

# IDAMP Manual-WASAs

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Standard Operating Procedures (SOPs) for  
Integrated Development and Asset Management  
Plan (IDAMP)

Water & Sanitation Agencies (WASAs)

Lahore, Faisalabad, Rawalpindi, Gujranwala and Multan

## Acknowledgements

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## Foreword

Infrastructure management is the cornerstone of social equity, public health & safety and service delivery for good governance. Infrastructure is essential to achieve the increased levels of economic growth as aspired under Punjab Growth Strategy through job creation and establishment of well serviced areas in urban centers - conducive for economic investment and its enabling environment. In recent years, Government of the Punjab has increasingly focused on the need to balance the delivery of infrastructure in the short term, with the need to strive for sustainability.

Medium Term Budgetary Framework (MTBF), Medium Term Development Framework (MTDF), New Accounting Model (NAM), Project to Improve Financial Reporting and Auditing (PIFRA) are demonstration of Govt. policy and initiatives which is now driving and supporting the cities and their entities through process for asset management by policy guidelines and technical support.

Infrastructure assets and community facilities are complex by nature and require robust management practices. Sound knowledge of the location, characteristics, estimated lives, capacity and utilization, cost characteristics, risk exposure and safety requirements of assets is required to best manage them and make sustainable improvements in service delivery.

We support Local Government in achieving programs that promote sustainable quality of life to all citizens. As part of a broader and ongoing support framework for urban development and sustainable cities, we have developed this document (IDAMP Manual-WASA) with inputs from all stakeholders, led by Dr. Nasir Javed CEO The Urban Unit, Mr. Abid Hussainy Sr. Capacity Development Specialist The Urban Unit and Mr. Iftikhar Ali Sahoo, Secretary P&DD.

IDAMP Manual-WASA has been compiled to prescribe detailed Standard Operating Procedures (SOPs) for municipal and city asset managers to prepare Integrated Development and Asset Management Plan (IDAMP). In particular, its application will assist in strengthening IDMAP processes and outcomes, the implementation of generally accepted asset management for improved service delivery and matters related to immovable assets, improve infrastructure investment planning efforts and management for improved governance and asset management in cities.

*Mohammad Jahanzaib Khan*  
*Chairman, P&DD Board*

## Acronyms

ADP	Annual Development Plan
AM	Asset Manager
AMP	Asset Management Plan
AMIS	Asset Management Information System
CDG	City District Government
GIS	Geographic Information System
HUD & PHE	Housing Urban Development & Public Health Engineering
IDAMP	Integrated Development and Asset Management Plan
MD	Managing Director
P&D (WASA)	Planning & Design
P&DD	Planning & Development Department of Punjab Government
PPP	Public Private Partnership
WASA	Water & Sanitation Agency

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# Part 1: Overview of IDAMP

# 1. Introduction of IDAMP Manual

## 1.1. Introduction

This document may be called as 'IDAMP Manual - WASAs – Standard Operating Procedures for IDAMP' (*hereinafter referred as "IDAMP Manual"*). This IDAMP Manual is derived from the principles/ guidelines and policies prescribed in the 'Integrated Development and Asset Management Framework' "IDAMP Framework".

This IDAMP Manual sets out the detailed procedures for planning and investment of resources through effective planning, careful management, accurate recording and reliable reporting of all the assets over the asset life cycle for optimized service delivery to the public. These procedures are based on tested methodology for the development of IDAMPs for Water & Sanitation Agency (WASA) Lahore and City District Government (CDG) Lahore.

IDAMP Framework and IDAMP Manual has been based on local as well as global asset planning and management practices and procedures. Following resources were referred for development of IDAMP Framework and IDAMP Manual:

- 'ISO 55000 Asset Management –Overview, principles and terminology' – International Standard
- 'ISO 55001 Asset Management –Management systems-Requirements' – International Standard
- 'ISO 55002 Asset Management – Management systems-Guidelines for the application of ISO 55001' – International Standard
- 'Project Selection Criteria' by Michael Schaeffer & Wesal Ashur, World Bank Group
- 'Medium Term Budget Framework Manual' by Michael Schaeffer & Wesal Ashur, World Bank Group
- 'Project Appraisal Manual' by Michael Schaeffer & Wesal Ashur, World Bank Group
- 'Managing Project Risk' by Michael Schaeffer & Wesal Ashur, World Bank Group
- International Infrastructure Asset Management Manual (IIMM)
- 'City Infrastructure Investment Programming & Prioritization Toolkit' by Cities Development Initiative for Asia (CDIA)
- 'Manual for Development Projects'- Planning Commission of Pakistan

## 1.2. Contextualizing the IDAMP

The concept of "Integrated Development & Asset Management Plan (IDAMP)" revolves around the international best practices of asset management and its enhancement for improving service delivery by the Local Government institutions within the available fiscal space. The processes have been derived from the well-established standards like ISO 55000 and International Infrastructure Asset Management Manual (IIMM). The process is contextualized for Punjab Province based on the intensive discussion with the respective officials overseeing the asset management.

The city entities currently manage public capital assets worth billions of rupees. City entities provides various services and requires capital assets that support excellent service delivery outcomes, including facilities, base infrastructure and specialist equipment. The effective management of assets is therefore an essential business process, providing the opportunity for organizational efficiencies, improved asset utilization, reduced operating costs, more effective use of capital.

An IDAMP is a key part of the asset management process. It provides a description of the overall system components, and summarizes key asset and planning information at a single point in time. Its primary purpose is to identify the financial consequences of delivering public services through physical assets, describing:

- The importance of physical assets to delivering service delivery objectives and outcomes;
- The quality of existing physical assets in terms of condition and asset performance;
- The assets needed to meet or sustain current levels of service, and to address current and future shortfalls;
- The feasible asset solutions to address identified shortfalls; and
- The level of commitment and planned improvements.

### 1.3. Purpose of the IDAMP Manual

The primary purpose of IDAMP Manual is to prescribe the Standard Operating Procedures (SOPs) for evidence based planning, budgeting and management of assets on a medium term horizon of three years.

IDAMP Manual includes procedures for the following asset management activities:

- Asset planning
  - Annual preparation of Integrated Development and Asset Management Plan (IDAMP)
  - Implementation of IDAMP
- Asset Management
  - Development of Asset Inventory in GIS based AMIS
  - Physical management of assets through Asset Management Plans (AMP)
- Monitoring and Evaluation

## 1.4. Scope of Manual

- 1.4.1. Initially, this Manual is applicable for integrated development & asset management planning activities within the operation areas of Water and Sanitation Agencies (WASAs) of following cities:
1. Lahore
  2. Faisalabad
  3. Rawalpindi
  4. Gujranwala
  5. Multan
- 1.4.2. Subsequently, the scope of this Manual shall be extended to water & sanitation utilities operating within the municipal boundaries of other cities with the approval of competent authorities.

## 1.5. Authority of the Manual

### 1.5.1. Legal Status of Manual

- IDAMP Manual has been prepared under the guidelines of notified IDAMP Framework. IDAMP Framework and IDAMP Manual shall serve as instruments for medium term planning and management of the infrastructure of WASAs in five large cities of Punjab.
- The premise of the IDAMP in planning horizon of WASAs shall be as follow:

Planning Horizon	Punjab Government	WASAs
	Planning Instrument	Planning Instrument
Long Term	Punjab Growth Strategy (Three years)	Master Plans (10-20 years)
Medium Term	Medium Term Development Framework (MTDF) (Three Years)	Integrated Development And Asset Management Plan (IDAMP) (Three Years)
Short Term	Consolidated Annual Development Plan (ADP) (One Year)	Annual Development Plan (ADP) (One Year)

### 1.5.2. Approval Authorities

- IDAMP Manual-WASA shall be approved and notified in the official gazette by the Chairman P&D Board. Further, IDAMP Manual-WASA shall be endorsed by the HUD & PHE Department for implementation in the five WASAs and other water & sanitation utilities.
- After respective approval and endorsement, WASAs/ water & sanitation utilities shall adopt and implement the IDAMP Manual.

## 1.6. Reader Guidance

1.6.1. There are five levels of heading in the Manual:

level 1 - Part

level 2 - section

level 3 - sub-section

level 4 - bullet point

1.6.2. The organization of the part, sections and sub-sections are shown in the Table of Contents at the front of this document

1.6.3. The layout of each page within this Manual is standardized. The title of the Manual is displayed in the top right corner of each page respectively. The footer for each page contains the page number and custodian of the document

1.6.4. A list of abbreviations and Glossary commonly used in this Manual is included for reference purposes.

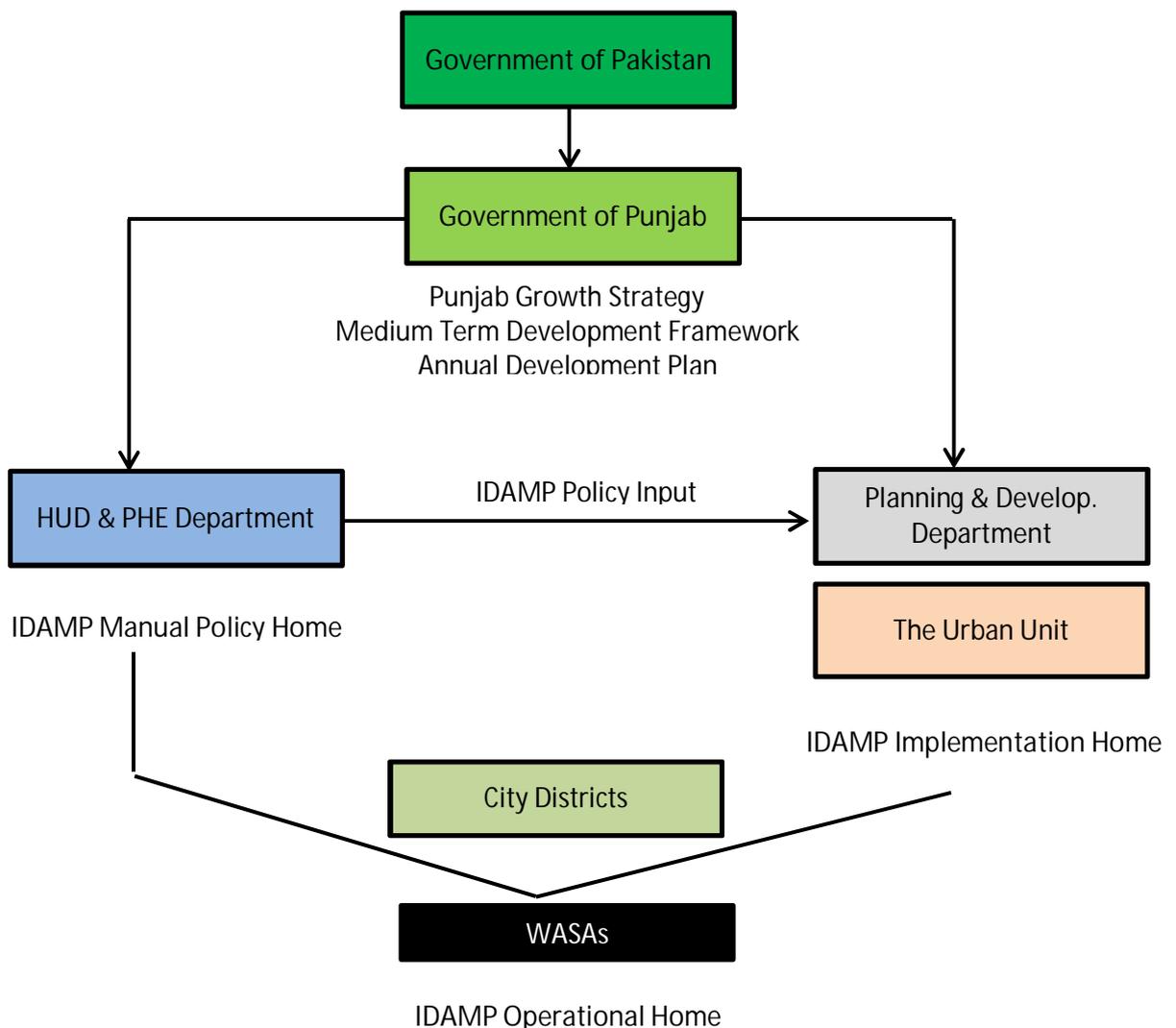
1.6.5. The Annexure includes forms to be used in the application of this Manual.

## 1.7. Controller (Homes) of the Manual

### 1.7.1. Homes of IDAMP Manual

The IDAMP Manual is housed at three levels as illustrated in the Figure below.

- 1) The Secretary of HUD & PHE, as the controller, will be the Policy Home for the Manual to ensure safe custody, and management of legal requirements for notification, maintenance, distribution, implementation and revision. However, for water & sanitation utilities other than Five WASAs, Secretary LG & CD shall be the Policy Home.
- 2) The Secretary of Planning and Development (P&D), through the Urban Sector Planning and Management Services Unit (Private) Limited (Urban Unit, UU), shall be the Implementation Home of the Manual providing the resource support to individual WASAs for all aspects of IDAMP activities in accordance with the IDAMP Framework and Manual requirements.
- 3) Individual WASAs/ water & sanitation utilities will be the Operational Home of the Manual and responsible for actually preparing, implementing and managing the process.



### 1.7.2. Distribution of IDAMP Manual

- i. Secretary HUD & PHE shall also ensure that the IDAMP Manual is not distributed without business intent. Further, Secretary HUD & PHE shall be responsible for ensuring that any person, party or group who receives IDAMP Manual is informed of the confidentiality requirement.
- ii. All copies of the IDAMP Manual, revisions and changes shall be controlled by Secretary HUD & PHE and a due record of such revisions and changes shall be maintained in the Document Control Page. *(Refer to sub section 1.7.4 for Document Control Page)*
- iii. Secretary HUD & PHE shall distribute the IDAMP Manual to the WASAs.
- iv. MDs shall be responsible for intra entity distribution within the respective WASAs.

### 1.7.3. Amendments to the Manual

- i. Amendment to the Manual may be proposed by a competent official in any of the five WASAs (Operational Home) or P&D Department & The Urban Unit (Implementation Home) or HUD & PHE (Policy Home).
- ii. Procedure For Amendment to the Manual
  - A competent official of WASA may propose an amendment in these procedures to Director Planning & Design (P&D) along with the business case for the proposed revision.
  - Director Planning & Design (P&D) shall raise a 'Request for IDAMP Manual Amendment Form' as per format prescribed in 'Form-IDAMP-1' and submit the same to MD for review.
  - After reviewing the appropriateness of the proposed changes and making further recommendations, MD shall endorse the same.
  - After endorsement by the MD, Director P&D shall forward the Form to Secretary HUD & PHE for consideration and recommendation on the requested amendment.
  - Secretary HUD & PHE shall forward the Form to Implementation Home (P&D and The Urban Unit) for technical review and recommendation.
  - The Urban Unit shall technically review the proposed amendment. The Urban Unit may consult with other WASAs and seek their concurrence on the proposed amendment.
  - After technical review, The Urban Unit shall submit the recommendation to the Secretary P&D for endorsement.
  - Secretary P&D shall endorse or reject the proposed amendment and notify the same to Secretary HUD & PHE.
  - Secretary HUD & PHE shall approve or reject amendment and record the same in the Document Control Page. Further, Secretary HUD & PHE shall circulate the approved amendment to all the WASAs for implantation and compliance of revised procedures .
  - MDs of respective WASAs shall circulate the change to all the relevant directorates and officials for compliance.

- iii. The HUD & PHE shall annually issue a revised/ updated version of IDAMP Manual based on the changes approved during the year. While issuance of annual updated version, HUD &PHE shall update the 'Document Control Page' and archive all the versions of the IDAMP Manual.

1.7.4. Document Control Page

The Document Control Page is used to record the information about the revisions and/ or amendments (addition/ modification/ deletion) that have been made to the document:

Version	Date of Revision/ Amendment	Section	Page No.	Summary of change	Change Approved By
1		-	-	Initial Document	-

## 2. Overview of WASAs

### Introduction

This section provides information about the WASAs, its establishment, functions, composition and organizational structure.

### 2.1. Establishment of Water & Sanitation Agencies (WASAs)

Water and Sanitation Agencies are the agencies of respective Development Authorities (DA). Development Authorities and WASAs were established under 'The Punjab Development of Cities Act 1976'. The WASAs, through respective Development Authorities, are administratively aligned to "Housing Urban Development and Public Health Engineering Department (HUD&PHED)" of the Government of Punjab.

The list of five Development Authorities and their WASAs as follow:

Housing Urban Development & Public Health Engineering (HUD & PHE) Department	
Lahore Development Authority (LDA)	Water & Sanitation Agency (WASA) Lahore
Faisalabad Development Authority (FDA)	Water & Sanitation Agency (WASA) Faisalabad
Rawalpindi Development Authority (RDA)	Water & Sanitation Agency (WASA) Rawalpindi
Gujranwala Development Authority (GDA)	Water & Sanitation Agency (WASA) Gujranwala
Multan Development Authority (MDA)	Water & Sanitation Agency (WASA) Multan

### 2.2. Functions of WASAs

WASAs are responsible for planning, designing and construction of water supply, sewerage & drainage facilities for:

- New works
- Rehabilitation and augmentation of the existing systems
- Operation and maintenance of water supply, sewerage & drainage systems
- Billing and collection of rates, fees and charges for the services provided to consumers

# Part 2: Assets Planning

## Introduction

This part contains information about the planning phase of the Asset. Planning of asset involves activities and decisions for analysis of existing assets and need assessment for replacement/rehabilitation of existing assets or procurement of new assets in order to achieve the service delivery objectives. Asset Planning involve the following activities:

- Preparation of IDAMP
- Implementation of IDAMP

## 3. Preparation of IDAMP

### Introduction

This section contains procedures for evidence based planning of assets. For this purpose, an Integrated Development & Asset Management Plan (IDAMP) shall be prepared for upcoming three years on a rolling basis approach. IDAMP shall include identification of projects for replacements/rehabilitation of existing assets and creation/purchase of new assets for upcoming three years. Rolling basis means that for the initial three years, a roll-on plan is prepared for 'a', 'b', 'c' years. Next year, the 'a' year is ousted and 'd' year entered, so that the plan still remains for the three years. For the 'b' and 'c' years, adjustments are made according to the implementation of 'a' year. This process continues for good.

Preparation of IDAMP involves following activities:

- 1) Annual IDAMP Planning
- 2) Development of Project Proposals along with estimated rough costs
- 3) Preparation of O&M Costs
- 4) Development of Project Packages
- 5) Financial Capacity Analysis
- 6) Projects Selection and Approval by Technical Team
- 7) Capital Investment Plan
- 8) Finalization of IDAMP

## 3.1. Annual Planning for IDAMP

### Introduction

This section contains procedures to initiate the process for preparation of IDAMP. On annual basis, an IDAMP planning & review meeting shall be convened to review the progress of preceding year and plan for the upcoming three years. Following the meeting, process for the preparation of IDAMP shall be initiated by the Directorate of P&D.

#### 3.1.1. Annual Planning & Review Meeting of IDAMP

- i. In the first week of October, Director Planning & Design (P&D) of WASA shall circulate an official letter to convene the Annual Planning & Review Meeting on IDAMP. Director P&E shall attach the following documents with the letter:
  - Annual IDAMP Progress Report
  - LOS Report
- ii. Annual Planning & Review Meeting of IDAMP shall be attended by the following personnel:
  - Representatives of Implementation Home
    - P&D Department
    - The Urban Unit
  - Representative of Operational Home
    - MD (Chair)
    - Director P&D (convener & secretary)
    - Director P&E
    - All DMDs
    - All Directors O&M
    - Director Engineering
- iii. Agenda of the Annual Planning & Review Meeting shall include the following activities and decisions:
  - Director P&D shall present the Annual IDAMP Progress Report and Annual LOS Report to the participants. Annual IDAMP Progress Report shall contain the information about status of procurement/ construction, operationalization and recordation in AMIS of projects approved for the preceding year. Whereas Annual LOS Report shall contain the information about LOS achieved during the preceding year.
  - Participants of meeting shall discuss and give their recommendation for setting the Target LOS for the upcoming three years.
  - Chairperson of the meeting shall approve the Reports and authorize the same for circulation to the relevant directorates. Further, Chairperson shall authorize Director P&D to finalize the Target LOS and initiate the process for preparation of IDAMP.

3.1.2. Preparation and Notification of target Level of Service (LOS)

- i. Director P&D shall, on the recommendations of Annual IDAMP Progress Meeting, prepare LOS Statement for the upcoming three years.
- ii. Director P&D shall coordinate with relevant directorates and obtain the required information for establishment of following LOS indicators:

Sr. No.	Indicator	Unit	Description
1	Service Coverage		
1.1	Water Coverage	%	Percentage of population with access to water services in comparison to total population
1.2	Sewerage Coverage	%	Population with sewerage services (direct service connection) as a percentage of the total population
2	Water Production and Consumption		
2.1	Water production	LCPD	Total annual water supplied to the distribution system (ex-treatment plant and including purchased water, if any) expressed by population served per day.
2.2	Water consumption	LCPD	(Total annual water sold + Total annual volume of free supplies) expressed by population served per day
2.3	Metered water consumption	LCPD	Total annual metered water consumed expressed by metered population served per day
3	Non-Revenue Water/ Water Loss		
3.1	Unaccounted for water	%	Difference between total water produced (ex-treatment plant) and total water consumed (which is water sold plus free supplies) expressed as a percentage of total water produced.
3.2	Non-revenue water	%	Difference between total water produced (ex -treatment plant) and total water sold expressed as a percentage of total water produced.
4	Metering Practices		
4.1	Proportion of functional meters	%	Total number of water connections with functional/operating meters expressed as a percentage of total number of metered water connections
4.2	Metered water supply	%	Volume of water sold that is metered expressed as a percentage of total volume of water sold

Sr. No.	Indicator	Unit	Description
5	Operational Performance / Pipe Network Performance		
5.1	Pipe breaks	Breaks /Km	Total number of pipe breaks per year expressed per km of the water distribution network.
5.2	Sewerage blockages	Blockages /Km	Total number of blockages per year expressed per km of sewers
5.3	Pipe leakages	Leakages/Km	Total number of pipe leakages per year per km of the water distribution network
6	Cost and Staffing		
6.1	Unit operational cost - water sold (production cost at consumer end)	Rs. /m <sup>3</sup>	Total annual operating expenses divided by the total annual volume of water sold.
6.2	Unit operational cost - water produced (gross production cost)	Rs. /m <sup>3</sup>	Total annual operating expenses divided by the total annual water of water produced.
6.3	Staff per 1000 water and sewerage connections	Ratio	Total number of staff expressed as per thousand water and sewerage connections
6.4	Water supply staff per 1000 water connections	Ratio	Total number of water supply staff expressed as per thousand water connections
6.5	Sewerage staff per 1000 sewerage connections	Ratio	Total number of sewerage staff expressed as per thousand sewerage connections
6.6	Salary cost as proportion of Operating costs	%	Total annual salary costs (including salaries, wages, pensions, other benefits, etc.) Expressed as a percentage of total annual operating costs.
6.7	Power and Electricity Costs as proportion of Operating Costs	%	Total annual power/electricity costs of the utility expressed as a percentage of total annual operating costs.
7	Water Quality		
7.1	Chemically Unfit Water Samples at Tap	%	Total number of chemically unfit water samples at tap expressed as a percentage of total samples taken
7.2	Biologically Unfit Water Samples at Tap	%	Total number of biologically unfit water samples at tap expressed as a percentage of total samples taken
7.3	Water Quality - Required Samples Tested for residual chlorine	%	Total number of residual chlorine samples carried out expressed as a percentage total number of residual chlorine samples carried out as per standards

Sr. No.	Indicator	Unit	Description
7.4	Water Quality - Samples having residual chlorine	%	Total no of residual chlorine samples that passed the relevant standard expressed as a percentage of Total no of residual chlorine samples carried out
8	Quality of Services		
8.1	Continuity of Service	Hrs. / Day	Average hours of service per day for water supply.
8.2	Water Supply Complaints	%	Total number of water supply complaints per year expressed as a percentage of the total number of water supply connections.
8.3	Sewerage Complaints	%	Total number of sewerage complaints per year expressed as a percentage of the total number of sewerage connections.
8.4	Revenue/ Billing Complaints	%	Total number of revenue or billing complaints expressed as a percentage of total water and waste water connections
8.5	Waste water Treatment – Primary	%	Proportion of collected sewage that receives primary treatment only, i.e. involving settlement with the intention of removing solids, but not biological treatment. Both lagoon and mechanical treatment can be included, where appropriate.
8.6	Waste water Treatment – Secondary	%	Proportion of collected sewage that receives at least secondary treatment, i.e. removing oxygen demand as well as solids, normally biological. Both lagoon and mechanical treatment can be included, where appropriate.
9	Billings & Collections		
9.1	Average Revenue of Water & Waste water	Rs. / m <sup>3</sup>	Total operating revenue divided by total water sold
9.2	Collection Period	months	Year-end accounts receivable/Total annual operating revenues expressed in months equivalent of sales.
9.3	Billing Efficiency	%	Total no. of bills issued and delivered at door step expressed as a percentage of Total connections (water +waste water)
9.4	Collection Efficiency (Physical)	%	Total number of bills paid expressed as percentage of total number of bills issued

Sr. No.	Indicator	Unit	Description
9.5	Collection Efficiency (Financial)	%	Total amount of bills received expressed as a percentage of total amount of bills issued
10	Financial Performance		
10.1	Operational cost coverage	Ratio	Total annual operational revenues/Total annual operating cost

- iii. After compilation of LOS Statement, Director P&D shall forward the same to MD for approval.
- iv. After approval by the MD, Director P&D shall forward the LOS Statement to Secretary HUD & PHE for notification.
- v. After notification, Director P&D shall publish the LOS statement on official website of WASA and PWON.

### 3.1.3. Circulation of letter for preparation of IDAMP

- vi. After notification of LOS Statement, Director P&D shall circulate an official letter to all the directorates of WASA with the intimation to prepare project proposals for IDAMP. Director P&D shall also annex the Project Proposal Form (refer to Annexures for specimen of Project Proposal Form Form 2.1 and 2.2) and LOS statement with the letter.

## 3.2. Development of Project Proposals

### Introduction

This section contains procedures for initial planning of assets for incorporation in IDAMP. Initial planning involves identification of assets for replacement, rehabilitation or new creation of assets over three years in order to meet the target service delivery program. For this purpose, respective Asset Managers shall develop the detailed proposals for replacement/rehabilitation or new acquisition of assets. *Asset Manager includes WASA Officials who are controlling or using the asset for service delivery to the public. In the context of IDAMP Manual, Asset Manager includes Sub Division Officer (SDO) or Adssistant Director (AD) for the respective Subdivisiona/Sub zonal assets.* Where SDOs/ ADs are not in place, XEN shall b deemed as the Asset Manager. Project Proposal shall be based an evidence based identification and chrteria based screening and phasing in respect of all the identified projects.

Development of project proposals involve the following activities:

- Project Identification
- Project preparation
- Projects Appraisal
- Projects Screening and Phasing

### 3.2.1. Project Identification

i. AM shall, in consultation with the supporting staff, identify the infrastructure required to meet the service delivery program/ target LOS in designated service area/ boundaries. For this purpose, AM shall shall use the following tools/ techniques:

A. Asset Management Information System (AMIS)

AMIS, the software used for the recording and maintenance of assets inventory along with the attributes such as condition, failure risk and replacement year shall be used for analysis of existing assets.

B. Energy Audit Reports (EAR)

Recommendations of Energy audits used to be conducted on annual basis by WASA energy wing for examining the energy efficiency and effectiveness of pumps of tube wells and disposal stations, should also be considered and used for projects identification.

C. Community Consultation Survey

Asset Manager shall conduct the surveys on sample basis for obtaining the feedback of public regarding the quality of WASA services and the deficiencies in sewerage and water supply services in the area. The sample size for determining the number of people to be interviewed/ households to be surveyed shall be calculated by using the link <https://www.mccallum-layton.co.uk/tools/statistic-calculators/sample-size-calculator/>.

D. Complaint Data

Asset Manager shall collect and analyze the data from WASA Complaint Cell. AM shall identify the areas and assets that need immediate attention for trouble in service delivery to the complainants.

- ii. Depending on the infrastructure requirements identified through aforementioned tools/ techniques, AM shall identify the assets/work required over three years. Asset/ work requirement include the following categories:

- Rehabilitation/ replacement of existing assets
- Creation of new assets

- iii. AM shall consider the following factors while identification of assets/ work:

A. Rehabilitation/ replacement of existing assets:

Rehabilitation/ replacement of existing assets means that assets are already been in operation but the lines, tube wells, disposal pumps or any other machinery needs to be replaced due to any of the following factors:

- Assets have reached to its replacement year (Source: Asset Management System)
- Assets have condition rating D (poor) & F (failing) Condition of asset (Source: Asset Management System)
- Assets have High risk of failure (Source: Asset Management System)
- Recommendations of Energy Audits
- There are regulatory/ statutory directions to replace the asset

B. Creation of new assets

Creation of new assets means the laying of sewerage/ water supply pipelines, installation of tube wells, disposal pumps or any other machinery for reaching to un-served serviceable area by increasing the service delivery coverage. The need for enhancement in service delivery will be based on the growing needs of population, development intervention and extension of services in extended boundary of city that requires planning of new assets to be integrated with the existing network of assets.

- iv. After due consideration to above factors, AM shall identify the list of assets/ projects for replacement/ rehabilitation of existing assets and acquisition of new assets.

3.2.2. Preparation of Projects

- i. After identification of the assets, AM shall prepare the detailed projects on the Project Proposal Form (Refer to Annexures for "Form 2.1 & 2.2 - Project Proposal" for specimen of Project Proposal Form). AM may group different assets under a single project if the improvement in the service delivery is based on the integrated operation of different assets.

- ii. AM shall perform the following activities in respect of identified project:

- A. Preparation of technical design or technical specifications

- AM shall prepare the technical design/ specification of the projects. Technical design/ specification of shall be based on the category of respective asset. Few components of technical design/ specification are as follow:
    - Identification of project area
    - Length and diameter of the project in case if project involves installation of pipelines
    - Proposed Capacity if project involves the proposal of tube well, disposal pump, filtration plant, ground reservoir, overhead reservoir and machinery & equipment
  - For below ground assets (water supply pipelines & sewerage pipelines), AM shall use the Geographic Information System (GIS) and information contained in the Asset Management System (AMIS).
  - For above ground assets, AM shall use the information in the Asset Management System.
  - Having identified the technical specification/ design, AM shall develop separate GIS maps for the projects involving water supply service and sewerage service highlighting the area and identified projects on maps where service needs to be improved. Moreover existing and proposed tube wells and disposal stations should also be identified on respective maps.
- B. Rough cost estimation of the projects**
- AM shall estimate the rough cost of the project in the light of technical design/ specifications. Rough cost shall be based on the following rates:
    - a) Latest Market Rate System (MRS) rates
    - b) The cost of non-MRS items shall be based on:
      - Latest procurement cost with 10% annual increase or
      - An open market quotation
- C. Operation and maintenance (O&M) costing of proposed projects**
- In addition to the estimated rough cost, AM shall identify the Annual Operational and Maintenance (O&M) cost for the proposed project.
  - O&M Cost includes the operational cost for the operation of the asset and maintenance cost required to keep the asset in operational form.
  - For computation of Operational Cost, AM shall consider the following components:
    - Staff cost
    - Electricity cost
    - POL cost

- For computation of Maintenance Cost, AM shall consult the Asset Management Plan (AMP).

### 3.2.3. Projects Appraisal

- i. After preparation of project, AM shall perform the project appraisal for the new assets/projects. The results of appraisal shall play an important role in screening and phasing of identified projects.
- ii. AM shall use the following appraisal techniques for the appraisal of the identified projects:
  - Project Payback period: The payback period is the length of time required to recover the cost of an investment. The payback period of a given investment or project is an important determinant of whether to undertake the position or project, as longer payback periods are typically not desirable for investment positions
  - Net Present Value (NPV): NPV is the difference between the present value of cash inflows and the present value of cash outflows
  - Internal Rate of return (IRR): IRR is a metric used in capital budgeting, measuring the profitability of potential investments. Internal rate of return is a discount rate that makes the net present value of all cash flows from a particular project equal to zero.
- iii. For the appraisal of any identified project, Asset manager shall use the following assumptions:

#### Costs:

- a) Costs should be taken at Constant prices (without inflation)
- b) Costs should include the Capital Costs and O&M costs.

#### Benefits

- a) Benefits should be taken at Constant prices (without inflation)
- b) Benefits shall include the following:
  - For Sewerage Projects, Annual Financial Cost saved will be Rs. 213 per person per year in the project area.
  - For Water Supply Projects, Annual Financial Cost saved will be equal to Rs. 147 per person per year in the project area.
  - Direct revenue expected by way of new connections against the extension of water supply network/ sewerage network
- c) Residual value shall be taken as nil.

Useful Life

Sr. No.	Type	Design life (Years)
1.	Tube wells - Civil Woks - Tube well - Pumping Machinery	25 15 15
2.	Water Treatment Plant	20
3.	Water Supply pipe lines - UPVC - AC - HDPE	50 50 80
4.	OHR	50
5.	Disposal station - (Civil Works) - Pumping machinery	25-30 15
6.	Sewerage lines (RCC)	25

Discount Rate

Discount rate shall be used as per prescribed by the P&D Department of Punjab Government.

3.2.4. Projects Screening and Phasing

- i. Finally, AM shall , in consultation with the relevant staff, evaluate and prioritize the identified projects against Screening & Phasing Criteria. For this purpose, AM shall, in consultation with relevant staff (XEN & Director) assign the scores to each project against the following criteria:

Criteria No	Criteria description	Lowest score	Highest score
1	Project Purpose <ul style="list-style-type: none"> <li>▪ Whether the Project is linked to the WASA Master Plan/ Sectoral Development allocation in the MTFD?</li> <li>▪ Whether the project will contribute to city master plan/ regional development goals?</li> <li>▪ Does the project contribute to the target Level of Service (LOS) and fill a gap in a wider system of service delivery?</li> <li>▪ Whether the deference/ delay of the project is going to affect citizens' health, safety, property, prosperity etc.?</li> </ul>	01	20

Criteria No	Criteria description	Lowest score	Highest score
2	<p>Public Response &amp; Service Delivery Improvement</p> <ul style="list-style-type: none"> <li>▪ Is the project likely to get support from municipal leadership?</li> <li>▪ Will the project get approval from higher levels of entity?</li> <li>▪ Does the project have a local 'champion' or where did the project idea originate from?</li> <li>▪ Is there support or opposition from residents, NGO's and community groups in the immediate vicinity of the proposed facility/ project?</li> </ul>	01	20
3	<p>Environmental Impact</p> <ul style="list-style-type: none"> <li>▪ Does the project provide any benefits to the quality of public spaces in the city e.g. parks, green infrastructure, water bodies, boulevards, open spaces, etc.?</li> <li>▪ Does the project confer direct benefits to the quality of the local environment e.g. air quality, water pollution, waste reduction, etc.?</li> </ul>	01	20
4	<p>Socio-Economic Impact</p> <ul style="list-style-type: none"> <li>▪ Does the project bring improvements to low income neighborhoods?</li> <li>▪ Does the project contribute to a more harmonious society?</li> <li>▪ Will the project bring in direct revenue?</li> <li>▪ Does the project has acceptable economic appraisal/ cost effectiveness?</li> <li>▪ Are there indirect economic benefits from this project in the long term, e.g. employment creation, investment generation, increase in land/property prices, reduction in citizens' expenditures, etc.?</li> </ul>	01	20
5	<p>Project Feasibility of Implementation</p> <ul style="list-style-type: none"> <li>▪ Ease of implementation of project in respect of technical design?</li> <li>▪ Has an institutional needs assessment been carried out with regard to planning, implementing and managing the proposed infrastructure?</li> <li>▪ Will the external factors negatively impact the outcome of the proposed project?</li> <li>▪ Is there a capable system in place to implement and operate this project or is external support needed?</li> </ul>	01	20

- ii. AM shall compute the total score of each project. Further, AM shall screen out and prioritize the project in any of the three years against the following scheme:

Cumulative Average Score	Phasing Plan
100 -----71	Year 1
70 ----- 51	Year 2
50 ----- 21	Year 3
20----- 0 Or Feasibility of Implementation score is less than 10	Screened Out

- iii. After screening and phasing, AM shall finalize the Project Proposal Form in respect of each project and submit the same to the respective Director.

### 3.3. Preparation of O&M Cost

#### Introduction

This section contains procedures for computation of Operational & Maintenance costs. O&M costs shall be incorporated in the IDAMP for allocation of funds to keep the assets in intended operational form.

- 3.3.1. AM shall compute asset wise annual operational and maintenance cost in respect for all the assets managed by the AM. For this purpose Asset Manager shall use the O&M Cost Forms for asset category wise calculation of O&M Costs. (Refer to Annexures for the specimen of Asset Category wise O&M Costs Form)
- 3.3.2. Annual Operational cost/ unit (for each asset) shall include the following components:

#### A. Tube wells

- a) Annual Staff Cost
  - Staff at tube well includes Tube well operators.
  - Annual staff cost shall consist of total annual salaries of all the operators on the tube well.
- b) Annual Electricity Cost
  - Annual electricity cost shall be the total electricity bills for the preceding year.
- c) Annual Generator (fuel) Cost
  - Annual generator cost shall be the total fuel cost for the preceding year..
- d) Annual Repair & maintenance Cost
  - As per Asset Management Plan.

#### B. Disposal Stations (DS)

- a) Annual Staff Cost
  - Staff at disposal station includes 'DS operators' and 'electrician'
  - Annual staff cost shall consist of total annual salaries of all the DS operators and electricians.
- b) Annual Electricity Cost
  - Annual electricity cost shall be the total electricity bills for the preceding year.
- c) Annual Generator (fuel) Cost
  - Annual generator cost shall be the total fuel cost for the preceding year..
- d) Annual Repair & Maintenance Cost

- As per Asset Management Plan.

### C. Sewerage pipelines

- a) Annual Staff Cost
  - The only cost assumed is the cost of sewer men.
- b) Annual Repair & Maintenance Cost
  - As per Asset Management Plan.

### D. Water Supply Pipelines

- a) Annual Staff Cost
  - Staff for the water supply pipelines include Head Pipe fitter, Pipe fitter and Assistant pipe fitter.
- b) Annual Repair & Maintenance Cost
  - As per Asset Management Plan.

### E. Vehicle

- a) Annual Staff cost
  - It is assumed that no driver is provided to SDOs/ EX. Ens.
- b) Annual Fuel Cost
  - As per authorized annual fuel limit.
- c) Annual Repair & maintenance Cost

### F. Buildings

- a) Buildings include Director Office, XEN Office, SDO Office and Complaint office (if separately identified in endorsed asset inventory)
- b) Annual Electricity Cost shall be computed for each building on the basis of electricity bills for the preceding year.
- c) Annual Repair & Maintenance Cost

### G. Machinery & Equipment

- a) Annual Staff Cost
  - Staff for the Machinery & equipment shall include drivers, helpers and operators.
- b) Annual Fuel Cost
- c) Annual Repair & Maintenance Cost

## 3.4. Development of IDAMP Package

### Introduction

This section contains procedures for the consolidation of project proposals and annual O&M requirements at directorate/ town/ zone level.

- 3.4.1. After development of project proposals and O&M cost, Asset Managers shall submit the following documents to their respective Directorate/ town/ zone.
  - Project Proposals
  - GIS based Project Maps (if applicable)
  - O&M Costs
  - AMIS report of Existing asset inventory
  - Community Consultation Survey Forms
- 3.4.2. Director shall consolidate all the projects to produce an IDAMP Package at the directorate/town/zone level. IDAMP Package shall include following documents, at minimum;
  - Summary of Proposed Projects (Asset manager wise, asset wise, year wise summary of projects)
  - Detail of Proposed Projects (Asset manager wise, asset wise, year wise)
    - Project ID
    - Description of project
    - Screening & Phasing Scores
    - Proposed year
    - Rough Capital costs
    - Annual Operation & Maintenance Costs
  - GIS based project maps
  - Total O&M costs for existing assets
  - AMIS report of Existing asset inventory (Asset manager wise)
  - Results of community consultation surveys conducted at sub division level
- 3.4.3. Relevant Directorates (O&M) shall submit their IDAMP Package to the Director P&D for consideration.

## 3.5. Financial Capacity Analysis

### Introduction

This section contains procedures for assessment of potential financial resources over the three years. Availability of financial resources determines the prioritization for investment in the most eligible projects. Results of financial capacity analysis shall assist the planning authorities in prioritization of projects or to arrange additional resources from external sources.

- 3.5.1. After receipt of IDAMP packages from all the directorates, Director P&D shall coordinate with DMD Finance/Director Finance and request the estimated figures of the own source revenue, subsidies, government grants and donations for the next three years.
- 3.5.2. DMD Finance/Director Finance shall analyze the following potential financial sources that would be available for financing the projects.
  - Local capital revenues: These include revenues generated only once, e.g. from selling a property that is owned by the WASAs, and not needed for public use. Also, included here are incomes generated from renting of own properties or assets for use to public interest.
  - Planned operating surplus (balance): This is the net operating surplus calculated as the balance (difference) between WASAs operating revenues and operating expenditures.
  - Using the capital reserve fund: Although WASAs have not yet started to set up a capital reserve fund for the replacement of capital equipment or capital investments, this represents one of the potential source for funding in the future.
  - Central Government transfers: This foresees the transfer from central/provincial Government coming either in the form of conditional grant for investments or unconditional grant, which can be used for capital investments.
  - Donor Grants: This comprises all incomes for which the WASAs are assured they will be raised from donors, by clearly identifying the donor, fund, their requests and the year.
  - Public Private Partnership: WASA may enter into Public Private Partnership agreement for the construction or procurement of certain assets in accordance with policy and guidelines laid under Public Private Partnership Act 2014. Thus funds may be raised from the public in accordance with terms and condition of PPP agreement
- 3.5.3. After receiving the financial estimations, Director P&D shall finalize the figures that would guide the Technical Team for final decision regarding selection and phasing of projects.

## 3.6. Projects Selection and Approval by Technical Team

### Introduction

This section contains procedures for evaluation, selection and approval of projects for incorporation in the IDAMP.

- 3.6.1. After receipt of financial projections for three years, Director P&D shall prepare a "TT Selection and Approval Form" (refer to Annexure for the specimen) and present the same to Technical Team for evaluation and selection.
- 3.6.2. Director P&D shall convene the meeting of WASA Technical Team in the second week of December. Technical Team shall comprise of following personnel:
  - MD - Chair
  - Director Planning & Design (Convener & Secretary)
  - DMD Engineering
  - Director Planning & Evaluation
  - DMD O&M
  - DMD Finance/Director Finance
  - Director Engineering
  - Concerned Asset Manager (Director O&M/ XEN /SDO) shall attend the meetings of Technical Team for justification of their proposed projects.
- 3.6.3. Technical Team shall evaluate the proposed projects against following criteria and assign a score to each project:

Criteria No	Criteria description	Lowest score	Highest score
1	Relevance <ul style="list-style-type: none"> <li>▪ Whether the project design is fundamentally suited for achieving the goals associated with the project?</li> <li>▪ Whether the proposed project complied with the applicable legal regulations?</li> </ul>	01	20
2	Short Term Assumptions Performance <ul style="list-style-type: none"> <li>▪ Has funding been secured/allocated within the Local Government budget for this project?</li> <li>▪ If required then whether the external sources of funding have been secured?</li> </ul>	01	20
3	Efficiency <ul style="list-style-type: none"> <li>▪ Whether the proposed project is financially and/ or economical viable?</li> </ul>	01	20

Criteria No	Criteria description	Lowest score	Highest score
	<ul style="list-style-type: none"> <li>▪ Whether the proposed project would be able to attain time &amp; cost efficiency?</li> <li>▪ Will the proposed project going to improve the overall efficiency of the service delivery?</li> </ul>		
4	<p>Effectiveness</p> <ul style="list-style-type: none"> <li>▪ Does the project contribute towards long term sustainable development, e.g. renewable energy, clean water supply, waste treatment, recycling, etc.?</li> <li>▪ Does the project improve the social status and access to social services (health, education, etc.) for women and children?</li> <li>▪ Whether the project will be able in achieving the associated <i>wide objectives</i>?</li> </ul>	01	20
5	<p>Sustainability</p> <ul style="list-style-type: none"> <li>▪ If there is risk, does the project design include a risk mitigation strategy?</li> <li>▪ Whether the proposed project would be able to sustain if external financial or technical support has been withdrawn after completion?</li> </ul>	01	20

3.6.4. Director P&D shall compute the final score achieved by each project. Final project score shall be derived on basis of scores allocated by Technical Team and Asset Manager to the individual project. Score given by Technical Team and Asset Manager shall be clubbed by 70% and 30% respectively.

3.6.5. Director P&D shall prepare Final Approved and Phased List of Projects against the following scores schedule;

Cumulative Average Score	Phasing Plan
100 ----- 71	Year 1
70 ----- 51	Year 2
50 -----21	Year 3
20-----0	Rejected

## 3.7. Capital Investment Plan

### Introduction

This section contains the procedures for preparation of Capital Investment Plan. Capital Investment Plan is used to match the funds required for investment in the approved projects with the funds available from various sources.

- 3.7.1. After Technical Team meeting, Director P&D shall identify total funds required for investment in the approved projects. For this purpose, Director P&D shall accumulate:
  - Capital Costs of the approved projects over three years
  - Operation and Maintenance costs of the existing asset and approved projects in the relevant proposed year
- 3.7.2. After identification of total annual fund requirements, Director P&D shall match the total funds required with the total funds available for investment in projects over three years.
- 3.7.3. Director P&D shall allocate following source of finance to each project:
  - Local capital revenues
  - Planned operating surplus (balance)
  - Using the capital reserve fund
  - Central Government transfers
  - Donor Grants
  - Public Private Partnerships

## 3.8. Finalization of IDAMP

### Introduction

This section contains the procedures for finalization of IDAMP. After finalization of capital Investment Plan, IDAMP shall be finalized and approved by the competent authorities.

- 3.8.1. After finalization of Capital Investment Plan, Integrated Development and Asset Management Plan (IDAMP) for WASA shall be compiled in the form of a single book. (refer to Annexure for the template of IDAMP)
- 3.8.2. Director P&D shall forward the IDAMP WASA to MD for review and comments.
- 3.8.3. After review and revisions (if any), MD shall forward IDAMP WASA to secretary HUD & PHE for approval and notification.
- 3.8.4. After notification, Director P&D shall circulate the IDAMP to all the directorates of WASA. Further, Director P&D shall publish the IDAMP in AMIS and official website of WASA.

## 4. Implementation of IDAMP

### Introduction

This section contains procedures for implementation of notified IDAMP. IDAMP is a medium term plan and it contains potential projects for upcoming three years. Thus these potential projects may be implemented through government regulated Annual Development Program (ADP) and/or nongovernment programs with the aid of Funding Agencies.

WASAs are currently under statutory obligation to comply with the requirements of Annual Development Planning process. Annual Development Program represents a key policy instrument for implementing development vision of the government through strategic resource allocation with a medium term perspective.

In addition to ADP, WASAs also execute development works with the aid of certain funding agencies. For this purpose, funding agencies support WASAs through funds transfer or aid in kind for potential development projects.

As IDAMP-WASA is a medium term planning instrument, It includes the maximum projects that are objectively beneficial, technically sound and practically feasible for implementation in the next three years. Thus, IDAMP shall provide potential investment projects that could be adopted through ADP or funding agencies.

### 4.1. Integration of IDAMP with ADP

- 4.1.1. Currently, on Annual basis, Director P&D receives a letter from HUD &PHE for preparation of ADP for WASA. Director P&D receives development schemes from WASA officials and elected members of national/provincial assemblies. Director P&D finalize the schemes in consultation with executive management of WASA and submit the same to HUD & PHE for approval.
- 4.1.2. Once IDAMP process has been operationalized, Director P&D shall prepare the ADP in line with the notified IDAMP.
- 4.1.3. While preparation of Annual ADP, Director P&D shall incorporate the pre notified projects from IDAMP in the ADP. Director P&D shall annex the Project Proposal of approved projects in the IDAMP to the PC I and incorporate the project in ADP.
- 4.1.4. In case of change in circumstances or WASAs requirements, Non IDAMP projects could also be incorporated in the ADP of upcoming year. However, Non IDAMP projects must be routed through the process of IDAMP.

### 4.2. Integration of IDAMP with Funding Agencies

- 4.2.1. Certain IDAMP projects which could not be adopted in ADP shall be implemented through funding agencies or through public private partnership.

- 4.2.2. Whenever, a funding agency wants to plan and invest for the improvement and rehabilitation of WASA, Director P&D shall present the projects of IDAMP to the interested agency.

# Part 3: Asset Management

## 5. Management of GIS based Asset Inventory in AMIS

### Introduction

This section contains the procedures for development and management of asset inventory in Geographic Information System (GIS) based Asset Management Information System (AMIS). Asset inventory is the group of assets held by the public body to achieve its service delivery program. GIS based AMIS is the software in which a centralized record of assets shall be maintained for planning and management of the assets. *Please refer to "Appendix A for 'AMIS User's Manual'" to operate various functions of AMIS.*

The screenshot shows the AMIS dashboard with the following callouts:

- Define asset categories for**: Points to the 'GIS Based Inventory Assets' button.
- Includes Asset depreciation, revaluation, auction & energy**: Points to the 'Asset Maintenance' button.
- Includes maintenance and billing**: Points to the 'Asset Maintenance' button.
- Includes asset condition reports, IDAMP and long lists**: Points to the 'Asset Reports' button.
- Create new asset**: Points to the 'Add Assets' button.

The main content area displays 'Daily Activities District Base' with filters for 'From Date', 'To Date', and district selection (Rawalpindi, Faisalabad, Gujranwala, Lahore, Multan). Below the filters is a table showing asset data for Lahore:

District	Assets	Total Update	Total New Added
Lahore	Building	0	0
Lahore	MachineryEquipment	0	0
Lahore	Land	0	0
Lahore	TubeWell	0	0
Lahore	DisposalStation	0	0
Lahore	GroundReservoirs	0	0
<b>Total</b>			

Development and Management of Asset Inventory in the AMIS includes the following key activities:

- Addition/ Creation of Assets in AMIS
- Removal of Assets from AMIS
- Updation of Asset Information in AMIS

## 5.1. Addition/ Creation of Assets in AMIS

5.1.1. Asset Manager shall be responsible to maintain a complete and updated record of all the assets under his/ her control.

5.1.2. Assets shall be created in AMIS at two stages:

Stage 1: Creation of existing assets

Stage 2: Creation of new assets

Stage 1: Creation of Existing Assets

5.1.3. Asset Manager shall update the Asset inventory by creating the existing assets in AMIS.

5.1.4. Asset Manager shall complete the 'AMIS Asset Creation Form' for each asset of following asset categories:

1. Tube wells
2. Disposal Stations
3. Waste Water Treatment Plants
4. Overhead Reservoirs
5. Machinery & Equipment
6. Vehicles
7. Land
8. Buildings
9. Pipelines

5.1.5. After completion of Form, Asset Manager shall log in to the AMIS (IP address: 192.168.80.130:99 and allocated Log in and Password).

5.1.6. AM shall enter the asset information in the Asset Creation Module in AMIS.

5.1.7. After recording asset information, AM shall archive the record.

Stage 2: Creation of New Assets

5.1.8. New Assets shall be created in the AMIS after the procurement has been made.

5.1.9. AM shall receive the procurement documents from the procuring department/ directorate/ authority within seven (7) days of procurement.

- 5.1.10. Asset Manager shall complete the 'AMIS Asset Creation Form' for newly procured asset of respective category as mentioned in Table 01: Asset Categories.
- 5.1.11. After completion of Form, Asset Manager shall log in to access the AMIS (IP address: 192.168.80.130:99 and allocated Log in and Password).
- 5.1.12. AM shall enter the asset information in the Asset Creation Module in AMIS.
- 5.1.13. After recording asset information, AM shall archive the record.

## 5.2. Removal of Assets from AMIS

- 5.2.1. AM shall remove the asset form active assets in AMIS on following grounds:
  - Replacement of an asset with new asset
  - Permanent discontinuance of the use of asset for service delivery program
- 5.2.2. Incase of replacement of an asset with new asset, asset shall be removed form AMIS ONLY after the new asset has been purchased.
- 5.2.3. Incase of permanent discontinuance of the use of asset, asset shall be removed form AMIS ONLY after the approval from the competent authority.
- 5.2.4. In either case, AM shall complete the 'AMIS Asset Removal Form' for removal of respective asset.
- 5.2.5. After completion of Form, Asset Manager shall log in to the AMIS (IP address: 192.168.80.130:99 and allocated Log in and Password).
- 5.2.6. AM shall enter the asset information in the Asset Removal Module in AMIS.
- 5.2.7. After recording asset information, AM shall archive the record.

## 5.3. Updation of Asset Information in AMIS

- 5.3.1. Asset information shall be updated in AMIS on periodic intervals or on happening of a specific event, whichever is earlier.
- 5.3.2. AM shall fill the AMIS Asset Information Form for any change in the asset attributes.
- 5.3.3. After completion of Form, Asset Manager shall log in to the AMIS (IP address: 192.168.80.130:99 and allocated Log in and Password).
- 5.3.4. AM shall update the asset information in AMIS.
- 5.3.5. After recording asset information, AM shall archive the record.

## 6. Asset Management Plan

### Introduction

This section contains information about operational and maintenance activities to keep the assets operational and for the intended use. All the assets of WASA, especially, pumping machinery and pumping station are very important components in water Supply and sewerage system. The assets are subjected to wear, tear, erosion and corrosion due to their nature of functioning and use and therefore these are vulnerable for failures. In order to keep the assets up and available for use, assets should be properly operated and maintained. In the following sub sections, various activities/ schedules are detailed in respect of all the assets for effective operation and timely maintenance.

6.1. Asset Manager shall, in consultation with the Director O&M, prepare Asset Management Plan in respect of following services:

1. Water Services
2. Sewerage Services

## 6.2. Water Services

Following are the components of an effective water supply system:

- Water Supply Pipelines
- Water Tube wells
- Generators

The asset management activities (operation and maintenance) are detailed in the following section:

### 6.2.1. Water Supply pipelines

Water supply pipe lines are used to deliver the water throughout the community. It may be of any type. The operational & maintenance activities are as follow:

#### A. Operational Activities

The observation and operational activity is described in below table

- Conduct a surveillance programme for leaks in pipelines, pipe joints and valves.
- Conduct a water quality surveillance programme.
- Conduct a programme for locating and repairing leaks including rectifying cross connections if any, arrange for flushing, cleaning and disinfecting the mains
- Establish procedures for setting up maintenance schedules and obtain and process the information provided by the public and the maintenance teams about the pipeline leaks
- Establish repair procedures for standard services and with provision for continuous training of the team members

#### B. Maintenance Activities

Pipeline bursts/main breaks can occur at any time and the O & M agencies shall have a plan for attending to such events.

- a) Preventive or routine maintenance should be carried out to prevent any breakdown of the system and to avoid emergency operations to deal with leakage and under pressure lines. Preventive maintenance is more economical and provides for reliability in operations of the sewer facilities.
- b) Emergency repairs, which would be very rare if proper maintenance is carried out well also, have to be provided for. Proper inspection and preventive maintenance are necessary.
- c) Scouring of pipeline Scouring is done to clean the transmission lines by removing the impurities or sediment that may be present in the pipe.

- d) Leakage control The maintenance staff during surveillance operation can report visible leaks found by him to his superiors. Critical areas where leaks often occur have to be identified and appropriate correct measures have to be implemented.
- e) Chlorine Residual Testing A minimum free chlorine residual of 0.2 mg/lit at the receiving reservoir of a transmission system is needed to be maintained. Absence of residual chlorine could indicate potential presence of contamination in transmission system.

The following steps which are required to be taken are:

- Testing of residual chlorine
- Checking the chlorination equipment at the start of the transmission system.
- Searching for source of contamination along the transmission system which has caused the increase in chlorine demands.
- Immediate rectification of the source of contamination

### 6.2.2. Tube wells

A pipe and a pump are used to pull water out of the ground, and a screen filters out unwanted particles that could clog the pipe.

Following are the components of a tube well:

- Motor Control Unit (MCU)
- Main Circuit Breaker
- Pressure Gauge
- Motor
- Pump
- Valves
- Flow meter

Table 1: Maintenance Procedure for Tube wells

Sr. No	Tube Well Parts	Maintenance Activities			
		Daily	Monthly	Quarterly	Annually
1.	Pump	<ul style="list-style-type: none"> <li>a) Clean the pump, motor and other accessories</li> <li>b) Check coupling bushes/rubber spider.</li> <li>c) Check stuffing box, gland etc.</li> </ul>	<ul style="list-style-type: none"> <li>a) Check free movement of the gland of the stuffing box; check gland packing and replace if necessary.</li> </ul>	<ul style="list-style-type: none"> <li>a) Check alignment of the pump and the drive.</li> <li>b) Clean oil lubricated bearings and replenish with fresh oil. If bearings are</li> </ul>	<ul style="list-style-type: none"> <li>a) Clean and flush bearings with kerosene and examine for flaws developed, if any.</li> <li>b) Clean bearing housing and examine for flaws, e.g. wear, grooving etc. Change</li> </ul>

Sr. No	Tube Well Parts	Maintenance Activities			
		Daily	Monthly	Quarterly	Annually
		<p>Observation</p> <ul style="list-style-type: none"> <li>▪ Abrupt changes in bearing temperature.</li> <li>▪ Oil leakage from bearings</li> <li>▪ Leakage from stuffing box or mechanical seal</li> <li>▪ Changes in voltage</li> <li>▪ Changes in current</li> <li>▪ Changes in vacuum gauge and pressure gauge readings</li> <li>▪ Sparks or leakage current in motor, starter, switch-gears, cable etc.</li> </ul>	<p>Clean and apply oil to the gland bolts.</p> <p>b) Inspect the mechanical seal for wear and replacement if necessary. Check condition of bearing oil and replace if necessary.</p>	<p>grease lubricated, the condition of the grease should be checked and replaced/replenished to the correct quantity.</p> <p>c) Tighten the foundation bolts and holding down bolts of pump and motor mounting on base plate or frame. Check vibration level with instruments if available; otherwise by observation.</p> <p>d) Clean flow indicator, other instruments and appurtenances in the pump house</p>	<p>oil or grease in bearing housing.</p> <p>c) Examine shaft sleeves for wear or scour and necessary rectification.</p> <p>d) Check stuffing box, glands, lantern ring, and mechanical seal and rectify if necessary.</p> <p>e) Check clearances in wearing ring.</p> <p>f) Check impeller hubs and vane tips for any pitting or erosion.</p> <p>g) All vital instruments i.e. pressure gauge, vacuum gauge, ammeter, voltmeter,</p> <p>h) Check performance test of the pump for discharge, head efficiency.</p>
		<u>12,000 operational hours may be taken as broad guidelines for overhauling of tube wells (Vertical Turbine Pump).</u>			
2.	Motor	<p>a) Clean external surface of motor.</p> <p>b) Examine earth connections and motor leads</p> <p>c) Check for any abnormal Bearing noise.</p>	<p>a) Check belt tension. In case where this is excessive it should immediately be reduced.</p> <p>b) Blow dust from the motor.</p> <p>c) Examine oil in oil</p>	<p>a) Clean oil lubricated bearings and replenishes fresh oil.</p> <p>b) Check insulation resistance of the motor.</p> <p>c) Check tightness of cable gland, lug and connecting bolts.</p> <p>d) Check and tighten</p>	<p>a) Clean and flush bearings with kerosene and examine for flaws developed, if any</p> <p>b) Clean bearing housing and examine for flaws, e.g. wear, grooving etc. Change oil or grease in bearing housing.</p> <p>c) Blow out dust from</p>

Sr. No	Tube Well Parts	Maintenance Activities			
		Daily	Monthly	Quarterly	Annually
			lubricated bearing for contamination by dust, grit, etc. (this can be judged from the color of the oil).	foundation bolts and holding down bolts between motor and frame. e) Check vibration level with instrument if available; otherwise by observation	windings of motors thoroughly with clean dry air. d) Clean and varnish dirty and oily windings. e) Check condition of stator, insulation, terminal box, fan etc. f) Check insulation resistance to earth and between phases of motors windings, control gear and wiring. g) Check air gaps. h) Check resistance of earth connections
3.	MCU	a) Clean the external surface b) Check for any spark or leakage current c) Check for overheating	a) Blow the dust and clean internal components in the panel, breaker and starter b) Check and tighten all connections of cable, wires, jumpers and bus-bars. All carbon deposits shall be cleaned c) Check relay setting	-	-

Table 4: Maintenance Frequencies for Tube wells

Sr. No.	Asset Type	Monthly	Quarterly	Annual	Overhaul period (Yrs.)
1.	Pump	*		*	5
2.	Motors		*	*	5
3.	Gear Box	*	*	*	5
4.	Transformer		*	*	5
5.	Control Panel	*			
6.	Control Valves	*			
7.	Bulk meters	*			
8.	Generators	*	*	*	5
9.	Chlorinators	*		*	3
10.	Safety Inspections			*	

### 6.2.3. Generator

Generator is usually used in load shedding duration. Load shedding is a common issue in Pakistan and to deliver the sufficient quantity of water to consumer generator plays a major contribution.

#### A. Maintenance Activities

The maintenance activities involve for generator are described in below table;

Table 6: Generator Maintenance

Sr. No.	Maintenance Item	Method of checking					Frequency
		Visual	Record	Change	Drain	Test	
1.	Coolant heater and level	X	X				Daily
2.	Check and record oil and fuel level	X	X				Daily
3.	Examine charge-air piping	X					Daily
4.	Drain water from tank and filter		X		X		Weekly

Sr.	Maintenance Item	Method of checking					Frequency
5.	Check air cleaner	X					Weekly
6.	Check battery charges	X					Weekly
7.	Check coolant concentration		X		X		Monthly
8.	Exhaust water trap	X			X		Monthly
9.	Check drive belt tension	X					Monthly
10.	Check starting battery	X	X			X	Monthly
11.	Change fuel, oil and air filter		X	X			6 months
12.	Examine radiator	X					6 months
13.	Flush and clean cooling system				X		Annually

## 6.3. Sewerage System

Following are the components of an effective sewerage system:

1. Sewer Pipelines
2. Disposal Pumps

The asset management activities (operation and maintenance) are detailed in the following section:

### 6.3.1. Sewer Lines

Sewers are the most important part of a sewerage system. They are laid below the ground and are difficult to repair. Hence great care is needed in their O&M.

#### A. Maintenance

There are two types of maintenance of a sewerage system

- a. Preventive or routine maintenance should be carried out to prevent any breakdown of the system and to avoid emergency operations to deal with clogged sewer lines or overflowing manholes or backing up of sewage into a house or structural failure of the system. Preventive maintenance is more economical and provides for reliability in operations of the sewer facilities.

Table 7: Routine Inspection & Maintenance of Sewer System

Category	Manhole	Sewer
Roads subjected to heavy & mixed traffic	Once a year	Once on 2 year
Roads 2-5m wide (6-15 ft.) subject to mixed traffic	Once in 2 years	Once in 2 years
Roads and lanes less than 2m wide	Once in 3 years	Once in 3 years
Demarcated & kerbed/ raised footpaths (likely along main roads)	Once in 2 years	Once in 3 years

- b. Emergency repairs, which would be very rare if proper maintenance is carried out well also, have to be provided for. Proper inspection and preventive maintenance are necessary.

### 6.3.2. Disposal Pumps

Various types of pumps are in use and the specification of O&M schedule provided by Manufacturers shall be followed. However, the following points shall be observed while operating the pumps;

- Dry running of the pumps should be avoided
- The delivery valve should be operated gradually to avoid sudden change in flow velocity which can cause water hammer pressures.
- The running of the duty pumps and the standby should be scheduled so that no pump remains idle for long period and all pumps are in ready-to run condition
- Frequent starting and stopping should be avoided as each start causes overloading of motor, starter, contactor and contacts. Though overloading lasts for a few seconds, it reduces life of the equipment.
- Pumps properly primed before starting

#### A. Maintenance Activities

A maintenance schedule includes these types of inspections:

- Routine maintenance & inspections
- Quarterly inspections
- Annual inspections

Table 8: Maintenance of disposal station

Sr. No.	Routine Maintenance & Inspection	Quarterly inspections	Annual inspections
1.	<ul style="list-style-type: none"> <li>- Lubricate the bearings.</li> <li>- Inspect the seal</li> </ul> <p style="text-align: center;">Inspection</p> <ul style="list-style-type: none"> <li>- Check the level and condition of the oil through the sight glass on the bearing frame.</li> <li>- Check for unusual noise, vibration, and bearing temperatures.</li> <li>- Check the pump and piping for leaks.</li> <li>- Analyze the vibration.</li> <li>- Inspect the discharge</li> </ul>	<ul style="list-style-type: none"> <li>- Check that the foundation and the hold-down bolts are tight.</li> <li>- Check the packing if the pump has been left idle, and replace as required.</li> <li>- Change the oil every three months (2000 operating hours).</li> <li>- Change the oil more often if there are adverse atmospheric or other conditions that might contaminate or</li> </ul>	<ul style="list-style-type: none"> <li>- Check the pump capacity.</li> <li>- Check the pump pressure.</li> <li>- Check the pump power</li> </ul>

Sr. No.	Routine Maintenance & Inspection	Quarterly inspections	Annual inspections
	<p>pressure.</p> <ul style="list-style-type: none"> <li>- Inspect the temperature.</li> <li>- Check the seal chamber and stuffing box for leaks.</li> <li>- Ensure that there are no leaks from the mechanical seal.</li> <li>- Adjust or replace the packing in the stuffing box if you notice excessive leaking</li> </ul>	<p>break down the oil.</p> <ul style="list-style-type: none"> <li>- Check the shaft alignment, and realign as required</li> </ul>	

# Part 4: Monitoring & Evaluation

## 7. Monitoring & Evaluation

### Introduction

This section contains procedures for monitoring and evaluation of IDAMP system. Monitoring & Evaluation include processes for the measurement, monitoring, analysis and evaluation of the WASA assets, asset management system and asset management activities.

### 7.1. Establishment of M&E Unit

7.1.1. A Monitoring and Evaluation (M&E) Unit shall be established for continuous monitoring of implementation and compliance of the IDAMP.

7.1.2. Managing Directors shall nominate the DMD/Director O&M to lead the M&E Unit. Further, MD shall designate following personnel as part of M&E unit for support to the M&E Lead:

1. GIS Officer
2. XEN/ SDO
3. Technical Officer

7.1.3. M&E unit shall use the M&E tools/techniques to perform its M&E functions and retain appropriate documented information as evidence of the results of monitoring, measurement, analysis and evaluation.

### 7.2. Term of References for M&E Unit

The M&E Unit shall have the following terms of references:

- Ensure that Asset Management System (AMIS) is updated in all aspects
- Review and evaluation of performance of IDAMP Team (Technical Team & Asset Managers)
- M&E Unit shall monitor;
  - Levels of services
  - performance of an asset, including financial and non-financial performance
  - the effectiveness of the asset management system
- M&E Unit shall receive and evaluate the following reports from the entity and Asset Managers:
  - Report on Key Performance Indicators (Target vs Achieved)
  - Report on projects implementation status
  - Report on any hindrance observed while implementing the project
- Evaluation of projects implemented during the year and its status with respect to IDAM Plan developed
- Conduct Internal Audit at planned intervals to identify and address potential gaps in system and identify opportunities for performance improvement

- Review the entity's asset management policies, procedures and systems, at planned intervals, to ensure its continuous improvement, adequacy, suitability and effectiveness
- Provide recommendation and guidelines to IDAMP Team

### 7.3. Function of M&E Unit

#### 7.3.1. Maintenance of Asset Inventory in GIS based AMIS

- M&E Unit shall obtain Category wise Asset Reports from all the Asset Mangers on quarterly basis.
- M&E shall review the asset reports and reconcile the asset information with the information in AMIS.
- In case of inconsistencies, M&E unit shall coordinate with the respective AM and update the record in AMIS.

#### 7.3.2. Progress report on IDAMP

- M&E unit shall obtain Quarterly Progress Reports on IDAMP from all the Asset Managers. Progress Reports shall contain the information of completed projects along with the completion certificates and ongoing projects.
- M&E shall review the reports and take appropriate action as required.

#### 7.3.3. Performance Management

- M&E Unit shall monitor the performance of WASA and Asset Manager and prepare the following reports:
  - LOS Report  

(This report contains the target LOS for the year and actual LOS achieved during the year.
  - Community Surveys Report  

This report contains the town/zone wise results of community surveys conducted to assess the services provided by the WASA.
- M&E Unit shall present the reports to MD for review and further proceedings.

## IDAMP Calendar

Activity	Responsibility	Frequency	Timeline	Document
Annual Planning & Review Meeting	Directorate P&D	Annual	Second week of October	IDAMP Report LOS Report
Preparation and Notification of target Level of service	Directorate P&D	Annual	Third week of October	LOS Statement
Development of Project Proposals	Asset Managers	Annual	Last week of OCT till 2 <sup>nd</sup> week of November	Project Proposal
O&M Costing	Asset Managers	Annual		O&M Costs
Development of IDAMP Package	Asset Managers & Directorates/Towns/Z Ones	Annual	Third week of November	Projects Package
Financial Capacity Analysis	DMD/Director Finance	Annual	Fourth week of November	Annual Financial Projections
Projects Selection & Approval by TT	Technical Team	Annual	Second week of December	-
Capital Investment Plan Finalization and Notification of IDAMP	DMD/ Director Finance Directorate P&D	Annual	Fourth week of December	Notified IDAMP-WASA

## Glossary

Asset	A resource with economic value that an individual, organization or country owns or controls with the expectation that it will provide future benefits.
Asset Life	Period from asset creation to asset end-of-life
Asset Management Plan	Documented information that specifies how organizational objectives are to be converted into asset management objectives), the approach for developing asset management plans, and the role of the asset management system in supporting achievement of the asset management objectives
Asset Management System	Management system for asset management whose function is to establish the asset management policy and asset management objectives
Asset portfolio	Assets that are within the scope of the asset management system
Asset system	Set of assets that interact or are interrelated
Asset type	Grouping of assets having common characteristics that distinguish those assets as a group or class
Audit	Systematic, independent and documented process for obtaining audit evidence and evaluating it objectively to determine the extent to which the audit criteria are fulfilled
Capability	Asset management measure of capacity and the ability of an entity system, person or organization to achieve its objectives
Competence	Ability to apply knowledge and skills to achieve intended results
Conformity	Fulfilment of a requirement
Continual improvement	Recurring activity to enhance performance
Critical asset	Asset having potential to significantly impact on the achievement of the organization's objectives
Depreciable Asset	A non-current asset having a limited useful life

Depreciation	An amount representing the reduction of the service potential during an accounting period
Documented Information	Information required to be controlled and maintained by an organization and the medium on which it is contained
Effectiveness	Extent to which planned activities are realized and planned results achieved
Level of service	Parameters, or combination of parameters, which reflect social, political, environmental and economic outcomes that the organization delivers
Life Cycle	stages involved in the management of an asset
Maintenance	The actions required for an asset to achieve its expected useful life. Maintenance can be planned or unplanned. Planned Maintenance includes measures to prevent known failure modes and can be time or condition- based. Repairs are a form of unplanned maintenance to restore an asset to its previous condition after failure or damage. Expenses on maintenance are considered operational expenditure.
Monitoring Objective	Determining the status of a system, a process or an activity result to be achieved
Organization	Person or group of people that has its own functions with responsibilities, authorities and relationships to achieve its objectives
Organizational Objective	Overarching objective that sets the context and direction for an organization's activities
Organizational Plan	Documented information that specifies the programs to achieve the organizational objectives
Performance Policy	Measureable result Intentions and direction of an organization as formally expressed by its top management
Predictive action	Actions to monitor the condition of an asset and predict the need for preventive action or corrective action
Process	Set of interrelated or interacting activities which transforms inputs into outputs
Rehabilitation	Works to rebuild or replace parts of an asset to enable it to the original

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	capacity and performance, and materially extend its useful life (which may be a full or partial extension of life - i.e. less than its original expected useful life).
Remaining Useful Life	The time remaining until an asset ceases to provide the required standard of performance or economic usefulness
Replacement	The complete replacement or reconstruction of an asset with one that performs to a similar standard of performance, as a result of which the asset life can be considered to have re-commenced
Risk Management	The application of a formal process that identifies the exposure of a municipality to service performance risk and determines appropriate responses.
Stakeholder	Person or organization that can affect, be affected by, or perceive themselves to be affected by a decision or activity
Asset Management Plan	Documented information that specifies how organizational objectives are to be converted into asset management objectives), the approach for developing asset management plans, and the role of the asset management system in supporting achievement of the asset management objectives
Upgrading	The augmentation or alteration of an asset that results in a material improvement to capacity or performance. Expenses on upgrading works are considered capital expenditure