

**THE ISLAMIC REPUBLIC OF PAKISTAN  
WATER AND SANITATION AGENCY, MULTAN**

**PREPARATORY SURVEY  
FOR  
THE PROJECT FOR UPGRADING OF  
MECHANICAL SYSTEM FOR SEWERAGE  
AND DRAINAGE SERVICES IN MULTAN  
IN  
THE ISLAMIC REPUBLIC OF PAKISTAN**

**FINAL REPORT**

**FEBRUARY 2022**

**JAPAN INTERNATIONAL COOPERATION AGENCY**

**JAPAN TECHNO CO., LTD.  
NJS CO., LTD.  
NIHON SUIDO CONSULTANTS CO., LTD.**

GE
CR (1)
22-019



## **PREFACE**

Japan International Cooperation Agency (JICA) decided to conduct the preparatory survey for the Project for Upgrading of Mechanical System for Sewerage and Drainage Services in Multan in the Islamic Republic of Pakistan and entrust the survey to the Consortium consisting of Japan Techno Co., Ltd., NJS Co., Ltd. and Nihon Suido Consultants Co., Ltd.

The survey team held a series of discussions with the officials concerned of the Government of the Islamic Republic of Pakistan and conducted a field investigation. As a result of further studies in Japan, the present report was finalized.

I hope that this report will contribute to the promotion of the project and to the enhancement of friendly relations between our two countries.

Finally, I wish to express my sincere appreciation to the officials concerned of the Government of the Islamic Republic of Pakistan for their close cooperation extended to the survey team.

February 2022

Eiji Iwasaki  
Director General,  
Global Environment Department  
Japan International Cooperation Agency





## **SUMMARY**



# Summary

## 1. Country Overview

The Islamic Republic of Pakistan (hereinafter referred to as "Pakistan") is located in South West Asia, facing India to the east, Iran and Afghanistan to the west, and the Arabian Sea to the south, with a land area of 796,000 km<sup>2</sup> (about twice the size of Japan). With Islamabad as its capital, the country consists of the provinces of Punjab where Multan is located, Sindh, Balochistan, and Khyber Pakhtunkhwa, and Northern Areas. The total population of the country is 220 million (annual population growth rate: 2.0%) (UNFPA State of World Population 2020), of which rural population accounts for 2/3.

The country has the warm temperate climate with dry winter, steppe climate and desert climate, with hot summers and cold winters in the north and centre, and a relatively mild maritime climate in the south. Annual rainfall ranges from 250 mm to 1,250 mm, with rainfall concentrated in the monsoon season.

Real GDP is about 314,500 million USD (World Bank, 2018), with agriculture and textiles being the main industries.

## 2. Background and Outline of the Project

The urban area of Multan is the centre of southern Punjab with a population of 2.06 million (as per census 2017). Most of the sewerage systems in Multan have been constructed since the 1970s and about 48 % of the existing sewerage pipes are older than 30 years. The increase in sewage flow due to the increase in population and the reduction in flow capacity due to the accumulation of mud, sand and rubbish in the sewerage system has resulted in the constant flooding of roads in the city centre due to sewage overflows in several places, blocking roads with sewage and causing sanitation problems. In terms of sewage, the National Sanitation Policy (2006) and the Punjab Urban Water Supply and Sanitation Policy (2007) have been implemented for the development of sewerage facilities at the national and provincial levels, respectively. It is a challenge to solve the above problems in the sewage sector in Multan.

In this context, the "Data Collection Survey on Water Supply and Sewerage Sector of Pakistan (2019-2021)" was carried out by Japan International Cooperation Agency (hereinafter referred to as "JICA") prior to this preparatory survey on the sewerage and drainage sector in Multan, and this was the background to the planning of the "Project for Upgrading of Mechanical System for Sewerage and Drainage Services in Multan" (hereinafter referred to as "the Project"). The Project will address the above development issues by improving sewerage services in the region and contributing to the improvement of sanitation through the provision and upgrading of cleaning equipment, dewatering pumps and other equipment required for the maintenance of sewerage pipes and drains.

### 3. Outline of the Survey Results and Contents of the Project

As a preparatory survey for this project, a remote field survey was started from July 1st, 2021 (in response to the impact of the COVID-19 pandemic that spread worldwide from 2020), and a survey team was dispatched to Pakistan from August 20th to September 18th to discuss the details of the request with the local government officials, including those of the Water and Sanitation Agency, Multan (hereinafter referred to as “WASA-M”), which is the implementing agency of the project, and to conduct a field survey. As a result, the details and quantities of equipment required based on the local conditions have been studied, and procurement of the equipment shown in the following table has been discussed and agreed upon with the government.

List of planned equipment

Equipment name	Summary of specifications	Objective	Quantity	Remarks
1) Equipment for cleaning sewage pipes				
i Jetting Machine	Tank capacity <sup>3</sup> over 4 m Discharge rate over 200 Lit/min Operating pressure approx. 20 MPa	Sewage pipeline cleaning	18	No change from the request
ii Suction Machine	Tank capacity <sup>3</sup> over 4 m Max. suction pressure - around 96 kPa Max. suction air flow approx. 20 m/min <sup>3</sup>	Sewage pipeline cleaning	18	No change from the request
iii Pipe Cleaning machine	Van Type Small Vehicle Mounted Type	Sewage pipeline cleaning	9	Change from towing to self-propelled vehicle
2) Equipment for pipe survey and diagnosis				
i TV Camera	Insert type	Investigation into the cause of sewer blockages	3	No change
ii TV Camera	Telescopic type	Checking the condition after the cleaning work is completed	9	No change
iii Water Stop Plug	Suitable for internal diameters 8"-36".	Sewage pipe stoppage	36	Pneumatic
3) Equipment for cleaning drains				
i Small Backhoe	Small size wheel type Bucket 0.2to 0.3m <sup>3</sup>	Sludge and sediment removal	3	Change to a smaller size following a site survey

Equipment name	Summary of specifications	Objective	Quantity	Remarks
ii Clamshell	16t truck crane with clam bucket approx. 0.3m <sup>3</sup>	Sludge and sediment removal	2	No change from the request, but based on the results of the survey, the specification of the mother plane was changed to a crane.
iii Dump Truck	2 t capacity class	Sludge and sediment transport	5	Change from request 4t4 cars
iv Wheel Loader	Bucket 0.2to 0.3m <sup>3</sup>	Loading of rubbish and other materials removed from sewage drains and sewage pipes	3	Change from the forklift truck at the time of request
<b>4) Drainage equipment</b>				
i Dewatering Pump set	Self-priming 4-5cfs: 12 2-4cfs: 30 -1 cfs: 10	Drainage in case of overflow, water replacement during sewer cleaning and pipe replacement	52	Set from 52 the requested 26 set as it is essential when cleaning sewage pipes
<b>5) Transport vehicles</b>				
i Truck Crane	Rough terrain crane 16 t lifting	Heavy equipment transfer	1	Reduction in the number of requesting 2 tables to 1 table
ii Cargo Truck with crane	4t loading, 2.9t lifting	Transport of equipment and materials	1	Substitution of truck cranes, taking into account the purpose for which they are used
iii Pickup Truck	Double cabin	Transport of cleaning materials and equipment Staff mobility	5	No change

In addition to the procurement of the above equipment, consultancy services for the detailed design and supervision of the procurement, as well as for the soft components to facilitate more effective use of the equipment will be provided.

#### **4. Implementation Schedule of the Project and estimated project cost**

The project will be implemented through the grant assistance of the Government of Japan by signing a Grant Agreement (hereinafter referred to as "G/A") after the signing of an Exchange of Notes (E/N) between the Government of Japan and the Government of Pakistan. The implementation of the project is expected to take approximately five (5) months from the signing of the E/N to the completion of the detailed design, including bidding, and approximately fourteen (14) months for the manufacturing and procurement of and soft component on the equipment.

The cost of the project borne by the Pakistan side is estimated at 65 million yen.

## 5. Project Evaluation

The relevance and effectiveness of the implementation of this project are as follows

### (1) Relevance

The project will benefit the general public, including the poor, and approximately 2.06 million people in the urban area of Multan will benefit directly or indirectly from the project.

This project, which aims to eradicate the unsanitary conditions caused by sewage overflows, will make a significant contribution to the stability of people's livelihood and the improvement of their lives. In addition, the urgency of this project is very high because it aims to improve the situation where sewage overflows occur on a daily basis in urban areas and citizens continuously complain about them.

The project is in line with national and provincial policies aiming at the development of sanitation facilities, and the improvement of the maintenance capacity of the sewerage system is an essential part of these policies, as it will ensure the sustainability of the sewerage system in the future.

### (2) Effectiveness

The quantitative indicators of the effects are shown in the following table.

Reference and target values for quantitative effects

Indicator	Baseline value (2021)	Target value (2027)
Distance of removal of sediments in sewage pipes (km)	4.1 km/year	approx. 230 km/year
Dewatering pump set emergency drainage capacity	140 m <sup>3</sup> /min	392 m <sup>3</sup> /min

The qualitative effects are as follows

- Reduced risk of waterborne diseases as a result of reduced flooding and flooding damage
- The economic and social activities of citizens, which had been hampered by flooded roads and urban areas, will be invigorated
- Improving sanitation in the city by reducing waste dumping and chronic flooding
- Increased public satisfaction with sewerage services.

# Contents

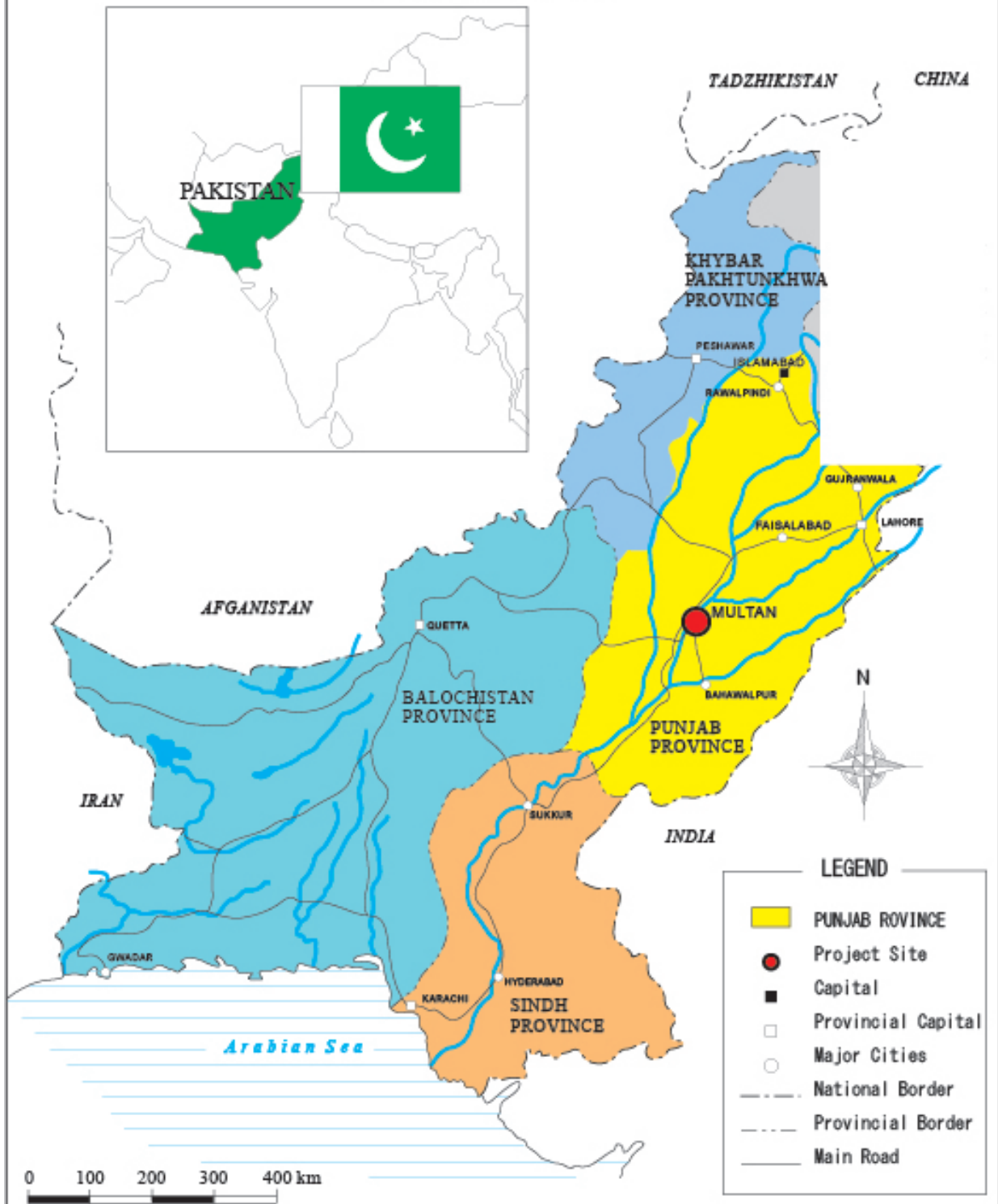
Preface	
Summary	
Contents	
Location Map	
List of Figures and Tables	
Abbreviations	
CHAPTER 1	BACKGROUND OF THE PROJECT..... 1-1
1-1	Background of the Project ..... 1-1
1-2	Outline of the Request ..... 1-4
1-3	Positioning of the Project..... 1-5
CHAPTER 2	CONTENTS OF THE PROJECT ..... 2-1
2-1	Basic Concept of the Project..... 2-1
2-1-1	Overall goals and project objectives ..... 2-1
2-1-2	Project overview ..... 2-1
2-2	Outline Design of the Japanese Assistance ..... 2-1
2-2-1	Design Policy ..... 2-1
2-2-1-1	Basic Policy ..... 2-1
2-2-1-2	Equipment Quantity Policy ..... 2-3
2-2-1-3	Policy for Natural Environmental Conditions ..... 2-3
2-2-1-4	Policy on Procurement Situation Policy ..... 2-3
2-2-1-5	Policy for Operation and Maintenance ..... 2-4
2-2-1-6	Policy Regarding the Establishment of Equipment Grades ..... 2-4
2-2-1-7	Policy on Relevant Laws, Regulations and Licensing Systems ..... 2-4
2-2-2	Basic Plan (Equipment Plan) ..... 2-4
2-2-3	Procurement Plan ..... 2-15
2-2-3-1	Procurement Policy ..... 2-15
2-2-3-2	Points to Note in Procurement ..... 2-16
2-2-3-3	Scope of Work ..... 2-16
2-2-3-4	Consultant Supervision ..... 2-17
2-2-3-5	Quality Control Plan ..... 2-20
2-2-3-6	Operational Guidance Plan. .... 2-20
2-2-3-7	Soft Component Plan ..... 2-21
2-2-3-8	Implementation Schedule..... 2-22
2-3	Security Plan..... 2-22
2-4	Obligations of Recipient Country ..... 2-23
2-4-1	Measures Required of Pakistan ..... 2-23
2-4-2	Scope of Work of the Pakistan Side ..... 2-23
2-4-2-1	Tax exemption ..... 2-23
2-4-2-2	Construction by the Pakistan side ..... 2-24
2-4-2-3	Acceptance of soft components ..... 2-24
2-5	Project Operation Plan ..... 2-24
2-5-1	Basic Concept of WASA-M in Management Planning ..... 2-24

2-5-2	Organization and Operation and Maintenance Plan of WASA-M .....	2-25
2-6	Project Cost Estimation .....	2-28
2-6-1	Initial Cost Estimation .....	2-28
2-6-1-1	Cost Borne by Pakistan .....	2-28
2-6-1-2	Estimation Conditions.....	2-28
2-6-2	Operation and Maintenance Cost.....	2-28
2-6-2-1	Estimation Conditions.....	2-28
2-6-2-2	Estimation of Operation and Maintenance Costs.....	2-30
<b>CHAPTER 3 PROJECT EVALUATION.....</b>		<b>3-1</b>
3-1	Preconditions .....	3-1
3-2	Necessary Inputs by Recipient Country.....	3-1
3-3	Important Assumptions .....	3-2
3-4	Project Evaluation.....	3-2
3-4-1	Relevance.....	3-2
3-4-1-1	Project beneficiaries.....	3-3
3-4-1-2	Project purpose and human security .....	3-3
3-4-1-3	Achieve the goals of the country's medium- and long-term development plans.....	3-3
3-4-1-4	Consistency with Japan's assistance policy.....	3-3
3-4-2	Effectiveness .....	3-4
3-4-2-1	Quantitative effects .....	3-4
3-4-2-2	Qualitative effects .....	3-5
 <b>【APPENDICES】</b>		
1.	Member List of the Study Team .....	A1-1
2.	Study Schedule .....	A2-1
3.	List of Parties Concerned in the Recipient Country .....	A3-1
4.	Minutes of Discussions .....	
(1)	Minutes of Discussions (First Survey) .....	A4-1
(2)	Minutes of Discussions (Second Survey) .....	A4-27
5.	Soft Component Plan .....	A5-1
6.	Other Relevant Data .....	
(1)	Technical Data of the existing Disposal Stations, WASA-M .....	A6(1)-1
(2)	Project Monitoring Report .....	A6(2)-1



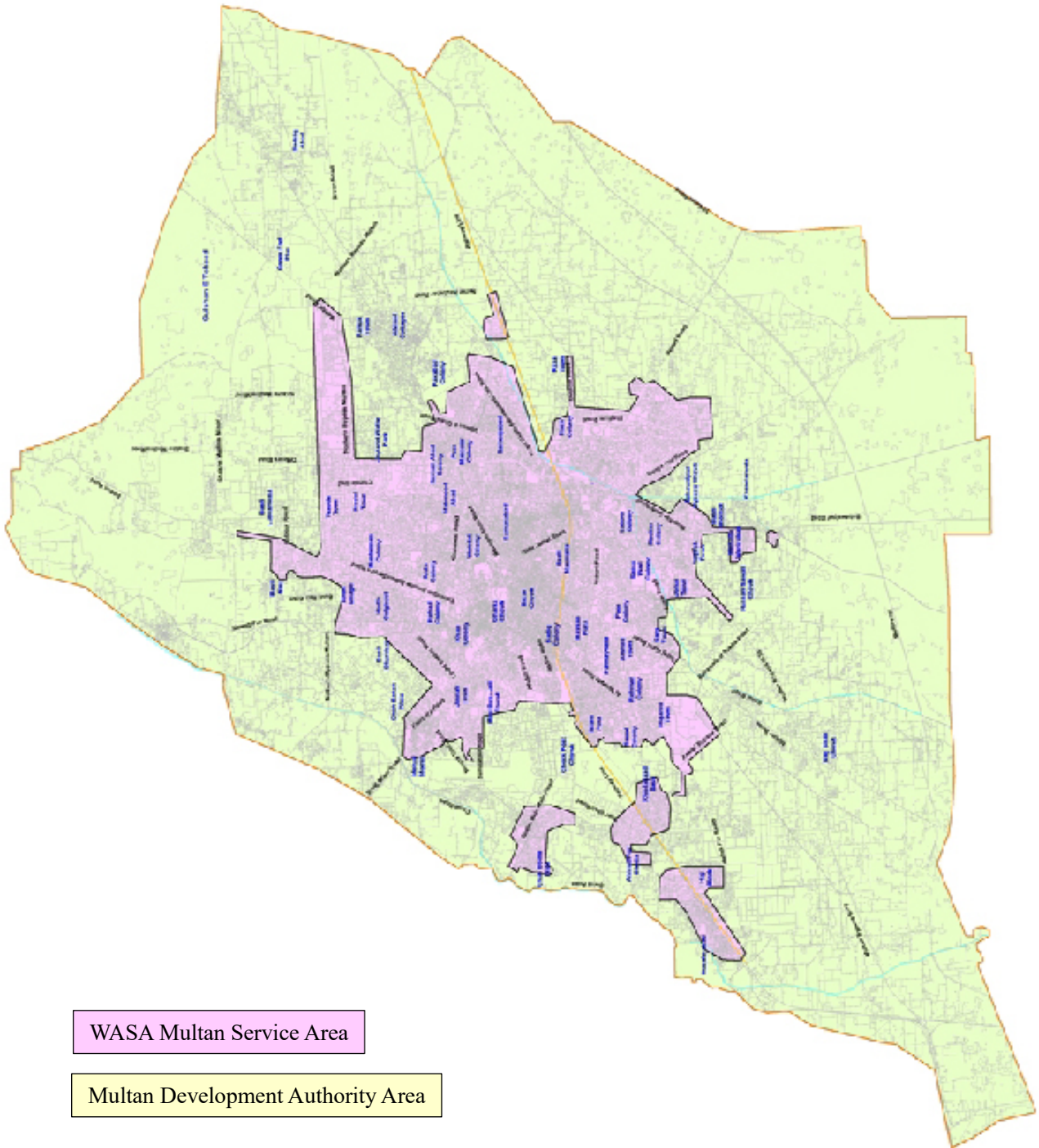
ISLAMIC REPUBLIC OF PAKISTAN  
THE PROJECT FOR UPGRADING OF MECHANICAL SYSTEM  
FOR SEWERAGE AND DRAINAGE SERVICES  
IN MULTAN

LOCATION MAP



Location Map





WASA Multan Service Area

Multan Development Authority Area

Source: WASA-M

**WASA Multan Service Area**



## List of Figures and Tables

### Figures

Figure 2-1 Use of Waterstop Plugs .....	2-10
Figure 2-2 Organizational Chart of the Sewerage Division .....	2-25
Figure 2-3 Disposal Station Division.....	2-26

### Tables

Table 1-1 WASA-M Sewer Line Extension (cumulative).....	1-3
Table 1-2 Requested Equipment List .....	1-4
Table 2-1 List of Planned Equipment .....	2-5
Table 2-2 Complaint Handling Records by Each SD from Mar. 2019 to Apr. 2021 .....	2-8
Table 2-3 Layout and Responsibilities of Equipment for Drain Cleaning .....	2-12
Table 2-4 Existing Dewatering Pump Sets at WASA-M.....	2-13
Table 2-5 Dewatering Pump Set Deployment Plan.....	2-14
Table 2-6 Procurement Plan.....	2-15
Table 2-7 Scope of Work.....	2-17
Table 2-8 Staffing Plan for Detailed Design .....	2-17
Table 2-9 Staffing Plan for Procurement Supervision .....	2-18
Table 2-10 Staffing Plan for Procurement Management.....	2-19
Table 2-11 Procurement Implementation Schedule .....	2-22
Table 2-12 WASA-M's Plan to Assign Jurisdiction over the Provided Equipment Personnel to Operation and Management of the Provided Equipment .....	2-26
Table 2-13 Breakdown of Pakistan's Share of Costs.....	2-28
Table 2-14 Procurement Planning Policy.....	2-28
Table 2-15 Workforce Requirements and labor Costs (increase).....	2-29
Table 2-16 Operation and Maintenance Costs .....	2-30
Table 2-17 Projected Annual Expenditure for WASA-M.....	2-30
Table 3-1 Baseline and Target Values for Quantitative Effects.....	3-4

## Abbreviations

AB	Acquiring Body
AD	Assistant Director
ADB	Asian Development Bank
ADP	Annual Development Programme
BPS	Basic Pay Scale
cusec	Cubic Feet per Second
DEO	District Environmental Officer
DD	Deputy Director
DIP	Ductile Iron Pipe
DMD	Deputy Managing Director
DN	Diameter Nominal
DG	Director General
D/S	Disposal Station
DS	Disposal Station Division
EIA	Environmental Impact Assessment
E/N	Exchange of Notes
EPA	Environment Protection Agency
G/A	Grant Agreement
GDP	Growth Domestic Product
GIP	Ductile Iron Pipe
GTS	Government Transport Service
HDPE	High Density Polyethylene
HUD&PHED	Housing, Urban Development and Public Health Engineering Department
HWL	High Water Level
IEE	Initial Environmental Examination
IUCN	International Union for Conservation of Nature and Natural Resources
JICA	Japan International Cooperation Agency
JPY	Japanese Yen
kW	Kilo Watt
kWh	Kilo Watt Hour
LAA	Land Acquisition Act
L/S	Lift Station
LWL	Low Water Level
m <sup>3</sup> /day	Cubic Meter per Day
m <sup>3</sup> /hr	Cubic Meter per Hour
m <sup>3</sup> /min	Cubic Meter per Minute
m <sup>3</sup> /sec	Cubic Meter per Second
MC	Municipal Corporation
M/D	Minutes of Discussion
MD	Managing Director
MDA	Multan Development Authority
MEPCO	Multan Electric Power Company
MGD	Million Gallon per Day
M/M	Man Month
M/P	Master Plan
MWMC	Multan Waste Management Company
NEQS	National Environmental Quality Standards:
NEQSAA	National Environmental Quality Standards for Ambient Air
NGO	Non-Governmental Organization
NOC	No Objection Certificate
NRP	Pakistan National Resettlement Policy

O&M	Operation and Maintenance
OHR	Overhead Reservoir
OP	Operational Policies
PC-1	Planning Commission Form -1
P&D	Planning & Development Board
PE	Polyethylene Pipe
PEPA	Pakistan Environmental Protection Act
PEPC	Pakistan Environmental Protection Council
PEQS	Punjab Environmental Quality Standards
PHA	Parks & Horticulture Authority
PIU	Project Implementation Unit
PKR	Pakistan Rupee
PQ	Pre-qualification
PVC	Polyvinyl Chloride
RAP	Re-allocation Program
R&R	Revenue and Recovery
RB	Requiring Body
RHC	Rural Health Center
SD	Sewerage Division
SS	Suspend Solid
STP	Sewage Treatment Plant
TDS	Total Dissolved Solid
TEPA	Transport Engineering Planning Agency
TOR	Terms of Reference
UC	Union Council
UPS	Uninterruptible Power Supply
V	Volt
WASA	Water and Sanitation Agency
WASA-M	Water and Sanitation Agency, Multan
WASH	Water, Sanitation and Hygiene
WHO	World Health Organization
WWF	World Wildlife Fund





# **CHAPTER 1**

## **BACKGROUND OF THE PROJECT**



# Chapter 1 Background of the Project

## 1-1 Background of the Project

### (1) Overview and challenges of sewage and drainage systems in Multan

Most of the sewerage facilities in Multan were constructed after the 1970s, and about 48% (about 1,000 km) of the existing sewerage pipes (about 2,100 km) are more than 30 years old. As a result, the sewage flow rate has increased with the increase in population and the flow capacity has decreased due to the accumulation of mud, sand and garbage, which have resulted in the constant flooding of roads in the city centre due to sewage overflow in several places, blocking roads with sewage and causing sanitation problems. On the other hand, most of the equipment and dewatering pumps owned by the Water and Sanitation Agency, Multan (hereinafter referred to as “WASA-M”) for cleaning sewerage pipes and drains are old and obsolete. Although WASA-M has been providing sewerage services by repeatedly repairing this equipment and relocating reusable equipment to places where it is highly needed, WASA-M has not been able to sufficiently respond to citizens' requests to eliminate sewage flooding.

Regarding the sewerage and drainage sector in Multan, the "Data Collection Survey on Water Supply and Sewerage Sector of Pakistan (2019-2021)" was conducted by Japan International Cooperation Agency (hereinafter referred to as “JICA”) prior to the preparatory survey for this project, which provided the background for the formation of this project in Multan and the request to Japan for its implementation.

A summary of the sewage and drainage systems in Multan identified at the time of the above survey is as follows:

- The generated sewage is discharged into the sewerage pipes. Part of it is discharged from the Disposal Stations (hereinafter referred to as “D/Ss”) to the Sewage Treatment Plant (hereinafter referred to as “STP”) through the Sullage Carrier and treated sewage is discharged into a river. The rest of the sewage is discharged from the D/Ss into irrigation canals or farmland.
- Some areas in the city center do not have sewerage pipes, and sewage and rainwater are discharged into open roadside ditches, creating a poor environment due to the accumulation of garbage. These roadside ditches end in sewers and the sewers end in the D/Ss.
- Rainwater is discharged into storm drains if a road has one. However, these drains end up in sewers (Some seem to be drained into irrigation canals). These sewers also end in the D/Ss.
- If there are no storm drains on the street, storm water is discharged into the sanitary sewers. These sewers also end in D/Ss.

- As described above, the majority of sewage and rainwater flows into the D/S.

The following problems have also been identified as arising from the current state of the sewage and drainage systems described above:

- There is sewage flooding during clear weather conditions throughout the city due to breakage, inadequate capacity and inadequate maintenance of sewage pipes.
- Sewage other than that discharged into the sewage drains that flows into the newly constructed STP is discharged from the D/Ss into irrigation canals/farmland (no trunk drains have been constructed in Multan that connect D/Ss to rivers like Lahore and Faisalabad).
- As there are no trunk storm water drainage channels leading to rivers, rainwater is discharged from roadside drains into sewage pipes. In addition, roadside ditches and other drainage channels end in sewage pipes and the sewage pipes have insufficient capacity to handle the volume of rainwater and are poorly managed. Furthermore, their capacity is reduced due to the accumulation of sediment and debris, resulting in the flooding of sewage and rainwater.
- Many pumps have failed at D/Ss.
- There are D/Ss that are experiencing overflows due to insufficient pump capacity during rain events.

## (2) Conditions related to blockage of sewage pipelines

In areas of Multan where overflows and flooding occur frequently, one cannot see sewage pipes in most manholes due to the accumulation of sediments, debris and/or sewage. Therefore, much of the sewer network is considered to have reduced flow capacity due to sediment and debris accumulation. As a result, overflow and flooding can easily occur. The main reason for this is that when the sewage pipes are cleaned, the work is done only for the purpose of improving the passage of sewage, and when the overflow water recedes into the manhole, the work is ended without removing the sediment. This is not a unique situation in Multan, but a common phenomenon in WASA's in Punjab.

As a result, overflows and other problems due to blockages recur easily, and the Sewerage Divisions (hereinafter referred to as "SD"), the department in charge of cleaning the sewage pipelines, are forced to respond to complaints. The removal of solid waste in the pipelines is limited to the removal of waste deposited through manholes at night when the water level in the sewage pipes drops. In order to solve this situation fundamentally, it is necessary to completely remove the sediment in the sewage pipes by cleaning the pipes, and if there is a condition that needs to be repaired such as damage by inspecting the pipes after cleaning, it is necessary to formulate a rehabilitation plan. However, the jetting machine currently used by WASA-M is old and the pump pressure is low, so it cannot be used for removing the sediment in the pipe. Therefore, it is hoped that the provision of equipment in this project will be an opportunity to review the pipe cleaning method and improve it to ensure that the sediment is always completely removed.

The above situation regarding the cleaning and blockage of the pipeline is mainly for the relatively small diameter branch line sewage pipes. On the other hand, as for the dredging of the relatively large diameter trunk line sewage pipes, it was found in this field survey that the dredging is carried out by entrusting work to a construction company which has a venting machine (a simple machine which moves buckets fixed to wires back and forth in the pipeline between manholes and raises the collected sludge from the manholes for dredging). Since the venting machine was not mentioned in the request for the provision of equipment this time, the dredging of the trunk line is to be entrusted to an outside contractor and is not included in the scope of the Project.

### (3) Condition of other sewer lines

The ADB-supported Master Planning of Water Supply, Sewerage and Drainage System of WASA Multan (hereinafter referred to as “M/P”) prepared by ADB in 2017 noted that the slow flow velocity in the sewage pipes due to the flat terrain of Multan and pipe blockage with debris and sludge had resulted in the sedimentation of debris and sludge in the pipes, which was thought to lead to the generation of hydrogen sulfide and that the damage to the top of the sewage pipes had caused by hydrogen sulfide and/or aging of the pipes. In this regard, during the current field survey, several sites were observed where trunk sewerage pipes with damaged tops were being renewed, and it was confirmed that the renewal was being carried out as a project funded by the Annual Development Programme (hereinafter referred to as “ADP”) under the jurisdiction of the Government of Punjab.

WASA-M told us that under the ADP, the sewer lines under their jurisdiction have been extended and provided data on the sewer line extension, which is shown in Table 1-1. This shows that from 2017 to date, the pipeline has been extended by approximately 14% for both trunk and branch lines.

**Table 1-1 WASA-M Sewer Line Extension (cumulative)**

Caliber	Extension (m)			
	Inches	M/P 2017	2020-21.	2023-24 (Planning)
9"		669,248	669,248	669,248
12"		723,095	892,081	1,039,428
15"		55,345	71,882	113,546
18"		97,064	126,444	172,055
21"		13,027	16,004.70	24,754.70
24"		73,745	93,750	121,813
27"		16,115	16,175	18,321
30"		13,753	17,976	20,721
36"		37,832	40,738	49,536
42"		20,989.	21,530	25,846
48"		23,233	23,929	28,059
54"		9,278	9,278	9,721

Caliber	Extension (m)		
60"	17,329	17,329	19,409
66"	206	206	206
72"	14,711	18,445	19,286
Extension Subtotal (km)			
Branch Line (9"-21")	1,558	1,776	2,019
Trunk Line (24"-72")	227	259	313
Total Amount	1,785	2,035	2,332*

Source: Prepared by JICA Survey Team from WASA-M materials

According to the information from WASA-M, 297 km of new sewage pipes are planned to be constructed, increasing the total length from 2,035 m to 2,332 m, until 2024.

#### (4) Condition of drainage channels

In the trunk drainage channels in Multan City, WASA-M is working to remove a lot of solid waste from the drainage channels because a lot of solid waste floats and accumulates on the water surface upstream at the point where the channels pass under irrigation canals and roads in the city. The waste collected from the drainage channels is dried on the ground to a certain extent and then transported to the dumping site by the Multan Waste Management Company (hereinafter referred to as "MWMC"), which is in charge of waste collection in Multan City, for disposal, but as its coordination with WASA-M is not sufficient, the waste is not transported in a timely manner and is left on the road for a long time, which has become a problem. Loading and transport equipment is needed for WASA-M to remove the waste from the drainage channels and transport it in a timely manner itself.

## 1-2 Outline of the Request

The equipment requested by WASA-M to address the above issues is shown in Table 1-2.

**Table 1-2 Requested Equipment List**

Equipment	Specification Outline	Purpose	Q'ty	Remarks
1. Suction Machine	Tank capacity 4m <sup>3</sup> or more	Sewage pipeline cleaning	18	Self-propelled
2. Jetting Machine	Tank capacity 4m <sup>3</sup> or more	Sewage pipeline cleaning	18	Self-propelled
3. Dewatering pump set	5cfs and above	For rainwater control	10	Self-priming
4. Clamshell	Wheel type	Sludge and sediment removal	2	Dragline
5. Backhoe	Wheel type	Sludge and sediment removal	2	Excavator

Equipment	Specification Outline	Purpose	Q'ty	Remarks
6. Dump truck	4 t	Sludge and sediment transport	4	Transport vehicle
7. Truck crane	10 t	O&M	2	
8. Pipe cleaning machine	Towing type	Sewage pipeline cleaning	9	
9. Forklift		Loading and unloading of equipment and materials	3	
10. Dewatering pump set	Less than 5cfs	For sewage countermeasures	16	self-priming
11. Water quality analysis vehicle	Mounted on a wagon	Quick water quality check	1	Including tap water analysis
12. Pickup truck	Single cabin	Movement of staff Transportation of materials and equipment for cleaning	5	
13. Waterstop plug	For inside diameters from 12" to 18".	Sewage pipe stopper	36	Pneumatic
14. TV camera	Insertion type	Checking the cause of sewage pipe blockage, and checking the condition after the cleaning work is completed	3	Necessity confirmed by confirmation survey
	Telescopic type		9	

### 1-3 Positioning of the Project

In view of the above situation, this project will contribute to the improvement of the sanitation environment by enhancing the sewerage services in the area through the augmentation of sewerage equipment such as cleaning equipment and dewatering pumps necessary for the maintenance and management of sewerage pipes and drains in WASA-M.

Therefore, the procurement of equipment under this project is not merely to replace aging equipment or to replenish insufficient equipment, but also to maintain the equipment necessary to establish preventive cleaning as a standard cleaning activity of WASA-M, which has not been possible in the current system of cleaning in response to complaints. The purpose of this project is to provide the equipment necessary to establish preventive cleaning as a standard cleaning activity of WASA-M. Naturally, complaints are expected to continue to occur for the time being, and it will be necessary to respond to them, but it is expected that the situation of overflowing and flooding will eventually decrease and complaints will also decrease as the original functions of sewage facilities are restored as a result of preventive cleaning. Once this trend is established, a virtuous cycle will be created in which the equipment and personnel that have been mobilized for complaint handling can be mobilized for systematic cleaning work that should be the primary

focus, and the system will be able to respond to the future expansion of sewage facilities in Multan that is already underway or planned. During this process, the number of complaints and the distance of sewer lines where preventive cleaning has been carried out will be used as indicators to show the effectiveness of this project.

This project, with the expected outcome of equipping WASA-M with equipment required for the cleaning and maintenance of the sewerage facilities in Multan City, is important not only in terms of the expansion of equipment by new procurement but also in terms of encouraging WASA-M to take advantage of the procurement to change its awareness of cleaning sewerage facilities, including stormwater drainage facilities.

It should be noted that in order to orient this project as described above, it is necessary to provide not only the procurement of equipment but also the transfer of technology to acquire the basic practices related to preventive cleaning and the knowledge necessary to develop a cleaning plan. The project will include the procurement of the necessary equipment and the related software component. The details of these items are shown in Chapter 2.



**CHAPTER 2**  
**CONTENTS OF THE PROJECT**



## **Chapter 2 Contents of the Project**

### **2-1 Basic Concept of the Project**

#### **2-1-1 Overall goals and project objectives**

In terms of sewerage, as the upper-level objective of the project, the National Sanitation Policy (2006) and the Punjab Urban Water Supply and Sanitation Policy (2007) are aiming to develop sanitation facilities at the national and provincial levels respectively. The project aims to improve the sanitation environment in the target area by strengthening the operational and implementation capacity of the sewerage services in Multan District in the southern part of Punjab Province, which is in line with the overall goal of the project.

#### **2-1-2 Project overview**

##### **(1) Project content (output)**

WASA-M, the implementing agency, will be provided with the necessary equipment for cleaning and maintenance of sewerage facilities, with the aim of strengthening the operational and implementation capacity of sewerage services in Multan in the southern part of Punjab and improving the sanitation environment in the target areas.

##### **(2) Direct effects of the project**

WASA-M will improve both its hardware and software capabilities to enable systematic cleaning tasks to be carried out, rather than the more traditional reactive cleaning.

##### **(3) Indirect and long-term effects of the project**

The reduction of flooding and flooding damage reduces the risk of waterborne diseases caused by the flooding and improves the sanitation environment in the city. It will also increase the economic and social activity of the citizens, which have been hampered by flooded roads and urban areas. As a result, citizens' satisfaction with water and sewerage services will increase.

### **2-2 Outline Design of the Japanese Assistance**

#### **2-2-1 Design Policy**

##### **2-2-1-1 Basic Policy**

WASA-M, which is the sewerage service provider, is currently focusing on the handling of complaints. Except for the cleaning work carried out before the rainy season, there is no systematic cleaning of sewage pipes and drains, which leads to a vicious cycle of dealing with complaints of flooding due to sewage overflow. In order to address this situation, it is necessary to achieve

improvements in this area through the implementation of this project. However, even if the capacity to respond to complaints is temporarily improved by strengthening the implementation capacity of WASA-M with the equipment to be procured under this project, the effect will be limited if the activities are an extension of the same way of using the equipment as before. Therefore, in addition to identifying the causes of complaints, the project will be directed by going into the background of complaints occurring on a regular basis.

One of the reasons for the large number of complaints received by WASA-M is that observations of the sewage pipes from the roadside sewage ditches and manholes show that much of the sewage pipe network is covered with sediment and debris, which is thought to reduce the flow capacity, making it easy for the pipes to overflow and flood. The main reason for this is that when cleaning sewage pipes, the work is done with the aim of improving the passage of sewage without removing the sediment in the pipes. Therefore, as the condition of the sewerage facilities will not be improved comprehensively in the current system of reactive cleaning in response to complaints, it is necessary to restore and maintain the original capacity of sewerage facilities by carrying out systematic and preventive cleaning activities.

Regarding the cleaning of the drainage channels, at the point where they pass under irrigation canals through the city, a lot of solid waste surfaces and accumulates on the water surface upstream. In addition, the waste removed from the drainage channels is carried out after the moisture content is reduced to some extent on the ground. Therefore, it has become a problem that the waste collected from the drainage channels is not discharged in a timely manner and is left on the roadside for a long time. This is because WASA-M itself does not have the necessary equipment to transport the waste and relies on MWMC, which is in charge of waste collection in Multan. To improve this situation, WASA-M itself needs to increase the equipment required to remove and transport the waste on a regular basis.

In this project, the equipment requested by WASA-M was classified by application as follows, and the necessity for WASA-M to implement the planned operation and maintenance of sewerage facilities in the future was examined based on the assumed method of use.

- (1) Equipment for cleaning sewage pipes: Jetting machines, suction machines, and small pipeline cleaning machines used to remove sediment from sewer lines.
- (2) Equipment for pipeline survey and diagnosis: TV cameras (insertion type and telescopic type) used to check the condition of the inside of sewage pipes after cleaning.
- (3) Equipment for cleaning drainage channels: Backhoes, clamshells, wheel loaders, dump trucks; backhoes and clamshells are used to remove accumulated and floating debris in the drainage channels, and wheel loaders are used to load the debris onto dump trucks for transport to the dumping site. Clamshells and dump trucks are also used to dredge and transport sludge from the pumping station pits.
- (4) Drainage equipment: Dewatering pump sets  
It is used to clean away overflowed sewage and to divert water in the replacement of sewage pipes. It is also used to temporarily compensate for the drainage of D/Ss with insufficient

performance due to pump failure.

- (5) Transport vehicles: Truck crane, cargo truck with crane, pickup trucks

Truck cranes and trucks with cranes are used to move heavy items, such as generators and pumps, within the premises and between pump stations. Pickup trucks will be used to move dewatering pump sets to and from the site.

### **2-2-1-2 Equipment Quantity Policy**

The cleaning of sewerage facilities by WASA-M is under the jurisdiction of three Sewerage Divisions (SDs) (Central, North and South) in each district. As each SD has three branches, a total of nine branches are engaged in the cleaning service in their respective service areas. As a result of the discussion with WASA-M, it was decided that the equipment to be procured for this project should basically be equally distributed to the three SDs and the nine branches in accordance with the existing implementation system. The quantity of equipment to be procured under the Project will be determined based on the allocation plan considering the purpose of use of each piece of equipment.

Although the existing equipment is aging, some of the equipment is still in usable condition. However, the equipment will continue to be used for countermeasures against complaints because their performance has deteriorated over time and the equipment is not able to perform sufficient cleaning work. The number of pieces of such equipment will not be taken into consideration when determining the equipment for cleaning work to be procured under this project.

### **2-2-1-3 Policy for Natural Environmental Conditions**

Even though Multan receives less rainfall than other cities in Punjab, it receives the highest rainfall in July and August due to the monsoon, and WASA-M has been taking pre-monsoon measures such as cleaning the main sewage pipes and dispatching dedicated teams to each area where overflow occurs. However, in Multan, overflow and flooding due to blockage in the sewage pipes as described above occur throughout the year regardless of the amount of rainfall. Therefore, this project is not limited to monsoon measures, but mainly procures equipment required for sewer cleaning work to reduce the risk of normalized overflow. The requested dewatering pump sets are also useful equipment for monsoon control by using the equipment for urgent drainage work.

In Multan, the maximum temperature can exceed 40°C in the peak summer season, but the minimum temperature in winter can be less than 10°C. Therefore, the equipment to be procured shall be for use in ordinary weather conditions and it does not need to have particular specifications for extreme weather.

### **2-2-1-4 Policy on Procurement Situation Policy**

Suppliers from Japan, Pakistan and third countries shall be considered, and it shall be confirmed that the manufacturer has a system in place to provide local after-sales service, including the supply of spare parts and repairs. To the extent possible, the equipment should not differ significantly from

the existing equipment owned by WASA-M in terms of operation and maintenance and should be easily accepted by the drivers and operators of WASA-M who are proficient in operating the existing equipment.

#### **2-2-1-5 Policy for Operation and Maintenance**

It has been confirmed that the equipment will be stored and operated at the three SDs (North, Central and South) and the disposal stations (D/Ss) of the Disposal Station Division (DS), where it will be deployed in accordance with the existing operation and maintenance system of WASA-M. (See Chapter 4, 4-2 WASA-M Organization and Operation and Maintenance Plan).

Most of the requested equipment is already in use by WASA-M, so there are no problems with basic operation. For the sewage pipe cleaning work, technology transfer will be done through the Soft Component. Repair and maintenance of equipment other than a daily inspection are outsourced by WASA-M, therefore, the maintenance system of WASA-M will not be expanded.

#### **2-2-1-6 Policy Regarding the Establishment of Equipment Grades**

Since most of the equipment to be procured is used for cleaning sewerage facilities, it should have a certain level of corrosion resistance to sewage. Since there are products on the market with standard specifications that meet international industrial standards for each application of equipment, these products shall be targeted.

In the consideration of the class related to the size of the equipment, as for the self-propelled vehicles, considering the narrow road conditions in Multan, we will consider small vehicles and equipment as possible within the range that meets the necessary conditions. In addition, self-propelled construction equipment should be wheeled type instead of crawler type for driving on city roads.

#### **2-2-1-7 Policy on Relevant Laws, Regulations and Licensing Systems**

Vehicles and self-propelled vehicle-mounted equipment shall comply with the road traffic laws and emission regulations of Pakistan.

#### **2-2-2 Basic Plan (Equipment Plan)**

The list of equipment planned for procurement based on the design policy is shown in Table 2-1.

**Table 2-1 List of Planned Equipment**

Equipment name	Outline of specifications, etc.	Purpose	Q'ty	Note
<b>1) Equipment for cleaning sewage pipes</b>				
i Jetting Machine	Tank capacity 4m <sup>3</sup> or more Discharge rate 200 Lit/min or more Operating pressure approx. 20 MPa	Sewage cleaning pipeline	18	No change from the request
ii Suction Machine	Tank capacity 4m <sup>3</sup> or more Max. suction pressure - around 96 kPa Max. suction air flow approx. 20 m <sup>3</sup> /min	Sewage cleaning pipeline	18	No change from the request
iii Small pipe cleaning machine	Van type/ Small vehicle-mounted type	Sewage cleaning pipeline	9	Changed from towing type to self-propelled vehicle type
<b>2) Equipment for pipeline investigation and diagnosis</b>				
i TV camera	Insertion type portable	Investigation of sewage pipe blockage causes	3	No change
ii TV camera	Telescopic portable	Confirmation of condition after completion of cleaning work	9	No change
iii Waterstop plug	Available for internal diameters 8"-36"	Sewage pipe stopper	36	Pneumatic
<b>3) Equipment for cleaning drainage channels</b>				
i Small backhoe	Wheel type Bucket 0.2 to 0.3m <sup>3</sup>	Sludge and sediment removal	3	Changed to small size by field survey
ii Clamshell	Clam bucket approx. 0.3m <sup>3</sup> mounted 16t truck crane	Sludge and sediment removal	2	No change in quantity, changed to truck crane-mounted type
iii Dump truck	Load capacity 2 t class	Sludge and sediment transport	5	Changed from request 4t units
iv Wheel loader	Bucket 0.2 to 0.3m <sup>3</sup>	Loading of garbage, etc. removed from sewage drainage channels and sewage pipes	3	Changed from forklifts at time of the request
<b>4) Drainage equipment</b>				
1. Dewatering pump set	4-5cfs: 10 2-4cfs: 32 -1 cfs: 10	Drainage at the time of overflow, water replacement at the time of sewage pipe cleaning and replacement	52	Requested because it is essential when cleaning sewage pipes: 26 to 52 units
<b>5) Carrying vehicles</b>				
i Truck crane	Rough terrain crane 16t lifting	Heavy equipment transfer	1	Request reduced from 2 units to 1 unit

Equipment name	Outline of specifications, etc.	Purpose	Q'ty	Note
ii Cargo truck with crane	4t loading, 2.9t suspension	Transportation of materials and equipment	1	Substitution of truck crane reduction in consideration of the purpose of use of truck crane
iii Pickup truck	Double cabin	Transportation of materials and equipment for cleaning Movement of staff	5	No change

The details of the equipment to be procured are described in the following.

(1) Equipment for cleaning sewage pipes

i. Jetting Machine

Currently, the existing jetting machines are used for emergency responses to complaints, but it is assumed that the jetting machines to be procured through this project will basically be used for systematic sewage pipe cleaning. It is planned to use the existing jetting machine if it is available and to use it for emergency response together with the small pipe washing machine described later. As described in the outline, it is assumed that the existing jetting machines and suction machines will not be able to demonstrate the performance required for sediment removal due to their aging, but since some of the equipment can be used for the current complaint response, WASA-M will continue to use good quality equipment as necessary. As the removal of sediment in the sewage pipes progresses, complaints are expected to disappear almost completely and the use of the equipment that is no longer needed will be discontinued.

Renewal of jetting machines and suction machines is often carried out in 7-10 years in Japan. The equipment currently used in Multan, even the relatively new items, are more than 15 years old, and they are prone to breakdowns and require frequent maintenance at private repair shops, so they cannot be systematically mobilized for the preventive cleaning work that will be required to minimize the overflow of sewage in the future. In addition, machines such as plunger pumps and vacuum pumps are limited in repair and need to be replaced. The repair costs of such equipment have been increasing the maintenance costs.

Jetting Machines will be equally deployed at a total of nine locations in each of the three branches of the three SDs that will use them, along with suction machines, to carry out sewage pipe cleaning operations. According to the results of the following study, assuming that two vehicles are deployed in each branch, the cleaning of all the target branch pipes will be completed in 4.8 years. If one unit is deployed in each branch, it will take a very long time to show a certain effect of this project, and it is desirable to deploy more than one unit in order to avoid equipment breakdowns and stagnation of cleaning activities during the maintenance period. We have already confirmed that there is enough storage space for the additional jetting machines (including small vehicle-mounted pipeline cleaning



machines) and suction machines by checking all SDs (North, Central and South) and their respective branches.

The cleaning work span assumed from the length of the sewer line is as follows.

Progress of sewage pipe cleaning and inspection per day

It is assumed that the daily progress of the pipeline cleaning is 90m/day or three spans with a standard manhole interval of 30m as one span, including the confirmation of the completion of the work by the telescopic TV camera at the pipe mouth after cleaning and the confirmation of the internal condition and the cause of the abnormality by the insertion type TV camera in case of possible abnormality.

$$\text{[Tank capacity of jetting machine]} 4\text{m}^3 / 200\text{Lit /min} = 20\text{min}$$

$$\text{[Manhole interval]} 30 \text{ m/span} \times 3 \text{ spans/day} \times 200 \text{ days/year} = 18 \text{ km/vehicle/year}$$

$$\therefore 18\text{km} \times 18 \text{ units} = 324\text{km/year}$$

[Length of Sewage pipes]

Trunk line (24"-72" dia.) 227 km \*Excluded from this project because 2-4 km of the line is cleaned by machine annually by subcontracting.

Branch line (8"-21" dia.) 1,557 km

If we divide 1,557 km by 324 km/year, the result is 4.8 years. Once the cleaning of semi-clogged sewage pipes has been completed by using newly procured equipment, it will be possible to clean and check the inside of the entire pipeline except for the trunk line about once every five years. However, since it is assumed that many sewage pipes will be in a semi-clogged state at the beginning, more time will be required to clean them, and it is quite possible that the daily rate of progress will be less than one span per day per unit.

As for the specifications, the tank capacity of the requested jetting machine is 4m<sup>3</sup>, and the maximum injection capacity of the pump of that class of jetting machine is 200 to 250 liters per minute. However, the pump does not continue to spray at its maximum capacity during the work time because of preparation, checking the situation, and removal of sediment. Therefore, the tank capacity should be 4m<sup>3</sup> class, which is a popular model, and the pump capacity should be 200Lit/min class.

## ii. Suction Machine

WASA-M currently uses suction machines to suck up unsanitary sewage that overflows due to pipe blockages and remove it into the sewage system. WASA-M currently owns 12 suction machines, but like the jetting machines, they are aging and are being repaired repeatedly. It is necessary to replace/renew them soon. Since suction machines are basically used in combination with jetting machines, the number of suction machines required is 18, based on the same concept as for jetting machines.

iii. Small pipe cleaning machine

Multan is an ancient city, and its central area is very narrow and complicated. Because of this, there are many areas that cannot be entered by ordinary truck-based jetting machines, so WASA is requesting a towable cleaning vehicle mounted on a cart. On the other hand, WASA does not have such equipment at present, and WASA did not provide detailed specifications required by WASA. Since WASA's request is for a cleaning vehicle that can move around easily, we discussed the possibility of using a mini or standard van equipped with a pump, tank, and hose reel or transporting portable equipment by vehicle. As a result, it was decided that van-type small vehicles equipped with a cleaning device, which are widely used in Pakistan, would be appropriate.

The number of complaints handled by WASA-M in relation to sewage is shown in Table 2-2. It can be imagined that complaints about sewerage are caused by flooding or overflowing of sewage, and the average number of complaints handled is about 7,000 per year, which means that each branch of the management office handles several hundred to 2,000 complaints per year, although the number varies from branch to branch. Although the number of complaints and their contents do not necessarily correspond to those caused by sewage flooding or overflow, there is at least one flooded or overflowed area in the area of which each branch is in charge. Therefore, in view of the nature of the equipment to be mobilized in an emergency in any area, one unit will be assigned to each branch of SD to ensure mobility, for a total of nine units.

**Table 2-2 Complaint Handling Records by Each SD from Mar. 2019 to Apr. 2021**

Online Complaint Cell WASA Report 11.03.2019 to 12.04.2021		
Divisional Complaints		
Division	Sub Division	Complain Cell Pending Complaints
Sewerage (North)	Gulgasht	5681
	Sooraj Miyani	3131
	Eidgah	7526
<b>Division's Total</b>		<b>16338</b>
Sewerage (Central)	New Multan	1746
	Mumtazabad	5021
	Qasimpur	4055
<b>Division's Total</b>		<b>10822</b>
Sewerage (South)	Hassan Parwana	3835
	Walayat Abad	3188
	Garden town	7657
<b>Division's Total</b>		<b>14680</b>
Water Supply	W/S North/Central	3227
	W/S South	630
	Water Works	1508
<b>Division's Total</b>		<b>5365</b>
<b>Total:</b>		<b>47253</b>

Source: WASA-M

## (2) Equipment for pipeline survey and diagnosis

### i. TV camera (Insertion type)

This equipment was not included in the request from WASA-M but will be procured as it is essential to confirm the condition of the sewer line and the cause of the blockage.

In Japan where little sediment and large pieces of debris are found in sewage pipes, crawler cameras are often used for the inspection of pipes. However, in Multan, blockage due to the accumulation of sediment or large debris is possible, and the blockage itself is assumed to be caused by the destruction of the pipeline. If a crawler camera is used in such a pipeline, it may get stuck in the pipeline. Therefore, insertion type cameras will be procured.

The policy is to use these cameras to conduct systematic sewer line inspections and to use WASA-M to develop a plan for cleaning and necessary replacement of the lines.

The number of units will be three, one for each SD, as the three SDs will coordinate their inspection plans for each branch since they will not be used for daily inspection work.

### ii. TV camera (Telescopic type)

This type of camera checks the condition of the inside of the sewage pipe through the manhole. It is used for daily inspection and to check the condition after cleaning work is completed. It is expected to improve the management level.

A total of nine units, one for each branch, will be procured for the purpose of use in daily inspection work.

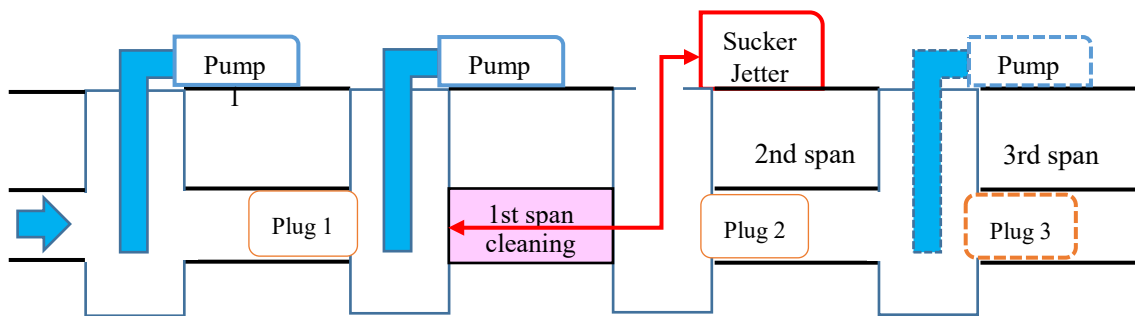
### iii. Waterstop plug

Three plugs are required to stop the sewage to clean and inspect a span of manholes. The plugs are placed at the inlet in the manhole on the upstream side, the outlet in the manhole on the downstream side, and the outlet in the manhole one span downstream of the second manhole to drain sewage in the two spans with a dewatering pump set. After cleaning the pipe in the upstream span with a jetting machine and a suction machine and checking its inside with a telescopic camera (insertion type TV camera if necessary), two plugs on the upstream side are installed on the downstream side in the same way as the first span, and then draining, cleaning, and checking are repeated.

If cleaning work is to be carried out at two separate locations, another combination of jetting machines and suction machines, dewatering pumps 1 and 2, and waterstop plugs 1 and 2 will be required.

In the case cleaning work from the upstream side to the downstream side is continuously performed at the same place, continuous cleaning work is possible by setting plug 3 and dewatering pump 3 during the cleaning work of the first span and draining the sewage in the second span beforehand. The same applies to the case of going from the downstream side to the upstream side.

Figure 2-1 shows how to use the waterstop plugs.



**Figure 2-1 Use of Waterstop Plugs**

For this series of work, sets of plugs for different diameter ranges (two or three types depending on the manufacturer) that can cover a diameter between 300 and 900 mm will be procured. Two sets of suction machines and jetting machines placed in each branch can be used for the work at the same time. In order to carry out the work more smoothly, to set the plugs ahead of time, and to prepare for damage, one spare set will be procured for each set so a total of four sets will be allocated to each branch, making a total of 36 sets.

The initial request was for 12-18" (300-450mm), but plugs that can be used in " the branch pipes (8" to 21" diameter) and "the trunk line (up to 36" (900mm) diameter) in some situations will be procured.

### (3) Equipment for cleaning drainage channels

#### i. Small backhoe

Small backhoes will be used for the removal of sludge and debris from drainage channels.

Sewage collected from city sewage pipes and ditches is pumped by sewage pumps at D/Ss and Lift Stations (L/Ss) located throughout the city and discharged into the irrigation canals or the trunk drainage channel called the Sullage Carrier.

Basically, foreign substances such as debris are removed at each D/S or L/S, but people dump trash directly into drainage channels, and rainwater carries debris and sediment from roads to the channel.

At present, WASA-M has one wheeled and one crawler type medium-sized backhoe each, but the wheeled type is used for cleaning drainage channels due to its mobility. Drainage channels are cleaned systematically and intensively mainly before monsoons. On the other hand, for cleaning sewage ditches in urban areas, since the existing backhoe is not suitable, the work has to be done manually. In addition, the Sullage Carrier is difficult to access for a medium-sized backhoe in some places.

Although we tried to confirm the specifications of the backhoe in both the information collection and confirmation survey (three consultants participating in this project also participated in the information collection and confirmation survey) conducted before this survey and the remote survey for this project, we were not able to confirm the necessity and specifications of backhoes at the field level. However, we were able to confirm the necessity of backhoes with a small turning radius at the field level through discussions during the field survey.

Initially, it was assumed that a total of two units equivalent to the existing backhoes would be procured, one each for drainage channels in the city and for Sullage Carrier, with the intention of using

the existing unit together and replacing it in the future. However, the policy of procuring smaller wheel-type backhoes with a bucket capacity of about 0.3 m<sup>3</sup> was adopted for driving on public roads in the urban area. Three units will be procured, each of which will be deployed at each SD in charge of sewage ditches in urban areas.

It should be noted that the Sullage Carrier is managed by DS and the urban drainage channel is managed by the SD.

ii. Clamshell

Although the backhoe has excellent workability, there are locations where excavation (removal of trash) at deep points in distant places cannot be performed even within the working radius due to the characteristics of the arm. For this reason, clamshells are used to excavate the areas where it is not possible to enter the other side of the drainage channel. In addition, the sludge and other sediments that have accumulated in the pits in D/Ss and L/Ss are removed.

Initially, WASA-M planned to procure a dragline type machines with a wire bucket attached to a wheeled lattice jib crane, like those owned by WASA Lahore and WASA Faisalabad, but the crane arm of the machine is long and difficult to handle, and the wheel type of lattice jib crane has not been manufactured for more than 10 years. And a clamshell in Japan is usually mounted on a backhoe but there is no wheel type<sup>2</sup>. For these three reasons, it was decided to procure wheel type backhoes whose ordinary bucket on the end of the arm can be replaced by a mechanical rope type clamshell bucket. However, in the field survey, it was confirmed that it was desirable to remove the sludge accumulated in the pits of the D/Ss in addition to cleaning the trunk drainage channel by utilizing the characteristics of the clamshells, which WASA-M does not have at present. The pits at the D/Ss are about 10m deep at the deepest point, which is more than the working depth of 4m for the backhoe base machine, so clamshell buckets with a working depth of 10m or more will be procured. The clamshell bucket will be used attached to the arm of a wheel type crane in place of a hook.

From the purpose of use, DS which has jurisdiction over the work in the Sullage Carrier and D/Ss will have jurisdiction over this equipment. Therefore, the quantity of this equipment should be two units, one for the Sullage Carrier and one for D/Ss.

iii. Dump truck

Currently, WASA-M does not have the machinery to transport the dredged sediment and debris. The sediment and debris are left on site and later transported to a large dumping site to the east of Multan town centre and disposed of at the site by MWCM. This disposal system applies not only for the cleaning operations in the drainage channels but also for the operations in the city.

The request from WASA-M was for four units on the assumption that they would work in pairs with the backhoes and clamshells. The initial request was for a 4-ton load capacity, but a 4-ton dump truck can only travel on main roads or roads with a certain width, and a smaller vehicle was requested in

---

<sup>2</sup> When we checked with a construction equipment manufacturer during the investigation of an existing project, they said that although it was possible to manufacture the equipment, it would be necessary to confirm its safety, which would require a large amount of time and money to verify, so we gave up on procurement.

consideration of transporting dirt, sand, and trash generated by cleaning in narrow streets, resulting in planning the procurement of 2-ton class trucks.

As for the quantity, when two clamshells and three small backhoes perform direct loading work, or when five wheel loaders described below load the material when it is necessary to remove a certain amount of moisture and store it, the total number of units is five.

The allocation and responsibilities of the equipment for drainage cleaning will be as follows.

**Table 2-3 Layout and Responsibilities of Equipment for Drain Cleaning**

Management Item	Disposal Station Division (DS)	Sewerage Divisions (SDs)
Managed object	15D/Ss <sup>3</sup> , 10 L/S <sup>4</sup> , trunk drainage channel	Sewage pipes, branch line drainage channel
Backhoe	Continued use of existing medium-sized units	3 small units for the 3 SDs
Clamshell	2 units for cleaning in areas that cannot be handled with backhoe	-.
Dump truck	2	3

As for the operators, there are many employees who currently do work manually, and these employees can be used (if necessary, they shall have to acquire driving qualifications). Also, there are many residents who have licenses to operate construction equipment and dump trucks, so there is no problem in recruiting them.

iv. Wheel loader

The equipment was originally requested as a lifter (forklift), but during discussions at the WASA-M field level, it was explained that the original demand was for a wheel loader, not a lifter, because the equipment was needed to load the waste removed from the drainage channels and D/S onto dump trucks. Currently, the soil and waste removed by the existing backhoe in the drainage channel and D/Ss are left on the spot for several days and transported by MWMC at a later date, so there is no work to load waste onto a dump truck at the same time as the excavator work. If dump trucks are procured in this project, backhoes and clamshells will be able to load waste directly, but wheel loaders will be procured to load trash and other materials stored on-site for the need to be dried to some extent separate from the excavators.

The trash removed from the drainage ditches by the small backhoe is basically loaded onto the dump truck by the backhoe, but the trash that needs to be dried to some extent or that is removed by hand is stored at the site for several days. The small backhoe moves to the next site as soon as the work is completed, and the garbage and sludge left at the site will be loaded onto the dump truck by the wheel loader.

As for the number of units, three units will be procured because they will work with the three dump

<sup>3</sup> Disposal Station, Sewage Pumping Station

<sup>4</sup> Lift Station, Relay Pumping Station

trucks deployed at the SDs.

4) Drainage equipment

i. Dewatering pump set (for rainwater and sewage)

Initially, pumps for rainwater and sewage were listed separately, but there is no distinction in actual use, and pumps with sewage specifications can also be used for rainwater, so they are treated as the same item.

All of the equipment currently in operation is being mobilized for water diversions at sites and for the ongoing sewer line replacement work. During the replacement work, the equipment will be used to pump water to bypass sewage pipes that are being taken out of service for replacement. At the site where flooding occurs or is expected to occur, the pump set is used to pump the sewage, which has caused flooding from the manhole and drain it to a downstream location. Dewatering pump sets may also be used on an emergency basis to compensate for capacity shortage during the monsoon period at existing pumping stations.

As for the specifications, we plan to procure mainly self-priming pumps which are used most frequently and some submersible pumps. As for the drive system, there was an initial request for an electric motor drive because of the running cost, but in the end, a diesel engine drive system was requested for emergency use in consideration of use during a power outage or at a site where there is no power supply. Therefore, such pumps shall be procured. In any case, they will be portable types that are towed. WASA-M plans to procure various types of pump sets consisting mainly of those with the capacities of 1, 2, 3, and 4 cfs and including those with the maximum capacity of 5 cfs, so that they can be used in various conditions. WASA plans to store the pump sets to be procured at three D/S and one L/S (Suraj Miani D/S, Farooqura L/S, Inner Bye Pass D/S and New Shah Shamas D/S).

As for the quantity, 52 units are currently being requested compared to the initial request of 26 units.

The existing wastewater pump sets currently owned by WASA-M are shown in Table 2-4.

**Table 2-4 Existing Dewatering Pump Sets at WASA-M**

Pump capacity	Q'ty	Year of procurement
5cfs	6	2002-2003
4cfs	17	2002-2003
2cfs	12	2004-2005
1.5cfs	2	2004-2005
1cfs	35	2004-2005
0.33-0.1cfs	18	2012-2013
Total	90	

Source: WASA-M

WASA-M explained that 50 of the 90 existing dewatering pump sets are currently mobilized on a long-term basis for water diversion work at overflow sites and reclamation sites, that many of the pumps were procured between 2002 and 2005, and that the 40 pumps that are not currently in service

have already exceeded their normal service life. In addition, the relatively new 2012 and 2013 procurements are very small at less than 0.1 cfs, which means that WASA-M currently lacks pumps that can be utilized for emergency response. In 2023, when the equipment for this project is procured, the sewer network will be 30% larger than it was in 2017, so the drainage capacity will need to be expanded for water diversion during the ongoing and planned construction for the expansion of the sewer network. The procurement of 52 units, which is 1.3 times the number of units requiring replacement, 40, is requested based on the assumption that the sewer network will be expanded by 30 %. The specifications were determined based on WASA-M's experience in the past, taking into account the flow rate of the pipelines that could be targeted, as it is impossible to know the exact conditions of use, including places of use and required capacity, in detail in advance due to the nature of the equipment being used for emergency response. Among the four D/Ss and L/S in which the pumps are to be stored, the Farooqura L/S located in the center of the city, which has a large storage warehouse, is planned to have twice as many pumps as the other D/Ss.

The equipment can also be used as emergency pumps to temporarily compensate for the failure or insufficient capacity of aging pumps at existing pumping stations.

**Table 2-5 Dewatering Pump Set Deployment Plan**

Storage area	Pump capacity					(platform) plan
	1cfs	2cfs	3cfs	4cfs	5cfs	
Suraj Miani D/S	2	4	4	1	1	12
Farooqura L/S	4	6	6	2	2	20
Inner Bye Pass D/S	2	3	3	1	1	10
New Shah Shamas D/S	2	3	3	1	1	10
Total	10	16	16	5	5	52

(5) Transport vehicles

i. Truck crane

This request is for the movement of heavy items such as transformers, pumps, and generators within the D/Ss. Two units with a lifting capacity of 10 tons<sup>5</sup> are requested. In terms of the frequency of use, a track crane can only be used for lifting heavy items. When the replacement of a crane truck with a truck with crane<sup>6</sup>, which is more versatile, was proposed, the proposal was accepted.

The DS removes (lifts) sewage pumps for repair and installs (lowers) repaired pumps at D/Ss and flexibly transfers generators between D/Ss as needed. Since the need for a truck crane is high, one truck crane will be placed at DS.

ii. Cargo truck with crane

While the procurement of a truck crane is considered, one cargo truck with a crane will be located at SD, as the existing dewatering pump set without a dolly and workers will need to be transported to a site of work.

<sup>5</sup> Rough terrain crane is used for 10t lifting class

<sup>6</sup> Generally, lifting capacity is less than 3t



iii. Pickup truck

This equipment is mainly used for transporting dewatering pump sets and workers. Initially, the request was for single-cabin pickup trucks with the seating capacity of two, but it was changed and it is for double-cabin pickup trucks with a seating capacity of five as they may need to transport three or more workers, in addition to the driver, to installation sites of the sets.

Since the purpose of these vehicles is to transport the dewatering pump sets and workers to flooded and overflowing points and to sites where water diversion work is to be carried out, they shall be 4WD in consideration of access to sites with unpaved or high water levels. They shall have diesel engines (2,800CC class).

As for the number of units, a total of 5 units will be deployed to four stations (1 unit at Suraj Miani D/S, 2 units at Farooqpora L/S, 1 unit at Inner Bye Pass D/S, and 1 unit at New Shah Shamas D/S) where the dewatering pump sets will be stored. These trucks will be used to transport the 52 pumps to be newly procured. Since the number of dewatering pump sets to be deployed at Farooqpora L/S is twice that of other pump stations, two vehicles will be used for transportation.

## 2-2-3 Procurement Plan

### 2-2-3-1 Procurement Policy

The counterpart organization considers the durability of the procured equipment and the ease of procurement of spare parts to be important and has decided to give priority to equipment of which there is an agent or importer in Pakistan for the procurement from Japan and in Pakistan. Therefore, as a result of the survey/examination, it was decided that the eligible countries for the procurement of equipment and materials are Japan and Pakistan and the policy will be to procure equipment and materials from manufacturers that have agents or importers in Pakistan. In the case of Japanese manufacturers, the procurement shall not be limited to products produced in Japan but shall include products produced in third countries.

The selection of suppliers will be a trading company bidding because the equipment to be procured includes a wide range of items such as sewage pipe cleaning equipment, construction machinery, transport vehicles and pumps. The procurement plan is shown in Table 2-6.

**Table 2-6 Procurement Plan**

Equipment name		Supplier		
		Pakistan	Japan	Third country
Equipment for cleaning sewage pipes	Jetting Machine		x	
	Suction Machine		x	
	Small pipe cleaning machine		x	
Equipment for pipeline investigation and diagnosis	TV camera (Insert type, Telescopic type)		x	
	Waterstop plug		x	
Equipment for cleaning drainage channels	Small backhoe			x

Equipment name		Supplier		
		Pakistan	Japan	Third country
	Clamshell			x
	Dump truck		x	
	Wheel loader			x
Drainage equipment	Dewatering pump set			x
Transport vehicle	Truck crane			x
	Cargo truck with crane		x	
	Pickup truck	x		

In addition, the implementing agency of this project on the Pakistan side is WASA-M, and 3 SDs (North, Central and South) and DS, which manage the sewerage facilities, will be responsible for the operation and maintenance of the equipment from the procurement stage.

### 2-2-3-2 Points to Note in Procurement

In previous projects, it took a long time (30-45 days) from the time of unloading at Karachi port to the time of customs clearance. This is because Karachi is in the province of Sindh and not in Punjab, which is the target of the project, and therefore, it is necessary to go through the federal government for the tax exemption treatment. Therefore, it should be noted that the procurement process should be planned well in advance and that it is necessary to encourage the relevant agencies to provide necessary support at the implementation stage so that the federal government can take prompt action.

### 2-2-3-3 Scope of Work

None of the equipment to be procured in this project requires installation work.

#### (1) Scope of Work of the Japanese Side

In this project, the following details will be borne by the Japanese side.

- Consultant services for the implementation of this project
- Procurement of cleaning equipment
- Transporting and insuring each procured item from the place of procurement to Multan
- Dispatch of technicians for inspection of equipment and initial operation guidance

#### (2) Scope of Work of the Pakistan Side

It was agreed that the Pakistan side would be responsible for the construction of rain shelters, and the renovation, demolition and new construction of buildings at the storage sites, as necessary, associated with procurement of equipment, as described in Obligations of Recipient Country below.

#### (3) Summary of Scope of Work

The above contents are summarized as follows.

**Table 2-7 Scope of Work**

Japanese Side	Pakistan Side
Consultant services	Tax exemption
Procurement of cleaning equipment and pumping station equipment	Storage of equipment procured by the Japanese side from receipt to start of installation work
Transportation and insurance of the procured equipment from the respective place of procurement to Multan.	Renovation or demolition of non-vehicle equipment storage areas; and New vehicle garage
Dispatch of technicians for acceptance inspection of equipment, initial operation guidance, etc.	
On-site assembly of cleaning equipment	
Cleaning work guidance with soft components	

### 2-2-3-4 Consultant Supervision

#### (1) Consultant Supervision

##### 1) Procurement and design system

At the time of detailed design, the staffing plan for the implementation the detailed design under the leadership of the Team Leader/Expert in charge of sewerage and drainage planning, who was in charge of the preparatory study, shall be as follows:

**Table 2-8 Staffing Plan for Detailed Design**

Responsibility		Detailed-design person	Rating	Work in Japan M/M	Work in Pakistan M/M
Detailed design	Final confirmation of plan contents	Team Leader Equipment planning	No. 2 No. 3		0.33 0.33
	Equipment specification review	Team Leader Equipment planning Estimation and procurement plan	No. 2 No. 3 No. 3	0.25 0.25 0.50	
Bidding-related services 1	Preparation of documents for bidding	Team Leader Equipment planning	No. 2 No. 3	0.35 0.35	
	Approval of documents for bidding	Team Leader Equipment planning	No. 2 No. 3		0.33 0.33
Bidding-related services 2	Public notice, handover of drawings and explanation of contents	Team Leader Equipment planning	No. 2 No. 3	0.25 0.25	
	Bidding, bid evaluation	Team Leader Equipment planning	No. 2 No. 3		0.50 0.50

## 2) Procurement management

The consultant shall supervise the supplier's implementation of the procurement of equipment and materials to ensure that the quality and process control are properly carried out and shall also confirm that the equipment and materials delivered to the site are properly adjusted. The main tasks of procurement supervision are as follows.

- Consultations with the supplier
- Witnessing factory acceptance test and management of pre-shipment inspection
- Consultations and meetings with WASA and other related organizations
- Project on-site confirmation of projects funded by partner countries
- Equipment confirmation of equipment procurement status
- Confirmation and follow-up of the progress of operations related to customs clearance of equipment
- Witnessing equipment inspections and issuing certificates
- Submission of reports, etc.

The duties of each expert shall be as follows:

Fieldwork shall be 1 day on the outward journey, 2 days on the return journey, plus 1 week (6 days) of fieldwork, for a total of 9 days (0.30 M/M). Local assistants will not be hired and vehicles will be rented 8 days from the date of arrival to the date of departure.

**Table 2-9 Staffing Plan for Procurement Supervision**

Procurement Supervision Personnel	Rating	Responsibility	Work in Japan M/M	Work in Pakistan M/M
Team leader	No. 2	Acceptance inspection and delivery		0.30
Procurement Supervisor	No. 3	Preliminary confirmation and various meetings		0.30
		Acceptance inspection and delivery		0.30
Inspector 1	No. 3	Inspection and verification shop drawings of equipment and related documents	0.40	
Inspector 2 (On-site inspection)	No. 3	Factory acceptant test (Test location: Kawasaki x 2 days x 1 time)	0.10	
		Pre-shipment equipment verification inspection (Inspection location: Port of Yokohama 3 days x 1 time, 5 days x 1 time)	0.40	

The factory acceptance test shall be conducted for the 18 jetting machines and 18 suction machines.

The pre-shipment equipment verification inspection is assumed to be conducted for a total of eight days: Once for three days for containers and once for five days for vehicles.

(2) Procurement Management Plan of Supplier

Procurement management of the supplier shall include the following tasks

- Product (factory) inspection
- Factory acceptance test
- Witnessing pre-shipment inspection
  - Process control                      Process control of unpacking, quantity verification, assembly, initial operation guidance, etc.
- Acceptance inspection and delivery

The procurement management system shall be as shown in the table below. For pre-shipment inspection, the supplier shall attend the equipment verification inspection by a third party. The procurer shall provide an additional two weeks of on-site work for the procedures at the port of Karachi. The duration of the work is shown in Table 2-10.

**Table 2-10 Staffing Plan for Procurement Management**

Procurement Management Personnel	Rating	Responsibility	Work in Japan M/M	Work in Pakistan M/M
Local Procurement Manager	No. 3	Meeting with WASA-M, confirmation of receiving preparations, various local business procedures (unloading, customs clearance)		0.47
		Acceptance inspection		0.30
Inspector 1	No. 3	Inspection and verification shop drawings of equipment and related documents	0.50	
Inspector 2 (On-site inspection)	No. 3	Factory acceptance test (Test location: Kawasaki x 2 days x 1 time)	0.20	
		Attendance of pre-shipment equipment verification inspection (Inspection location: Port of Yokohama 3 days x 1 time, 5 days x 1 time)	0.40	

The factory acceptance test shall be conducted for the 18 jetting machines and 18 suction

machines.

The pre-shipment equipment verification inspection is assumed to be conducted for a total of eight days: Once for three days for containers and once for five days for vehicles.

The following items are considered to be the responsibility of 0.47 M/M for Local Procurement Manager No. 3.

Job description: Final confirmation of the receiving system for the procured equipment taken over from the procurement supervisor, the preparation status of items in the scope of work of the Pakistan side, and the procedures for unloading and related matters at the site. In particular, since it is a long period of time (30 to 45 days) from unloading to customs clearance, final coordination should be made so that the procured equipment can be moved to the destination smoothly. Multan and the port of Karachi are about 900 km apart, so it will also take time to move the equipment.

Pre-shipment inspections are assumed to be conducted for a total of eight days: once for three days for containers and once for five days for vehicles.

#### **2-2-3-5 Quality Control Plan**

Before equipment is manufactured, specifications are discussed in detail with the manufacturer and confirmed with approval drawings. Factory witness tests are to be conducted prior to the shipment of equipment. The submission of in-plant test data is required at the time of equipment shipment. When transporting equipment, sufficient attention will be paid to the environment and changes in the environment during transportation, and insurance against damage, corrosion, and loss of functionality during transportation will be obtained. If special packaging, such as export packaging, is required, it shall be properly implemented.

As for storage, the contractor in charge will be instructed to pay attention to temperature, ultraviolet rays, humidity, dust, corrosive gas, vibration, etc., and take out insurance in case of an emergency.

We will keep in close contact with manufacturers, dealers, transporters, insurance companies, and other related companies so that they can immediately respond to any problems that may be found on site.

#### **2-2-3-6 Operational Guidance Plan.**

After the equipment arrives from the transporter, it will be inspected at the storage site for quantity, temporarily handed over for the registration procedure to the government of Pakistan and assembled if necessary. The equipment shall be handed over to the counterpart after conducting on-site trial operation and adjustment and, if necessary, on-site initial operational instruction. At this time, the equipment shall be serviced by the supplier. The supplier shall be responsible for any malfunctions or inadequacies of the equipment during the commissioning and initial operation guidance.

Many of the machines have already been used by WASA-M, and the differences between the existing machines and those of different manufacturers will be checked during the initial operation instruction.

The insertion type TV camera and the telescopic camera will be introduced for the first time, but only a basic operation check will be performed as necessary guidance for the actual use of the equipment will be provided in the software component.

In addition, a soft component will be implemented at the time of delivery of the procured equipment, focusing on cleaning methods and management plans for the sewage pipelines.

### **2-2-3-7 Soft Component Plan**

The purpose of this project is to strengthen WASA-M's capacity to manage sewerage pipes and drains and to improve sanitation in the target areas by providing the necessary materials and equipment for cleaning and maintaining the necessary sewerage pipes and drains.

In Multan City, sewage overflow and road flooding due to obstruction of flow caused by sediment and rubbish accumulation in sewage pipes often occur, and SDs in charge of sewage pipe cleaning at WASA-M have been forced to respond to the associated complaints. The main reason for this is that sewer cleaning operations are aimed at responding to complaints and only improving the passage of sewage, and once the overflowed sewage has receded into the manhole, the operation is terminated without removing the sediment.

In order to improve this situation, the sediment in the sewage pipes needs to be removed without fail every time the sewage pipes are cleaned, and this should be carried out systematically. In addition, if an inspection of the pipe after cleaning reveals damage or other conditions that need to be repaired, it is necessary to take appropriate measures according to the situation. Continuing to carry out reactive activities aimed at addressing complaints as in the past will not result in fundamental improvement, so it is necessary to restore the original capacity of sewer facilities and maintain their condition by carrying out systematic cleaning activities.

In order to achieve this, it is necessary to update the equipment that has become old and whose performance has deteriorated, to provide equipment that can remove sediment, and transfer the technology including the appropriate cleaning method to remove sediment from the pipe and repair measures according to the condition of the pipe after cleaning. As the capacity in the cleaning of sewerage facilities of WASA-M in terms of the cleaning operations will be greatly enhanced with the procurement of equipment in this project, it is necessary to plan and implement the soft component for WASA-M to have the necessary capacity and system to carry out systematic cleaning using the equipment.

In addition, the technical cooperation project called "The Project for Improving the Capacity of WASAs in Punjab Province Phase 2" (hereinafter referred to as "Technical Cooperation Project") is currently being implemented for major cities in Punjab Province including Multan. As support for sewer cleaning, the Technical Cooperation Project includes activities to make WASA's senior management and those responsible for sewer cleaning aware of the problems with current sewer cleaning and encourage them to change to the original cleaning method that removes sludge from the sewage pipes and is scheduled to be implemented from 2022. Training on sewage pipe cleaning practices will not be provided by the Technical Cooperation Project and will be conducted under the soft component of the project.

Details of the soft components planned for this project are shown in the "Soft Component Plan" and attached as documents.

### 2-2-3-8 Implementation Schedule

The outline of the implementation schedule of this project is shown in the following Table 2-11 based on the scheme of Japan's grant assistance.

**Table 2-11 Procurement Implementation Schedule**

Month	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Contractor Contract	▼																
Manufacturing																	
Inspection/ Verification																	
Transportation																	
Delivery and Inspection																	▼

### 2-3 Security Plan

Since the project is an equipment procurement project and the procured equipment does not include any installation work, the threats of security that the project-related parties will face during the grant period are basically assumed to be in the following situations.

- (1) During a detailed design field survey
- (2) At the time of delivery of procured equipment
- (3) When implementing the software component

The target area is the urban area of Multan, and there have been no political or religious terrorist activities in Multan in recent years. Although the city of Multan is considered to be relatively safer than other terrorist-prone areas, including the general security situation, the following security measures will be taken during the above period.

- Obtaining public safety information by registering on the travel register
- Contact information and report on planned activities to the safety officer at the Japanese Embassy and JICA Pakistan Office
- Staying in accommodation with security systems in place, including for terrorism.
- As a rule, the scope of action is limited to the accommodation and the area covered by the business.

With regard to safety management, in addition to the threat to public safety, traffic control personnel will be assigned to prevent traffic accidents, since the training will be conducted around busy streets when the soft component is implemented.



## **2-4 Obligations of Recipient Country**

### **2-4-1 Measures Required of Pakistan**

The measures required of Pakistan for the implementation of the Project are as follows, based on the details agreed upon in the Minutes at the time of the Preparatory Survey.

- 1) Pakistan government shall enter into a Bank Arrangement (B/A) and shall pay the banks that have entered into the B/A a fee for notification of the Authorization for Payment (A/P) and a fee for payment.
- 2) Promptly carry out procedures related to the unloading of procured equipment at ports and import customs clearance.
- 3) Exempt Japanese nationals from customs duties, domestic taxes, and other taxes imposed on them by the State of Pakistan in connection with this equipment procurement project.
- 4) In order to facilitate the performance of services by Japanese nationals in relation to the Procurement Project, the necessary facilities for entry and stay in Pakistan will be provided to them.
- 5) Secure the necessary personnel to ensure that the equipment to be procured under this project is properly and effectively maintained and used, and bear all costs not covered by the grant assistance.
- 6) Equipment parts required for maintenance and management are procured as necessary to avoid shortages.
- 7) Secure the necessary storage space for each piece of equipment in the implementation of the plan.
- 8) The equipment procured in this project shall not be re-exported from Pakistan.
- 9) Dispose of general waste and other waste from sewage pipes collected by cleaning at the final disposal site and dispose of sludge at the sewage treatment plant.
- 10) Submit project monitoring reports.

### **2-4-2 Scope of Work of the Pakistan Side**

The scope of work of the Pakistani side includes the following, in particular:

#### **2-4-2-1 Tax exemption**

It was confirmed in the Minutes that the duty exemption would be under the responsibility of the Government of Pakistan and WASA-M. It should be noted that in the past, tax exemptions have been properly provided in similar equipment procurement projects implemented by WASA in other cities of Punjab and no problems related to tax exemptions have been encountered, therefore, it is desirable for WASA-M to share information based on the experience in earlier projects in other cities for smooth tax exemption procedures.

### **2-4-2-2 Construction by the Pakistan side**

The sites of WASA-M's sewage related facility, which are candidates for equipment storage, will be cleared and roofed structures will be constructed. In addition, the interior of the existing building to be used as an equipment storage warehouse will be rearranged and equipped with shelves for storing spare parts.

### **2-4-2-3 Acceptance of soft components**

WASA-M is required to fully understand the importance of the soft component to be implemented together with the equipment procurement as part of the Project and to actively participate in the project as a whole organization. For this purpose, WASA-M will take measures to ensure smooth and effective technology transfer by allocating the necessary human resources and adjusting the work schedule. In addition, for the project to be effective, WASA-M is required to encourage the recording and reporting in the monitoring phase even after completion of the technology transfer by the soft component and to commit itself to the sustainable implementation of the systematic cleaning of sewerage facilities that the project aims to achieve by utilizing the transferred technology.

In implementing the soft component, the following are required as the responsibilities of WASA-M:

- Selection of appropriate technology transfer participants
- Coordination necessary for the implementation of technology transfer
- Providing a suitable venue for training
- (Provision of necessary facilities for the activities of Experts)
- Cleaning operations by WASA-M itself scheduled for after expert guidance.
- Provision of reports and materials necessary for evaluation, such as daily and monthly work reports prepared during cleaning operations

## **2-5 Project Operation Plan**

### **2-5-1 Basic Concept of WASA-M in Management Planning**

As for the operation and maintenance plan of the provided equipment, WASA-M presented the basic concept for such subjects as the planned storage sites, the jurisdiction of operation and maintenance, and the assignment of personnel.

The proposed sites for the storage of the donated equipment are those owned by WASA-M, and it was confirmed during the field survey that the vacant land and the buildings for storage have been secured on the sites.

The basic idea for the operation and maintenance plan is that the department that is currently in charge of the same type of equipment will also be in charge of the newly provided equipment,

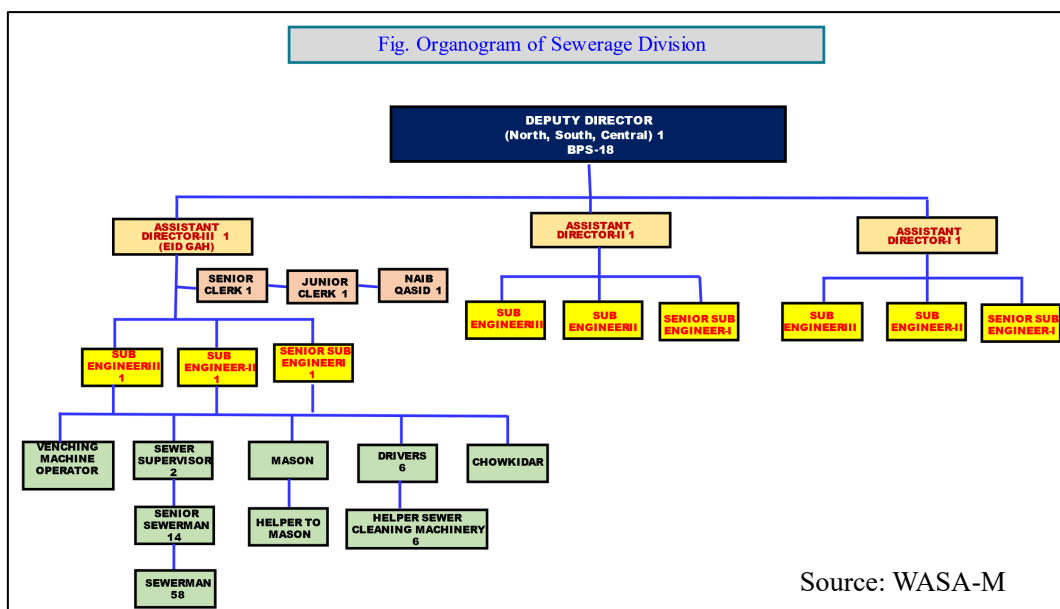
and there are no plans to change the organization.

The repair and maintenance of equipment are currently outsourced, and it is planned to outsource this work for the provided equipment as well. This is considered to be the correct response, as vehicles and equipment are increasingly electronic and require a high level of expertise for repair and maintenance.

### 2-5-2 Organization and Operation and Maintenance Plan of WASA-M

The responsibility for the management of sewerage in WASA-M is broadly divided into 3 SDs (North, Central and South) and DS.

Figure 2-2 shows the organization chart of SD and Figure 2-3 shows the organization chart of DS.



Source: WASA-M

Figure 2-2 Organizational Chart of the Sewerage Division

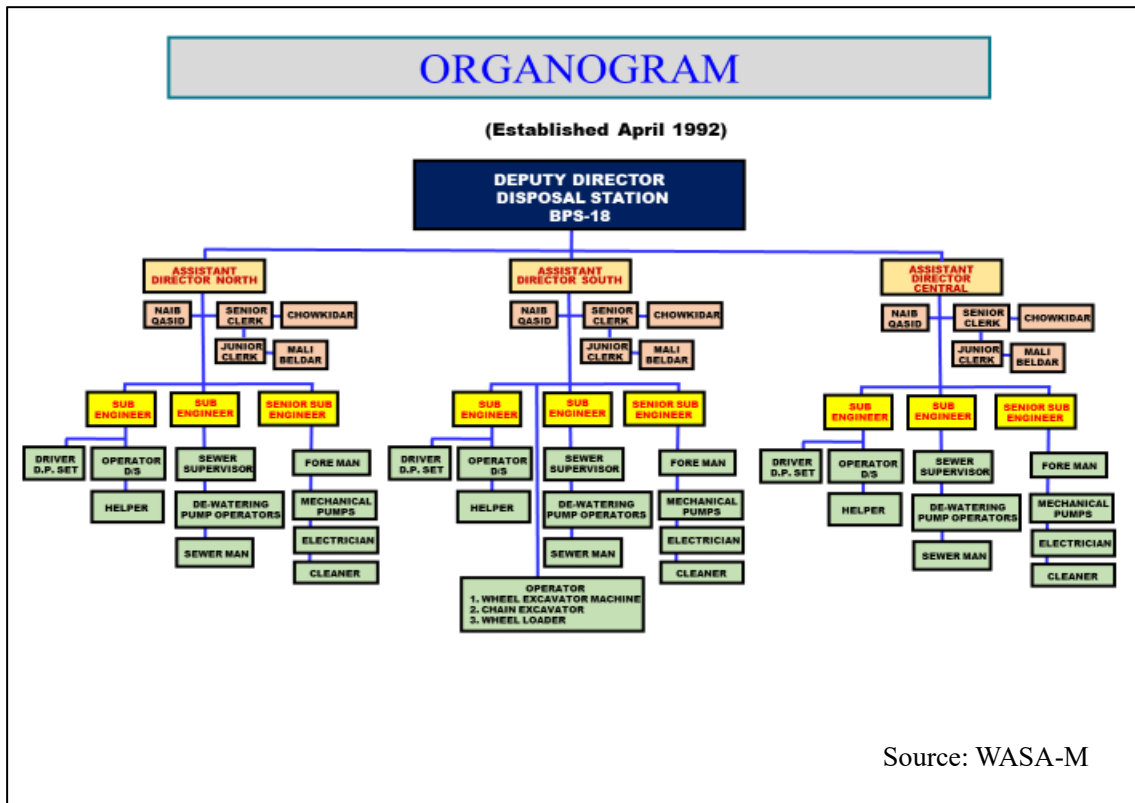


Figure 2-3 Disposal Station Division

According to the management plan presented by WASA-M, 3 SDs (North, Central and South) and DS will be responsible for the management of the provided equipment.

Three SDs have almost the same organizational structure headed by a Deputy Director (DD), and each SD has three branches headed by Assistant Directors (AD). Each of the nine branches has three senior sub-engineers or sub-engineers and they manage sewerage pipelines and drainage channels in the area under its jurisdiction.

DS is also headed by a DD and has three ADs and nine senior sub-engineers or sub-engineers, who are responsible for the management of D/Ss, L/Ss and the trunk drainage channel (Sullage Carrier).

Table 2-12 shows the plan presented by WASA-M for the operation and maintenance of the provided equipment and the increase in the number of drivers and equipment operators.

Table 2-12 WASA-M's Plan to Assign Jurisdiction over the Provided Equipment Personnel to Operation and Management of the Provided Equipment

	Equipment name	Q'ty	Staff currently available for assignment	Additional staffing plan	Div.	Remarks
1	Suction Machine	18	Drivers: 27	Drivers:9	SD	2 in charge
2	Jetting Machine	18	Drivers: 27	Drivers:9	SD	2 in charge

Equipment name		Q'ty	Staff currently available for assignment	Additional staffing plan	Div.	Remarks
3	Dewatering pump set	(52)	Drivers: 6 Operators: 54		DS	Can be handled with current workforce
4	Clamshell	2	Operators: 0	Drivers/operators : 2	DS	
5	Small backhoe	3	Operators: 0	Drivers/operators : 3	DS	
6	Dump truck	5	Drivers:0	Drivers:5	SD 3 DS 2	
7	Truck crane	1	Drivers:0	Drivers:1	DS	
8	Cargo truck with crane	1	Drivers:0	Drivers:1	DS	
9	Small pipe cleaning machine	9	Drivers:2	Drivers:7.	SD	
10	Wheel loader	3	Drivers:0	Drivers:3	SD	
11	Pickup truck	(5)	*Normal car		DS	Can be handled with current workforce
12	Waterstop plug	(36)	Coping with current workforce		SD	
13	TV camera: Insert type	(3)			SD	
14	TV camera: Telescopic	(9)			SD	

Source: Prepared by the JICA survey team from WASA-M materials

To coincide with the provision of the equipment, an additional 40 new jobs are planned for the operation and maintenance of the provided equipment. Under this plan, the operators of the equipment to be replaced or disposed of at the time of the provision will work with the new hires to operate and maintain the old and new equipment. The existing jetting machines and suction machines will continue to be used to respond to complaints, but those in poor condition will be disposed of gradually.

When recruiting such drivers and operators, it is planned that a certain level of experience in similar work will be a requirement for the application, and in such cases, applicants who have worked as temporary employees of WASA-M are often hired, so it is expected that the training of new employees will be relatively easy. As for the new type of work, for the systematic cleaning work to remove sediment in sewage pipes, training will be provided by the soft component, and the trainees will transfer their skills to other workers.

The new equipment, such as TV cameras, will initially be operated by section chief-level staff, and we plan to transfer technology for this as a software component.

The manufacturer or supplier is scheduled to provide on-site guidance on basic operation and daily maintenance and inspection upon delivery of the equipment.

## 2-6 Project Cost Estimation

### 2-6-1 Initial Cost Estimation

#### 2-6-1-1 Cost Borne by Pakistan

The cost of the project borne by the Pakistan side is estimated at 65 million yen. The breakdown is shown in Table 2-13.

**Table 2-13 Breakdown of Pakistan's Share of Costs**

Item	Content	Cost (PKR million)	Cost (Millions of yen)
Bank account, fees	B/A fee, A/P opening fee	1.49	1.25
Secure storage of procured equipment	Refurbishment, demolition or new construction of non-vehicle equipment storage areas and new vehicle garages	76.32	64.11
Total		77.81	65.36

#### 2-6-1-2 Estimation Conditions

The estimation conditions are shown in Table 2-14.

**Table 2-14 Procurement Planning Policy**

Item	Content
Estimation category	Project for equipment provision
Estimated time	September 2021
Exchange rate	(1) US dollar vs. Japanese yen 1 USD=111.09 JPY Local currency (PKR: Pakistani Rupee) 1 PKR =0.84JPY Average rate for the past 3 months (2021.06.01 - 2021.08.31)
Price fluctuation coefficient	N/A

### 2-6-2 Operation and Maintenance Cost

#### 2-6-2-1 Estimation Conditions

The operation and maintenance costs were assumed to consist of 1) personnel costs, 2) fuel costs for equipment with internal combustion engines, and 3) maintenance and repair costs. The conditions and cost estimation of each cost item are shown below.

1) Labor cost

Table 2-15 shows the increase in personnel and labor costs based on the number of the current workforce and the additional staffing plan shown in 2-5 Project Operation Plan.

**Table 2-15 Workforce Requirements and labor Costs (increase)**

Equipment name	Q'ty	Current workforce	Additional staffing plan / Job class (BPS)	Increase in labor costs (Thousands of PKR/year)
1. Suction Machine	18	Drivers: 27.	Drivers: 9/BPS05	3,789
2. Jetting Machine	18	Drivers: 27.	Drivers: 9/BPS05	3,789
3. Dewatering pump set	(52)	Drivers: (6) Operators: (54)	0	-.
4. Clamshell	2	Operators: 0	Operators: 2 / BPS09	982
5. Small backhoe	3	Operators: 0	Operators: 3 / BPS09	1,473
6. Dump truck	5	Drivers: 0	Drivers: 5/BPS05	2,105
7. Truck crane	1	Drivers: 0	Drivers: 1 / BPS05	421
8. Cargo truck with crane	1	Drivers: 0	Drivers: 1 / BPS05	421
9. Small pipe cleaning machine	9	Drivers: 2	Drivers: 7/BPS05	2,947
10. Wheel loader	3	Drivers: 0	Drivers: 3 / BPS05	1,263
11. Pickup truck	(5)	*Normal car	0	-.
12. Waterstop plug	(36)	Coping with		
13. TV Camera (Insert type)	(3)	current	0	-.
14. TV Camera (Telescopic type)	(9)	workforce		
Total			40	17,190

BPS05: 421 thousand PKR/year x 35 employees, BPS09: 491 thousand PKR/year x 5 employees

Source: processed by the JICA survey team from additional material in WASA-M

2) Fuel costs for equipment with internal combustion engines

The estimation of the fuel costs is based on the fuel consumption rate and standard operating hours shown in the Construction Machinery Ownership Cost Table (published by the Japan Construction Machinery and Construction Association in 2021).

3) Maintenance and repair costs

The maintenance and repair costs shall be estimated by multiplying the main unit price of the equipment with an internal combustion engine by the annual maintenance and repair cost rate shown in the Construction Machinery Ownership Cost Table.

Maintenance and repair costs are the costs of maintenance and repair necessary to maintain the utility of a machine during its standard service life (which varies depending on the machine) and consist of periodic maintenance costs and on-site repair costs. There is no significant difference in the price of the equipment itself between Japan and Pakistan., In the case of vehicle inspections in Japan, around 80% of the maintenance and repair costs are labor costs and the labor cost in

Pakistan is approximately 5% of that in Japan. Therefore, maintenance and repair costs are estimated at 25 % of those in Japan.

### 2-6-2-2 Estimation of Operation and Maintenance Costs

Based on the above estimation conditions, the operation and maintenance costs required in 2024 for the equipment to be procured in this project are estimated as shown in Table 2-16.

**Table 2-16 Operation and Maintenance Costs**

Expenditure item	Amount (PKR million)
Labor costs	17.2
Fuel costs	72.7
Maintenance and repair costs	27.4
Total amount	117.3

As mentioned above, the total annual operation and maintenance costs will increase by approximately PKR 117.2 million in 2024, the year of procurement completion.

When the above increase in the operation and maintenance costs is compared with the expenditure in the preceding year (2021-22), the increase of PKR 117.2 million is equivalent to 5.0% of the total expenditure in the preceding year, PKR 2,332 million, which is considered to be an acceptable increase in the total expenditure of WASA-M.

Table 2-17 projected annual expenditures:

**Table 2-17 Projected Annual Expenditure for WASA-M**

Expenditure item	2020-21 (PKR million)	%.	2021-22 (forecast) (PKR million)	%.
Electric utility cost	137.485	11	750.000	32
Labor costs (salaries and pensions)	870.542	68	1,160,196	50
Operation and maintenance costs	250.737	19	336.500	14
Others (office consumables, etc.)	24.467	2	85.509	4
Total amount	1,283,231	100	2,332.205	100

Source: WASA-M documents

WASA-M continues to rely heavily on subsidies from the Government of Punjab to secure its budget for the next year's anticipated expenditures. Until future increases in water and sewerage tariffs are implemented and WASA-M is able to increase its rate of return, it will be necessary to adjust its income and expenditure through subsidies. Such a situation is not limited to WASA-M but is a general situation in WASA in major cities of Punjab.

The sharing of operation and maintenance costs for the implementation of the project is also specified in the minutes of the consultation on the implementation of the project signed in



September 2021, and the agreement of the Housing, Urban Development & Public Health Engineering Department, (HUD&PHED), the supervising ministry of the Government of the Punjab for WASA-M, has been obtained. The government is expected to ensure continued financial support through subsidies to WASA-M. In addition, optimization of water and sewerage tariffs by raising the tariffs is currently being promoted jointly by the five WASAs in Punjab and has already been submitted to the Cabinet Committee of the Punjab Provincial Assembly with the consent of the Chief Minister. If the proposed hike is approved, the budgetary flexibility of the WASA-M will be greatly enhanced.

The standard service life of the equipment to be procured in this project is generally 10 years for all machines, based on the standard service life listed in the Construction Machinery Ownership Cost Table. If the equipment is properly maintained and managed, it can be used beyond the standard service life of 10 years like existing equipment.



**CHAPTER 3**  
**PROJECT EVALUATION**



## Chapter 3 Project Evaluation

### 3-1 Preconditions

In order to implement the project properly, it is assumed that the following items are fulfilled by the Pakistan side.

- Completion of PC-1 procedure <sup>8</sup>
- Budgetary provision
- Provision of facilities for customs clearance
- Tax exemption
- Bank charges

### 3-2 Necessary Inputs by Recipient Country

In order for the project to develop and maintain its initial effectiveness, the following inputs by the Pakistan side are required.

#### (1) Securing necessary personnel

Jetting machines, suction machines, and other vehicle-related equipment to be provided require drivers and operators. In addition, auxiliary workers are required when they are used for cleaning sewage pipes.

There is no need to hire new auxiliary workers because there is enough manpower in the manual cleaning team of each branch to support machine cleaning.

For drivers and other equipment operators, WASA-M has provided a plan to increase their number as described in Chapter 4. Employment of 46 new staff members at the time of the provision of the equipment is planned for its operation and management.

The activities of a relevant JICA technical cooperation project, the Project for Improving the Capacity of WASAs in Punjab Province Phase 2, has already begun and WASA-M is planning to participate in the relevant training in the project.

#### (2) Securing deployment locations

In order to secure the storage space necessary for the maintenance of newly procured equipment, we confirmed the availability of sufficient space for the storage of the equipment at the candidate WASA-M facilities and the existence of available buildings at some of them by conducting site

---

<sup>8</sup> Planning Commission Document-1

A document to apply for a development budget within the Government of Pakistan for each project. In this project, the necessary expenses other than those covered by the grant assistance are to be accounted for.

visits to SDs and its branches, D/Ss, and other candidate facilities. On the other hand, since it is necessary to construct vehicle access roads, clear the storage areas and put up the roof over storage areas, such works need to be completed by the time the equipment is handed over.

(3) Securing maintenance and management costs

WASA-M will need to secure a budget for fuel, inspection, repair, etc. of the equipment to be provided. WASA-M has started to prepare the PC-1 to secure the maintenance budget and to allocate the necessary expenses to the WASA-M budget. The PC-1 has been prepared and will be ready as soon as the details of the equipment to be provided are finalized. The provision of the equipment is expected in mid-FY2023-24, and the plan to increase the number of personnel shown in the section on securing necessary personnel will be implemented in time for the provision of equipment. Information on this project plan has been shared with relevant parties, including the budget manager.

(4) Encouraging systematic cleaning work

The effect of this project will be expressed by the shift of the cleaning method of sewerage facilities of WASA-M from the conventional reactive method to systematic cleaning. Therefore, it is required that WASA-M continues to implement the cleaning method based on the technology transferred in the soft component to establish it as a daily activity.

### **3-3 Important Assumptions**

The external conditions for developing and sustaining the effects of the project are assumed to be as follows.

- Continued financial support from the provincial government grants until future improvement in WASA-M's financial position is achieved through revised rates for water and wastewater
- No extreme deterioration in public safety or the prevalence of infectious diseases, including COVID-19, in the target area

### **3-4 Project Evaluation**

Based on the following, it is judged that this project is highly relevant and expected to be effective.

#### **3-4-1 Relevance**

This project aims to strengthen the operational system and implementation capacity of sewerage services in Multan District in the southern part of Punjab Province and improve the sanitation

environment in the target area, which is fully in line with Pakistan's national and provincial policies to improve sanitation through water supply and sewerage projects. It is also in line with the development cooperation policy of Japan. The relevance of this project in the light of the key elements of these policies and directions is presented below.

#### **3-4-1-1 Project beneficiaries**

The project will benefit the general public, including the poor, rather than people of any particular class or in any particular region, and approximately two million people in Multan will benefit directly or indirectly from its implementation.

#### **3-4-1-2 Project purpose and human security**

This project, which aims to eradicate unsanitary conditions caused by overflowing sewage, will greatly contribute to the stability of the people's livelihood and the improvement of their lives. In addition, the urgency of this project is very high because it aims to improve the situation where sewage overflows occur on a daily basis in urban areas and citizens continuously complain about them.

#### **3-4-1-3 Achieve the goals of the country's medium- and long-term development plans**

The water sector is one of the priority policy areas of the federal and provincial governments and the development of sewerage facilities is planned and implemented at the national and provincial levels based on the National Sanitation Policy (2006) and Punjab Urban Water Supply and Sanitation (2007), respectively. The improvement of the maintenance and management capacity of the sewerage facilities by this project is regarded as an essential part of these policies, as it will ensure the sustainability of the sewerage system to be developed in the future.

#### **3-4-1-4 Consistency with Japan's assistance policy**

Frequent overflowing of sewage and flooding of roads in the city of Multan has become an obstacle to traffic, adversely affecting human traffic and distribution, and hindering commercial activities from a sanitary point of view. The improvement of such conditions forms part of the improvement of economic infrastructure, which is a priority area in Japan's Country Assistance Policy for Pakistan (February 2018). With regard to ensuring human security and improving social infrastructure, which are also the priority areas, Japan's policy on water and sanitation is to model infrastructure and operational systems, including fee collection, with a focus on water supply and sewerage in urban areas, and to consider expanding these systems on a regional basis. This project is consistent with the series of assistance to WASA that Japan has been promoting in other major cities in Punjab.

## 3-4-2 Effectiveness

### 3-4-2-1 Quantitative effects

The quantitative indicators of the effects are shown in Table 3-1.

**Table 3-1 Baseline and Target Values for Quantitative Effects**

Indicator	Baseline value (2021)	Target value (2027)
Distance of removal of sediment in sewage pipes (km)	4.1 km/year	Approx. 230 km/year*.
Dewatering pump set emergency drainage capacity	140 m <sup>3</sup> / min	392 m <sup>3</sup> /min

#### a) Distance of removal of sediment in sewage pipes

While the target value of the distance of removal of sediment in sewage pipes with the cleaning work is set at 324 km/year, the initial figures are expected to be low: we assumed 30% of the target distance after one year, and then 50% after two years and 70% (or 324 km x 70% ≈ 230 km) after three years as the work efficiency is expected to improve gradually.

We assume that the cleaning work to remove the sediment will start from the areas where the frequency of overflow and flooding is high and complaints are concentrated and the work in these areas will take a lot of time because the degree of blockage by the sediment in the sewage pipes in that areas is high. On the other hand, taking into account the shifting of the work area to areas with lower blockages and the improvement in the skill level of the workers, the daily progress for the next three years is assumed to be as follows.

The final distance of removal of sediment in the sewage pipe (daily progress) will be 30m/span between manholes x 3 spans or times/day, in accordance with the current situation in Multan, while referring to the standard daily progress in Japan.

After 1 year, only one span was used instead of the standard three spans due to the amount of sediment and the low level of proficiency 1 span/3 spans ≈ 30 %

After 2 years, as the work efficiency improves a little, the target is set at 1.5 spans, 1.5 spans/3 spans ≈ 50%

After 3 years, as the work efficiency improves further, the target is set at 2 spans, 2 spans/3 spans ≈ 70%.

#### b) Drainage capacity of dewatering pump sets in emergency

The combined drainage capacity of all the existing dewatering pumps currently in operation is estimated at 140 m<sup>3</sup>/min assuming that the drainage capacity of each of those pumps has been reduced to 50 % of the rated capacity due to aging. At the completion of this project, the combined capacity is expected to be reduced further by 50 % to 70 m<sup>3</sup>/min due to aging and disuse. The target value was



obtained by adding the combined rated capacity of the pumps to be provided (322 m<sup>3</sup>/min) to that of the existing ones (70 m<sup>3</sup>/min).

### **3-4-2-2 Qualitative effects**

The qualitative effects are as follows:

- Reduced risk of waterborne diseases due to reduced flooding and flooding damage
- The economic and social activities of citizens, which have been hampered by flooded roads and urban areas, will become more active
- Improving sanitation in the city by reducing waste dumping and chronic flooding conditions and
- Increased public satisfaction with sewerage services



## **APPENDICES**



**APPENDIX-1**  
**MEMBER LIST OF THE STUDY TEAM**



## Appendix 1 Member List of the Study Team

Name	Title	Organization
Hideaki MATSUOKA	Team Leader	Director Environmental Management Team 1 Environmental Management Group Global Environment Department, JICA
Sayaka TAKUWA	Planning Management	Assistant Director Environmental Management Team 1 Environmental Management Group Global Environment Department, JICA
Koji MIYAUCHI	Chief Consultant/ Sewerage and Drainage Planning	Japan Techno Co., Ltd.
Hiroki FUJIWARA	Equipment Planning 1	NJS Consultants Co., Ltd.
Shoji TAKAMATSU	Equipment Planning 2	Japan Techno Co., Ltd.
Takashi NAKAGAWA	Cost Estimation/ Procurement Planning	Japan Techno Co., Ltd.
Masayuki NAGAMOCHI	Operation and Maintenance Planning	Nihon Suido Consultants Co., Ltd.





**APPENDIX-2**  
**STUDY SCHEDULE**



## Appendix 2 Study Schedule

### Schedule for First Survey in Pakistan (Consultant Team)

Date		Main Activities
22nd, Aug.	Sun	Arrival in Pakistan from Japan Isolation days to 31st, On line meetings with WASA-M and/or with JICA
1st, Sep.	Wed	Courtesy call and meeting with HUD&PHED, P&D and WASA-M
2nd, Sep.	Thu	Signing of Minutes
3rd, Sep.	Fri	Shift from Lahore to Multan
4th, Sep.	Sat	Courtesy call and meeting with WASA-M, Survey schedule adjustment and etc.
6th, Sep.	Mon	Meeting with WASA-M, Site survey
7th, Sep.	Tue	Meeting with WASA-M, Site survey
8th, Sep.	Wed	Meeting with WASA-M, Site survey
9th, Sep.	Thu	Meeting with WASA-M, Site survey
10th, Sep.	Fri	Meeting with WASA-M, Site survey
11th, Sep.	Sat	Meeting with WASA-M, Site survey
13th, Sep.	Mon	Meeting with WASA-M, Site survey
14th, Sep.	Tue	Meeting with WASA-M, Shift from Multan to Faisalabad
15th, Sep.	Wed	Courtesy call and meeting with WASA-F, Site survey
16th, Sep.	Thu	Site survey, Shift from Faisalabad to Lahore
17th, Sep.	Fri	Leaving for Japan

### Schedule for Second Survey in Pakistan (Consultant Team)

Date		Main Activities
29th, Nov.	Mon	Arrival in Pakistan from Japan, Meeting for DOD with MoFA and JICA
30th, Nov.	Tue	Courtesy call and meeting with HUD&PHED, P&D and WASA-M
1st, Dec.	Wed	Meeting with HUD&PHED, P&D and WASA-M
2nd, Dec.	Thu	Signing of DOD
3rd, Dec.	Fri	Reporting
4th, Dec.	Sat	Leaving for Japan



**APPENDIX-3**  
**LIST OF PARTIES CONCERNED**  
**IN THE RECIPIENT COUNTRY**



## **Appendix 3 List of Parties Concerned in the Recipient Country**

### **(1) First Field Survey in Pakistan**

#### Planning and Development Board (P&D)

Mr. Muhammad Shafiq Ahmad                      Member Social Infrastructure

#### Housing, Urban Development & Public Health Engineering Department (HUD&PHED)

Mr. Umar Farooq                                      Additional Secretary (Technical)

Mr. Souman Khalid                                  Deputy Secretary

#### WASA Multan

Mr. Nasir Iqbal                                        Managing Director

Mr. Chaiudary Shahzad Murin                    Director (Works)

Mr. Abdul Salam                                     Director (Engineering)

Mr. Waqas Ahmad                                  Deputy Director (Works). Sewerage Centre

Mr. Arif Abbas                                        Deputy Director (Works) \* hold two posts, Sewerage South

Mr. Asif Francis                                      Assistant Director (Works), Sewerage South

Mr. Sajid    Deputy Director (Works), Sewerage North

Mr. Arif Abbas                                        Deputy Director (Works), Disposal Stations

Mr. Tariq Mahmood                                 Assistant Director (Works), Disposal Stations

Mr. Afzal    Assistant Director (Works), Central, Disposal Stations

Mr. Abdul Qayyum                                 Assistant Director (Works), South, Disposal Stations

Mr. Umer Zafar                                      Assistant Director (Works), North, Disposal Stations

Mr. Abdul Mueed                                    Assistant Director (Works), Technical, Disposal Stations

Mr. Muhammad Nadeem                            Deputy Director (P&D, Engineering)

#### Multan Development Authority (MDA)

Mr. Irfan Ali    Executive Engineer / Deputy Director

#### WASA Faisalabad

Mr. Faqir Muhammad Chaudhry                    Managing Director

Mr. Adnan Nisar Khan                                Deputy Managing Director

Mr. Saqib Raza                                        Director (Works)

Mr. Furqan Haidar                                  Deputy Director (O&M)

#### WASA Lahore

Mr. Zahid Aziz Syed                                 Managing Director

Mr. Zeeshan Bilal                                    Director (Planning & Design)

Mr. Mavra Khan                                      Deputy Director (P&D)

**(2) Second Field Survey in Pakistan (Explanation of Draft Final Report)**

Planning and Development Board (P&D)

Mr. Muhammad Shafiq Ahmad	Member Social Infrastructure
Mr. Yasir Mubeen	Chief of the Section
Mr. Mehtab Yaseen	Assistant Chief (Urban Development)
Mr. Shahid Iqbal	Assistant Chief (External Capital Assistance II)
Ms. Nida Shamim	Project Officer (External Capital Assistance II)

Housing, Urban Development & Public Health Engineering Department (HUD&PHED)

Mr. Souman Khalid	Deputy Secretary
Mr. Ashar Ashif	Project Coordinator

WASA Multan

Mr. Nasir Iqbal	Managing Director
Mr. Muhammad Nadeem	Deputy Director (Plan & Design)

Multan Development Authority (MDA)

Mr. Irfan Ali	Executive Engineer / Deputy Director
---------------	--------------------------------------



**APPENDIX-4**  
**MINUTES OF DISCUSSION**

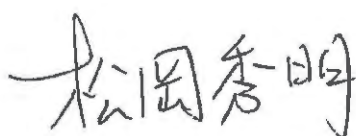


## Appendix 4(1) Minutes of Discussions (First Survey)

### Minutes of Discussions on the Preparatory Survey for the Project for Upgrading of Mechanical System for Sewerage and Drainage Services in Multan

In response to the request from the Government of Pakistan (hereinafter referred to as "Pakistan"), Japan International Cooperation Agency (hereinafter referred to as "JICA") dispatched the Preparatory Survey Team for the Outline Design (hereinafter referred to as "the Team") of the Project for Upgrading of Mechanical System for Sewerage and Drainage Services in Multan (hereinafter referred to as "the Project") to Pakistan. The Team held a series of discussions with the officials of the Government of Pakistan and conducted a field survey. In the course of the discussions, both sides have confirmed the main items described in the attached sheets.

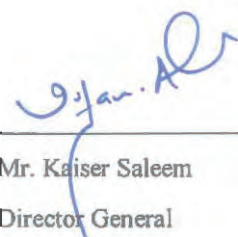
Islamabad /Multan /Tokyo, 2<sup>nd</sup>, September, 2021



Mr. Matsuoka Hideaki  
Leader  
Preparatory Survey Team  
Japan International Cooperation  
Agency  
Japan



Mr. Nasir Iqbal  
Managing Director  
Water and Sanitation Agency,  
Multan  
Islamic Republic of Pakistan



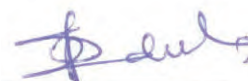
Mr. Kaiser Saleem  
Director General  
Multan Development Authority  
Multan  
Islamic Republic of Pakistan



Mr. Umar Farooq  
Additional Secretary  
(Technical)  
Housing, Urban Development  
& Public Health Engineering  
Department,  
Government of the Punjab  
Islamic Republic of Pakistan



Mr. Muhammad Shafiq  
Ahmad  
Member (Social  
Infrastructure)  
Planning & Development  
Board, Government of the  
Punjab  
Islamic Republic of Pakistan



Ms. Syeda Adeela Bokhari  
Joint Secretary  
Japan/NGO/INGO  
Economic Affairs Division  
Islamic Republic of Pakistan

## ATTACHMENT

### 1. Objective of the Project

The objective of the Project is to strengthen the operational system and implementation capacity of sewerage services in Water and Sanitation Agency (WASA)'s area of jurisdiction in Multan Province, Punjab through providing the Equipment required for cleaning and maintenance of sewers and drainage channels, thereby contributing to improve the sanitation environment in the target areas.

### 2. Title of the Preparatory Survey

Both sides confirmed the title of the Preparatory Survey as "the Preparatory Survey for the Project for Upgrading of Mechanical System for Sewerage and Drainage Services in Multan".

### 3. Project site

Both sides confirmed that the site of the Project is in jurisdictional area of WASA, Multan, which is shown in Annex 1.

### 4. Responsible authority for the Project

Both sides confirmed the authorities responsible for the Project are as follows:

4-1. The Water and Sanitation Agency (WASA) , Multan will be the executing agency for the Project (hereinafter referred to as "the Executing Agency"). The Executing Agency shall coordinate with all the relevant authorities to ensure smooth implementation of the Project and ensure that the undertakings for the Project shall be managed by relevant authorities properly and on time. The organization charts are shown in Annex 2.

4-2. The Housing Urban Development and Public Health Engineering Department, Government of Punjab (hereinafter referred to as "HUD&PHED") shall be responsible for supervising the Executing Agency on behalf of the Government of Pakistan.

### 5. Items requested by the Government of Pakistan

5-1. As a result of discussions, both sides confirmed that the items requested by the Government of Pakistan are as follows:

Equipment Name	Purpose	Quantity
		Nos.
1. Suction Machine	Sewer Cleaning	18
2. Jetting Machine	Sewer Cleaning	18
3. Dewatering Pumps (for rainwater)	Rainwater Pumping	10
4. Dragline	Main Drain Cleaning	2
5. Backhoe	Main Drain Cleaning	2
6. Dump Truck	Carry silt to dump site	4
7. Truck Crane	O&M	2
8. Cleaning machine for sewer pipe (Towing type)	Sewer pipe cleaning	9
9. Lifter	Loading & un-loading of pumps & motors	3
10. Dewatering Pumps (for sewage)	Sewage pumping	16
11. Water Analysis Lab Mobile Cab	Sampling & Testing of water quality	1
12. Pickup truck	Shifting of Material and equipment	5
13. Plugs for sewer line	Sewer stopping	36
14. Camera a) Insert type b) Telescopic type	Inspect cause of sewer clogging and confirm conditions after cleaning	a: 3 b: 9

Items and quantities will be finally concluded and the further details of specification will be confirmed mutually in accordance with the result of field work by the Team.

5-2. JICA will assess the feasibility of the above requested items through the survey and will report the findings to the Government of Japan. The final scope of the Project will be decided by the Government of Japan.

## 6. Procedures and Basic Principles of Japanese Grant

6-1. The Pakistani side agreed that the procedures and basic principles of Japanese Grant (hereinafter referred to as "the Grant") as described in Annex 3 shall be applied to the Project.

As for the monitoring of the implementation of the Project, JICA requires the Pakistani side to submit the Project Monitoring Report, the form of which is attached as Annex 4.

6-2. The Pakistani side agreed to take the necessary measures, as described in Annex 5, for smooth implementation of the Project. The contents of the Annex 5 will be elaborated and refined during the Preparatory Survey and be agreed in the mission dispatched for explanation of the Draft Preparatory Survey Report.

The contents of Annex 5 will be updated as the Preparatory Survey progresses, and eventually, will be used as an attachment to the Grant Agreement.

## 7. Schedule of the Survey

7-1. The Team will proceed with further survey in Pakistan until the end of September.



- 7-2. JICA will prepare a draft Preparatory Survey Report in English and dispatch a mission to Pakistan in order to explain its contents around November 2021.
- 7-3. If the contents of the draft Preparatory Survey Report are accepted and the undertakings for the Project are fully agreed by the Pakistani side, JICA will finalize the Preparatory Survey Report and send it to Pakistan around April 2022.
- 7-4. The above schedule is tentative and subject to change.

## 8. Environmental and Social Considerations

- 8-1. The Pakistani side confirmed to give due environmental and social considerations before and during implementation, and after completion of the Project, in accordance with the JICA Guidelines for Environmental and Social Considerations (April, 2010).
- 8-2. The Project is categorized as "C" from the following considerations:  
Not located in a sensitive area, nor has it sensitive characteristics, nor falls it into sensitive sectors under the Guidelines, and its potential adverse impacts on the environment are not likely to be significant.

## 9. Other Relevant Issues

### 9-1. PC-1 of the Project

The Pakistani side confirmed that approval of Planning Commission-I (PC-1) of the Project is necessary for implementation of the Project. The schedule for the approval of the PC-1 is as follows.

November 2021	Provision of necessary information from the Team to WASA Multan for finalization of PC-1
November 2021	Development of PC-1 (Final) by WASA Multan
December 2021	Approval of the PC- by Provincial Development Working Party (PDWP)
January 2022	Approval of the PC-1 by CDWP

### 9-2. Security Arrangement

The Pakistani side shall take all possible and necessary measures to ensure the safety of concerned Japanese and other foreign persons during the Survey and during the implementation of the Project, whenever Japanese side requests in advance.

### 9-3. Tax exemption

Both sides confirmed that the exemption of tax including Value Added Tax (VAT), customs duty, and any other taxes and fiscal levies, which is to be imposed in relation to the Project, will be ensured by the Pakistani side. Both sides agreed that WASA Multan would take any necessary procedures for tax exemption, and in case that tax exemption should not be secured, the cost of tax would be borne by Government of Punjab.

*ch*  
*o*  
*\**

【Annex 1 Project Site】

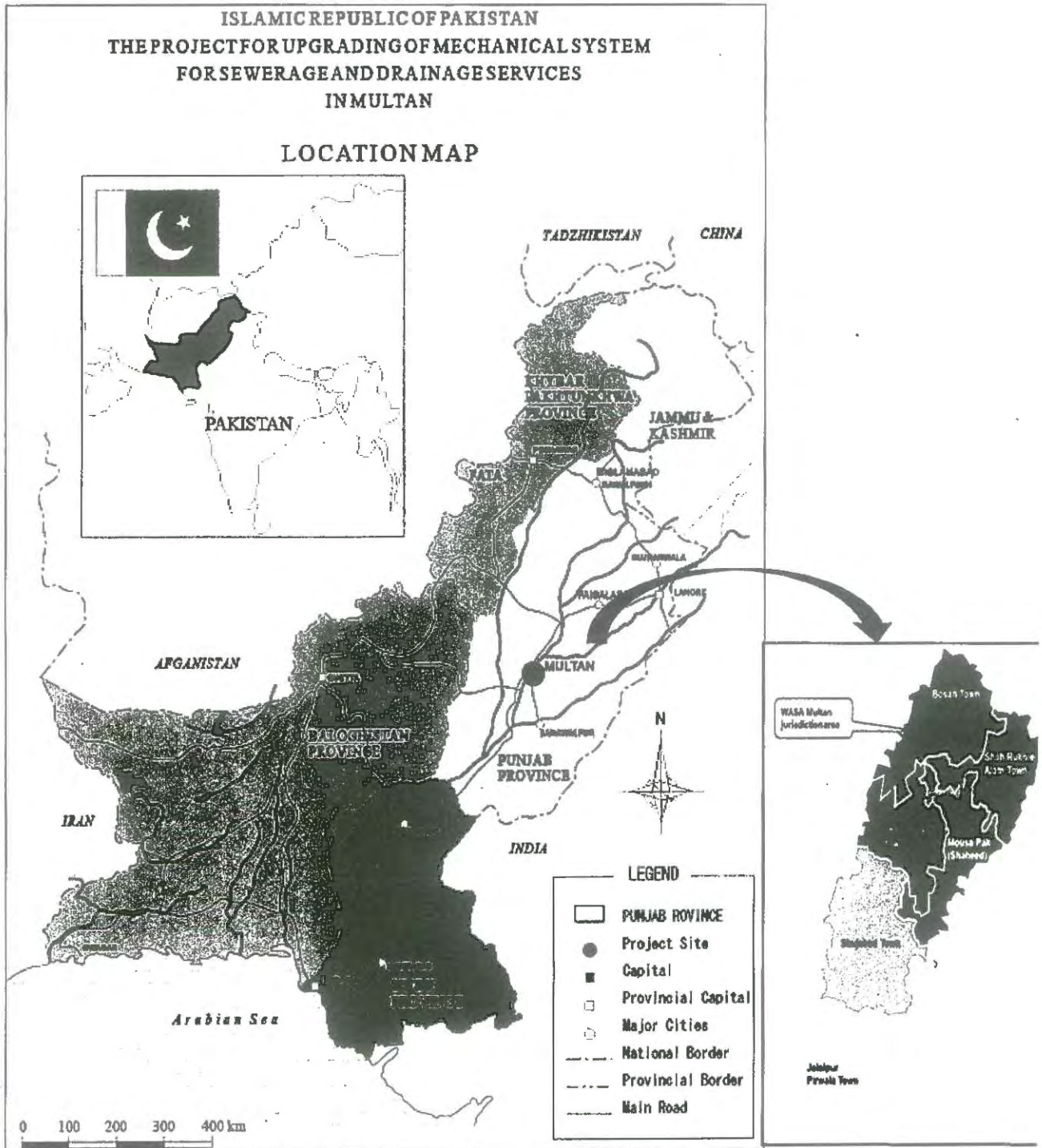
【Annex 2 Organization Chart】

【Annex 3 Japanese Grant】

【Annex 4 Project Monitoring Report (template)】

【Annex 5 Major Undertakings to be taken by the Government of Pakistan】

**【Project Site】**



*Handwritten blue scribbles*

*Handwritten blue signatures and initials*





## JAPANESE GRANT

The Japanese Grant is non-reimbursable fund provided to a recipient country (hereinafter referred to as "the Recipient") to purchase the products and/or services (engineering services and transportation of the products, etc.) for its economic and social development in accordance with the relevant laws and regulations of Japan. Followings are the basic features of the project grants operated by JICA (hereinafter referred to as "Project Grants").

### 1. Procedures of Project Grants

Project Grants are conducted through following procedures (See "PROCEDURES OF JAPANESE GRANT" for details):

(1) Preparation

- The Preparatory Survey (hereinafter referred to as "the Survey") conducted by JICA

(2) Appraisal

- Appraisal by the government of Japan (hereinafter referred to as "GOJ") and JICA, and Approval by the Japanese Cabinet

(3) Implementation

Exchange of Notes

- The Notes exchanged between the GOJ and the government of the Recipient

Grant Agreement (hereinafter referred to as "the G/A")

- Agreement concluded between JICA and the Recipient

Banking Arrangement (hereinafter referred to as "the B/A")

- Opening of bank account by the Recipient in a bank in Japan (hereinafter referred to as "the Bank") to receive the grant

Construction works/procurement

- Implementation of the project (hereinafter referred to as "the Project") on the basis of the G/A

(4) Ex-post Monitoring and Evaluation

- Monitoring and evaluation at post-implementation stage

### 2. Preparatory Survey

(1) Contents of the Survey

The aim of the Survey is to provide basic documents necessary for the appraisal of the the Project made by the GOJ and JICA. The contents of the Survey are as follows:

- Confirmation of the background, objectives, and benefits of the Project and also institutional capacity of

relevant agencies of the Recipient necessary for the implementation of the Project.

- Evaluation of the feasibility of the Project to be implemented under the Japanese Grant from a technical, financial, social and economic point of view.
- Confirmation of items agreed between both parties concerning the basic concept of the Project.
- Preparation of an outline design of the Project.
- Estimation of costs of the Project.
- Confirmation of Environmental and Social Considerations

The contents of the original request by the Recipient are not necessarily approved in their initial form. The Outline Design of the Project is confirmed based on the guidelines of the Japanese Grant.

JICA requests the Recipient to take measures necessary to achieve its self-reliance in the implementation of the Project. Such measures must be guaranteed even though they may fall outside of the jurisdiction of the executing agency of the Project. Therefore, the contents of the Project are confirmed by all relevant organizations of the Recipient based on the Minutes of Discussions.

*g*

(2) Selection of Consultants

*l*

For smooth implementation of the Survey, JICA contracts with (a) consulting firm(s). JICA selects (a) firm(s) based on proposals submitted by interested firms.

(3) Result of the Survey

JICA reviews the report on the results of the Survey and recommends the GOJ to appraise the implementation of the Project after confirming the feasibility of the Project.

### 3. Basic Principles of Project Grants

(1) Implementation Stage

1) The E/N and the G/A

*A*

After the Project is approved by the Cabinet of Japan, the Exchange of Notes (hereinafter referred to as "the E/N") will be signed between the GOJ and the Government of the Recipient to make a pledge for assistance, which is followed by the conclusion of the G/A between JICA and the Recipient to define the necessary articles, in accordance with the E/N, to implement the Project, such as conditions of disbursement, responsibilities of the Recipient, and procurement conditions. The terms and conditions generally applicable to the Japanese Grant are stipulated in the "General Terms and Conditions for Japanese Grant (January 2016)."

*mi* *Jun*  
*GA*



2) Banking Arrangements (B/A) (See "Financial Flow of Japanese Grant (A/P Type)" for details)

- a) The Recipient shall open an account or shall cause its designated authority to open an account under the name of the Recipient in the Bank, in principle. JICA will disburse the Japanese Grant in Japanese yen for the Recipient to cover the obligations incurred by the Recipient under the verified contracts.
- b) The Japanese Grant will be disbursed when payment requests are submitted by the Bank to JICA under an Authorization to Pay (A/P) issued by the Recipient.

3) Procurement Procedure

The products and/or services necessary for the implementation of the Project shall be procured in accordance with JICA's procurement guidelines as stipulated in the G/A.

4) Selection of Consultants

In order to maintain technical consistency, the consulting firm(s) which conducted the Survey will be recommended by JICA to the Recipient to continue to work on the Project's implementation after the E/N and G/A.

5) Eligible source country

In using the Japanese Grant disbursed by JICA for the purchase of products and/or services, the eligible source countries of such products and/or services shall be Japan and/or the Recipient. The Japanese Grant may be used for the purchase of the products and/or services of a third country as eligible, if necessary, taking into account the quality, competitiveness and economic rationality of products and/or services necessary for achieving the objective of the Project. However, the prime contractors, namely, constructing and procurement firms, and the prime consulting firm, which enter into contracts with the Recipient, are limited to "Japanese nationals", in principle.

6) Contracts and Concurrence by JICA

The Recipient will conclude contracts denominated in Japanese yen with Japanese nationals. Those contracts shall be concurred by JICA in order to be verified as eligible for using the Japanese Grant.

7) Monitoring

The Recipient is required to take their initiative to carefully monitor the progress of the Project in order to ensure its smooth implementation as part of their responsibility in the G/A, and to regularly report to JICA about its status by using the Project Monitoring Report (PMR).

8) Safety Measures

The Recipient must ensure that the safety is highly observed during the implementation of the Project.

9) Construction Quality Control Meeting

Construction Quality Control Meeting (hereinafter referred to as the "Meeting") will be held for quality assurance and smooth implementation of the Works at each stage of the Works. The member of the Meeting will be composed by the

Recipient (or executing agency), the Consultant, the Contractor and JICA. The functions of the Meeting are as followings:

- a) Sharing information on the objective, concept and conditions of design from the Contractor, before start of construction.
- b) Discussing the issues affecting the Works such as modification of the design, test, inspection, safety control and the Client's obligation, during of construction.

(2) Ex-post Monitoring and Evaluation Stage

1) After the project completion, JICA will continue to keep in close contact with the Recipient in order to monitor that the outputs of the Project is used and maintained properly to attain its expected outcomes.

2) In principle, JICA will conduct ex-post evaluation of the Project after three years from the completion. It is required for the Recipient to furnish any necessary information as JICA may reasonably request.

(3) Others

1) Environmental and Social Considerations

The Recipient shall carefully consider environmental and social impacts by the Project and must comply with the environmental regulations of the Recipient and JICA Guidelines for Environmental and Social Considerations (April, 2010).

2) Major undertakings to be taken by the Government of the Recipient

For the smooth and proper implementation of the Project, the Recipient is required to undertake necessary measures including land acquisition, and bear an advising commission of the A/P and payment commissions paid to the Bank as agreed with the GOJ and/or JICA. The Government of the Recipient shall ensure that customs duties, internal taxes and other fiscal levies which may be imposed in the Recipient with respect to the purchase of the Products and/or the Services be exempted or be borne by its designated authority without using the Grant and its accrued interest, since the grant fund comes from the Japanese taxpayers.

3) Proper Use

The Recipient is required to maintain and use properly and effectively the products and/or services under the Project (including the facilities constructed and the equipment purchased), to assign staff necessary for this operation and maintenance and to bear all the expenses other than those covered by the Japanese Grant.

4) Export and Re-export

The products purchased under the Japanese Grant should not be exported or re-exported from the Recipient.

*a*  
*b*  
~~*c*~~  
*d*

*Jun*  
*Che*

## PROCEDURES OF JAPANESE GRANT

Stage	Procedures	Remarks	Recipient Government	Japanese Government	JICA	Consultants	Contractors	Agent Bank
Official Request	Request for grants through diplomatic channel	Request shall be submitted before appraisal stage.	x	x				
1. Preparation	(1) Preparatory Survey Preparation of outline design and cost estimate		x		x	x		
2. Appraisal	(2) Preparatory Survey Explanation of draft outline design, including cost estimate, undertakings, etc.		x		x	x		
	(3) Agreement on conditions for implementation	Conditions will be explained with the draft notes (E/N) and Grant Agreement (G/A) which will be signed before approval by Japanese government.	x	x (E/N)	x (G/A)			
	(4) Approval by the Japanese cabinet			x				
3. Implementation	(5) Exchange of Notes (E/N)		x	x				
	(6) Signing of Grant Agreement (G/A)		x		x			
	(7) Banking Arrangement (B/A)	Need to be informed to JICA	x					x
	(8) Contracting with consultant and issuance of Authorization to Pay (A/P)	Concurrence by JICA is required	x			x		x
	(9) Detail design (D/D)		x			x		
	(10) Preparation of bidding documents	Concurrence by JICA is required	x			x		
	(11) Bidding	Concurrence by JICA is required	x			x	x	
	(12) Contracting with contractor/supplier and issuance of A/P	Concurrence by JICA is required	x				x	x
	(13) Construction works/procurement	Concurrence by JICA is required for major modification of design and amendment of contracts.	x			x	x	
(14) Completion certificate		x			x	x		
4. Ex-post monitoring & evaluation	(15) Ex-post monitoring	To be implemented generally after 1, 3, 10 years of completion, subject to change	x		x			
	(16) Ex-post evaluation	To be implemented basically after 3 years of completion	x		x			

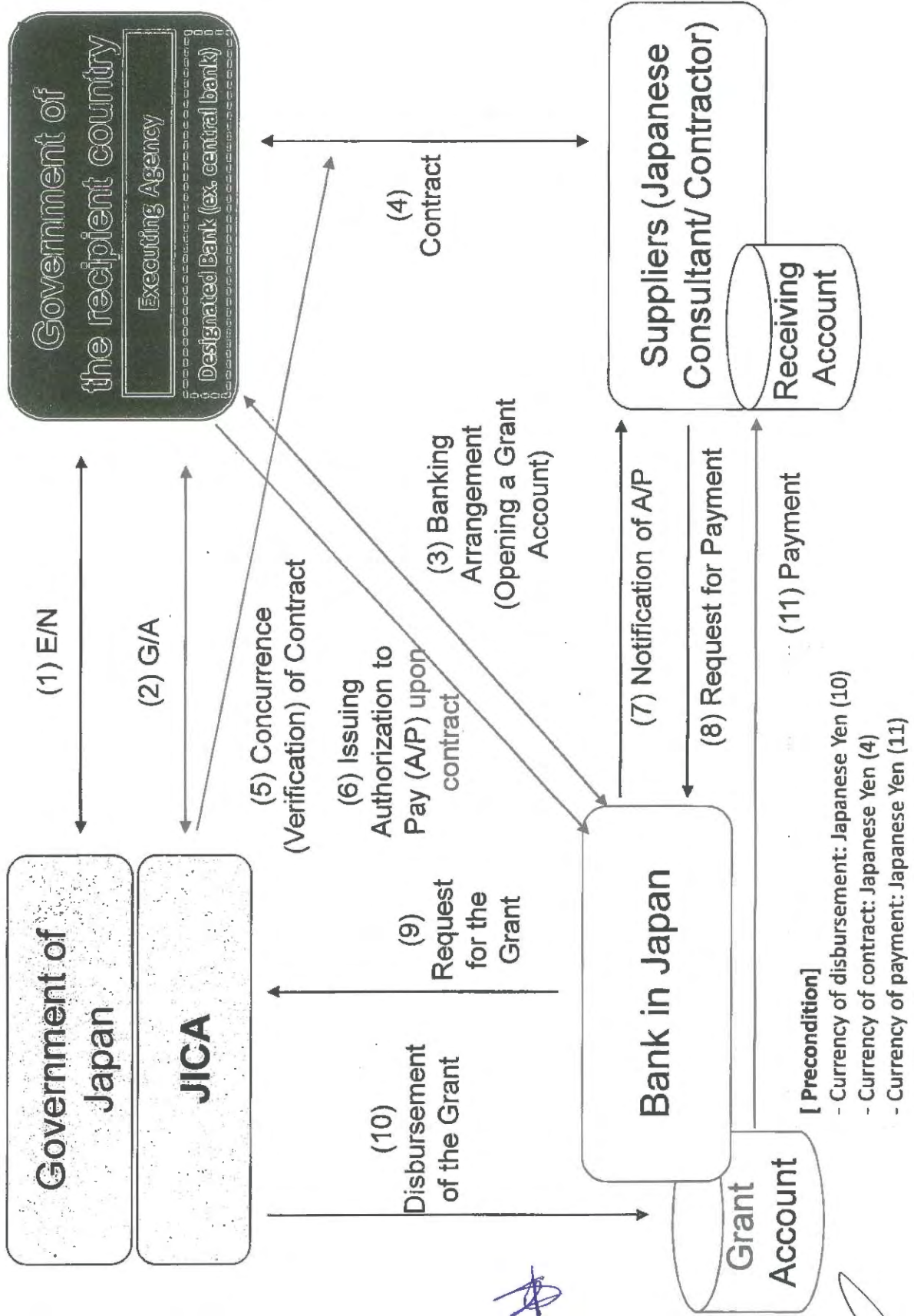
notes:

- Project Monitoring Report and Report for Project Completion shall be submitted to JICA as agreed in the G/A.
- Concurrence by JICA is required for allocation of grant for remaining amount and/or contingencies as agreed in the G/A.

2  
Jun  
Cal



# Financial Flow of Japanese Grant (A/P Type)



*Handwritten signatures and initials:*

- Top right: *Handwritten signature*
- Middle right: *Handwritten initials 'Zi'*
- Bottom right: *Handwritten initials 'Zm'*
- Far right: *Handwritten signature 'A'*
- Bottom right: *Handwritten signature 'Sei'*



**Project Monitoring Report**  
on  
**Project Name**  
**Grant Agreement No. XXXXXXXX**  
20XX, Month

**Organizational Information**

<b>Signer of the G/A (Recipient)</b>	Person in Charge <u>(Designation)</u> <hr/> Contacts <u>Address:</u> <u>Phone/FAX:</u> <u>Email:</u>
<b>Executing Agency</b>	Person in Charge <u>(Designation)</u> <hr/> Contacts <u>Address:</u> <u>Phone/FAX:</u> <u>Email:</u>
<b>Line Ministry</b>	Person in Charge <u>(Designation)</u> <hr/> Contacts <u>Address:</u> <u>Phone/FAX:</u> <u>Email:</u>

**General Information:**

<b>Project Title</b>	
<b>E/N</b>	Signed date: Duration:
<b>G/A</b>	Signed date: Duration:
<b>Source of Finance</b>	Government of Japan: Not exceeding JPY _____ mil. Government of (_____): _____

*Handwritten mark*

*Handwritten signatures and initials*

**1: Project Description**

**1-1 Project Objective**

--

**1-2 Project Rationale**

- Higher-level objectives to which the project contributes (national/regional/sectoral policies and strategies)
- Situation of the target groups to which the project addresses

--

**1-3 Indicators for measurement of "Effectiveness"**

Quantitative indicators to measure the attainment of project objectives		
Indicators	Original (Yr )	Target (Yr )
Qualitative indicators to measure the attainment of project objectives		

**2: Details of the Project**

**2-1 Location**

Components	Original <i>(proposed in the outline design)</i>	Actual
1.		

**2-2 Scope of the work**

Components	Original* <i>(proposed in the outline design)</i>	Actual*
1.		

Reasons for modification of scope (if any).

(PMR)
-------

**2-3 Implementation Schedule**

Items	Original		Actual
	<i>(proposed in the outline design)</i>	<i>(at the time of signing the Grant Agreement)</i>	

Reasons for any changes of the schedule, and their effects on the project (if any)

**2-4 Obligations by the Recipient**

**2-4-1 Progress of Specific Obligations**

See Attachment 2.

**2-4-2 Activities**

See Attachment 3.

**2-4-3 Report on RD**

See Attachment 11.

**2-5 Project Cost**

**2-5-1 Cost borne by the Grant(Confidential until the Bidding)**

Components			Cost (Million Yen)	
	Original <i>(proposed in the outline design)</i>	Actual <i>(in case of any modification)</i>	Original <sup>1)2)</sup> <i>(proposed in the outline design)</i>	Actual
1.				
Total				

Note: 1) Date of estimation:  
 2) Exchange rate: 1 US Dollar = Yen

**2-5-2 Cost borne by the Recipient**

Components			Cost (1,000 Taka)	
	Original <i>(proposed in the outline design)</i>	Actual <i>(in case of any modification)</i>	Original <sup>1)2)</sup> <i>(proposed in the outline design)</i>	Actual
1.				

- Note: 1) Date of estimation:  
2) Exchange rate: 1 US Dollar =

Reasons for the remarkable gaps between the original and actual cost, and the countermeasures (if any)

(PMR)

**2-6 Executing Agency**

- Organization's role, financial position, capacity, cost recovery etc,
- Organization Chart including the unit in charge of the implementation and number of employees.

**Original** (at the time of outline design)

name:

role:

financial situation:

institutional and organizational arrangement (organogram):

human resources (number and ability of staff):

**Actual** (PMR)

**2-7 Environmental and Social Impacts**

- The results of environmental monitoring based on Attachment 5 (in accordance with Schedule 4 of the Grant Agreement).
- The results of social monitoring based on in Attachment 5 (in accordance with Schedule 4 of the Grant Agreement).
- Disclosed information related to results of environmental and social monitoring to local stakeholders (whenever applicable).

**3: Operation and Maintenance (O&M)**

**3-1 Physical Arrangement**

- Plan for O&M (number and skills of the staff in the responsible division or section, availability of manuals and guidelines, availability of spareparts, etc.)

**Original** (at the time of outline design)

**Actual** (PMR)

**3-2 Budgetary Arrangement**

- Required O&M cost and actual budget allocation for O&M

**Original** (at the time of outline design)



**Actual (PMR)**

**4: Potential Risks and Mitigation Measures**

- Potential risks which may affect the project implementation, attainment of objectives, sustainability
- Mitigation measures corresponding to the potential risks

**Assessment of Potential Risks (at the time of outline design)**

Potential Risks	Assessment
1. (Description of Risk)	Probability: High/Moderate/Low
	Impact: High/Moderate/Low
	Analysis of Probability and Impact:
	Mitigation Measures:
	Action required during the implementation stage:
2. (Description of Risk)	Probability: High/Moderate/Low
	Impact: High/Moderate/Low
	Analysis of Probability and Impact:
	Mitigation Measures:
	Action required during the implementation stage:
3. (Description of Risk)	Probability: High/Moderate/Low
	Impact: High/Moderate/Low
	Analysis of Probability and Impact:
	Mitigation Measures:
	Action required during the implementation stage:

	Contingency Plan (if applicable):
<b>Actual Situation and Countermeasures</b>	
(PMR)	

**5: Evaluation and Monitoring Plan (after the work completion)**

**5-1 Overall evaluation**

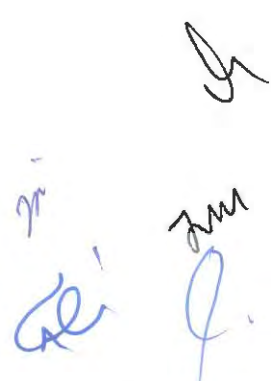
Please describe your overall evaluation on the project.

**5-2 Lessons Learnt and Recommendations**

Please raise any lessons learned from the project experience, which might be valuable for the future assistance or similar type of projects, as well as any recommendations, which might be beneficial for better realization of the project effect, impact and assurance of sustainability.

**5-3 Monitoring Plan of the Indicators for Post-Evaluation**

Please describe monitoring methods, section(s)/department(s) in charge of monitoring, frequency, the term to monitor the indicators stipulated in 1-3.



Attachment

1. Project Location Map
  2. Specific obligations of the Recipient which will not be funded with the Grant
  3. Monthly Report submitted by the Consultant
- Appendix - Photocopy of Contractor's Progress Report (if any)
- Consultant Member List
  - Contractor's Main Staff List
4. Check list for the Contract (including Record of Amendment of the Contract/ Agreement and Schedule of Payment)
  5. Environmental Monitoring Form / Social Monitoring Form
  6. Monitoring sheet on price of specified materials (Quarterly)
  7. Report on Proportion of Procurement (Recipient Country, Japan and Third Countries) (PMR (final) only)
  8. Pictures (by JPEG style by CD-R) (PMR (final) only)
  9. Equipment List (PMR (final) only)
  10. Drawing (PMR (final) only)

*[Handwritten signatures and initials in blue ink]*

Monitoring sheet on price of specified materials

1. Initial Conditions (Confirmed)

Items of Specified Materials	Initial Volume A	Initial Unit Price (₹) B	Initial total Price C=A×B	1% of Contract Price D	Condition of payment Price (Decreased) E=C-D	Price (Increased) F=C+D
Item 1	●●t	●	●●	●	●	●
Item 2	●●t	●	●●	●		
Item 3						
Item 4						
Item 5						

2. Monitoring of the Unit Price of Specified Materials

(1) Method of Monitoring : ●●

(2) Result of the Monitoring Survey on Unit Price for each specified materials

Items of Specified Materials	1st month, 2015	2nd month, 2015	3rd month, 2015	4th	5th	6th
Item 1	●	●	●			
Item 2						
Item 3						
Item 4						
Item 5						

(3) Summary of Discussion with Contractor (if necessary)

Handwritten notes and signatures in blue ink, including the word "Summary" and several illegible signatures.



Report on Proportion of Procurement (Recipient Country, Japan and Third Countries)  
 (Actual Expenditure by Construction and Equipment each)

	Domestic Procurement (Recipient Country) A	Foreign Procurement (Japan) B	Foreign Procurement (Third Countries) C	Total D
Construction Cost	(A/D%)	(B/D%)	(C/D%)	
Direct Construction Cost	(A/D%)	(B/D%)	(C/D%)	
others	(A/D%)	(B/D%)	(C/D%)	
Equipment Cost	(A/D%)	(B/D%)	(C/D%)	
Design and Supervision Cost	(A/D%)	(B/D%)	(C/D%)	
Total	(A/D%)	(B/D%)	(C/D%)	

*[Handwritten mark]*

*20*

*[Handwritten signature]*  
*[Handwritten initials]*

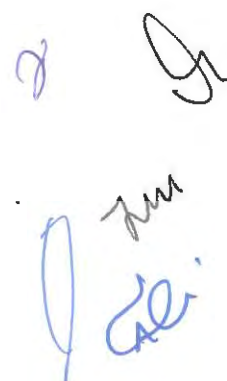
## Major Undertakings to be taken by the Government of Pakistan

## 1. Specific obligations of the Government of Pakistan( "the Recipient" of the Grant) which will not be funded with the Grant

## (1) Before the Bidding

No	Items	Deadline	In charge	Estimated Cost	Ref.
1	To sign the banking arrangement (B/A) with a bank in Japan (the Agent Bank) to open bank account for the Grant	within 1 month after the signing of the G/A	EAD WASA-M		
2	To issue A/P to the Agent Bank for the payment to the consultant	within 1 month after the signing of the contract(s)	WASA-M		
3	To bear the following commissions to the Agent Bank for the banking services based upon B/A				
	1) Advising commission of A/P	within 1 month after the signing of the contract(s)			
	2) Payment commission for A/P	every payment			
4	To secure the necessary budget and implement land acquisition and resettlement (including preparation of resettlement sites), and compensation with full replacement cost in accordance with RAP	before notice of the bidding document(s)	WASA-M		
5	To submit Project Monitoring Report (with the result of Detailed Design)	before preparation of bidding document(s)	WASA-M		

(B/A: Banking Arrangement, A/P: Authorization to pay, N/A: Not Applicable)

(2) During the Project Implementation

NO	Items	Deadline	In charge	Estimated Cost	Ref
1	To issue A/P to the Agent Bank for the payment to the supplier (s) and contractor (s)	within 1 month after the signing of the contract(s)	WASA-M		
2	To bear the following commissions to the Agent Bank for the banking services based upon the B/A				
	1) Advising commission of A/P	within 1 month after the signing of the contract(s)	WASA-M		
	2) Payment commission for A/P	every payment	WASA-M		
3	To handle duty (tax) exemption procedures and to take necessary measures as well as provide requisite legal and/or administrative documentations for customs clearance to the customs broker/forwarder to be employed by the Supplier(s) at the port of disembarkation for the materials and equipment imported for the Project as well as sending back of any defective equipment and/or spare parts to the manufacturer for repair at the factory or replacement and importation thereof into the country of the Recipient during the-implementation and warranty periods of the Project.	during the Project	EAD WASA-M		
4	To accord Japanese physical persons and/or physical persons of third countries whose services may be required in connection with the supply of the products and the services such facilities as may be necessary for their entry into the country of the Recipient and stay therein for the performance of their work	during the Project	EAD WASA-M		
5	To ensure that customs duties, internal taxes and other fiscal levies which may be imposed in the country of the Recipient with respect to the purchase of the products and/or the services be exempted/ be borne by its designated authority without using the Grant	during the Project	EAD WASA-M		
6	To bear all the expenses, other than those covered by the Grant, necessary for the implementation of the Project	during the Project	WASA-M		
7	1) To submit Project Monitoring Report after each work under the contract(s) such as shipping, hand over, installation and operational training	within 1 month after completion of each work	WASA-M		
	2) To submit Project Monitoring Report (final) (including equipment list, photographs and etc.)	within 1 month after issuance of Certificate of Completion for the works under the contract(s)	WASA-M		
8	To submit a report concerning completion of the Project	within 6 months after completion of the Project	WASA-M		
9	To prepare garages, stockyards with shade, watersupply and electricity, communication network and etc. for the equipment procured by the Project	prior to the delivery of the equipment to the site	WASA-M		

10	To ensure the safety of persons engaged in the implementation of the Project	during the Project	WASA-M		
11	To take necessary measures for security and safety of the Project site 1) To arrange security around the Project sites with the police. 2) To arrange security around the accommodation(s) of the Consultants & the Contractor with the police. 3) To arrange escort guard with the police during movements between the accommodation(s) of the Supplier(s) and the Project sites.	during the Project	WASA-M		
12	To provide necessary working spaces with internet connection at the WASA-M Office.	during the Project	WASA-M		

(3) After the Project

NO	Items	Deadline	In charge	Estimated Cost	Ref.
1	To maintain and use properly and effectively the facilities and equipment provided under the Grant Aid 1) Allocation of maintenance cost 2) Allocation of additional staff for operation and maintenance  Routine check/Periodic inspection	After completion of the construction	WASA-M		

25



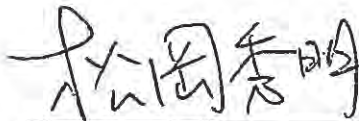
## Appendix 4(2) Minutes of Discussions (Second Survey)

### Minutes of Discussions on the Preparatory Survey for the Project for Upgrading of Mechanical System for Sewerage and Drainage Services in Multan (Explanation on Draft Preparatory Survey Report)

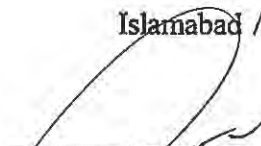
With reference to the minutes of discussions signed between Water and Sanitation Agency, Multan (hereinafter referred to as "WASA Multan" and Multan Development Authority (hereinafter referred to as "MDA") and Housing, Urban Development & Public Health Engineering Department (hereinafter referred to as "HUD&PHED") and Planning & Development Board (hereinafter referred to as "P & D") and the Japan International Cooperation Agency (hereinafter referred to as "JICA") on 2<sup>nd</sup> September, 2021 and in response to the request from the Government of Pakistan (hereinafter referred to as "Pakistan") dated 15<sup>th</sup> December, 2020, JICA dispatched the Preparatory Survey Team (hereinafter referred to as "the Team") for the explanation of Draft Preparatory Survey Report (hereinafter referred to as "the Draft Report") for the Project for Upgrading of Mechanical System for Sewerage and Drainage Services in Multan (hereinafter referred to as "the Project").

As a result of the discussions, both sides agreed on the main items described in the attached sheets.

Islamabad /Multan /Tokyo, 2nd, December, 2021

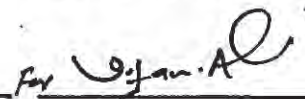


Mr. Matsuoka Hideaki  
Leader  
Preparatory Survey Team  
Japan International Cooperation  
Agency  
Japan



Mr. Nasir Iqbal  
Managing Director  
Water and Sanitation Agency,  
Multan

Islamic Republic of Pakistan

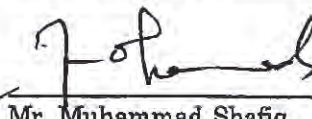


Mr. Kaiser Saleem  
Director General  
Multan Development Authority  
Multan

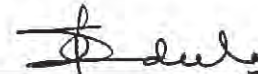
Islamic Republic of Pakistan



Mr. Umar Farooq  
Additional Secretary  
(Technical)  
Housing, Urban Development  
& Public Health Engineering  
Department,  
Government of the Punjab  
Islamic Republic of Pakistan



Mr. Muhammad Shafiq  
Ahmad  
Member (Social  
Infrastructure)  
Planning & Development  
Board, Government of the  
Punjab  
Islamic Republic of Pakistan



Ms. Syeda Adeela Bokhari  
Joint Secretary  
Japan/NGO/INGO  
Economic Affairs Division  
Islamic Republic of Pakistan

## ATTACHEMENT

### 1. Objective of the Project

The objective of the Project is to strengthen the operational system and implementation capacity of sewerage services in Water and Sanitation Agency (WASA)'s area of jurisdiction in Multan Province, Punjab through providing the Equipment required for cleaning and maintenance of sewers and drainage channels, thereby contributing to improve the sanitation environment in the target areas.

### 2. Title of the Preparatory Survey

Both sides confirmed the title of the Preparatory Survey as "the Preparatory Survey for the Project for Upgrading of Mechanical System for Sewerage and Drainage Services in Multan".

### 3. Project site

Both sides confirmed that the site of the Project is in jurisdictional area of WASA Multan, which is shown in Annex 1.

### 4. Responsible authority for the Project

Both sides confirmed the authorities responsible for the Project are as follows:

4-1. WASA Multan will be the executing agency for the Project (hereinafter referred to as "the Executing Agency"). The Executing Agency shall coordinate with all the relevant authorities to ensure smooth implementation of the Project and ensure that the undertakings for the Project shall be managed by relevant authorities properly and on time. The organization charts are shown in Annex 2.


4-2. HUD&PHED shall be responsible for supervising the Executing Agency on behalf of the Government of Pakistan.

### 5. Contents of the Draft Report

After the explanation of the contents of the Draft Report by the Team, the Pakistan side agreed to its contents. JICA will finalize the Preparatory Survey Report based on the confirmed items. The report will be sent to the Pakistan side around March 2022.

### 6. Cost estimate

Both sides confirmed that the cost estimate explained by the Team is provisional and will be examined further by the Government of Japan for its approval.



7. Confidentiality of the cost estimate and technical specifications

Both sides confirmed that the cost estimate and technical specifications of the Project should never be disclosed to any third parties until all the contracts under the Project are concluded.

8. Procedures and Basic Principles of Japanese Grant

The Pakistan side agreed that the procedures and basic principles of Japanese Grant (hereinafter referred to as "the Grant") as described in Annex 3 shall be applied to the Project. In addition, the Pakistan side agreed to take necessary measures according to the procedures.

9. Timeline for the project implementation

The Team explained to the Pakistan side that the expected timeline for the project implementation is as attached in Annex 4.

10. Expected outcomes and indicators

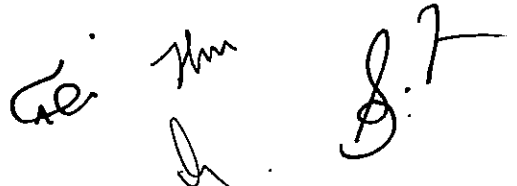
Both sides agreed that key indicators for expected outcomes are as follows. The Pakistan side will be responsible for the achievement of agreed key indicators targeted in year 2027 and shall monitor the progress for Ex-Post Evaluation based on those indicators.

[Quantitative indicators]

Index-name	Nominal value (2021 actual figures)	Target value (2027) Three years after completion of the project
Distance to remove sediment in sewage pipes (km)	4.1 km/year	Approx. 230 km/year
Dewatering pump set emergency drainage capacity	140 m <sup>3</sup> /min	392 m <sup>3</sup> /min

[Qualitative indicators]

- Reduce the risk of waterborne diseases due to reduced flooding and flooding damage.
- Citizens' economic and social activities, which had been hampered by flooded roads and urban areas, will become more active.
- Improve sanitation in the city by reducing abandoned waste and chronic flooding conditions



- Improve the degree of citizen's satisfaction about the sewerage services provided by WASA Multan.

11. Ex-Post Evaluation

JICA will conduct ex-post evaluation after three (3) years from the project completion, in principle, with respect to five evaluation criteria (Relevance, Effectiveness, Efficiency, Impact, Sustainability). The result of the evaluation will be publicized. The Pakistan side is required to provide necessary support for the data collection.

12. Technical assistance ("Soft Component" of the Project)

Considering the sustainable operation and maintenance of the products and services granted through the Project, following technical assistance is planned under the Project. The Pakistan side confirmed to deploy necessary number of counterparts who are appropriate and competent in terms of its purpose of the technical assistance as described in the Draft Report.

13. Undertakings of the Project

Both sides confirmed the undertakings of the Project as described in Annex 5. With regard to exemption of customs duties, internal taxes and other fiscal levies as stipulated in 1 (2) 3 of Annex 5, both sides confirmed that such customs duties, internal taxes and other fiscal levies, which shall be clarified in the bid documents by WASA Multan during the implementation stage of the Project.

The Pakistan side assured to take the necessary measures and coordination including allocation of the necessary budget which are preconditions of implementation of the Project. It is further agreed that the costs are indicative, i.e. at Outline Design level. More accurate costs will be calculated at the Detailed Design stage.

Both sides also confirmed that 2. 1 and 2 of Annex 5 will be used as an attachment of G/A.

As shown in Annex 5, both sides confirmed that WASA Multan shall take necessary measures to ensure and maintain the security of the Project site and the persons related to the implementation of the Project, in cooperation with relevant authorities during the Project period. Such security measures shall reasonably reflect needs of the Consultant/the Contractor engaging in the Project, as shown in Annex 5.

Both sides agreed that in case the additional security cost would be necessary for the implementation of the Project, such cost shall be borne by the Recipient without using the Grant.





14. Monitoring during the implementation

The Project will be monitored by the Executing Agency and reported to JICA by using the form of Project Monitoring Report (PMR) attached as Annex 6. The timing of submission of the PMR is described in Annex 5.

15. Project completion

Both sides confirmed that the Project completes when all the facilities constructed and equipment procured by the Grant are in operation. The completion of the Project will be reported to JICA promptly, but in any event not later than six months after completion of the Project.

16. Environmental and Social Considerations

The Team explained that 'JICA Guidelines for Environmental and Social Considerations (April 2010)' (hereinafter referred to as "the Guidelines") is applicable for the Project. The Project is categorized as C because the Project is likely to have minimal adverse impact on the environment under the Guidelines.

17. Other Relevant Issues

17-1. Disclosure of Information

Both sides confirmed that the Preparatory Survey Report from which project cost is excluded will be disclosed to the public after completion of the Preparatory Survey. The comprehensive report including the project cost will be disclosed to the public after all the contracts under the Project are concluded.

17-2. Human Resources and Budget Allocation

The Pakistan side agreed to secure required human resources and budget needed for pipe cleaning waste collection, transportation and final disposal, and Operation and Maintenance (O&M).

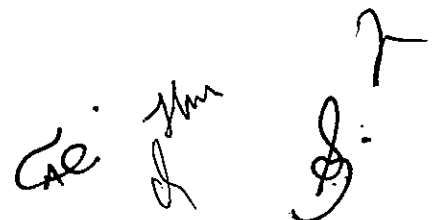
17-3. Proper operation and maintenance for equipment

The Pakistan side agreed that vehicles and equipment to be provided shall be operated and maintained in proper manner.

17-4. Securing the necessary lands

The Pakistan side will secure the lands for the parking lots for the procured vehicles and equipment.

17-5. Disposal of generated solid wastes and sludge, etc.



Solid wastes and other waste by cleaning sewage pipes, trenches and sullage carriers shall be disposed of at the final dumping site, and sludge shall be disposed of at the sewage treatment plant.

17-6. Monitoring for appropriate management

Both sides confirmed that WASA Multan will supervise and periodically monitor the progress status of the Project.

**【Annex 1 Project Site】**

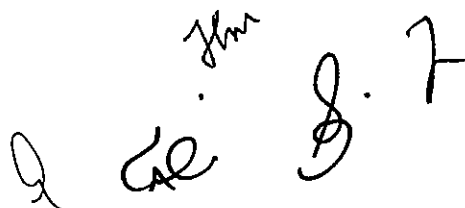
**【Annex 2 Organization Chart】**

**【Annex 3 Japanese Grant】**

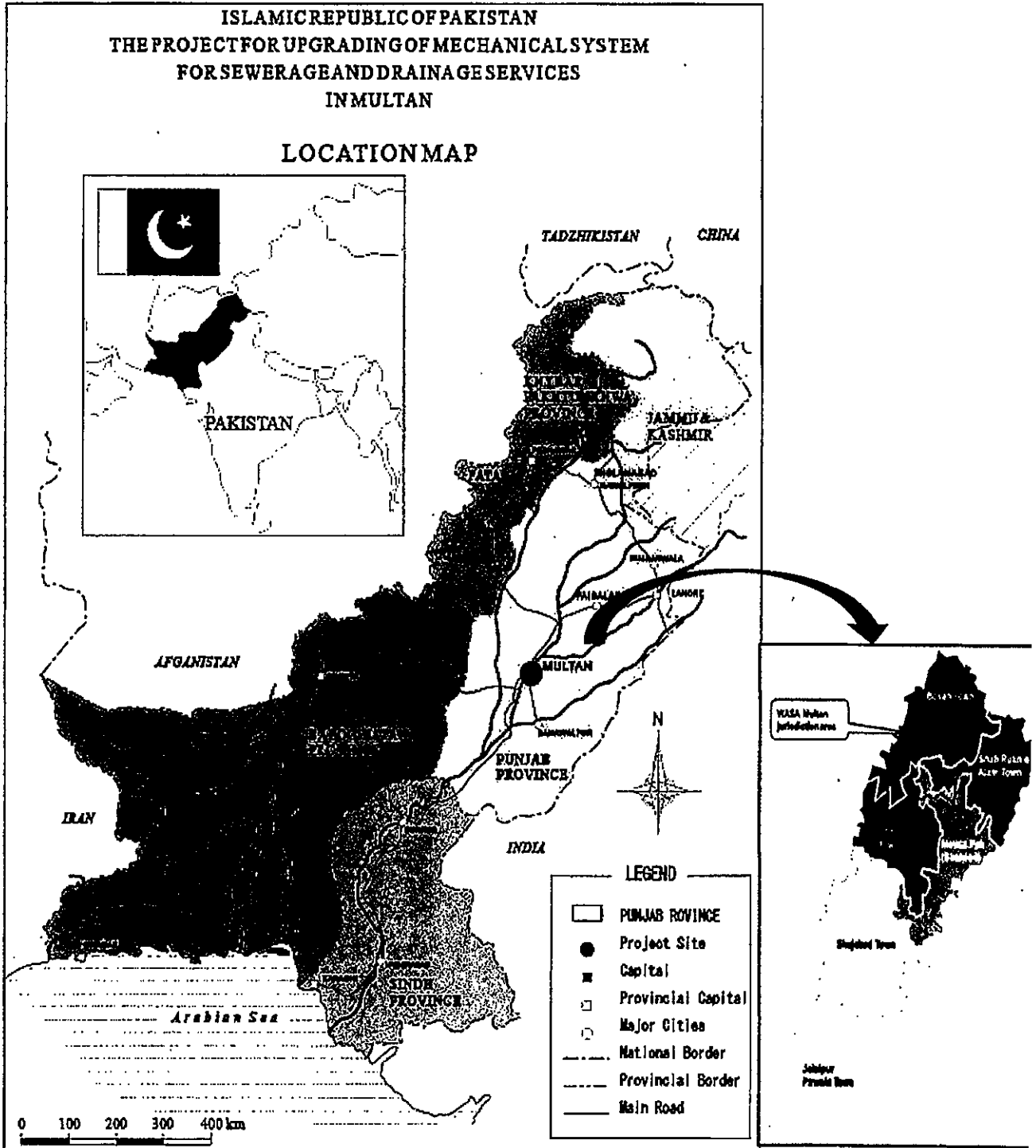
**【Annex 4 Project Implementation Schedule】**

**【Annex 5 Major Undertakings to be taken by the Government of the Pakistan】**

**【Annex 6 Project Monitoring Report (template) 】**



【Project Site】



*[Handwritten signature]*

*[Handwritten signature]*



## JAPANESE GRANT

The Japanese Grant is non-reimbursable fund provided to a recipient country (hereinafter referred to as “the Recipient”) to purchase the products and/or services (engineering services and transportation of the products, etc.) for its economic and social development in accordance with the relevant laws and regulations of Japan. Followings are the basic features of the project grants operated by JICA (hereinafter referred to as “Project Grants”).

### 1. Procedures of Project Grants

Project Grants are conducted through following procedures (See “PROCEDURES OF JAPANESE GRANT” for details):

(1) Preparation

- The Preparatory Survey (hereinafter referred to as “the Survey”) conducted by JICA

(2) Appraisal

-Appraisal by the government of Japan (hereinafter referred to as “GOJ”) and JICA, and Approval by the Japanese Cabinet

(3) Implementation

Exchange of Notes

-The Notes exchanged between the GOJ and the government of the Recipient

Grant Agreement (hereinafter referred to as “the G/A”)

-Agreement concluded between JICA and the Recipient

Banking Arrangement (hereinafter referred to as “the B/A”)

-Opening of bank account by the Recipient in a bank in Japan (hereinafter referred to as “the Bank”) to receive the grant

Construction works/procurement

-Implementation of the project (hereinafter referred to as “the Project”) on the basis of the G/A

(4) Ex-post Monitoring and Evaluation

-Monitoring and evaluation at post-implementation stage

### 2. Preparatory Survey

(1) Contents of the Survey

The aim of the Survey is to provide basic documents necessary for the appraisal of the the Project made by the GOJ and JICA. The contents of the Survey are as follows:

- Confirmation of the background, objectives, and benefits of the Project and also institutional capacity of

relevant agencies of the Recipient necessary for the implementation of the Project.

- Evaluation of the feasibility of the Project to be implemented under the Japanese Grant from a technical, financial, social and economic point of view.
- Confirmation of items agreed between both parties concerning the basic concept of the Project.
- Preparation of an outline design of the Project.
- Estimation of costs of the Project.
- Confirmation of Environmental and Social Considerations

The contents of the original request by the Recipient are not necessarily approved in their initial form. The Outline Design of the Project is confirmed based on the guidelines of the Japanese Grant.

JICA requests the Recipient to take measures necessary to achieve its self-reliance in the implementation of the Project. Such measures must be guaranteed even though they may fall outside of the jurisdiction of the executing agency of the Project. Therefore, the contents of the Project are confirmed by all relevant organizations of the Recipient based on the Minutes of Discussions.

## (2) Selection of Consultants

For smooth implementation of the Survey, JICA contracts with (a) consulting firm(s). JICA selects (a) firm(s) based on proposals submitted by interested firms.

## (3) Result of the Survey

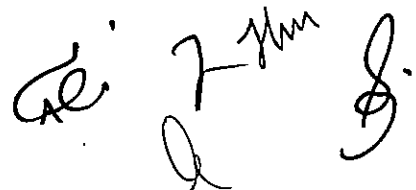
JICA reviews the report on the results of the Survey and recommends the GOJ to appraise the implementation of the Project after confirming the feasibility of the Project.

## 3. Basic Principles of Project Grants

### (1) Implementation Stage

#### 1) The E/N and the G/A

After the Project is approved by the Cabinet of Japan, the Exchange of Notes (hereinafter referred to as "the E/N") will be signed between the GOJ and the Government of the Recipient to make a pledge for assistance, which is followed by the conclusion of the G/A between JICA and the Recipient to define the necessary articles, in accordance with the E/N, to implement the Project, such as conditions of disbursement, responsibilities of the Recipient, and procurement conditions. The terms and conditions generally applicable to the Japanese Grant are stipulated in the "General Terms and Conditions for Japanese Grant (January 2016)."



2) Banking Arrangements (B/A) (See "Financial Flow of Japanese Grant (A/P Type)" for details)

a) The Recipient shall open an account or shall cause its designated authority to open an account under the name of the Recipient in the Bank, in principle. JICA will disburse the Japanese Grant in Japanese yen for the Recipient to cover the obligations incurred by the Recipient under the verified contracts.

b) The Japanese Grant will be disbursed when payment requests are submitted by the Bank to JICA under an Authorization to Pay (A/P) issued by the Recipient.

3) Procurement Procedure

The products and/or services necessary for the implementation of the Project shall be procured in accordance with JICA's procurement guidelines as stipulated in the G/A.

4) Selection of Consultants

In order to maintain technical consistency, the consulting firm(s) which conducted the Survey will be recommended by JICA to the Recipient to continue to work on the Project's implementation after the E/N and G/A.

5) Eligible source country

In using the Japanese Grant disbursed by JICA for the purchase of products and/or services, the eligible source countries of such products and/or services shall be Japan and/or the Recipient. The Japanese Grant may be used for the purchase of the products and/or services of a third country as eligible, if necessary, taking into account the quality, competitiveness and economic rationality of products and/or services necessary for achieving the objective of the Project. However, the prime contractors, namely, constructing and procurement firms, and the prime consulting firm, which enter into contracts with the Recipient, are limited to "Japanese nationals", in principle.

6) Contracts and Concurrence by JICA

The Recipient will conclude contracts denominated in Japanese yen with Japanese nationals. Those contracts shall be concurred by JICA in order to be verified as eligible for using the Japanese Grant.

7) Monitoring

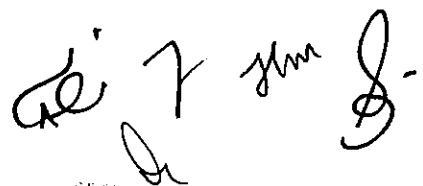
The Recipient is required to take their initiative to carefully monitor the progress of the Project in order to ensure its smooth implementation as part of their responsibility in the G/A, and to regularly report to JICA about its status by using the Project Monitoring Report (PMR).

8) Safety Measures

The Recipient must ensure that the safety is highly observed during the implementation of the Project.

9) Construction Quality Control Meeting

Construction Quality Control Meeting (hereinafter referred to as the "Meeting") will be held for quality assurance and smooth implementation of the Works at each stage of the Works. The member of the Meeting will be composed by the



Recipient (or executing agency), the Consultant, the Contractor and JICA. The functions of the Meeting are as followings:

- a) Sharing information on the objective, concept and conditions of design from the Contractor, before start of construction.
- b) Discussing the issues affecting the Works such as modification of the design, test, inspection, safety control and the Client's obligation, during of construction.

## (2) Ex-post Monitoring and Evaluation Stage

- 1) After the project completion, JICA will continue to keep in close contact with the Recipient in order to monitor that the outputs of the Project is used and maintained properly to attain its expected outcomes.
- 2) In principle, JICA will conduct ex-post evaluation of the Project after three years from the completion. It is required for the Recipient to furnish any necessary information as JICA may reasonably request.

## (3) Others

### 1) Environmental and Social Considerations

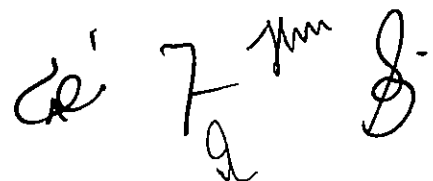
The Recipient shall carefully consider environmental and social impacts by the Project and must comply with the environmental regulations of the Recipient and JICA Guidelines for Environmental and Social Considerations (April, 2010).

### 2) Major undertakings to be taken by the Government of the Recipient

For the smooth and proper implementation of the Project, the Recipient is required to undertake necessary measures including land acquisition, and bear an advising commission of the A/P and payment commissions paid to the Bank as agreed with the GOJ and/or JICA. The Government of the Recipient shall ensure that customs duties, internal taxes and other fiscal levies which may be imposed in the Recipient with respect to the purchase of the Products and/or the Services be exempted or be borne by its designated authority without using the Grant and its accrued interest, since the grant fund comes from the Japanese taxpayers.

### 3) Proper Use

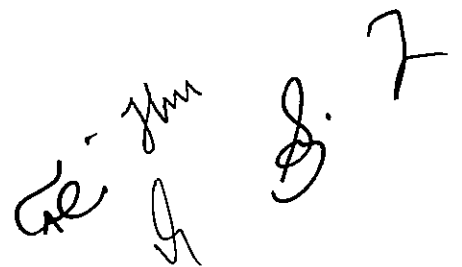
The Recipient is required to maintain and use properly and effectively the products and/or services under the Project (including the facilities constructed and the equipment purchased), to assign staff necessary for this operation and maintenance and to bear all the expenses other than those covered by the Japanese Grant.





4) Export and Re-export

The products purchased under the Japanese Grant should not be exported or re-exported from the Recipient.



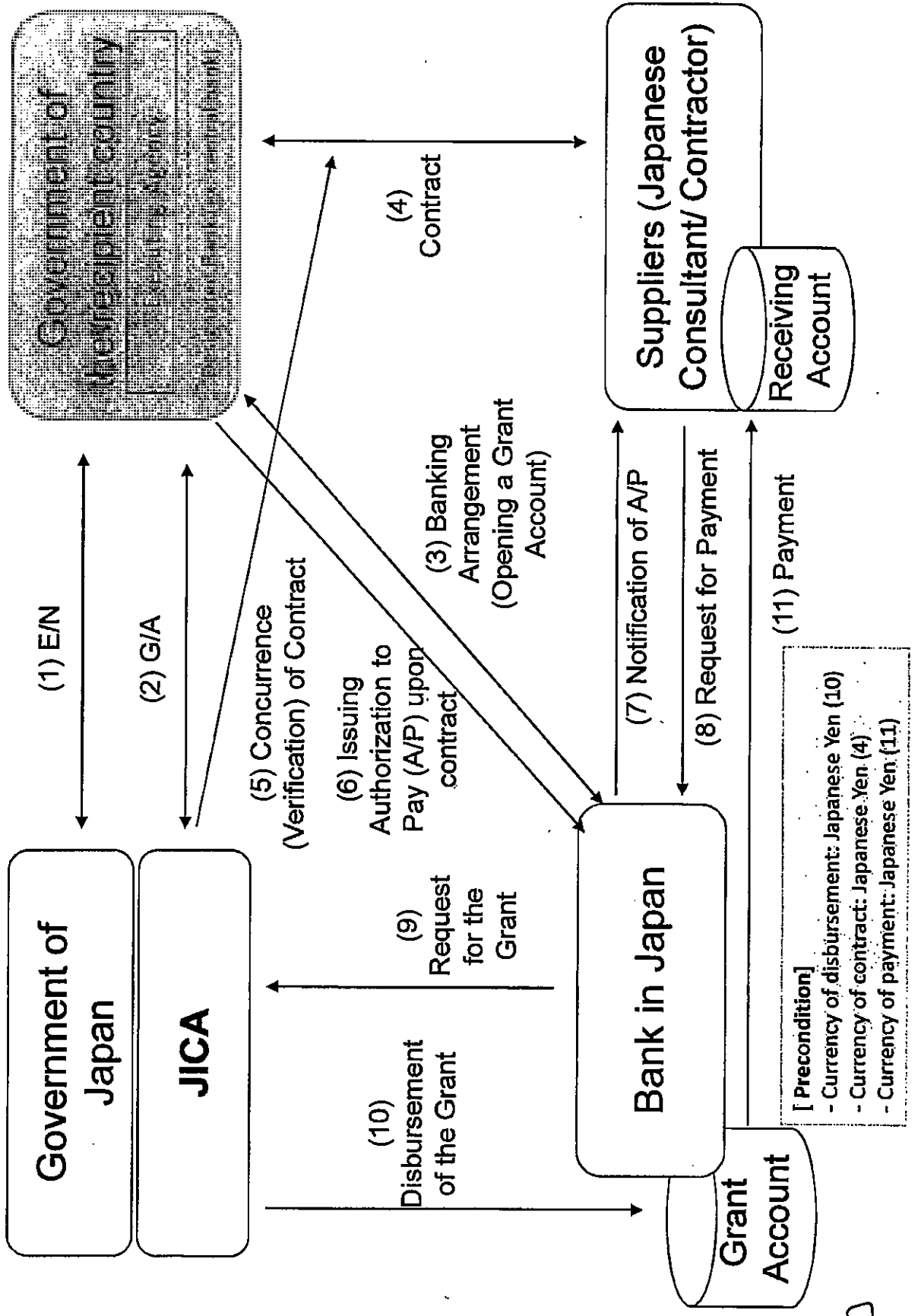
## PROCEDURES OF JAPANESE GRANT

Stage	Procedures	Remarks	Recipient Government	Japanese Government	JICA	Consultants	Contractors	Agent Bank
Official Request	Request for grants through diplomatic channel	Request shall be submitted before appraisal stage.	x	x				
1. Preparation	(1) Preparatory Survey Preparation of outline design and cost estimate		x		x	x		
2. Appraisal	(2) Preparatory Survey Explanation of draft outline design, including cost estimate, undertakings, etc.		x		x	x		
	(3) Agreement on conditions for implementation	Conditions will be explained with the draft notes (E/N) and Grant Agreement (G/A) which will be signed before approval by Japanese government.	x	x (E/N)	x (G/A)			
	(4) Approval by the Japanese cabinet			x				
3. Implementation	(5) Exchange of Notes (E/N)		x	x				
	(6) Signing of Grant Agreement (G/A)		x		x			
	(7) Banking Arrangement (B/A)	Need to be informed to JICA	x					x
	(8) Contracting with consultant and issuance of Authorization to Pay (A/P)	Concurrence by JICA is required	x			x		x
	(9) Detail design (D/D)		x			x		
	(10) Preparation of bidding documents	Concurrence by JICA is required	x			x		
	(11) Bidding	Concurrence by JICA is required	x			x	x	
	(12) Contracting with contractor/supplier and issuance of A/P	Concurrence by JICA is required	x				x	x
4. Ex-post monitoring & evaluation	(13) Construction works/procurement	Concurrence by JICA is required for major modification of design and amendment of contracts.	x			x	x	
	(14) Completion certificate		x			x	x	
4. Ex-post monitoring & evaluation	(15) Ex-post monitoring	To be implemented generally after 1, 3, 10 years of completion, subject to change	x		x			
	(16) Ex-post evaluation	To be implemented basically after 3 years of completion	x		x			

notes:

1. Project Monitoring Report and Report for Project Completion shall be submitted to JICA as agreed in the G/A.
2. Concurrence by JICA is required for allocation of grant for remaining amount and/or contingencies as agreed in the G/A.

# Financial Flow of Japanese Grant (A/P Type)



*[Handwritten signature]*

*[Handwritten signatures]*



## Major Undertakings to be taken by the Government of Pakistan

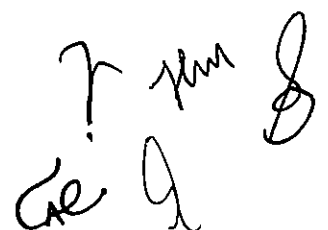
**1. Specific obligations of the Government of Pakistan( "the Recipient" of the Grant) which will not be funded with the Grant****(1) Before the Bidding**

No	Items	Deadline	In charge	Estimated Cost (millions PKR)	Ref.
1	To sign the banking arrangement (B/A) with a bank in Japan (the Agent Bank) to open bank account for the Grant	within 1 month after the signing of the G/A	EAD WASA-M	—	
2	To issue A/P to the Agent Bank for the payment to the consultant	within 1 month after the signing of the contract(s)	WASA-M	—	
3	To bear the following commissions to the Agent Bank for the banking services based upon B/A			—	
	1) Advising commission of A/P	within 1 month after the signing of the contract(s)		0.01	
	2) Payment commission for A/P	every payment		0.02	
4	To submit Project Monitoring Report (with the result of Detailed Design)	before preparation of bidding document(s)	WASA-M	—	

(B/A: Banking Arrangement, A/P: Authorization to pay, N/A: Not Applicable)

(EAD: Economic Affairs Division, Islamic Republic of Pakistan)

(WASA-M: Water and Sanitation Agency, Multan)

(2) During the Project Implementation

NO	Items	Deadline	In charge	Estimated Cost (millions PKR)	Ref
1	To issue A/P to the Agent Bank for the payment to the supplier (s)	within 1 month after the signing of the contract(s)	WASA-M	—	
2	To bear the following commissions to the Agent Bank for the banking services based upon the B/A			—	
	1) Advising commission of A/P	within 1 month after the signing of the contract(s)	WASA-M	0.01	
	2) Payment commission for A/P	every payment	WASA-M	1.45	
3	During the implementation and warranty period of the project, complete customs (tax) exemption procedures and take necessary actions for materials and equipment imported for this project, and provide the necessary legal and/or administrative documentation for customs clearance to the customs broker/forwarder employed by the supplier at the port of disembarkation. Take necessary actions not exceed the bonded warehouse period.	during the Project	EAD WASA-M		
4	To accord Japanese physical persons and/or physical persons of third countries whose services may be required in connection with the supply of the products and the services such facilities as may be necessary for their entry into the country of the Recipient and stay therein for the performance of their work	during the Project	EAD WASA-M		
5	To ensure that customs duties, internal taxes and other fiscal levies which may be imposed in the country of the Recipient with respect to the purchase of the products and/or the services be exempted/ be borne by its designated authority without using the Grant	during the Project	EAD WASA-M		
6	To bear all the expenses, other than those covered by the Grant, necessary for the implementation of the Project	during the Project	WASA-M		
7	1) To submit Project Monitoring Report after each work under the contract(s) such as shipping, hand over, installation and operational training	within 1 month after completion of each work	WASA-M	—	
	2) To submit Project Monitoring Report (final) (including equipment list, photographs and etc.)	within 1 month after issuance of Certificate of Completion for the works under the contract(s)	WASA-M	—	
8	To submit a report concerning completion of the Project	within 6 months after completion of the Project	WASA-M	—	
9	To prepare garages, stockyards with shade, water supply and electricity, communication network and etc. for the equipment procured by the Project	prior to the delivery of the equipment to the site	WASA-M		
10	To ensure the safety of persons engaged in the implementation of the Project	during the Project	WASA-M		

11	To take necessary measures for security and safety of the Project site 1) To arrange security around the Project sites with the police. 2) To arrange security around the accommodation(s) of the Consultants & the Supplier(s) with the police. 3) To arrange escort guard with the police during movements between the accommodation(s) of the Supplier(s) and the Project sites.	during the Project	WASA-M		
12	To provide necessary working spaces with internet connection at the WASA-M Office.	during the Project	WASA-M		
13	1) Renovation or demolition and construction for non-vehicle equipment storage. 2) Construction garages for new vehicles.	during the Project.	WASA-M	76.32	

(3) After the Project

NO	Items	Deadline	In charge	Estimated Cost (millions PKR)	Ref.
1	To maintain and use properly and effectively the facilities and equipment provided under the Grant Aid 1) Allocation of maintenance cost 2) Allocation of additional staff for operation and maintenance Routine check/Periodic inspection	After completion of the construction	WASA-M	117.3/ year	

**2. Other obligations of the Government of Pakistan funded with the Grant**

NO	Items	Deadline	In charge	Amount (Million Japanese Yen)
1	Procurement of the equipment for the Project.	during the Project	WASA-M	
2	Procurement of the consulting services for the Project.			
	Total			



*F. M. Ali*





**1: Project Description**

**1-1 Project Objective**

--

**1-2 Project Rationale**

- Higher-level objectives to which the project contributes (national/regional/sectoral policies and strategies)
- Situation of the target groups to which the project addresses

--

**1-3 Indicators for measurement of "Effectiveness"**

Quantitative indicators to measure the attainment of project objectives		
Indicators	Original (Yr )	Target (Yr )
Qualitative indicators to measure the attainment of project objectives		

**2: Details of the Project**

**2-1 Location**

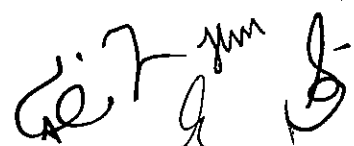
Components	Original <i>(proposed in the outline design)</i>	Actual
1.		

**2-2 Scope of the work**

Components	Original* <i>(proposed in the outline design)</i>	Actual*
1.		

Reasons for modification of scope (if any).

(PMR)
-------

**2-3 Implementation Schedule**

Items	Original		Actual
	<i>(proposed in the outline design)</i>	<i>(at the time of signing the Grant Agreement)</i>	

Reasons for any changes of the schedule, and their effects on the project (if any)

--

**2-4 Obligations by the Recipient**

**2-4-1 Progress of Specific Obligations**

See Attachment 2.

**2-4-2 Activities**

See Attachment 3.

**2-4-3 Report on RD**

See Attachment 11.

**2-5 Project Cost**

**2-5-1 Cost borne by the Grant (Confidential until the Bidding)**

Components			Cost (Million Yen)	
	Original <i>(proposed in the outline design)</i>	Actual <i>(in case of any modification)</i>	Original <sup>1,2</sup> <i>(proposed in the outline design)</i>	Actual
1.				
Total				

Note: 1) Date of estimation:  
 2) Exchange rate: 1 US Dollar = Yen

**2-5-2 Cost borne by the Recipient**

Components			Cost (1,000 Taka)	
	Original <i>(proposed in the outline design)</i>	Actual <i>(in case of any modification)</i>	Original <sup>1,2</sup> <i>(proposed in the outline design)</i>	Actual
1.				

- Note: 1) Date of estimation:  
2) Exchange rate: 1 US Dollar =

Reasons for the remarkable gaps between the original and actual cost, and the countermeasures (if any)

(PMR)

**2-6 Executing Agency**

- Organization's role, financial position, capacity, cost recovery etc,
- Organization Chart including the unit in charge of the implementation and number of employees.

<b>Original</b> (at the time of outline design) name: role: financial situation: institutional and organizational arrangement (organogram): human resources (number and ability of staff):
<b>Actual</b> (PMR)

**3: Operation and Maintenance (O&M)**

**3-1 Physical Arrangement**

- Plan for O&M (number and skills of the staff in the responsible division or section, availability of manuals and guidelines, availability of spareparts, etc.)

<b>Original</b> (at the time of outline design)
<b>Actual</b> (PMR)

**3-2 Budgetary Arrangement**

- Required O&M cost and actual budget allocation for O&M

<b>Original</b> (at the time of outline design)
<b>Actual</b> (PMR)

**4: Potential Risks and Mitigation Measures**

- Potential risks which may affect the project implementation, attainment of objectives,

- sustainability
- Mitigation measures corresponding to the potential risks

**Assessment of Potential Risks** (at the time of outline design)

Potential Risks	Assessment
1. (Description of Risk)	Probability: High/Moderate/Low
	Impact: High/Moderate/Low
	Analysis of Probability and Impact:
	Mitigation Measures:
	Action required during the implementation stage:
2. (Description of Risk)	Probability: High/Moderate/Low
	Impact: High/Moderate/Low
	Analysis of Probability and Impact:
	Mitigation Measures:
	Action required during the implementation stage:
3. (Description of Risk)	Probability: High/Moderate/Low
	Impact: High/Moderate/Low
	Analysis of Probability and Impact:
	Mitigation Measures:
	Action required during the implementation stage:
<b>Actual Situation and Countermeasures</b>	
(PMR)	

**5: Evaluation and Monitoring Plan (after the work completion)**

**5-1 Overall evaluation**

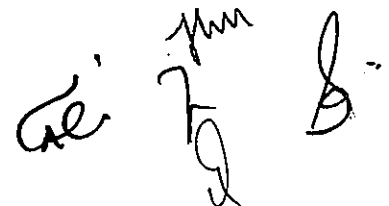
Please describe your overall evaluation on the project.

**5-2 Lessons Learnt and Recommendations**

Please raise any lessons learned from the project experience, which might be valuable for the future assistance or similar type of projects, as well as any recommendations, which might be beneficial for better realization of the project effect, impact and assurance of sustainability.

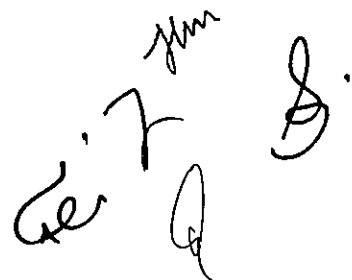
**5-3 Monitoring Plan of the Indicators for Post-Evaluation**

Please describe monitoring methods, section(s)/department(s) in charge of monitoring, frequency, the term to monitor the indicators stipulated in 1-3.



Attachment

1. Project Location Map
2. Specific obligations of the Recipient which will not be funded with the Grant
3. Monthly Report submitted by the Consultant
- Appendix - Photocopy of Contractor's Progress Report (if any)
  - Consultant Member List
  - Contractor's Main Staff List
4. Check list for the Contract (including Record of Amendment of the Contract/ Agreement and Schedule of Payment)
5. Monitoring sheet on price of specified materials (Quarterly)
6. Report on Proportion of Procurement (Recipient Country, Japan and Third Countries) (PMR (final) only)
7. Pictures (by JPEG style by CD-R) (PMR (final) only)
8. Equipment List (PMR (final) only)
10. Drawing (PMR (final) only)
11. Report on RD (After project)



Report on Proportion of Procurement (Recipient Country, Japan and Third Countries)  
 (Actual Expenditure by Construction and Equipment each)

	Domestic Procurement (Recipient Country) A	Foreign Procurement (Japan) B	Foreign Procurement (Third Countries) C	Total D
Construction Cost	(A/D%)	(B/D%)	(C/D%)	
Direct Construction Cost	(A/D%)	(B/D%)	(C/D%)	
others	(A/D%)	(B/D%)	(C/D%)	
Equipment Cost	(A/D%)	(B/D%)	(C/D%)	
Design and Supervision Cost	(A/D%)	(B/D%)	(C/D%)	
Total	(A/D%)	(B/D%)	(C/D%)	





**APPENDIX-5**  
**SOFT COMPONENT PLAN**



## 1. Background to Planning Soft Components

The "The Project for Upgrading of Mecanical Sysetem for Sewerage and Drainage Services in Multan" aims to strengthen the operational and implementation capacity of the Multan Water Supply and Sewerage Authority (WASA-M) to provide water and sewerage services and thereby improve the sanitation environment in the targeted areas.

The sewers and drains in Multan frequently overflow and flood even outside of rainfall periods due to malfunctioning caused by the accumulation of sludge and garbage.

Since sewage pipes are buried under the road, overflowing or flooding of sewage causes flooding on the roadside or on the road, which is even slightly lower than the road, causing traffic obstruction and interfering with social and economic activities. In addition, the overflowing sewage prevents people from seeing the road surface and ground, causing accidents such as falling into drainage ditches or hitting steps from the side of the road that is flooded or under water. In addition, the overflowing sewage has increased the risk of infectious diseases due to the unsanitary conditions, and has caused great damage to the lives of the citizens (see the photo below).



The reason for these overflows and flooding is that many sewage pipes are always semi-clogged due to sediments, and even a small amount of debris flowing down them can block them and cause overflows and flooding. As is the case in other WASAs in Punjab, when you open the cover of a manhole and look inside, the water level is often high and the sewage pipe is submerged. The sewage flows through the pipes at a slope, and it is normal to see the water surface flowing through the pipes when the manhole covers are opened.

The most significant factor that led to this situation was that the cleaning crew that was dispatched in response to a complaint about overflowing water caused by rainfall did not remove the sediment in the sewer pipes, assuming that their work was completed by improving the passage of water.

When there is a complaint about a flooded road, the manpower cleaning team in charge of the area is first dispatched to poke the sewage pipe with a bamboo pole and try to let the water flow through, and if that does not solve the problem, a high-pressure washing truck is mobilized to pierce the nozzle with the guide of the bamboo pole and pass through the blockage. When the water level starts to fall, the high-pressure washing truck leaves the site, the sludge suction truck sucks out the accumulated sewage, and when the water level falls into the manhole, the work is completed, and the manhole cover is closed for removal.

Since the sediment in the sewage pipes is not removed but left as it is, overflowing and flooding can easily recur due to a little rain or debris flow, which has caused many complaints repeatedly.

In order to improve this situation, it is necessary to restore and maintain the original capacity of sewerage facilities by carrying out systematic cleaning activities.

Specifically, it is necessary to remove the sediment in the pipes when cleaning the sewage pipes, and there

are two conditions for this: One is to have equipment that can remove the sediment in the sewage pipes, and the other is to learn the cleaning method to remove the sediment in the pipes. WASA-M's current fleet of high-pressure washing trucks and other equipment has deteriorated with age, making it difficult to use them to remove sediment from the pipes. As for the other cleaning method, technology transfer by the soft components will be carried out to provide the necessary knowledge and skills.

WASA-M does not have any experience in cleaning planning because it has not conducted planned cleaning operations in the past. Therefore, there is a need for technology transfer related to them in addition to cleaning practices. Another issue is that WASA-M does not currently have a system for monthly reports by workers and other staff, or for compilation of reports by managers and other staff.

In addition, sewage pipes with extremely slow flow velocity in the pipes and years of accumulation of sludge and garbage often suffer from sewage pipe damage due to corrosion. In addition, 48.3% of the sewage pipes in Multan were laid by 1989, and 65.9% by 1999, so the aging of the sewage pipes is progressing. As a result, road cave-in due to collapsed pipe tops have been occurring in various parts of the city (see photo below). Therefore, we believe that it is necessary to observe the inside of the sewer pipe with an insertion type camera or a camera at the mouth of the pipe after removing the sediment to check the damage. If damage



is confirmed, it is necessary to immediately proceed with the repair plan, and in some cases it may be necessary to take temporary emergency measures before starting the repair. If the road is left without the necessary repair measures, not only will the blockage recur in a short time due to the inflow of sediment from the damaged area, but there is also a risk of the road cave-ins as described above.

In particular, sewage pipes that have been submerged for a long period of time after being damaged by corrosion must be cleaned with great care, since there is a risk of damage due to the removal of sediment and the flow of sewage. Therefore, it is important to acquire the skills to survey the sewage pipes from the inside with a TV camera after cleaning to find the damaged areas, as well as to study the emergency construction methods according to the scale and damage. Repair measures for these sewage pipes and safety measures during cleaning are also planned to be addressed by the software component.

This planned cleaning of sewers will cover all 1,550 km or so of branch line sewers identified in the 2017 Master Plan, including at least one pipe that is semi-closed.

In addition, the technical cooperation project called "Punjab Water Supply and Sewerage Management Capacity Enhancement Project (Phase 2)" (hereinafter referred to as "Technical Project") is currently being implemented for major cities in Punjab Province, including Multan. The technical cooperation project includes activities to support the cleaning of sewage pipes by making WASA's senior management and those in charge of cleaning sewage pipes aware of the problems with the current cleaning of sewage pipes, and encouraging them to change to the original cleaning method that removes sludge from the sewage pipes. Therefore, it is expected that the Technical Project will create awareness of the need to improve cleaning methods within WASA-M before the implementation of the soft components of the Project.

**2. Soft Component Goals**

WASA-M will prevent blockage of pipelines and restore the functioning of semi-blocked sewer pipes through the continuous implementation of systematic cleaning as a routine activity, rather than as a preventive measure against complaints. The goal of the soft components of this plan is to have the ability to formulate an early repair and renewal plan for the damage caused by corrosion of the sewage pipes identified as a result. Specifically, this project aims to transfer the necessary technology to WASA-M so that WASA-M will have (1) the ability to develop and manage the cleaning plan and repair measures, and (2) the ability to conduct practical cleaning work.

**3. Outcomes of the Soft Component**

**Outcome 1: Planning and implementation management**

The sewerage department of WASA-M will be equipped with a system to prevent blockage of sewerage pipes through systematic cleaning of sewerage pipes and to manage the implementation of this system on a continuous basis. In addition, WASA-M will be equipped with an ability to grasp the damage from the situation inside the sewer pipe and formulate necessary repair measures.

**Outcome 2: Practical cleaning work**

WASA-M cleaning practitioners are equipped with the skills necessary to clean and remove sediment from the sewer pipe.

**4. Methods to Check the Achievement of Outcomes**

The following table shows the methods and indicators (items) for confirming the degree of achievement of the outcomes specified in "3 Outcomes of the Soft Component".

Outcome 1: The sewerage department of WASA-M has a system to develop a systematic sewer cleaning plan for the total length of all sewerage pipes and drains to prevent blockages and to manage the implementation of the plan on a continuous basis. In addition, WASA-M will be equipped with an ability to grasp the damage from the situation inside the sewer pipe and formulate necessary repair measures.

Indicator 1	Develop an appropriate cleaning plan
Method	The target area will be designated, WASA-M staff will be required to make a cleaning plan by themselves using the newly provided equipment, and the results will be used to evaluate their ability to make an appropriate plan. The number of participants will be 18 groups based on the number of pieces of equipment provided, but Group 2, which is the field management group, will have 27 participants. Complaint handling (call center) will not be directly covered

	<p>in the training. In the exercise, the participants will evaluate whether appropriate plans are formulated according to the different conditions of each branch office based on the basic knowledge for planning obtained in the lecture. The appropriateness of the cleaning plan, which is the index of evaluation, is judged from the fact that the elements planned by WASA-M itself, such as the amount of work, working hours, and allocation and input of equipment and personnel, are in line with the actual conditions and are not excessive or insufficient. The target of the evaluation will be the personnel who performed the tasks in the exercise, and will be a scale of 3 members each from 9 branches..</p>
--	---

Indicator 2	Ability to respond after cleanup work
Method	<p>As for the implementation management, one month after the completion of the field guidance, the contents of the daily and monthly reports of the cleaning work will be checked, and the response capability to the compilation of the inspection and investigation results themselves will be evaluated. The daily report should include the amount of progress and the amount of sludge removed, as well as photographs of the inside of the sewage pipes taken with a pipe mouth camera or an insertable camera after the work. Nine branches and one month's daily and monthly reports of the planned sewage pipe cleaning will be used for the evaluation, and all the management members of each office and branch should be involved in some way, and at least one pair of drivers and workers in charge of the provided equipment should be involved from each branch. Since the evaluation will be conducted after the on-site guidance by the expert from Japan, the level of understanding will be judged by the accuracy of the work management records written in the report sent from the site, the understanding of the condition of the pipelines, and whether the necessary repair measures are in accordance with the guidance.</p>

Outcome 2: WASA-M cleaning practitioners will be equipped with the original cleaning methods and techniques required for cleaning to remove sediment in sewer pipes.

Indicator 1	The amount of cleaning work in progress and the condition of the pipe after cleaning
Method	<p>WASA-M staff shall be instructed to actually complete one process (one span between manholes) using the equipment and procedures required for cleaning work at the site, including points to note. After the completion of instruction, WASA-M will evaluate the amount of progress made, the condition of the pipe after cleaning, and the recorded safety management (installation of color cones and bars in the work area, assignment of traffic control and security guards, and checking of manhole covers after the work) to judge the degree of achievement. Target value of daily cleaning distance shall be 15m/day.</p>

## **5. Soft Component Activities (Input planning)**

The following activities are envisaged in the input planning to achieve the outcomes described in "3. Outcomes of the Soft Components" above.

In the implementation phase of the project, experts with expertise in sewage pipe cleaning, who will implement the soft component, will conduct a preliminary survey in the field at the initial stage of the implementation of the training, and prepare a new more detailed input plan and textbook according to the current status of WASA-M at that time, and implement the activities.

### **[Activities related to Outcome 1]**

#### **(1) Pipeline management planning:**

The target participant is expected to be a group of managers and group of on-site managers (Focus on group 2 and partially participate from group 1.). Complaint handling (call center) is not a direct training subject.

Basic lectures will be given on the calculation of realistic daily advancements and medium to long term planning for sewer cleaning to remove sediments in the pipes.

Based on the current status of sewage pipes and drains under WASA-M's jurisdiction, areas with high incidences of overflow and flooding, as well as areas with a high number of complaints will be identified on a map, and the priority of areas for cleaning activities will be discussed.

In the practice, it will be expected to formulate an appropriate plan according to the different conditions of each branch office, and also examine how to start the cleaning work and how to select the location.

#### **(2) Work management and record keeping:**

The target participant is assumed to be a group of on-site managers (group 2).

The lecture will cover on-site work procedures and safety management, daily work reports and their management, and compilation of records, using examples of preparation of SOPs and daily reports.

#### **(3) Repair measures:**

The target participant is basically assumed to be a group of managers (group 1).

This lecture provides basic knowledge on repair measures for aging and damage of pipelines. The lecture will also cover the measures that should be taken in case of damage.

Using the information obtained from the image analysis of the camera survey of the inside of the sewage pipes after cleaning, the participants will discuss in a workshop format the methods of emergency work and emergency measures according to the scale and conditions of the damage, and practice the formulation of repair measures to prevent accidents such as road cave-in due to sewage pipe damage. WASA-M has already had experience with specific repairs, but the current situation is to take action after a road cave-in or other accident has occurred. In this project, not only after-the-fact measures will be taken, but also measures to prevent serious accidents caused by pipe damage will be examined by being able to check the condition of the pipe from the inside through cleaning.

### **[Activities related to Outcome 2]**

#### (1) Practical training on reading camera images

The target group is basically assumed to be a group of managers and a group of on-site managers (group 1 & group 2)..

They will be given practical training on analysis using existing sample camera images, and will be instructed with the goal of being able to determine the condition of sewage pipes, whether or not there is damage or abnormality, and what the situation is from camera images of the inside of sewage pipes.

Then, during the trial of the proposed work plan, the participants will take pictures of the actual inside of the sewage pipe after it has been cleaned with a camera at the site and practice checking the condition of the inside of the pipe using the images, and will be instructed on pipe management using cameras.

#### (2) Safety management of sewage pipe cleaning work:

The target participants are assumed to be a group of workers in leadership positions engaged in sewage pipe cleaning work (Focus on group 3 and partially participate from group 2.).

Lectures and practical training will be provided on basic issues such as setting up color cones and bars in the work area, arranging traffic control and security guards, and checking manhole covers after work, as well as countermeasures against oxygen depletion and hydrogen sulfide in manholes.

#### (3) Practical training on sewage pipe cleaning:

The target participant is assumed to be a group of workers in leadership positions engaged in sewage pipe cleaning work (group 3).

In the practical training, WASA-M staff will actually complete one process (cleaning of one span between manholes, about 30 meters on average) as a trial work plan, in order to transfer the technology of the original work method of removing sediment, since the conventional cleaning work is completed without removing the sediment. This will be done on site using the provided equipment.

In the practical training, the participants will be instructed on the practical work and procedures necessary for the cleaning work, including safety management, preparatory work such as water stop plugs and water diversions as necessary, arrangements such as the procedure for high wash and suction vehicles to enter the same manhole, selection of nozzles according to the situation, and how to work without damaging the hose, as well as points to note.

### **[Activities related to Outcome 1 & 2]**

#### (1) Trial of the proposed work plan (group 1, 2, 3):

The target participant is assumed to be all training participants.

Based on the proposed work plan reviewed in the pipeline management plan, the training will be conducted as a sewer pipeline management practice. After cleaning, the inside of the sewer pipe is photographed as a camera image reading exercise, and repair measures are discussed based on the results of image analysis. The results will be recorded and stored according to the work management procedures.

The results of the first trial will be used to discuss inadequacies and improve the proposed work plan, and



the second trial will be conducted.

In this way, WASA-M aims to improve its overall capabilities in sewer pipeline management.

**[Target group]**

- (1) For assistant director and above managers (Group 1)
- (2) For senior sub-engineers and sub-engineers, as on-site managers. (Group 2)
- (3) Targeting staff members who have traditionally been engaged in cleaning work practices in WASA-M's sewage department, with a focus on complaint handling (Group 3)

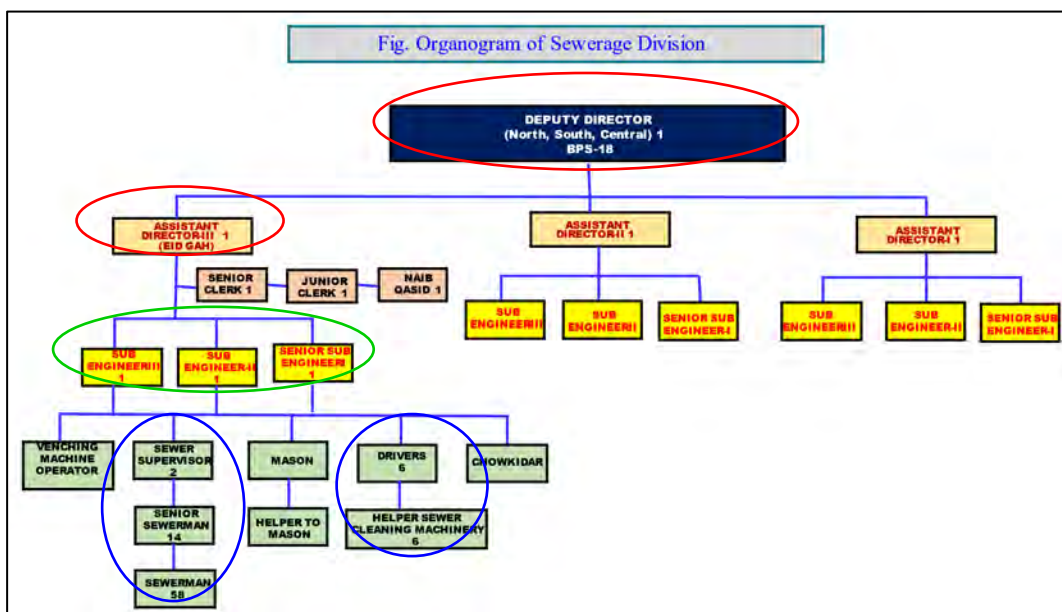
The training form will be that a representative staff member will take the TOT and teach it to other staff members. The expected number of participants is as follows.

Group 1: One member from each of the three sewage pipe management offices (assuming Deputy Director) and one member from each branch (assuming Assitant Director) x 9 branches, for a total of 12 members. Assuming participation from other organizations such as DS (Disposal Station Division, sewage pumping station office), there will be about 15 members.

Group 2: Two members from each of the three sewage pipe management offices (assuming Sub-Engineer) and one member from each branch (assuming to be one of Senior Sub-engineer or Sub-engineer) x 9 branches, for a total of 15 members

Group 3: A total of 36 people (3 members and 1 driver x 9 branches, mainly consisting of operators from each branch of the sewage pipe management office)

Figure 1 Organizational chart of the groups of subjects.



0: Group 1, 0: Group 2, 0: Group 3

Figure 1 Organizational chart of WASA-M Sewer Management Department and target groups

Source: WASA-M

**[Personnel plan]**

Three experts will be dispatched from Japan and two local consultants will be appointed to carry out the activities. The responsibilities of each expert will be as follows:

(1) Training summary/Sewerage pipeline planning

To develop a plan for all the soft components and manage its implementation. To provide guidance on the overall maintenance of sewerage pipelines and to acquire basic knowledge on repair measures for aging and damaged pipelines identified by cleaning.

(2) Sewage pipeline management

Develop specific cleaning plans for sewer lines and provide guidance on camera image reading techniques.

(3) Cleaning of sewage pipelines

Provide hands-on instruction in sewer line cleaning practices.

(4) Local consultant

Two engineers with experience in the water sector and familiarity with local conditions will be appointed. They will be in charge of providing support services to Japanese staff and will also be responsible for interpreting local language for training of non-English speaking workers. The consultants should have 10 to 20 years of experience.

The input plan is shown on the next page.

**[Input plan]**

Activities	Target group	Period	Deliverables/Remarks
Preparation work (1 month prior to equipment handover)			
Preliminary investigation: <b>Outcome 1, 2</b> Preparing for field research in Japan by organizing information Confirmation and coordination of the progress of technical cooperation projects being implemented in the same sector	-.	3 days	-.
Field survey: <b>Outcome 1, 2</b> Interview of WASA-M to understand the current situation Gathering information necessary to create materials (teaching materials)	-.	Outward: 2 days 3 days Return: 1 day	Local engineer 1 shall work before and after the Japanese arrival at the site, and shall work for 6 days.
Documentation: <b>Outcome 1, 2</b> Training plan planning Preparation of SOPs (Standard Operating Procedures), manuals, and other materials/educational materials suitable for local use	-.	7 days	Training plan Manual for Formulation of Sewerage Pipeline Management Plan SOP for sewer cleaning SOP for TV camera operation Safe work manual for sewer pipe management Lecture materials
After delivery of relevant procurement equipment			

Activities	Target group	Period	Deliverables/Remarks
Description of implementation by on-site guidance: <b>Outcome 1, 2</b>	1, 2, 3	Outward: 2 days 1 day	-.
Pipeline Management Plan 1: <b>Outcome 1</b> Lecture on planning	2, (1) *	1 day	-.
Pipeline Management Plan 2: <b>Outcome 1</b> Formulation of pipeline management plans in a workshop format	2, (1)	1 day	-.
Work Management: <b>Outcome 2</b> Lectures on site work procedures and safety management, daily work reports and their management and record compilation, etc.	2	1 day	-.
Repair measure 1: <b>Outcome 1</b> Lecture on what to do in case of damage to pipelines and what to do when cleaning pipelines in case of damage.	1	2 days	Start on the same day as work management
Repair measure 2: <b>Outcome 1</b> Discussions will be held in a workshop format, and exercises will be conducted to formulate repair countermeasure plans based on the condition of the pipelines and buried roads??, and to determine whether the current system can handle the situation.	1	2 days	-.
Practical training in camera image reading: <b>Outcome 2</b>	1, 2	1 day	-.
Confirmation of proposed work plan: <b>Outcome 1, 2</b>	1, 2, 3	1 day	-.
Lecture on safety management of sewage pipe cleaning work: <b>Outcome 2</b>	3, (2)	1 day	Parallel to repair measure 2
Practical training in operations necessary for safety management: <b>Outcome 2</b>	3, (2)	1 day	Parallel to camera image reading
Site visit <b>Outcome 1</b> Practical cleaning training inspection Guidance on points to keep in mind and points to focus on during field work Check the condition of the sewage pipes and consider repair measures.	1	1 day	Parallel to the trial of the draft work plan
Trial of the proposed work plan 1: <b>Outcome 1 and 2</b> The work based on the work plan draft prepared by WASA-M itself is tried out and it is confirmed whether it can be executed smoothly. Based on the results, the problems of the proposed work plan are confirmed.	2, 3.	3 days	-.
Trial of the proposed work plan 2: <b>Outcome 1 and 2</b> Sewage pipes are cleaned according to the revised work plan, sediments in the pipes are removed, and the status of sediment removal is checked with a pipe mouth camera. In addition, an insertion-type TV camera will be used to photograph the condition of the inside of the pipe.	2, 3	3 days Return: 1 day	-.
<b>Monitoring</b>			
Implementation of cleaning work / preparation of daily and monthly reports: <b>Outcome 1, 2</b> WASA-M itself will carry out the clean-up work, record the progress and results of the clean-up, and report to the consultant.	1, 2, 3	1 month	Daily work report, monthly report, and annual report
Evaluation and report writing (Domestic)			

Activities	Target group	Period	Deliverables/Remarks
Evaluation and report writing: <b>Outcome 1, 2</b> Confirm the implementation status from the WASA-M report and evaluate the status of the cleaning work in terms of both quality and quantity. A completion report based on the results is prepared.	-	4 days	Software component completion report Standard images for diagnostic camera imaging

\* Groups indicated in parentheses ( ) will participate partially.

The table below shows the planned activities, target persons of technology transfer, expected period and deliverables. Note that the total number of days of activities at the time of on-site guidance is greater than the number of days of dispatch because some of the activities will be carried out concurrently.

#### Software component engagement period

	Preliminary investigation	Field survey	Document writing	On-the-spot guidance	Assess report writing	M/M total amount
Training summary/ Sewerage pipeline planning	3 days (0.15M/M)	6 days (0.20M/M)	7 days (0.35M/M)	18 days (0.60M/M)	4 days (0.20M/M)	Domestic 0.70 Local 0.80
Sewerage pipeline management	3 days (0.15M/M)	6 days (0.20M/M)	7 days (0.35M/M)	18 days (0.60M/M)	4 days (0.20M/M)	Domestic 0.70 Local 0.80
Sewerage pipeline cleaning	2 days (0.10M/M)	-	4 days (0.20M/M)	18 days (0.60M/M)	2 day (0.10M/M)	Domestic 0.40 Local 0.60
Local technician 1	-	6 days (0.20M/M)	-	15 days (0.50M/M)	3 days (0.10M/M)	0.80
Local technician 2	-	-	-	15 days (0.50M/M)	-	0.50

The number of days of field activities plus two days for the vehicles to be used for the activities as rental cars is assumed to be one car/three persons for the field survey and two cars/five persons for the field guidance, because the vehicles are required to pick up and drop off the participants at the time of boarding and returning home.

## 6. How to Procure Resources to Implement the Soft Components

In the discussion with WASA-M, it was pointed out that the training of trainers for technology transfer can be conducted in English for the management level, but for the staff involved in the practical cleaning work, it is desirable that the training be conducted by a person who has sufficient understanding of the local language and culture. Therefore, the use of local resources, especially in the latter, is considered essential. However, the required local resources should not only be able to interpret and communicate with each other, but also understand the goals and processes of the soft components, and be able to provide support to the staff dispatched by Japanese consultants.

In consideration of the above, TORs will be offered to local consultancies and individual consultants who have potential to work in Multan, and they will be requested to submit their CVs and proposals for the

work together with their cost estimates, and the contents of those CVs and proposals will be reviewed. In the selection process, emphasis will be placed not only on the price but also on the CV and the content of the proposal.

## **7. Implementation Process of Software Components**

A proposed process chart for the soft components is shown in the Appendix.

## **8. Soft Component Deliverables**

- (1) Training plan
- 2) Manual for Formulation of Sewerage Pipeline Management Plan
- 3) Standard Operating Procedure (SOP) for cleaning sewage pipes
- 4) TV camera operation standard operating procedure (SOP)
- 5) Standard images for camera image diagnosis
- 6) Lecture materials
- 7) Safe work manual for sewage pipeline management
- 8) Daily work report, monthly report, and annual report
- 9) Soft Component Completion Report

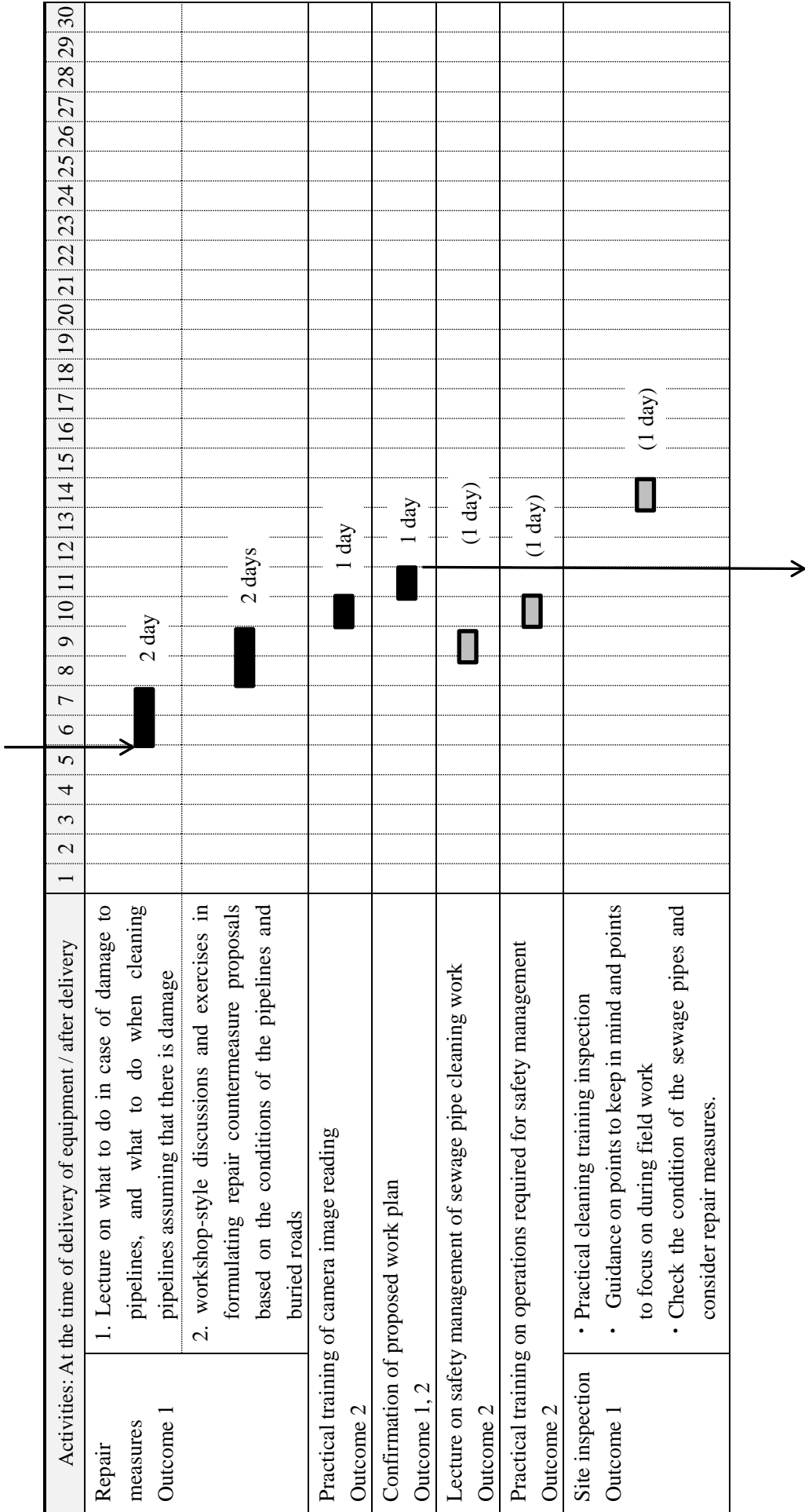
## **9. Responsibilities of the Other Country**

In order to achieve satisfactory results with the Soft Components, the proactive and active participation of the WASA-M side is essential. Therefore, it is necessary to explain the position of the soft components as a prerequisite for the provision of equipment by the Government of Japan, rather than as a technical support incidental to the procurement of equipment, at the explanation stage of the Draft Preparatory Survey Report, and to obtain consent.

After fostering such awareness, we request that the implementing agencies prepare the following as their responsibilities and confirm that they will take the necessary budgetary measures for them.

- Selection of appropriate participants for technology transfer
- Work coordination necessary for the implementation of technology transfer
- Provide a suitable venue for training
- Provision of Necessary Facilitation for the Activities of Experts
- Clean-up work by WASA-M itself to be scheduled after expert guidance.
- Provision of reports and materials necessary for evaluation, such as daily and monthly work reports prepared during cleaning operations





		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
Activities: At the time of delivery of equipment / after delivery																															
Trial of the proposed work plan Outcome 1, 2	1. to confirm whether the work based on the draft work plan prepared by WASA-M can be carried out smoothly through trial work, and to confirm problems with the draft work plan based on the results.	<p>3 days</p> <p>4 days (including 1 day for return trip) Total 18 days</p>																													
	2. cleaning the sewer pipe according to the revised work plan to remove sediment from the pipe, checking the removal of sediment with a pipe mouth camera, and photographing the condition of the inside of the pipe with an insertable TV camera	<p>One week preparation period before the start of the clean-up work by WASA, and the next activity will start on the 26th day.</p>																													
Activity: Site cleanup work by WASA		26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55
[Monitoring] Implementation of cleaning work/preparation of daily and monthly reports Outcome 1, 2	• WASA will carry out the clean-up itself, record the progress and results of the clean-up, and report to the consultant.	<p>30 days</p>																													
Activities: Evaluation and report writing		56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75										
[Domestic] Evaluation Report Outcome 1, 2	• Check the implementation status from WASA-M reports and evaluate the status of cleaning work in terms of both quality and quantity. • Prepare a completion report based on the results.	<p>4 days</p> <p>Assumed to be completed by 75 days (2.5 months) from the time of delivery of procured equipment</p>																													



**APPENDIX-6**  
**OTHER RELEVANT DATA**



**APPENDIX-6(1)**  
**TECHNICAL DATA OF THE EXISTING**  
**DISPOSAL STATIONS, WASA-M**



**Technical Data of the existing Disposal Stations, WASA-M****No.D-1 Chungi No.9 Disposal Station****Site Visit : 16 July, 2021**

S.#	Description	Locality	Remarks
1	Name of Disposal / Lift Station	Chungi No.9 Disposal Station	
2	Catchment Area	2,548 Acre	
3	Location	E737967.140, N3344414.278	
4	Established year	1982-83, Upgrade/replace 2006	
5	Fund /Donor	Govt. of Punjab	
6	Total Capacity (cfs)	164 cfs	
7	Total Number of Pumps	12 no	
8	Pump Number x Dia (mm) x Q (cfs) x H(M) x KW [Year installed ,type*]	5 x 20cfs x 15m x 134kW 2 x 12cfs x 15m x 93kW 3 x 10cfs x 15m x 75kW 2 x 5cfs x 15m x 37kW, [2006, V]	4 no.: not function (3no. in Dec,2019)
9	Gate Number x Width (m) x height (m) [Year Installed ,Type]	7 x 355mm dia, 3 x 300mm dia 2 x 200 dia	
10	Screen Number x Width (m) x height (m) x Opening(mm), [Year Installed ,Type]	1 x 6.5m x 4.87m x 38mm 1 x 4.0m x 3.90m x 38mm [2006, Manual]	
11	Transformer Incoming Line Number x Capacity (KVA), [Year Installed ,Type]	2-Feedres 11KVA 1 x 1250 KVA [2008, step down]	
12	Generator Number x Capacity (KVA) [Year Installed ,Type]	1 x 635 KVA 1 x 275 KVA [2007, Diesel]	275KVA: Out of order, need major repair
13	Other Major Equipment		
14	Status of Equipment(Function etc)	11 no pumps will be replaced in ADP	No yet
15	Size of Inflow sewer	36" dia, 42" dia, 60" dia	
16	Size of Discharge Line	40" dia Force main, 60" dia sewer	
17	No. of Pumps operated	Dry: 5 – 6 no	Manual operation
18	No. of O&M staff	Shift-1:7p, Shift-2:5p, Shift-3:3p	
19	Power Failure	Dry: Few, Wet:Frequent	
20	Discharge point	Partially to Suraj Miani DS and Northern Sullage Carrier	

\*Pump type: V(vertical type),H (Horizontal Type),S (Submersible type),SC(Submersible, Cooling Jacket, dry pit)

**Comments:**

1. Screen pit is deep (5m) and manual rubbish removal work is dangerous. Because this DS is located in the city, odor problem occurs.
2. 4 of 12 vertical pumps are not functioning, and the other pumps also have many failures (bearings, etc.), and struggling to repair. Although the pump shaft is long (about 9 m), the shaft runout is found because the intermediate bearing is anti-sway. That is presumed to be a major cause of the failures. Equipment and structures are aging.
3. Up-gradation and Environmental Improvement Project by ADP (Annual Development Program) of Govt. of Punjab was supported to be implemented in Jan. 2020 to 24 months, but it has not yet been. The reason for this is budgetary issues.  
Scope : Renewed eleven pumps, expanded pump wells / valve pits, expanded force main (1200dia x 2), installed deodorizing equipment.

# SITE D-1 : Chungi Vo.9 DS



PUMP ROOM 1



PUMP ROOM 1



PUMP ROOM 2



PUMPS ROOM 2



MANUAL RAKE SCREEN



SCREEN RUBBISH PILE



S.#	Description	Locality	Remarks
1	Name of Disposal / Lift Station	Old Shujabad Disposal Station	
2	Catchment Area	4,682 Acre	
3	Location	N3084122, E7126852	
4	Established year	No.1:1980, Upgrade/replace 2006-2008, No.2:2018	
5	Fund /Donor	Govt. of Punjab	
6	Total Capacity (cfs)	145 cfs	
7	Total Number of Pumps	10 nos	
8	Pump Number x Dia (mm) x Q (cfs) x H(M) x KW [Year installed ,type*]	No.1: 6 x 15cfs x 15m x 93kW [2006-08, V] No.2: 3 x 15cfs x 15m x 93kW 1 x 10cfs x 15m x 74.6kW [2018, SC]	No.1: 2no: Not function (2no in 12-2019)
9	Gate Number x Width (m) x height (m) [Year Installed ,Type]	7 x 450mm dia 3 x 525mm dia	
10	Screen Number x Width (m) x height (m) x Opening(mm),[Year Installed ,Type]	No.1: 1 x 6.1m x 8.1m 1 x 6.3m x 8.1m No.2: 1 x 4.1m x 8.1m	Function
11	Transformer Incoming Line Number x Capacity (KVA) [Year Installed ,Type]	2-Feeder 11kV 1 x 750kVA[1980]	Function
12	Generator Number x Capacity (KVA) [Year Installed ,Type]	1 x 500kVA [2008] 2 x 500kVA [2006]	Function
13	Other Major Equipment		
14	Status of Equipment(Function etc)	Remarks	
15	Size of Inflow sewer	60" dia, 72" dia	
16	Size of Discharge Line	2 x 40" AC, 1 x 40" GRP	
17	No. of Pumps operated	Dry: 5-6 no	Manual operation
18	No. of O&M staff	Shift-1: 4p, Shift-2: 4p, Shift-3: 4p	
19	Power Failure	Dry: few, Wet: sometime	
20	Discharge point	Hamid Pur Minor/Agriculture fields	

\*Pump type: V(vertical type),H (Horizontal Type),S (Submersible type),SC(Submersible, Cooling Jacket, dry pit)

### Comments:

1. Screen pit is deep (8 m) and manual rubbish removal work is dangerous.
2. No.1: Two of six vertical pumps are not functioning, and the other pumps also have many failures (bearings, etc.), and struggling to repair. Although the pump shaft is long (about 10 m), the shaft runout is found because the intermediate bearing is anti-sway. That is presumed to be a major cause of the failures. Equipment and structures are aging.  
No.2: Good operation of dry pit type Submersible Pump (Cooling Jacket).
3. Few power failure due to double-line power receiving.



SITE D-2: Old Shujabad Road DS



Disposal station D 2 Pump Room 1 (Old)



Manual Rake Screen



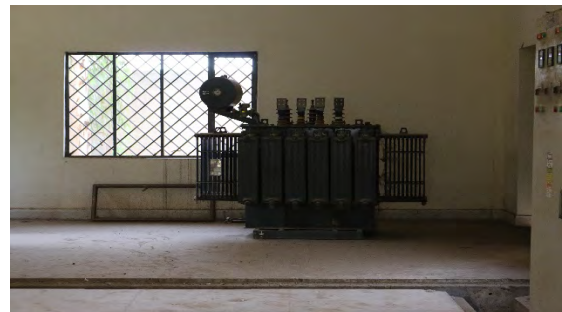
No.2 Pump discharge valve



No.1 Pump Motor Room



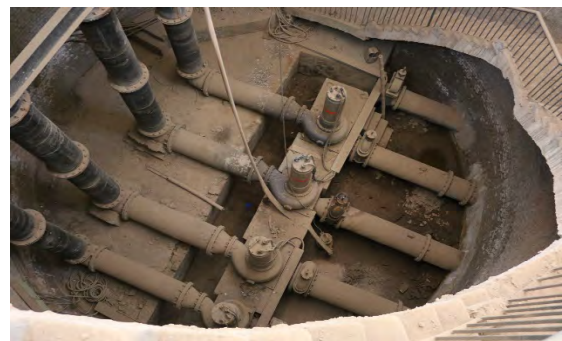
Generator



For Replacement New Transformer



Pump Room 2 (New)  
submersible pump (SC)



Pump Room 2, Dry pit



S.#	Description	Locality	Remarks
1	Name of Disposal / Lift Station	Kirri Jamandan Disposal Station	
2	Catchment Area	914 Acre	
3	Location	Lat 30° 10'51.63"N, 71°28'51.21"E	
4	Established year	(Old)1983-1984 & (New)2005-2009	Old: abandon
5	Fund /Donor	Govt. of Punjab	
6	Total Capacity (Cfs)	75 Cfs	
7	Total Number of Pumps	07 Nos	
8	Pump Number x Dia (mm) x Q (cfs) x H(M) x KW [Year installed ,type*]	2 x 15 cfs x 15m x 111.9 Kw 2 x 10 cfs x 15m x 74 Kw 2 x 5 cfs x 15m x 44 Kw [2004-2005, V] 1 x 15 cfs x 15m x 93kW [2018, S]	-2 x 5 cfs (2nos in 2019), 1x10cfs : Not function -Submersible pump is in Pump well
9	Gate Number x Width (m) x height (m) [Year Installed ,Type]	Nil	
10	Screen Number x Width (m) x height (m) x Opening(mm),[Year Installed ,Type]	1 x 4.26 m x 5.18 m x 38 mm [2008-2009]	Function
11	Transformer Incoming Line Number x Capacity (KVA) [Year Installed ,Type]	1 Feeder 11 KVA 635 KVA Transformer [2008-2009]	Function
12	Generator Number x Capacity (KVA) [Year Installed ,Type]	1x630 KVA (Siemens) 1x635 KVA (FG Willson) [2008-2009, Diesel]	Function
13	Other Major Equipment		
14	Status Of Equipment(Function etc)	Remarks	
15	Size Of Inflow sewer	2x36" dia	
16	Size Of Discharge Line	2x30" dia Forcemain	
17	No. of Pumps operated	Dry: 2 to 3 units, Wet: 4 to 5 units	Manual operation
18	No. of O&M staff	Shift-1:4P, Shift-2:3p,Shift-3:3p	
19	Power Failure	2 to 3 hrs/day, Wet: also full day	
20	Discharge point	Agriculture fields and New Shah Shams DS	

\*Pump type: V(vertical type),H (Horizontal Type),S (Submersible type), SC(Submersible, Cooling Jacket, dry pit)

#### **Comments:**

1. Screen pit is deep (6m) and manual rubbish removal work is dangerous. Rake screen is under repair.
2. 3 of 6 vertical pumps are not functioning, and the other pumps also have many failures (bearings, etc.), and struggling to repair. Although the pump shaft is long (about 10 m), the shaft runout is found because the intermediate bearing is anti-sway. That is presumed to be a major cause of the failures. Equipment and structures are aging. Due to aging, large amount of water leakage from pump casing and piping. Aging equipment and structures.
3. Motor damage due to large voltage fluctuation.
4. One submersible pump has been installed in the pump pit to cope with inlet sewage increase in the wet season.

# SITE D-3 : Kiri Jamandan Disposal Station



PUMP ROOM 1



PUMPS MOTORS



MANUAL RAKE SCREEN



WET WELL



GENERATOR



ELECTRIC CONTROL PANEL



SCREEN RUBBISH



BROKEN RAKE SCREEN, WAITING FOR REPAIRS

S.#	Description	Locality	Remarks
1	Name of Disposal / Lift Station	Sameejabad Disposal Station	
2	Catchment Area	2,730 Acre	
3	Location	N301117.49, E713110.50	
4	Established year	2011-2012	
5	Fund /Donor	ADB(SPBUSP, Southern Punjab Basic Urban Services Project)	
6	Total Capacity (Cfs)	100cfs	
7	Total Number of Pumps	7 nos	
8	Pump Number x Dia (mm) x Q (cfs) x H(M) x KW [Year installed ,type*]	2 x 20 cfs x 15m x 149kW 3 x 15 cfs x 15m x 112kW 1 x 10 cfs x 15m x 75kW 1 x 5 cfs x 15m x 37kW [2011-2012, H]	2-Not function (2 nos in 2019) 1-Not function  1-Not function Aging
9	Gate Number x Width (m) x height (m) [Year Installed ,Type]	2 x 2m x 2m [2011-2012]	Function
10	Screen Number x Width (m) x height (m) x Opening(mm), [Year Installed ,Type]	1 x 5m x 6.5m x 38m [2011-2012, H]	Function
11	Transformer Incoming Line Number x Capacity (KVA) [Year Installed ,Type]	1-Feeder 11kV 1 x 630kVA [2011-2012]	Function, but its replacement with 1000kVA is necessary for smooth working
12	Generator Number x Capacity (KVA) [Year Installed ,Type]	2 x 750kVA [2011-2012, Diesel]	1-Not function
13	Other Major Equipment		
14	Status of Equipment(Function etc)	Remarks	
15	Size of Inflow sewer	72" dia	
16	Size of Discharge Line	2 x 18" dia Force main	
17	No. of Pumps operated	Dry: 3 nos	Manual operation
18	No. of O&M staff	Shift-1:5p, Shift-2:3p, Shift-3: 3p	
19	Power Failure	Dry: Few, Wet: 2-3 hrs/day	
20	Discharge point	Naubahar Canal	

\*Pump type: V(vertical type),H (Horizontal Type),S (Submersible type), SC(Submersible, Cooling Jacket, dry pit)

#### **Comments:**

1. Screen pit is deep (7 m) and manual rubbish removal work is dangerous.
2. Motor damage due to large voltage fluctuation. Generator and electrical equipment have many failures. Damaged bearings due to misalignment of shaft coupling in 2019 have already been repaired.
3. The pumps were installed in 2011, but there are already aging.



## SITE D-4 : Sameejabad Disposal Station



PUMP ROOM



PUMP ROOM 1 F



MANUAL RAKE SCREEN



ELECTRIC CONTROL PANEL



UNDERGROUND PUMP



GENERATOR



OUTFALL TO CANAL



TRANSFORMER

S.#	Description	Locality	Remarks
1	Name of Disposal / Lift Station	Khan Village Northern Bypass Disposal Station	Old name: Bosan Road DS
2	Catchment Area	5,742 Acre	
3	Location	E738695.181, N3348683.248	
4	Established year	2008-2009	
5	Fund /Donor	ADB(SPBUSP)	
6	Total Capacity (Cfs)	170 cfs	
7	Total Number of Pumps	10 nos	
8	Pump Number x Dia (mm) x Q (cfs) x H(M) x KW [Year installed ,type*]	6 x 15 cfs x 15m x 112kW 4 x 20 cfs x 15m x 149kW [2008-2009, H]	2 no-Not function 3 nos-shifted to other DS
9	Gate Number x Width (m) x height (m) [Year Installed ,Type]	10 x 355 mm dia	
10	Screen Number x Width (m) x height (m) x Opening(mm), [Year Installed ,Type]	1 x 6.70m x 5.63m x 38mm [2009, Manual]	Function
11	Transformer Incoming Line Number x Capacity (KVA) [Year Installed ,Type]	1-Feeder 11kV 1 x 630kVA [2009, Step down]	Function
12	Generator Number x Capacity (KVA) [Year Installed ,Type]	2 x 500kVA [2009, Diesel]	1 no-Not function
13	Other Major Equipment		
14	Status of Equipment(Function etc)	Remarks	
15	Size of Inflow sewer	72" dia, 66" dia	
16	Size of Discharge Line	4 x 40" dia GRP Force main	
17	No. of Pumps operated	Dry: 3-nos	Manual operation
18	No. of O&M staff		
19	Power Failure	Dry: Few, Wet: Many time	
20	Discharge point	Northern Sullage Carrier / Sewage Treatment Plant	

\*Pump type: V(vertical type),H (Horizontal Type),S (Submersible type), SC(Submersible, Cooling Jacket, dry pit)

#### **Comments:**

1. Screen pit is deep (6 m) and manual rubbish removal work is dangerous.
2. Three pumps have been relocated to the other DS with insufficient capacity. Motor of two pumps were damaged due to large voltage fluctuation and will be repaired.
3. One-line power receiving and many power failures, but generator is out of order. So, in case of power failure no back up at all.



**SITE D-5 : Khan Village Northern Bypass Disposal Station**



**PUMP ROOM**



**MANUAL RAKE SCREEN**



**ELECTRICAL ROOM**



**GENERATOR**



**UNDERGROUND PUMP ROOM**



**UNDERGROUND PUMP ROOM**

S.#	Description	Locality	Remarks
1	Name of Disposal / Lift Station	Suraj Miani Disposal Station	
2	Catchment Area	2,670 Acre	
3	Location	E733555.278, N3346270.243	
4	Established year	1982-83, 2006(Upgrade/replace)	
5	Fund /Donor	Govt. of Punjab	
6	Total Capacity (Cfs)	135 cfs	
7	Total Number of Pumps	9	
8	Pump Number x Dia (mm) x Q (cfs) x H(M) x KW [Year installed ,type*]	6 x 15 cfs x 15m x 93kW [2006, V] 3 x 15 cfs x 15m x 93kW [2006, SC]	V: 3 nos: not function, SC: 1 no: not function (Same as 2019)
9	Gate Number x Width (m) x height (m) [Year Installed ,Type]	9 x 355 dia	Function
10	Screen Number x Width (m) x height (m) x Opening(mm), [Year Installed ,Type]	1 x 6.7m x 5.58m x 38mm 1 x 5.86m x 5.25m x 38mm [2006, Manual]	Function
11	Transformer Incoming Line Number x Capacity (KVA) [Year Installed ,Type]	2-Feeders, 11kV 2 x 1250 KVA, 1 duty + 1 standby [2006, Step down]	Function
12	Generator Number x Capacity (KVA) [Year Installed ,Type]	2 x 500 KVA [2006, Diesel]	Function
13	Other Major Equipment		
14	Status Of Equipment(Function etc)	Replacement required of 9 pumps	
15	Size of Inflow sewer	72" dia, 54" dia	
16	Size of Discharge Line	3 x 40" dia GRP Forced main	Dia 1000mm
17	No. of Pumps operated	Dry:5 to 6 pumps	Manual operation
18	No. of O&M staff	Shift-1:7p, Shift-2:5p, Shift-3:4p	
19	Power Failure	Dry: Few, Wet: 7 to 8 hrs/day	
20	Discharge point	Sewage Treatment Plant / Agriculture field	

\*Pump type: V(vertical type),H (Horizontal Type),S (Submersible type),SC(Submersible, Cooling Jacket, dry pit)

### Comments:

1. Screen pit is deep (6m) and manual rubbish removal work is dangerous.
2. Three of six vertical pumps are not functioning, and the other pumps also have many failures (bearings, etc.), and struggling to repair. Although the pump shaft is long (about 9 m), the shaft runout is found because the intermediate bearing is anti-sway. That is presumed to be a major cause of the failures. Equipment and structures are aging. Due to aging, large amount of water leakage from pump casing and piping. Aging equipment and structures. One SC pump is not functioning, and the other pumps are good operation.
3. Motor damage due to large voltage fluctuation.
4. GRP Forced main in the yard leaked due to damage.
5. New No. 2 pump facility currently under construction on the site under ADP program, but still on the way not yet completed.
6. As per site conditions about 2 hectare of spare land is available with DS compound for parking of procured equipment.



## SITE D-6 : Suraji Miani Disposal Station



GENERATOR ROOM



MANUAL RAKE SCREEN



EXTERNAL PUMP



ELECTRICAL ROOM



VERTICAL PUMP ROOM



GENERATOR



New No.2 pump facility under construction



Leak point of Forced main on the site



S.#	Description	Locality	Remarks
1	Name of Disposal / Lift Station	Vehari Road Disposal Station	
2	Catchment Area	5291 Acre	
3	Location	N301057.71, E713324.70	
4	Established year	No.1 Pump House 1982-83 No.2 Pump House 2016-2017	No.1 Upgrade /replace: 2004-2005
5	Fund /Donor	Govt. of Punjab	
6	Total Capacity (cfs)	210 cfs	
7	Total Number of Pumps	No.1: 9, No.2: 5, Total 14	
8	Pump Number x Dia (mm) x Q (cfs) x H(M) x KW [Year installed ,type*]	No.1: 9 x 15cfs x 15m x 93kW [2004-2005, V] No.2: 5 x 15cfs x 15m x 112kW [2016-2017, SC]	No.1: 5 nos- Not function (7 in 2019) No.2: 2nos-Not function
9	Gate Number x Width (m) x height (m) [Year Installed ,Type]	Nil	
10	Screen Number x Width (m) x height (m) x Opening(mm), [Year Installed ,Type]	3 x 5m x 6m x 38mm [2007-2008, Manual]	Function
11	Transformer Incoming Line Number x Capacity (KVA) [Year Installed ,Type]	2-Feeder 11kV 1 x 1000KVA [2004-2005]	Function
12	Generator Number x Capacity (KVA) [Year Installed ,Type]	1 x 725KVA [2014-2015] 1 x 300KVA [1986] 1 x 250KVA [2002]	300&250KVA: Not function
13	Other Major Equipment		
14	Status Of Equipment(Function etc)	Replacement required of 9 Vertical Pumps and others	
15	Size of Inflow sewer	1 x 72" dia, 2 x 60" dia	
16	Size of Discharge Line	2 x 36" , 2 x 24" , 2 x 18"Force main,	
17	No. of Pumps operated	Dry: 4 -5 units	Manual operation
18	No. of O&M staff	Shift-1:7p, Shift-2: 3p, Shift-3 5p	
19	Power Failure	Dry: Few, Wet: 2-3hrs/day	
20	Discharge point	Naubahar Canal	

\*Pump type: V(vertical type),H (Horizontal Type),S (Submersible type),SC(Submersible, Cooling Jacket, dry pit)

### Comments:

1. Screen pit is deep (7 m) and manual rubbish removal work is dangerous.
- 2.No.1 : 5 of 9 vertical pumps are not functioning, and the other pumps also have many failures (bearings, etc.), and struggling to repair. Although the pump shaft is long (about 9 m), the shaft runout is found because the intermediate bearing is anti-sway. That is presumed to be a major cause of the failures. Equipment and structures are aging.
- No.2 : 2 of 5 Cooling Jacket Submersible Pumps (SC) are not functioning.
- 3.Motor damage due to large voltage fluctuation. Insufficient capacity of generator due to two units are not functioning.
4. Double-line power receiving and very few power failures. In the wet season, sometimes double lines are stopped.

## SITE D-7 : Vehari Road Disposal Station



MANUAL RAKE SCREEN



VERTICAL PUMP MOTOR ROOM



INTERMEDIATE SHAFT OF VERTICAL PUMP



SUBMERSIBLE PUMP



GENERATOR



CANAL DISCHARGE



**No.D-8 Garden Town Disposal Station****Site Visit : 28 July 2021**

S.#	Description	Locality	Remarks
1	Name of Disposal / Lift Station	Garden Town Station	
2	Catchment Area	312 Acre	
3	Location	N309150.73, E712337.87	
4	Established year	2013	
5	Fund /Donor	Govt. of Pakistan	
6	Total Capacity (Cfs)	30 cfs	
7	Total Number of Pumps	4 nos	
8	Pump Number x Dia (mm) x Q (cfs) x H(M) x KW [Year installed ,type*]	2 x 10 cfs x 15m x 74.6kW 2 x 5 cfs x 15m x 37.3kW [2013, SC]	Function
9	Gate Number x Width (m) x height (m) [Year Installed ,Type]	4 x 450mm	
10	Screen Number x Width (m) x height (m) x Opening(mm), [Year Installed ,Type]	1 x 4.57m x 2.74m [2013, Manual]	Function
11	Transformer Incoming Line Number x Capacity (KVA) [Year Installed ,Type]	1 x 200kVA [2007]	Function
12	Generator Number x Capacity (KVA) [Year Installed ,Type]	1 x 365kVA [2013, Diesel]	Function
13	Other Major Equipment		
14	Status of Equipment(Function etc)	Function	
15	Size of Inflow sewer	60"	
16	Size of Discharge Line	18"	
17	No. of Pumps operated	2-nos	
18	No. of O&M staff	Shift-1:2p, Shift-2:2p, Shift-3: 2p	
19	Power Failure	Dry: 2-3hrs/day, Wet:Many	
20	Discharge point	Agriculture fields/Muzafarabad Canal	

\*Pump type: V(vertical type),H (Horizontal Type),S (Submersible type),SC(Submersible, Cooling Jacket, dry pit)

**Comments:**

1. All facilities are in good working conditions.
2. Submersible (Cooling jacket, dry pit) pumps (SC) working in very well conditions.
3. According to the field staff existing transformer is working well, but if its capacity enhanced it will be much better.



## SITE D-8 : Garden Town Disposal Station



Underground pump room (SC)



Electrical Room panel



Generator



Pump pit



Manual Rake Screen



Pole-Mounted Transformer



Pump Room

Discharge to Muzafarabad Canal

No.D-9 Muzaffarabad Jhakar Pur Disposal Station

Site Visit : 30 July 2021

S.#	Description	Locality	Remarks
1	Name of Disposal / Lift Station	Muzafarabad Jhakar Pur Disposal Station	
2	Catchment Area	1,337 Acre	
3	Location	N30831.61, E712157.57	
4	Established year	(Old)1993-94, (New)2006-12	Old: abandon
5	Fund /Donor	Govt. of Pakistan	
6	Total Capacity (Cfs)	30 cfs	
7	Total Number of Pumps	4 nos	
8	Pump Number x Dia (mm) x Q (cfs) x H(M) x KW [Year installed ,type*]	2 x 10cfs x 15m x 74.6kW 2 x 5cfs x 15m x 37.3kW [2006, 2012, SC]	Function
9	Gate Number x Width (m) x height (m) [Year Installed ,Type]	1 x 760mm dia	
10	Screen Number x Width (m) x height (m) x Opening(mm) [Year Installed ,Type]	1 x 4.57m x 3.66m [2006, Manual]	Function
11	Transformer Incoming Line Number x Capacity (KVA [Year Installed ,Type]	1 x 200kVA [2007]	Function
12	Generator Number x Capacity (KVA [Year Installed ,Type]	1 x 365kVA 1 x 300kVA [2012, Diesel]	Function
13	Other Major Equipment		
14	Status of Equipment(Function etc)	Function	
15	Size of Inflow sewer	2 x 610mm dia, 1 x 760mm dia	
16	Size of Discharge Line	1 x 450 dia	
17	No. of Pumps operated	2-3 nos	Manual operation
18	No. of O&M staff	Shift-1:2p, Shift-2: 2p, Shift-3: 2p	
19	Power Failure	Dry:2-3hrs/day, Wet:Many	
20		Shujahabad Canal/Agriculture fields	

\*Pump type: V(vertical type),H (Horizontal Type),S (Submersible type), SC(Submersible, Cooling Jacket, dry pit)

**Comments:**

1. Facility condition is good
2. Good operation of Submersible (Cooling jacket, dry pit) Pump (SC)
3. Discharge to Canal and irrigation channel, flow rate is about more than 65% each.
4. According to the field staff, Transformer is working good but if capacity enhanced it may be more safe.
5. Approximately 0.5 Hectare of spare land within DS compound is available for Procured equipment parking.



## SITE D-9 : Muzaffarabad Jhakar Pur Disposal Station



PUMP ROOM



MANUAL RAKE SCREEN



SUBMERSIBLE PUMP



PUMP DISCHARGE VALVE



GENERATOR



PUMP CONTROL PANEL



**No.D-10 Qasim Bela Disposal Station****Site Visit : 30 July 2021**

S.#	Description	Locality	Remarks
1	Name of Disposal / Lift Station	Qasim Bela Disposal Station	
2	Catchment Area	467 Acre	
3	Location	N301120.05, E712345.51	
4	Established year	2012	
5	Fund /Donor	Govt. of Pakistan	
6	Total Capacity (Cfs)	30 cfs	
7	Total Number of Pumps	4 nos	
8	Pump Number x Dia (mm) x Q (cfs) x H(M) x KW [Year installed ,type*]	2 x 10 cfs x 15m 74.6kW 2 x 5 cfs x 15m x 37.3kW [2012,SC]	Function
9	Gate Number x Width (m) x height (m) [Year Installed ,Type]	2 x 900 mm dia	
10	Screen Number x Width (m) x height (m) x Opening(mm) [Year Installed ,Type]	1 x 4.57m x 4.57m x 38mm	Function
11	Transformer Incoming Line Number x Capacity (KVA [Year Installed ,Type]	1 x 200 kVA	Function
12	Generator Number x Capacity (KVA [Year Installed ,Type]	1 x 365kVA [2012, Diesel]	Function
13	Other Major Equipment		
14	Status of Equipment(Function etc)	Function	
15	Size of Inflow sewer	36" dia	
16	Size of Discharge Line	20" dia	
17	No. of Pumps operated	2-3 nos	Manual operation
18	No. of O&M staff	Shift-1:2p, Shift-2:2p, Shift-3:2p	
19	Power Failure	Dry:2-3hrs/day, Wet: Many	
20	Discharge point	Shujahabad Canal/Agriculture fields	

\*Pump type: V(vertical type),H (Horizontal Type),S (Submersible type),SC(Submersible, Cooling Jacket, dry pit)

**Comments:**

1. Facility condition is good.
2. Good operation of Submersible pump (Cooling jacket, dry-pit)
3. Discharge to Canal
4. According to the field staff and verified during site visit, the small pump installed at the bottom floor of SC pump for lifting the leakage water is out of order since long and needs replacement.



## SITE D-10 : Qasim Bela Disposal Station



PUMP ROOM



MANUAL RAKE SCREEN



SUMBERSIBLE PUMP ROOM-1



ELECTRICAL ROOM



GENERATOR



POLE – MOUNTED TRANSFORMER



SUMBERSIBLE PUMP ROOM-2



Discharge to Canal



S.#	Description	Locality	Remarks
1	Name of Disposal / Lift Station	Under Pass Disposal Station	Storm Water DS
2	Catchment Area	Under pass area only	
3	Location	Close to Under Pass	
4	Established year	2007-2008	
5	Fund /Donor	Govt. of Punjab	
6	Total Capacity (Cfs)	7cfs	
7	Total Number of Pumps	5 nos	
8	Pump Number x Dia (mm) x Q (cfs) x H(M) x KW [Year installed ,type*]	2 x 2 cfs x 15m x 14kW 3 x 1 cfs x 15m x 7.5kW [2011-2012, S]	Functioning
9	Gate Number x Width (m) x height (m) [Year Installed ,Type]	Nil	
10	Screen Number x Width (m) x height (m) x Opening(mm) [Year Installed ,Type]	Nil	
11	Transformer Incoming Line Number x Capacity (KVA) [Year Installed ,Type]	Nil	
12	Generator Number x Capacity (KVA) [Year Installed ,Type]	1 x 100kVA 1 x 50kVA [2012-2013, Diesel]	Functioning
13	Other Major Equipment		
14	Status of Equipment(Function etc)	Functioning	
15	Size of Inflow sewer	18" dia	
16	Size of Discharge Line	12" dia	
17	No. of Pumps operated	4 nos, operates only during rain	Manual operation
18	No. of O&M staff		
19	Power Failure	-	
20	Discharge point	Multan Branch Canal	

\*Pump type: V(vertical type),H (Horizontal Type),S (Submersible type),SC(Submersible, Cooling Jacket, dry pit)

#### **Comments:**

1. For drainage in the Under Pass area. Operate only during rainfall.
2. Pump operation by generator without commercial power supply.
3. Large amount of sediment deposited after cleaning inside the inlet pipe. Due to heavy rainfall a lot of sediment flow generated from roads and streets.

# SITE D-11 : Under Pass Disposal Station



PUMP ROOM



GENERATOR



ELECTRICAL PANEL



SUMBERSIBLE PUMP ROOM



SEDIMENT DEPOSIT



DEEP PIT



Under pass for drainage

S.#	Description	Locality	Remarks
1	Name of Disposal / Lift Station	New Shah Shams Disposal Station	
2	Catchment Area	1,465 Acre	
3	Location		
4	Established year	2019.9	
5	Fund /Donor	Govt. of Punjab	
6	Total Capacity (Cfs)	185 cfs	
7	Total Number of Pumps	14 nos	
8	Pump Number x Dia (mm) x Q (cfs) x H(M) x KW [Year installed ,type*]	4 x 20 cfs x 15m x 149kW 4 x 15 cfs x 15m x 112kW 3 x 10 cfs x 15m x 75kW 3 x 5 cfs x 15m x 37kW [2018-2019, SC]	Functioning
9	Gate Number x Width (m) x height (m) [Year Installed ,Type]	4 x 2m x 2.5m [2018-2019]	Functioning
10	Screen Number x Width (m) x height (m) x Opening(mm) [Year Installed ,Type]	1 x 6m x 8m x 38mm [2018-2019, Mechanical Screen]	Functioning
11	Transformer Incoming Line Number x Capacity (KVA) [Year Installed ,Type]	1-Feeder 11kV 1 x 750 kVA [2018-2019]	Functioning
12	Generator Number x Capacity (KVA) [Year Installed ,Type]	2 x 635 kVA [2018-2019, Diesel]	Functioning
13	Other Major Equipment		
14	Status of Equipment(Function etc)	Functioning	
15	Size of Inflow sewer	1 x 72" dia, 1 x 36" dia, 1 x 60"(from Kiri Jamandan DS)	
16	Size of Discharge Line	3 x 32" dia Forcemain	
17	No. of Pumps operated		Manual operation
18	No. of O&M staff		
19	Power Failure		
20	Discharge point	Canal	

\*Pump type: V(vertical type),H (Horizontal Type),S (Submersible type),SC(Submersible, Cooling Jacket, dry pit)

#### **Comments:**

1. Latest Disposal Station for WASA Multan.
2. Although the screen pit is deep (about 9m), good operation with mechanical screen (rope type) installed.
3. All pumps are dry-pit type submersible pump (Cooling Jacket, SC), and very good working conditions.
4. As seen at site about 4 Hectares of free space available within the compound of Disposal station and can be easily utilized for the Parking of procured equipment.



## SITE D-12 : New Shah Shams Disposal Station



PUMP ROOM



PUMP DISCHARGE PIPES



MECHANICAL SCREEN, ROPE TYPE



DRY-PIT TYPE SUBMERSIBLE PUMPS



GENERATOR



ELECTRICAL ROOM

S.#	Description	Locality	Remarks
1	Name of Disposal / Lift Station	Inner Bypass Disposal Station	
2	Catchment Area	235 Acre	
3	Location	E737242.208, N3348613.120	
4	Established year	2018	
5	Fund /Donor	Govt. of Punjab	
6	Total Capacity (Cfs)	22 cfs	
7	Total Number of Pumps	4 nos	
8	Pump Number x Dia (mm) x Q (cfs) x H(M) x KW [Year installed ,type*]	2 x 5 cfs x 15m x 37kW 1 x 10 cfs x 15m x 75kW 1 x 2 cfs x 15m x 19kW [2018, SC]	Functioning
9	Gate Number x Width (m) x height (m) [Year Installed ,Type]	2 x 350mm dia 1 x 450mm dia 1 x 200mm dia	
10	Screen Number x Width (m) x height (m) x Opening(mm) [Year Installed ,Type]	1 x 6.22m x 5.53m x 38mm [2018, Manual]	Functioning
11	Transformer Incoming Line Number x Capacity (KVA [Year Installed ,Type]	1-Feeder 11kV 1 x 200 kVA [2018, step down]	Functioning
12	Generator Number x Capacity (KVA [Year Installed ,Type]	2 x 300kVA [2000, Diesel]	(Shifted from Store) Not functioning
13	Other Major Equipment		
14	Status f Equipment(Function etc)	Remarks	
15	Size of Inflow sewer	42" dia	
16	Size of Discharge Line	2 x 20" dia AC Forced main	
17	No. of Pumps operated	2 nos	
18	No. of O&M staff		
19	Power Failure	Dry: Few, Wet: many	
20	Discharge point	Ting Sullage Carrier/Sewage Treatment Plant	

\*Pump type: V(vertical type),H (Horizontal Type),S (Submersible type),SC(Submersible, Cooling Jacket, dry pit)

#### **Comments:**

1. Screen pit is deep (6m) and manual rubbish removal work is dangerous.
2. Good operation of dry-pit type submersible pump (Cooling Jacket, SC).
3. The installed generator is the existing equipment stored in the warehouse, but it is out of order. Pump stops during power failure.
4. As per site conditions about 1 hectare of spare land is available within the compound of DS for parking of procured equipment.

## SITE D-13 : Inner Bypass Disposal Station



PUMP ROOM



ELECTRICAL ROOM



UNDERGROUND PUMP ROOM



GENERATOR



MANUAL RAKE SCREEN

S.#	Description	Locality	Remarks
1	Name of Disposal / Lift Station	Paeran Ghaib Disposal Station	
2	Catchment Area		
3	Location	N301157.71, E713358.23	
4	Established year	2002, Taken over from PHED in 2016	
5	Fund /Donor	PHED	
6	Total Capacity (Cfs)	5 cfs	
7	Total Number of Pumps	2 nos	
8	Pump Number x Dia (mm) x Q (cfs) x H(M) x KW [Year installed ,type*]	1 x 2cfs x15m x 15kW 1 x 3cfs x 15m x 22kW [2008, H]	2cfs: Not functioning
9	Gate Number x Width (m) x height (m) [Year Installed ,Type]	Nil	
10	Screen Number x Width (m) x height (m) x Opening(mm) [Year Installed ,Type]	2 x 1m x 3m x 38mm [2007-2008, Manual]	1 no :Not functioning
11	Transformer Incoming Line Number x Capacity (KVA [Year Installed ,Type]	1-Feeder 11kV 1 x 50KVA [2007-2008]	Functioning
12	Generator Number x Capacity (KVA [Year Installed ,Type]	Nil	
13	Other Major Equipment		
14	Status of Equipment(Function etc)	Remarks	
15	Size of Inflow sewer	1 x 18" dia	
16	Size of Discharge Line	1 x 12" dia, Force main	
17	No. of Pumps operated	1 no	
18	No. of O&M staff	Shift-1:2p, Shift-2:1p, Shift-3:1p	
19	Power Failure	Sometime, 1-2hrs/one time	
20	Discharge point	Multan Branch Canal / Agriculture fields	

\*Pump type: V(vertical type),H (Horizontal Type),S (Submersible type),SC(Submersible, Cooling Jacket, dry pit)

#### **Comments:**

1. Rubbish is relatively small, may be due to small catchment area.
2. Pumps and equipment are aging and need to be renewed.
3. Without generator, pump stops during power failure.
4. Discharge pipe is branched for Canal and irrigation.



## SITE D-14 : Paeran Ghaib Disposal Station



PUMP ROOM



UNDERGROUND PUMP ROOM



BRANCHED DISCHARGE PIPE



ELECTRICAL PANEL



DISCHARGE TO CANAL



S.#	Description	Locality	Remarks
1	Name of Disposal / Lift Station	Basti Langrial Disposal Station	
2	Catchment Area		
3	Location		
4	Established year	2001-2002	
5	Fund /Donor	Govt. of Punjab	
6	Total Capacity (Cfs)	2 cfs	
7	Total Number of Pumps	1 no	
8	Pump Number x Dia (mm) x Q (cfs) x H(M) x KW [Year installed ,type*]	1 x 2 cfs, H, Engine Pump	Functioning
9	Gate Number x Width (m) x height (m) [Year Installed ,Type]	Nil	
10	Screen Number x Width (m) x height (m) x Opening(mm) [Year Installed ,Type]	Nil	
11	Transformer Incoming Line Number x Capacity (KVA [Year Installed ,Type]	Nil	
12	Generator Number x Capacity (KVA [Year Installed ,Type]	Nil	
13	Other Major Equipment		
14	Status of Equipment(Function etc)	Functioning	
15	Size of Inflow sewer		
16	Size of Discharge Line		
17	No. of Pumps operated	1no	Manual operation
18	No. of O&M staff	1p	
19	Power Failure		
20	Discharge point	Adjacent agriculture fields	

\*Pump type: V(vertical type),H (Horizontal Type),S (Submersible type),SC(Submersible, Cooling Jacket, dry pit)

#### **Comments:**

1. Old pump room was abandoned. One aging engine-driven horizontal pump is installed next to the pump well.
2. Actually, this DS is not proper Disposal station. Only one pump with small pit is constructed on village road shoulder. Shoulder strip is 20 feet wide only. Even land also belongs to the private owner. As land is not owned by the Govt of Punjab so this Disposal station is only installed for temporary relief to the adjacent residents. Very small discharge so it can be disposed of nearby agriculture fields easily.

## SITE D-15 : Basti Langrial Disposal Station



Pump and Pump Pit



Pump discharge channel to farmland & Accompanying room

**APPENDIX-6(2)**  
**PROJECT MONITORING REPORT**



**Project Monitoring Report**  
**on**  
**The Project for**  
**Upgrading of Mechanical System for**  
**Sewerage and Drainage Services in Multan**  
**Grant Agreement No. XXXXXXXX**  
 2022, February

**Organizational Information**

<b>Signer of the G/A (Recipient)</b>	Person in Charge _____ Contacts _____ <u>Address:</u> _____ <u>Phone/FAX:</u> _____ <u>Email:</u> _____
<b>Executing Agency</b>	<u>Mr./Ms. xxxxxxxxxxxx</u> Person in Charge <u>Managing Director</u> <u>Water and Sanitation Agency, Multan</u> Contacts <u>Address: Rohtak House Multan, 316A, Bosan Rd,</u> <u>Shamsabad Colony Multan</u> <u>Phone/FAX: +92-61-9330051</u> <u>Email: wasa_mln@yahoo.com</u>
<b>Line Ministry</b>	Person in Charge _____ Contacts _____ <u>Address:</u> _____ <u>Phone/FAX:</u> _____ <u>Email:</u> _____

**General Information:**

<b>Project Title</b>	The Project for Upgrading of Mechanical System for Sewerage and Drainage Services in Multan
<b>E/N</b>	Signed date: Duration:
<b>G/A</b>	Signed date: Duration:
<b>Source of Finance</b>	Government of Japan: Not exceeding JPY _____ mil. Government of (_____): _____

## 1: Project Description

### 1-1 Project Objective

The project will contribute to the improvement of the sanitation environment by enhancing the sewerage services in the area through the augmentation of sewerage equipment such as cleaning equipment and drainage pumps necessary for the maintenance and management of sewerage pipes and drains in WASA Multan (WASA-M).

### 1-2 Project Rationale

- Higher-level objectives to which the project contributes (national/regional/sectoral policies and strategies)
- Situation of the target groups to which the project addresses

#### (1) Project beneficiaries

The project will benefit the general public, including the poor, rather than any particular class or region, and approximately 2 million people in Multan will benefit directly or indirectly.

#### (2) Business goals and human security

This project, which aims to eradicate unsanitary conditions caused by overflowing sewage, will greatly contribute to the stability of the people and the improvement of the lives of the residents. In addition, the urgency of this project is very high because it aims to improve the situation where sewage overflows occur on a daily basis in urban areas and citizens complain about it.

#### (3) Achieve the goals of the country's medium- and long-term development plans

The water sector is one of the priority policies of the federal and provincial governments, the National Sanitation Policy (2006) and Punjab Urban Water Supply and Sanitation (National Sanitation Policy, 2006) as well as the Punjab Urban Water Supply and Sanitation Policy (Punjab Urban Water Supply and Sanitation Policy, 2007). The improvement of the maintenance and management capacity of the sewerage facilities by this project is regarded as an essential part of these policies, as it will ensure the sustainability of the sewerage system to be developed in the future.

#### (4) Consistency with Japan's aid policy and policy

Frequent overflowing of water and flooding of roads in the city of Multan has become an obstacle to traffic, adversely affecting human traffic and distribution, and hindering commercial activities from a sanitary point of view. The improvement of such conditions forms part of the improvement of economic infrastructure, which is a priority area in Japan's Country Development Cooperation Policy (February 2018). With regard to ensuring human security and improving social infrastructure, which are also priority areas, Japan's policy on water and sanitation is to model infrastructure and operational systems, including fee collection, with a focus on water supply and sewerage in urban areas, and to consider expanding these systems on a regional basis. This project is consistent with the series of cooperation for WASA that Japan has been promoting in other major cities in Punjab.

### 1-3 Indicators for measurement of “Effectiveness”

Quantitative indicators to measure the attainment of project objectives		
Indicators	Baseline value (2021)	Target value (2027)
Distance to remove sediment in sewage pipes (km)	4.1 km/year	Approx. 230 km/year
Dewatering pump set emergency drainage capacity	140 m <sup>3</sup> / min	392 m <sup>3</sup> / min
Qualitative indicators to measure the attainment of project objectives		
<ul style="list-style-type: none"> <li>· Reduce the risk of waterborne diseases due to reduced flooding and flooding damage.</li> <li>· Citizens' economic and social activities, which had been hampered by flooded roads and urban areas, will become more active.</li> <li>· Improve sanitation in the city by reducing abandoned waste and chronic flooding conditions.</li> </ul>		

## 2: Details of the Project

### 2-1 Location

Components	Original <i>(proposed in the outline design)</i>	Actual
Water and Sanitation Agency, Multan (WASA-M)	Service area of WASA-M	

### 2-2 Scope of the work

Components	Original* <i>(proposed in the outline design)</i>	Actual*
1. Equipment for cleaning sewage pipes	<ul style="list-style-type: none"> <li>➤ Jetting Machine: 18</li> <li>➤ Suction Machine: 18</li> <li>➤ Small pipe cleaning machine 9</li> </ul>	
2. Equipment for pipeline investigation and diagnosis	<ul style="list-style-type: none"> <li>➤ TV camera ( Insertion type): 3</li> <li>➤ TV camera ( Telescopic portable): 9</li> <li>➤ Waterstop plug ( Available for internal diameters 8"-36"): 36</li> </ul>	
3. Equipment for cleaning drainage channels	<ul style="list-style-type: none"> <li>➤ Small backhoe: 3</li> <li>➤ Clamshell: 3</li> <li>➤ Dump truck: 5</li> <li>➤ Wheel loader: 3</li> </ul>	
4. Drainage equipment	Dewatering pump set <ul style="list-style-type: none"> <li>➤ 4-5cfs: 10</li> <li>➤ 2-4cfs: 32</li> <li>➤ -1 cfs: 10</li> </ul>	
5. Carrying vehicles	<ul style="list-style-type: none"> <li>➤ Truck crane: 1</li> <li>➤ Cargo truck with crane: 1</li> <li>➤ Pickup truck: 5</li> </ul>	

Reasons for modification of scope (if any).

(PMR)

## 2-3 Implementation Schedule

Items	Original		Actual
	<i>(proposed in the outline design)</i>	<i>(at the time of signing the Grant Agreement)</i>	
Cabinet Approval	2/2022		
E/N	3/2022		
G/A	3/2022		
Detailed Design	4/2022 - 5/2022		
Tender Notice	6/2022		
Procurement Period	9/2022 - 12/2023		
Soft Component	7/2023 - 1/2024		
Project Completion Date	3/2024		
Defect Liability Period	none		

Project Completion was defined as the timing of the commencement of operation.

Reasons for any changes of the schedule, and their effects on the project (if any)

--

## 2-4 Obligations by the Recipient

### 2-4-1 Progress of Specific Obligations

See Attachment 2.

### 2-4-2 Activities

See Attachment 3.

## 2-5 Project Cost

### 2-5-1 Cost borne by the Grant(Confidential until the Bidding)

Components			Cost (Million Yen)	
	Original <i>(proposed in the outline design)</i>	Actual <i>(in case of any modification)</i>	Original <sup>1),2)</sup> <i>(proposed in the outline design)</i>	Actual
1. Equipment	<ul style="list-style-type: none"> <li>➤ Jetting Machine: 18</li> <li>➤ Suction Machine: 18</li> <li>➤ Small pipe cleaning machine: 9</li> <li>➤ TV camera ( Insertion type): 3</li> <li>➤ TV camera ( Telescopic portable): 9</li> <li>➤ Waterstop plug ( Available for internal diameters 8"-36"): 36</li> <li>➤ Small backhoe: 3</li> <li>➤ Clamshell: 3</li> <li>➤ Dump truck: 5</li> <li>➤ Wheel loader: 3</li> <li>➤ Dewatering pump set 4-5cfs: 10</li> <li>➤ Dewatering pump set 2-4cfs: 32</li> <li>➤ Dewatering pump set -1 cfs: 10</li> <li>➤ Truck crane: 1</li> <li>➤ Cargo truck with crane: 1</li> <li>➤ Pickup truck: 5</li> </ul>			



2. Consulting Service	- Detailed design - Procurement Management - Soft Component			
Total				

Note: 1) Date of estimation: November 2021  
 2) Exchange rate: 1 US Dollar = 113.10 Yen, 1 Pakistan Rupees = 0.84 Yen

**2-5-2 Cost borne by the Recipient**

Components			Cost (Million Yen)	
	Original <i>(proposed in the outline design)</i>	Actual <i>(in case of any modification)</i>	Original <sup>(1),2)</sup> <i>(proposed in the outline design)</i>	Actual
Construct and Maintain of storage	Parking Yard, Shed and etc.		65	
			65	

Note: 1) Date of estimation: November 2021  
 2) Exchange rate: 1 US Dollar = 113.10 Yen, 1 Pakistan Rupees = 0.84 Yen

Reasons for the remarkable gaps between the original and actual cost, and the countermeasures (if any)

(PMR)
-------

**2-6 Executing Agency**

- Organization's role, financial position, capacity, cost recovery etc,
- Organization Chart including the unit in charge of the implementation and number of employees.

**Original** (at the time of outline design)

name: Water and Sanitation Agency, Multan (WASA-M)

Role: Forecasting of demand for services of Water Supply, Sewerage and Drainage, preparation of plans and design for their extension, rehabilitation and replacement.

Construction, Improvement, Maintenance and Operation of Water Works, Sewerage Works and Main Storm Water Drainage Channels, and Pumping Stations.

Billing and collection of all rates, fees and charges, for the services so provided to the consumers.

Financial situation: The financial sources for the development and the non-development budget of WASA-M are subsidy from the provincial government and the income from water tariff, etc.

Expense	2020-21 (PKR million)	%.
Electric utility expense	137.485	11
Personnel expenses (salaries and pensions)	870.542	68
Operation and maintenance expenses	250.737	19
Others (office consumables, etc.)	24.467	2
Total amount	1,283,231	100

Institutional and organizational arrangement (organogram): The organization is headed by MD and formed by two Deputy Directors (DMD) sectionalized in i) administration, finance & recovery and ii) engineering. Two Directors under the DMD of engineering, three Deputy Directors under Director Works, two Deputy Directors under Director Engineering.

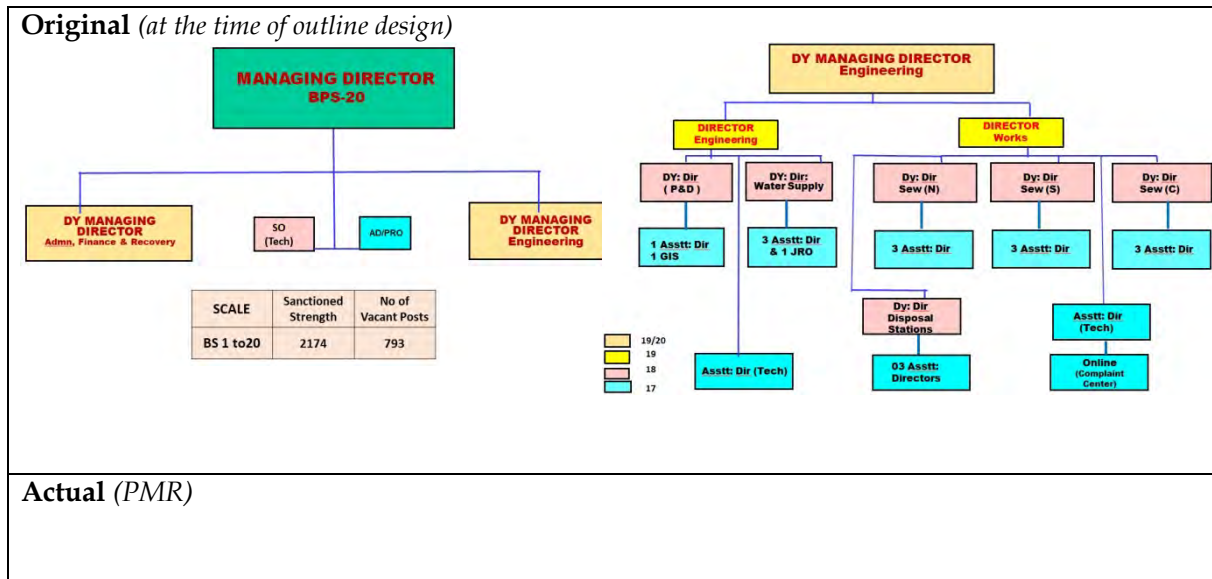
Human resources (number and ability of staff): Total number of staff is 2,174 and vacant posts 793. The staff of sewerage and drainage services is responsible and properly working for the operation of procuring equipment.

**Actual** (PMR)

### 3: Operation and Maintenance (O&M)

#### 3-1 Physical Arrangement

- Plan for O&M (number and skills of the staff in the responsible division or section, availability of manuals and guidelines, availability of spareparts, etc.)



### 3-2 Budgetary Arrangement

- Required O&M cost and actual budget allocation for O&M

**Original (at the time of outline design)**

Expense	2021-22 (forecast) (PKR million)	%.
Electric utility expense	750.000	32
Personnel expenses (salaries and pensions)	1,160,196	50
Operation and maintenance expenses	336.500	14
Others (office consumables, etc.)	85.509	4
Total amount	2,332.205	100

**Actual (PMR)**

## 4: Potential Risks and Mitigation Measures

- Potential risks which may affect the project implementation, attainment of objectives, sustainability
- Mitigation measures corresponding to the potential risks

### Assessment of Potential Risks (at the time of outline design)

Potential Risks	Assessment
1. Air Pollution	Probability: High/Moderate/Low
	Impact: High/Moderate/Low
	Analysis of Probability and Impact: Temporary deterioration of air quality is expected due to operation of machineries and vehicles.
	Mitigation Measures: None

	Action required during the implementation stage:
	None
	Contingency Plan (if applicable):
2. Water Pollution	Probability: High/Moderate/Low
	Impact: High/Moderate/Low
	Analysis of Probability and Impact:
	None
	Mitigation Measures:
	None
	Action required during the implementation stage:
	None
	Contingency Plan (if applicable):
3. Solid Waste	Probability: High/Moderate/Low
	Impact: High/Moderate/Low
	Analysis of Probability and Impact:
	None
	Mitigation Measures:
	None
	Action required during the implementation stage:
	None
	Contingency Plan (if applicable):
<b>Actual Situation and Countermeasures</b>	
(PMR)	

**5: Evaluation and Monitoring Plan (after the work completion)**

5-1 Overall evaluation

Please describe your overall evaluation on the project.

**5-2 Lessons Learnt and Recommendations**

Please raise any lessons learned from the project experience, which might be valuable for the future assistance or similar type of projects, as well as any recommendations, which might be beneficial for better realization of the project effect, impact and assurance of sustainability.

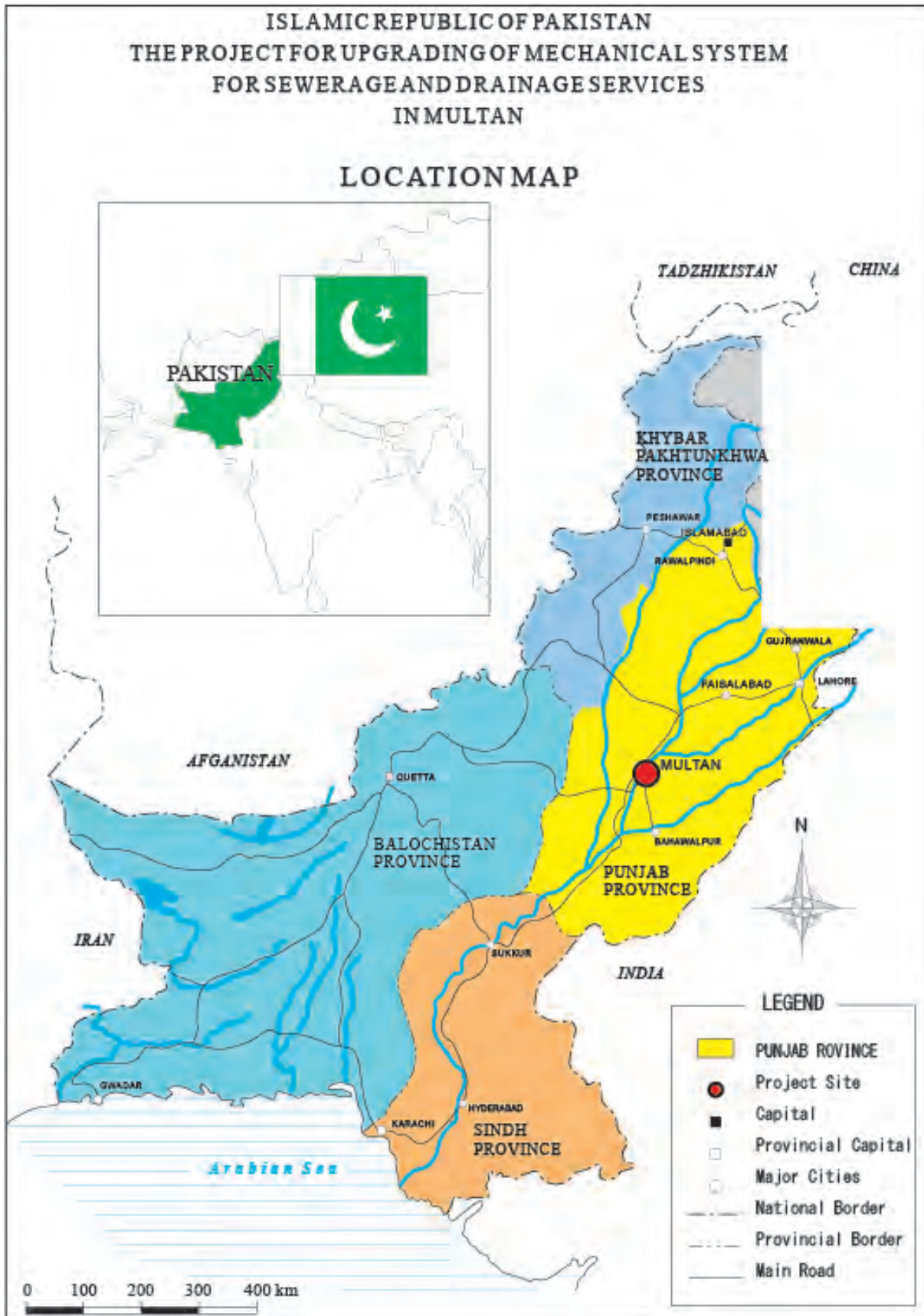
**5-3 Monitoring Plan of the Indicators for Post-Evaluation**

Please describe monitoring methods, section(s)/department(s) in charge of monitoring, frequency, the term to monitor the indicators stipulated in 1-3.

Attachment

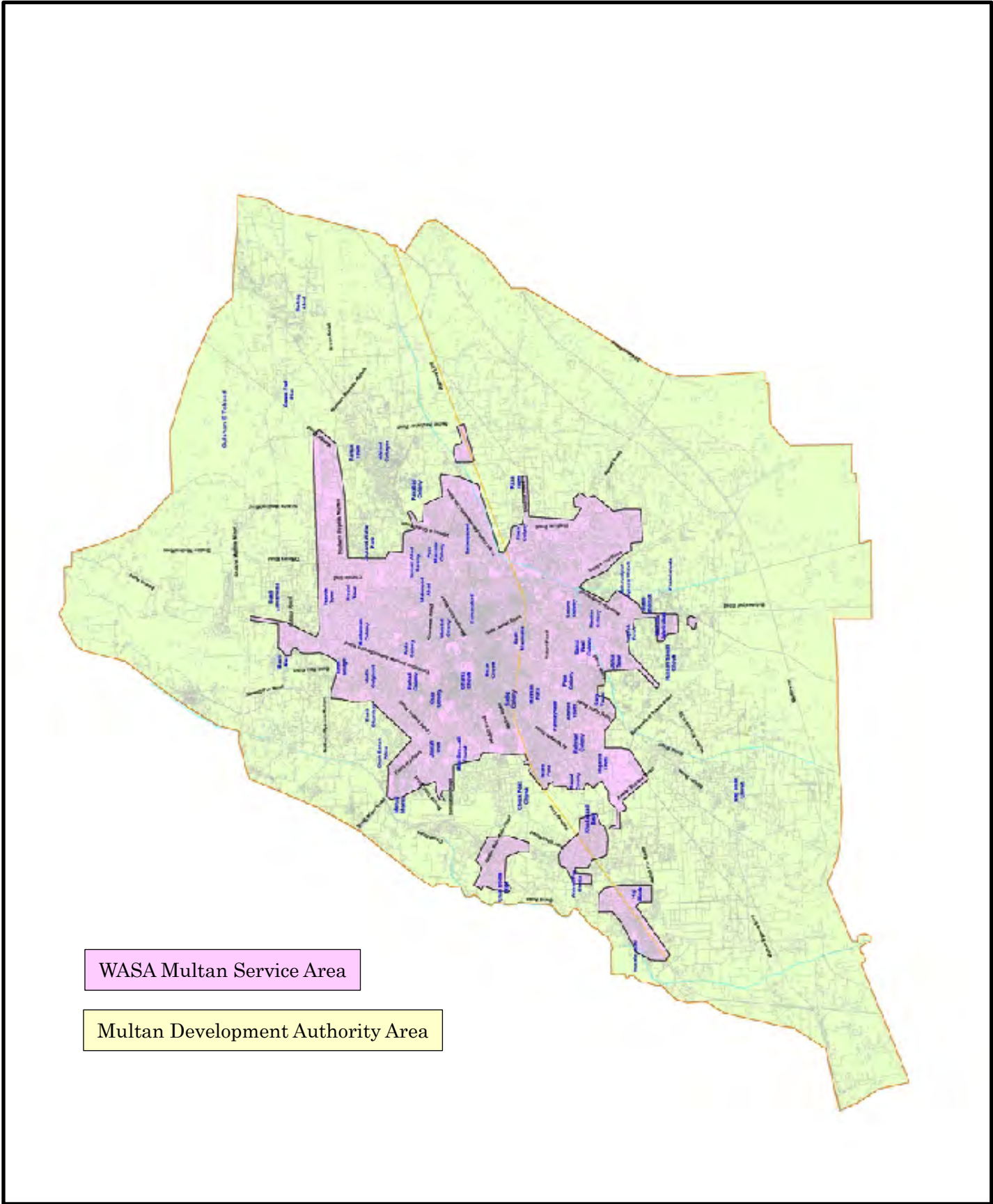
1. Project Location Map
2. Specific obligations of the Recipient which will not be funded with the Grant
3. Monthly Report submitted by the Consultant
- Appendix - Photocopy of Contractor's Progress Report (if any)
  - Consultant Member List
  - Contractor's Main Staff List
4. Check list for the Contract (including Record of Amendment of the Contract/ Agreement and Schedule of Payment)
5. Monitoring sheet on price of specified materials (Quarterly)
6. Report on Proportion of Procurement (Recipient Country, Japan and Third Countries) (PMR (final )only)
7. Pictures (by JPEG style by CD-R) (PMR (final)only)
8. Equipment List (PMR (final )only)
10. Drawing (PMR (final )only)
11. Report on RD (After project)

Attachment 1: Project Location Map



Source: Prepared by the JICA survey team

**Location Map**



Source: WASA-M

### WASA Multan Service Area



**Attachment 2: Specific obligations of the Recipient which will not be funded with the Grant**

The following tables show obligations of the Pakistan side by category.

**【Before the Bidding】**

No	Items	Deadline	In charge
1	To sign the banking arrangement (B/A) with a bank in Japan (the Agent Bank) to open bank account for the Grant	within 1 month after the signing of the G/A	EAD WASA-M
2	To issue A/P to the Agent Bank for the payment to the consultant	within 1 month after the signing of the contract(s)	WASA-M
3	To bear the following commissions to the Agent Bank for the banking services based upon B/A		
	1) Advising commission of A/P	within 1 month after the signing of the contract(s)	
	2) Payment commission for A/P	every payment	
4	To submit Project Monitoring Report (with the result of Detailed Design)	before preparation of bidding document(s)	WASA-M

(B/A: Banking Arrangement, A/P: Authorization to pay, N/A: Not Applicable)

(EAD: Economic Affairs Division, Islamic Republic of Pakistan)

(WASA-M: Water And Sanitation Agency, Multan)

**【 During the Project Implementation】**

NO	Items	Deadline	In charge
1	To issue A/P to the Agent Bank for the payment to the supplier (s)	within 1 month after the signing of the contract(s)	WASA-M
2	To bear the following commissions to the Agent Bank for the banking services based upon the B/A		
	1) Advising commission of A/P	within 1 month after the signing of the contract(s)	WASA-M
	2) Payment commission for A/P	every payment	WASA-M
3	During the implementation and warranty period of the project, complete customs (tax) exemption procedures and take necessary actions for materials and equipment imported for this project, and provide the necessary legal and/or administrative documentation for customs clearance to the customs broker/forwarder employed by the supplier at the port of disembarkation. Take necessary actions not exceed the bonded warehouse period.	during the Project	EAD WASA-M
4	To accord Japanese physical persons and/or physical persons of third countries whose services may be required in connection with the supply of the products and the services such facilities as may be necessary for their entry into the country of the Recipient and stay therein for the performance of their work	during the Project	EAD WASA-M
5	To ensure that customs duties, internal taxes and other fiscal levies which may be imposed in the country of the Recipient with respect to the purchase of the products and/or the services be exempted/ be borne by its designated authority without using the Grant	during the Project	EAD WASA-M
6	To bear all the expenses, other than those covered by the Grant, necessary for the implementation of the Project	during the Project	WASA-M

NO	Items	Deadline	In charge
7	1) To submit Project Monitoring Report after each work under the contract(s) such as shipping, hand over, installation and operational training	within 1 month after completion of each work	WASA-M
	2) To submit Project Monitoring Report (final) (including equipment list, photographs and etc.)	within 1 month after issuance of Certificate of Completion for the works under the contract(s)	WASA-M
8	To submit a report concerning completion of the Project	within 6 months after completion of the Project	WASA-M
9	To prepare garages, stockyards with shade, water supply and electricity, communication network and etc. for the equipment procured by the Project	prior to the delivery of the equipment to the site	WASA-M
10	To ensure the safety of persons engaged in the implementation of the Project	during the Project	WASA-M
11	To take necessary measures for security and safety of the Project site 1) To arrange security around the Project sites with the police. 2) To arrange security around the accommodation(s) of the Consultants & the Supplier(s) with the police. 3) To arrange escort guard with the police during movements between the accommodation(s) of the Supplier(s) and the Project sites.	during the Project	WASA-M
12	To provide necessary working spaces with internet connection at the WASA-M Office.	during the Project	WASA-M
13	1) Renovation or demolition and construction for non-vehicle equipment storage. 2) Construction garages for new vehicles.	during the Project	WASA-M

**【After the Project】**

NO	Items	Deadline	In charge
1	To maintain and use properly and effectively the facilities and equipment provided under the Grant Aid 1) Allocation of maintenance cost 2) Allocation of additional staff for operation and maintenance Routine check/Periodic inspection	After completion of the construction	WASA-M

**【 Other obligations of the Government of Pakistan funded with the Grant】**

NO	Items	Deadline	In charge
1	Procurement of the equipment for the Project.	during the Project	WASA-M
2	Procurement of the consulting services for the Project.		
	Total		

Monitoring sheet on price of specified materials

1. Initial Conditions (Confirmed)

Items of Specified Materials	Initial Volume A	Initial Unit Price (¥) B	Initial total Price C=A×B	1% of Contract Price D	Condition of payment	
					Price (Decreased) E=C-D	Price (Increased) F=C+D
Item 1	●●t	●	●	●	●	●
Item 2	●●t	●	●	●		
Item 3						
Item 4						
Item 5						

2. Monitoring of the Unit Price of Specified Materials

(1) Method of Monitoring : ●●

(2) Result of the Monitoring Survey on Unit Price for each specified materials

Items of Specified Materials	1st month, 2015	2nd month, 2015	3rd month, 2015	4th	5th	6th
Item 1	●	●	●			
Item 2						
Item 3						
Item 4						
Item 5						

(3) Summary of Discussion with Contractor (if necessary)

-  
-  
-

Report on Proportion of Procurement (Recipient Country, Japan and Third Countries)  
 (Actual Expenditure by Construction and Equipment each)

	Domestic Procurement (Recipient Country) A	Foreign Procurement (Japan) B	Foreign Procurement (Third Countries) C	Total D
Construction Cost	(A/D%)	(B/D%)	(C/D%)	
Direct Construction Cost	(A/D%)	(B/D%)	(C/D%)	
others	(A/D%)	(B/D%)	(C/D%)	
Equipment Cost	(A/D%)	(B/D%)	(C/D%)	
Design and Supervision Cost	(A/D%)	(B/D%)	(C/D%)	
Total	(A/D%)	(B/D%)	(C/D%)	