technical guidances
   - Delivering the field works as regulated operational procedures
   - Delivering the works, done by experts, professionally and being able to technically accountable and reliable.

iii. Supervising consultants are responsible for:
   - Monitoring the works as standardised operational procedures
   - Delivering quality results as on the technical standards and directions
   - Assigning monitoring experts

The most influential and the main actors out of those above-mentioned offices are:

i. Sewerage Operators, wastewater treatment unit of PDPAL/PDAM that plays as the main actor in planning, implementing, operating and financially managing the wastewater treatment matters.

ii. Local Government Project Implementation Agency, specifically Public Works Office that plays the roles as manager, technical assistant and monitoring office.

iii. Local Goverment Taskforce (a working group that consists of Bappeda and related offices, scholars and non-government organisations), that is influential on the implementation in terms of criticising, giving advices, in order to have better wastewater treatment service provisión.

iv. Local contractors and Supervising consultants that are responsable in delivering quality Works as agreed directions and technical standards.

The involvement of those stakeholders in capacity building is expected to bring results as follow:

- Raised awareness of the community on health and hygiene thus interests to have house connections are increased.
- Improved wastewater treatment infrastructure works thus it will lead to better system and in the end to give more profits.

CHAPTER 4: IMPLEMENTATION OF CAPACITY BUILDING ACTIVITIES

The implementation of capacity building activites and skill for the wastewater unit of PDAM Surakarta, wastewater unit of PDAM Balikpapan, and PD-PAL Banjarmasin, which formed in workshop or training activities, SOP production, and forming FOPIP.

4.1 TRAINING ACTIVITIES

4.1.1 Operational Aspect

Balikpapan

The training activities in Balikpapan was held on 26 – 27 May 2011. Training implementation conducted in class room then proceed with practice on the field.

Subject matter includes :

a. The concept of biological domestic waste water treatment using activated sludge.
b. The concept of waste water distribution.

Training results :

A strong commitment from employees is required in carrying out operational activities of Waste Water Treatment Plant (WWTP) and sewage network. Especially for Margasari WWTP, where the number of employees only 4 people, their commitment is good enough, simply add the number of human resources up to a sufficient level and improve their skills and also added their operational support equipment to expected a better management WWTP performance.

Banjarmasin

The training activities in Banjarmasin was held on 13 – 14 May 2011. Training implementation conducted in class room then proceed with practice on the field.

Subject matter includes :

a. Introduction to the principles of domestic wastewater management
b. Management of Waste Water Treatment Plant (WWTP)
c. Operation and maintenance system of Rotating Biological Contactor (RBC)
d. Routine maintenance schedule procedurs for wastewater networks

e. The Method of infiltration and actual pump capacity measurement.

Training results :

1. WWTP operators are recommended to regularly participate in training and on the job training.
2. Additional personnel required for equipment maintenance technician (mechanical&electrical engineers).
3. More concise and understandable Standard Operating Procedure (SOP) are required for operating WWTP and wastewater networks.
4. Further assistance is needed for the preparation of operational monitoring book/log sheet.
5. Collection of dservice areas ata-base are required for the accuracy of infiltration rate calculation.

Surakarta

The training activities in Surakarta was held on 1 – 4 April 2011. Training implementation conducted in class room then proceed with practice on the field.

Subject matter includes :

a. Introduction to the principles of domestic wastewater management
b. Management of Waste Water Treatment Plant (WWTP)
c. Operation and maintenace system of biofilter sistem (Semanggi WWTP)
d. Operation and maintenance system of pound system (Mojosongo WWTP)
e. Operation and maintenance of wastewater networks

Training results :

1. Management and WWTP operators are recommended to regularly participate in training and on the job training.
2. Equipment maintenance technician are required (mechanical and technical engineers).
3. More concise and understandable Standard Operating Procedure (SOP) are required for operating WWTP, wastewater networks, laboratory analysis equipment.
4. Basis calculation of WWTP operation parameters and assistance for preparation of operational monitoring book/log sheets are required.

4.1.2 Construction Aspect

Balikpapan

The training activities in Balikpapan was held on 26 April 2011. Training implementation conducted in class room then proceed with practice on the field.

Subject matter includes :

1. Introduction of project organisation
2. Introduction of project management
3. Introduction of existing project contract types
4. Introduction of project work order from an early stage, pre-feasibility study up to the stage of commisioning/handover project in general.
5. Description of the project work starts from selecting the type of pipes, the way to procurement of pipes, safe way to implement the pipeline excavation, pipe placement ways, pipe connecting ways, and re-backfill the pipe, including the following tests that must be done before the pipeline project was handed over.
6. Introduction of materials on quality system.

Training results :

Although not directly involved in project implementation, Margasari WWTP should start looking and preparing technical staff to learn about construction system and supervision, so in the future when Margasari WWTP were directly involved with the project, Margasari WWTP has had tough person or team in project management and supervision.

Banjarmasin

The training activities in Banjarmasin was held on 7-8 June 2011. Training implementation conducted in class room then proceed with practice on the field.

Subject matter includes :

1. Introduction of construction project organisation.
2. Introduction of project management.
3. Introduction of exsisting project contract types and also the advantage and disadvantage on each type of contract.
4. Introduction of project work order from an early stage, pre-feasibility study up to the stage of commisioning/handover project in general.
5. Description of the project work starts from selecting the type of pipes, the way to procurement of pipes, safe way to implement the pipeline excavation, pipe

placement ways, pipe connecting ways, and re-backfill the pipe, including the following tests that must be done before the pipeline project was handed over.

6. Introduction of materials on quality system.

Training results :

Give contractors more technical assistance and training on the network, and also provide knowledge about issues related to project management.

Surakarta

The training activities in Surakarta were held on 28-30 April 2011. Training implementation conducted in class room then proceeded with practice on the field.

Subject matter included:

1. Introduction of construction project organisation.
2. Introduction of project management.
3. Introduction of exsisting project contract types and also the advantage and disadvantage on each type of contract.
4. Introduction of project work order from an early stage, pre-feasibility study up to the stage of commisioning/handover project in general.
5. Description of the project work starts from selecting the type of pipes, the way to procurement of pipes, safe way to implement the pipeline excavation, pipe placement ways, pipe connecting ways, and re-backfill the pipe, including the following tests that must be done before the pipeline project was handed over.
6. Introduction of materials on quality system.

Training results:

Although not directly involved in project implementation, Semanggi WWTP should start looking and preparing technical staff to learn about construction system and supervision, so in the future when Semanggi WWTP were directly involved with the project, Semanggi WWTP has had tough person or team in project management and supervision.

4.1.3 Financial Aspect

Balikpapan

The training activities in Balikpapan was held on 27 April 2011. Training implementation conducted in class room then proceed with practice on the field.

Subject matter includes :

1. Increased revenues through increased number of customers, tariff structures, billing collection system and pursuit of other revenue, and
2. Expenses efficiency include : operational costs, general costs, and financial costs; and
3. Strategy, especially marketing and institutional strategy.

Training results :

Based on Focus Group Discussion (FGD) post-training that to strengthening the relations of marketing and customer relations is needed. In addition, in order no to burden the taps and the WWTP could be more independent, the opportunity to secede from the taps and become BLU-D is an option. Balikpapans' local government – through Bappeda, seems enthusiastic to make WWTP as BLU-D.

Banjarmasin

The training activities in Banjarmasin were held on 3 May 2011. Training implementations conducted in class room then proceeded with practice on the field.

Subject matter includes:

1. Increased revenues through increased number of customers, tariff structures, billing collection system and pursuit of other revenue, and
2. Expenses efficiency include : operational costs, general costs, and financial costs; and
3. Strategy, especially marketing and institutional strategy.

Training results:

The need for strengthening the marketing and customer relations. The strengthening is formed by designation of Marketing and Cusomer Relations to echelon 1 equal to Technical Director and General/Financial Director.

Surakarta

The training activities in Surakarta were held on 29 April 2011. Training implementation conducted in class room then proceed with practice on the field.

Subject matter includes:

1. Increased revenues through increased number of customers, tariff structures, billing collection system and pursuit of other revenue, and

2. Expenses efficiency include : operational costs, general costs, and financial costs; and
3. Strategy, especially marketing and institutional strategy.

Training results:

Based on Focus Group Discussion (FGD) post-training that to strengthening the relations of marketing and customer relations is needed. In addition, in order no to burden the taps and the WWTP could be more independent, the opportunity to secede from the taps and become BLU-D is an option. Balikpapans' local government – through Bappeda, seems enthusiastic to make WWTP as BLU-D.

4.1.4 Institutional Aspect

Balikpapan

The training activities in Balikpapan were held on 26 April 2011. Training implementation conducted in class room then proceeded with practice on the field.

Subject matter includes:

1. Legal and institutional framework of wastewater processor
2. Institutional development of public service – WWTP

Training results:

Recommendation from simultaneous discussion that WWTP remains BLU-D with transition.

Banjarmasin

The training activities in Banjarmasin were held on 3 May 2011. Training implementation conducted in class room then proceeded with practice on the field.

Subject matter includes:

1. Asset management
2. Institutional development of public services – PDPAL

Training results:

1. Asset Management Unit needs to be developed
2. Promotion for marketing and customer relations into directorates.
3. Need to make a potential customers mapping.

4. Marketing strategy formulated accurately.
5. Necessary to find an affective model of billing for non-PDAM customers.

Surakarta

The training activities in Surakarta were held on 29 April 2011. Training implementation conducted in class room then proceeded with practice on the field.

Subject matter includes:

Two of these materials related to the position of WWTP Surakarta which is still a part of PDAM Surakarta. This position causes the WWTP management not optimal.

1. Legal and institutional framework. This material is motivated by the development of wastewater construction and legal aspects which out of sync. As a result, wastewater is perceived as a part of drinking water. Yet from the service aspect, wastewater is different from dringking water. Then, some of the new lae began to give the firmness of this wastewater activities. If so, there should be an institutional reform of WWTP according to the existing legal developments.
2. Institutional development of public services – WWTP. This material is motivated by the diversity of WWTPs' institutional status and in its development does not corresponden with the activities of WWTP. In this study, besides the institutional strategy for WWTP, also granted an institutional options in accordance with the characteristics of the WWTP, among others, the optimal form is the BLU-D.

Training results:

Recommendation from simultaneous discussion that WWTP remains as part of PDAM, but by strengthening the marketing and customer relations, or become BLU-D with transition.

4.1.5 Community Development Aspect

Balikpapan

The training activities in Balikpapan were held on 26-28 May 2011. Training implementation conducted in class room.

Training results:

Still urgently needed assistance and on-the-job training to maximise the results of the allocation of a "capacity building" development program, especially for :

- Preparation of strategies and mechanisms for effective service.
- Handling complain mechanism.

- Preparation and implementation of social marketing programs through public campaign.

Banjarmasin

The training activities in Banjarmasin were held on 11-13 June 2011. Training implementation conducted in class room.

Training results:

1. Provide the opportunity for participants who have received training to continue to process the appropriate skills and sharpen the skills possessed.
2. Still urgently needed assistance and on-the-job training to maximise the results of the allocation of a "capacity building" development program, especially for :
    - Preparation of strategies and mechanisms for effective service.
    - Handling complain mechanism.
    - Preparation and implementation of social marketing programs through public campaign.

Surakarta

The training activities in Surakarta were held on 1 - 4 April 2011. Training implementation conducted in class room.

Training results:

Still urgently needed assistance and on-the-job training to maximise the results of the allocation of a "capacity building" development program, especially for :

- Preparation of strategies and mechanisms for effective service
- Handling complain mechanism
- Creating a billing method
- Preparation and implementation of social marketing programs through public campaign

4.2 SOP PRODUCTION

This procedure describes the preparation, operation, and supervision of wastewater treatment that done through the treatment process performed by PDPAL. Through this procedure be attempted to achieve conformity of production quality and continuity of services that impact on customers' satisfaction.

For more details, Standard Operating Procedure of every activity of the three cities can be seen separately in books SOP Balikpapan, Banjarmasin, and Surakarta.

4.3 FORMING FOPIP

FOPIP is a program or a plan for the performance of an institution in a spesified period of time in terms of financial and operational aspect. FOPIP for PDPAL aims to improve the quality of financial and operational performance of PDPAL by setting standards performance and establishing a work program. Assessment indicators of FOPIP performance for the development of wastewater management system in Banjarmasin is adopted from Internal Affairs Ministry Decree No. 47 year 1999 on Guidelines for Performance Assessment of PDAM *(Keputusan Menteri Dalam Negeri No. 47 tahun 1999 tentang Pedoman Penilaian Kinerja Perusahaan Daerah Air Minum)*.

For more details, operational and financial strategies of the three cities can be seen separately in books FOPIP Balikpapan, Banjarmasin, and Surakarta.

4.4 RESULTS OF ACTIVITIES REPORT

All the results of activities or implementation of capacity building expertise and skills or capacity building of PDPAL/PDAM presented in the reports of activities as below.

Work Results	The resulting product	Language Version
Preliminary report	- Preliminary Report	- Bahasa & English
Capacity review and identification of areas requiring support.	- Capacity review and identification of areas requiring support report for : - Balikpapan - Banjarmasin - Surakarta	 - Bahasa & English - Bahasa & English - Bahasa & English
Training implementation.	- Training implementation report for : - Balikpapan - Banjarmasin - Surakarta	 - Bahasa & English - Bahasa & English - Bahasa & English

Work Results	The resulting product	Language Version
Capacity assessment local contractor and training implementation	- Capacity assessment local contractor and training implementation report for : - Banjarmasin	- Bahasa & English
Standard Operational Procedure, O&M, monitoring and reporting.	- Standard Operational Procedure, O&M, monitoring and reporting report for : - Balikpapan - Banjarmasin - Surakarta	- Bahasa & English - Bahasa & English - Bahasa & English
FOPIP	- FOPIP report for : - Balikpapan - Banjarmasin - Surakarta	- Bahasa & English - Bahasa & English - Bahasa & English
Institutional review of local government sanitation services and long term capacity development plan.	- Institutional review of local government sanitation services and long term capacity development plan report for : - Balikpapan - Banjarmasin - Surakarta	- Bahasa & English - Bahasa & English - Bahasa & English
IndIIs' monitoring and evaluation report	- IndIIs' monthly report of monitoring and evaluation for 3 cities	- Bahasa & English
Comparative Study	- Comparative study report	- Bahasa & English
Document of RFP-EPC for Vacuum Sewer System	- Report of RFP-EPC document for Vacuum Sewer System for Banjarmasin City	- English
Final report	- Final report for 3 cities	- Bahasa & English

CHAPTER 5: SUMMARY AND RECOMMENDATION

5.1 SUMMARY

Summaries are drawn base don the project implementation in Banjarmasin:

1. Technical skills of the PDAM/PD-PAL haven't met the required standard.
2. Less thorough knowledge of the PDAM/PD-PAL on project management that leads to poor field project management.
3. Designs were lack of details that lead to difficulties in project implementation (this becomes the responsibilities of the designer)
4. No Indonesia National Standard on the type of pipe used for wastewater system, thus PDAM/PD-PAL do not have reference on the type of pipe used on a project.
5. Work safety as an important factor has been disregarded.

From the early identification, it was found out that PDAM/PD-PAL were highly cooperative and willing to know more on project technical and management matters thus better quality construction works are obtained in the future.

Steps to be taken to overcome the above mentioned issues are as follow:

1. Ensuring that other party as well understand project technical and management and in addition to that documents and drawings to be given to the PDAM/PD-PAL is realistic and applicable without any significant difficulties. Thus, PDAM/PD-PAL staff capacity building is also important.
2. Technical and management capacity building of the PDAM/PD-PAL as needed.
3. Explaining work safety and risks faced whould there be any accidents.
4. Informing the impacts of structural failures together with the examples to broaden the PDAM/PD-PAL's point of views in performing their works.

5.2 RECOMMENDATIONS

Six months is considered to be short for PDAM/PD-PAL to learn and to be assessed. Thus, recommendations for future action plans are as follow:

1. Ensuring that other party understand project technical and management matters thus documents and drawings given to the PDAM/PD-PAL are applicable and realistic (PDAM/PD-PAL staff capacity building).
2. Regular training on project technical and management
3. Facilitating PDAM/PD-PAL by the consultant as part of the capacity building effort from beginning until end of the project on project technical and management matters

4. Workshop on Work Safety

It is expected that these recommendations can be points of attention for satisfactory and better planning, works quality, budgets allocation, and zero accidents in the future PDAM/PD-PAL projects.

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