

Islamic Republic of Pakistan

Ex-Post Evaluation of Japanese Grant Aid Project

“Project for the Retrieval of Sewage and Drainage System in Lahore”

Mr. Koichiro Ishimori, Value Frontier Co., Ltd

## 1 . Project Description



Project Location



Heap of Wastes on the Drain

### 1.1 Background

In Lahore, the second largest city in Pakistan, the carrying capacity of sewage and drainage system was significantly deteriorating due to large quantities of sludge and wastes and the pumping capacity of the pumping stations at the end of the sewage and drainage system was also low. Consequently, downpours frequently happening during the monsoon season caused inundations in every corner of the city and negatively affected the hygienic environment as well as socio-economic activities there.

### 1.2 Project Outline

The objective of the project is to improve the carrying capacity of sewage and drainage system by procuring equipment and vehicles required to retrieve sludge and wastes in the north of Lahore.

Grant Limit/Actual Grant Amount	1,222 million Yen/1,030 million Yen
Exchange of Notes Date	February 2005
Implementing Agency	Water and Sanitation Agency (WASA)
Project Completion date	February 2006
Main Contractors	(1)(3): Ebara Corporation (Japan), (2) Tomen Corporation (Japan)
Consultant	CTI Engineering Corporation (Japan)
Basic Design	Basic Design Study on the Project for Retrieval of Sewerage and Drainage System in Lahore July 2004 to December 2004

Related Projects	JICA “Project for Improving the Capacity of WASAs in Punjab Province”
------------------	---

## 2. Outline of the Evaluation Study

### 2.1 External Evaluator

Mr. Koichiro Ishimori, Value Frontier Co., Ltd

### 2.2 Duration of the Evaluation Study

Duration of the Study: November, 2009 – September, 2010

Duration of the Field Study: 26 February, 2010 – 16 March, 2010

17 May, 2010 – 25 May, 2010

### 2.3 Constraints during the Evaluation Study

Equipment and vehicles required to retrieve sludge and wastes that have been procured by the project are operated at 4 districts<sup>1</sup> (approximately 50 km<sup>2</sup>) in the north of Lahore, and the study has been able to check their operation status through the database run by WASA. Due to limitations on the budget and time available for the study, they study has been unable to check it through field visits to all the districts.

## 3. Results of the Evaluation (Overall Rating: A)

### 3.1 Relevance (Rating: a)

#### 3.1.1 Relevance with the Development Policies/Plans of Pakistan

The Ten Year Perspective Development Plan (2001-2010) at the time of the basic design aimed by 2010 to improve the carrying capacity of 4,088 km of sewage and drainage system that was causing significant human and economic damages due to its low capacity under one of its priorities, water resources development.

The Integrated Master Plan for Lahore 2021 (2002) highlighted development and improvement of urban infrastructures necessitated by the rapid expansion of the city of Lahore and put a high priority on development of pumping stations, procurement of equipment and vehicles required to retrieve sludge and wastes, and others.

The Ten Year Plan and the Master Plan are still valid at the time of the ex-post evaluation study.

#### 3.1.2 Relevance with the Development Needs of Pakistan

A downpour in August 1996, before the project, caused inundations in every corner of the city and deprived it of its commercial and traffic functions. After all it resulted in demolition of 3,000 houses, loss of 32 lives, and evacuation of tens of thousands of

<sup>1</sup> A district, B district, G district, and H1 district.

people. Therefore, the project that has procured equipment and vehicles and provided technical assistance required to retrieve sludge and wastes in order to improve the carrying capacity of sewage and drainage system met the development needs at that time. In light of the above, the needs of the project were judged to be high.

Now after the project, inundations in the city are eased. However, downpours in the recent years which bring unexpected volume of rainfalls are becoming a new threat. Therefore, the project that has procured such equipment and vehicles and provides related technical assistance still meets the development needs today. In light of the above, the needs of the project are judged to be high.

### 3.1.3 Relevance with Japan’s ODA Policies

At the time of basic design, the Charter on ODA (2003) highlighted the importance of water and sanitation from the perspective of human securities, and the previous Mid-term Policy on ODA also prioritized development of economic and social infrastructures supporting the economic growth under one of its priorities, support for economic and social infrastructures.

Besides, the project is judged to be relevant in that it took the form of a grant aid assistance considering its purpose of securing human securities.

In sum, this project has been highly relevant with the country’s development policies/plans, the development needs, as well as the Japan’s ODA policies, therefore, its relevance is high.

## 3.2 Efficiency (Rating: b)

### 3.2.1 Project Outputs

The planned and actual outputs of the project are described in Table 1, including notes and reasons in case of a difference between the two.

Table 1: Outputs

Plan (Basic Design)	Actual (Ex-post Evaluation)	Notes
(1) Procurement of equipment and vehicles required to retrieve sewers: <ul style="list-style-type: none"> <li>• Jetting machine (4 units)</li> <li>• Sludge sucker (4 units)</li> <li>• Water Tanker (2 units)</li> <li>• Dump Truck 4t (4 units)</li> <li>• Submersible sludge pump(4 units)</li> <li>• Generator (4 units)</li> </ul>	As planned	Submersible sludge pumps (4 units) were procured for pumping waste water out of sewers. Since it is possible to do so without them, however, they are used for another purpose <sup>2</sup> . As a result, they are not meeting the original expectation, and thus there

<sup>2</sup> 2 units are used for pumping waste water of Nawaz Sharif Colony Lift Station into a drain, and the other 2 units are used for pumping waste water inside of Shad Bagh Pumping Station into a drain.

		remains a doubt if they have been appropriate and efficient inputs.
(2) Procurement of equipment and vehicles required to retrieve drains: <ul style="list-style-type: none"> <li>• Clam shell (2 units)</li> <li>• Excavator 0.28 m<sup>3</sup> (2 units)</li> <li>• Excavator 0.8 m<sup>3</sup> (1 unit)</li> <li>• Dump Truck 8t (20 units)</li> </ul>	As planned	—
(3) Procurement of equipment for monitoring and clean up of pumping stations: <ul style="list-style-type: none"> <li>• Pick up truck (4 units)</li> <li>• Wheel Loader (2 units)</li> </ul>	As planned	—
(4) Procurement of pumps and trash raking machine: <ul style="list-style-type: none"> <li>• Pump 2.2 m<sup>3</sup>/second (3 units)</li> <li>• Other pump-related equipment (1 set)</li> <li>• Trash raking machine (1 unit)</li> </ul>	As planned	—
(5) Technical assistance to executive engineers and sub-divisional officers: <ul style="list-style-type: none"> <li>• 5 months</li> </ul>	As planned	Technical assistance to executive engineers and sub-divisional officers was appropriate inputs to improve the effectiveness and sustainability of the project.

Source: Water and Sanitation Agency (WASA)

### 3.2.2 Project Inputs

#### 3.2.2.1 Project Period

The project period planned for the basic design was about 9 months, but the actual project period was 13 months from March 2005 (tender opening) to March 2006. However, the 4 months of delay was due to delay in productions of pumps by makers and thus out of control for JICA.

#### 3.2.2.2 Project Cost

The project cost for the basic design was 1,220 million yen. However, the actual project cost was 1,030 million yen and thus lower than planned.

In sum, the project period was slightly longer than planned, but the project cost was lower than planned, therefore, the efficiency of the project is fair.

### 3.3 Effectiveness (Rating: a)

#### 3.3.1 Quantitative Effects

Table 2: Operation Indicators

Indicators (unit)	2004 status quo	2009 target	2006	2007	2008	2009
Waste retrieved from sewage (m <sup>3</sup> ) (Upper: accumulation, Lower: annual achievement)	—	26,000	11,300	34,585	64,910	108,335
Waste retrieved from drainage (m <sup>3</sup> ) (Upper: accumulation, Lower: annual achievement)	—	40,000	172,985	402,885	614,739	963,995
Pumping capacity (m <sup>3</sup> /second)	22.4	29.0	29.0	29.0	29.0	29.0

Source: Water and Sanitation Agency (WASA)

The accumulated volume of waste retrieved from sewage<sup>3</sup> in 2007, one year after completion of the project, became 34,585 m<sup>3</sup> and already exceeded the 2009 target, 26,000 m<sup>3</sup>, due to introduction of such equipment and vehicles as sludge suckers by the project.

The accumulated volume of waste retrieved from drainage<sup>4</sup> in 2007 became 402,885 m<sup>3</sup> and already exceeded the 2009 target, 400,000 m<sup>3</sup>.

The pumping capacity<sup>5</sup> has since 2006 been achieving the 2009 target, 29.0 m<sup>3</sup> per second.

Sludge sucker



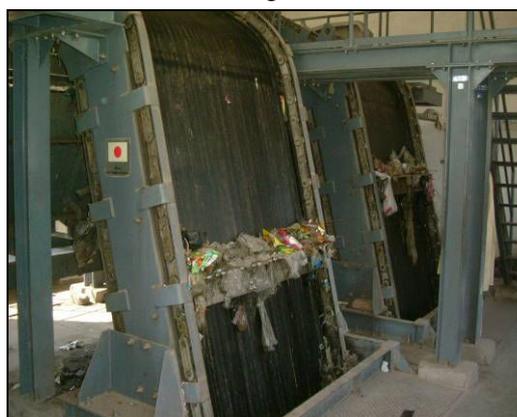
Clam shell and Dump truck (8t)



Pumps



Trash raking machine



<sup>3</sup> = (The weight of loaded dump truck – the weight of dump truck) x the number of dump truck used.

<sup>4</sup> It was calculated in the same way as the footnote 3.

<sup>5</sup> It was calculated by adding the pumping capacity of the existing pumps in operation (20 units) at the pumping stations which the project targeted to that of the newly installed pumps (6 units).

### 3.3.2 Qualitative Effects

Table 3: Number of claims related to sewages and drainages

Indicator (unit)	2004	2006	2007	2008	2009
Claims from people in the benefited areas (case)	32,540	27,014	25,115	22,917	19,980

Source: Water and Sanitation Agency (WASA)

Although the number of people living in the benefited areas increased from 1.4 million in 2004 to 1.52 million in 2009, the number of claims from them has been decreasing during the same period. The ratio of the number of claims divided by the number of beneficiaries has dropped from 2.3% to 1.3%. Therefore, one can observe the improvement on sewage and drainage conditions.

According to the beneficiary survey<sup>6</sup> that was conducted towards 100 households who lived near the project sites during the ex-post evaluation study, 66 households out of 100 acknowledged that it was the Japanese Government that had implemented the project, and 53 households of the 66 households were satisfied with the project.

In sum, this project has largely achieved its objectives, therefore, its effectiveness is high.

## 3.4 Impact

### 3.4.1 Intended Impacts

Table 4: Indicators related to the Living and Hygienic Environment

Indicator (unit)	2002	2006	2007	2008	2009
Submerged hours (hour)	10	8	3	4	1
Submerged depths (cm)	40	42	15	45	15
Patients with typhoid in Lahore (case per 10,000 people)	2.2	1.9	1.4	1.5	1.6
Staff died inside of drains during cleaning (case)	—	0	0	0	0

Source: Water and Sanitation Agency (WASA) and Health Department (HD)

The project was intended to reduce submerged hours by half in 2009 in comparison to the 2002 figure. In case of 32mm of rainfalls in 2002, it was intended to reduce them from 10 hours in 2002 to 5 hours in 2009. All the figures from 2006 to 2009 were taken at the same monitoring point as 2002<sup>7</sup> when the volume of rainfalls in respective years was closest to 32 mm (i.e. 56mm in 2006, 32mm in 2007, 62mm in 2008, and 49mm in 2009). Despite the fact that the volume of rainfalls from 2006 to 2009 was either equal to or greater than the volume in 2002, submerged hours have been less than 10 hours in 2002

<sup>6</sup> The beneficiary survey was implemented at the 4 districts and 25 households were randomly chosen, respectively.

<sup>7</sup> Bhatti Chowk, G District.

and since 2007 less than 5 hours, the 2009 target.

The project was similarly intended to reduce submerged depths by half in 2009 in comparison to the 2002 figure. In case of 32mm in 2002, it was intended to reduce them from 40 cm in 2002 to 20 cm in 2009. The figures in 2006 and 2008 were taken at the same monitoring point as 2002 after 56mm and 62mm of rainfalls and consequently submerged depths reached 42cm and 45cm, respectively. On the other hand, despite the fact that the volume of rainfalls in 2007 and 2009 were 32mm and 49 mm, respectively, submerged depths in those years were both 15cm and lower than 20cm, the 2009 target.

Patients with typhoid in Lahore moderately and significantly decreased in 2006 and 2007 in comparison to 2002, but they have been slightly increasing of recent.

Staff died inside of drains during cleaning has been nil from 2006 to 2009 and consequently it has been meeting the 2009 target.

According to the beneficiary survey mentioned above, 47 households out of 100 answered that the streets had been submerged for 2 days or even longer once it heavily rains before the project, but zero household answered so now after the project. In addition, 56 households out of 100 answered that someone of their family members had been affected by water-borne diseases at least once a year before the project, but only 35 households answered so now after the project.

In sum, both the statistical data from Water and Sanitation Agency (WASA) and Health Department (HD) and the results from the beneficiary survey indicate that the project has contributed to improving the living and hygienic environment of the areas benefitted by the project.

### 3.4.2 Other Impacts

#### 3.4.2.1 Impacts on the Natural Environment

The pumps at the end of the sewage and drainage system that have been procured by the project are now a contributing factor of worsening the water quality of River Ravi because they drain waste water from the system into River Ravi without any treatment. Regarding the water quality measured on May 22<sup>nd</sup>, 2009 at the monitoring point<sup>8</sup> where waste water from the project areas gathers, pH was 7.57 and BOD was 51mg/l. Both of them meet the Pakistani standard (pH: 6 - 10, BOD: less than 80 mg/l), but BOD does not meet the lowest level of Japanese standard (less than 10 mg/l) where people do not feel uncomfortable in daily lives, while pH meets the Japanese standard as well (pH: 6 – 8.5).

---

<sup>8</sup> R4.

### 3.4.2.2 Impacts on Resettlement and Land Acquisition

There has been no observation on such impacts.

### 3.4.2.3 Impacts on Others

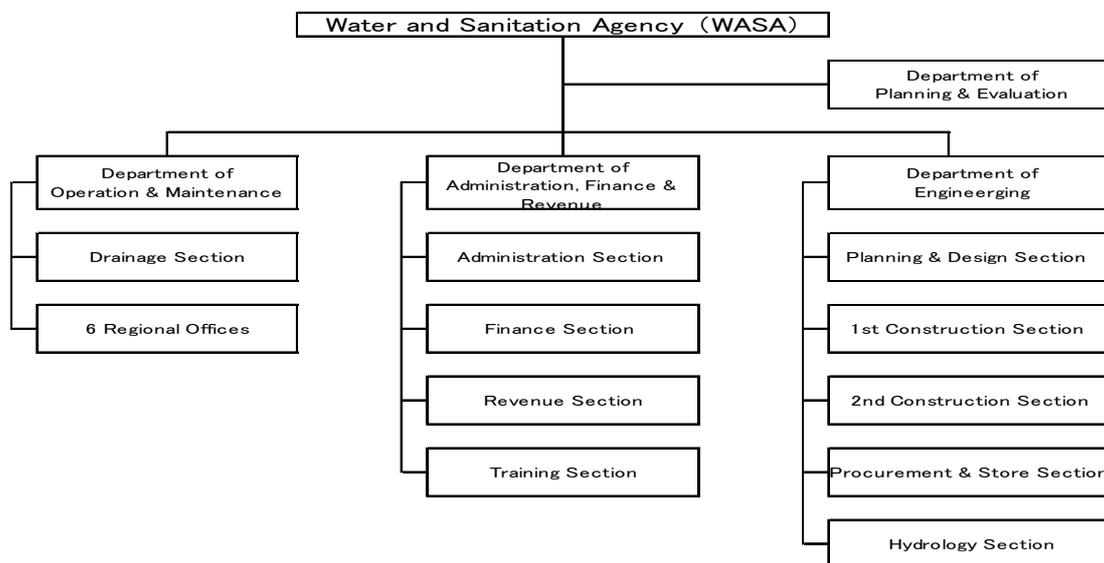
According to the beneficiary survey, 95 households out of 100 answered that they had had difficulties in accessing offices and schools due to submergences before the project, but only 21 households out of 100 answered so now after the project.

In sum, the project has had a minor negative impact on the natural environment, but has had positive impacts on the living and hygienic environment of the areas benefitted by the project.

## 3.5 Sustainability (Rating: a)

### 3.5.1 Structural Aspects of Operation and Maintenance

Structure of operation and maintenance is same as planned at the time of the basic design. The procured equipment and vehicles are operated by 221 full-time staff at drainage section under department of operation and maintenance of Water and Sanitation Agency (WASA). WASA regularly has two working shifts (8AM to 4PM and 10PM to 4AM) for retrieval of wastes, but it also has flexibility to have three shifts (6AM to 2PM, 2PM to 10PM, and 10PM to 6AM) during the monsoon season and heavy rain.



Source: Water and Sanitation Agency (WASA)

Chart 1: Organizational Diagram of WASA

### 3.5.2 Technical Aspects of Operation and Maintenance

The educational level of the staff at drainage section under department of operation and

maintenance ranges from a junior high school diploma to a post graduate degree, but they have been operating and maintaining all the procured equipment and vehicles with no problem. Out of 2 executive engineers and 4 sub-divisional officers who have received trainings during the project, only 2 sub-divisional officers remain at WASA. However, the knowledge on planning of cleaning sewers and drains and on managing overall cleaning activities has been transferred through on-the-job trainings to other staff. Besides, Japan International Cooperation Agency (JICA) has another plan to implement a technical cooperation project<sup>9</sup> in order to improve technical capability of the training center of WASA. Staff at drainage section have been receiving numerous trainings<sup>10</sup> at the center and trying to improve their technical capability. Therefore, there seems to be no technical problem with them.

### 3.5.3 Financial Aspects of Operation and Maintenance

The balances from 2006 to 2008, which were available at the time of the ex-post evaluation study, were all negative. Each year, however, Punjab Government compensates WASA for all debts based on the Act<sup>11</sup>. It also puts a high priority on the Integrated Master Plan for Lahore 2021 (2002) and plans to continuously support WASA. Therefore, there seems to be no major financial problem with WASA.

### 3.5.4 Current Status of Operation and Maintenance

By and large, the procured equipment and vehicles are well operated and maintained. However, 4 submersible pumps are used for another purpose, as mentioned earlier. Also, 1 clam shell is currently out of order and not in service, but it is going to be fixed soon with the budget secured.

In sum, no major problems have been observed in the operation and maintenance system, therefore, sustainability of the project is high.

## 4. Conclusions, Recommendations, and Lessons Learned

### 4.1 Conclusions

The relevance, efficiency, effectiveness, impacts, and sustainability of the project are all high.

In light of the above, this project is evaluated to be highly satisfactory (A).

---

<sup>9</sup> JICA has a plan to implement “Project for Improving the Capacity of WASAs in Punjab Province” for 3 years and tries to further improve sustainability of the project.

<sup>10</sup> Trainings vary from cleaning of wastes inside of sewers and drains to maintenance of pumps.

<sup>11</sup> Lahore Development Authority Act 1975 (Clause 4 under Chapter 27)

## **4.2 Recommendations**

### **4.2.1 To WASA**

Debts owned by WASA are guaranteed by the Act. However, it is recommended that WASA should improve its financial situations. Every year since 2004, WASA has been asking Punjab Government to give WASA a permission to increase water tariff, but Punjab Government has not given it to WASA. Since it is still unclear when Punjab Government will give it to WASA, it is not expected that WASA will improve its financial situations through an increase of water tariff. Rather, WASA should make efforts to reduce over 40 % of unaccounted for water rate by further cracking down on water thefts, executing installations of meters and collections of water tariff, and fixing pipes that leak, and by doing so it is expected that WASA will improve its financial situations<sup>12</sup>.

### **4.2.2 To JICA**

Since the water quality of River Ravi has been becoming an issue in Lahore these days, it is important to properly treat waste water from the sewage and drainage system before discharging it into River Ravi. Therefore, it is expected that JICA should take measures not to deteriorate the water quality of River Ravi in the future, such as construction of waste treatment plants.

## **4.3 Lessons Learned**

When JICA supports a similar activity that intends to retrieve wastes from sewerage and drainage system at another country in the future, it should pay due attention to possible negative environmental impacts on locations where waste water is discharged and, in case of any necessity, support treatment of waste water.

---

<sup>12</sup> JICA has been dispatching an expert who develops indicators to check management of WASA and monitors them to WASA in order to improve its financial situations.

### Comments from the Third Party Evaluator

#### 1. Comments on the project

As one of the most populous countries of the world, Pakistan is still struggling with water and sanitation issues. Most of the population in urban centres as well as rural settings still does not have adequate safe water and sanitation facilities. The project provided an important initiative to pilot various components in one of the most important and the second largest cities of Pakistan – Lahore. The project was significant in terms of not only delivering its specific targets as specified in the project document, but also mainstreaming the issue for its replication. The project was also significant as it reached out to various stakeholders and targeted beneficiaries. And this was indeed very well appreciated by the counterparts in Government as well as the beneficiaries and stakeholders. The successful delivery of the project has generated sufficient interest in the government and in interested stakeholders to build upon this project and replicate its learning elsewhere and to systematically strengthen WASA and other affiliated institutions.

#### 2. Comments on the way the evaluation is done

The work undertaken is of high quality, reflecting due diligence and a very professional eye for detail. The findings are based on review of documents, interviews with key decision makers, as well as survey of a selected sample of intended beneficiaries. The report reflects fairness and accuracy. The research findings succinctly capture the state of affairs in areas of i) relevance, ii) efficiency, iii) effectiveness, iv) impact, and v) sustainability. I have no hesitation in endorsing the overall rating and specific rating in the above-mentioned areas as well as the overall and broader recommendations.

Mr. Ali Sheikh, Chief Executive Officer,  
LEAD Pakistan, Pakistan